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TRANSACTIONS

OF

THE FIRST PAN-AMERICAN MEDICAL CONGRESS

HELD IN

THE CITY OF WASHINGTON, D. C., U. S. A.,

SEPTEMBER 5, 6, 7, AND 8, A. D. 1893.

IN THREE PARTS.

PART I.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1895.

LETTER OF THE SECRETARY GENERAL OF THE CONGRESS.

CINCINNATI, OHIO, *November 25, 1893.*

DEAR SIR: I have the honor to transmit herewith the Transactions of the First Pan-American Medical Congress, held in the city of Washington, D. C., September 5, 6, 7, and 8, A. D. 1893, pursuant to the invitation issued by the President of the United States to the various American countries in accordance with the joint resolution of Congress approved July 18, A. D. 1892.

I have the honor to be, sir, very sincerely, yours,

CHARLES A. L. REED,
Secretary-General.

Hon. WALTER Q. GRESHAM,
Secretary of State, Washington, D. C.

Approved:

WILLIAM PEPPER,
President.

FORM OF INVITATION ISSUED BY THE PRESIDENT OF THE UNITED STATES.

DEPARTMENT OF STATE,
Washington, October, 1892.

SIR: The American Medical Association, which is the great national organization of the medical profession of the United States, has authorized an invitation to the medical profession of all countries of the western hemisphere to a Pan-American medical congress, to be held in the city of Washington, September 5, 6, 7, 8, 1893, and a joint resolution of Congress, approved July 18, 1892, authorized and requested the President to invite the several governments concerned to send official delegates to that congress.

The purposes of this congress are to promote the closer relations between the medical profession of the various participating countries, and it is confidently believed that such a congress can not fail to result in important intellectual and material benefits.

The sections for consideration are as follows:

1. General medicine.
2. General surgery.
3. Military medicine and surgery.
4. Obstetrics.
5. Gynecology and abdominal surgery.
6. Therapeutics.
7. Anatomy.
8. Physiology.
9. Diseases of children.
10. Pathology.
11. Ophthalmology.
12. Laryngology and rhinology.
13. Otology.
14. Dermatology and syphilography.
15. Orthopædics.
16. Hygiene, climatology, and demography.
17. Marine hygiene and quarantine.
18. Diseases of the mind and nervous system.
19. Oral and dental surgery.
20. Medical pedagogics.
21. Medical jurisprudence.
22. Railway surgery.

Indeed, from the foregoing, it may be positively stated that the scope of the deliberations of the body will be more extensive than in any previous similar congress, while the subjects that will come before several of these sections, such, for example, as that embraced in No. 17—marine hygiene and quarantine—will lead to results of special importance in their bearing upon the reciprocal relations between the countries participating.

The official languages of the congress will be English, Spanish, Portuguese, and French.

In order to secure the complete success of the congress, it is understood that a systematic organization has been effected of the medical profession in all of the countries interested, but it is of the utmost importance that there shall be present at the congress from each country a certain number of official delegates.

It is the wish of the President that you promptly bring this invitation to the knowledge of the government to which you are accredited and urge upon it the pleasure it would afford him to learn of its acceptance and of the appointment of official delegates, not exceeding 6 in number.

It is the intention of the Government of the United States to be represented in the proposed congress by 6 delegates. Of course, liberty of action as to the number each State may decide to appoint is freely accorded, but it is hoped the maximum number will not be exceeded.

I am, sir, your obedient servant,

JAMES G. BLAINE,
Secretary of State.

THOMAS RYAN, ESQ.,
U. S. Minister, City of Mexico.

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OFFICE OF THE PERMANENT SECRETARY
OF THE AMERICAN MEDICAL ASSOCIATION,
Philadelphia, June 4, 1891.

To the Medical Profession of the Western Hemisphere:

At the meeting of the American Medical Association, held at Washington May 5, 1891, Dr. Charles A. L. Reed, of Cincinnati, introduced the following:

Resolved, That the American Medical Association hereby extends a cordial invitation to the Medical Profession of the Western Hemisphere to assemble in the United States in an Inter-Continental American Medical Congress.

Resolved, That the Committee on Nominations be, and is hereby, instructed to nominate one member for each State and Territory, and one each from the Army, Navy, and Marine-Hospital Service, who shall constitute a committee, which is hereby instructed to effect a permanent organization of the proposed Inter-Continental American Medical Congress and to determine the time and place at which the same shall be held.

The resolutions were seconded by Dr. Wm. H. Pancoast and others and unanimously adopted.

Pursuant to the foregoing, the following committee was nominated and elected:

Alabama—W. H. Sanders, M. D.
Arizona—Henry A. Hughes, M. D.
Arkansas—Ed. Bentley, M. D.
California—W. R. Claness, M. D.
Colorado—Wm. A. Campbell, M. D.
Connecticut—C. A. Lindsley, M. D.
Delaware—C. H. Richards, M. D.
District of Columbia—D. W. Prentiss, M. D.
Florida—C. R. Oglesby, M. D.
Georgia—J. McFadden Gaston, M. D.
Idaho—Geo. P. Haley, M. D.
Illinois—N. S. Davis, M. D.
Indiana—A. M. Owen, M. D.
Iowa—B. H. Criley, M. D.
Kansas—J. E. Minney, M. D.
Kentucky—J. N. McCormack, M. D.
Louisiana—Stanford E. Chaillé, M. D.
Maine—Hampton E. Hill, M. D.
Maryland—Geo. H. Rohé, M. D.
Massachusetts—Augustus P. Clarke, M. D.
Michigan—C. Henri Leonard, M. D.
Minnesota—P. H. Millard, M. D.
Mississippi—W. T. Kendall, M. D.
Missouri—I. N. Love, M. D.
Montana—Thos. J. Murray, M. D.
Nebraska—R. C. Moore, M. D.
Nevada—P. J. Aiken, M. D.
New Hampshire—Irving A. Watson, M. D.
New Jersey—E. J. Marsh, M. D.
New Mexico—C. E. Winslow, M. D.
New York—John Cronyn, M. D.
North Carolina—H. Longstreet Taylor, M. D.
North Dakota—E. M. Darrow, M. D.

ORGANIZACIÓN PRELIMINAR DEL CONGRESO.

OFICINA DEL SECRETARIO PERMANENTE
DE LA ASOCIACIÓN MÉDICA AMERICANA,
Filadelfia, junio 4 de 1891.

A los Señores profesores de medicina del Hemisferio Occidental:

En junta de la Asociación Médica Americana, celebrada en Washington el 5 de mayo de 1891, el Dr. D. Carlos A. L Reed, de Cincinati, hizo las propuestas siguientes:

Primera: Que la Asociación Médica Americana dirige cordial invitación á los Señores profesores de medicina del Hemisferio Occidental para reunirse en los Estados Unidos, formando un Congreso Médico Americano Intercontinental.

Segunda: Que la Comisión de Designaciones quede notificada para que nombre un vocal para cada Estado y Territorio, y para cada uno de los cuerpos del Ejército, Marina y Servicio de Hospitales Marítimos, los cuales constituirán una comision que lleve á debido efecto la organización permanente del propuesto Congreso Médico Americano Intercontinental, fijando la época y el lugar en que haya de reunirse.

Habiendo sido apoyadas estas propuestas por el Dr. Wm. H. Pancoast y otros Señores, fué unánimemente adoptada.

De conformidad con lo expuesto, fueron designados los Señores siguientes, doctores en medicina:

Alabama—W. H. Sanders.
Arizona—Henry A. Hughes.
Arkansas—Ed. Bentley.
California—W. R. Cluness.
Colorado—Wm. A. Cámpbell.
Connecticut—C. A. Lindsley.
Delaware—C. H. Richards.
Distrito de Columbia—D. W. Prentiss.
Florida—C. R. Oglesby.
Georgia—J. McFadden Gaston.
Idaho—Geo. P. Haley.
Illinois—N. S. Davis.
Indiana—A. M. Owen.
Iowa—B. H. Criley.
Kansas—J. E. Minney.
Kentucky—J. N. McCórmack.
Luisiana—Stanford E. Chaillé.
Maine—Hampton E. Hill.
Maryland—Geo. H. Rohé.
Massachusets—Augusto P. Clarke.
Michigan—C. Henri Léonard.
Minnesota—P. H. Millard.
Misisipi—W. F. Kéndall.
Misuri—I. N. Love.
Montana—Tom. J. Murray.
Nebraska—R. C. Moore.
Nevada—P. J. Aiken.
Nueva Hampshire—Irving A. Watson.
Nueva Jersey—E. J. Marsh.
Nueva Méjico—C. E. Winslow.
Nueva York—Juan Cronyn.
Carolina del Norte—H. Lóngstreet Táylor.
Dakota del Norte—E. M. Darrow.

Ohio—Charles A. L. Reed, M. D.
Oregon—Wm. Boys, M. D.
Pennsylvania—Wm. Pepper, M. D.
Rhode Island—Geo. L. Collins, M. D.
South Carolina—R. A. Kinloch, M. D.
South Dakota—J. W. Freeman, M. D.
Tennessee—J. R. Buist, M. D.
Texas—J. W. Carhart, M. D.
Utah—F. S. Bascom, M. D.
Vermont—H. D. Holton, M. D.
Virginia—J. S. Wellford, M. D.
Washington—J. M. Morgan, M. D.
West Virginia—J. H. Brownfield, M. D.
Wisconsin—J. T. Reeve, M. D.
Wyoming—J. H. Finfrock, M. D.
U. S. Army— ——— ———.
U. S. Navy— ——— ———.
U. S. Marine-Hospital Service—J. B. Hamilton, M. D.

WM. T. BRIGGS, M. D.,
President.
WILLIAM B. ATKINSON, M. D.,
Permanent Secretary.

BY THE CONGRESS OF THE UNITED STATES.

JOINT RESOLUTION to authorize the President to invite certain governments to send delegates to the Pan-American Medical Congress.

A joint resolution was unanimously adopted by the Senate June 3, 1892, concurred in by the House of Representatives July 14, 1892, and approved July 18, 1892, by which the President was authorized and requested to invite the several governments of the Western Hemisphere to send official delegates to the meeting of the Pan-American Medical Congress to be held in the city of Washington September 5, 6, 7, and 8, A. D. 1893.

PRELIMINARY REPORT (AD INTERIM) OF THE COMMITTEE ON ORGANIZATION.

DEAR DOCTOR: On behalf of the committee appointed by the American Medical Association May 5, 1891, "to effect a permanent organization of an Inter-Continental American Medical Congress," I beg leave to report that the work has been prosecuted as diligently as possible. A series of regulations, hereby submitted, has been adopted and an organization in accordance therewith has been effected, in some degree, in all of the constituent countries except Paraguay. In several countries the organization has been completed in accordance with the regulations, while in some instances full lists of secretaries have been secured; in others honorary chairmen only have been furnished, while in still others the organization has not advanced beyond the appointment of a member of the international executive committee. The lists of officers are, however, sufficiently complete to furnish channels through which the necessary preliminary correspondence of the sections may be inaugurated. In view of this, and the additional fact that a considerable time is necessary for the interchange of letters with some of the remoter countries, the committee deems it expedient to submit for promulgation this preliminary announcement of the congress.

Ohio—Carlos A. L. Reed.
Oregon—Wm. Boys.
Pensilvania—Wm. Pépper.
Rhode Island—Geo. L. Collins.
Carolina del Sur—R. A. Kinloch.
Dakota del Sur—J. W. Freeman.
Tenesi—J. R. Buist.
Tejas—J. W. Cárhart.
Utah—F. S. Báscom.
Vermont—H. D. Holton.
Virginia—J. S. Wéilford.
Washington—J. M. Morgan.
Virginia del Oeste.—J. H. Brównfield.
Wisconsin—T. Reeve.
Wyoming—J. H. Finfrock.
U. S. Army.— ——— ———.
U. S. Navy.— ——— ———.
U. S. Marine-Hospital Service—J. B. Hámilton.

Wm. F. Briggs,
Doctor en Medicina, Presidente.
Guillermo A. Atkinson,
Doctor en Medicina, Secretario Permanente.

Congreso de los Estados Unidos.

ACUERDO UNIDO autorizando al Presidente de los Estados Unidos para invitar á ciertos gobiernos á enviar delegados al Congreso Médico Pan-Americano.

Se acuerda en acta por el Senado y Cámara de Representantes de los Estados Unidos de América, reunidos en Congreso, que el Presidente de los Estados Unidos, sea, y está por ésta, autorizado y suplicado, para que invite á los diferentes gobiernos del Hemisferio Occidental, para que envien delegados oficiales á la junta del Congreso Médico Pan-Americano, que ha de celebrarse en la ciudad de Washington en los dias cinco, seis, siete y ocho de setiembre del año del Señor mil ochocientos noventa y tres.

INFORME PRELIMINAR (AD INTERIM) DE LA COMISIÓN DE ORGANIZACIÓN.

Muy Sor. mio: En nombre de la Comisión designada por la Asociación Médica Americana en mayo 5 de 1891, "para llevar á efecto la organización permanente del Congreso Médico Americano Intercontinental," tengo el honor de poner en su conocimiento que los trabajos han adelantado con toda la diligencia posible. Una serie de artículos reglamentarios, que se acompañan, ha sido aprobada, efectuándose de conformidad, hasta cierto punto, la debida organización en todos los paises constituyentes, con excepción del Paraguay. En varios países la organización se ha completado sobre las bases de los Reglamentos, en algunos otros se ha obtenido llenar las nóminas de los Secretarios, al paso que de otros sólo se han conseguido los Presidentes Honorarios, sin que falten algunos, cuya organización no va más allá de la designación de un vocal de la Comisión Ejecutiva Internacional. Las nóminas de Presidentes y Secretarios son, sin embargo, suficientes á abrir sendas por las cuales se inaugure la debida correspondencia preliminar de las secciones. En vista de esto, y siendo, además, considerable el tiempo que se requiere para la comunicacion postal con algunos de los países más distantes, juzga la Comisión conveniente proponer la publicación de este anuncio preliminar del Congreso.

The committee entertains the hope that the organization may be completed in each of the constituent countries, in accordance with the regulations, before the meeting of the congress.

Respectively submitted on behalf the committee.

CHARLES A. L. REED,
Chairman of the Committee on Permanent Organization and Secretary-General of the Congress.

DR. HUNTER McGUIRE,
President of the American Medical Association, Richmond, Va.

CINCINNATI, *September 5, 1892.*

RICHMOND, VA., *October 6, 1892.*

DEAR DOCTOR: I am in receipt of the report of the committee on organization of the Pan-American Medical Congress, transmitting the Preliminary Announcement of the Organization. Permit me to state that I am gratified to note the completeness of the work which has already been accomplished by your committee, and that, for, the reasons stated in your letter, I deem the immediate publication of the preliminary announcement imperative to the success of the congress.

With the assurance that the American Medical Association will do all in its power to promote the interests of the meeting at Washington in September of next year,

Very sincerely, yours,

HUNTER McGUIRE,
President of the American Medical Association.

DR. CHARLES A. L. REED,
Chairman of the Committee on Permanent Organization of the Pan-American Medical Congress.

GENERAL REGULATIONS.

TITLE.

1. This organization shall be known as The Pan-American Medical Congress, and shall meet once in —— years.

MEMBERSHIP.

2. Members of the congress shall consist of such members of the medical profession of the Western Hemisphere, including the West Indies and Hawaii, as shall comply with the special regulations regarding registration, or who shall render service to the congress in the capacity of foreign officers.

OFFICERS.

3. The executive officers of the congress shall be residents of the country in which the congress shall be held, and shall consist of one president, such vice-presidents as may be determined by special regulations, one treasurer, one secretary-general, and one presiding officer and necessary secretaries for each section, all of whom shall be elected by the committee on organization, and there shall be such foreign vice-presidents, secretaries, and auxiliary committees as are hereinafter designated.

THE COMMITTEE ON ORGANIZATION.

4. The committee on organization shall be appointed by the representative medical association of the country in which the congress shall meet. This committee

La Comisión concibe la esperanza de que se hallará la organización completa en cada uno de los países constituyentes, de conformidad con los Reglamentos, antes de la apertura del Congreso.

Con todo respeto se somete este informe en nombre de la Comisión.

CARLOS A. L. REED,
Presidente de la Comisión de Organización Permanente y Secretario General del Congreso.

Al DR. HÚNTER MCGUIRE.
Presidente de la Associación Médica Americana, Richmond, Va.

CINCINATI, *setiembre 5 de 1892.*

RICHMOND, VA., *octubre 6 de 1892.*

MUY SR. MIO: He recibido el informe de la Comisión de Organizacion del Congreso Médico Pan-Americano, transmitiendo el Anuncio Preliminar de la Organización. Tengo el gusto de manifestar á Usted mi satisfacción por lo completo del trabajo llevado á cabo por la Comisión, siendo del parecer de Usted sobre que la pronta publicación del Anuncio Preliminar es de absoluta necesidad para el buen éxito del Congreso.

Con la seguridad de que la Asociación Médica Americana hará todo lo posible para promover los intereses de la junta que ha de celebrarse en Washington en setiembre del año próximo,

Soy de Usted S. S.,

HÚNTER MCGUIRE,
Presidente de la Asociación Médica Americana.

DR. CARLOS A. L. REED,
Presidente de la Comisión de Organización Permanente del Congreso Médico Pan-Americana.

REGLAMENTO GENERAL.

TÍTULO.

1. Esta organización será conocida con el nombre de El Congreso Médico Pan-Americano, y se reunirá una vez cada —— años.

MIEMBROS.

2. Serán considerados miembros del Congreso todos los Señores profesores de medicina del Hemisferio Occidental, incluyendo las Antillas y Hawaii, que acepten los reglamentos especiales de asiento, ó presten al Congreso servicios como Empleados Extranjeros.

JUNTA DIRECTIVA.

3. La Junta Directiva del Congreso se compondrá de residentes del país en que se instale el Congreso, y consistirá en un Presidente, el número de Vice-Presidentes que se designe por artículo especial, un Tesorero, un Secretario General, con un Presidente y los Secretarios necesarios para cada sección, todos los cuales serán elegidos por la Comisión de Organización; y habrá, además, el número de Vice-Presidentes, Secretarios y Comisiones Auxiliares que en lo adelante se designarán.

COMISIÓN DE ORGANIZACIÓN.

4. La Comisión de Organización será nombrada por la asociación médica representativa del pais en que se reunirá el Congreso. Esta Comisión elegirá la Mesa del

shall select all domestic officers of the congress, and shall, at its discretion, confirm all nominations by members of the international executive committee, and, in the event that any member of the international executive committee shall fail to nominate by the time specified by special regulation, the committee on organization shall elect officers for the country thus delinquent. It may appoint vice-presidents and auxiliary committeemen in foreign countries, independently of nominations by the members of the international executive committee. It shall appoint auxiliary committees, arrange for the meeting, and frame special regulations for the session of congress for which it was appointed. It shall make a report of its transactions to the opening session of the congress.

THE INTERNATIONAL EXECUTIVE COMMITTEE.

5. There shall be an international executive committee, which shall be appointed by the first committee on organization and which shall consist of one member for each constituent country. This committee shall hold permanent tenure of office, except that when a member shall fail to be present at a meeting of the congress his office shall be declared vacant and the vacancy be filled by election held by the registered members from the country from which he was accredited. In the event of no representation whatever from the country in question, the members of the international executive committee present shall determine what disposition shall be made of the office.

It shall be the duty of each member of the international executive committee to nominate, from the medical profession of his country, one vice-president for the congress and one secretary for each section of the congress, and to forward the same to the chairman of the committee on organization; except that in any country in which the congress shall meet, it shall be the duty of the member of the international executive committee for that country to request his representative national medical association to appoint a committee on organization, which committee on organization shall discharge the duties designated in Regulation IV. Members of the international executive committee shall also nominate such auxiliary committees, and shall furnish such information as the committee on organization may request.

INCORPORATION.

6. The committee on organization may, at its discretion, cause the congress to be incorporated, which incorporation shall hold only until the final disbursement of funds for the session held in that particular country. In the event of such incorporation, such additional officers shall be elected and in such manner as may be required by law.

CONSTITUENT COUNTRIES.

7. The following shall be considered as the constituent countries of the Pan-American Medical Congress:

Argentine Republic, Bolivia, Brazil, British North America, British West Indies (including British Honduras). Chile, Dominican Republic, Honduras (Spanish), Mexico, Nicaragua, Paraguay, Peru, Salvador, Republic of Colombia, Republic of Costa Rica, Ecuador, Gautemala, Haiti, Kingdom of Hawaii, Spanish West Indies, United States, Uruguay, Venezuela, Danish, Dutch, and French West Indies.

SECTIONS.

8. The sections of the congress shall be as follows:

(1) General Medicine, (2) General Surgery, (3) Military Medicine and Surgery, (4) Obstetrics, (5) Gynaecology and Abdominal Surgery, (6) Therapeutics, (7) Anatomy, (8) Physiology, (9) Diseases of Children, (10) Pathology, (11) Ophthalmology, (12) Laryngology and Rhinology, (13) Otology, (14) Dermatology and Syphilography,

Congreso interior, y quedará á su discreción confirmar todo nombramiento hecho por los miembros de la Comisión Ejecutiva Internacional, y en el caso de que algún miembro de la Comisión Ejecutiva Internacional dejare de hacer las designaciones dentro del tiempo señalado por los reglamentos, la Comisión de Organización hará la elección para el país remiso. Está en sus atribuciones designar Vice-Presidentes y Vocales de Comisiones Auxiliares en países extranjeros con independencia de nombramientos hechos por miembros de la Comisión Ejecutiva Internacional. Formará Comisiones Auxiliares, preparará la junta, y dispondrá reglamento especial para la sesión del Congreso para que fué designada. En la sesión de apertura del Congreso presentará informe sobre sus actos.

COMISIÓN EJECUTIVA INTERNACIONAL.

5. Se formará una Comisión Ejecutiva Internacional, que será constituida por la primera Comisión de Organización, y que consistirá de un vocal para cada país constituyente. Esta Comisión será permanente en sus funciones; pero si alguno de los vocales dejase de asistir á una junta del Congreso, su empleo será declarado vacante, y ocupará su plaza el designado por elección de los miembros del país correspondiente. En el caso en que el país en cuestión no estuviese en ningún modo representado, los vocales de la Comisión Ejecutiva Internacional determinarán lo que haya lugar para disponer de la vacante.

Será de obligación de cada uno de los vocales de la Comisión Ejecutiva Internacional designar de entre los profesores de medicina de su país, un Vice-Presidente para el Congreso y un Secretario para cada una de sus secciones, dando cuenta al Presidente de la Comisión de Organización. Pero en cualquier país en que se celebrare el Congreso, será de obligación del vocal de la Comisión Ejecutiva Internacional por cada país suplicar á su asociación médica nacional representante que señale una Comisión de Organización, la cual se hará cargo de las incumbencias prescriptas en el Artículo IV. Los vocales de la Comisión Ejecutiva Internacional designarán asimismo semejantes Comisiones Auxiliares, y darán los informes que pida la Comisión de Organización.

INCORPORACIÓN.

6. La Comisión de Organización está autorizada, si lo creyere conveniente, á hacer que el Congreso posea existencia legislativa que tendrá efecto solamente hasta el desembolso final de fondos para la sesión celebrada en el país correspondiente. En el caso de que se efectúe la incorporación, se harán los nombramientos adicionales de conformidad con los requisitos legales.

PAISES CONSTITUYENTES.

7. Los que á continuación se expresan, serán considerados como países constituyentes del Congreso Médico Pan-Americano:

República Argentina, Bolivia, Brasil, América Inglesa del Norte, Chile, República Dominicana, Honduras, Méjico, Nicaragua, Paraguay, Perú, Salvador, Colombia, Costa Rica, Ecuador, Guatemala, Haití, Reino de Hawaii, Estados Unidos, Uruguay, Venezuela, Antillas Españolas, Inglesas, Frances, Danesas y Hollandesas.

SECCIONES.

8. Las secciones del Congreso serán las siguientes:

(1) Medicina, (2) Cirugia en general, (3) Medicina y Cirugía militares, (4) Obstetricia, (5) Ginecología y Cirugía abdominal, (6) Terapéutica, (7) Anatomía, (8) Fisiología, (9) Enfermedades de la Infancia, (10) Patología, (11) Oftalmología, (12) Laringología y Rinología, (13) Otología, (14) Dermatología y Sifilografía, (15)

(15) General Hygiene and Demography, (16) Marine Hygiene and Quarantine, (17) Orthopaedic Surgery, (18) Diseases of the Mind and Nervous System, (19) Oral and Dental Surgery, (20) Medical Pedagogics, (21) Medical Jurisprudence, (22) Railway Surgery.

LANGUAGES.

9. The languages of the congress shall be Spanish, French, Portuguese, and English.

AUXILIARY COMMITTEES.

10. The auxiliary committee shall consist of one member for each medical society or one for each considerable center of population in each of the constituent countries of the congress. Nominations for the foreign auxiliary committee shall be made to the chairman of the committee on organization by the members of the international executive committee, each for his own country, except that in the country in which the congress is to be held nominations shall be made by the committee on organization. Appointments on the auxiliary committee shall hold only for the meeting for which they were made.

Members of the auxiliary committee shall be the official representatives of the congress in their respective localities. It shall be their duty—

(1) To transmit to the profession of their respective districts all information relative to the congress forwarded to them for that purpose by the general officers

(2) To co-operate with the officers of sections in securing desirable contributions to the proceedings of the congress.

(3) To furnish to the general officers such information as they may request for the purpose of promoting the interests of the congress.

(4) To cause such publicity to be given to the development of the organization as will elicit the interest of the profession and secure attendance upon the meeting; and they shall discharge such other duties as will promote the welfare of the congress.

AMENDMENTS.

11. Amendments to these regulations can be made only by the international executive committee, on a majority vote, ten members constituting a quorum, at any meeting of the congress.

SPECIAL REGULATIONS OF THE FIRST CONGRESS.

TIME AND PLACE OF MEETING.

1. The first Pan-American Medical Congress shall be held in the city of Washington, D. C., September 5, 6, 7, 8, A. D. 1893.

REGISTRATION.

2. The registration fee shall be $10 for each member residing in the United States, but no fee shall be charged to foreign members. Each registered member shall receive a card of membership and be furnished a set of the transactions.

ABSTRACTS, PAPERS, AND DISCUSSIONS.

3. Contributors are required to forward abstracts of their papers, not to exceed 600 words each, to be in the hands of the secretary-general not later than the 10th of July, 1893. These abstracts shall be translated into English, French, Spanish, and Portuguese, and shall be published in advance of the meeting for the convenience of the congress, and no paper shall be placed upon the programme which has not been thus presented by abstract. Abstracts will be translated by the literary

Higiene en general y Demografía, (16) Higiene marítima y Cuarentena, (17) Cirugía ortopédica, (18) Enfermedades mentales y del sistema nervioso, (19) Cirugía oral y dental, (20) Pedagogía médica, (21) Jurisprudencia médica, (22) Cirugía de Ferrocarriles.

IDIOMAS.

9. Los idiomas del Congreso serán el español, el francés, el portugués y el inglés.

COMISIONES AUXILIARES.

10. Las Comisiones Auxiliares se compondrán de un vocal por cada sociedad médica ó por cada centro considerable de población en cada uno de los países constituyentes del Congreso. Los nombramientos para la Comisión Auxiliar Extranjera serán presentados al presidente de la Comisión de Organización por la Comisión Ejecutiva Internacional, cada uno para su propio país; pero en el país en que se reuna el Congreso, los nombramientos estarán á cargo de la Comisión de Organización. Los nombramientos para la Comisión Auxiliar servirán solamente para la junta para la cual han sido hechos.

Los miembros de la Comisión Auxiliar serán representantes oficiales del Congreso en sus localidades respectivas. Será de su incumbencia:

(1) Trasmitir á los facultativos de sus distritos toda noticia relativa al Congreso que con este objeto le haya sido comunicada por la Dirección General.

(2) Cooperar con la mesa de las secciones á suministrar los trabajos que se deseau para presentar al Congreso.

(3) Tener á la Dirección General al corriente de todo lo que se les pida con el objeto de llevar á cabo las intenciones del Congreso.

(4) Dar la debida publicidad al desarrollo de la organización para despertar el interés de la facultad, promoviendo la asistencia á las sesiones. y atender á todo lo que asegure el buen éxito del Congreso.

REFORMAS.

11. No se podrán hacer reformas en este reglamento sino por la Comisión Ejecutiva Internacional y por mayoría de votos, entendiéndose que diez miembros constituyen junta para cualquier sesión del Congreso.

REGLAMENTO ESPECIAL PARA EL PRIMER CONGRESO.

ÉPOCA Y LUGAR DE LA JUNTA.

1. El primer Congreso Médico Pan-Americano se efectuará en la ciudad de Washington, capital de los Estados Unidos, en los días 5, 6, 7 y 8 de setiembre de 1893.

ASIENTOS.

2. Al asentar sus nombres los asociados residentes en los Estados Unidos pagarán 10 pesos; pero á los extranjeros no se cobrará ninguna cuota. Cada miembro, después del asiento, recibirá una tarjeta que le acredite, y la colección de actas.

EXTRACTOS, ESCRITOS Y DISCUSIONES.

3. Los Señores que presenten trabajos, habrán de dar un extracto de sus escritos, que no exceda de seiscientas palabras para cada uno, poniéndolo en manos del Secretario General antes del 10 de julio de 1893. Estos extractos serán traducidos en inglés, francés, español y portugués, y se publicarán antes de la junta para conveniencia del Congreso; entendiéndose que ningún escrito tendrá lugar en el programa que no haya sido antes presentado en extracto. Los extractos serán traducidos por

bureau of the congress at the request of contributors. Papers to be presented to sections must not consume more than twenty minutes each in reading and when of greater length must be read by abstract. Papers read by abstract may be printed in full in the transactions, subject to approval by the editorial committee. Abstracts should be forwarded through the secretaries of sections. Papers and discussions will be printed in the language in which they may be presented. All papers read in the sections shall be surrendered to the secretaries of the sections; all addresses read in the general session shall be surrendered to the secretary-general as soon as read; and all discussions shall be at once reduced to writing by the participants.

INCORPORATION.

4. The chairman of the committee on organization shall cause the congress to be incorporated under the laws of Ohio, and fifteen trustees shall be elected in accordance therewith, who, by by-laws and through the executive committee, shall supervise all receipts and disbursements by the treasurer, in accordance with the laws of Ohio. The president, secretary-general, treasurer, the member of the international executive committee for the United States, and executive presidents of sections shall be *ex officio* members of the board of trustees.

FOREIGN NOMINATIONS.

5. All nominations by the international executive committee must be in the hands of the chairman of the committee on organization by June 1, 1892, and in default thereof the committee on organization shall elect officers for countries thus delinquent.

THE ORGANIZATION OF SECTIONS.

6. The officers of each section shall consist of —— honorary presidents, who shall be residents of the constituent countries of the congress; one executive president, who shall organize the work of the section, direct its deliberations, and deliver an inaugural address at its opening session; one English-speaking secretary and one Spanish-speaking secretary, residents of the United States, who shall cooperate with the executive president in conducting the correspondence of the section; and there shall be one secretary for each section, resident in each additional constituent country of the congress.

DOMESTIC AUXILIARY COMMITTEE.

7. The auxiliary committee for the United States shall be elected by the committee on organization and shall consist of one member for each local medical society, or, in the absence of medical organization, then one in each considerable center of population, which auxiliary committee shall cooperate with the committee on organization and with the general officers in promoting the welfare of the congress. Nominations for the auxiliary committee shall be made by members of the committee on organization, each for his own State, except that in the failure of any member to make such nomination by January 1, 1892, or in the inadequacy of the same, the chairman of the committee on organization shall supply the deficiency.

EXECUTIVE COMMITTEE.

8. The board of trustees shall designate seven members, including the president, treasurer, secretary-general, and member of the international executive committee for the United States, who shall comprise an executive committee, which shall transact all business of the congress, *ad interim*, in accordance with by-laws adopted by the board of trustees.

el Departamento Literario del Congreso á petición de sus autores. Los escritos que se presenten á las secciones no han de tomar, en su lectura, más de 20 minutos cada uno; y si no fueren de esta extensión, habrán de leerse en extracto. Los escritos leídos en extracto aparecerán impresos integramente en las actas, mediante la aprobacion de la Mesa Editorial. Los extractos se dirigirán á los Secretarios de Secciones. Los escritos y las discusiones se imprimirán en el idioma correspondiente. Todo escrito leído en las secciones será entregado á los Secretarios de Sección: y todo discurso leído en Sesión General lo será al Secretario General inmediatamente después de la lectura. Toda discusión se pondrá desde luego por escrito por los que hayan tomado parte en ella.

INCORPORACIÓN.

4. El Presidente de la Comisión de Organización cuidará de que el Congreso reciba existencia legal según las leyes del Estado de Ohio, y de conformidad con ellas, se elegirán quince curadores, los cuales, por un reglamento especial y con la intervención de la Comisión Ejecutiva, inspeccionará todas las entradas y salidas de fondos hechas por el Tesorero, de acuerdo con las leyes del Estado de Ohio. El Presidente, el Secretario General, el Tesorero, el Representante de los Estados Unidos en la Comisión Ejecutiva Internacional y los Presidentes Ejecutivos de las Secciones, serán vocales de oficio del Cuerpo de Curadores.

NOMBRAMIENTOS EXTRANJEROS.

5. Todo nombramiento para la Comisión Ejecutiva Internacional deberá estar en poder del Presidente de la Comisión de Organización antes del primero de junio de 1892; y si faltare alguno, la Comisión de Organización procederá á elegir la mesa correspondiente.

ORGANIZACIÓN DE LAS SECCIONES.

6. La mesa de cada sección se compondrá de presidentes honorarios, los cuales han de ser residentes de los paises constituyentes del Congreso; de un Presidente Ejecutivo que organizará los trabajos de la sección, dirigirá sus deliberaciones y pronunciará un discurso inaugural en la apertura de la sesión; de un Secretario que hable el inglés y otro que hable en español, residentes ambos en los Estados Unidos, los cuales auxiliarán al Presidente Ejecutivo en el despacho de la correspondencia de la sección; y habrá un Secretario para cada sección, residente en cada país constituyente adicional del Congreso.

COMISIÓN AUXILIAR DE LOS ESTADOS UNIDOS.

7. La Comisión Auxiliar de los Estados Unidos será elegida por la Comisión de Organización, y se compondrá de un vocal por cada sociedad médica local, ó, á falta de organización médica, de un facultativo por cada centro considerable de población; la cual Comisión auxiliar cooperará con la Comisión de Organización y con la Dirección General á promover el buen éxito del Congreso. Las designaciones para la Comisión Auxiliar serán hechas por vocales de la Comisión de Organización, cada uno por su propio Estado; pero en el caso de que dichos vocales no hicieren la designación antes del primero de enero de 1892, ó que ésta fuere inadecuada, llenará el vacío el Presidente de la Comisión Organizadora.

COMISIÓN EJECUTIVA

8. El Cuerpo de Curadores designará siete miembros incluyendo el Presidente, el Tesorero, el Secretario General y el Vocal Representante de los Estados Unidos en la Comisión Ejecutiva Internacional, los cuales constituirán una Comisión Ejecutiva que interinamente y de acuerdo con los Reglamentos que adopte dicho cuerpo entenderá en todo lo relativo á los asuntos del Congreso.

GENERAL OFFICERS OF THE CONGRESS.

President.

WILLIAM PEPPER, M. D., LL. D., Philadelphia, Pa.

Vice-presidents.

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Dr. JEROME COCHRAN, Montgomery, Ala.
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Dr. B. J. D. IRWIN, Assistant Surgeon-General, Washington, D. C., U. S. Army.
Dr. J. MILLS BROWNE, Surgeon-General, Washington, D. C., U. S. Navy.
Surg. CHAS. S. D. FESSENDEN, Louisville, Ky., U. S. Marine-Hospital Service.

Secretary-General.

Charles A. L. Reed, m. d., 311 Elm street, Cincinnati, Ohio.

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1. Dr. J. McFadden Gastin, 1½ Edgewood avenue, Atlanta, Ga.
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3. Dr. Wm. F. Hutchinson, 159 High street, Providence, R. I.
4. Dr. W. H. Heath, 415 Pearl street, Buffalo, N. Y.
5. Dr. Irving A. Watson, 10 Centre street, Concord, N. H.
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7. Dr. Ferd. C. Valentine, 236 W. Fifty-first street, New York, N. Y.
8. Dr. A. Walter Suiter, Herkimer, N. Y.
9. Dr. Isaac N. Love, Grand Ave., St. Louis, Mo.
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The president, secretary-general, treasurer, members of the international executive committee for the United States, and executive presidents of sections are *ex officio* members of the board of trustees.

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Dr. A. Vander Veer, (*ex officio*), 28 Eagle street, Albany, N. Y.
Dr. Charles A. L. Reed, (*ex officio*), 311 Elm street, Cincinnati, Ohio.

International executive committee.

Argentine Republic.—Dr. Pedro Lagleyze, Calle Artes 46, Buenos Ayres.
Bolivia.—Dr. Emilio di Tomassi, Calle Ayacucho 26, La Paz.
British West Indies.—Dr. James A. de Wolf, Port of Spain.
British North America.—Dr. James F. W. Ross, 481 Sherborne street, Toronto.
Chile.—Dr. Moises Amaral, Facultad de Medicina, Santiago.

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Guatemala.—Dr. José Monteros, Avenida Sur No. 8, Guatemala City.
Haiti.—Dr. T. Lamothe, Rue du Centre, Port au Prince.
Hawaii.—Dr. John S. McGrew, Honolulu.
Honduras (Spanish.—Dr. Geo. Bernhardt, Tegucigalpa.
Mexico.—Dr. Tomás Noriega, Hospital de Jesus, Mexico.
Nicaragua.—Dr. J. I. Urtecho, Calle Real, Granada.
Paraguay.—No nomination received.
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Republic of Colombia.—Dr. P. M. Ibañez, Calle 5a Número 99, Bogota.
Salvador.—Dr. David J. Guzman, San Salvador.
Spanish West Indies.—Dr. Juan Santos Fernandez, Calle Reina No. 92, Havana.
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United States of Brazil.—Dr. Carlos Costa, Rua Largo da Misericordia 7, Rio de Janeiro.
Uruguay.—Dr. Jacinto de Leon, Calle de Florida No. 64, Montevideo.
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Alaska.—Dr. Clarence Thwing, Sitka.

Argentine Republic.—Dr. Pedro Lagleyze, Buenos Aires, member International Executive Committee; Dr. Samuel Gache, Lavalle 725, Buenos Aires, Circulo Médico Argentino; Dr. Francisco Lavalle, Victoria 1104, Buenos Aires, Sociedad Nacional de Farmacia; Dr. Emilio R. Coni, Tacuari 252, Buenos Aires, Sociedad Médica Argentina; Dr. Ignacio Bas Ossa, La Plata, Centro Médico de la Plata; Dr. Arturo Ferrand, Cordoba, Centro Médico de Cordoba.

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Arizona.—Dr. Henry A. Hughes, Phœnix, member of National Committee on Organization.

For local profession: Dr. R. L. Rosson, Dr. Roberts, Dr. T. Adler, Dr. Wm. Hunt, Dr. J. Goodfellow, Dr. J. T. Holcomb, Dr. M. M. Gilbert.

Bolivia.—Dr. Emilio di Tomassi, La Paz, member of the International Executive Committee.

For the local profession: Dr. Manuel Cuellar (hijo) Sucre; Dr. Ricardo Guzman, La Paz; Dr. Cleomedeo Blanco, Cochabamba; Dr. Gregorio Cava, Potosi; Dr. Mercado, Santa Cruz, Dr. José Viscarra Calderon, Oruro.

British North America.—Dr. James F. W. Ross, Toronto, member of the International Executive Committee.

Province of Ontario: Dr. John L. Bray, Chatham, Canadian Medical Association; Dr. James E. Graham, Toronto, Toronto Medical Association; Dr. H. P. Wright, Ottawa, Ontario Medical Association; Dr. Herbert S. Griffin, Hamilton, Hamilton Medical and Surgical Society; Dr. Vincent H Moore, Rockville, St. Lawrence and Eastern Medical Association; Dr. Charles E. Barnhart, County of Grey Medical Association; Dr. Walter H. Moorehouse, London, The London Medical Association; Dr. J. L. G. McCarthy, Barrie, Simcoe District Medical Society; Dr. John Bostwick Lundy, Preston, South Waterloo Medical Association. For the local profession: Dr. Howitt, Guelph; Dr. Henwood, Brantford; Dr. Boucher, Peterboro; Dr. Wm. H. Henderson, Kingston; Dr. Herbert S. Griffin, Hamilton; Dr. Tayler, Goderich; Dr. Eakins, Belleville; Dr. D. S. Bowlby, Berlin; Dr. D. H. Moore, Brockville; Dr. Robt. Astley Corbett, Port Hope; Dr. J. G. Scott, Seaforth; Dr. Albert B. Welford, Woodstock.

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Manitoba: Dr. Chown, Winnepeg; Dr. J. A. Macdonald, Brandon; Dr. Robert Wilson, Morden.

New Brunswick: Dr. J. Z. Currie, Fredericton, New Brunswick Medical Association. For the local profession: Dr. Murray McLaren, St. John; Dr. John S. Benson, Chatham; Dr. H. B. Chandler, Moncton; Dr. Ferdinand L. Pedolin, New Castle.

New Foundland: Dr. Alfred Harvey, St. John, New Foundland Medical Association.

Northwest Territory: Dr. J. H. C. Willoughby, Regina.

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Dr. Reuben Gross, Humboldt County Medical Society; Dr. S. Bert Ellis, Los Angeles County Medical Society; Dr. W. J. G. Dawson, Napa County Medical Society; Dr. J. M. West, Northern District Medical Society of Shasta and Tehama Counties; Dr. W. LeMoyne Wills, Southern California Medical Society; Dr. C. L. Bard, Ventura County Medical Society; Dr. Thomas Ross, Yolo County Medical Society; Dr. David Powell, Medical Society of Yuba and Sutter Counties; Dr. James Stimson, Santa Cruz County Medical Society; Dr. S. A. Deuel, Placer County Medical Society; Dr. George F. Shiels, San Francisco County Medical Society.

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Society; Dr. J. Williamson, Wapello County Medical Society; Dr. H. C. McCleary, Warren County Medical Society; Dr. J. H. Hull, Washington County Medical Society; Dr. A. L. Wright, Carroll.

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Mexico.—Dr. Tomás Noriega, Hospital de Jesús, City of Mexico, member of the International Executive Committee; Dr. Luis E. Ruiz, San Pedro y San Pablo 13, Academia Nacional de Medicina; Dr. Francisco Chacón, 2a del Factor 1, Sociedad de Ginecologia; Juan José B. De Avellano, Consejo S. de Salubridad, Sociedad "Pedro Escobedo;" Dr. Roque Macouret, Escuela de Medicina, Sociedad Filoiátrica; Dr. Eduardo Vargas, Escalerillas núm. 4, Sociedad ———. For the local profession: Dr. Francisco de P. Chacón, México; Dr. Rosendo Gutierrez, Leon; Dr. Fausto Uribe, Guadalajara; Dr. Francisco Morín, Puebla; Dr. Jesús Chico, Guanajuato; [To be appointed], Merida; Dr. Ignacio Alvarado, San Luis Potosí; Dr. Juan Berña, Zacatecas; Dr. Manuel Septien, Querètaro; Dr. Fernando Solozuren, Oaxaca; [To be appointed], Colima; Dr. Ishael Salas, Saltillo; Dr. Daniel Ruiz, Vera Cruz; Dr. Francisco Iturbide, Morelia; [To be appointed], Aguascalientes; Dr. Trinidad Ortega, Celaya; Dr. Gregorio Mendizabal, Orizaba; [To be appointed], Zapotlan; Dr. Pedro Noriega, Monterey; Dr. Patricio Trueba, Campeche; Dr. Felipe Martinez, Mazatlan; Dr. Alfonso Ortiz, Hermosillo; Dr. Pascha, Chihuahua; Dr. Mariano Herrera, Durango; Dr. Eduardo Navarro, Toluca; Dr. Miguel Barragán, Matamoras.

New Hampshire.—Dr. Irving A. Watson, Concord, member national committee on organization. Dr. Ezra Mitchell, White Mountain Medical Society; Dr. George Cook, Center district Medical Society; Dr. C. A. Fairbanks, Rockingham County Medical Society; Dr. M. A. Harmon, Carroll County Medical Society.

New Mexico.—Dr. C. E. Winslow, Albuquerque, member national committee on organization. Dr. Geo. W. Harrison, New Mexico Medical Society.

New Jersey.—Dr. E. J. Marsh, Paterson, member of the national committee on organization. Dr. Boardman Reed, Atlantic County Medical Society; Dr. Daniel A. Currie, Bergen County Medical Society; Dr. F. Gaunt, Burlington County Medical Society; Dr. E. L. B. Godfrey, Camden County Medical Society; Dr. J. C. Marshall, Cape May County Medical Society; Dr. H. W. Elmer, Cumberland County Medical Society; Dr. Edward J. Ill, Essex County Medical Society; Dr. Howard Wilson, Gloucester County Medical Society; Dr. O. H. Sproul, Hunterdon; Dr. B. W. McGallard, Mercer County Medical Society; Dr. D. C. English, Middlesex County Medical Society; Dr. S. Pierson, Morris County Medical Society; Dr. P. A. Harris, Passaic County Medical Society; Dr. B. A. Waddington, Salem County Medical Society; Dr. H. G. Wagoner, Somerset County Medical Society; Dr. L. W. Miller, Sussex County Medical Society; Dr. A. Pettit, Union County Medical Society; Dr. J. C. Johnson, Warren County Medical Society; Dr. H. P. Houghton, Monmouth County Medical Society.

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State Medical Association; Dr. A. Walter Suiter, Medical Society of the State of New York; Dr. Albert Vander Veer, Albany County Medical Society; Dr. W. W. Crandall, Allegany County Medical Society; Dr. J. C. Comstock, Broome County Medical Society; Dr. I. Z. Fisher, Cattaraugus County Medical Society; Dr. C. P. Criveling, Cayuga County Medical Society; Dr. Edward Ames, Chautauqua County Medical Society; Dr. Henry Flood, Chemung County Medical Society; Dr. H. C. Lyman, Chenango County Medical Society; Dr. D. S. Kellogg, Clinton County Medical Society; Dr. E. C. Fritts, Columbia County Medical Society; Dr. F. W. Higgins, Cortland County Medical Society; Dr. S. S. Cartwright, Delaware County Medical Society; Dr. R. K. Lothill, Dutchess County Medical Society; Dr. W. W. Potter, Erie County Medical Society; Dr. Edward T. Strong, Essex County Medical Society; Dr. James Macfie, Franklin County Medical Society; Dr. Eugene Beach, Fulton County Medical Society; Dr. Charles E. Willar, Greene County Medical Society; Dr. C. W. Hamlin, Herkimer County Medical Society; Dr. James D. Spencer, Jefferson County Medical Society; Dr. Lewis S. Pilcher, Kings County Medical Society; Dr. W. H. Johnston, Lewis County Medical Society; Dr. F. M. Perrine, Livingston County Medical Society; Dr. H. W. Carpenter, Madison County Medical Society; Dr. John O. Roe, Monroe County Medical Society; Dr. Chas. Stover, Montgomery County Medical Society; Dr. Frederick R. Sturgis, New York County Medical Society; Dr. Alfred L. Loomis, Academy of Medicine; Dr. M. S. Kittinger, Niagara County Medical Society; Dr. James H. Glass, Oneida County Medical Society; Dr. J. L. Heffron, Onondaga County Medical Society; Dr. Burk Pillsbury, Orange County Medical Society; Dr. Wm. C. Bailey, Orleans County Medical Society; Dr. F. S. Low, Oswego County Medical Society; Dr. O. W. Peck, Otsego County Medical Society; Dr. George W. Murdock, Putnam County Medical Society; Dr. C. G. J. Finn, Queens County Medical Society; Dr. W. W. Seymour, Rensselaer County Medical Society; Dr. F. E. Martindale, Richmond County Medical Society; Dr. E. H. Maynard, Rockland County Medical Society; Dr. B. F. Sherman, St. Lawrence County Medical Society; Dr. Wm. L. Pearson, Schenectady County Medical Society; Dr. Lemuel, Cross Schoharie County Medical Society; Dr. S. B. Allen, Schuyler County Medical Society; Dr. H. R. Ainsworth, Steuben County Medical Society; Dr. B. D. Skinner, Suffolk County Medical Society; Dr. W. W. Appley, Sullivan County Medical Society; Dr. C. L. Stiles, Tioga County Medical Society; Dr. S. H. Peck, Tompkins County Medical Society; Dr. Thomas S. Dawes, Ulster County Medical Society; Dr. B. G. Streeter, Warren County Medical Society; Dr. Henry Root, Washington County Medical Society; Dr. J. N. Arnold, Wayne County Medical Society; Dr. E. F. Brush, West Chester County Medical Society; Dr. Benj. L. Holt, Yates County Medical Society; Dr. R. J. Wilding, Medical Association of Northern New York; Dr. J. W. Whitbeck, Rochester Pathological Society; Dr. W. M. Gobson, Utica Medical Library Association.

Nicaragua.—Dr. Juan Ignacio Urtecho, Calle Real, city of Granada, member of the international executive committee. Dr. Fran'co M. Lacayo, León, Protomedicato de la República. For the local profession: Dr. Basilio Marín, Leon; Dr. Carmen Bengochea, Managua; Dr. Alejandro Bolaños, Masaya; Dr. E. Flint, Rivas.

North Carolina.—Dr. H. Longstreet Taylor, Asheville, member national committee on organization. Dr. Karl von Ruck, Buncombe County Medical Society; Dr. J. W. Long, Randolph County Medical Society; Dr. J. M. Hays, Granville County Medical Society. For local profession: Dr. J. B. Watts, Taylorsville; Dr. N. Robinson, Elizabethtown; Dr. R. S. Young, Concord; Dr. A. A. Kent, Lenoir; Dr. M. F. Arendell, Dr. R. H. Williamson, Yanceyville; Dr. J. M. McCorkle, Newton; Dr. H. T. Chapin, Pittsboro; Dr. J. F. Abernathy, Murphy; Dr. R. H. Winborne, Barnitz; Dr. O. P. Gardner, Shelby; Dr. J. A. Hodges, Fayetteville; Dr. R. L. Payne, jr., Lexington; Dr. J. W. Blount, Kenansville; Dr. N. M. Johnson, Durham; Dr. E. S. Foster, Louisburg; Dr. E. B. Holland, Dallas; Dr. E. H. Sugg, Snow Hill; Dr. E. R. Michaux, Greensboro; Dr. A. B. Pierce, Weldon; Dr. R. L. Allen, Waynesville; Dr. W. B. Reese, Hendersonville; Dr. M. W. Hill, Statesville; Dr. J. M. Chandler, Dillsboro; Dr. W. L. Crouse, Lincolnton; Dr. J. M. Lyle, Franklin: Dr. J. H. Gilkey, Marion; Dr. F. W. Potter, Wilmington; Dr. Jno. Whitehead, Salisbury; Dr. James McKee, Raleigh; Dr. W. H. H. Cobb, Goldsboro; Dr. Joseph Gracham, Charlotte; Dr. Albert Anderson, Wilson; Dr. Charles McDuffie, Newbern; Dr. P. H. Murphy, Morganton.

Ohio.—Dr. Chas. A. L. Reed, Cincinnati, member national committee on organization. Dr. T. V. Fitzpatrick, Cincinnati Academy of Medicine; Dr. L. S. Colter, Cincinnati Medical Society; Dr. S. B. Hiner, Allen County Medical Society; Dr. Jno. A. Dickson, Ashtabula County Medical Society; Dr. A. J. Gawne, Bay City Medical Society; Dr. J. S. McClellan, Belmont County Medical Society; Dr. W. W. Ellsbury, Brown County Medical Society; Dr. J. F. Baldwin, Central Ohio Medical Society; Dr. C. E. Imhoff, Champaign; Dr. Seys, Clark County Medical Society; Dr. A. W. Ashburn, Clermont County Medical Society; Dr. W. H. Humiston, Cuyahoga County Medical Society; Dr. G. W. Hoglan, Columbus Medical Club; Dr. L. G. Thacker, Defiance County Medical Society; Dr. J. B. Ford, Delamater Medical Association; Dr. O. Pomeroy, Geauga County Medical Society; Dr. Alta F. Cook, Erie County Medical Society; Dr. F. D. Bain, Hardin County Medical Society; Dr. D. J. Snider, Harrison County Medical Society; Dr. D. B. Cotton, Hempstead Memorial Academy of Medicine; Dr. A. M. Brown, Highland County Medical Society; Dr. J. G. Bigham, Holmes County Medical Society; Dr. A. A. Elliott, Jefferson County Medical Society; Dr. Chas. F. House, Lake County Medical Society; Dr. S. S. Scoville, Lebanon Medical Society; Dr. Jos. Larimore, Licking County Medical Society; Dr. J. McCurdy, Mahoning County Medical Society; Dr. F. W. Thomas, Marion County Medical Society; Dr. J. H. Hysell, Meigs County Medical Society; Dr. T. M. Wright, Miami County Medical Society; Dr. J. W. Grimes, Monroe County Medical Society; Dr. F. H. Darby, Miami Valley Medical Society; Dr. Geo. Goodhue, Montgomery County Medical Society; Dr. H. S. Green, Morrow County Medical Society; Dr. R. Harvey Reed, North Central Ohio Medical Association; Dr. E. C. Brush, Hildreth District Medical Association; Dr. W. C. Jacobs, Northeast Ohio Medical Association; Dr. D. W. Steiner, Northwest Ohio Medical Association; Dr. T. B. Wright, Pickaway County Medical Society; Dr. J. E. Shellenberger, Piqua Society of Clinical Medicine; Dr. J. B. Welsh, Preble County Medical Society; Dr. E. J. Galbraith, Ross County Medical Society; Dr. D. P. Campbell, Sandusky County Medical Society; Dr. T. J. West, Seneca County Medical Society; Dr. D. R. Silver, Shelby County Medical Society; Dr. David P. Maxwell, Stark County Medical Society; Dr. R. J. Pumphrey, Stillwater Medical Society; Dr. L. S. Ebright, Summitt County Medical Society; Dr. S. S. Thorn, Toledo Medical Association; Dr. C. S. Ward, Trumbull County Medical Society; Dr. A. L. King, Union Medical Society; Dr. Samuel Hart, Washington County Medical Society; Dr. J. E. Barrett, Wayne County Medical Society; Dr. W. M. Fuller, Wood County Medical Society; Dr. H. T. Sutton, Zanesville Medical Society: Dr. Dan Millikin, Butler County Medical Society; Dr. J. G. Reed, Union District Medical Society; Dr. Wm. E. Rice, Darke County Medical Society; Dr. R. B. Hall, Southwestern Ohio Medical Society.

Oregon.—Dr. William Boys, Portland, member of the National Committee on Organization. For local profession: Dr. H. F. McCormick, Eugene; Dr. J. M. Pruett, Pendleton; Dr. W. E. Rinehart, The Dalles; Dr. F. M. Robinson, Beaverton; Dr. H. B. Stanley, Dallas; Dr. O. J. West, Wasco; Dr. O. M. Dodson, Baker City; Dr. G. R. Farra, Corvallis; Dr. J. A. Fulton, Astorio; Dr. C. S. Hall, Salem; Dr. J. L. Hill, Albany; Dr. M. F. Honan, La Grande; Dr. J. M. V. Chalmers, Hillsboro; Dr. H. A. Wright, Linkville.

Pennsylvania.—Dr. William Pepper, Philadelphia, member National Committee on Organization; Dr. A. W. Thomas, Adams County Medical Society; Dr. W. H. Mercur, Alleghany County Medical Society; Dr. T. M. Allison, Armstrong County Medical Society; Dr. W. H. Grim, Beaver County Medical Society; Dr. John A. Clark, Bedford County Medical Society; Dr. W. M. Weidman, Berks County Medical Society; Dr. William M. Findlay, Blair County Medical Society; Dr. C. K. Ladd, Bradford County Medical Society; Dr. R. B. Knight, Bucks County Medical Society; Dr. Samuel Graham, Butler County Medical Society; Dr. L. H. Mayer, Cambria County Medical Society; Dr. Joseph A. Horne, Carbon County Medical Society; Dr. C. S. Musser, Center County Medical Society; Dr. Jacob Price, Chester County Medical Society; Dr. J. F. Ross, Clarion County Medical Society; Dr. J. E. Vaughn, Clearfield County Medical Society; Dr. J. R. Montgomery, Columbia County Medical Society; Dr. George W. Barr, Crawford County Medical Society; Dr. R. L. Sibbett, Cumberland County Medical Society; Dr. Hugh Hamilton, Dauphin County Medical Society; Dr. J. L. Forwood, Delaware County Medical Society; Dr. C. G. Wilson, St. Marys, Elk County Medical Society; Dr. L. S. Gaddis, Fayette County Medical Society; Dr. G. S. Hull, Franklin County Medical Society; Dr. I. H. Sharpnack, Greene County Medical Society; Dr. A. B. Brumbaugh, Huntington County Medical Society; Dr. William Anderson, Indiana County Medical Society; Dr. W. K. Dolan, Lackawanna County Medical Society; Dr. G. R. Rohrer, Lancaster County Medical Society; Dr. A. B. Gloninger, Lebanon County Medical Society; Dr. W. S. Berlin, Lehigh County Medical Society; Dr. L. H. Taylor, Luzerne County Medical Society; Dr. C. W. Youngman, Lycoming County Medical Society; Dr. E. O. Kane, McLean County Medical Society; Dr. J. W. Hillier, Mercer County Medical Society; Dr. S. H. Rothrack, Mifflin County Medical Society; Dr. Joseph Anderson, Montgomery County Medical Society; Dr. P. C. Newbaker, Montour County Medical Society; Dr. Isaac Ott, Northampton County Medical Society; Dr. W. G. Marsh, Northumberland County Medical Society; Dr. H. O. Orris, Perry County Medical Society; Dr. J. S. Carpenter, Schuylkill County Medical Society; Dr. P. A. Boyer, Snyder County Medical Society; Dr. W. L. Richardson, Susquehanna County Medical Society; Dr. J. A. Ritchey, Venango County Medical Society; Dr. W. M. Baker, Warren County Medical Society; Dr. J. A. McKean, Washington County Medical Society; Dr. R. B. Hammer, Westmoreland County Medical Society; Dr. I. C. Gable, York County Medical Society.

Republic of Columbia.—Dr. Pedro M. Ibañez, Calle 5, número 99, Bogotá, member of the International Executive Committee; Dr. José M. Buendia, calle 10, Bogotá, Academia nacional de Medicina; Dr. Manuel Uribe Angel, Medellín, Academia de Medicina de Medellín; Dr. Evaristo García, Cali, Sociedad de Medicina del Cauca. For the local profession: Dr. Nicolás Osorio, calle 13, Bogota; Dr. Andrés Posada Arango, Medellín (Departamento de Antioquia); Dr. Jorge E. Delgado, Panamá (Departamento de Panamá); Dr. Eugenio de la Hoz, Barranquilla (Departamento de Bolívar); Dr. Domingo Cagiao, Popayán (Departamento del Cauca); Dr. José Manuel Rodriquez, Socorro (Departamento de Santander); Dr. Paulo Emilio Villar, Bucaramanga (Departamento de Santander); Dr. Felix M. Hernandez, Cúcuta (Departamento de Santander); Dr. Rafael Calvo, Cartagena (Departamento de Bolívar); Dr. N. Ribón; Mompox (Departamento de Bolivar); Dr. Miciades Castro, Ibagué (Departamento del Tolima); Dr. Cayetano Lombana, Ambalema (Departamento del Tolima); Dr. José M. Martinez, Antioquia (Departamento de Antioquia); Dr. Isaias Saavedra, Velez (Departamento de Santander); Dr. Severs Forres, Funja (Departamento de Boyacá); Dr. N. Villa, Remedios (Departamento de Antioquia); Dr. Miguel Caicedo, Pasto (Departamento de Cauca); Dr. Emilio Villamazar, Pamplona (Departamento de Santander.)

Republic of Guatemala.—Dr. Jose Monteros, Calle Avenida Sur No. 8, City of Guatemala, member of the International Executive Committee; Dr. Samuel Gonzales, City of Guatemala, Facultad de Medicina y Farmacia del Centro; Dr. Leon Saenz, Quezaltenango, Facultad de Medicina y Farmacia de Occidente; Dr. Manuel Aparicio, Quezaltenango, Sociedad Médica, Farmacéutico de Occidente. For the local profession: Dr. Enecon Mora, Quezaltenango.

Rhode Island.—Dr. George L. Collins, Providence, member National Committee on

Organization; Dr. John W. Mitchell, Providence Medical Association; Dr. F. H Rankin, Newport Medical Society; Dr. Henry K. Gardiner, Washington Medical Society; Dr. W. F. Hutchinson, Providence.

South Carolina.—Dr. R. A. Kinloch, Charleston, member National Committee on Organization; Dr. L. T. Hill, Abbeville; Dr. T. G. Croft, Aiken; Dr. S. M. Orr, Anderson; Dr. W. F. Holmes, Barnwell; Dr. A. P. Prioleau, Beaufort; Dr. J. P. Cain, Monk's Corner; Dr. S. M. Davage, Chester; Dr. C. Kollock, Cheraw; Dr. W. S. Pack, Manning; Dr. Charles Witsell, Walterboro; Dr. J. C. Wilcox, Darlington; Dr. Thomas J. McKie, Woodlawn; Dr. J. C. Buchanan, Winnsboro; Dr. James Evans, Florence; Dr. Thomas P. Bailey, Georgetown; Dr. J. M. Wilkinson, Greenville; Dr. S. Smith, Brighton; Dr. W. E. Sparkman, Bucksville; Dr. A. A. Moore, Camden; Dr. W. O. Nesbit, Lancaster; Dr. J. T. Poole, Laurens; Dr. M. Q. Hendrix, Lexington; Dr. J. C. Mullins, Marion; Dr. J. L. Napier, Blenheim; Dr. O. B. Mayer, jr., Newberry; Dr. J. James, Westminster; Dr. C. R. Tabor, Fort Mott; Dr. J. W. Quillian, Easley; Dr. B. W. Taylor, Columbia; Dr. T. S. Means, Spartanburg; Dr. A. J. China, Sumter; Dr. M. W. Culp, Union; Dr. S. D. M. Byrd, Scranton; Dr. R. A. Bratton, Yorkville.

Spanish West Indies.—Dr. Juan Santos Fernandez, Reina No. 92, Havana, Cuba, member of the International Executive Committee; Dr. Federico Hortsman, Havana Real Academia de Ciencias Médicas; Dr. Diego Tamayo, Havana, Sociedad de Estudios, Clínicos; Dr. Aristides Mestre, Havana, Sociedad Antropológica; ———, Sociedad de Hygiene. For the local profession: Cuba—Dr. Joaquin Diago, Havana; Dr. José H. Perez, Baracoa; Dr. Fernandez Mendez Capote, Cardenas; Dr. Gabriel M. Landa, Cienfuegos; Dr. Angel Cantero, Trinidad; Dr. Sebastian Cuerro y Serrano Zaza; Dr. Vicente Tomás, Matanzas; Dr. Francisco Martinez Mesa, Sagua la Grande; Dr. Amado del Valle, Gibara; Dr. Manuel G. Gonzalez, Nuevitas; Dr. Domingo Lagomasino, San Juan de los Remedios; Dr. Urbano Guimera, Santiago de Cuba; Dr. Fernando Pons, Guantánamo; Dr. Francisco Codina, Manzanillo; Dr. Luis D. Pimienta, Santa Cruz de los Pinos; Dr. Francisco Solano Ramos, Pinar del Rio; Dr. Juan Guzmán, Puerto Principe; Dr. Rudesindo G. Rizo, Sancti Spiritus; Dr. Toribio del Villar, Güines; Dr. Rafael Trista, Villa Clara; Dr. Leonardo Esperón, Colón; Dr. Francisco Portela, Guanajay; Dr. Enrique V. Valenzuela, Guanabacoa; Dr. Enrique Ranz, Sante Fé de Isla de Pinos. Puerto Rico: Dr. Salvador Carbonell, Mayagüez; Dr. Juan Fernandez, San Juan; Dr. J. Ruiz, Aguadilla; Dr. Rafael Valle, Arecibo; Dr. J. López, Fajardo; Dr. Blondet, Guayama; Dr. C. Camó, Naguabo; Dr. Vasquez, Viequez; Dr. Eduardo Lacot, Ponce.

United States of Brazil.—Dr. Carlos Costa, Calle Largo de Misericordia 7, Rio de Janeiro; Dr. Visconde de Saboia, Rio de Janeiro, Academia Nacional de Medicina; Dr. Oscar Bulhões, Rio de Janeiro, Sociedade de Medicina e Cirurgia do Rio de Janeiro; Dr. Carlos Hastings, Rio de Janeiro, Instituto dos Cirurgiões Dentistas Brasilieros; Dr. Moura Brazil, Rio de Janeiro, Polyclinica Geral; Dr. Silva Lima, Bahia, Sociedade Medica de Bahia; Dr. João Penido, Juiz de Fora, Sociedade de Medicina e Cirurgia de Juiz de Fora; Dr. Luiz Pedro de Barbosa, Rio de Janeiro, Gremio dos internas dos Hospitaes do Rio de Janeiro. For the local profession: Dr. A. Ferreira da Silva and Dr. Paulo Cezar, Rio de Janeiro; Dr. Nina Rodriques and Dr. Pacifico Pereira, Bahia; Dr. Malaquias Goncalves and Dr. Alcebiades Vellozo, Pernambuco; Dr. Miranda Azevedo and Dr. Mello e Oliviera, São Paulo; Dr. O. de Almeida and Dr. Joao Godinho—Balfort Rôxo. Para; Dr. Eduardo Guimarães, Campinas; Dr. Almir Nino, Maranhão; Dr. Victor de Britto, Porto Alegre; Dr. Luna Friere and Dr. Matos de Alencar, Ceara; Dr. Eduardo de Menezes and Dr. Simões Correa, Juiz de Fora; Dr. Goulart, Esperito Santo; Dr. Duarte Schutel, Santa Catharina; Dr. Ismael de Rocha, Curitiba.

Uruguay.—Dr. Jacinto de Leon, calle de Florida núm. 61, Montevideo, member of the international executive committee; Dr. Juan L. Heguy, 18 de Julio 54, Montevideo, Honorable Consejo de Higiene; Dr. José Romeu, Plaza de Cagancha 41, Montevideo, Círculo Médico Uruguayo. For the local profession: Dr. Atilio Chiassaro, Salto; Dr. Julio Jurkoski, Artigas; Dr. N. Parietti, Paysandu; Dr. Pascual Cioni, Fray Bentos; Dr. Jerónimo Rodriguez Gallego, Mercedes; Dr. Guillermo Dall' Orto, Colonia; Dr. Alejandro Chiolini, San José; Dr. N. Laborde, Flores; Dr. José Scozeria, Montevideo; Dr. N. Caleza, San Carlos; Dr. Alfonso Cifani, Rocha; Dr. N. Murguia, Melo; Dr. Juan Resso Herrera, Montevideo (por Treinta y Tres); Dr. Hermenegilda Gagliardi, Minas; Dr. Antonio Bonasso, San Fructuoso; Dr. Eduardo Lamas, Salto; Dr. Ramón Irigoyen, Florida; Dr. Julián B. Blanco, Durazno; Dr. Pedro de Freitas, Canelones.

Utah.—Dr. F. S. Bascom, Salt Lake City, member national committee on organization; Dr. A. C. Standart, Salt Lake Medical Society; Dr. J. P. Carnahan, Ogden Medical Society.

Venezuela.—Dr. José María Rodríguez Garmendia, Tocuyo; Dr. Francisco A. Risquez, Caracas; Dr. Freites Pineda, Ciudad Bolivar; Dr. Domingo Bello Hernández, Merida; Dr. Gabriel Briceño Ricón, Trujillo; Dr. Luis Betancourt, La Guayra; Dr. Francisco E. Bustamente, Maracaibo; Dr. Paulino Balbuena, Puerto Cabello; Dr. Rómulo D'Aubeterre, Cumana; Dr. Pedro Luis Briceño Martín, Maturin; Dr. Cesar Espino, Barcelona; Dr. Manuel A. Fonseca, Valencia; Dr. Arnaldo Morales, Ciudad de Cura; Dr. Antonio María Pineda, Barquisimeto.

Vermont.—Dr. H. D. Holton, Brattleboro, member of national committee on organization; Dr. M. R. Crain, Rutland County Medical Society; Dr. E. B. Campbell, Windham County Medical Society; Dr. D. C. Hawley, Chittenden County Medical Society; Dr. Ralph Sherwood, Franklin County Medical Society; Dr. W. D. Huntington, Windsor County Medical Society; Dr. C. L. Erwin, Orleans County Medical Society; Dr. D. G. Kemp, Washington County Medical Society; Dr. J. D. Folsom, Caledonia County Medical Society.

Virginia.—Dr. J. S. Wellford, Richmond, member national committee on organization. For the local profession: Dr. W. C. Dabney, Charlottesville; Dr. L. B. Anderson, Norfolk; Dr. S. W. Carmichael, Fredericksburg; Dr. R. F. Hicks, Warrenton; Dr. J. A. Gayle, Roanoke; Dr. W. F. Barr, Abingdon; Dr. L. B. Edwards, Richmond; Dr. S. W. Budd, Petersburg; Dr. H. M. Patterson, Staunton.

West Virginia.—Dr. J. H. Brownfield, Fairmount, member national committee on organization. For the local profession: Dr. L. D. Wilson, Wheeling; Dr. T. A. Harris, Parkersburg; Dr. W. P. Hogue, Charleston.

Wisconsin.—Dr. J. T. Reeve, Appleton, member of the national committee on organization. Dr. A. J. Hosmer, Ashland Medical Society; Dr. C. S. Sheldon, Central Wisconsin Medical Society; Dr. P. H. Letourneau, Chippewa County Medical Society; Dr. F. D. Bentley, Columbia County Medical Society; Dr. T. T. Beveredge, Fox River Valley Medical Society; Dr. F. Robert Zeit, German Northwestern Medical Society; Dr. F. M. Eply, Inter-Co. Medical Society; Dr. F. S. Luhmann, Manitowoc County Medical Society; Dr. J. Simonsin, Northwestern Wisconsin Medical Society; Dr. C. M. Gould, Pierce County Medical Society; Dr. W. Hausmann, Brainard Medical Society; Dr. Edward Kovats, Society of German Physicians; Dr. C. D. Conkey, Douglass County Medical Society; Dr. N. O. B. Wingate, health department of Milwaukee; Dr. W. A. Batchelor, Milwaukee Medical Society.

Wyoming.—Dr. J. H. Finfrock, Laramie City, member national committee on organization. For local profession: Dr. J. J. Marston, Cheyenne; Dr. M. C. Barkwell, Cheyenne; Dr. T. G. Ricketts, Carbon; Dr. E. S. Murray, Rock Springs; Dr. T. G. Maghee, Rawlins; Dr. W. A. Hocken, Evanston; Dr. J. C. Watkins, Buffalo; Dr. J. M. Wilson, Douglas; Dr. H. L. Squire, Sundance; Dr. H. M. Bennett, Saratoga.

MEDICAL JOURNALS TO WHICH THE OFFICIAL BULLETINS OF THE CONGRESS WERE REGULARLY FURNISHED.

Alabama.—The Alabama Medical and Surgical Age, Jno. C. LeGrand, 1014 Noble street, Anniston.

Argentine Republic.—Anales del Círculo Médico Argentino, Dr. Samuel Gache, editor, Lavalie 725, Buenos Aires; Anales de la Asistencia Pública, Dr. José Penna, editor, Rivadavia 1167, Buenos Aires; Anales del Departamento Nacional de Higiene, Drs. Pedro N. Arata and Emilio R. Coni, editors, 25 de Mayo 273, Buenos Aires; Boletin de Sanidad Militar, Drs. Alberta Costa and José M. Cabezin, editors, Hospital Militar, Buenos Aires; La Salud, Dr. J. M. Franceschi, editor, Chivilcoy; Revista de la Sociedad Nacional de Farmacia (anonymous), Esmeralda 591, Buenos Aires; Revista Médica de la Plata, Drs. Bas, Arce, Peñalva, Alexander, Gallastegui, and Ferrand, editors, La Plata.

Brazil.—Annaes da Academia de Medicina do Rio de Janeiro, Drs. A. J. Souza Lima and Alfredo Piragibe, editors, Rio de Janeiro; Boletins da Academia de Medicina, Drs. A. J. Souza Lima and Alfredo Piragibe, editors, Rio de Janeiro; Brazil Médico [weekly], Dr. Azavedo Sodré, editor, Rio de Janeiro; União Medica, Dr. João Drummond, editor, Rio de Janeiro; Annuario Medico Brasileiro, Dr. Carlos Costa, editor, Rio de Janeiro; Revista dos Cursos Praticos e Theoricos da Faculdade de Medicina e Cirurgia de Rio de Janeiro, Drs. Benicio de Abreu, Rocha F. João M. Teixeira, Oscar Bulhões, Jose Paulo, editors; Gazeta Medica da Bahia, Dr. Pacifico Pereira, Bahia; Boletins da Sociedade de Medicina e Cirurgia de Rio de Janeiro, Dr. Jorge Franco, editor, Rio de Janeiro; Boletins da Sociedade de Medicina e Cirurgia de Juiz de Fora, Drs. Eduardo de Menzes and Goncalves Penna Filho, editors, Juiz de Fora; Revista do Gremio dos Internos dos Hospitaes do Rio de Janeiro, Drs. Carlos Seidl, Modesto Guimaraes and Adolpho Possolo, editors, Rio de Janeiro.

California.—Southern California Practitioner, Dr. H. Bert Ellis, Los Angeles; Pacific Health Journal, Dr. J. N. Loughborough, 1059 Castro, Oakland; Occidental Medical Times, James H. Parkinson, 429½ I, Sacramento; Pacific Medical Journal, Dr. D. A. Hodghead, 522 California, San Francisco.

Canada.—The Canadian Practitioner, Dr. Adam H. Wright, editor, Toronto, Ontario; The Canada Lancet, Drs. J. L. Sevison and C. Sheard, Toronto, Ontario; The Montreal Medical Journal, Drs. George Ross, Thomas G. Roddick, and James Stewart, Montreal, Quebec; The Canada Medical Record, Drs. A. Lapthorn Smith, F. Wayland Campbell, and Rollo Campbell, Montreal, Quebec; La Gazette Médicale, Montreal, Quebec; The Maritime Medical News, Halifax, Nova Scotia; L'Union Médicale du Canada, Drs. J. B. A. Lamarche, H. E. Desvosiers, and M. T. Brennan, Montreal, Quebec.

Chile.—Revista Médica, Dr. Sancristobal, editor, Santiago de Chile; Boletin de Medicina, Dr. Octavio Maira, editor, Santiago de Chile; Anales de Farmacia, Angel Vasquez, editor, Santiago de Chile; Revista Farmacéutica Chilena, Adolfo Larenas, editor, Santiago de Chile.

Republic of Colombia.—Revista Médica, Drs. Abraham Aparicio and Cárlos Michelsen, editors, Bogota; Revista de Higiene, Dr. Gabriel Duran Borda, editor, Bogota; Boletin de Medicina del Cauca, Dr. Daniel Quijana Wallis, editor, Cali; Anales de la Academia de Medicina de Medellin (anonymous), Medellin.

Colorado.—Denver Medical Times, Dr. Thomas H. Hawkins, 1657 Arapahoe, Denver.

Connecticut.—New England Medical Monthly, Dr. Wm. C. Wile, 7 Delay, Danbury; The Quartely Journal of Inebriety, Dr. T. D. Crothers, Fairfield avenue, Hartford.

Costa Rica.—La Gaceta, San José; El Maestro, San José.

Cuba.—Anales de la Academia de Ciencias, Havana; Crónica Médico-Quirúrgica, Dr. Juan Santos Fernandez, editor, Havana; Revista de Ciencias Médicas, Dr. Joaquin Jacobson, editor, Havana; Progreso Médico, Dr. Gabriel Casuso, editor, Havana; La Higiene, Dr. Manuel Delfin, editor, Havana; El Repertorio Médico, Dr. Antonio Gonzalez Curguezo, editor, Havana.

Georgia.—Atlanta Medical and Surgical Journal, Dr. M. B. Hutchins, P. O. box 431, Atlanta; Southern Medical Record, A. W. Griggs, 29 N. Forsyth, Atlanta; The Dixie Doctor, Dr. T. H. Huzza, 2½ Marietta, Atlanta.

Guatemala.—Memoria de la Facultad de Medicina y Farmacia del Centro, Dr. Samuel Gonzalez, editor, Guatemala City; Memoria de la Facultad de Medicina y Farmacia de Occidente, Dr. Encon Mora, editor, Quezaltenango; Gaceta Médica Quezalteca, Dr. Encon Mora, editor, Quezaltenango.

Illinois.—Journal of the American Medical Association, Dr. J. C. Culbertons, 68 Wabash avenue, Chicago; Medical Standard, Dr. James G. Kiernan, 834 Opera House Block, Chicago; North American Practitioner, Dr. Bayard Holmes, 75 Wabash avenue, Chicago; Sanitary News, A. H. Harryman, 90 La Salle, Chicago; Western Medical Reporter, Dr. John E. Harper, 163 State, Chicago; Peoria Medical Monthly, Dr. Thomas M. McIlvaine, Peoria.

Indiana.—Fort Wayne Journal of the Medical Sciences, Drs. C. B. and George Steemen, 95 Calhoun, Fort Wayne; Journal of the National Association of Railway Surgeons, Christian B. Steemen, Fort Wayne; Indiana Medical Journal, Dr. Frank C. Ferguson, 19 W. Ohio, Indianapolis.

Iowa.—Iowa State Medical Reporter, Dr. F. E. Crittenden, Des Moines.

Kansas.—Kansas Medical Journal, Dr. John E. Minney, 723 Kansas avenue, Topeka.

Kentucky.—Medical Progress, Dr. Robert C. Kenner, 315 Commerce Building, Louisville; American Practitioner and News, Dr. D. W. Yandell, 440 W. Main, Louisville; Medical Herald, Dr. Edward Miller, 327 Third avenue, Louisville.

Louisiana.—New Orleans Medical and Surgical Journal, Dr. G. B. Lawrason, 158 Canal, New Orleans.

Maryland.—Maryland Medical Journal, A. K. Bond, 209 Park avenue, Baltimore.

Massachusetts.—Annals of Gynæcology, Dr. E. W. Cushing, 168 Newbury, Boston; Boston Medical and Surgical Journal, Dr. George B. Shattuck, 283 Washington, Boston.

Mexico.—La Gazeta Médica, Dr. Manuel S. Soriana, editor, City of Mexico; La Revista Médica de México, Dr. José Ferrer, editor, City of Mexico; La Escuela de Medicina, Dr. Adrian de Garay, editor, City of Mexico; La Revista Médica de Puebla, Dr. Miguel Solas, editor, city of Puebla; Boletin del Hospital General de Puebla, Dr. Francisco Morin, editor, city of Puebla; El Estudio, Dr. Secundino E. Sosa, editor, City of Mexico.

Michigan.—The Physician and Surgeon, Dr. J. W. Keating, Ann Arbor; Pharmaceutical Era, Charles W. Parsons, 99 Woodward avenue, Detroit; Bulletin of Pharmacy, Dr. B. W. Palmer, Detroit; American Lancet, Dr. Leartus Connor, 103 Car, Detroit; Leonard's Illustrated Medical Journal, Dr. C. Henri Leonard, 18 John R. Detroit; Medical Age, Dr. B. W. Palmer, P. O. box 470, Detroit.

Minnesota.—Northwestern Lancet, Dr. A. J. Stone, Union Block, St. Paul.

Missouri.—St. Joseph Medical Herald, Dr. Hiram Christopher, St. Joseph; Alienist and Neurologist, Dr. C. H. Hughes, 500 N. Jefferson, St. Louis; American Journal of Ophthalmology, Dr. Adolph Alt, 914 Locust, St. Louis; Annals of Surgery, Dr. L. S. Pilcher, 914 Locust, St. Louis; Medical Brief, Dr. J. J. Lawrence, Ninth and Olive, St. Louis; Medical Mirror, Dr. I. N. Love, Grand avenue, St. Louis; The Medical Fortnightly, Dr. Brandsford Lewis, 1006 Olive, St. Louis; St. Louis Medical and Surgical Journal, Dr. F. L. James, St. Louis; Weekly Medical Review, Dr. Frank L. James and Dr. A. H. Ohmann-Dumesnil, 615 Locust, St. Louis.

Nebraska.—Omaha Clinic, Dr. George Wilkinson, Karback Block, Omaha.

New York.—Albany Medical Annals, Albany; Brooklyn Medical Journal, Dr. Joseph H. Raymond, 356 Bridge, Brooklyn; The Sanitarian, Dr. A. N. Bell, 291 Union street, Brooklyn; Buffalo Medical and Surgical Journal, Dr. W. W. Potter, 284 Franklin, Buffalo; American Druggist, 56 Lafayette Place, New York; La Revista

Médico—Quirúrgica, Dr. Samuel E. Millikin and Dr. Pedro J. Salierup, 126 Liberty street, New York; American Journal of Obstetrics, Dr. Brooks H. Wells, 56 Lafayette Place, New York; Domestic Gazette, W. F. Waugh, 447 Greenwich, New York; Gaillard's Medical Journal, Dr. G. T. Harrison, P. O. box 1124, New York; La Gaceta Médico Farmacéutica, Johnson & Johnson, 92 William, New York; Hall's Journal of Health, Nelson Cross, 340 W. Fifty-ninth, New York; Herald of Health, Dr. George Henry Bassett, P. O. box 2141, New York; International Journal of Surgery, Dr. Ferdinand King, 95 William, New York; Doctor's Weekly, Dr. Ferdinand King, 315 W. Sixty-third, New York; Journal of Balneology, Dr. A. L. A. Tabolett, P. O. box 1670, New York; Journal of Cutaneous and Genito-Urinary Diseases, Dr. P. A. Morrow, 3 Bond, New York; Journal of Nervous and Mental Diseases, Dr. Charles Henry Brown, 25 W. Forty-fifth, New York; Journal of Syphiology and Dermitology, Dr. Morris H. Henry, 531 Fifth avenue, New York; New York Medical Journal, Dr. Frank P. Foster, 3 Bond, New York; New York Medical Record, Dr. George F. Shrady, 56 Lafayette Place, New York; Medical Missionary Record, George D. Dowkontt, 118 Forty-fifth, New York; American Journal of Insanity, Dr. George Adler Bloomer, Utica; New York Journal of Gynæcology Obstetrics, Dr. J. Duncan Emmet, 91 Madison avenue, New York.

North Carolina.—North Carolina Medical Journal, Dr. Thomas F. Wood, 201 Chestnut, Wilmington.

Ohio.—Cincinnati Medical Journal, Dr. Gilbert I. Cullen, 478 West Sixth, Cincinnati; Lancet and Clinic, Dr. J. C. Culbertson, 199 West Seventh, Cincinnati; Cleveland Medical Gazette, Dr. A. R. Baker, 143 Euclid avenue, Cleveland; Columbus Medical Journal, Dr. J. F. Baldwin, 112 West Fourth, Columbus; Medical Compend, Dr. H. G. Blaine, 902 Adams, Toledo.

Pennsylvania.—American Journal of the Medical Sciences, Dr. E. P. Davis, Philadelphia; Annals of Hygiene, Dr. Joseph F. Edwards, Philadelphia; Archives of Pædiatrics, Dr. William Perry Watson, 715 Market, Philadelphia; College and Clinical Record, Dr. Richard J. Dunglison, Philadelphia; Medical News, Dr. G. M. Gould, 706 Sansom, Philadelphia; Medical World, Dr. C. F. Taylor, 1520 Chestnut, Philadelphia; Medical and Surgical Reporter, Dr. E. T. Reichert, northeast corner Thirteenth and Walnut, Philadelphia; Times and Register, Dr. William F. Waugh, 1725 Arch, Philadelphia; Pittsburg Medical Review, Dr. X. O. Werder, 924 Pennsylvania avenue, Pittsburg; Therapeutic Gazette, Dr. H. A. Hare, 22 South Fifteenth, Philadelphia.

Peru.—La Crónica Médica, Lima; El Monitor Médico, Lima.

San Salvador.—La Universidad, San Salvador; Repertorio Salvadoreño, San Salvador.

Tennessee.—Memphis Medical Monthly, Dr. F. L. Sim, 126 Hernando, Memphis; Journal of Medicine and Surgery, Dr. C. S. Briggs, 313 Church, Nashville; Southern Practitioner, Dr. Deering J. Roberts, 218 Russell, Nashville.

Texas.—Daniel's Texas Medical Journal, Dr. F. E. Daniel, 510 Rio Grande, Austin; Texas Health Journal, J. R. Briggs, 903 Elm, Dallas.

Venezuela.—La Union Médica, Caracas; Revista Científica de la Universidad Central, Caracas.

Virginia.—The Virginia Medical Monthly, Landon B. Edwards, Richmond, Va.

Dental journals.

Dental Cosmos, Philadelphia; Dental Review, Chicago; Dental Register, Dr. J. Taft, Cincinnati; Dental Head-Light, Dr. W. C. Barrett, Buffalo, N. Y.; International Dental Journal, Philadelphia; Western Dental Journal, Kansas City, Mo.; American Journal of Dental Science, Baltimore; Ohio State Dental Journal, Toledo, Ohio; Dominion Dental Journal, Dr. W. G. Beers, Montreal, Canada; Southern Dental Journal, Atlanta, Ga.

FINAL REPORT OF THE COMMITTEE ON PERMANENT ORGANIZATION OF THE PAN AMERICAN MEDICAL CONGRESS TO THE AMERICAN MEDICAL ASSOCIATION.

MILWAUKEE, WIS., *June 6, 1893.*

To the American Medical Association:

Your committee, appointed at Washington to effect a permanent organization of an intercontinental American medical congress, begs leave to submit its final report as follows:

An organization has been effected under the style and title of the Pan American Medical Congress, to be held at the City of Washington, D. C., September 5, 6, 7, and 8, A. D. 1893, under the presidency of Prof. William Pepper, M. D., LL. D., of Philadelphia. The details of the organization are set forth in the published preliminary announcement of the Congress, copies of which are respectfully submitted herewith, in both English and Spanish, as a part of this report.

Since the publication of this preliminary announcement an organization has been effected in Paraguay. Your committee is therefore pleased to state that an organization of the Pan American Medical Congress exists in every State and Territory of the United States and in every remaining country and colony of the Americas, including the West Indies and Hawaii.

A provision has been adopted since the foregoing publication whereby every medical society, national, colonial, and local, has been made a constituent organization of the Congress.

The committee begs leave to report further that the organization which has been effected as above, by the authority you have conferred upon it, has been and is already very actively engaged in carrying out the practical ends of the Congress.

The Senate and House of Representatives at the first session of the last Congress adopted a joint resolution authorizing the President to extend an invitation to the governments of the Western Hemisphere to send official delegates to the meeting, and to appoint similar delegates on behalf of our own Government. This official invitation has been issued through the Department of State, and all replies so far received have been in the nature of acceptances. The President has indicated that the Government of the United States will be represented at the Congress by 6 delegates. At the last meeting of the executive committee of the congress a resolution was adopted directing that in view of the Columbian exercises in progress in America this year, and in view of the relations which have become intimate between the United States and Spain, that the Government of the latter country be requested to send delegates to the congress. It was thought that the exceptional relations of amity existing between the two countries would warrant a course which has been avoided with regard to all other European countries out of deference to the interests of the international congress which is to meet in Rome.

The National Congress at its last session appropriated fifteen thousand dollars ($15,000) for the purposes of entertainment of the meeting.

The President of the United States has consented to open the congress in person and to extend the courtesy of a reception at the White House to delegates and their families.

A special feature of the congress will be the proceedings of the sections on hygiene, climatology, and demography, and on marine and hygiene and quarantine. The proceedings of these sections will be largely of the nature of a sanitary conference with particular reference to practical questions of public health and of imminent importance.

With this object in view, every municipality of the three Americas, including the West Indies and Hawaii, has been invited to send an official delegate, and a very large number of acceptances have already been received.

The titles of several hundred papers, accompanied in many instances with abstracts, have already been received from representative medical writers in the English, Latin, French, and Portugese countries. This of itself assures the scientific success of the congress.

Invitations have been extended to representative European scientists to be the guests of the congress, and a number of acceptances have been received.

In conclusion, your committee begs leave to express its appreciation of the spontaneous response to its appeal for funds in the form of advance registration fees from the public-spirited representatives of our profession in America. Let it be remembered, no registration fees will be accepted from members of the congress residing outside the United States. Although money has been realized from advance registrations in amount sufficient to pay some of the preliminary expense of organization, a still larger sum is needed with which to meet accumulated obligations.

It should be held in mind that the Congressional appropriation, meager as it is, will be available only for purposes of entertainment at the time of the meeting, and that the expense involved in publication, correspondence, and clerical work is necessarily very heavy and must be met at once. The members of the profession are therefore again urgently requested to register at once by paying the fee ($10) to the treasurer, Dr. A. M. Owen, Evansville, Ind. Those who thus become members of the congress, but who may be prevented from attending the meeting, will receive a set of the transactions, which of themselves promise to be worth more than the amount of the registration fee.

In submitting this, its final report, your committee begs leave to thank the association and its executive officers for cordial support and the medical press for its energetic and efficient aid in promoting this earnest movement for the unification of the medical profession of all the Americas.

Respectfully submitted on behalf of the committee.

CHARLES A. L. REED,
Chairman.

REGISTERED DELEGATES.

Name.	Residence.	Delegate from—
Isaac E. Atkinson	Baltimore, Md	University of Maryland.
H. W. Austin	U. S. Marine-Hospital Service.	United States Marine-Hospital Service.
George N. Acker	Washington, D. C	Medical Society, District of Columbia.
Samuel S. Adams	Washington, D. C	Medical Society, District of Columbia.
Zabdiel Boylston Adams	Framingham, Mass	The State of Massachusetts, by appointment by the governor.
J. Dennis Arnold	San Francisco, Cal	San Francisco County Medical Society.
Florestan Aguilar	Cadiz, Spain	"La Odontologia."
Gueterrez y Arango	Santander, Colombia	The Government of the Republic of Colombia; the Government of the Department of Cauca; Sociedad de Medicina del Cauca.
Leonard Ballou Almy	Norwich, Conn	The State of Connecticut, by appointment by the governor.
Albert Anderson	Wilson, N. C	North Carolina State Medical Society.
Joseph W. Anderson	Ardmore, Pa	Montgomery County (Pa.) Medical Society.
Howard Emerson Ames	Washington, D. C	United States Navy.
James M. Andres	Philadelphia, Pa	Medico-Chirurgical College.
John S. Anvim	Columbus, Ind	The State of Indiana, by appointment by the governor.
Lawrence Ashton	Dallas, Texas	Texas State Medical Association.
John B. Baggett	Washington, D. C	Medical Association, District of Columbia.
Henry B. Baker	Lansing, Mich	State of Michigan, by appointment by the governor.
A. R. Baker	Cleveland, Ohio	Cuyahoga County (Ohio) Medical Society.
H. H. Barker	Washington, D. C	Medical Association, District of Columbia.
Amy S. Barton	Philadelphia, Pa	Woman's Medical College of Pennsylvania.
John N. Baskett	Hannibal, Mo	State of Missouri, by appointment by the governor.
Joseph D. Bryant	New York	Bellevue Hospital Medical College.
Edwin Bentley	Little Rock, Ark	Arkansas Industrial University, Medical Department.
Darby Bergin	Cornwall, Ontario	Surgeon-General of Canada.
A. C. Bernays	St. Louis, Mo	Marion Sims Medical College.
Henry G. Beyer	Annapolis, Md	United States Navy.
John S. Billings	Washington, D. C	United States Army.
Seth Scott Bishop	Chicago, Ill	Illinois Charity Eye and Ear Infirmary.
Alexander B. Blackader	Montreal, Canada	McGill University.
J. Mount Bleyer	New York	New York County Medical Society.
Eugene Boise	Grand Rapids, Mich	City of Grand Rapids, appointed by the mayor.
Henry F. Borden	Brockton, Mass	Massachusetts Medical Society.
James P. Boyd	Albany, N. Y	Albany Medical College.
Alexander B. Briggs	Ashaway, R. I	Rhode Island State Board of Health.
Charles W. P. Brock	Richmond, Va	National Association of Railway Surgeons.

REGISTERED DELEGATES—Continued.

Name.	Residence.	Delegate from—
Daniel R. Brower	Chicago, Ill	The State of Illinois, by appointment by the governor.
Hawkins Brown	Hustonville, Ky	The State of Kentucky, by appointment by the governor.
Seneca B. Brown	Fort Wayne, Ind	Indiana Dental College.
Valentine Brown	Yonkers, N. Y	The city of Yonkers, N. Y., appointed by the mayor.
Albert P. Brubaker	Philadelphia, Pa	Jefferson Medical College.
Samuel W. Bogan	Washington, D. C	Columbian University.
Peter H. Bryce	Toronto, Canada	Provincial Board of Health.
Daniel S. Burr	Binghamton, N. Y	City of Binghamton, appointed by the mayor.
John J. Burroughs	Houston, Tex	Texas State Medical Association.
Samuel C. Busey	Washington, D. C	Medical Association, District of Columbia.
J. Wellington Byers	Charlotte, N. C	Charlotte Academy of Medicine.
James Campbell	Hartford, Conn	The State of Connecticut, by appointment by the governor; and the city of Hartford, by appointment by the mayor.
Henry W. Cattell	Philadelphia, Pa	Institution for Feeble-Minded Children, at Elwyn.
Charles G. Cannaday	Roanoke, Va	The State of Virginia by appointment by the governor.
Roland G. Curtin	Philadelphia, Pa	American Climatological Association.
Manuel Carmona y Válle	City of Mexico	The State of Tamaulipas.
José Clairac	Havana	The Spanish Government.
Auguste Comean	Port au Prince, Haiti	The Haitien Government.
J. Henry Carstens	Detroit	Detroit Gynecological Society.
William S. Carter	Philadelphia, Pa	The University of Pennsylvania.
H. R. Carter	U. S. Marine-Hospital Service.	The United States Marine-Hospital Service.
Silas J. Cartwright	Roxbury, N. Y	Delaware County (N. Y.) Medical Society.
John J. Castellanos	New Orleans, La	Orleans Parish (La.) Medical Society.
David Cerna	Galveston, Tex	Texas State Medical Association.
James Collins	Philadelphia, Pa	Philadelphia County Medical Society.
Samuel Powers Carbee	Haverhill, N. H	State of New Hampshire, by appointment by the governor.
Julian J. Chisolm	Baltimore, Md	The University of Maryland.
Russell H. Chittenden	New Haven, Conn	Yale University.
John Herbert Claiborne	Petersburg, Va	The Commonwealth of Virginia, by appointment by the governor.
Augustus P. Clarke	Boston, Mass	The State of Massachusetts, by appointment by the governor.
N. D. Clouser	Hartford City, Ind	Blackford County (Ind.) Medical Society.
Wm. H. H. Cobb	Goldsboro, N. C	State of North Carolina, by appointment by the governor.
Anton Coe	Washington, D. C	Medical College of Columbia University.
Henry L. Coit	Newark, N. J	Essex District Medical Society.
P. C. Coleman	Colorado, Texas	Texas State Medical Association.
Cornelius G. Comegys	Cincinnati, Ohio	Cincinnati Hospital and Academy of Medicine.
Granville P. Conn	Concord, N. H	Appointed by the governor of New Hampshire to represent the State Board of Health, Dartmouth Medical College.

REGISTERED DELEGATES – Continued.

Name.	Residence.	Delegate from—
Phineas S. Conner	Cincinnati, Ohio	The Medical College of Ohio; Dartmouth Medical College.
Angel Contreras	Puebla, Mexico	The State of Yucatan.
Albert C. Corr	Carlinville, Ill	The State of Illinois, by appointment by the governor.
Berton H. Criley	Dallas Center, Iowa	The State of Iowa, by appointment by the governor.
John Cronyn	Buffalo, N. Y	Medical Department of Niagara University.
Thomas D. Crothers	Hartford, Conn	Walnut Lodge Hospital.
Hannah L. Croasdale	Philadelphia, Pa	Woman's Medical College of Philadelphia.
Frederic Colton Curtis	Albany, N. Y	Albany Medical College.
Ernst W. Cushing	Boston, Mass	Massachusetts Medical Society.
Wm. C. Cutler	Chelsea, Mass	The city of Chelsea, appointed by the mayor.
Juan Martinez del Campo.	City of Mexico	The State of Zacatecas.
Wm. C. Dabney	University of Virginia.	University of Virginia.
Sam'l S. Davis	Lancaster, Pa	Appointed by the Governor of Pennsylvania to represent the State board of health.
John Isaac Darby	Americus, Ga	The State of Georgia by appointment by the governor.
Wm. J. G. Dawson	St. Helena, Cal	Napa County (Cal.), Medical Society.
A. W. de Roaldes	New Orleans, La	The State of Louisiana by appointment by the governor. Orleans Parish Medical Society.
William Dougall	Joliet, Ill	Will County (Ill.) Medical Society.
Charles Duffy	Newbern, N. C	The State of North Carolina by appointment by the governor.
George Douglas	Oxford, N. Y	The New York State Medical Association.
Columbus Drew	Jacksonville, Fla	Florida State Medical Association and the city of Jacksonville.
E. A. de Schweinitz	Washington, D. C	The Medical College of Columbian University.
William Edgar Driscoll.	Muncie, Ind	The State of Indiana by appointment by the governor.
Francis X. Dercum	Philadelphia, Pa	Jefferson Medical College.
Mary Gage Day	Wichita, Kans	Wichita Medical Society.
G. Edgar Dean	Scranton, Pa	Lackawanna County (Pa.) Medical Society.
D. Bryson Delavan	New York	American Laryngological Association (president).
P. Gourdin De Saussure.	Charleston, S. C	Medical College of the State of South Carolina.
Wm. B. Dewees	Salina, Kans	The State of Kansas by appointment by the governor.
Jose M. de Ita	Puebla, Mexico	The Maternity Hospital.
Charles E. Doubleday	Penn Yan, N. Y	Yates County (N. Y.) Medical Society.
Cyrus Edson	New York	The city of New York, appointed by the mayor.
Henry W. Elmer	Bridgeton, N. J	Cumberland County (N. J.) Medical Society.
Thomas B. Earley	Philadelphia, Pa	Medico-Chirurgical College.
W. J. Eddy	Shelbyville, Ill	Shelby County (Ill.) Medical Society.
Landon B. Edwards	Richmond, Va	The State of Virginia by appointment by the governor.

REGISTERED DELEGATES—Continued.

Name.	Residence.	Delegate from—
William H. Elliott	Savannah, Ga	The State of Georgia by appointment by the governor.
Harold C. Ernst	Boston, Mass	Harvard University Medical School.
George Evans	New York	Baltimore College of Dental Surgery.
Charles Henry Eyles	Belize, British Honduras.	The Government of British Honduras.
Robert Farnham	Washington, D. C	Medical Association of the District of Columbia.
George E. Falls	Buffalo, N. Y	Niagara Medical College.
Joseph Benson Fenwick	Chelsea, Mass	City of Chelsea, appointed by mayor.
C. G. J. Finn	New York, N. Y	Queen County Medical Society.
Frank Finney	La Junta, Colo	Atchison, Topeka and Santa Fe Railway Hospital Association.
Samuel A. Fisk	Denver, Colo	Medical Department University of Denver.
T. V. Fitzpatrick	Cincinnati, Ohio	Cincinnati College of Medicine and Surgery.
Chas. F. Flanders	Manchester, N. H	New Hampshire State Medical Society.
De Saussure Ford	Augusta, Ga	Medical Department University of Georgia.
Felix Formento	New Orleans, La	State board of health.
Otto E. Farster	St. Louis, Mo	City of St. Louis, appointed by mayor.
J. L. Forwood	Chester, Pa	University of Pennsylvania.
W. H. Forwood	Washington, D. C	U. S. Army.
Romulus Adams Foster	do	Columbian University.
F. W. Frankhauser	Reading, Pa	City of Reading, appointed by mayor.
Wm. Alexander Frazier	Staunton, Va	Medical Society of Virginia.
Erskine B. Fullerton	Columbus, Ohio	Starling Medical College.
Albert Leary Gihon	Hotel Richmond, Washington, D. C.	U. S. Navy.
George M. Gould	Philadelphia, Pa	Medical News.
David Wilson Graham	Chicago, Ill	Illinois State Medical Society.
Amus Graves	San Antonia, Tex	National Association Railway Surgeons.
Robert Willard Greenleaf.	Boston, Mass	Massachusetts College of Pharmacy.
Richard F. Gundry	Catonsville, Md	The R. Gundry Home for Mental and Nervous Diseases.
Manuel Gutiewiz	Mexico City, Mexico	The State of Oajaca, Mexico.
Grant Bey	Cairo, Egypt	The Medical Service of the Khedive of Egypt.
Daniel M. Gluiteras	Washington, D. C	U. S. Navy.
Isaac C. Gable	York, Pa	York County (Pa.) Medical Society.
A. C. George	Washington, D. C	U. S. Navy, Medical Department.
Sam'l M. Garlik	Bridgeport, Conn	City of Bridgeport, Conn.
Alonzo Garcelon	Lewiston, Me	President-secretary of Medical Jurisprudence.
Edward R Garcia	13 San José de Gracia, Mexico City, Mexico.	The State of Tabasco, Mexico.
Louis A. La Garde	Chicago, Jackson Park, Ill.	U. S. Army.
Joseph Gardner	Bedford, Ind	American Red Cross Association.
Wm. Gardner	Montreal, Canada	McGill University.
Angel Gavino	Mexico City	The State of Morelas, Mexico.
M. W. Gillmer	Bahia, Brazil	The city of Bahia, Brazil.
Alfred Garces	Colombia Republicà	Sociedad de Medicina.
V. L. Gilles	Port au Prince, Haiti	Government of Haiti.

REGISTERED DELEGATES—Continued.

Name.	Residence.	Delegate from—
John L. Heffron	Syracuse, N. Y	Medical Department Syracuse University.
C. R. Holmes	Cincinnati, Ohio	Academy of Medicine of Cincinnati.
Lewis E. Hawie	Danville, Va	The State of Virginia by appointment by the governor.
Joseph H. Hunt	Brooklyn, N. Y	Brooklyn College of Pharmacy.
John B. Hamilton	Chicago, Ill	The State of Illinois by appointment by the governor.
Hugh Hamilton	Harrisburg, Pa	Dauphin County Medical Society.
Charles W. Hamlin	Middleville, N. Y	Herkimer County (N. Y.) Medical Society.
Philander A. Harris	Paterson, N. J	Medical Society of New Jersey.
Geo. Byrd Harrison	Washington, D. C	Columbian University.
D. H. Hazen	do	Medical Society of the District of Columbia.
Ernst Hart	London, England	British Medical Association.
Mrs. Ernst Hart	do	Bchelien és-Sciences es lettres of the Faculty of Medicine of Paris.
Edmund Burke Haywood.	Raleigh, N. C	The State of North Carolina by appointment by the governor.
Ferdinand Herff	San Antonio, Tex	State of Texas by appointment by the governor.
Juan Hernandez	San Juan, Porto Rico	Ciudad de Jan Juan.
James F. Hibberd, president-elect of the American Medical Association.	Richmond, Ind	American Medical Association (guest of honor).
W. Frank Hallnlen	Philadelphia, Pa	Medico-Chirurgical College.
Clifton F. Hodge	Worcester, Mass	Clark University.
John Van R. Hoff (major)	Governors Island, New York Harbor.	U. S. Army.
Wm. P. Hogue	Charleston, W. Va	Medical Society of West Virginia.
Bayard Holmes	Chicago, Ill	College of Physicians and Surgeons.
J. B. S. Holmes	Rome, Ga	Georgia State Medical Association.
W. E. Hughes	Philadelphia, Pa	University of Pennsylvania.
George Homan	St. Louis, Mo	The city of St. Louis.
Thos. C. Hoover	Columbus, Ohio	Appointed by the governor of Ohio to represent the Ohio State board of health. Starling Medical College.
James G. Hopkins	Thomasville, Ga	The State of Georgia by appointment by the governor.
Alvin A. Hubbell	Buffalo, N. Y	Medical Department of Niagara University.
Charles H. Hughes	St. Louis, Mo	Barnes Medical College.
D. L. Huntington	U. S. Army	U. S. Army.
E. Fletcher Ingals	Chicago, Ill	Illinois State Medical Society.
B. J. D. Irwin	do	U. S. Army.
H. L. E. Johnson	Washington, D. C	Washington Gynecological Society.
W. T. Jenkins	Quarantine Station, N. Y.	Health officer of port, New York.
Antonio Jover	Havana, Cuba	University of Havana.
Walter B. Johnson	Paterson, N. J	American Medical Association.
Dean G. Kemp	Montpelier, Vt	State of Vermont.
Fred B. Kilmer	New Brunswick, N. J	City of New Brunswick and New Jersey Pharmaceutical Society.
Elijah S. Kelley	Minneapolis, Minn	Health commissioner, Minneapolis.
George M. Kelly	Washington, Pa	Washington Medical Society.

REGISTERED DELEGATES—Continued.

Name.	Residence.	Delegate from—
George T. Kemp	Johns Hopkins University, Baltimore, Md.	Hoagland Laboratory.
Peter D. Keyser	Philadelphia, Pa	City of Philadelphia and board of health, City of Philadelphia.
Charles W. Kollock	Charleston, S. C	Charleston Medical School.
George A. Ketcham	Mobile, Ala	Medical College of Alabama.
James K. King	Watkins, N. Y	County Medical Society.
A. F. A. King	Washington, D. C	Medical department, University of Vermont.
J. Ferd. Klinedinst	York, York County, Pa.	Medico-Pathological Society.
J. Rollo Knapp	New Orleans, La	Louisiana State Dental Society.
William F. Knox	McKeesport, Pa	Allegheny County (Pa.) Medical Society.
Pedro Lagleyze	Buenos Ayres, Arg. Rep	The Argentine Republic.
Enrique Lopez	Havana, Cuba	Sociedad de Estudios Clinicos.
Damaso Lainé	Media, Pa	Delaware County (Pa.) Medical Society.
Daniel S. Lamb	Washington, D. C	U. S. Army Medical Museum.
Ernest Laplace	Philadelphia, Pa	Medico Chirurgical College.
John A. Larrabee	Louisville, Ky	Hospital College of Medicine.
Henry W. Latham	Latham, Mo	Central Missouri Medical Society.
Thomas S. Latimer	Baltimore, Md	College of Physicians and Surgeons.
Rafael Lavista	City of Mexico	Government of Mexico.
Richard Henry Lewis	Raleigh, N. C	North Carolina Board of Health.
William Patrick Lawler	Lowell, Mass	Lowell Board of Health.
Benjamin Lee	Philadelphia	Appointed by the governor of the State of Pennsylvania to represent the State Board of Health.
Charles Lehlbach, jr	Newark, N. J	Newark board of health.
Francis B. Loring	Washington, D. C	Medical Department Howard University.
Eugene R. Lewis	Kansas City, Mo	National Association Railway Surgeons.
E. Liceaga	City of Mexico	State of Guanajuato, Mexico.
George N. Lowe	Randall, Kans	Republican Valley Medical Society.
John H. Lowman	Cleveland, Ohio	Medical department, Western Reserve University.
Charles H. Lindsley	New Haven, Conn	Appointed by the governor of Connecticut for the State Board of Health of Connecticut.
David Lobo	Caracas, Venezuela	University of Caracas.
James E. Logan	Kansas City, Mo	Academy of Medicine.
I. N. Love	St. Louis, Mo	Mississippi Valley Medical Association.
V. C. Lucas	Cleveland, Ohio	Cuyahoga County Medical Society.
John Nolan Mackenzie	Baltimore, Md	Johns Hopkins University.
Philip Marvel	Atlantic City, N. J	Atlantic County (N. J.) Medical Association.
A. B. Macallum	Toronto, Canada	Toronto University.
Henry Macdonald	New York City	National Association of Railroad Surgeons.
Willis G. Macdonald	Albany, N. Y	Albany County Medical Society.
Roque Maconzel	City of Mexico	State of Michoacan, Mexico.
Stephen A. Mahoney	Holyoke, Mass	Massachusetts Medical Society.
Thomas H. Manley	New York	Harlem Hospital.
Tomas Casas y Marti	Havana, Cuba	The Spanish Government.
Henry O. Marcy	Boston	Massachusetts Medical Society.
W. V. Marmion	Washington, D. C	Medical Association, District of Columbia.
Francisco Marin	Puebla, Mexico	The State of Chiapas, Mexico.

REGISTERED DELEGATES—Continued.

Name.	Residence.	Delegate from—
Rudolph Matas	New Orleans, La	State of Louisiana, by appointment by the governor. New Orleans Polyclinic.
Thomas J. Mays	Philadelphia	Philadelphia Polyclinic.
G. Mendozabal	Vera Cruz, Mexico	The State of Vera Cruz.
Samuel K. Merrick	Baltimore, Md	Baltimore Medical College.
James H. Mitchell	Cohoes, N. Y	The city of Cohoes, appointed by the mayor.
Adolph W. Miller	Philadelphia, Pa	Philadelphia College of Pharmacy.
Samuel Edwin Milliken	New York	New York Medical Association.
Charles K. Mills	Philadelphia	Philadelphia Neurological Society.
Giles S. Mitchell	Cincinnati	Cincinnati College of Medicine and Surgery.
J. E. Monjaras	San Luis Potosi, Mexico	The State of San Luis Potosi, Mexico.
E. E. Montgomery	Philadelphia, Pa	Jefferson Medical College.
Frederick Montezambert	Quebec	Dominion of Canada.
Luis G. Muñoz	Chihuahua, Mexico	The State of Chihuahua.
Manuel A. Muñez	Lima, Peru	The Peruvian Government.
James Bassett Murdock	Pittsburg, Pa	Western Pennsylvania Medical College.
Alexander J. Mullen, jr	Michigan City	The State of Indiana, by appointment by the governor.
Edward B. Montgomery	Quincy, Ill	Illinois Soldiers and Sailors' Home.
Jennie McCowen	Davenport, Iowa	The State of Iowa, by appointment by the governor.
Joseph D. McCann	Monticello, Ind	The State of Indiana, by appointment by the governor.
Edward Davis McDaniel	Mobile, Ala	Wilcox County (Ala.) Medical Society.
Joseph McFarland	Philadelphia, Pa	University of Pennsylvania.
John I. McLain	Washington, D. C	Medical Association, District of Columbia.
C. Agress McMahan	Evansville, Ind	Vandeberg County Medical Society.
Floyd W. McRae	Atlanta, Ga	Board of health of the city of Atlanta.
Hugh T. Nelson	Charlottesville, Va	State of Virginia by appointment by the governor.
Charles Bliss Noble	Washington, D. C	Washington City Dental Society.
Albert Lane Norris	Cambridge, Mass	Harvard Medical School. Massachusetts State Medical Society.
John T. Nagle	New York, N. Y	Health department of the city of New York.
Frederick G. Navy	Ann Arbor, Mich	Medical department of the University of Michigan.
Dr. Rafael Alvarez Ortez	Havana, Cuba	Sociedad de Higiene of Havana.
John Oenslager, jr	Harrisburg, Pa	Dauphin County Medical Society.
William O'Daniel	Atlanta, Ga	City of Atlanta.
Domingo Orvañanos	Mexico, Mexico	National Medical Institute.
Thomas Opie	Baltimore, Md	College of Physicians and Surgeons.
Thaddeus O. Outerbridge	Bermuda, West Indies	Government of Bermuda, West Indies.
Abraham M. Owen	Evansville, Ind	American Medical Association.
Thomas B. Owings	Ellicott City, Md	State of Maryland, by appointment by the governor.
Guillermo Vargas Paredes.	Bogota, South America	Republic of Colombia, South America.
Richard Henry Plummer	San Francisco, Cal	Cooper Medical College.

REGISTERED DELEGATES—Continued.

Name.	Residence.	Delegate from—
John Asborn Polak	Brooklyn, N. Y	Long Island College Hospital.
Adam Politzer	Vienna, Austria	University of Vienna.
James G. Porteaus	Poughkeepsie, N. Y	New York State Medical Association.
D. Webster Prentiss	Washington, D. C	Medical department, Georgetown University.
F. F. Prewitt	St. Louis, Mo	State of Missouri, appointed by the governor.
Charles O. Probst	Columbus, Ohio	Appointed by the governor to represent the Ohio State Board of Health.
Dr. Juan Padilla	Guatemala City	Guatemala Medical Faculty.
Charles Page	Governor's Island	U. S. Army.
Wm. N. Pencoast	Philadelphia, Pa	Medico-Chirurgical College.
Geo. Farrar Patton	New Orleans, La	Louisiana State Board of Health.
William Peppin	Philadelphia, Pa	University of Pennsylvania.
James Cecil Phillipps	Kingston, West Indies / Jamaica, West Indies.	Medical Council of Kingston.
Lorenzo N. Phinney	Norwalk, Conn	Geneva Medical College.
Ambrosio Grillo y Partmondo.	Santiago, Cuba	Laboratorio Bacteriologico de Santiago de Cuba.
William Peirson	Orange, N. J	Medical Society, State of New Jersey.
Isaac N. Quimby	Jersey City, N. J	New Jersey City Hospital.
Joseph P. Remington	Philadelphia, Pa	Philadelphia College of Pharmacy.
Hermogenes Rivero-Saldiva.	Caracas, Venezuela	Central University.
L. F. Reynaud	New Orleans, La	The State of Louisiana, by appointment by the governor.
Alonzo B. Richardson	Columbus, Ohio	Columbus Asylum for the Insane.
Maurice Howe Richardson.	Boston, Mass	Harvard University.
John B. Roberts	Philadelphia, Pa	Philadelphia Polyclinic.
Henry H. Rusby	New York	College of Pharmacy of the city of New York.
Thos. George Roddick	Montreal, Canada	McGill University.
John O. Roe	Rochester, N. Y	Medical Society of the State of New York.
George H. Rohé	Catonsville, Md	The State of Maryland, by appointment by the governor.
M. Rowe	Deals Island, Md	The State of Maryland, by appointment by the governor.
Eliza H. Root	Chicago, Ill	Northwestern University Woman's Medical School.
Edward K. Root	Hartford, Conn	Connecticut Mutual Life Insurance Company.
Charles A. Ruggles	Stockton, Cal	The State of California, by appointment by the governor.
Luis Hernandez Rubin	Havana, Cuba	Medical Society, Academy of Havana.
Francisco A. Risquez	Caracas, Venezuela	The Government of Venezuela.
Luis E. Ruiz	City of Mexico	The State of Hidalgo.
Frank Gibbs Ryan	Philadelphia, Pa	American Pharmaceutical Association.
Beaven Rake	Trinidad, West Indies	The Government of Trinidad.
Edward Randall	Galveston, Tex	Medical Department, University of Texas.
Augustus Ravogli	Cincinnati, Ohio	The American Medical Association.
Paul S. Redfield	Providence, R. I	Rhode Island State Board of Health.
Henry Redmond	Philadelphia, Pa	The University of Pennsylvania.
John G. Reed	Elmwood Place, Cincinnati, Ohio.	The Union District Medical Society.

REGISTERED DELEGATES—Continued.

Name.	Residence.	Delegate from—
Charles A. L. Reed	Cincinnati, Ohio	The Cincinnati College of Medicine and Surgery.
Elgar Reed	El Monte, Cal	The Alumni Association of Cincinnati, College of Medicine and Surgery.
Howard S. Reeser	Reading, Pa	Berks County (Pa.) Medical Society.
James Edmund Reeves	Chattanooga, Tenn	The State of Tennessee, by appointment by the governor.
John H. Rauch	Chicago, Ill	Journal of the American Medical Association.
William Scott Renner	Buffalo, N. Y	Niagara University.
William A. B. Sellman	Baltimore, Md	Baltimore University, School of Medicine.
Reginald H. Sayre	New York, N. Y	New York State Medical Association.
Thomas Sidney Scales	Mobile, Ala	City of Mobile, appointed by the mayor.
John C. Schapps	Brooklyn, N. Y	St. Mary's Hospital, Brooklyn.
George W. Stoner	U. S. Marine Hospital, Baltimore.	U. S. Marine-Hospital Service.
Robert Lowry Sibbet	Carlisle, Pa	Cumberland County Medical Society.
Charles A. Siegfried	U. S. Naval Training Station, Newport, R. I.	U. S. Navy.
Barton D. Skinner	Greenport, N. Y	Suffolk County, N. Y.
John Philip Slaughter	The Plains, Va	Medical Society of Virginia.
Christian B. Stemen	Fort Wayne, Ind	The State of Indiana, by appointment by the governor; the Wabash Railway Surgical Association.
Robert T. Sloan	Kansas City, Mo	Kansas City District Medical Society.
Charles Smart	U. S. Army	Medical Department, U. S. Army.
Andrew R. G. Smith	North Whitefield, Me	Maine State Board of Health.
Arthur Lapthorn Smith	Montreal, Canada	Medico-Chirurgical Society of Montreal.
Allen J. Smith	Galveston, Tex	Texas Medical Association.
Thos. J. Smith	Bridgeton, N. J	Medical Society of New Jersey.
Robt. Wm. Bruce Smith	Seaforth, Ontario	Royal College of Physicians and Surgeons.
J. Gardner Smith	New York, N. Y	Harlem Medical Association.
J. Lewis Smith	do	Pædiatric Society.
Thos. C. Smith	Washington, D. C	Medical Society of the District of Columbia.
John P. Savage	Cleveland, Ohio	Medical Department of Western Reserve University.
Samuel Edwin Solly	Colorado Springs, Colo.	Colorado State Medical Society.
A. Walter Suiter	Herkimer, N. Y	Medical Society of the State of New York.
Charles Sutherland	Washington, D. C	U. S. Army.
Gottfried Stamm	St. Paul, Minn	City of St. Paul, appointed by the mayor.
Byron Stanton	Cincinnati, Ohio	Appointed by the governor of Ohio to represent the Ohio State Board of Health; the Miami Medical College, Cincinnati.
George I. Stevens	New York, N. Y	American Medical Association.
James A. Stewart	Baltimore, Md	Maryland State Board of Health.
Sarah Hackett Stevenson.	Chicago, Ill	The Woman's Medical College, Chicago.
Charles W. Stiles	Washington, D. C	Bureau of Animal Industry, U. S. Government; Georgetown Medical College.

REGISTERED DELEGATES—Continued.

Name.	Residence.	Delegate from—
David St. John	Hackensack, N. J	New Jersey State Medical Society.
Charles Stover	Amsterdam, N. Y	Medical Society of the State of New York.
John C. Sundberg	Bagdad, Persia	The U. S. consulate at Bagdad.
Jonathan Taft	Cincinnati, Ohio	Dental College, University of Michigan.
T. Oliver Tait	Rochester, N. Y	Monroe County Medical Society.
Robert W. Talbott	Washington, D. C	Washington Dental Society.
A. J. Thomas	Evansville, Ind	Southern Hospital for Insane.
F. B. Tiffany	Kansas City, Mo	University Medical College of Kansas City.
Wm. Tillman	La Crosse, Wis	State of Wisconsin, appointed by the governor.
Jno. W. Trader	Sedalia, Mo	State of Missouri, appointed by the governor.
J. Rufus Tryon	Washington, D. C	U. S. Navy (Surgeon-General).
Lawrence Turnbull	Philadelphia, Pa	Jefferson Medical College Hospital.
Robert Straker Turton	Jamaica, West Indies	Board of Physicians of Jamaica.
T. J. Tyner	Austin, Tex	State of Texas, by appoinment by the governor.
James Tyson	Philadelphia, Pa	University of Pennsylvania.
Juan J. Ulloa	San José, Costa Rica	The Government of Costa Rica Costa Rica Medical Society.
J. N. Upshur	Richmond, Va	The Commonwealth of Virginia, by appointment by the governor.
B. A. Vaughan	Columbus, Miss	Mississippi State Medical Association.
Joshua M. Van Cott, jr	Brooklyn, N. Y	Long Island College Hospital.
William K. Vance	Bristol, Tenn	Bristol Medical Society.
Albert Vander Veer	Albany, N. Y	Albany Medical College.
Geo. Tully Vaughan	Washington, D. C	U. S. Marine-Hospital Service.
Victor C. Vaughan	Ann Arbor, Mich	University of Michigan, State of Michigan, by appointment by the governor.
Thomas Norris Vincent	Washington, D. C	Medical Association of District of Columbia.
J. Roland Walton	Washington, D. C	Dental Department National University.
Arthur Williams	Elk Ridge, Md	Medical Association of Howard County, Md.
Jefferson H. Wilson	Beaver, Pa	Beaver County Medical Society.
John Collins Warren	Boston, Mass	Medical School of Harvard University.
Irving A. Watson	Concord, N. H	The American Public Health Association.
Louis A. Weigel	Rochester, N. Y	Orthopedic Association.
Ernst Wende	Buffalo, N. Y	Health Department of Buffalo.
Alexander C. Wenz	Hanover, Pa	York County (Pa.) Medical Society.
George William West	Washington, D. C	Medical Association of the District of Columbia.
Edward Graeff West	Boston, Mass	Massachusetts Medical Society.
Hamilton Atchison West	Galveston, Tex	Texas Medical State Association.
J. T. Wilson	Sherman, Tex	State of Texas, by appointment by the governor.
Jacob L. Williams	Boston, Mass	Massachusetts Medical Society.
Robert J. Wilding	Malone, N. Y	Northern New York Medical Association.
James C. Wilcox	Darlington, S. C	South Carolina State Medical Association.
William J. Williams	Adel, Iowa	Dallas County (Iowa) Medical Association.

REGISTERED DELEGATES—Continued.

Name.	Residence.	Delegate from—
John L. Wolf	Washington, D. C	Medical Department Georgetown University.
John R. Wolfe	Glasgow, Scotland	St. Mungo's College, Glasgow.
Galen Murray Woodcock	Bangor, Me	State of Maine, by appointment by the governor.
Charles E. Woodruff	U. S. Army	U. S. Army.
J. Ramon Icaza	City of Mexico	State of Sinaloa.
A. G. Young	Augusta, Me	State Board of Health of Maine.
Juan Zavala	Guadalajara, Mexico	The State of Jalisco.
E. Gustav Zuike	Cincinnati, Ohio	Medical College of Ohio.
Bernard Zweighoft	Philadelphia, Pa	University of Pennsylvania.

REGISTERED MEMBERS.

Name.	Residence.
Aguilar, F	San José, 2, Cadiz, Spain.
Acker, George N	913 Sixteenth street NW., Washington, D. C.
Adams, Samuel S	1632 K street NW., Washington, D. C.
Adams, William A	Fort Worth, Tex.
Adams, Zabdiel Boylston	Framingham, Mass.
Arnold, J. Dennis	54 Chronicle Building, San Francisco, Cal.
Alden, Charles H., A. S. G	Surgeon-General's Office, Washington, D. C.
Allen, Dudley P	278 Prospect street, Cleveland, Ohio.
Allen, Rufus L	Waynesville, N. C.
Almy, Leonard Ballow	Norwich, Conn.
Als, Adolph	3819 Pine street, St. Louis, Mo.
Anderson, L. B	Norfolk, Va.
Anderson, Frank	1628 Nineteenth street NW., Washington, D. C.
Anderson, Albert	1311 H street NW., Washington, D. C.
Anderson, Joseph W	Ardmore, Pa.
Ames, H. E	3026 P street NW., Washington, D. C.
Anders, J. M	Philadelphia, Pa. (Medico-Chirurgical College).
Arwin, John S	Columbus, Ind.
Ash, William M	473 Florida avenue NW., Washington, D. C.
Ashton, Lawrence	Dallas, Tex.
Atkinson, W. B	1400 Pine street, Philadelphia.
Atkinson, I. E	605 Cathedral street, Baltimore, Md.
Austin, H. W	Marine-Hospital Service, Washington, D. C.
Ayers, Edw. A	151 East Thirty-fourth street, New York City.
Arango, G. Y	Santander, Colombia.
Bennett, T. J	Austin, Tex.
Boldt, Hermann	51 West Fifty-second street, New York City, N. Y.
Bond, Erwin D	Parkersburg, W. Va.
Borden, Henry F	Brockton, Mass.
Bowen, W. Sinclair	1531 I street NW., Washington, D. C.
Boyd, James P	Albany, N. Y.
Boyd, John C	1313 P street NW., Washington, D. C.
Boyle, C. B	1615 S street NW., Washington, D. C.
Braunwarth, A. M	Post-Graduate School Hospital, Chicago, Ill.
Briggs, A. B	Ashaway, R. I.
Briscoe, W. C	317 C street NW., Washington, D. C.
Brock, C. W. P	Richmond, Va.
Bromwell, J. R	1147 Connecticut avenue, Washington, D. C.
Brose, L. D	Evansville, Ind.
Brothers, A	162 Madison street, New York City, N. Y.
Brower, Daniel R	Chicago, Ill.
Brown, Bedford	Alexandria, Va.
Brown, Hawkins	Hustonville, Ky.
Brown, Price	Toronto, Ontario, Canada.
Brown, S. B	Fort Wayne, Ind.
Browne, Valentine	Yonkers, N. Y.
Brubaker, A. P	Jefferson Medical College, Philadelphia, Pa.
Brush, E. F	Mount Vernon, N. Y.
Brumbaugh, G. Marcus	904 Massachusetts avenue, Washington, D. C.
Bogan, Samuel W	121 G street NW., Washington, D. C.
Bryan, J. H	818 Seventeenth street NW., Washington, D. C.
Bryce	Toronto, Ontario, Canada.
Buchanan, C. M	1212 Twelfth street NW., Washington, D. C.
Baggett, John B	1920 Sixteenth street NW., Washington, D. C.
Baldy, J. M	1722 Chestnut street, Philadelphia, Pa
Baker, William H	22 Mount Vernon street, Boston, Mass.
Ball, O. D	Albany, N. Y.
Baker, Frank	1315 Corcoran street, Washington, D. C.
Baker, Henry B	726 Ottowa street, Lansing, Mich.
Baker, A. R	122 Euclid avenue, Cleveland, Ohio.
Barker, H. H	1116 H street NW., Washington, D. C.

REGISTERED MEMBERS—Continued.

Name.	Residence.
Barton, S. S	1523 Spruce street, Philadelphia, Pa.
Baruch, Simon	51 West Seventieth street, New York City, N. Y.
Baskett, John N	Hannibal, Mo.
Bates, N. L	U. S. Navy.
Beck, Carl	37 East Thirty-first street, New York City, N. Y.
Bell, A. Nelson	Brooklyn, N. Y.
Belt, E. O	1701 H street NW., Washington, D. C.
Bentley, E	Little Rock, Ark.
Bergin, Darby	Surgeon-General of Canada, Ontario, Canada.
Bemays, A. C	St. Louis, Mo.
Bey, Grant	Palais Matatin, Cairo, Egypt.
Beyer, Henry G	Annapolis, Md.
Bill, T. J	Tyler, Tex.
Billings, John S	Army Medical Museum, Washington, D. C.
Bishop, S. S	Chicago, Ill.
Blackader	236 Mountain street, Montreal, Canada.
Bleyer, J. M	118 East Sixteenth street, New York City, N. Y.
Boarman, C. W	1104 Maryland avenue SW., Washington, D. C.
Bodkin, D. G	290 Clinton avenue, Brooklyn, N. Y.
Boise, Eugene	Grand Rapids, Kent County, Mich.
Bryant, Jos. D	54 West Thirty-first street, New York City, N. Y.
Burch, J. D	Aurora, Tex.
Burnett, Swan M	1770 Massachusetts avenue NW., Washington, D. C.
Bierd, Daniel S	Binghampton, N. Y.
Burroughs, John I	Houston, Tex.
Burroughs, Silas M	82 Fulton street, New York City, N. Y.
Busey, Samuel C	901 Sixteenth street NW., Washington, D. C.
Byers, J. W	Charlotte, N. C.
Campbell, J	34 Congress street, Hartford, Conn.
Cattell, H. W	3455 Woodland avenue, Philadelphia, Pa.
Collins, Orville W	South Framingham, Mass.
Cannaday, Charles G	Roanoke City, Va.
Cahart, John W	Lampasas, Tex.
Carmona y Valle	Encarnaceon, 8, Mexico City, Mexico.
Carvello, H. D. W	Manchester, N. H.
Carr, William	35 West Forty-sixth street, New York City, N. Y.
Clairac, Dr. José	O'Reilly, 25, Habana, Cuba.
Corneau, Auguste	Port au Prince, Hayti.
Carstens, J. Henry	Detroit, Mich.
Carter, William S	807 North Forty-first street, Philadelphia, Pa.
Carter, H. R	U. S. Marine-Hospital Service, Washington, D. C.
Cartwright, Silas S	Roxbury, Delaware County, N. Y.
Castellanos, John J	72 Orleans street, New Orleans.
Cerna, David	Galveston, Tex.
Chamberlin, Frank T	226 New Jersey avenue SE., Washington, D. C.
Collins, James	704 Franklin street, Philadelphia, Pa.
Chestnut, J. H. W	1757 Frankford avenue, Philadelphia, Pa.
Chittenden, Russell H	New Haven, Conn.
Claiborne, John Herbert	Petersburg, Va.
Clarke, A. P	Cambridge, Mass.
Clauser, N. D	Hartford City, Ind.
Cobb, Frederic	102 Charles street, Boston, Mass.
Cobb, William H. H	479, Goldboro, N. C.
Coe, Anton	Washington, D. C.
Cohen, S. S	219 South Seventeenth street, Philadelphia, Pa.
Cohen, Felix	38 East Sixtieth street, New York City, N.Y.
Coit, Henry L	Newark, N. J.
Cole, G. R. Lee	424 Seventh street, Washington, D. C.
Coleman, P. C	Colorado, Tex.
Collings, Samuel P	Hot Springs, Ark.
Collins, Charles Read	1125 Fourteenth street, Washington, D. C.
Comegys, Cornelius G	Cincinnati, Ohio.
Compton, William Penn	1732 K street, Washington, D. C.
Conn, G. P	Concord, N. H.

REGISTERED MEMBERS—Continued.

Name.	Residence.
Conner, Phineas S	159 Ninth street, Cincinnati, Ohio.
Contreras, Angel	Calle de J. C. Bonilla, No. 4, Puebla, Mexico.
Cook, G. W	3 Thomas Circle, Washington, D. C.
Corr, A. C	Carlinville, Macoupin County, Ill.
Corson, Jos. K	Washington barracks, D. C.
Criley, Benton H	Dallas Center, Iowa.
Cronyn, John	Buffalo, N. Y.
Crothers, Thomas D	Hartford, Conn.
Croasdale, H. T	1525 Walnut street, Philadelphia, Pa.
Culbertson, J. C	Cincinnati, Ohio.
Cunningham, Thomas E	707 Main, cor. Clinton street, Cambridge, Mass.
Curtis, H. Holbrook	New York City, N. Y.
Curtis, Frederic Colton	17 Washington avenue, Albany, N. Y.
Curtin, Roland G	Philadelphia, Pa.
Currier, Andrew F	159 East Thirty-seventh street, New York City, N. Y.
Cushing, Ernest W	168 Newbury street, Boston, Mass.
Cuthbert, W. F	1162 Rhode Island avenue, Washington, D. C.
Cutler, William E	Chelsea, Mass.
Campo, Juan Martinez del	Alcaicerea 15, City of Mexico.
Connell, A. J	133 Lackawanna avenue, Scranton, Pa.
Carbee, Samuel Powers	Haverhill, N. H.
Chisolm, Julian J	114 West Franklin street, Baltimore, Md.
Dabney, William C	University Station, Va.
Daland, Judson	319 South Eighteenth street, Philadelphia, Pa.
Davis, James C	Rochester, N. Y.
Davis, Samuel T. D	Lancaster, Pa.
Darby, J. I	Americus, Ga.
Daly, John S	520 Thirteenth street NW., Washington, D. C.
Dawson, Wm. J. G	St. Helena, Napa County, Cal.
Day, Mary C. G	25 J block, Wichita, Kans.
de Roaldes, A. W	136 Grovier street, New Orleans, La.
Dougall, William	507 Union street, Joliet, Ill.
Douglas, George	Oxford, Chenany & Co., New York, N. Y.
Donnally, William	1022 Fourteenth street, Washington, D. C.
Donohue, Florence	1134 Eighth street NW., Washington, D. C.
Drew, C	Jacksonville, Fla.
Driscoll, W. E	525 East Main street, Muncie, Ind.
Ducum, Francis X	810 Broad street, Philadelphia, Pa.
Dufour, Clarence R	1009 H street, Washington, D. C.
Duhring, Louis A	Philadelphia, Pa.
Dye, Hobart S	1103 L street NW., Washington, D. C.
Dean, G. E	Scranton, Pa.
Delavan, Prof. D. B	1 East Thirty-third street, New York City, N. Y.
Desaussure, R. G	62 Hasell street, Charleston, S. C.
de Schweinitz, E. A	Cosmos Club, Washington, D. C.
Dewees, William B	Salina, Saline County, Kans.
de Yta, Jose M	Pueblo, Mexico.
Duenās, Joaquin	San Miguel 75, Habana, Cuba.
Dixon, H. T	704 Fulton avenue, Evansville, Ind.
Doubleday, Chas. E	Penn Yan, Yates County, N. Y.
Dumeswil, A. H. O	1 North Broadway, St. Louis, Mo.
Davis, Josephine Griffith	132 West Twelfth street, New York City.
Duffy, Charles	Newbern, N. C.
Dolan, Wm. K	Scranton, Pa.
Earley, Charles R	Ridgway Pa.
Edson, Cyrus	9 W. Forty-ninth street, New York, N. Y.
Early, Thomas B	1228 Fairmount avenue, Philadelphia, Pa.
Edebohls, George M	198 Second avenue, New York, N. Y.
Eddy, W. J	Shelbyville, Ill.
Edwards, Landon B	Richmond, Va.
Eliot, Llewellyn	1106 P street, Washington, D. C.
Eliot, Johnson	1417 N street, Washington, D. C.
Elliott, William H	Savannah, Ga.
Ernst, Harold C	Boston, Mass.

REGISTERED MEMBERS—Continued.

Name.	Residence.
Evans, George	133 W. Thirty-fourth street, New York, N. Y.
Evans, Warwick	1105 Ninth street, Washington, D. C.
Eyler, Charles H	Belize, British Honduras.
Elmer, Henry W	Bridgeton, N. J.
Engleman, George J	St. Louis, Mo.
Farnham, Robt	1103 M street, Washington, D. C.
Fell, Geo. E	72 Niagara street, Buffalo, N. Y.
Fenwick, Jos. B	181 Chestnut street, Chelsea, Mass.
Finley, M. F	1928 I street, Washington, D. C.
Finn, C. G	Hempstead, N. Y.
Finney, Frank	La Junta, Colo.
Fiske, Sam'l A	37 Eighteenth avenue, Denver, Colo.
Fitz, Reginald H	18 Arlington street, Boston, Mass.
Fitzpatrick, T. V	136 W. Eighth street, Cincinnati, Ohio.
Flanders, Chas. F	Manchester, N. H.
Flich, Lawrence F	736 Pine street, Philadelphia, Pa.
Fletcher, M. H	65 W. Seventh street, Cincinnati, Ohio.
Ford, De Saussure	Augusta, Ga.
Formento, Felix	New Orleans, La.
Forster, Otto E	1515 Washington avenue, St. Louis, Mo.
Forward, J. L	Chester, Pa.
Forward, Wm. H	U. S. Soldiers' Home, Washington, D. C.
Foster, R. A	2029 Q street, Washington, D. C.
Frank, Jacob	17 Lincoln avenue, Chicago, Ill.
Frankhauser, F. W	Reading, Pa.
Franzoni, Chas. W	605 I street, Washington, D. C.
Frazier, Wm. A	Staunton, Va.
Fry, Wm. H	1826 Jefferson Place, Washington, D. C.
Fuller, Wm	Grand Rapids, Mich.
Frey, C. L	Scranton, Pa.
Fullerton, Erskine B	Columbus, Ohio.
Foster, W. S	133 Wylie avenue, Pittsburg, Pa.
Greenley, Thomas B	Meadow Lawn, Jefferson County, Ky.
Grinder, Geo. W	923 Ninth street, NW., Washington, D. C.
Guiteras, Daniel M	Hotel Richmond, Washington, D. C.
Gable, I. C	York, Pa.
Gad, Prof. J	Berlin S. W., Grossbeerenstr 67.
Greene, C. T	Castile, Wyoming County, N. Y.
Gorgas, A. C	Museum of Hygiene, Washington, D. C.
Gurlich, S. M	316 State street, Fairfield County, Conn.
Guiteras, Ramon	79 West Fifty-fourth street, New York City, N. Y.
Garcelon, Alonzo	Lewiston, Me.
Garcia, Eduardo R	13 San Jose de Garcia, Mexico City.
Garde, La Louis A	U. S. A. Hospital, Jackson Park, Chicago, Ill.
Gardner, Joseph	Bedford, Ind.
Garrigues, Henry J	155 Lexington avenue, New York City, N. Y.
Gardner, William	109 Union avenue, Montreal, Canada.
Gaviño, Angel	Corbatana, 6, Mexico City, Mexico.
Garciadiego, S	Guadalajara, Santuario 8, Mexico.
Garces, A	Popayan, Rep. of Colombia, del Cauca Colombia Republic.
Gilles, V. L	Port au Prince, Haiti.
Gibbons, Richard H	435 Wyoming avenue, Scranton, Pa.
Gihon, A. L	U. S. Navy.
Goss, Ossian W	Laconia, N. H.
Goss, I. H	Athens, Clarke County, Ga.
Gotthiel, William S	25 W. Fifty-third street, New York City, N. Y.
Gould, George M	Philadelphia, Pa.
Graham, D. W	672 W. Monroe street, Chicago, Ill.
Graves, Amos	San Antonio, Tex.
Greene, T. C	Chicago, Ill.
Greenleaf, R. W	561 Boylston street, Boston, Mass.
Gundry, R. F	Catonsville, Baltimore County, Md.
Gunnell, R. H	1727 Q street, Washington, D. C.

REGISTERED MEMBERS—Continued.

Name.	Residence.
Gutierrez, Manuel	Mexico City, 2a Aduana Vieja 12, Mexico.
Gillmer, Maurice W	1618 S. Broad street, Philadelphia, Pa.
Heiberger, Ida J	722 Eighteenth street, Washington, D. C.
Henderson, G	817 T street, Washington, D. C.
Herbert, J Fred'k	1313 Arch street, Philadelphia, Pa.
Herff, F	San Antonio, Tex.
Hernandez, Juan	San Juan, Porto Rico.
Hibberd, J. F	Indiana.
Hill, E. A	East Killingly, Conn.
Hobbs, A. G	Atlanta, Ga.
Hobby, C. M	Iowa City, Iowa.
Hodge, C. F	Worcester, Mass.
Hoff, J. Van R., U. S. A	Governors Island, N. Y.
Hoffman, R. C	Oskaloosa, Iowa.
Hogue, W. P	Charleston, W. Va.
Holden, R. J	802 Sixth street, Washington, D. C.
Holmes, B	104 East Fortieth street, Chicago, Ill.
Holmes, J. B. S	Rome, Ga.
Holton, H. D	Brattleboro, Vt.
Homan, G	St. Louis, Mo.
Hoover, T. C	Columbus, Ohio.
Hopkins, J. G	Thomasville, Ga.
Howitt, H	Guelph, Ontario, Canada.
Hubbell, A. A	Buffalo, N. Y.
Hughes, C. H	St. Louis, Mo.
Hummel, A. L	Philadelphia, Pa.
Huntington, D. L., U. S. A	Surgeon-General's Office, Washington, D. C.
Hutchinson, W. F	Providence, R. I.
Hyatt, F	1228 Seventeenth street, Washington, D. C.
Heffron, Jno. L	Syracuse, N. Y.
Holmes, Christian R	Cincinnati, Ohio.
Harvie, Lewis E	Danville, Va.
Hansell, Howard F	251 S. Sixteenth street, Philadelphia, Pa.
Hunt, Joseph H	1085 Bedford avenue, Brooklyn, N. Y.
Hamilton, Jno. B	Room 20, Post-office building, Chicago, Ill.
Hamilton, Hugh	212 Second street, Harrisburg, Pa.
Hamlin, Chas. W	Middleville, Herkimer County, N. Y.
Hammer, Robt. B	Greensburg, Pa.
Hammond, W. A	Thirteenth and Princeton street, Washington, D. C.
Handy, W. E	300 A street SE., Washington, D. C.
Hare, H. A	222 S. Fifteenth street, Philadelphia, Pa.
Harris, Philander A	Paterson, N. J.
Harrison, Geo. Byrd	605 Fourteenth street NW., Washington, D. C.
Hart, Ernest	Donegal Castle, London, England.
Hart, Mrs. Ernest	Do.
Hatch, Jas. H	1011 Pine street, San Francisco, Cal.
Hayes, Henry L	Cor. First and B streets NE., Washington, D. C.
Haynes, Irving P	316 E. Eighty-sixth street, New York, N. Y.
Haywood, Edmund B	Raleigh, N. C.
Hazan, D. H	407 Sixth street SW., Washington, D. C.
Haehnlen, W. Frank	1121 N. Broad street, Philadelphia, Pa.
Hughes, W. E	3726 Baring street, Philadelphia, Pa.
Hammond, Graeme Monroe	58 W. Forty-fifth street, New York, N. Y.
Hulohizer, Allen H	Pennsylvania.
Ill, Edward J	Newark, N. J.
Ingalls, E. Fletcher	36 Washington street, Chicago, Ill.
Inglis, David	Detroit, Mich.
Irwin, R. J. D	U. S. Army, Chicago, Ill.
Jackson, Edward	215 S. Seventeenth street, Philadelphia, Pa.
Jackson, Jabez N	Kansas City, Mo.
Johnson, H. L. E	1400 L street NW., Washington, D. C.
Jenkins, William T	Health Office, New York, N. Y.
Johnson, Robert W	101 W. Franklin street, Baltimore, Md.
Jover, Antonio	University of Havana, Havana, Cuba.

REGISTERED MEMBERS—Continued.

Name.	Residence.
Johnson, Walter B	Paterson, N. J.
Johnson, Joseph Tabor	1728 K street NW., Washington, D. C.
Jacobs, W. C	Akron, Ohio.
Jacobi, A	New York.
Kemp, Dean G	Montpelier, Vt.
Kelly, Elijah S	Minneapolis, Minn.
Kelly, George M	Washington, Pa.
Kemp, George T	Johns Hopkins University, Baltimore, Md.
Keyser, Peter D	Philadelphia, Pa.
Kingsbury, Albert D	Needham, Mass.
Kollock, Charles W	Charleston, S. C.
Kent, Richard W	Eureka Mills, Cal.
Ketchum, George A	7 N. Conception, Mobile, Ala.
King, James K	Watkins, N. Y.
King, A. F. A	1315 Massachusetts avenue, Washington, D. C.
Kirwan, George H	Wilkes Barre, Pa.
Klienschmidt, C. H. A	3045 N street, Washington, D. C.
Klinedinst, J. Ferd	York, Pa.
Knapp, J. Rollo	New Orleans, La.
Knox, William F	McKeesport, Pa.
Koser, Simon S	Williamsport, Pa.
Lagleyze, Pedro	Buenos Ayres, Argentine Republic.
Lopez, Enrique	Apartado, 273, Havana, Cuba.
Laine, Damaso	Media, Pa.
Lamb, Daniel S	Army Medical Museum, Washington, D. C.
Lancaster, F. M	Wayside, Md.
Laplace, Ernest	Philadelphia, Pa.
Larrabee, Jno. A	Louisville, Ky.
Latham, Henry W	Latham, Mo.
Lautenbach, Louis J	1723 Wayland street, Philadelphia, Pa.
Latimer, Thos. S	103 W. Monument street, Baltimore, Md.
Lavista, Rafael	1ª de Independencia, Mexico City, Mex.
Lawler, William P	60 Andover street, Lowell, Mass.
Lee, Benj	Care Executive Mansion, Harrisburg, Pa.
Leech, D. Olin	631 Maryland avenue NE., Washington, D. C.
Leech, Frank	Children's Hospital, Washington, D. C.
Lehlbach, Chas., jr	Newark, N. J.
Leighton, Nathaniel W	143 Taylor street, Brooklyn, N. Y.
Lewis, Eugene R	Kansas City, Mo.
Liceaga, E	San Andres 4, Mexico City, Mexico.
Lincoln, Nathan S	1514 H street N. W., Washington, D. C.
Love, J. W. C	Mexico City, Mexico.
Lowe, Geo. N	Randall, Kans.
Lowman, John H	441 Prospect street, Cleveland, Ohio.
Lindsley, Chas. A	New Haven, Conn.
Loboi, David	Professor of physiology, University of Caracas, Caracas, Venezuela.
Logan, Jas. E	Kansas City, Mo.
Love, Louis F	Philadelphia, Pa.
Love, I. N	St. Louis, Mo.
Lucas, V. C	1101 Pearl street, Cleveland, Ohio.
Lewis, R. H	Raleigh, N. C.
Lovell, Chas. E	Whitman, Mass.
Loring, Francis B	1420 K street, Washington, D. C.
Mackenzie, Jno. N	Johns Hopkins University, Baltimore, Md.
Marvel, Philip	Atlantic City, N. J.
Macallum, A. B	Toronto University, Toronto, Canada.
Macdonald, Henry	Woodhaven Junction, Long Island, N. Y.
Macdonald, Willis G	Albany, N. Y.
Mackall, Louis, jr	U. S. Army, Washington, D. C.
MacKinnon, Angus	Professor of oratario, Guelph, Canada.
Maclean, Donald	Detroit, Mich.
Macouzet, Rogue	Mexico City, Mexico.
Magruder, G. L	815 Vermont avenue NW., Washington, D. C.

REGISTERED MEMBERS—Continued.

Name.	Residence.
Mahoney, Stephen A	Holyoke, Mass.
Manley, Thos. W	302 W. Fifty-third street, New York, N. Y.
Miranda, Ramon L	319 W. Forty-sixth street, New York, N. Y.
Y'Marti, Tomas Casas	Havana, Cuba.
Marcy, Henry O	180 Commonwealth street, Boston, Mass.
Marmion, W. V	Washington, D. C.
Marin, Francisco	Infantes 11, Puebla, Mexico.
Martin, Hugh	Prince Edward Island, Canada.
Mayer, Oscar J	SW. corner Gary and Octavia Streets, San Francisco, Cal.
Massey, G. Betton	212 S. Fifteenth street, Philadelphia, Pa.
Matas, Rudolph	72 S. Rampart street, New Orleans, La.
Mathiot, Edward B	Westinghouse Building, Pittsburg, Pa.
Mattison, J. B	Brooklyn, N. Y.
Maury, Richard B	273 Beale Street, Memphis, Tenn.
Maxey, F. E	18 Iowa Circle, Washington, D. C.
Maxson, Willis H	St. Helena, California.
Mays, Thomas J	1829 Spruce Street, Philadelphia, Pa.
Mendizabal, G	Orizaba, San Miguel NE., Vera Cruz, Mexico.
Merrick, Samuel K	813 Eutaw street, Baltimore, Md.
Mitchell, James H	Cohoes, N. Y.
Miller, Adolph W	400 N. Third street, Philadelphia, Pa.
Miller, Abner M	Lancaster County, Bird-In-Hand, Pa.
Miller, David P	Huntingdon, Pa.
Milliken, Samuel E	36 W. Fifty-ninth street, New York, N. Y.
Miles, Franklin	1315 Masonic Temple, Chicago, Ill.
Mills, Chas. K	1909 Chestnut street, Philadelphia, Pa.
Mitchell, Giles S	Cincinnati, Ohio.
Monjaros, J. E	Cinco de Mayo 2, San Luis Potosi, Mexico.
Montgomery, E. E	1715 Walnut street, Philadelphia, Pa.
Montizambert, Frederick	Quebec, Canada.
Moran, Jno. F	2120 Pennsylvania avenue, Washington, D. C.
Morgan, Jas. Dudley	919 Fifteenth street NW., Washington, D. C.
Muñoz, Louis G	Libertad No. 7, Chihuahua, Mexico.
Muñíz, Manuel A	Lima, Peru.
Murdoch, Jas. Bissett	Pittsburg, Pa.
Mosher, Eliza M	196 Jovaleman street, Brooklyn, N. Y.
Mullen, Alex J	Michigan City, Ind.
Mullinnix, L. P	Astoria, Oreg.
Muncaster, S. B	1510 H street NW., Washington, D. C.
Murray, T. Morris	730 Seventeenth street NW., Washington, D. C.
Musser, J. H	406 Locust street, Philadelphia, Pa.
Montgomery, Edmund B	Quincy, Ills.
Morse, Fred. Harris	Melrose, Mass.
Morris, Robert T	133 W. Thirty-fourth st., New York, N. Y.
Murray, Robert A	235 W. Twenty-third street, New York, N. Y.
Muncaster, Magruder	1510 H street NW., Washington, D. C.
Mundell, John H	1022 Eighteenth street, NW., Washington, D. C.
Murphy, J. B	911 Venetian Building, Chicago, Ill.
McArdle, Thomas E	821 Sixteenth street NW., Washington, D. C.
McCall, Hugh	Lapeer, Mich.
McCowen, Jennie	Davenport, Iowa.
McCann, Joseph D	Monticello, Ind.
McCosh, Andrew J	600 Madison avenue, New York, N. Y.
McDaniel, Edward D	Mobile, Ala.
McFarland, Joseph	1314 Franklin street, Philadelphia, Pa.
McFarland, Solomon F	Binghamton, N. Y.
McKie, T. Jefferson	Woodlawn, S. C.
McLain, John S	1921 N street NW., Washington, D. C.
McLaughlin, James W	Austin, Tex.
McLaughlin, Thomas N	1226 N street NW., Washington, D. C.
McMahon, C. Agness	Evansville, Ind.
McMurtry, Lewis S	231 Chestnut street, Philadelphia, Pa.
McRae, Floyd W	63½ Whitehall street, Atlanta, Ga.

REGISTERED MEMBERS—Continued.

Name.	Residence.
McShane, James F	City Hall, Baltimore, Md.
McComas, Josiah Lee	Oakland, Md.
Noble, Chas. P	Philadelphia, Pa.
Nash, Francis S	909 Sixteenth street NW., Washington, D. C.
Neff, John	701 Carrollton avenue, Baltimore, Md.
Nelson, Wolfred D. E	Astor House, New York, N. Y.
Noble, Henry Bliss	1324 New York avenue, Washington, D. C.
Noriega, Tomas	Hospital de Jesus, Mexico City, Mexico.
Norris, Albert Lane	Cambridge, Mass.
Norris, Milton D	Catonsville, Md.
Nagle, John T	Health department, New York City, N. Y.
Northrop, Geo. J	Marquette, Mich.
Novy, Frederick G	University of Michigan, Ann Arbor, Mich.
Nelson, Hugh T	Charlottesville, Va.
Ober, Geo. C	210 B street SE., Washington, D. C.
Ortiz, Rafael	San Miguel No. 236, Havana, Cuba.
Osio, M. T	Fuen Corrall 57, Madrid, Spain.
Oenslager, John, jr	Harrisburg, Pa.
O'Daniel, William	Atlanta, Ga.
Orvaños, Domingo	Chavarria 25, Mexico City, Mexico.
Otl, Isaac	Easton, Pa.
Opie, Thomas	219 W. Monument street, Baltimore, Md.
Osler, William	Johns Hopkins University, Baltimore, Md.
Owen, Abraham M	Evansville, Ind.
Owings, Thomas B	Ellicott City, Md.
Outerbridge, Thaddeus A	Bermuda.
Portuondo, A. J	Santiago de Cuba, Cuba.
Padilla, Juan	Guatemala City, Guatemala.
Page, Chas	U. S. Army, Governors Island, N. Y.
Pancoast, Wm. N	Philadelphia, Pa.
Park, J. Walter	Harrisburg, Pa.
Parker, Chas. B	564 Euclid avenue, Cleveland, Ohio.
Parsons, Mary	Washington, D. C.
Patton, Geo. F	312 Camp street, New Orleans, La.
Pepper, William	1811 Spruce street, Philadelphia, Pa.
Perry, Geo. N	1524 Fourteenth street NW., Washington, D. C.
Phillippo, James Cecil	Kingston, Jamaica.
Page, Isham R	1206 Linden avenue, Baltimore, Md.
Phinney, Lorenzo N	26 West avenue, Norwalk, Conn.
Postle, James Martin	Hinckley, Ill.
Pierson, William	13 Hillyer street, Orange, N. J.
Pilcher, L. S	145 Gates avenue, Brooklyn, N. Y.
Pitner, F. R	Fairfield, Ill.
Palmer, Lewis M	South Framingham, Mass.
Pile, Mayne M	1230 Fourteenth street NW., Washington, D. C.
Parendes, Guillermo Vargas	Bogota, Cawera 7, 638, Colombia, South America.
Plummer, Richard Henry	652 Mission street, San Francisco, Cal.
Pollitzen, Sigmund	21 W. Fifty-second street, New York, N. Y.
Polok, John Osborn	25 Seventh avenue, Brooklyn, N. Y.
Politzer, Adam	Vienna, Austria.
Porteaus, James G	Poughkeepsie, N. Y.
Powell, Thomas E	Evansville, Ind.
Prentiss, D. Webster	1101 Fourteenth street NW., Washington, D. C.
Prewitt, T. F	3101 Pine street, St. Louis, Mo.
Probst, Chas. O	Columbus, Ohio.
Quimby, Isaac N	City Hospital, Jersey City, N. J.
Rake, Beaver	Trinidad, British West Indies.
Randall, Edw	Galveston, Tex.
Ravogh, Augustus	88 W. Seventh street, Cincinnati, Ohio.
Redfield, Paul I	161 Benefit street, Providence, R. I.
Redmond, Henry	1224 Walnut street, Philadelphia, Pa.
Reed, John G	Elmwood Place, Cincinnati, Ohio.
Reed, Chas. A. L	311 Elm street, Cincinnati, Ohio.
Reeser, Howard I	Reading, Pa.

REGISTERED MEMBERS—Continued.

Name.	Residence.
Regensburger, Alfred E	San Francisco, Cal.
Reichert, Edw. T	Philadelphia, Pa.
Rauch, John H	Chicago, Ill.
Renner, Wm. S	361 Pearl street, Buffalo, N. Y.
Renshaw, Frank G	Pensacola, Fla.
Reyburn, Robt	Washington, D. C.
Remington, Jos. P	Philadelphia, Pa.
Rivero-Saldivia, H	Caráeas, Venezuela.
Reyaud, L. F	24 Barone street, New Orleans, La.
Richardson, C. W	1102 L street, Washington, D. C.
Risley, S. D	1722 Walnut street, Philadelphia, Pa.
Richardson, A. B	Columbus, Ohio.
Richardson, M. H	224 Beacon street, Boston, Mass.
Roberts, J. B	1627 Walnut street, Philadelphia, Pa.
Rusby, H. H	209 E. Twenty-third street, New York, N. Y.
Rockwell, A. D	113 W. Thirty-first street, New York City, N. Y.
Roddick, Thos. G	80 Union avenue, Montreal, Canada.
Roe, John O	Rochester, N. Y.
Rohé, Geo. H	Catonsville, Md.
Roher, Geo. R	Lancaster, Pa.
Rost, Eliza H	26 Central Music Hall, Chicago, Ill.
Rost, Edw. K	Hartford, Conn.
Rotch, J. N	Boston, Mass.
Rudgles, Chas. A	Stockton, Cal.
Rubin, Luis H	1 Tacon street, Havana.
Resquez, Francisco A	Caráeas, Venezuela.
Ruiz, Luis E	Calle Norte, 11 N.,316, Mexico City.
Rutherford, Jacob C	14 Franklin street, Providence, R. I.
Ryan, Frank G	3739 Brown street, Philadelphia, Pa.
Rowe, M	Laurel, Md.
Salicrup, Pedro J	129 E. Seventeenth street, New York, N. Y.
Sellman, Wm. A. B	Baltimore, Md.
Saumer, A. J. C	103 State street, Chicago, Ill.
Satterlee, Richard H	Easton, Md.
Savage, Gile C	Nashville, Tenn.
Sayre, Reginald H	285 Fifth avenue, New York, N. Y.
Schapps, John C	498 Bedford avenue, Brooklyn, N. Y.
Schavoer, F	8 Atlantic street, Stamford, Conn.
Scott, Jos. F	1311 Connecticut avenue, Washington, D. C.
Scudder, Chas. L	1 Marlboro street, Boston, Mass.
Septein, Manuel	Queretaro, Mexico.
Shakepeare, Edw. O	Rosemont station, near Philadelphia, Pa.
Sharer, John P	634 John street, Little Falls, N. Y.
Shotwell, Alfred N	Mount Clemens, Mich.
Sibbet, Robert L	Carlisle, Pa.
Sayfried, Chas. A	Newport, R. I.
Skinner, Barton D	Greenport, N. Y.
Slaughter, John Phillip	The Plain, Va.
Steman, Christian B	Fort Wayne, Ind.
Sloane, Robert T	1235 Grant avenue, Kansas City, Mo.
Small, J. Frank	135 E. Market street, York, Pa.
Smart, Chas	U. S. Army, Surgeon-General's Office.
Smith, A. R. G	North Whitefield, Me.
Smith, Arthur L	250 Bishop street, Montreal, Canada.
Smith, Allen J	Galveston, Tex.
Smith, Thos. J	Bridgeton, N. J.
Smith, Robert W. B	Seaford, Ontario.
Simon, Geo. E	Unknown.
Smith, S. McCuen	1502 Walnut street, Philadelphia, Pa.
Smith, S. Lewis	64 W. Fifty-sixth street, New York, N. Y.
Smith, Thos. C	1133 Twelfth street, Washington, D. C.
Sawyer, Jno. P	122 Euclid avenue, Cleveland, Ohio.
Snellen, Herman, jr	The Netherlands.
Snyder, Dan'l	Scio, Ohio.

REGISTERED MEMBERS—Continued.

Name.	Residence.
Solly, Sam'l E	2 N. Cascade avenue, Colorado.
Summers, Jno. E	344 North avenue. Cambridge. Mass.
Sothoron, Elmer	1921 I street, Washington, D. C.
Sothoron, Jas. T	1917 I street, Washington, D. C.
Spackman, Mary D	1634 Sixteenth street. Washington, D. C.
Sprigg, Wm. M	911 H street, Washington. D. C.
Suddarth, Jos. L	821 N. Capitol street. Washington, D. C.
Suter, A. Walter	Herkimer, N. Y.
Summers, Geo. H	3321 N. Broad street, Philadelphia, Pa.
Sutherland, Chas	1517 Rhode Island avenue, U. S. Army.
Stamm, G	St. Paul, Minn.
Stanton, Bryon	157 Dayton street, Cincinnati. Ohio.
Stearns, H. P	Hartford, Conn.
Sternberg, Geo. M	War Department, Washington, D. C.
Stewart, Jas. A	1611 John street, Baltimore, Md.
Stevenson, Sarah H	322 N. State street, Chicago, Ill.
Stewart, David D	2620 N. Fifth street, Philadelphia, Pa.
Stiles, Chas. W	U. S. Agricultural Department, Washington, D. C.
St. John, David	Hackensack, N. J.
Stone, I. S	Washington, D. C.
Stover, Chas	Amsterdam, N. J.
Stowell, Chas	1326 New York avenue, Washington, D. C.
Stoner, Geo. W	U. S. Marine-Hospital Service.
Street, Dan'l B	1102 Ninth street, Washington. D. C.
Strout, A. O	Parkersburg. Iowa.
Smith, J. Gardner	307 Lenox avenue, New York City, N. Y.
Stevens, Geo. T	33 W. Thirty-third street, New York City.
Taft, Jonathan	Cincinnati, Ohio.
Tait, T. Oliver	18 Marietta street, Rochester, N. Y.
Talbot, Eugene S	125 State street. Chicago, Ill.
Talbot, Robt. W	1111 F street, Washington, D. C.
Taylor, Henry S	201 West Fifty-fourth street. New York, N. Y.
Teschner, Jacob	134 East Sixty-first street. New York, N. Y.
Thomas, A. J	Evansville, Ind.
Thompson, J. Ford	804 Seventeenth street. Washington, D. C.
Thompson, Jas. F	Fredericksburg, Va.
Thorner, Max	141 Garfield Place. Cincinnati, Ohio.
Thorndike, August	Boston, Mass.
Tiffany, Flavel B	College of Kansas City, Mo.
Tillman, Wm	La Crosse, Wis.
Tompkins, Edmund Lee	Washington. D. C.
Tracy, Edw. A	Boston, Mass.
Trader, John W	Sedalia, Mo.
Travis, Wm. A	Covington, Ga.
Tryon, J. R	Surgeon-General, U. S. Navy.
Turnbull, Lawrence	1719 Chestnut street, Philadelphia, Pa.
Turton, Robt. S	Browntown P. O., Jamaica, West Indies.
Tuttle, Albert Henry	735 Main street. Cambridge. Mass.
Tyner, T. J	Austin, Tex.
Tyson, James	1506 Spruce street, Philadelphia, Pa.
Upshaw, J. N	206 East Grace street, Richmond. Va.
Ulloa, Juan	San Jose, Costa Rica.
Valentine, Ferd. C	1214 Broadway, New York. N. Y.
Valk, Francis	163 East Thirty-seventh street, New York. N. Y.
Van Cott, Joshua M	122 Joralemon street, Brooklyn, N. Y.
Vance, Wm. K	Bristol, Tenn.
Vander Veer, Albert	Albany, N. Y.
Van Rensselaer, John	1023 Connecticut avenue, Washington, D. C.
Vaughan, B. A	Mississippi.
Vaughan, Geo. Tully	U. S. Marine-Hospital Service. District of Columbia.
Vaughan, Victor, C	University of Michigan, Ann Arbor, Mich.
Verdin, Wm. W	Lapidum, Md.
Vincent, T. N	1221 N street, Washington, D. C.
Wade, J. Percy	Catonsville, Md.

REGISTERED MEMBERS—Continued.

Name.	Residence.
Wallace, James	121 North Sixteenth street, Philadelphia, Pa.
Walton, J. Roland	700 Tenth street, Washington, D. C.
Williams, Aurthur	Elk Ridge, Md.
Wilson, Jefferson H	Beaver, Pa.
Weld, Geo. W	New York, N. Y.
Warren, John C	58 Beacon street, Boston, Mass.
Watson, Irving A	Concord, N. H.
Weidman, W. Murray	Reading, Pa.
Weigel, Louis A	Rochester, N. Y.
Welch, Wm. H	Baltimore, Md.
Welch, Wm. M	821 North Broad street, Philadelphia, Pa.
Wellington, J. R	1159 Fourteenth street, Washington, D. C.
Wells, Brooks H	71 West Forty-fifth street, New York, N. Y.
Wende, Ernest	171 Delaware avenue, Buffalo, N. Y.
Wentz, Alexander C	Hanover, Pa.
West, Geo. Wm	1102 Fourteenth street, Washington, D. C.
West, Edw. Graeff	630 Warren street, Boston, Mass.
West, Hamilton A	Galveston, Tex.
Wilson, J. T	Sherman, Tex.
Williams, Jacob Lafayette	1 Mount Vernon street, Boston, Mass.
Wilding, Robt. J	Malone, N. Y.
Wilcox, Jas. C	Darlington C. H., S. C.
Williams, William J	Adel, Iowa.
Wolfe, John L	1313 New York avenue, Washington, D. C.
Wolfe, John R	Glascow, Scotland.
Wood, Albert	67 Pleasant street, Worcester, Mass.
Wood, Casey Albert	103 East Adam street, Chicago, Ill.
Woodcock, Galen Murray	5 Adam street, Bangor, Me.
Woodruff, Chas. E	Assistant Surgeon, U. S. Army.
Woodward, Wm. C	125 New York avenue, Washington, D. C.
Worrell, J. W	Brownsville, Pa.
Wilson, Jas. C	1437 Walnut street, Philadelphia, Pa.
Woods, Hiram	816 Park avenue, Baltimore, Md.
Wilson, W. Reynolds	1633 Locust street, Philadelphia, Pa.
Watkins, Robt. L	320 West One hundred and forty-fifth street, New York, N. Y.
Ybarra, A. M. F	194 West Tenth street, New York, N. Y.
Yeaza, J. Ramon	City of Mexico.
Young, A. G	Augusta, Me.
Young, Henry Byrd	Burlington, N. Y.
Zavola, Juan	Guadalajara, Mexico.
Zinke, E. Gustav	85 Garfield Place, Cincinnati, Ohio.
Zweighaft, Bernard	Philadelphia, Pa.
Ziegler, S. Lewis	1504 Walnut street, Philadelphia, Pa.

PROCEEDINGS OF THE GENERAL SESSIONS.

ADDRESS BY DR. FRANCISCO A. RÍSQUEZ, OF VENEZUELA.
ADDRESS BY THE PRESIDENT OF THE CONGRESS, DR. WILLIAM PEPPER, OF PHILADELPHIA.

REPORT OF THE INTERNATIONAL EXECUTIVE COMMITTEE.

Resolved, That the International Executive Committee, on the behalf of the Pan-American Medical Congress, disclaims responsibility for the views expressed by any individual contributor to its proceedings. *Proceedings of the International Executive Committee, Washington, D. C., September 7, 1893.*

FIRST GENERAL SESSION.

SEPTEMBER 5, 1893.

Dr. WILLIAM PEPPER: The Right Rev. William Paret, D. D., Bishop of Maryland, will invoke the blessing of Almighty God upon the proceedings of this Congress.

The Right Rev. WILLIAM PARET, D. D. Let us pray.

Our Father who art in heaven, hallowed be Thy name. Thy kingdom come on earth as it is in heaven. Give us this day our daily bread, and forgive us our trespasses as we forgive those who trespass against us; and lead us not into temptation, but deliver us from evil: For Thine is the kingdom, the power, and the glory, forever and ever. Amen.

Almighty Father, by whose will and wisdom it is that medicines have power to heal and men have the will and skill to use them, who madest the bodies of men and gave to their minds the wonderful power to know and teach, bless, we beseech Thee, the medical learning and usefulness, and guide the consultations of those who are assembled to the glory of Thy name and the highest blessing of mankind. Lead them, we pray Thee, and make their lives and labors rich with fruitfulness and blessing. We ask for Jesus Christ's sake.

Direct us, O Lord, in all our dealings with Thy most gracious favor, and in all work begun and continued in Thee we may glorify Thy name and finally attain everlasting life through the grace of our Lord.

The grace of our Lord and the fellowship of the Holy Ghost be with us for ever more. Amen.

Dr. PEPPER. It is in accordance with the deep interest taken by the Government of the United States in the organization and success of this Congress that the honored President of the United States has kindly come this morning to exercise his function to open formally the First Pan-American Medical Congress. I have the great honor——.

President CLEVELAND. The part assigned me on this occasion admits of but few words. It, however, affords me the opportunity to say how pleased I am to be in any way related to such an assembly as this, altogether in furtherance of the highest and noblest purposes and designs. I hope I may also be permitted to add that the protection of the public health and the prevention of contagious diseases is properly discussed at the capital of a nation which appreciates as fully as ours the importance of all and everything which adds to make intercourse between civilized countries and commerce between them safe and easy. It is also fitting that those gentlemen, devoting themselves to saving human life and the alleviation of human suffering, should consider the means of reaching these beneficent ends at the seat of a Government whose greatest regard is the welfare and happiness of the individual citizen.

It only remains for me to declare this Congress of the Pan-American Medical Society open for the transaction of the business which has called it together.

Dr. ADAMS. Ladies and gentlemen: It is but fitting to state that on behalf of the citizens of Washington and the committee of arrangements of the Pan-American Congress we should select one of the most distinguished of our citizens to deliver the address of welcome. Therefore, it affords me much pleasure to introduce to you the Hon. John W. Ross, LL. D., president of the Board of Commissioners of the District of Columbia.

Hon. JOHN W. ROSS. The District of Columbia has entertained many distinguished gatherings, but it has never known such a one as I now have the honor, in the name of the local municipality, to welcome to the national capital. For the first time in the history of the New World there are assembled at one of its capitals the representatives of one of the largest and most honored of the learned professions of all the Americas. It is fitting that in the District of Columbia, which derived its name from that great discoverer, and that in the year set apart as the one in which the nations of the earth may do honor to his memory, that the Governments whose existence was made possible by his genius and daring could send their representatives to the Pan-American convention. It is in keeping also with the spirit of the age, which has prompted this gathering of representative men, that the delegates so convened should meet, not for individual or for national aggrandizement, but for the loftier purpose of extending the range of medical knowledge and for the alleviation of human suffering throughout the world. To a profession as progressive as that of medicine and surgery the results of such a conference can not be overestimated.

When we consider the vast area of surface of the globe here represented, its infinite variety of racial characteristics, of climatic conditions, and of all environments affecting health and disease, we can understand that such interchange of experience and observation was never before made possible. What may not be accomplished by the forceful men from all the Governments here represented, their plans for the enforcement of national quarantine relations, for international cooperation against the spread of infectious and contagious diseases? The municipal authorities of many of the cities of the United States are to-day vainly endeavoring to locate hospitals for the treatment of contagious diseases near enough to the centers of population to avoid the dangers incident to a long transportation of persons suffering from such diseases, and near enough to be within range of the sewer system and of an adequate water supply. It has been the common experience of all who are charged with such responsibility that the dread occasioned to those who reside in the vicinity of such proposed locations has assumed almost the proportions of a panic. If the positions maintained by many of our most eminent physicians be correct, that such hospitals when properly built and properly conducted are not likely to communicate disease to those residing near them, then the public mind should be relieved of this needless apprehension, and I venture to suggest that if this great body of experts should deem that subject worthy of its consideration there can be no doubt that the authority of the expression of its voice can do more than can be expected from any other source to educate the public mind upon this subject.

May there be, as a result of your deliberations upon all the important topics submitted to you for consideration, not only the formation and renewal of personal friendship, but a wider knowledge and a higher appreciation and a just conception of the demands of the age upon your profession. And I can not but believe that this extraordinary spectacle, this assembly of eminent physicians from all the great powers of the Western Hemisphere has a deeper significance than even the laudable one of the extension of medical knowledge among its students. Does it not indicate that benevolence and philanthropy are no longer limited by national boundaries, but that they are becoming as broad and universal as humanity itself? There will never be a time when there will be no clash of interests among the nations; but when the poor of Ireland were suffering for bread, when Chicago was desolated by fire, when Charleston and Johnstown were helpless, when the peasantry of Russia were starving, the West came in the form of material aid, ignored the terror of the seas and the boundaries of States, remembering that the stricken and suffering belong to the same great human family. New, swift means of communication are bringing the nations into closer relationship. May we not be encouraged to hope that this Pan-American Medical Convention is a forerunner of successive courses of all civilized states, whereby all the common interests of the states may be fostered and maintained. Mr. President and gentlemen, when you have as your immediate hosts all the immediate members of our profession who are our most honored and respected citizens, I beg you to be assured that the people of Columbia deem themselves honored by your having selected this as your place of meeting, and we hope to make your welcome to the capital so cordial that you may carry away with you to your distant homes, only pleasant and agreeable remembrances of the congress at Washington. I thank you for your courteous attention.

Dr. PEPPER. Members of the first Pan-American Medical Congress, ladies and gentlemen: In assuming duties devolved upon me by the choice of the executive committee, it will be my duty to address to you to-morrow evening some remarks concerning the scope of this congress, as those of us who have been working in it have comprehended it. It would, therefore, be improper for me this morning to occupy your time or detain you from the programme which has been arranged.

You know the joint resolution authorizing the invitation presented by the President of the United States has been cordially accepted by every one of the countries addressed; and, following this acceptance, there have been appointed official delegates from those countries to join us here in this congress. It is, therefore, eminently fitting that the representatives of these countries should be called to speak for the their constituency and for their respective governments. We have heard from the president and our distinguished host of Washington, D. C., how large is the work before this congress, how earnest is the hope that this congress is but the first of similar meetings to be held at different points throughout this great territory for the purpose of bringing together experts most competent to discuss and pass upon questions of enormous municipal, national, and international importance. We have called this congress a Pan-American congress. This is in accordance with race usage. Why not simply American? Are we not to-day upon the brink of that larger conception of what this great continent really is? That it is all really, truly American; that all residents upon it, from Puget Sound to the Straits of Magellan, are alike Americans, with a destiny, with international relations which necessitate national occasions, with political aspirations, which render cooperation attractive and easy. I would myself hope to see, if not at this single meeting at least at several meetings held at various parts of this continent, the American Medical Association merged into the Pan-American Congress, and see it meet in Mexico and Montreal, as well as in Washington. But these are features for the future; quite enough for the present the questions of importance to be presented in the different sections.

And now, in accordance with the programme, I shall have the honor of calling upon the several countries, and it there should be a representative here from any of them, we would be glad to hear from him what words of courteous cheer he can give us. We shall now have the pleasure of hearing from Prof. Pedro Lagleyze, of Buenos Ayres, on behalf of the Argentine Republic:

Senõr Presidente del Congreso Médico Pan-Americano—Señores: Anhelosa siempre la República Argentina, de seguir el movimiento científico determinado por los grandes centros, no ha podido vacilar un instante en corresponder á la invitación que le fué dirigida para concurrir á este acto. Si he de interpretar los sentimientos de su Gobierno, cuya representación invisto en este momento, mi primera palabra debiera ser de gratitud, una vez que se le ofrece la oportunidad de realizar sus nobles y grandes propósitos.

Las ciencias médicas, señores, como sabeis, atraviesan actualmente un periodo de evolución esforzándose sus cultores en enriquecerla dia á dia con nuevas y valiosas revelaciones, y el continente Americano no queriendo permanecer, indiferente al gran impulso dado á aquella por la Europa, ha creido llegado el momento de incorporarse ostensiblemente al movimiento, mostrando al mundo, no solamente el progreso material de sus hijos industriosos y comerciales, sino su progreso intelectual en las ciencias y en las artes.

El Congreso Médico Pan-Americano es el primer esfuerzo, que, unidos por el vínculo fraternal del continente que habitamos, hacemos en el tortuoso sendero de la medicina persiguiendo juntos los ocultos secretos de esta ciencia misteriosa.

El espíritu investigador de los genios del viejo continente ha iluminado un rincón del sendero y nos ha enseñado á marchar con la brújula de la paciente investigacion experimental.

Aprovechemos el trabajo de los viejos, juntemos nuestras observaciones, comparemos nuestros resultados, apliquemos con abnegacion nuestras jóvenes facultades persiguiendo la verdad en el estudio de la difícil ciencia, y, llevemos, sobre las tibias aguas del Gulf Stream que vivifica una gran parte del viejo mundo, el calor de nuestra inteligencia, contribuyendo al eterno fuego del espíritu de la familia humana.

Con estos votos, Señores, permitidme que yo, humilde miembro de este Congreso os ofrezca todo mi modesto concurso en mi triple carácter de Representante del Gobierno Argentino, de delegado por la Facultad de Ciencias Médicas de Buenos Aires y del Círculo Médico Argentino.

Dr. PEPPER. We shall next have the gratification of listening to the official representative of the Government of Jamaica, Dr. Phillippo, of Kingston.

Mr. PHILLIPPO. Mr. President, ladies, and gentlemen: I come before you now as a representative of a very small island lying not far off of your coast. I come from the island of Jamaica. I claim it is the earliest portion of the Western Hemisphere discovered by Christopher Columbus. Next year will make 400 years since Christopher Columbus landed upon the coast of Jamaica. He loved the island so much that he returned to it. Indeed, it is said that when a person once touches the coast of Jamaica, he is bound to go there again. Christopher Columbus there met with various misfortunes, being deserted by his followers, imprisoned, and sent home in chains.

Jamaica has now passed a stormy youth. She has been the refuge of buccaneers and pirates, and has suffered from earthquakes, and hurricanes. But she became wealthy after all, and has become what is known as the key of the Gulf of Mexico. Great Britain holds Jamaica as the key, because from that position she can command nearly all of the islands, as well as the Gulf itself. For the same reason of her geographical position the islands should be looked upon as one of the outposts of the United States. If your meteorological department had recognized the importance of this position we could have forewarned you of the advance of the recent hurricanes. As one of the outposts of America, we have also something to do with the epidemics which come to you. However, we scorn such things as "epidemics." We do not believe in them, because we have put our house in order and have drained our sewers—or are about to drain them.

We are like the Phœnix rising from its ashes. We send you not only sugar and rum, but now we are sending you that fruit which I find in your streets, the Jamaica banana, which you seem to relish very much. A large and growing capital is invested in this trade We have been visited by your medical men, and all give glowing descriptions of Jamaica. I hope to see you coming down there. Gentlemen of the Pan-American Medical Congress, I rejoice to be with you; I have much to learn sitting here at the feet of your professors, learning from them what I hope will be of use to me hereafter.

Dr. Pepper. There has been a slight change of the order of business. We have with us this morning one to whom more than to all others—I can not say to whom exclusively—is due the success of this project. It gives me the greatest pleasure to have the honor to call upon Hon. J. B. McCreary, of Kentucky, to answer briefly for the Congress of the United States.

Hon. J. B. McCreary. Ladies and gentlemen of the Pan-American Medical Congress: I came this morning only to pay my respects to this great body, and my presence was discovered only a few moments ago; I did not expect to be introduced to this great assembly, but I desire to say that it gives me much gratification and great pleasure to be with you on this occasion. The Congress of the United States passed the bill under which you are holding your meeting without hesitation, and unanimously. When the physicians of the United States seemed to desire that the physicians of the Western Hemisphere should assemble in the capital of our country, the members of the House of Representatives said, with but one voice, "We will be glad to have them with us, and we will welcome them to Washington." The Congress of the United States has in past years, through another Pan-American Congress, tried to cultivate commercial and social relations with all the republics of the Western Hemisphere. This convention follows properly that congress, and, I hope, Mr. President and gentlemen of the Pan-American Medical Congress, that this is but the beginning, and that there will be many other Pan-American medical congresses to raise the standard of health of the people, to promote as far as can be done the prosperity of the country. I hope your session in our capital will be successful. We all give you a hearty welcome, and if you should again desire any legislation from the Government of the United States, I should be very glad to be the humble instrument in trying to get it for you.

Dr. Pepper. Now I have the honor to call on a gentleman from British America, who has charge of the immensely important duty of guarding the sanitary condition of the St. Lawrence River, Dr. Montizambert.

Dr. MONTIZAMBERT. Mr. President, ladies, and gentlemen: Like the previous speaker, when I entered the building I had not the remotest idea of being called upon to address you. I regret that for one reason, but you may be assured that whenever there is an occasion of interchange of cordial expressions, or a desire of international courtesy, international coöperation, international work, British America will never need to look far for a speaker when I am present. I regret that I have not been able to devote more attention to this subject than I have, that I might take a wider view of it than I am able to this morning.

My own work is not a little severe, and you I trust will bear with me if, under the circumstances, I am obliged to confine the remarks I am to make to-day to the branch with which I am most familiar, that of hygiene and quarantine.

It was in the autumn of 1884, as far as I am aware, that the first step was made towards the international work between your Republic and the little neighbor to the north. The Government of Washington, in view of the threatening of cholera at that time, invited delegates to an international congress to be held in this city in December, 1884. I had the honor of representing my Government as a delegate on that occasion. Since then I have continued yearly to exchange information concerning the public health, and a vast amount of good has resulted from it. It is reasonable to believe that some good results will arise from this movement. I may mention as a small instance of the practical work of this national exchange the protection of our own country from the entrance of certain diseases from abroad. We have inaugurated certain means for meeting the emergency. The Government at Washington communicated with the Government of Canada with a view to sending officers to inform the people of the work carried on. This was met by our Government cheerfully, and now there are officers representing the Marine-Hospital Service of the United States who are present and are in a position to assure their Government, and through their Government the people, that the means of prevention are efficient. We work together with the utmost unanimity and cordiality. You will excuse me for giving this illustration, but it brings it down to practice, and it is practice which arises in the interchange of views that gives them their practical value. I thank you most cordially, Mr. President and gentlemen, and I can only say to you that British North America most cordially joins in the sentiment before expressed, hoping for the unqualified success of this great convention.

Dr. ULLOA, Costa Rica. Mr. President, ladies and gentlemen: I feel bound by courtesy to address you in your own language, though my speech, following upon the gentleman who has just spoken, may appear like the bringing in of a candle when the electric light is taken out, As the representative of one of the smallest Republics of the continent I salute these great Republics, expressing my earnest wishes for the continuous prosperity of this congress. I come from Costa Rica, the country from which we send you coffee and bananas in exchange for your various and valuable products. Your kindness has been so great toward all of us that we have no words to express our thanks. I wish, however, to express my best wishes for the success of the congress and the prosperity of your hospitable people.

Dr. PEPPER. In the absence of representatives at this moment from the Dominican Republic and Ecuador, I know you will join me in a cordial greeting to a representative of that body, to whose initiative and influence this congress owes its existence. I will call upon Dr. J. F. Hibberd, president-elect of the American Medical Association. [Applause.]

Dr. HIBBERD. Mr. President, ladies and gentlemen: This, somehow or other, seems to be a morning of surprises. Several of the gentlemen who have spoken before me stated they were not aware of the privilege and happiness they would have of addressing you until after they came in the room. It struck me with perfect astonishment that I should be called upon to make any remarks in the presence of other gentlemen, representing other countries, whom I supposed would be called upon to speak. However, as American citizens, all of us must be prepared for the emergencies of life, and, when great things happen to us individually, we must expect other difficulties to be made opposite the line of current events, and so is it this morning. But it gives me great pleasure to come here and greet you as an organization which had its initiative in the American Medical Association. It is very true that that association has in the past regarded itself as the parent of most of the other organizations in this country, and we, as a parent organization, love them and encourage them, and love to have them grow up in their proper spirit of good science and good morals. But I have not until this moment thought of the prospect of the coming of something which may be more extensive and perhaps wider than the American Medical Association. That is the Pan American Medical Association.

Now, we are a large country, but we acknowledge the whole continent is larger than the United States. If it turn out in the future that what has been initiated here this morning will grow and expand, as we have reason to believe it will, the American Medical Association will, perhaps, after a while have to consider itself only a part of what spreads over the whole America. I can assure you from my own feelings, as I can appreciate the feelings of the whole American Republic, if this greater organization regard us as a part, we stand ready to bow to that greater organization. We will, therefore, expect to see the congress that is inaugurated here this morning grow and extend the sphere of its scientific influence, and give renewed encouragement to the social relations existing between the nations of this continent. And we will always be glad to have you here in the United States. However, we will consider ourselves, the American Medical Association, to be the largest and best association in the world, and I heartily invite you all to meet us in San Francisco next year.

Dr. PEPPER. I will now call upon the secretary-general for his report. At some other time there must be made to the secretary a suitable expression of the gratitude due him for his foresight in formulating the suggestion and for his devotion, and ability, and tact, and patience, and faith, which have brought about this great and fully realized successful day.

Dr. C. A. L. REED. The congress as it stands to-day must constitute my report. The work of organization, which has devolved largely on the secretary-general of this congress, has been exacting in many particulars, but it has withal been an extremely pleasant task. The movement was inaugurated by drafting into the service the distinguished gentleman who presides over our deliberations to-day. The movement was next seconded by the Congress of the United States, largely through the instigation of the distinguished ex-governor of the State of Kentucky, who has addressed you this morning. It was seconded in the Senate of the United States by that grand peer of statesmen, Senator John Sherman, of Ohio. The movement was ratified in the executive circle by the President of the United States. At a later stage, when an appropriation was found necessary, the committee received the zealous and efficient support and management of that friend of progress, Senator Gorman, of Maryland. In that particular way this congress is a governmental protegé. Not only were these movements heartily seconded and heartily pushed forward in the United States, but the medical profession all over this country and all over the neighboring countries and colonies responded with an unanimity and enthusiasm, which made the work both easy and pleasant. The governments of the neighboring republics and the neighboring colonies responded and, although some of the delegates have failed to arrive to this date, in nearly all of those countries the delegates have been appointed by the government.

The work has touched and embraced every medical society from Bering Sea to the Straits of Magellan. To-day on the official manifesto of this congress you will find the names of those who have accepted offices on behalf of practically every local medical society of the Western Hemisphere, embracing a profession numbering over 150,000. The membership of this congress has been opened wide unto the medical profession, and the invitation issued has been responded to with the characteristic enthusiasm of all the American peoples. As I stated before, the formal report of the secretary-general must be found in the hand-book of the congress, which I will not endeavor to read in your presence. Thanking you all for your cooperation, I wish you Godspeed in the work before you.

Dr. PEPPER. I do not wonder that the honorable Mr. Rice referred to the medical profession of Washington. They have been taxed and taxed again, but they never fail to respond, and never has the profession of Washington come forward with more interest and zeal than in providing for the details of the actual work of this congress. I have therefore particular pleasure in calling upon the courteous chairman of the committee, Dr. Samuel S. Adams, of this city.

REPORT OF THE COMMITTEE OF ARRANGEMENTS, BY SAMUEL S. ADAMS, M. D., CHAIRMAN, WASHINGTON, D. C.

MR. PRESIDENT, LADIES AND GENTLEMEN: Before making a very short speech, I think it is but proper to state that in the formation of this congress it was necessary, for the recognition of the congress by the Government of the United States, the invitation having been extended to foreign countries to send representatives to this country, that an appropriation should come from the Congress of the United States in support of the necessary expenses that would be entailed by such an undertaking. All of us, but more particularly those of this territory, know with what difficulty appropriations are engineered through the various committees. After the recognition of this appropriation in one House, owing to other important matters, it was passed over, was ignored. It was taken up in the Senate, and those gentlemen passed it, but the final act was in the joint committee of the House and Senate, when the Hon. Arthur Gorman, of Maryland, said "we will have it," and *we have it.*

It is through the energy of Mr. Gorman that I am able to give you entertainment which will reflect credit upon the Congress which donated this money. When selected for this important position, I with some diffidence accepted the invitation of these honorable gentlemen, thinking I was not equal to the task, thinking the duties should fall upon those much older in years and experience; but they said they wanted young blood. The gentlemen selected one of the younger members of the profession for this duty. It has been the endeavor of my associates, I assure you, to present a programme satisfactory to every individual here present. While many of our seniors have been basking in the sun and playing on the sands of the seashore, we have been laboring, during the heated periods of June and July, in an attempt to complete the arrangements, in order to have the congress to move smoothly. [The doctor then made the announcements of the committee of arrangements.]

Dr. PEPPER. I would simply emphasize one point, that is sharp punctuality. The number of sections is unprecedentedly great. The one to which I would call particular attention is that of pedagogics, because the questions of education that will there be brought up will be of extreme importance.

As soon as the general session is over, the members should make up their minds as to the section they will attend, that the sections may meet with equal promptitude. Thus only will it be possible to cover the ground fully. The next item on the programme is an address by Prof. Francisco A. Rísquez, M. D., Caracas, Venezuela. There will be a general address of this character each day.

LA TERAPÉUTICA Y LA FLORA AMERICANA.

Discurso leido por d Dr. Francisco A. Rísquez.

DE CARACAS, VENEZUELA.

Aún conmueve mi espíritu la impresión producida por la noticia oficial de habérseme elegido para el discurso de orden, en esta asamblea general del primer Congreso Médico Pan-Americano. Tan alto puesto, que, discernido á una autoridad científica, le habría dado motivo de justo orgullo, asignado á quien no tiene más títulos que un entusiasmo inagotable por los estudios médicos, constituye una distinción tan abrumadora, que no encuentro como pudiera traducir mi palabra la inmensa gratitud de que me siento poseído.

Yo me reconozco, en verdad, tan pequeño para ocupar tan distinguido puesto, que no me habría resuelto á aceptarlo si no hubiese encontrado como explicármelo, y traído en mi auxilio una personalidad bastante digna para merecerlo, bastante grande para corresponderlo. Sí, Señores; yo recojo ese honor en nombre de Venezuela, la hermana cordialísima de la república de Washington; es ella quien por mis labios expresa su reconocimiento á la Comisión organizadora de este Congreso, por tal distinción, que ella recibe como el obsequio cariñoso que la noble patria del Libertador del Norte América tributa á la tierra gloriosa del Libertador de la América del Sur. Venezuela no olvidará jamás, que los organizadores de este Areópago de sabios, le han cedido el derecho de enarbolar un dia el estandarte de la medicina en las alturas de este monumento, levantado por la primogénita de la libertad americana al adelanto científico del mundo de Colón.

Y un momento más antes de comenzar. Hijo de raza hispana y casi extraño á la hermosa lengua de los descendientes de Albión, yo debiera, ya que me es forzoso dirigiros la palabra, hablaros en mi nativo idioma; pero yo me tildaría de descortés, si, por aprovecharme de la ventaja que me brinda la circunstancia de ser el español una de las lenguas oficiales de este Congreso, no me conformase con sujetaros á la necesidad de oirme, sino que os condenara, además, á la tortura de un discurso científico en un idioma desconocido para la mayor parte de vosotros. No; yo tengo que agotar mis facultades por corresponder á la esquisita galantería del Comité Ejecutivo, y fiándome por completo á vuestra benevolencia, que escusará mis defectos de lenguaje, agregaré á mis esfuerzos por agradaros, uno más: el de expresarme en inglés.

Algo habré, sin embargo, de ganar en el cambio: nacerán mis ideas pobres de todo valor intrínseco, pero las presentaré engalanadas con las bellezas que presta á la palabra vuestro dulcísimo idioma, enriquecidas con el mérito de esta lengua del Norte, que, merced al estupendo progreso que hora tras hora viene realizando esta poderosa nación, lleva camino de convertirse, en un porvenir no muy lejano, en el idioma universal del mundo culto.

Y ahora, si he de ser yo quien venga á atar con las débiles amarras de mi palabra la atención de esta asamblea; ¿dónde encontrar el tema cuyo desarrollo pueda interesarle? ¿Qué frutos podrá producir mi inteligencia, que en la vuestra no se hayan sazonado ya? ¿Qué nociones pudiera yo traer á vuestro examen, que no fueran asuntos familiares á vuestro saber?

Pero al fijarme en que es la época conmemorativa del suceso más grande que registran los anales de la humanidad, dilato mis miradas por el Continente Colombino, y deteniéndome ante la exhuberante vegetacion de su privilegiado suelo, encuentro en ella el deseado tema, que me lleva á someteros un asunto digno de la consideración de los profesores americanos aquí reunidos, como que somos todos los hijos de este Mundo Nuevo en cuyo seno germina el porvenir, y en cuyo cielo resplandece ya el astro que ha de alumbrar los caminos del progreso á las generaciones venideras.

Voy á hablaros de la Flora Americana en sus relaciones con la medicina. Pretendo hacer destilar ante vuestra memoria los tesoros que ella ha regalado á la humanidad doliente; quiero recordaros las riquezas que ella está ofreciendo al arte de curar, sin darle más trabajo que el de estender la mano para tomarlas; aspiro, en fin, á señalaros los veneros que la vegetación americana guarda para el investigador, como si fuera la flora de la América el galardón reservado por el Supremo Hacedor á los esfuerzos de la ciencia, en su lucha secular contra las enfermedades y la muerte.

Señores! La terapéutica, hija del empirismo, esclava en sus primeras edades de los caprichos del acaso y aguijoneada por las necesidades del arte, tuvo que aprovecharse de cuantos recursos le brindaba la naturaleza en sus múltiples fuentes.

Los tres reinos le abrían de par en par sus puertas, y el mineral, como el vegetal y el animal, llenaron de drogas los arsenales de la farmacología. Pero á medida que los progresos de la ciencia van haciendo luz en la materia, el reino inorgánico va cediendo su primitiva importancia al reino organizado: á los metales nobles de entonces suceden los productos vegetales de ahora; á los compuestos minerales del pasado reemplazan los alcalóides orgánicos del presente y á las preparaciones inasimilables preconizadas ayer, se sustituyen hoy los principios organizados que van á unirse con nuestras células en combinaciones biológicas.

Y en efecto, la terapéutica moderna no es la aplicación de agentes cuyo contacto parece despertar, de un modo puramente mecánico, los actos celulares, perturbándolos en su proceso; la terapéutica de hoy no basa su confianza en el cobre ó el antimonio, el oro ó el arsénico, la plata, el zinc ó el plomo, que no tienen representación en nuestro organismo, y que no pueden, por tanto, incorporarse al movimiento vital de que dependen las reacciones salutíferas.

Nó; los elementos histológicos de nuestra organización requieren principios semejantes que, asimilándoseles, puedan modificar la composición y propiedades del elemento vivo; la terapéutica de fines del siglo XIX contesta con el *similis similis* al *similia similibus* de las postrimerías del siglo XVIII, esfuerzo reaccionario provocado por el *contraria contrariis* de las épocas hipocráticas, y es, en suma, el reino organizado el que hoy levanta en alto el estandarte de la farmacología.

Sí; de los principios inorgánicos que repletan los anaqueles de los droguistas, no pueden quedar ya sino aquellos que forman parte integrante de nuestro sistema; los demás tienen que desaparecer como elementos extraños, ó quedar reducidos á sus efectos tópicos sobre las superficies con que se ponen en contacto; todo cuanto no sea principio constitutivo de nuestro organismo, está fuera de aplicación al cuerpo vivo, cuyos actos todos derivan del movimiento base de la vida: el proceso nutritivo, esto es, la asimilación, la transformación y la eliminación.

Partiendo de este punto, vemos ya la terapéutica encauzarse por una vía racional y científica, y en tres corrientes repartirse la tendencia de los modernos terapeutistas.

En Europa, donde el constante esfuerzo de las inteligencias parece ser el único aliento fecundador de aquella naturaleza relativamente estéril, agítanse los sabios en el anhelo de arrancar á las combinaciones de la química orgánica los agentes medicamentosos ; y encerrados en el laboratorio, uniendo y desuniendo átomos, reemplazando con el batallar del artificio, el espontáneo obsequio de la naturaleza, avara ya, si algún día fué generosa, con los hijos del Viejo Mundo ; y unas veces, empeñados en buscar el alivio de los sufrimientos por la supresión del dolor, ó la provocación del sueño, mientras otras, guiados por el espíritu de la época, que hace dominar el panspermismo en biología, mostrando en todas partes microorganismos como causas, y exigiendo sin tregua microbicidas como armas de combate, van dando á luz, día tras día, hipnóticos y analgésicos, antiparasitarios y antitérmicos, de los cuales gran número viven efímera existencia, se usan mientras curan, para relegarse luego á la fosa común de lo innecesario, sin dejar otro recuerdo, acaso, que la penosa gestación que precedió y las angustias é inquietudes que acompañaron su advenimiento al mundo de la terapéutica.

De este modo es como han venido á tomar puesto en los estrados del arte, atrayendo con irresistible fuerza la atención de sabios y de vulgo, de profesores y de clientes, los fenoles y los naftoles, los salicílicos y la antipirina, el paraldehido y el sulfonal, el mentol y la agatina, el aristol y el guaiacol, la piridina y las fenacetinas, los etilos y metilos, la pioctanina, el somnal, y tantísimos otros que se aglomeran y reemplazan, aparecen y se extinguen, ó nacen y perduran, llenando de inagotables capítulos las páginas de la farmacología.

La América, por su parte, orgullosa de su fecundo suelo y enamorada de la naturaleza, hija de la Suprema Inteligencia Creadora, más que del arte, engendro del ingenio imitador del hombre, se dedica á estudiar las propiedades de sus plantas, las analiza y ensaya, las entrega luego al farmacéutico para que les dé forma, enriquece la terapéutica con sustancias de gran mérito é inunda los mercados del orbe con las producciones de sus tierras.

Del examen de los vegetales nace la extracción de los principios activos y la reduccion de las drogas á la quitesencia de su actividad; los alcaloides, los glucosidos y los aceites esenciales surgen á la arena de la terapéutica combatiente, llenan el presente, señalan el porvenir y halagan de tal modo los anhelos del arte, que el genio de Burggrave se apodera de ellos y funda la Escuela Dosimétrica, á la vez que sobre sus mismos cimientos, alza sus reales la medicina hipodérmica, la última expresión, la idea más práctica y el médico más seguro del arte de administrar medicamentos.

Y finalmente, en el Viejo como en el Nuevo Mundo, el concepto patogénico de las enfermedades infectivas y contagiosas, y la nueva concepcion de la naturaleza de las enfermedades, por desgaste de los principios constitutivos de los elementos anatómicos, abre magníficos horizontes á la terapéutica profiláctica y curativa: las inoculaciones iniciadas por Pasteur en Francia, hechas ya universales, las inyecciones de jugos animales, ideades por Brown-Séquard, en Europa, y modificadas por Hammond en los Estados Unidos, y las transfusiones de sueros, ahora en estudio, representan hoy el último adelanto del arte de curar, y van camino de lo futuro, generalizando los principios, extendiendo el método simplificando los procederes, hasta ver de hallar el modo de contrarrestar la tremenda fatalidad que pesa sobre el linaje humano, condenado desde su cuna á sufrir y á morir.

Hé ahí compendiados el pasado, el presente y el porvenir de la terapéutica: ayer, el reinado de los medicamentos de origen mineral, con sus luchas, sus conquistas, sus glorias y sus desastres; hoy, el reinado de los principios orgánicos, con sus productos artificiales de laboratorio y los productos naturales de la flora de ambos mundos; mañana, el reinado puramente animal, representado por el tratamiento de las enfermedades del animal por sus mismos productos.

No hay duda alguna: la terapéutica vuela con las alas que le presta el siglo del vapor y la electricidad, abandonando á la industria los metales que un tiempo le sirvieron á sus necesidades, y tendiendo á un mañana en que el animal ha de suministrarle sus principales armas de combate. Ella avanza desdeñando los esfuerzos por arrancar á los minerales, ó sacar de las retortas, en ese microcosmos de las combinaciones del carbono, los elementos de la terapéutica y saludando á su frente ese espléndido porvenir, que el empleo de los productos bacterianos y los jugos y humores animales anuncian á la medicina.

Pero, si de ese ayer no debemos ocuparnos ya y ese mañana no nos pertenece todavía, pensemos en aprovechar los recursos de hoy, ya que nuestras necesidades apremiantes reclaman la diaria intervención: si la Providencia, que dió al oso del polo su vellón aislador y plantó las palmerasen las abrasadoras soledades, ha colocado siempre los recursos al lado de las necesidades, consagrémonos á interpretar, á la luz de los modernos adelantos, las advertencias que ofrece para el alivio de nuestros males esta "naturaleza colosal, que parece," ha dicho un escritor venezolano, "elegida por el Autor de lo Creado para levantar su trono de regalo y pasatiempo."*

La flora americana tiene en medicina una historia gloriosa, como no la ha tenido flora alguna. El valioso contingente ofrecido por ella á la terapéutica, no reconoce rival. Ella reveló á los indígenas del Perú ese agente poderoso que viene arrancando víctimas á la insalubridad de nuestras zonas, desde los remotos días de la Condesa de Cinchón: ya comprendeis que me refiero á la *quina*. Ella hizo brotar en el suelo brasilero la inimitable *ipecacuana*, con todos los méritos de un específico sin sustituto, en el tratamiento de la disentería que diezma las comarcas tropicales. Ella ha ido más allá todavía de esa obra tenida por divina entre los antiguos, de calmar el dolor, ha suprimido la sensibilidad al darnos la *coca*, antes limitada á sostener las fuerzas del trabajador peruano, ó embotar el hambre del indio acémila, y hoy fuente preciosa de ese alcaloide, la *cocaina*, que va invadiendo en el campo de la anestesia los dominios del éter y del cloroformo, un día surgidos á la voz de Jackson (de Boston) y Simpson (de Edimburgo), como el más trascendental descubrimiento en terapéutica quirúrgica, base de los prodigios que la mano audaz del arte ejecuta en el hombre vivo trocado en masa inerte.

Yo no podría en el rápido bosquejo que voy á diseñar, ni ello conduciría á mi objeto, hacer una enumeración completa de lós tesoros de la flora médica americana. Para obra de tanto vuelo é importancia, yo habría necesitado un tiempo y unas facultades de que no he podido disponer. Solo pretendo citar, á manera de muestras, y como estímulo á la obra de mis anhelos, sus principales plantas medicinales conocidas, para llegar á mi objeto principal, cual es invitaros á explorar la flora americana, desentrañar las riquezas ignoradas en que ella abunda, para gloria y provecho de la América y beneficio y satisfacción de la humanidad.

En las naciones del sur, Chile nos da, entre otras, la *Quillaya saponaria*, tan útil en las afecciones bronco-pulmonares, como necesaria, merced á sus especiales propiedades emulsionantes; y el *boldo*, *Boldea fragrans*, de Jussieu, *Pecunnus boldo*, de Molina, con sus principios excitantes aún no del todo estudiados y su acción benéfica, ya general-

*Cecilio Acosta.

mente reconocida, en las afecciones del hígado y de las vías génito-urinarias.

El Paraguay y Uruguay nos dan la *contrayerba*, que quiere decir *antídoto*, planta del género *Dorstenia*, que á sus efectos tónicos y estimulantes une los muy notables antisépticos; y el *mate*, *Ilex paraguayensis*, sustituto americano del té chino, igual á éste por sus propiedades excitantes y su aroma, el compañero inseparable del peatón viajero y el tónico cardiaco que compite con la cafeína y la teína. En tanto, la República Argentina nos suministra, como especialidad digna de mención, el *quebracho*, *Aspidosperma quebracho*, la digital del pulmón, como se ha llamado por sus propiedades eupneicas, y todavía no enteramente ensayado.

Más al norte, Bolívia y el Perú dán á más de la *quina* y la *coca*, que por si solas son dos monumentos de la terapéutica, la *ratania*, del género *Krameria*, el precioso tónico astringente descubierto por Ruiz en las tierras arenosas de las cordilleras perú-bolivianas; el *matico*, *Piper angustifolium*, de Ruiz y Pavón, cuyas propiedades hemostáticas y antiblenorrágicas le han asignado puesto de alto valor en terapéutica; y el *coto*, con sus derivados alcaloídicos, que en las afecciones gastro-intestinales suple con ventajas al opio, al tanino y á los demás astringentes vegetales reunidos.

Y el Brasil, la tierra de la ipecacuana, suministra también el *jaborandi*, *Pilocarpus pennatus*, único en su acción combinada de eliminaciones por las vías salivares, cutánea y urinaria; la *Paullinia sorbilis*, que reune en alto grado las propiedades de la cafeína y el tanino; la *pareira brava*, de propiedades al mismo tiempo diuréticas, emenagogas y febrífugas y los *berros del Pará*, *Spilanthes oleracea*, excitante y anti-escorbútico.

De los países de la Antigua Colombia, el Ecuador suministra la *Ambrosia artemisæfolia*, cuya múltiple acción estimulante, emenagoga, antihelmíntica y antihistérica, es explotada á diario en el país de su origen; el *paico*, ó té de España, *Chenopodium ambrosioides*, que reemplaza al verdadero té y se utiliza en medicina por sus virtudes como sudorífico y diurético, tónico estimulante, carminativo y antihelmíntico seguro; en fin, la *guayusa*, tan reconocida por el vulgo como eficaz en las perturbaciones dolorosas del aparato digestivo, que allí es frecuente decir: "Nadie se muere aquí de cólico porque tenemos *guayusa*."

Y la República de Colombia, el famoso *condurango*, *Gonolobus cundurango*, que un tiempo desdeñado por motivos de errores en la elección de la planta, ahora parece renacer con mayor crédito para combatir las lesiones sifilíticas y cancerosas; el *cedrón*, *simaba*, ó *Quassia cedron*, tan celebrado como específico contra las mordeduras de las culebras venenosas y contra la rabia, y que aún conserva su reputación como febrífugo y estomáquico; y el *palo matias*, *Croton malambo*, cuyas virtudes medicinales de alto renombre entre los nacioenals, merecen estudio especial y el puesto á que lo hacen acreedor en terapéutica.

Méjico y las naciones de Centro América son también ricas en plantas medicinales. En éstas abundan las mejores especies de *Smilax*, zarzaparrilla, harto conocida, y cuya fama raya en las alturas de un específico vegetal; ellas comparten con la República de Colombia la principal producción de los bálsamos llamados del Perú y del Tolú, *Myroxilon toluifera* y *pereiræ*, que están á la cabesa de las drogas balsámicas empleadas en medicina, y de ellas sale la famosa madera de *campeche*, *Hematoxilon campechianum*, tan usada en la farmacia como en la industria, por sus propiedades tánicas y colorantes.

Una de las ciudades de Méjico le dá nombre á una planta de frecuente uso, la *jalapa*, *Exogonium purga;* en su suelo se cultiva el obligado compañero de la zarzaparrilla, allí también común, el *Sasafras officinalis*, si decaído ya como antisifilítico, ensayado recientemente por las propiedades estimulantes de su aceite esencial, antiséptico respiratorio al mismo tiempo; la *cebadilla*, *Veratrum officinale*, fuente de la poderosa *veratrina*, antitérmico y analgésico y usada por el vulgo como inmejorable insecticida en todas las enfermedades originadas por los parásitos, tan abundantes en nuestras comarcas; y el *tlanepaquelite*, ó yerba santa, *Piper sanctuum*, recientemente estudiado por Don José T. Barriga, y en cuyo aceite esencial ha encontrado un anestésico local, y un antiblenorrágico, usado en forma de agua destilada.

Por su parte, el archipiélago antillano no escasea su concurso: ahí se produce el lecohzo, *Carica papaya*, de donde se extrae la papaína, tan justamente celebrada, que disputa su antiguo predominio á la pepsina animal; las diversas variedades de *quassia*, y de *simaruba*, la *Quassia amara*, la *Quassia simaruba*, la *Picrena excelsa* y la *Bittera febrifuga*, cuyas virtudes las hacen recorrer con brillo la escala de los amargos, recomendándose como febrífugas, antidispépticas, neuromusculares, parasiticidas é insectífugas; la *Piscidia erithrina*, que aún no ha sido bien estudiada, como sedante, hipnótica y analgésica, y la *cascarilla*, *Croton elutheria*, excitante, diaforética y antiemética; la *Asclepias curassavica*, catártico, emético, hemostático y antihelmíntico; la *Marantha arundinacea*, ó *arrowroot*, analéptica; el *Capsicum annuum* y el *fastigiatum* y muchísimas otras que, utilizadas empíricamente por el vulgo, están esperando la mano de la ciencia, que las saque á lucir sus calidades aún ocultas.

Y regadas en toda esa extensión de la América tropical, de quien dijo nuestro gran poeta A. Bello,

——fecunda zona,
Que al sol enamorado circunscribes
El vago curso, y cuanto ser se anima
En cada vario clima,
Acariciada de su luz, concibes;

entre los linderos de esa espléndida zona, desde los Estados Meridionales de la gran República Norte-Americana, hasta el corazón de Sur-América, la rica naturaleza ecuatorial derrama sus tesoros para la medicina, entre los cuales sobresalen, á más de los ya nombrados, el *Coffea arabiga*, originario de otro suelo, pero aclimatado ventajosamente en el nuestro, hasta el punto de considerarlo como propio; el café, no menos útil por contener el alcaloide del corazón, más y más usado cada día en terapéutica, que por ser la base de ese "líquido predilecto del poeta, del que careció Virgilio y adoraba Voltaire," como ha dicho Delille; el *Theobroma cacao*, alimento de los dioses, regalo de los Lúculos y portador de ese precioso aceite infermentescible y de ese otro álcaloide congénere de la cafeína; el *Manihot utilissima*, que dá una sustancia alimenticia, un condimento apreciado, por fermentación, y un principio tóxico, el ácido cianhídrico, por maceración, y cuya fécula es la empleada en las farmacias de mi país como sustituto ventajoso de la harina de trigo; las variedades de *agave*, que alimenta á los indios, dá el *pulque* al mejicano, el *cocuy* á los hijos de Venezuela y es diurético y emenagogo á la vez; el *tabaco*, *Nicotiana tabacum*, tan alabado, como tan deprimido, pero siempre sostenido en su empleo como calmante, paraciticida, anticonvulsivo, sialalogo, estornutatorio, de propiedades, en suma, tan diversas, que aún se hace necesario precisarlas y asignarles su legítimo valor; y el *Zingiber officinalis*, el *copaifera*, las diversas especies de *malvas*, y muchísimos otros que no sería posible enumerar en este rápido bosquejo.

¿Y qué diremos de este dilatado territorio del norte, donde, si bien la naturaleza es pródiga en ofrecer, el arte es avisado para elegir y la ciencia avanzada para analizar y clasificar?

De aquí han salido, patrocinadas por la alta autoridad de la Farmacopea de los Estados Unidos, multitud de plantas que son hoy tesoro, de la terapéutica universal y gloria de la flora americana.

De muy antigno figuran en los formularios la *serpentaria* y la *polígala*, y más tarde han venido presentándose el *Podophyllum peltatum* y el *Evonimus atropurpureus*, que comparten el primer puesto entre los colagogos vegetales de acción utilísima en los estados febriles de la zona tropical, complicadas casi siempre con congestiones hepáticas; la *Gaultheria procumbens*, cuya esencia, si como ligero astringente, buen aromático y poderoso antiséptico, presenta extensas aplicaciones, como la fuente del ácido salicílico y sus derivados, verdaderos específicos del reumatismo, es un valioso recurso terapéutico; el *Gelsemium sempervirens*, preconizado en las fiebres palúdicas rebeldes, pero no menos útil en las neuralgias y eficacísimo en la dismenorrea dolorosa; la *Cascara sagrada*, *Rhamnus purshiana*, de alta recomendación como laxante y vigorizador de las fibras intestinales, el remedio, en fin, de la constipación habitual; el *Geranium maculatum*, cuyas virtudes tónicas y astringentes utilizamos á diario en el tratamiento de las diarreas hemorragias; la *Cimicifuga racemosa*, el suave sedante del sistema nervioso, alivio de los reumáticos y esperanza de los atacados de consunción; el *Viburnum prunifolium*, de grande utilidad en tocología; el *Hidrastis canadensis*, de múltiple acción sobre el hígado, los intestinos y las membranas mucosas; la *Lobelia inflata*, de tanta utilidad en las afecciones espasmódicas de los bronquios, y la *Grindelia robusta*, que disputa al ioduro de potasio su virtud antiasmática; el *Hamamelis virginica*, elevado hasta el rango de específico en las hemorroides y hemorragias; el *Cactus grandiflora*, recien introducido en terapéutica y ya de grande fama en el tratamiento de las enfermedades del corazón, y las diversas especies de *Asclepias*, que pasan por diaforéticas y espectorantes, como el remedio de la pleuresia (pleurisy root); catárticas y anodinas, en el reumatismo y en el asma; alterantes y antihelmínticas; en la sífilis, la escrófula y los vermes; astringentes y hemostáticas, en las hemorragias y en la blenorrea, y finalmente, para no hacer interminable esta enumeración, el *Abies canadensis*, la *Sarracenia purpurea*, el *Arctostaphylos uvaursi*, el *Xanthoxylum carolinianum*, la *Leptandra virginica*, el *Erigeron philadelphicus* y muchísimas otras.

Y si para cerrar ya esta rápida exposición, pasamos á mencionar las plantas medicinales de Venezuela, encontraremos un grán número de vegetales ricos en propiedades curativas, que los nacionales emplean empíricamente con tan notables resultados, que se han abierto campo en la profesión médica, mas sin tener aún el pase de la investigación científica y de la esperimentación clínica.

Allí se dá, por ejemplo, la *algalia*, *Abelmoschus moschatus*, almizcle vegetal, digno de competir con el producto de la cabra almizclera, y tan útil en perfumería como precioso en la medicación estimulante y antiespasmódica; la *cruceta real*, planta no bien clasificada, cuya corteza, de un pronunciado sabor amargo, goza de gran reputación como estomáquico y febrífugo, sobre todo en las fiebres intermitentes inveteradas; la *esponjilla*, *Luffa purgans*, enérgico drástico sustitute de todos sus congéneres y, quizá por esas mismas propiedades, empleado como contraveneno general; la *escorzonera*, *Cranolaria annua*, que nunca falta en las casas de nuestras puérperas, auxiliar importante en el tratamiento de las enfermedades de las mujeres por medio de las píldoras tocológicas del médico venezolano, Doctor Nicanor Bolet, de tanto crédito en toda la América; el *guaco*, *Mikania gonoclada*, *M. radicans* y *M. scandens*, usado por nuestros campesinos para la operación llamada por ellos, *cerrarse*, es decir, hacerse refractario al veneno de las culebras, por inoculaciones repetidas y á dosis crecientes del jugo de la planta, y que aparte esa virtud no comprobada aún científicamente, es un precioso tónico preferido á sus similares por todos los médicos venezolanos, en los estados supurantes; la *raiz de mato*, de fabulosa historia, *Aristolochia barbata*, que une á sus propiedades estimulantes las hemostáticas, hasta ser un mediamento obligado en todas nuestras fiebres graves de tendencia hemorrágica; el *totumo*, *Crescentia cujete*, cuyo fruto parece deber sus propiedades á un principio oleoso, usado por vulgo y profesores en los estados crónicos inflamatorios de las vias aéreas; el *merei*, *Anacardium occidentale*, cuyo nombre va ligado en la memoria de todo venezolano al del célebre naturalista y médico de origen francés, Doctor

Beauperthuy, víctima gloriosa de sus estudios sobre la elefantiasis, en la cual aplicaba, como cáustico destructor de los tubérculos, el aceite esencial contenido en el mesocarpio del fruto; el *yagrumo*, *Cecropia peltata*, recomendado por el médico venezolano Doctor G. Michelena, como succedáneo de la digital, y empleado generalmente en el asma, con un éxito de que puedo yo mismo dar testimonio; el *bejuco de cadena*, *Schnella splendens*, y la *calaguala*, *Polypodium crassifolium*, que no faltan en ninguno de los jarabes llamados depurativos, con los cuales se tratan y curan en nuestros campos y ciudades la sífilis y la escrófula, sin el socorro de los específicos de origen inorgánico; el *guachamacá*, planta que ha sido muy estudiada entre nosotros, sin haberse obtenido resultados contestes, pues mientras para unos es un veneno violentísimo, para otros es un remedio manejable; y la *brusca*, *Cassia occidentalis*, la *congrina*, *Aristolochia ringens*, al *guácimo*, *Guazuma ulmifolia*, el *llanten*, *Plantago major*, y la *verdolaguilla*, el *torco*, la *albahaca*, el *chiquichique*, la *fregosa* y centenares de otras, que fueron exhibidas en la Exposición del Centenario de Bolivar, hace diez años, en Carácas, en número de 482 especies, entre las cuales fueron escojidas, estudiadas y clasificadas por nuestro laborioso naturalista, Doctor A. Ernst, 279 y que en gran número encontraréis expuestas en un trabajo del Doctor E. Meier Flegel, de Carácas, que he enviado á la Seccion de Materia Médica y Farmacología de este Congreso.

Pero no es eso todo. Al igual de esas plantas, cuyos nombres y propiedades son más ó menos conocidas, aún cuando no bien estudiadas, hay muchísimas otras que constituyen secretos de los indígenas, tan maravillosos algunos de éllos, que al no verlos y comprobarlos, se creería superstición de la ignorancia, engaño de la especulación, ó ilusiones de la sugestión.

Por ejemplo, ¿no habéis oído alguna vez hablar de ciertas hojas que, al aplicarse á la nariz, hacen brotar por ella sangre en abundancia, coercible instantáneamente á la aplicación de otra clase de hojas?

Hace ya varios años que un hombre inculto, muerto después violentamente llevando su secreto á la tumba, despertó una sensación profunda en las poblaciones del Occidente de Venezuela y de Colombia, haciendo operaciones con el cuchillo en diversas regiones, sin derramar sangre, mediante la previa impregnación de la hoja cortante con una sustancia de origen vegetal, apellidada entonces, por el nombre del indocto, pero curioso cirujano, *hemostático de Perdomo Neira*.

Yo tengo referencias fidedignas de un hipnótico ó anestésico usado por una tribu india de Puerto Rico, que administrado internamente en cualquier líquido, produce un sueño que va, según la dosis, hasta un letargo profundo, durante el cual pueden practicarse cortes y operaciones dolorosas, sin que el sujeto experimente dolor alguno, saliendo luego de aquel sueño, con facilidad y sin peligro, mediante una aplicación distinta. ¿No os parece todo eso digno de la atención de la ciencia?

Y aquí mismo he traído, para presentarlo á vuestro exámen, un remedio que hasta hace poco ha permanecido secreto sin ser, no obstante, fuente de especulación, y de cuyo maravilloso poder he sido yo mismo testigo repetidas veces. Yo no pretendo que querais creerme por mi sola aseveración; aquí tenéis la sustancia; os ruego la esperimentéis, en beneficio de la ciencia y en provecho de la humanidad, si vuestras observaciones confirman los hechos que yo he presenciado y son de pública notoriedad en mi país.

Tomad un animal cualquiera y hacedlo morder por una culebra venenosa, ó aguardad se os presente el caso, aún en un ser humano; al aparecer la inflamación y la desintegración globular, reveladas por la enorme hinchazón y la hemorragia por diversas vías, admininistrad una dósis de este agente, de cualquier modo, en agua, en cualquier líquido, bastarán cuatro ó cinco granos (0.25 gr.) aunque puede administrarse en mayor cantidad, pues no parece ser tóxico: vereis inmediatamente bajar de un modo notable la hinchazón, fluyendo por la herida, sobre todo si la habéis desbridado, un líquido amarillento; cesar las hemorragias, restablecerse las fuerzas y á las pocas horas cesar aquel espantoso trén de síntomas, dejando al enfermo en aptitud de recobrar todas sus actividades.

Sabéis que en Venezuela abundan las culebras venenosas, como las varias especies de cascabel (*Crotalus horridus* y otras) la tigra (*Cruspidocephalus atrox*), la mapanare (*Lachesis mutuus*), la coral (*Helax coralinus*) y algunas más de difícil estudio; pues bien, yo puedo testificaros una multitud de casos, de hombres y animales domésticos mordidos por estos ofidios, que han recobrado la salud en poquísimas horas, merced al beneficio de este medicamento prodigioso.

Os diré más: no hay en Mariches y Petare, sitios inmediatos á Carácas, campesino, cazador, ó hacendado, que no conozca ó lleve siempre consigo, en sus escursiones, esa sustancia, que en honor del agricultor que la descubrió, es llamada generalmente *el remedio de Vaamonde.*

Este remedio parece ser el bulbo desecado de una planta anual, de la famalia de las Àroideas, probablemente una *aloeacia*, ó quizá la *Aeontias helleborifolius*, que se marca durante el período de su vida en que brotan las hojas, para ser arrancadas en el período de su sequedad, cuando toda las savia se ha reconcentrado en el rizoma, conservándose como producto seco y fácilmente reductible á polvo. Esa investigación, sinembargo, está aún por hacerse.

Si, pues, tantas y de mérito tan notable son las plantas medicinales americanas; si solo falta, á fin de asignarles su valor real, analizarlas para separar lo útil de lo supérfluo, ensayarlas para precisar sus propiedades y entregarlas al arte para que les dé forma, aprovechemos la favorable oportunidad que nos ofrece esta congregación de médicos, para emprender esa tarea, que reflejaría luz de gloria sobre el progreso científico del Nuevo Mundo y arrojaría torrentes de consuelo sobre la triste humanidad.

Yo quisiera ver surgir de este Congreso una asociación americana de materia médica y terapéutica, con un centro aquí, por ejemplo, y ramificaciones en todas las demás naciones del continente, dedicada á explorar la flora de la América, estudiar esas plantas medicinales consagradas por la experiencia desde los más remotos tiempos, y darle brillo de ciencia y forma de arte á cuanto hoy luce, á pesar de su rudeza en manos de los incultos hijos de nuestras comarcas retiradas.

Y voy á terminar. Yo me diría feliz si al abandonar este sitio á que me ha traido la obsequiosidad de la Comisión Organizadora del Congreso, y donde la benevolencia de este respetable concurso me ha dado alientos para sostenerme, llevase la satisfacción de no haber hecho propaganda inútil, y que mis pobres ideas y mis entusiastas anhelos han tenido eco en vuestra inteligencia y seguirán repercutiéndose en vuestro espiritu.

Que este Congreso sea el lazo que estreche, en nombre de la ciencia, la gran familia médica americana, y que esta época marque el principio de una era de progreso para la medicina en esta nueva Atlántida, con el auxilio poderoso de esta gran nación, cuna y altar del primero en la guerra, el primero en la paz y el primero en el corazón de sus conciudadanos.

SECOND GENERAL SESSION.

SEPTEMBER 6, 1893.

Prayer by the Very Rev. P. J. Garrigon, D. D., vice-rector of the Catholic University of America.

In the name of the Father and of the Son and of the Holy Ghost. Amen. O almighty and eternal God, the father of light, the fountain of all knowledge, and the author of every good and perfect gift, we offer to Thee to-day the homage of our adoration, we consecrate to Thy glory all the faculty of our being, and we beg Thy blessing upon all our labors, that they may indeed tend to the welfare of our fellow beings and to the accomplishment of Thy holy will which is all beneficence and love. Deign, O Lord, to direct the deliberations of this assembly; send forth into their minds the fullness of Thy light and into their hearts the outpouring of Thy love, that its members may learn, more and more, the knowledge of those things which it is Thy will their noble vocation should deal with, and that all their aims and purposes, in the discharge of their responsible duties may ever be well pleasing in Thy sight, and honorable and meritorious to themselves. O Savior of the world Who didst look with compassion, not only on the spiritual ills of thy poor suffering creatures, but hadst also regard for their bodily ailments; Who didst heal the sick and pour consolation in the hearts of the sorrowing, deign, we pray Thee, to bless this congress of noble men animated with the same spirit of charity towards suffering humanity. Fill them with Thy own Holy Spirit: fit them to be worthy agents and instruments of Thy merciful providence, and guide their deliberations this day towards wise and useful results. All this we ask in the name of the Father and of the Son and of the Holy Ghost, in those sweet, simple words of prayer which Thou, Thyself hast first taught us: Our Father, Who art in Heaven, hallowed be Thy name; Thy kingdom come; Thy will be done in earth as it is in Heaven. Give us this day our daily bread and forgive us our trespasses as we forgive them that trespass against us; and lead us not into temptation, but deliver us from evil. Amen. In the name of the Father and of the Son and of the Holy Ghost. Amen.

Dr. PEPPER. In calling upon the representatives of the various constituent countries this morning, I take pleasure in first introducing the official representative from that energetic Republic to the south of us, Guatemala, Dr. Juan Padilla.

Dr. PADILLA. Mr. President, ladies and gentlemen: Since Secretary-General Dr. Reed notified me that I had to speak before you, I have been in doubt whether I ought to do it in my mother tongue or in English. I finally made up my mind to address you in the latter, hoping to obtain your kind indulgence.

So much has been spoken, and so ably, about the importance, the beneficial results of the Pan-American Medical Congress and of the well-deserved praise due to the initiators of the great idea, that it would be too daring on my part to pretend to add anything on the subject.

I come from Guatemala as a delegate of its Government, and in its name and in my own I give my heartfelt thanks to the American people and their worthy President for their kind invitation so cordially extended to their little sister Republic.

In Latin America, and I speak more especially of my own native Guatemala, Paris, France, is looked upon as the Mecca of our profession by all our medical aspirants; but, without wishing to detract from the importance of Paris, I must say that the time has come when the young student of medicine from the Latin-American Republics should seek the light of the new Mecca of the Western hemisphere.

The actual President of my country feels proud whenever he has the occasion to state that he received his military education in the United States. Besides that, his wife is a beautiful and estimable daughter of this privileged land.

These two motives will serve, I hope, to strengthen the sympathy and good friendship now existing between both republics.

Before concluding allow me to express my regret that I bring no contribution for your transactions. I anticipate, however, that I shall not return to my home empty handed, but laden with the offerings of science and hospitality from the great Republic and her citizens.

Dr. Mendizabal, of Vera Cruz, responded on behalf of Mexico. In the course of his remarks he spoke of the great enthusiasm with which the medical profession of Mexico had met the suggestion of a Pan-American Medical Congress; how cordially it had responded to the invitation to send delegates to this meeting. There were many interests in common between Mexico and the United States, and these interests—mercantile, commercial, educational, and sanitary—will be largely promoted by the deliberations of this Congress; but over and above all will be prized by the Mexican delegates the warm friendships which this meeting has already engendered. He referred to the leading position the United States always took in advancing the different sciences. The progress of this country in medicine he noted at length.

The United States is the elder sister of Mexico in medical learning. While Europe is spending millions on discovering the best engines of war, the United States is spending its coin in furthering the different sciences.

He expressed the hope that a great deal of benefit would accrue from the meeting.

Dr. PEPPER. I have pleasure in introducing Dr. Luis Gilles, of Port au Prince, who comes to us as the representative of Haiti:

Dr. GILLES. Mesdames, Messieurs, M. le Président et honorés confrères: Le Gouvernement de son Excellence le Président Hyppolite et le corps médical d'Haïti auxquels vous avez fait l'honneur d'inviter à prendre part au meeting du Pan-Américain Congrès, nous députent auprès de vous pour vous exprimer en cette circonstance leur plus grande et leur plus sincère félicitation. L'idée que vous avez conçue de vous réunir en congrès médical est noble, et elle est largement partagée chez nous.

Nous avons le ferme espoir que votre œuvre grandira et se retentira dans le monde entier.

Aussi, n'avons nous pas besoin d'ajouter, M. le Président et honorés confrères, que nous nous tenons à la disposition du congrès pour tous les renseignements dont vous pouvez avoir besoin sur la médecine et la chirurgie d'Haïti.

Dr. PEPPER. The next gentleman to bring us greetings is the official representative from the ancient Republic of Peru. You will now hear from Dr. Manuel A. Muñiz, surgeon-general of the Peruvian army.

Dr. MUÑÍZ. Ladies and gentlemen: The Government of Peru, in accepting the gracious invitation of the United States Government, has appointed me its official representative in this first Pan-American Medical Congress, and I have great pleasure in giving public expression in its name, and in the name of the Peruvian Medical Corporation, to the feelings of friendship and good will entertained by the Peruvian people toward their great sister Republic, whose advancement and welfare they so fervently desire.

I believe, further, that this first Pan-American Medical Congress will aid the scientific fraternity of both Americas to accomplish fruitful results, on all the fields opened to our noble profession, for the benefit of mankind.

Then followed a general address by Prof. Rafael Lavista, M. D., city of Mexico, Mexico.

(Copy of the address of Prof. Lavista, of Mexico, has not been furnished for publication.)

Dr. PEPPER. One of the distinguishing features of this meeting has been the earnest effort our friends have shown to display their interest and participate in our work by acquiring such a gratifying knowledge of our language. It is not a small matter, for there is likely to grow out of these meetings a more rapid spread of the use of English as the means of international communication. I feel, however, we trespass somewhat on the intelligences of these gentlemen by limiting the announcements to English. You will therefore bear with me for repeating the announcements in French.

I am instructed to offer the following resolution:

Resolved, That in view of the importance of taking the necessary steps to insure the continuance and transaction of the great continental work of this congress, the international executive committee is hereby empowered and requested to appoint suitable international committees on the subject of the proper governmental recognition of State preventive medicine, upon a uniformity in American pharmacology, upon the subject of medical education, and upon such other subjects as may be in harmony with the general purposes of the congress. (Repeated in French.)

This subject is before the congress for action, for its discussion, or, if it meets the approval of the body, it will be put immediately to a vote. The idea is that this great meeting, which has been called together at such great effort and cost, shall not fail of definite results. The executive committee will no doubt report before we adjourn some recommendation for a second meeting, where and when, but in the interval between that time and this a feeling exists that there should be some mechanism started to insure continuous results. Of course this carries with it no appropriation of funds, and therefore does not compromise this meeting or the successive meetings. If the gentlemen find it necessary to spend money, they must get the money to spend. A motion to adopt the resolution was then put and carried.

Then followed the announcement of the committee of arrangements, by Samuel S. Adams, M. D., chairman.

Resolutions which had been adopted by the section on hygiene, climatology, and demography were then brought before the general session, and referred to the international executive committee. (See report of the international executive committee for copy of resolutions.)

An invitation was then extended to the members to visit the Museum of Hygiene. (Repeated in French.)

The chairman of the committee of arrangements then stated that the hospitals, both special and general, were open to the members.

The following resolution was reported from the section on hygiene, climatology, and demography, indorsed by the section on railway surgery for the action of the whole congress:

Resolved, That in the opinion of the section on hygiene, climatology and demography of the Pan-American Medical Congress the interests of the public health in every country should be and must be intrusted to a department of the government especially charged with their administration; and that, while the precise form of administration may be left to legislation, the indispensable requisites are that it shall be national, that it shall have parity of voice and influence in the national councils, that it shall have independent executive authority under the limitations common to other departments, and that it shall be intrusted to educated and experienced medical men, who alone are competent to assume its responsibilities.

The resolution was referred to the international executive committee.

The following resolution was then introduced by John A. Larrabee, M. D., of Kentucky:

Resolved, That the Pan-American Medical Congress has learned with extreme regret of the painful accident which befell the Hon. John W. Ross last night, and entertains the hope that he will be speedily restored to health.

Dr. JOHN A. LARRABEE, of Kentucky. Mr. President and members of the Pan-American Medical Congress: It has been but twenty-four hours since we listened to the eloquent and earnest welcome delivered to us by Commissioner John W. Ross, on the behalf of the District of Columbia. Before his words of greeting could be read by the thousands, the honorable Commissioner was stricken down by the most appalling accident, and now lies upon a bed of suffering in jeopardy of his life. "Thus in the midst of life we are in death." I therefore move that we, the members of this congress, do hereby express our profound sympathy with his sufferings and our earnest hope for his recovery by the adoption of the resolution which I have presented.

Unanimously adopted.

Adjourned.

EVENING SESSION.

METZEROTT HALL, *September 6, 1893.*

ADDRESS BY THE PRESIDENT OF THE CONGRESS, PROF. WILLIAM PEPPER, M. D., LL. D., PHILADELPHIA, PA.

GENTLEMEN OF THE FIRST PAN-AMERICAN MEDICAL CONGRESS: This occasion is an unique one, and the thoughts which force themselves on the minds of all of us are, I am convinced, so similar that the briefest greeting might well seem the most fitting address. But when I reflect that I stand here to represent the original committee appointed in pursuance of the resolution which was adopted unanimously on May 5, 1891, at the meeting of the American Medical Association, and that this resolution extended a cordial invitation to the medical profession of the Western Hemisphere to assemble here in a congress, I realize the unusual dignity of the duty I must discharge. If anything could add to the dignity of this assemblage, which for the first time asserts formally the organic union of the physicians of all America, it is the fact that the Congress of the United States, impressed with the importance of our proposed meeting, passed a joint resolution (July 18, 1892) requesting the President to extend those invitations in response to which we welcome the presence here of official delegates from all the Governments of the Western Hemisphere. In like manner are the several States of our own Union, the principal municipalities, and many of the leading educational institutions, both of North and South America, represented officially. You will not, then, think it strange that, called upon to address such an assemblage in this Columbian year, it should seem less fitting to dwell upon any technical topic than to turn our thoughts to the state of this continent and of its aboriginal inhabitants at the time of its discovery by Columbus, and to the obstacles which opposed him and the great men who completed his work. For these have had a bearing on the racial developments which have since occurred here, and should be held in mind in any estimate of the progress we have made during the subsequent four centuries. The state of medical science in Europe at the time of the discovery, and the spirit which has controlled its subsequent course, are fitly to be studied in connection with what we have accomplished during the same period and with the opportunities which present themselves to us at this time.

The recognition of the appropriateness and importance of this great meeting has been immediate and universal. International although it is, the basis of its organization and the special features which mark it remove all possible suspicion of an imitation of, or of interference with, the great International Congress whose successive meetings form a crescendo scale of scientific and administrative triumphs which the medical profession of the world regards with justifiable pride.

Our executive committee and our efficient general secretary, to whose unselfish energy and masterly powers of organization we owe a great debt of gratitude, studiously avoided the possibility of any such interference by delaying the selection of a date for our meeting until that of the Congress at Rome was announced, and by then adopting a date which not only permitted but encouraged the presence later at Rome of those who should gather here. I can only add my deep regrets that the unhappy reappearance of cholera in southern Europe—striking example as it is of the urgent importance of the very work which calls us together—has necessitated a postponement until next spring, a postponement which, however, there is no reason to fear will lessen the complete success of the meeting on its newly announced date. The International Medical Congress is, indeed, a splendid demonstration of the solidarity of the profession and of the world-wide scope of the objects we pursue.

This congress represents much more, however, than our common interest in medical science and the common feeling of brotherhood which animates the entire profession. It is, indeed, it always has been, and forever may it so continue, the glory of the medical profession that their allegiance is one and undivided, for their service is solely in the cause of truth and humanity. Dynasties have risen and crumbled; the map of the world has been changed times almost without number, but the march of medical science through the ages has been ever onward and upward towards those lofty goals—the prevention of disease, the relief of suffering, the improvement of the race.

For us who meet here there is all of this glorious recollection and animating purpose, and there is much more to unite and to inspire us. We meet under the shadow of giant conceptions, as old as Aristotle, which agitated the minds of the great thinkers of antiquity, and were but slowly approaching a definite form when the sublime faith and genius of Columbus solved the problem of the globe.

It is true that this vast American continent, with its 16,500,000 square miles of territory, already numbers 110,000,000 inhabitants, embracing all types of human life and many varieties of political organization. But all that has yet been accomplished is but the feeble beginning of the development which awaits us. When Canning secured the recognition of the republics of South America he boasted that he had called the New World into existence to redress the balance of the Old, and yet the luminous suggestions of Franklin, of Bolivar, and of Blaine as to the political and commercial relations of the countries of the Western Hemisphere are still only prophesies which must long await their fulfillment.

The destinies of nations are slowly evolved, and occurrences which fill the horizon of a generation appear to the broad gaze of history as mere features in the great panorama of the ages.

Even a period of four hundred years is but a fraction of the history of Spain, of France, of England. Yet four hundred years ago this entire continent was not only undiscovered and unknown, but its very existence was unsuspected save in the ingenious speculation of philosophers. We recall the familiar but ever-interesting lines of Seneca—

> Venient annis saecula seris
> Quibus Oceanus vincula rerum
> Laxet, et ingens pateat tellus,
> Tiphys que novos detegat orbes
> Nec sit terris ultima Thule—

and do not marvel that their strain of glowing conviction should have led Columbus to write them out twice over in his "Profecias." But all the same, this New World lay shrouded in the obscurity of the great Sea of Darkness, cut off, as we have since learned, from the known inhabited world, by changes wrought in remote geologic eras, and waiting the fullness of time which should lead the inspired genius of Christopher Columbus to seek the east by sailing west. We now know that in his quest of a western passage to Asia he reached the eastern shore of this continent on October 12, 1492, but even to the time of his death, on January 20, 1506, neither did Columbus nor any voyager or writer have any conception of the vastness and real significance of his discovery. All that the geographical knowledge of the day enabled them to grasp was the belief that Columbus had found a new route to the Indies by sailing west. Within a few years, however, the daring sailors of Spain and Portugal, of Italy, and of England pushed their voyages along the coasts.

The astonishing discoveries of Americus Vespucius on his celebrated third voyage in 1501–'02, when between Lisbon and the island of South Georgia he traversed an arc of 93°, led him to apply for the first time to this continent (it really was South America of which he spoke) the title of New World (*Mundus Novus*). It concerns us not to consider further how, by no intent or design of Vespucius, portions of South America at first, and later the entire continent, came after his death to be named after him. Yet when a few days ago I held in my hands the little quarto published in 1507, in which Prof. Martin Waldseemüller, of the College of St. Dié in Lorraine, first suggests the name America, in utter ignorance that the coast explored by Vespucius was continuous with or even related to the land discovered by Columbus, I could not help smiling sadly at the frantic and fruitless efforts we make to secure immortality by our petty observations, while here Fame, in strange whimsey, threw her laurels for the greatest discovery ever made around the head of one who neither had nor preferred a claim to it.

Geology and paleontology have taught us that this so-called New

World is, in reality, in a scientific sense, better entitled to the name of the Old World. The oldest known strata have their widest development on its surface, and animals, such as the horse, which are said to have been introduced after 1492, are shown to have had their original habitat here and to have migrated hence to Europe, so that Cortes and Pizarro only reintroduced them to their former home. It is more important to recall the fact that the entire stretch of North and South America was, at that date, 1492, peopled more or less thickly with the descendants of tribes who had resided here from very remote antiquity.

A high authority assures us that the number of these aborigines was probably from twelve to fifteen millions, and in spite of considerable differences in physical appearance, as between the Iroquois of New York and the Aztecs of Mexico or the Incas of Peru in dialect and habits, it is generally conceded that this vast aboriginal population, of North America and South America alike, with the exception of the Eskimos, belonged to one great race of red men.*

In regard to the Eskimos, the polysynthetic or incorporative character of their system of word-building, in which they resemble the other aborigines of this continent, does not seem sufficient to counterbalance the marked dissimilarity in physical characteristics, and, still more, the strong chain of evidence which goes to identify them with the extinct Cave Men of Western Europe. Prof. Dawkins ("Early Man in Britain"), has especially developed this important argument. So striking is the resemblance of recent Eskimo remains to those in the Pleistocene caves of France and England, that they are pronounced by competent authorities to be indistinguishable. The extraordinary talent of the Eskimos for the artistic sketching of men and beasts is unique among savage peoples, with the single exception that among the remains of the European Cave Men many sketches, showing a similar talent, have been found. The musk-sheep, which were the inseparable attendants of the Cave Men, no longer exist save in subarctic America among the Eskimos, but the fossilized bones of these animals "lie in a regular trail across the Eastern Hemisphere, from the Pyrenees through Germany and Russia and all the vast length of Siberia."

Eskimos and Red Men alike seem to have migrated to our continent at one time, or more probably in successive waves, in the remote past, either when the northwest corner of America was joined to Siberia by the elevation of the area now known as Bering Sea, or when the lofty submarine ridge which now passes from France to Greenland was

* It is evident that the word race is used here in its broad ethnical sense. The English, the French, and the Greeks are different branches of one race from this point of view. No doubt, as John Fiske observes, "the Mexicans encountered by Cortes differed from the Iroquois encountered by Champlain as much as an Englishman differs from an Albanian or a Montenegrin," but when we are contrasting aboriginal Americans with white men or yellow men, it is right to say that Mexicans and Iroquois belong to the same great red race.

elevated so that it would be possible to travel on foot from Europe to America. If the attempt be made to decide at what period of geologic time such immigration occurred, and whether in one great migration, or, as seems most probable, in successive waves, problems of extreme if not insurmountable difficulty present themselves.

The aborigines who were living on this continent at the time of its discovery by Columbus presented, it is true, considerable differences in the stage of development they had reached, as well as in their language and even in their appearance. There are long intervals of social development evident between the squalid sty of the California savage, the long-house of the Iroquois, and the great structures of Zuñi, of Tlascala, or of Uxmal. Yet in them all can be demonstrated an underlying principle of adaptation to a certain mode of communal life such as all American aborigines are believed to have practiced.

All attempts to distinguish the existence of special races, as of the mound-builders, have broken down in the light of critical study, and the powerful arguments of philology confirm the results of zoological study as to the essential unity of the American red race. The tribes in different parts of this vast territory certainly presented marked differences in physical appearance, and our ethnological collections show that as regards size and weight of frame and shape of skull considerable variety existed among them. But all possessed the cinnamon-colored or copper-colored complexion, the high cheek bones and small, deep-set eyes, the straight black hair, with scanty or absent beard; and the conclusion of the most competent authorities is that no sufficient differences, physical, linguistic, or social, existed to invalidate the evidence in favor of the unity of the race.

Fortunately we are not called on to attempt to read the geological record. For our purpose it is indifferent whether all the relics of the ancient Americans are of the neolithic type, or whether the apparently plausible claim be ultimately established that paleolithic remains are also found in various places. This, at least, we know, that the soil and climate had shown themselves favorable to the development of a population already numerous, vigorous, hardy, and enduring, and brave and warlike, though often cruel, and evidently advancing in social development, though at very different rates at different localities. Ignorant as we are of their primitive origin, it is doubtful if the most earnest advocate of the monogenist * view that all mankind was originally descended from one pair, will urge that our aborigines were descended from a single couple, or even from a few boatloads of Asiatics accidentally carried to our Pacific coast, or that we shall hear again the

* As is well known, the tendencies of natural science are strongly towards this view. Philologists seem disposed to agree that on account of the mutability of language, especially when unwritten and while in its earlier stages, no conclusion adverse to the monogenist doctrine can be drawn from the diversities of speech now existing, or that are known to have existed at any past time.

arguments drawn from the many striking resemblances between the myths, languages, customs, or hand-wrought objects of the aboriginal Americans and of various Oriental nations. The surprise which, I am sure, all of us have experienced at these resemblances must be checked by these two thoughts, so well expressed by Fiske and by Lubbock, respectively, that one of the most important lessons impressed on us by a long study of comparative mythology is that human minds in different parts of the world, but under the influence of similar circumstances, develop similar ideas, and clothe them in similar forms of expression; and again, that different races in similar stages of development often present more features of resemblance to one another than the same race does to itself in different stages of its history.

An immense amount of sympathy has been expended upon the cruel treatment of the American aborigines by the European invaders. Of course it was the sad old story, so often repeated, whenever a better armed and more highly civilized power has come into conflict with a primitive, ignorant, and ill-armed people.

Over the ghastly picture of Indian slavery one would indeed wish to draw a veil, though its darkest shadows are relieved by the splendor of the character and labors of the illustrious Las Casas, and by the enlightened action of those great men, Emperor Charles V, Pope Paul III, and Cardinal Ximenes. But it is a romantic extravagance to deplore the destruction of any system of government or society which existed in 1492 in any part of the continent.*

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* It may not be amiss to give here a brief abstract of the ingenious method suggested by the late Lewis Morgan, of Rochester, N. Y., for gauging the real status of primitive peoples in an ethnical scale. It is obvious that any such scheme will be open to criticism, and it is not surprising that archæologists are divided as to the merits of this particular plan.

The ethnic stages, according to Morgan, are savagery, barbarism, and civilization, and in each of the lower two stages there are three subordinate periods.

The distinction between savagery and barbarism is marked by the point where the manufacture of pottery is begun. In the lower status of savagery men lived in their original restricted habitat and subsisted on fruits and nuts. Articulate speech may be supposed to have begun in this status. All existing races of men had passed beyond it at an unknown antiquity.

In the middle status of savagery men had learned how to catch fish and to use fire. My friend Dr. Lumholtz lived many months among the cannibal tribes of Australia, who are in this status. The invention of the bow and arrow marks its close.

The upper status of savagery, in which some of the lowest American tribes still continue, such as the Athabaskans, of Hudson's Bay, and the Fuegians, ends, as above stated, with the invention of pottery. Such tribes as the above know nothing of horticulture, make no pottery, and depend for subsistence entirely on bread-roots, fish, and game. They have little or no village life.

The lower status of barbarism exhibits the domestication of animals other than the dog. In 1492, except in Peru, the dog was the only animal domesticated by any of the aborigines. Indeed, the absence of domesticable animals is pointed out by Fiske as important among the causes which retarded the development of the American Indians. The horse, which is shown by fossil remains to have existed in six or

If the present state of the native Indian population in North and South America is far from satisfactory and fails to fulfill the promise shown, especially in South America during the first century after the conquest, may this not fairly be attributed to unwise legislation by the ruling nations, to the absence of continued, effective religious instruction, and to the base cupidity which has led us to promote the fatal passion for stimulants, so common among barbarous people? There seems no sufficient evidence to make us lose hope that the remains of the aboriginal Americans may, under more wise and equitable treatment, gradually develop into useful citizens of our republics and be capable of wholesome assimilation with the body of the population.

It is easy to assert and hard to disprove that the development of the red race on this continent was progressing slowing prior to 1492. As a matter of fact, we do not possess the data, either about their early history or about the primitive condition and rate of development of any of the more civilized races, to permit us to institute a comparison. Our earliest knowledge of the ancient Egyptians, for instance, reveals them living in a state of civilization already advanced at least a full ethnical period beyond that even of the Aztecs. How many centuries had elapsed while the successive stages of savagery and barbarism were passing in Egypt can never be even surmised. There seems no reason to doubt that, had America not yet been discovered,

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seven species, had become extinct, and was reintroduced by the invaders. The regular employment of tillage with irrigation, and the use of adobe brick and stone in architecture, marked the end of the lower status of barbarism in America.

The middle status of barbarism was marked in the Eastern Hemisphere by the domestication of other animals than the dog, and there, as well as in the Western Hemisphere, by the development of irrigation in cultivation, and the use of brick and stone in building, by great improvement in the manufacture of stone implements, and, ultimately, by the introduction of implements of copper or of bronze.

The middle status may be regarded as ending with the discovery of the process of smelting iron ore; and this process becomes more and more important through the upper status of barbarism, and is finally associated with the production of written records by means of a phonetic alphabet or of advanced hieroglyphics.

It is held by those who favor this classification that it renders the scientific comparative study of primitive peoples vastly easier than previously. It assigns definite meanings and boundaries for the terms savagery and barbarism, and should dispel entirely the repugnance with which the latter term has often been sentimentally regarded. It is manifestly impossible to determine in most cases the duration of the several periods above enumerated. It appears clear that certain races have passed through some of the periods more rapidly than others, and that, again, certain races have been more advanced in special points than would accord with the general level of their attainments by which their position in the ethnic scale must be determined. Among the influences which have affected the more or less rapid development of races the following suggest themselves: The conditions of soil and climate as favoring or not the acquisition of ample and varied means of sustenance; the existence or not of various animals suited for domestication, notably the horse, the sheep, and cattle; the opportunities for contact, by migration, commerce, or war, with races occupying a higher ethnic scale; inherent ethnological defects or advantages in special races.

there would have been going on here for the last four hundred years a slow and irregular approach to a higher social condition. There certainly is no doubt that during and since the conquest many sad mistakes, and not a few atrocious crimes, have been perpetrated in the name of civilization and of liberty. But, on the whole, the student of history is forced to admit the enormous advantages which have resulted from the conquest by Europeans of the fifteenth and sixteenth centuries of tribes the most advanced of which were still in a very primitive state of civilization.

I have ventured upon this rapid sketch of a familiar subject because it is well that we should be clear in our comprehension of the conditions which existed in America four hundred years ago, when the start was made to introduce the European races and civilizations. We meet here to-day to represent what these have accomplished in their new environment during these four centuries in regard to certain highly important subjects. We can not fail to be interested in considering what scientific acquisitions in these branches were actually brought here, what disadvantages were to be contended with, how far our progress may be regarded as satisfactory, what great questions there are which concern us all deeply, and in what lines of research and work we may unite for the common good and for the greater advancement of science.

The words graven on the tomb of Ferdinand Columbus in the cathedral at Seville:* "To Castille and Leon, Columbus gave a New World," are indeed true, but they do not express the whole truth. John Fiske well says: "The discovery of America may be regarded in one sense as a unique event, but it must likewise be regarded as a long and multifarious process. The unique event was the crossing of the Sea of Darkness in 1492, and no ingenuity of argument can take from Columbus and from Spain the glory of an achievement which has, and can have, no parallel in the whole career of mankind. It established a true and permanent contact between the eastern and western halves of our planet, and brought together the two streams of human life that had flowed in separate channels ever since the glacial period." But to demonstrate the magnitude of this discovery, to determine the physical features of this Western Hemisphere, to plant firmly the seeds of European civilization, demanded the heroic exertions of two full centuries. Not Spain alone, but Portugal, Italy, France, England, Holland, Denmark, Russia, played their part, and the names of Cabral and Pinzon and Magellan, of Cortes, Balboa, and Pizarro, of Ponce de Leon and Soto, of Champlain and La Salle, of Drake, Hudson, Baffin, Davis, and Bering, must remain associated forever with this stupendous and progressive work of discovery. Not until 1806 was the last step taken by Lewis and Clarke, who then succeeded in crossingthe continent of North America from east to west, and thus completed the task undertaken by Champlain in 1608. And if the mere study of the

*Á Castilla y á Leon Nuevo mundo dió Colon.

outlines and dimensions of America occupied two centuries, what are we to say of the far greater obstacles opposed to the colonization of the vast territory, and to the determination and establishment of suitable forms of government, and of harmonious relations between the numerous States and countries into which America soon came to be divided?

The older political systems of Europe seem to require still the assistance of considerable artificial support, and their occasional disturbances are of a decidedly unpleasant character. Is it strange that some of us still have our little unpleasantnesses at home or with our neighbors, which indicate that the education of our people is as yet woefully imperfect in those things that most nearly concern their welfare? Of this, at least, we may be sure, that all that promotes free intercourse among us helps on mightily the solution of these hard problems. It is a true saying that to know is to excuse, and, more than this, in regard to nations if not strictly in regard to individuals, it may be added that to know is to love. We turn with quickened interest to the sage advice of the illustrious Franklin, who, in 1749, embodied in his plan for the organization of the University of Pennsylvania an earnest advocacy of the thorough teaching of the Spanish and Portuguese tongues as likely to hasten the development of those close reciprocal relations which he foresaw would inevitably arise between the countries of the two Americas. The spirit of the age as it embodies itself in our educational systems and in our literature, the giant forces of steam and electricity, as they link together the most distant points of our territory, are working inevitably together for the enlightenment, the elevation, the better mutual understanding, and the more cordial relations of all of us.

The year whose four hundredth anniversary we now celebrate found the world stirred as never before. A work of tremendous importance for the future of the human race had been going on amid the gloom of what are often called the Dark Ages. The more closely this period of absorbing interest is studied the more do we appreciate the magnitude and the necessity of the changes effected during those centuries in preparation for the splendid activities of the Renaissance. The mission of the Middle Ages had been really, though not obviously, a cosmopolitan one, and it was fitting that the noblest achievement of the Renaissance should be the discovery of America. The barriers between nations had been lowered, and there had been going on the process of blending and interpenetration which was soon to be extended to this Western Hemisphere with such large results. The protest against mere dogma in religion and in philosophy; the revolt against usurped and abused absolutism; the demand for light and knowledge and the common rights of humanity, these awakened then to be stifled no more, but to swell forever in larger utterance until they shall, in some yet distant golden time, announce universal liberty under equitable laws and universal peace through arbitration. It is not for us to taunt the glowing expectations of the men of 1492 with their long-postponed fulfillment.

It ill becomes us of to-day to speak in other than tones of humility when across the brightest spots of the vaunted civilization of the close of the nineteenth century after Christ there still fall so many dark shadows lingering from the deep mediæval night.

How each generation turns aside with the restless impatience of children from the lessons of the past, and shuts its eyes to the truth which inexorable history calmly shows, that long periods of time are required for the accomplishment of each great advance in religious, or political, or social, or scientific truth.

Yet, though we smile somewhat sadly as we read the bursts of enthusiasm so plentiful at that time, we dare not challenge the fitness of that grand name, the Renaissance, to the age which, through its mighty discoveries and the master minds who used them, diffused among the nations the new conceptions of the earth and the skies, of the church and the state. Only the pity of it that such long centuries of travail must ensue between this implanting of the seed of religious and political liberty and the mature growth for which we still wait.

In no respect may the discovery of America be regarded as the dividing line between the Middle Ages and the Modern Era more truly than in regard to medical science. In spite of the prodigious learning of the most distinguished Arabian and Jewish physicians, such as Avicenna, the prince of physicians, of Albucasis, of Avenzoar, the wise and illustrious, of Maimonides, their medical science was far too largely speculative and philosophic. Great universities were established, some of which, as those of Bagdad and of Cordova, possessed regal revenues and magnificent libraries. Numerous hospitals were founded, of which the large and wealthy one established at Cairo in 1283 merits special mention.* But the outcome of this long dominion of the Arabs and the Moors, so far as concerns medical science, was merely a marked advance in chemistry and pharmacy, the introduction of many new remedies, and the advocacy of the union of the natural sciences with medicine. Their chemistry was tinctured strongly with alchemy, their clinical teaching was elementary, their diagnosis and treatment lacked the true Hippocratic force and directness.

The endless speculations and metaphysical discussions of the schools had shown that it was not that way true progress lay. Unaided observation had scarcely gone further in eighteen hundred years than the point to which the immortal Hippocrates had carried it.

True medical science, which could not progress without precise methods and instruments of precision, was forced to wait until from very different quarters came the development of the natural sciences and the era of exact experimentation, which alone rendered them possible. Harvey's immortal discovery of the circulation of the blood was

* The first hospitals, in our sense of the term, were probably founded about 335 A. D. by Helena, the mother of Constantine, at Constantinople and Jerusalem. That at Antioch was founded in 360, and the famous Basilides Hospital at Cæsarea in 373.

not announced until 1616, and his almost equally important and epoch-making discovery of the origin of the higher animals from the egg was published in 1651; yet it may be safely asserted that the work of this modest and truly scientific Englishman did more to advance medicine than all the labors of all the schools from the days of Hippocrates. Not only were the facts demonstrated of infinite importance, but his method of patient, exact observation and experimentation until the truth was developed by cautious induction marks the introduction of a new era, and stamps Harvey as the father of modern medicine.

Galileo first indicated the use of the thermometer in medicine about 1595. Sagredo, of Venice, improved it in 1613, and Sanctorius, in 1625, urged its importance in the study of disease forcibly, but as yet ineffectually, and the last half of the present century is reached before the classic work of Wunderlich placed medical thermometry on an enduring basis of practical value. Just as the astronomer, Galileo, gave us the first rude thermometer, Kepler, another illustrious astronomer, gave, in 1604, the first record of an accurate count of the human pulse. But so slowly did the importance of this datum in the study of disease impress the medical profession that the acute Sydenham, who lived until 1689, nowhere mentions a single pulse count. It is hard to find anything which illustrates better the radical difference between the spirit of mediæval and of modern medicine than the vast mass of obsolete literature upon the pulse, loaded with fanciful speculation and super-refined subtleties of description, and yet wholly deficient in the only features which would give practical value to the study. What progress in exact medicine could be made without chemistry? Yet scarcely any development in this branch occurred between the eighth and seventeenth centuries. And it was Boyle, the father of modern chemistry (not born until 1627; died 1691), who first succeeded in freeing from the trammels of alchemy this noble science. Not until the end of the seventeenth century did the value of quantitative analysis begin to be appreciated. Lastly, it was not until 1590 that we hear of the first compound microscope in the hands of Jansen.

Meanwhile the gross superstitions, combined with a blind dependence on the great authorities of antiquity, and especially on Aristotle and Galen, which had so long dominated medical science, yielded slowly to the growing light of positive knowledge. Fine-spun subtleties, drawn from metaphysical speculation; the fantastic notions of alchemy and astrology; the rank growth of impostures which flourished in the soil of ignorance, and the bigotry which placed every organ under the charge of a special saint and conjoined with every remedy a special form of supplication, still marked medical teaching and medical practice.

But the bold, fearless, investigating spirit of the sixteenth century did its work for medicine as it did for other great matters. Vesalius (1514–1564) and his contemporaries created accurate anatomy. Paré (1509–1590) stamped imperishably on surgery the influence of his genius and lofty character. Paracelsus (1493–1541) hurled the shafts of ridicule and invective against the groveling subserviency to ancient authority, and did a rough but important stroke of work toward the emancipation of the medical mind. The grand old Hippocratic method of careful observation and cautious reasoning was reasserted, the unproductive philosophy of Galen and his Arabian worshipers was discarded, and at last there begins to emerge from the darkness of so many centuries modern medicine, the medicine of loyalty to Nature and revolt against mere human authority; of reverent skepticism and reasonable faith; the medicine of scientific experimentation and of humane vivisection, that insists upon knowing the causes of disease and that looks to hygiene as its noblest expression.

The history of European medicine for more than three hundred years is a record of which we may well be proud, when the enormous obstacles to progress are held in view. It is not necessary to remind this audience of a single one of its great triumphs. Vesalius and Paré, Harvey and Sydenham, connect themselves with Bichat and Laennec, and Hunter and Jenner, and Pasteur and Lister, and Virchow and Koch, and the torch of genius is passed down the line of these immortals and lights up the ages with the splendor of their achievements. But it is sad to reflect upon what has been done as contrasted with what might have been. The dense ignorance of rulers and masses on scientific questions, the slow progress of sound, useful education among the people, the huge claims of imperialism and of militarism, the wanton waste of luxury, have retarded research, have left but paltry sums available for the diffusion of knowledge, have hindered the embodiment in legislation and in actuality of much that would help the healing of the nations. It is an odd commentary on the vaunted civilization of to-day to contrast the sums doled out by the most enlightened governments of Europe for the promotion of higher education and orginal research or for the suppression of preventable diseases with those lavished on the vast hosts of armed men and the huge fleets of unwieldy armored ships deemed necessary for the maintenance of peace and order.

Within our own day we have seen the announcement of the grandest generalization reached by the human mind, in this century at least, and advanced in the most philosophic and inoffensive manner, received with a burst of intellectual skepticism and of religious intolerance which showed that the old forces against which the Renaissance protested, and still protests, are yet alive, though happily shorn of most of their power. The marvelously rapid spread of the illuminating doctrines of Darwin, and their incorporation in the thought and speech of the world and in the teachings of the churches, may indeed be pointed to as the crowning intellectual achievement of the nineteenth century.*

*The grave of Harvey, in Hempstead Church, bears a plate which gives his birth April 1, 1578; his death June 3, 1657. His immortal work, Exercitatio Anatomica de Motu Cordis et Sanguinis, was unable to pass the censorship of the press in

If the actual progress of medical science was slow in Europe during the years which followed that *annus mirabilis*, 1492, surely no word of reproach may be uttered against the early settlers in North and South America because, amidst their heroic efforts to conquer this vast continent, it was long before they found time or energy to devote to the cultivation of that practical and essential subject of medical science.* It is true that in 1551 Charles V founded the University of Lima, in Peru, and in 1553 the University of Mexico. Yet it does not appear that medicine was taught at these universities until a little prior to 1700.†

In North America, although Harvard College was founded in 1636, the title of university seems to have first been applied to the University of Pennsylvania, which in 1765 established the first school of medicine in the United States. The scattered handfuls of early settlers on our shores had, indeed, problems facing them more urgent than the promotion of science. They differed as widely in their motives for undertaking the appalling task of conquering and colonizing America, and in their fitness for the work, as they did in their nationalities. Separated widely from the mother countries, hampered very often by unwise and vexatious interference from the home governments, they waged war against the powerful tribes of aborigines who swarmed over the country and against the no less serious obstacles of untried climatic and political conditions. Bloody warfare raged promiscuously, and disease was rife. We have seen that the work of mere preliminary exploration occupied two centuries. The close of the third century found the early struggles approaching a successful ending, only to be followed by violent political changes, not accomplished save by long and costly wars. The English conquest of Canada, in 1759–'60, the achievement of independence by the United States in 1783, the establishment of the independence of the South American republics in 1810 and the ensuing twenty years—these are the events from which the future historian will date the renaissance or the decadence in America, and to which reference will always be made in estimating our capacity for progress in politics, in literature, in art, and in science.

For a long time it seemed even to friendly critics that the new races

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England, and appeared (in his 50th year), in 1628, at Frankfort-on-the-Main. Although susceptible of easy demonstration, this epoch-making discovery failed for years to influence medical thought or practice. Darwin rests in Westminster Abbey, with the sovereigns, the statesmen, and the warriors of a proud people. The inscription, "Born February 12, 1809; died April 19, 1882," is to be taken in connection with the fact that his chief work, "On the Origin of Species," published in 1859, in his 50th year, was, during his lifetime, translated into all modern languges, and reached in England itself six editions and 72,000 copies.

*The first printing press in North America is said to have been set up in 1639, in the house of President Dunster, of Harvard College.

†Dr. Billings tells me there is on record a complaint of the want of a cadaver at the University of Mexico to read the lessons of anatomy over.

which strove for a foothold on American soil were unlikely to thrive as vigorously as in their accustomed habitats, and the impossibility of developing a genuine and lasting American type was freely asserted. To those of us who have considered this point with anxious care the last two decades have brought results that put to rest all apprehension. Whatever may be the future changes in the political organization or relations of the countries composing America, it is a demonstrated fact that the European race in America, which already numbers over 100,000,000, will show no decline in vigor or in energy, in physical or in mental strength. It is not on account of mere bigness in material achievement that we point to the millions who fought in the great civil war; or to the 170,000 miles of railroad in the United States—almost as much as in all the world besides, and the $10,000,000,000 of capital invested, and the army of 900,000 employés; or to that tremendous structure, the Canadian Pacific Railroad; or to the plans now under consideration for developing a continous railway system for the entire continent, from Montreal or Puget's Sound to Bueno Ayres. It is, even more, as evidences of large imagination, of courageous resolution and dauntless tenacity of purpose, and of enormous power of physical endurance that we value the enterprises which have subjugated this continent so swiftly and are hastening its commercial consolidation. We may be assured that countries which have shown such sturdy love of independence and resistance to outside interference, which have displayed so much sagacity in adapting their political constitutions to their peculiar conditions, which liberate and enfranchise all who dwell within their limits and afford to all an equal chance of advancement, will work out their destinies to far larger and wiser plans of friendly cooperation than we can now foresee.

Turgot, in his memorable address in the Sorbonne, well declared, "Tous les ages sont enchainés par une suite de causes et d'effets qui lient l'état du monde à tous ceux que l'ont préćédé." The discovery of America depended on the operation of causes which can be traced back many centuries. The present condition of our continent, four hundred years later, is the result of the action and reaction of mighty movements which involve every country of the world. Here is the new and probably the last great place of gathering and intermixture of all nations. Here as nowhere else are to be studied with all the aids of exact science the problems of ethnology and sociology.* Here are to

* It was on this account that I was so anxious for the organization of the American Anthropometric Society, which was happily established in 1891. The interaction between functional activity and cerebral development is attested by so many facts, and the methods of examining and recording the exact arrangement and minute structure of the nervous centers are so securely established, that the time seems to have come to begin, upon a broad and systematic basis, the study of the progressive anatomical changes effected in successive generations of individuals subjected to the stimulating and rapidly changing environment presented by our modern life. The full members of this society engage to direct that a post-mortem examination

be worked out to the best advantage the problems concerning the relations of man to his physical environment; and the demonstration that in spite of the apparent magnitude of the powers of nature, and in spite of the admitted influence of climate and physical condition upon the progress of civilization, the powers of man for intellectual and social advancement are incalculably superior.

In all of this work a large share must devolve upon medical men, and fortunately our position in America is one which will enable us to work together with good effect. The high average intelligence of our people will make them prompt to appreciate results of solid utility or scientific value. The enormous wealth, present and prospective, of this continent should readily be diverted more and more bountifully to the promotion of learning and research—if, as may be trusted, we shall strive more and more after peace among ourselves and abroad.

We shall never cease to be proud of our lineage, or to acknowledge the immense debt we owe to Europe. Its languages are ours; its glorious past is part of our heritage; its mighty names in art and philosophy and science are household words with us. Its rapidly advancing civilization incites us to loftier efforts. But the balance between the Old and the New Worlds is being redressed.

All know how the examples of our young and vigorous communities have supplied and fed the infections principles of political liberty and social equality.* In every struggle for the rights of man, from the terrible but beneficent drama of the French Revolution down to the present hour, our example and our assistance have been invoked.

I can not detain you by an enumeration of the services already rendered by America to medical science. Almost immediately after the discovery important contributions to pharmacology were announced,

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of the brain shall be permitted. The other members make no such pledge, but all are concerned in the promotion of anthropometric and ethnological research. The scope of the work undertaken by the society is very broad and profoundly important. It is believed that nowhere else can its investigations be so profitably prosecuted as in America. The organization is, however, essentially international in character. It is difficult to overestimate the value of a large series of exact portraits of the brain, in its macroscopic and microscopic features, obtained in successive generations during even so short a period as a thousand years. These records will be obtained from members of different races living under similar and under widely different physical conditions; and it is hoped to secure such records from many successive generations of a number of individual families whose intelligent interest in such collective investigations may be sufficiently maintained. The good work of this society is already actively progressing. The records will be preserved in the strictly fireproof buildings of the library and of the Wistar Institute of Anatomy and Biology connected with the University of Pennsylvania. Doubtless the medical profession of all America will be prompt to help, from their technical standpoint, the great work in ethnology and archaeology upon which all Americanists are now so vigorously entering.

*This is the only infections principle we have communicated. The fable which assigned an American origin for European siphilis has been refuted by conclusive evidence from many sources.

chiefly from South America, and from the introduction of guaiacum, in 1508, until now these contributions have become more and more frequent. The entire medical world was agitated during the latter half of the seventeenth century by the struggle over the merits of cinchona bark,* introduced into Europe, in 1640, by Juan del Vego, and no more convincing tribute can be adduced as to the value of medical and sanitary science than the prominent place occupied by malarial diseases in the general and medical literature of the seventeenth and eighteenth centuries as contrasted with the feeling of impunity with which they are now regarded. Among the results which may be anticipated from this meeting is, I trust, the adoption of some well-considered plan for systematic conjoint study of our American remedies and their pharmaceutical preparations, looking to their scientific classification, to greater uniformity in their preparation, and ultimately to a single pharmacopœia for the entire continent.

The introduction of nitrous oxide (1844) and of ether (1846) into medical practice, with which the names of Wells and of Morton are so honorably connected; the establishment of the operation of ovariotomy by McDowell, of Kentucky, upon a secure scientific basis—these and hundreds of other achievements of lesser brilliance are too familiar to need mention. Every one knows now how superfluous it is to say a word in defense of American literature, and certainly we who know how powerfully the opinions and practice of medical men in Europe and throughout the world are influenced by American writings may view our position with some complacency. Yet a survey of what America is actually contributing to medical literature shows clearly how far we are behind the nations which lead in medical thought. In the year 1879 Rupprecht's Bibliotheca † gave as the total number of new medical books, excluding pamphlets, periodicals, and transactions, 419, divided as follows, viz: France, 187; Germany, 110; England, 43; Italy, 32; United States, 21; all others, 26; and for 1891 I find the same Bibliotheca gives the total number as 1,063, divided as follows, viz: Germany, 360; France, 243; Great Britain, 141; United States, 80; Italy, 78; Austro-Hungary, 70; Spain, 24; other countries (chiefly Switzerland and Denmark), 67.

On the other hand, in the more ephemeral forms of medical literature the figures are very different. I have had a careful count made of the volumes of medical journals and transactions filed in the library

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*The motives influencing its opponents were borrowed in part from the doctrine of qualities of the ancients, in part from the hatred of the Jesuits, who were especially active in extending the use of the drug, and in part, as malicious tradition asserts, from the fear that it would cure so speedily as to render the earnings of physicians precarious. One is reminded of the old Indian proverb: "Various are the desires of men; the wagoner longs for wood, the doctor for diseases."

†J. S. Billings, M. D., "Our Medical Literature." Address before the International Medical Congress, 1881. He adds that these figures are too small, and especially so as regards Great Britain and the United States.

of the Army Medical Museum at Washington, with their respective places of publication,* and from this it is clear that of these classes of medical literature there were, in 1890 and in 1891, published in America (including Canada, the United States, and Latin-America) about twice as many volumes as in Germany or France, and fully three times as many as in Great Britain.

	Totals.		America, including Canada, United States, and Latin-America.		Germany.		France.		Great Britain and dependencies, not including Canada.	
	1890.	1891.	1890.	1891.	1890.	1891.	1890.	1891.	1890.	1891.
Number of volumes of journals.......	985	1,021	278	297	159	168	153	160	81	87
Number of volumes of transactions...	319	300	104	84	48	48	35	38	36	33
	Italy.		**Spain.**		**Austro-Hungary.**		**Belgium.**		**Other countries.**	
	1890.	1891.	1850.	1891.	1890.	1891.	1890.	1891.	1890.	1891.
Number of volumes of journals	106	103	36	37	39	38	23	21	110	110
Number of volumes of transactions...	27	27	1	1	4	6	10	10	54	52

Of course we must not forget the fact that in the hurry of our life of to-day many observations and investigations of great value are published in journals, instead of being reserved to become part of more serious and complete volumes. But it will not be doubted, I think, that the great excess of medical journals in America, as contrasted with the comparatively small number of new medical works, is entirely consistent with the admitted leadership of Germany, France, and Great Britain in medical science. The fact that during the past twelve years Germany has risen from a place in this list second to France, 110 as against 187 in 1879, to the first place at present, with 360 new medical works in 1891 as against 243 published in France, speaks eloquently of the strenuous effort with which newly united Germany is straining forward in science as in other fields. The truth is that the apparently extraordinary number of medical journals in America is due chiefly to a substantial reason, and one which influences equally the existence of very numerous medical schools and medical societies. The vast extent of territory and the relatively sparse population render it impossible to serve the country with as low an average of medical men, schools, societies, or journals as is possible in more densely populated countries.

As to other and less satisfactory reasons which have operated, especially in the United States, to produce a great growth of ill-equipped

* It gives me pleasure to acknowledge the assistance rendered in the preparation of these interesting statistics by the National Bureau of Medical Bibliography. This admirable enterprise, established at Washington so as to have immediate access to the great library of the Surgeon-General's Office, merits the appreciative support of the profession.

medical schools and of poorly-supported medical journals it is not necessary to speak here. Indeed, the rapid rise in the standard of scientific requirements, both of medical men and medical literature, and the increasing appreciation on all sides of the fact that the higher medical education is the true interest both of the profession and of the public is accomplishing the much-needed work of checking the ill-considered establishment of new medical enterprises, and of stimulating those in existence to more earnest life and more lofty aims. So true is this in regard to our medical journals in particular that no one who has occasion to consult regularly the files of any number of them can fail to have been struck forcibly with the steady and decided improvement in the tone of their management and in the scientific quality of their contents.

This Congress meets at a period of peculiar and critical interest in medical education, and I am glad to say that for the first time in the medical history of the United States we may feel proud to have such a meeting convened here, and to invite a close examination of our educational standards and facilities. I should fail in courtesy and in candor alike were I not to acknowledge the great value of the example which has been so consistently set by Latin America and by Canada in the maintenance of a high standard of qualifications for medical practitioners.

Fifteen years ago the medical profession of the United States arraigned severely the management of their overnumerous medical schools.* While Canada then exacted a reasonably strict entrance examination and a course of medical study extending over four years, with one session of six months in each year, and while every country in Latin-America exacted a collegiate degree or a rigid entrance examination and a course of medical study extending over six years, it was the general custom with the medical schools of the United States to grant a diploma conveying the full right to practice medicine to applicants who had been admitted without preliminary examination and had attended without term examinations two courses of lectures covering about five months and had passed a single and final examination conducted by their own teachers, whose emoluments were derived solely from the fees of such students. This discreditable prostitution of a great educational trust had been gradually brought about by large causes upon which I may not now comment. But it is with justifiable pride that we may point to the admirable and sweeping reforms that have since been instituted. It remains true that the laws of many of the States allow charters for medical schools to be secured without any guarantee of the standard of education that shall be maintained. But the awakened sentiment of the profession and of the community has in a rapidly increasing number of the States insisted that medical graduates before being admitted to practice shall pass a State examination

* Regular schools, 65; homeopathic, 11; eclectic, 4; total, 80, in 1877.

conducted by an impartial board of examiners appointed by the governor. The medical schools, to their honor be it proclaimed, have, with few exceptions, been foremost in the struggle to secure this wise and beneficent legislation. They have done much more. In advance of these laws which will insure a far higher standard of medical qualifications in the States fortunate enough to be so protected, the faculties of a number of the leading schools have forced their standard up at first to three years of obligatory study, and now to four years of eight months' study each, with a carefully graded curriculum and with strict examinations before entrance, at the close of each term, and finally before graduation.

When we recall that this has been done without the slightest governmental aid, and, further, that owing to the prevalent view that medical schools have been sources of large profit to their faculties the streams of private benefaction had not yet been directed in their favor, you will appreciate the high sense of duty and the devotion to science which have led these faculties to assume greatly increased labors with an expectation of considerably diminished remuneration owing to reduced attendance of students and to augmented expenditures.

The committee of arrangements of this congress has wisely provided for a tour of inspection of some of these institutions. It is trusted that all of our foreign delegates, and as many as possible of the members of this congress, will avail themselves of this opportunity to examine the equipment of some of our leading medical schools. They will be gratified to find, in hospitals, in laboratories, and in libraries and museums alike, facilities which bear comparison with those of Europe. They will find an arrangement of studies, and, above all, an organization for the conduct of daily thorough bedside instruction in all branches of medicine, which leave little to be desired. It is easy to foresee, as another of the desirable results of such meetings as this held successively in various parts of America, such increased acquaintance with and confidence in our respective methods of medical education and medical treatment as will retain on our continent many of our students and many of our invalids who have been in the habit of going farther to fare no better.

A broad field opens before us for the study, with the aid of collective investigation, of the distribution and course of phthisis and rheumatism and other important diseases as influenced by race and locality. The endemic fevers, other than malarial and typhoid and yellow fever, which are said to prevail in various parts of North and South America, have long demanded systematic investigation to complete the study which the illustrious Drake began. We shall now have the opportunity of studying, equally by means of collective investigation, the relative effects of various climates on the numerous races now represented in America, and of determining more accurately the scientific and practical questions connected with our extensive series of health resorts which embrace the finest examples of every type.

There are, indeed, none of the sections provided for in this congress from whose work more valuable results should follow than from those on medical pedagogies, on hygiene and climatology, and on quarantine. It was a sense of the urgent importance of these latter subjects, especially at the present time, and of the valuable results sure to follow their consideration by such a body as this, which led the Government of the United States to extend the cordial invitation which has been uniformly accepted on the part of the Pan-American Governments. I feel that by this action there has been secured for the subject of hygiene and State preventive medicine a formal recognition never before accorded on this continent, and one which must surely be followed by the willingness of the respective governments to use their influence to secure the enactment and efficient administration of proper legislation in accordance with the recommendations of this body of eminent experts.

When the International Medical Congress met in Philadelphia in 1876, the address on Hygiene and Preventive Medicine, delivered by the distinguished Bowditch, himself a pioneer in sanitary science, was one of the most impressive utterances on that important occasion. The review there given of the work of the previous century in this country in sanitary science was not flattering, but with the fine enthusiasm which marked that gifted man he predicted the immediate opening of the grandest epoch yet seen in the history of medicine. His closing appeal must be quoted. "Our present duty is organization, national, State, municipal, and village. From the highest place in the national council down to the smallest village board of health we need organization. With these organizations we can study and often prevent disease." These stirring words were in accord with the spirit of the times and with the developments of science.

When the brilliant discoveries of Koch brought to light the specific bacillus of tuberculosis and of cholera, and pointed out the scientific method to be pursued in similar investigations in the future, an unanswerable argument was provided against skepticism or indifferentism or official penuriousness. It required courage and showed rare breadth of view in Lord Palmerston to issue his celebrated reply to the Presbytery of Edinburgh on the occasion of the threatened outbreak of cholera in 1853, in which he urged that the weal or woe of mankind so far depends upon the observance or neglect of the natural laws by which the affairs of the world are regulated, that if the local causes of disease were not removed before the return of the hot weather, the pestilence would be sure to return in spite of all the prayers and fastings of a united but inactive nation.

Much was accomplished, it is true, in preventive medicine between 1853 and 1876, when Bowditch spoke; but it is scarcely an exaggeration to say that the progress in the past twenty years has been greater than in the preceding twenty centuries. We have not, indeed, yet detected the specific poison of every infections disease; even in regard to the familiar and much studied yellow fever the latest publication of the distinguished Surgeon-General of the U. S. Army shows that this point is still unsettled. But the position of the whole matter is changed radically. Hypotheses have given way to facts. Everyone now knows, or ought to know, that the most dreadful diseases are inseperably connected with definite organisms, that these organisms have special laws of development and distribution, that to destroy or exclude them is to avoid the disease, and that to tolerate conditions which favor their development is to encourage and invite the attack of the disease. When these simple, demonstrable propositions are considered in connection with such scourges as cholera and yellow fever, and typhus and typhoid fever, and scarlatina and diphtheria, and epidemic meningitis, it needs no further argument to prove the value and the necessity of quarantine, and of efficient medical inspection and protection. Nor does it need further argument to show the wisdom of establishing laboratories of hygiene at many points over the country, of equipping them amply with the ablest men and the finest apparatus, and of endowing them liberally, so that the search after the yet unknown causes of disease, and after the best methods to prevent the development of such causes as are known, may be prosecuted with ceaseless vigor.

It is easy now to get a hearing for these views, when public comfort is disturbed, the public purse threatened, and the public conscience awake and sensitive. At this moment our great commercial communities are reposing in confidence upon the sanitary measures adopted by our governments, in accordance with medical advice, for the restriction and exclusion of two dreaded pestilences, cholera and yellow fever. Recall with me the popular terror of last summer. Recall the hideous loss of life and the disastrous effects on commerce caused by former invasions of these diseases when the communities afflicted were smaller and less wealthy than are ours at present. We do not have to seek back to the Middle Ages for pictures of desolation wrought by infections disease. Recall that tragic story of the great yellow fever epidemic in Philadelphia just one hundred years ago, as told by Rush. Try to estimate the result if cholera had effected a lodgment in New York City in July, 1892, and having found favoring local and climatic conditions, had, as on former occasions, spread its deadly germs to the North and South and West. The fair White City that was rising by that distant lake, under the magic wands of Art and Industry, would have been stricken with a fatal blow. No computation can well exceed the loss that would have fallen on this country. The entire people gazed with bated breath at the struggle waging in New York Harbor, and universal thanksgiving arose when the dread invader was finally repulsed by the vigorous and sustained efforts of the sanitary authorities. That we in America are not to day witnessing the aggravated recurrence of the epidemic, in accordance with unvarying precedent, can be due only to the continuance of these same efforts, reinforced with large authority, and aided by more efficient local sanitation. When this gratifying result is associated with the success which for some years has attended our efforts for the exclusion of yellow fever, no further argument can be needed to urge the adoption of such uniform measures as will for the future afford most sure protection against these diseases. These instances exhibit in the most striking manner the need and the value of the international sanitary agreements this Congress may do much to promote.

But there will occur to all of us many other important questions to be solved only by earnest and united work. Nor can this work be accomplished until Bowditch's cry for organization is far more fully answered than it yet has been. Nothing but organization and cooperation, and, yet more, the establishment in the government of every civilized nation of a department of public health, will secure the continuous and forcible attention which the magnitude of this enterprise demands. There should be, and the day can not be far distant when there shall be, in the cabinet of every government here represented a secretary of public health, of rank, influence, and prerogative equal to that of any other cabinet officer.

Here, then, is the last and greatest service to be rendered to science and to the nation by our Congress. Our combined influence will be irresistible when used in advocacy of higher education; in carrying out large plans for the scientific study of our national life, as affected by social and climatic influences; in the adoption of remedies and remedial measures of demonstrated merit, and in the insistence upon a fuller recognition of the lofty function of preventive medicine. "Salus Sanitasque Republicæ, suprema lex." Let us acquire here a closer touch with each other, a deeper faith in our profession and its noble destiny, and a stronger determination to labor in brotherly cooperation for the loftiest ideals of service to science and the race.*

* It would be improper to omit an acknowledgment of the free use that has been made in the preparation of this address of various authorities. Especially must be mentioned Fiske's Discovery of America; Baas's History of Medicine (translated by Handerson, 1889); The Discovery of North America, by Henry Harrisse (Paris and London, 1892); The History of the New World called America, by E. T. Payne (Vol. I, Oxford, 1892); Buckle's History of Civilization in England; Draper's History of the Intellectual Development of Europe; Fisher's Outlines of Universal History; The Early History of Instrumental Precision in Medicine, by S. Weir Mitchell, M. D.; Historia Bibliográphica de la Medicine Española, by A. H. Morejon; Publications and Unpublished Letters of Dr. Daniel G. Brinton; Report on the Etiology and Prevention of Yellow Fever, by George M. Sternberg, 1890 (now Surgeon-General U. S. A.); Lubbock's Origin of Civilization, and also Prehistoric Times; Tylor's Anthropology, and also, Researches into the Early History of Mankind; Lewis Morgan, Ancient Society, New York, 1877.

It gives me much pleasure to acknowledge also the assistance received from Dr. R. P. Robins, especially in the examination of the History of Early Spanish Medicine.

SESIÓN DE LA TARDE.

Setiembre 6 de 1894.

DISCURSO INAUGURAL PRONUNCIADO EN EL SALÓN METZEROTT POR EL PRESIDENTE DEL CONGRESO, PROFESOR GUILLERMO PEPPER.

Señores del Primer Congreso Médico Pan-Americano: Esta ocasión es sin igual: por lo tanto estoy convencido que las ideas que se agolpan en la mente de todos son tan idénticas, que la alocución mas corta sería el discurso más adecuado: pero cuando reflexiono que me encuentro aquí para representar la resolución unánime adoptada el día 5 de mayo de 1891 por la Junta de la Asociación Médica Americana, y que esta resolución fué que se hiciese invitación cordial á la profesión médica del Hemisferio Occidental para que se reuniese aquí en Congreso Médico, entonces comprendo el alto deber que tengo el honor de cumplir. Si algo pudiera añadirse á la distinción de esta asamblea, que por primera vez afirma formalmente la unión orgánica de los médicos de todas las Américas, es el hecho de que el Congreso de los Estados Unidos, movido de la importancia de nuestra proyectada reunión, tomó la resolución unánime, el día 18 de julio de 1892, de suplicar al Presidente de la Nación que llevase á efecto esas invitaciones; por cuyo motivo tenemos el honor de dar la bienvenida aquí á todos los delegados oficiales del Hemisferio del Occidente. Igualmente están representados aquí varios de los Estados de nuestra Unión, los municipios más importantes y muchas de las instituciones docentes de la América del Norte y del Sur. Espero, pues, que no os parecerá extraño que, llamado á dirigiros la palabra en este año Colombino, elija como tema técnico llevar nuestros pensamientos al estado de este continente y de sus habitantes primitivos en la época del descubrimiento, por Colón; á los obstáculos que se le opusieron, y á los grandes hombres que completaron su obra: puesto que estos últimos han tenido una influencia sobre el desarrollo de las razas que después se han formado aquí, y que deben tomarse en consideración cuando estimamos el progreso que hemos hecho durante cuatro siglos consecutivos. El estado de la ciencia médica en Europa en la época del descubrimiento, y el espíritu que ha influido en su curso subsecuente, deben ser también estudiados en conexión con lo que hemos nosotros hecho durante el mismo período, contando con las oportunidades que se nos ofrecen en los tiempos que alcanzamos.

El reconocimiento de la importancia de esta reunión ha sido cosa inmediata y universal; y si bien internacional, sus bases de organización y sus caracteres especiales hacen desaparecer toda sospecha de una imitación ó de una intervención con el gran Congreso Internacional cuyas reuniones sucesivas forman una escala creciente de triunfos científicos y administrativos que la profesión médica del universo admira con un orgullo justificado.

Nuestra Junta de Gobierno y nuestro Secretario General, con quienes, por su energía y dotes especiales de organización, hemos contraído una deuda de gratitud, no queriendo producir el más leve obstáculo al buen éxito del Congreso de Roma, no decidió fecha alguna hasta no saber cuando se efectuaría éste, y entonces escogió una que, no tan solamente permitiría, sino que facilitaría mas tarde la presencia en Roma de los que asistiesen al nuestro. Deploro que la triste reaparición del cólera en la parte sur de Europa—sorprendente ejemplo de la importancia del fin que nos llama aquí á reunirnos—ha necesitado diferir la fecha del Congreso hasta la primavera entrante, cuya demora es de esperarse que no afectará la importancia ni el buen éxito de la reunión. El Congreso Internacional de Médicos es, en realidad, una demostración brillante de la solidaridad de la profesión, y del fin universal á que tendemos.

Este Congreso, sin embargo, representa mucho más que el interés común en las ciencias médicas y el afecto fraternal que anima á nuestra profesión en general. La gloria de la profesión médica ha sido, y será siempre, su unión estrecha é indivisible, puesto que su servicio tiene por objeto la causa de la verdad y de la humanidad. Han subido y han caído desmoronadas las dinastías: el mapa del mundo ha sido cambiado una infinidad de veces; pero la marcha de las ciencias médicas durante todas las épocas ha sido una ascensión constante á las altas aspiraciones de prevenir las enfermedades, aliviar á los que sufren y mejorar las razas.

Nosotros los que nos reunimos aquí tenemos para animarnos todos esos gloriosos recuerdos y hay más aún para unirnos é inspirarnos. Nos reunimos debajo de la sombra de una concepción gigantesca, tan antigua como Aristóteles, que agitó la mente de los grandes hombres de la antigüedad, y que lentamente se acercaba á una forma definida cuando la fé sublime y el genio de Colón resolvieron el problema del globo.

Verdad es que este vasto continente americano, que tiene seis millones quinientas millas cuadradas de territorio, ya contiene ciento diez millones de habitantes; que abraza todos los tipos de la vida humana y muchas variedades de las organizaciones políticas. Pero todo lo que hasta ahora ha sido hecho no es más que un tenue principio de lo que nos espera. Cuando Canning optuvo el reconocimiento de las Repúblicas de la América del Sur, se jactaba de que había llevado el Nuevo Mundo á una existencia en que pudiese corregir las faltas del Antiguo; y sin embargo las luminosas proposiciones de Franklin, de Bolívar y de Blaine en cuanto á las relaciones comerciales de los países del Hemisferio Occidental son aún solamente profecías que tardarán mucho para verse realizadas.

Los destinos de las naciones se desenvuelven lentamente; sucesos que ocupan todo el horizonte de una generación resplandecen á la faz de la historia como pequeñas pinceladas en el gran panorama de los siglos.

El curso de cuatrocientos años no es sino una fracción de la historia de España, Francia é Inglaterra; y sin embargo, hace cuatrocientos años que este continente entero no solamente no se había descubierto y era desconocido, sino que ni siquiera se sospechaba su existencia, á no ser en las ingeniosas especulaciones de los filósofos. Recuerdo los muy conocidos versos de Séneca:

> Venient annis sæcula seris
> Quibus Oceanus vincula rerum
> Laxet, et ingens pateat tellus,
> Tiphysque novos detegat orbes,
> Nec sit terris ultima Thule —

y no me sorprende que sus convicciones vehementes indujeran á Colón á transcribirlos dos veces en sus profecías; pero sin embargo, este Nuevo Mundo estaba aún envuelto en el manto oscuro de lo desconocido, desgarrado, como hemos podido saber después, del mundo conocido, por cambios producidos en remotas eras geológicas, esperando el plazo en que la inspiración y el genio de Cristóbal Colón le indujeran á buscar el Oriente navegando hacia Occidente. Ahora sabemos que buscando un derrotero al oeste hacia el Asia, llegó á las playas de este continente el día 12 de octubre de 1492; pero aún en la hora de su muerte, el día 20 de enero de 1506, ni Colón ni ningún otro navegante ó escritor tenía una idea de la magnitud de su descubrimiento. Todo lo que los conocimientos geográficos de aquella época les permitían comprender era que Colón había encontrado un camino nuevo para las Indias tomando un derrotero al oeste. Pocos años después atrevidos navegantes españoles, portugueses, italianos é ingleses exploraron las costas del nuevo continente.

Americo Vespucio en su célebre tercer viaje, de 1501 á 1502, habiendo navegado describiendo un arco de noventa grados entre Lisboa y las islas de las Georgias del Sur, llegó á comprender que era un nuevo mundo (Mundus Novus), pues era en realidad la América del Sur. No es nuestro intento ahora discutir porqué después de la muerte de Vespucio parte de la América del Sur, y más tarde todo el continente nuevo fué llamado por su nombre; sin embargo, cuando hace pocos días tuve en mis manos el pequeño folletto publicado en 1507 por el Professor Martin Waldseemüller, del Colegio de Saint-Dié, en Lorena, en el cual propone se le dé el nombre de América á toda la costa explorada por Vespucio, ignorando que todo formaba parte del vasto continente descubierto por Colón, no pude menos de sonreirme amargamente de los esfuerzos titánicos é infructuosos que nosotros hacemos para conseguir con nuestras observaciones la inmortalidad, mientras que en este caso la Fama caprichosamente ha ceñido con los laureles del descubrimiento más grandioso una cabeza que ni los reclamó ni tiene derecho á ellos.

La geología y la paleontología nos han demostrado que este llamado Nuevo Mundo era desde el punto de vista científico acreedor al nombre de Viejo Mundo. Las estratificaciones más antiguas tienen su desarrollo máximo en su superficie, y animales como el caballo, que se dice fueron introducidos después de 1492, se ha demostrado que habitaban ántes este continente, y que después emigraron á Europa; de modo que Cortés y Pizarro no hicieron más que volverlos á introducir á sus antiguas praderas. Es de mucha importancia recordar el hecho que toda la América del Norte y del Sur estaba en la fecha de 1492 habitada más ó menos populosamente por los descendientes de tribus que habían habitado aquí desde épocas remotísimas. Un autor competente nos asegura que el número de estos aborígenes era probablemente de doce á quince millones; y que no obstante las diferencias físicas que existían entre algunas razas, como entre los Iroqueses de Nueva York y los Aztecas de Mejico ó los Incas del Perú, en cuanto á sus dialectos y costumbres, es generalmente admitido que esta gran población indígena de la América del Norte y del Sur, con la excepción de los Esquimales, pertenecía toda á la gran raza de los pieles rojas.*

En cuanto á los Esquimales, sus caracteres polisintéticos, ó su sistema de construcción de palabras, en los cuales se asemejan á los otros aborígenes, no parecen suficientes para contrarrestar la desemejanza física, y aun más los indicios vehementes que existen para inducirnos á creerlos descendientes de la raza extinta del Oeste de Europa, los habitantes de cuevas. El Professor Dawkins en su obra "Early Man in Britain" ha desarrollado muy especialmente este argumento. Las osamentas de Esquimales recientes son tan idénticas á las de las cuevas pleistocénicas de Francia é Inglaterra, que, según autores competentes, son las mismas. El talento extraordinario de los Esquimales en cuanto al dibujo exacto de figuras humanas y animales es único entre las razas salvajes, con la única excepción de los habitadores de cuevas de Europa, en las cuales se encontraron idénticos dibujos. El *Ocibos moschatus*, que era el compañero inseparable de los habitantes de cuevas, ya no existe, á no ser en la América subártica, entre los Esquimales; pero los fósiles de estos animales se encuentran en rumbo marcado en el Hemisferio Oriental, desde los Pirineos, a través de la Alemania y Rusia y toda la gran extensión de la Siberia.

Los Esquimales, así como los pieles rojas, parecen haber emigrado á este continente en la misma época, ó quizas, mas probablemente, en épocas sucesivas de los más remotos tiempos, cuando la extremidad

* La palabra "raza" es evidente que se toma aquí en su sentido étnico más lato. Desde este punto de vista los Ingleses, Franceses y Griegos son diferentes ramificaciones de una misma raza. Indiscutiblemente, según observa John Fiske, "los Mejicanos encontrados por Cortés se diferenciaban de los Iroqueses que encontró Champlain tanto como un Inglés se diferencia de un Albanés ó un Montenegrino; pero cuando comparamos los aborígenes americanos con la raza blanca ó la amarilla, es correcto decir que los Mejicanos y los Iroqueses pertenecían á la misma raza."

noroeste de América astaba unida á la Siberia por la elevación del área ahora conocida por el Mar de Béring, ó cuando la alta cresta submarina que ahora se extiende desde la Francia hasta la Grœnlandia era tan elevada que se podía pasar á pie de la Europa á la América. Si se trata de saber fijamente en qué época geológica ocurrió esta emigración si fué de un golpe, ó mas probablemente en oleadas sucesivas, encontraremos problemas de insuperable resolución.

Los aborígenes que vivían aquí en la época del descubrimiento de Colón presentaban, es verdad, grandes diferencias en el estado de civilización que habían alcanzado, así como en sus idiomas y hasta en su apariencia. Hay grandes intérvalos de desarrollo social entre la zahurda miserable del salvaje de California, la larga choza del Iroqués y las grandes estructuras de Zuñi, Tlascala ó Uxmal. Sinembargo, se puede demostrar que en todos ellos había un principio oculto que obedecía á la adaptación á la vida comunal que se cree observaban todos los aborígenes de las Américas. Todas las tentativas para hacer una distinción entre los que habitaban chozas de barro y los demás han sido infructuosas ante el estudio crítico; y los argumentos de la filología confirman los resultados de los estudios zoológicos de la unidad esencial de la raza cobriza americana. Las tribus en las distintas partes de este vasto territorio presentaban ciertamente marcadas diferencias en la apariencia física, y nuestras colecciones etnológicas nos demuestran que en cuanto al tamaño y peso del esqueleto y la forma del cráneo había grandes diferencias entre ellos; pero todos tenían el mismo color cobrizo, los carrillos muy prominentes, ojos pequeños y hundidos, el pelo negro y lacio y la escaséz ó falta de barba; por cuyo motivo los autores más competentes no han podido encontrar suficientes diferencias físicas, linguísticas ó sociales contra la evidencia de la unidad de la raza.

Afortunadamente no estamos llamados á referir la historia geológica americana. Para nuestro fin es indiferente que todas las reliquias de la América antigua sean de un tipo neolítico ó que al fin se pruebe que existen también restos paleolíticos; pero lo que sí sabemos es que el clima y la tierra eran propicios al desarrollo de una población ya numerosa, vigorosa, fuerte y resistente, así como de hombres valientes y belicosos, aunque á menudo crueles, y que evidentemente avanzaban á un estado de civilización, si bien á pasos diferentes, según la localidad. Desconocedores como somos del origen primitivo de esta raza, es dudoso que los más ardientes sostenedores de la idea monogenistas* de que todo el género humano desciende originalmente de una sola, pareja, quieran afirmar que nuestros aborígines descendieron asimismo

* Es bien sabido que las tendencias de las ciencias naturales están á favor de estas ideas. Los filólogos parecen estar dispuestos á admitir que, á causa de la mutabilidad de las lenguas, especialmente en su estado primitivo y cuando no han sido escritas, no se puede llegar á conclusiones adversas á la doctrina monogenística, basadas en la diversidad de los idiomas hoy existentes, ó que han existido en épocas anteriores.

de una sola, ó aun de algunos botes cargados de asiáticos accidentalmente arrojado á nuestra costa del Pacífico; ó que volvamos á oir esos argumentos apoyados en la semejanza entre las tradiciones, idiomas, costumbres y objetos hechos á mano de los aborígenes americanos y los de varias naciones orientales. La sorpresa que, estoy seguro, nos han causado á todas esas semejanzas, debe cesar ante estos dos pensamientos tan bien expresados, por Fiske y por Lubbock respectivamente, á saber: que una de las más importantes lecciones grabadas en nuestro entendimiento por un largo estudio de la mitología comparada, es que la mente del hombre, en distintas partes del mundo, pero bajo la influencia de las mismas circunstancias, origina y desarrolla idénticas ideas, y las reviste con las mismas formas de expresión; y también que diferentes razas en el mismo estado de desarrollo á menudo presentan mayores semejanzas unas con otras que una raza consigo misma en diferentes períodos de su historia.

Mucho se ha censurado el cruel tratamiento que recibieron los aborígenes americanos á manos de los Europeos; pero no ha sido otra cosa que la misma triste historia repetida tantas veces, siempre que una raza primitiva, ignorante y mal armada ha entrado en conflicto con otra mas civilizada y bien armada. Sobre el cuadro triste de la esclavitud de los Indios más vale correr un velo, aunque sus sombras más oscuras fueron atenuadas por el esplendor del carácter y de las gestiones del ilustre Las Casas y por las sabias iniciativas de hombres tan eminentes como el Emperador Carlos V, el Papa Pablo III y el Cardenal Jiménez; pero es una extravagancia romancesca el deplorar la destrucción de cualquiera forma de gobierno ó sociedad existente en este continente en 1492.*

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*Creo conveniente dar aquí un breve extracto del método ingenioso propuesto por Lewis Morgan, de Róchester, Nueva York, para medir el verdadero estado primitivo de las razas en una escala étnica. Es evidente que todo plan semejante se presta á la crítica, y no es extraño, pues, que los arqueólogos estén divididos sobre los méritos de este plan en particular.

Los períodos étnicos, según Morgan, son: el del salvajismo, el de la barbarie y el de la civilización, y en cada uno de los dos primeros períodos hay tres estados secundarios.

La distinción entre el salvajismo y la barbarie está marcada por la aparición de la fabricación de artículos de alfarería. En el estado primitivo del salvajismo vivía el hombre en su reducida guarida y se alimentaba de frutas y nueces. El lenguaje articulado puede suponerse que principió en este estado. Todas las razas humanas pasaron de este estado en períodos de tiempo desconocidos.

En el estado medio del salvajismo aprendió el hombre el modo de pescar y el uso del fuego. Mi amigo, el Dr. Lumholtz, vivió muchos meses entre los caníbales de la Australia, que se hallan en este estado. El invento de la flecha marca el fin de este período.

El estado más avanzado del salvajismo, en el cual aún continuan algunas de las razas de los Indios americanos, como los Atabaskans de la Bahía de Hudson y los indígenas de la Tierra del Fuego, termina, como hemos dicho, con la invención de la alfarería; estas tribus desconocen la horticultura, no fabrican artículos de alfarería, Si el presente estado de los indígenas de la América del Norte y del Sur está lejos de ser satisfactorio en cuanto al desarrollo que prometían algunas de las tribus, especialmente de la América del Sur, durante el primer siglo después de la conquista, quizás podamos atribuirlo á la mala legislación de los conquistadores, á la ausencia de instrucción religiosa continua, y á la vil codicia que indujo á fomentar la fatal pasión por las bebidas embriagantes, tan común entre los pueblos bárbaros. Creo que no existe suficiente causa para dudar que con un tratamiento más equitativo y más inteligente, los que quedan de los aborígenes americanos pueden llegar gradualmente á ser ciudadanos útiles de nuestras repúblicas, y asimilarse á la masa de nuestra población.

Es fácil de aseverar y difícil de confutar que el desarrollo de la raza de los pieles rojas de este continente progresaba lentamente antes de 1492. Es un hecho que carecemos de datos tanto de su más remota historia como del estado primitivo y de la marcha en el desarrollo de ninguna de las razas más civilizadas, para poder hacer una comparación. Los conocimientos más remotos que tenemos de los antiguos

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y dependen para su alimentación de las raíces farinaceas, el pascado y la caza, y apenas viven en poblaciones.

El primer estado del barbarismo está indicado por la domesticación de otros animales, no contando el perro. En 1492, á no ser en el Perú, el único animal domesticado era el perro, y Fiske llama la atención sobre que la falta de animales domésticos era la causa de la retardación del desarrollo de los Indios americanos. El caballo, de cuya familia existieron seis ó siete especies, según lo demuestran los restos fósiles encontrados, desapareció y fué reintroducido después por los invasores. El cultivo de las tierras y la irrigación, así como el uso del adobe y la piedra en construcciones arquitectónicas, marcan el fin del primer estado del barbarismo.

El segundo ó estado medio está marcado en el Hemisferio del Este por la domesticación de otros animales además del perro, y allá, tanto como aquí, por el desarrollo de la irrigación en la agricultura, el uso del ladrillo y la piedra en la arquitectura, por el gran mejoramiento en la fabricación de artículos de alfarería, y por último, por la introducción de utensilios de cobre y de bronce.

Puede decirse que este período termina con el descubrimiento del procedimiento de fundir el mineral de hierro, el cual se hace más y más importante en el tercer estado del barbarismo y está finalmente asociado con la producción de documentos escritos por medio de alfabetos fonéticos ó geroglíficos perfeccionados.

Los que están en favor de esta clasificación aseguran que facilita mucho el estudio comparativo de las razas primitivas, pues nos proporciona una significación y límites definidos entre el estado salvaje y el de barbarismo, y debiera disipar la repugnancia sentimental con que se ha mirado siempre esta última palabra. Es manifiestamente imposible determinar en la mayor parte de los casos la duración de los varios períodos enumerados, pues parece evidente que ciertas razas han pasado por algunos de ellos más rápidamente que otras. Entre las causas que han influido en el desarrollo de la civilización de las razas, se nos sugieren las siguientes: Las condiciones más ó ménos favorables de la tierra y del clima para proporcionar abundantes medios de subsistencia; la existencia ó carencia de varios animales fácilmente domesticados, especialmente el caballo, la oveja, y el ganado vacuno; las oportunidades para el contacto por medio de la emigración, el comercio ó la guerra, con las razas que ocupan un grado más alto en la escala étnica; y las ventajas ó defectos étnicos inherentes en razas especiales.

Egipcios nos revelan que vivían ya en un estado de civilización un entero período étnico más avanzado que el de los Aztecas. Cuántos siglos pasaron entre los períodos del salvajismo y la barbarie de los Egipcios nunca se sabrá. No hay razon para dudar que si la América no hubiese sido descubierta todavía, se estarían dando aquí en estos últimos cuatrocientos años esos pasos más ó ménos lentos en la marcha hacia un estado social más civilizado. Los Europeos han cometido errores y atrocidades aquí en nombre de la civilización y de la libertad; pero tenemos que admitir que grandes ventajas se han obtenido con la conquista hecha por los Europeos de los siglos quince y diez y seis de tribus, la más adelantada de las cuales, se hallaba todavía en un estado muy primitivo de civilización.

Me he aventurado á hacer este rápido bosquejo de un asunto bien conocido, porque es conveniente que tengamos claramente presente el estado de desarrollo que existía en América hace cuatrocientos años, cuando se dió comienzo á la introducción de las razas eruropeas y de la civilización.

Aquí nos reunimos hoy para representar lo que ellas han conseguido en sus nuevas posesiones durante estos cuatrocientos años. No pueden dejar de interesarnos los conocimientos científicos que en estos ramos fueron traídos aquí; cuales fueron los obstáculos que hubo que vencer; hasta qué grado puede considerarse satisfactorio nuestro estado de civilización; cuales son los temas que nos interesan á todos, y en qué camino de investigaciones podemos unirnos para el bién de todos, y el progreso de la ciencia.

Las palabras grabadas en la tumba de Fernando Colón en Sevilla:

A Castilla y á León
Nuevo mundo dió Colón,

encierran una verdad incuestionable; pero no expresan toda la realidad. John Fiske dice bien: "El descubrimiente de América puede considerarse como un suceso sin igual; pero tiene también que ser considerado como un procedimiento prolongado y multiforme. El suceso sin igual fué la travesía del Mar de Tinieblas en 1492, y no hay argumentos, por más ingeniosos que sean, que puedan quitarles á Colón y á España la gloria de un hecho que no tiene igual en la historia del género humano. Fué un suceso que estableció un contacto verdadero y permanente entre la mitad oriental y la occidental de nuestro planeta, y unió las dos corrientes de la vida humana que habían corrido separadas en distintos cauces desde el período glacial." Pero para demostrar la magnitud de este descubrimiento; para determinar los caracteres físicos de este continente occidental; para arraigar las semillas de la civilización europea se requirieron los esfuerzos heroicos de dos siglos enteros. No solamente España, sino Portugal, Italia, Francia, Inglaterra, Holanda, Dinamarca y Rusia tomaron su parte en la gran empresa, y los nombres de Cabral, Pinzón y Magallanes, de Cortés, Balboa y Pizarro, de Ponce de León y Soto, de Champlain, La Salle, Drake, Hudson, Baffin, Davis y Béring deben quedar para siempre asociados en la obra estupenda y progresiva del descubrimiento. Hasta 1806 no vino á darse el último paso por Lewis y Clark, quienes cruzaron el continente de Norte América de este á oeste, y terminaron así la empresa comenzada por Champlain en 1608. Si sólo el estudio de la extensión de la tierra ya descubierta exigió dos siglos; ¿qué diremos de los obstáculos mayores que se opusieron á la colonización del vasto territorio y á la formación y establecimiento de gobiernos adecuados y de relaciones armoniosas entre los numerosos estados y países en que la América pronto se subdividió?

Los más antiguos gobiernos de Europa parece que necesitan aún apoyos artificiales, y sus disturbios no son á la verdad nada agradables. ¿Es acaso de extrañarse que nosotros en este hemisferio tengamos también nuestras pequeñas disensiones así intestinas como con nuestros vecinos, en prueba de que la educación de estos países es aún lastimosamente imperfecta en lo que atañe al bienestar común? De una cosa podemos estar seguros por lo ménos, y es de que cuanto tiende á fomentar las francas relaciones entre nuestros países es una ayuda poderosa para la resolución del arduo problema de nuestro bienestar. El dicho corriente de que excusamos á aquellos que conocemos contiene una verdad; pero podría añadirse, con respecto á las naciones más estrictamente que con respecto á los individuos, que el conocimiento mútuo engendra el afecto. Recordamos con un vivo interés el sabio consejo del ilustre Franklin, quien, en 1749, incorporó en su plán para la organización de la Universidad de Pensilvania una cláusula abogando decididamente por la completa enseñanza de los idiomas español y portugués, como medios de apresurar el desarrollo de esas íntimas y recíprocas relaciones que previó se establecerían inevitablemente entre los países de las dos Américas. El espíritu de la época infundido en nuestros sistemas de educación y en nuestra literatura; y las giganteseas fuerzas del vapor y la electricidad que unen los más distantes puntos de nuestro territorio, trabajan de común acuerdo por la ilustración, la elevación, el mejor conocimiento mútuo y las más cordiales relaciones entre todos nosotros.

El año cuyo cuarto centenario actualmente estamos celebrando vió el mundo tan agitado como jamás lo estuvo. Una obra de gran importancia para el género humano hacía tiempo se venía efectuando en la sombra de la que á menudo se ha llamado la Edad Tenebrosa. Cuanto más estudiamos ese período de gran interés, más apreciamos la magnitud y la necesidad de los cambios realizados durante esos siglos de preparación para las espléndidas actividades del Renacimiento. Puede decirse que la misión de la Edad Media fué cosmopolita, y que una de las hazañas más nobles del Renacimiento fué el descubrimiento de América. Hacía tiempo que estaban desapareciendo las barreras entre las naciones, y que la mezcla de unos pueblos con otros que tan vastos resultados ha dado en el Hemisferio del Oeste, se estaba llevando á cabo. Las protestas contra el mero dogma en religión y filosofía, las revoluciones contra el absolutismo, el ansia natural de luz y de ciencia, y los derechos naturales de la humanidad, se despertaron entonces para nunca más rendirse al sueño, hasta que en fecha aurea, pero aún muy distante, se anunciará la libertad universal y la pacificación completa por medio del arbitraje. No debemos de burlarnos de los sueños dorados de los hombres de 1492 que tardaron tanto tiempo en realizarse: y es triste el ver que á fines de este siglo diez y nueve después de Cristo se noten en la aurora de la civilización sombras oscuras, como restos de la noche de la Edad Media.

Es de extrañar el modo con que cada generación desatiende con la impaciencia de niños las lecciones de lo pasado y cierra sus ojos á las verdades que tranquilamente nos enseña la historia inexorable, á saber: que se requieren largos períodos de tiempo para realizar todo gran progreso en el verdadero camino de la religión, la política, la sociología ó la ciencia.

En nada tanto como en las ciencias médicas debe considerarse el descubrimiento de América como la línea divisoria entre la Edad Media y la Edad Moderna. No obstante los vastos conocimientos de los grandes médicos arabes y judíos, como Avicena, el príncipe de los médicos, Albucasis, Avenzoar, el sabio é ilustre, y Maimónides, sus conocimientos eran más filosóficos y especulativos que positivos. Grandes universidades se formaron, algunas de las cuales, como la de Bagdad y Córdova, poseyeron grandes rentas y magníficas bibliotecas. Numerosos hospitales también se erigieron, entre los cuales merece mención especial el del Cairo en 1283.* Pero el prolongado predominio de los moros y árabes en cuanto se relaciona con las ciencias médicas no fué marcado más que por el adelanto de la química y de la farmacia, la introducción de muchos remedios nuevos y la promoción de la union de las ciencias naturales con la medicina. Su química estaba fuertemente adulterada con la alquimia; su enseñanza clínica era elemental, y sus diagnósticos y tratamientos carecían de la verdadera fuerza y rectitud de un Hipócrates.

Las innumerables discusiones y especulaciones metafísicas pronto probaron que no era aquél el modo de poder conseguir el verdadero progreso.

Las observaciones aisladas habían progresado apenas en mil ochocientos años más alla de donde las había dejado Hipócrates. La verdadera ciencia médica, que no podía adelantar sin métodos fijos, é instrumentos de precisión, se vió obligada á esperar que por otros rumbos viniese la era de la verdad, ayudada por el estudio experimental. El inmortal descubrimiento de Harvey de la circulación de la sangre no fué anunciado hasta 1616, y su casi tan grande descubrimiento de que todos los animales superiores procedían de un huevo no se publicó

*Los primeros hospitales, estrictamente hablando, se fundaron en el año de 335 de la Era Cristiana por Elena, la madre de Constantino, en Constantinopla y Jerusalén. El de Antioquía se fundó en 360, y el famoso hospital Basílides en Cesarea en 375.

hasta 1651; y sin embargo, puede decirse que los trabajos de aquel modesto inglés y verdadero hombre científico hicieron más por el adelanto de los conocimientos médicos que todos los trabajos de todas las escuelas anteriores desde la época de Hipócrates. No solamente fueron de gran importancia las verdades que demostró, sino que su método de investigación experimental concienzuda marcó un nuevo período en la marcha de las ciencias médicas y le hace el padre de la medicina moderna.

Galileo fué el que primero indicó el uso del termómetro en la medicina, en 1595. Sagredo, de Venecia, lo mejoró en 1613, y Sanctorio, en 1625, insistió urgentemente sobre su utilidad; pero no fué sino á mediados de este siglo cuando Wunderlich colocó la termometría médica sobre bases tan sólidas que se hizo indiscutible su utilidad. Así como el astrónomo Galileo nos dió las primeras leyes del termómetro, así también otro astrónomo, Keplero, dió, en 1604, la primera descripción exacta del pulso humano. Pero este dato tan importante en el estudio de las enfermedades hizo tan poca impresión en la profesión médica, que el perspicaz Sydenham, que vivió hasta 1689, en ninguna de sus obras menciona nada sobre el pulso, y en casi ninguna de las obras de aquella época que mencionan el pulso se dice nada sobre su importancia en la patología. ¿Qué progreso podía hacerse en la medicina exacta sin la química? Y sin embargo, poco se hizo por el adelanto de ese ramo desde el siglo octavo hasta el décimosétimo. Boyle fué el padre de la química moderna (nació en 1627 y murió en 1691), y fué quien logró librar de las trabas de la alquimia á esa noble ciencia. Hasta fines del siglo diez y siete no se estimó el valor del análisis cuantitativo, y finalmente hasta 1590 no tenemos noticia del primer microscopio en manos de Jansen.

Mientras tanto la superstición combinada con la fe ciega en los maestros antiguos, y especialmente en Aristóteles y Galeno, cuyas teorías habían predominado por tanto tiempo en la medicina, cedían gradualmente á la luz de los conocimientos positivos. Las fantásticas nociones de la alquimia y de la astrología, la ignorancia y el fanatismo que ponían cada órgano del cuerpo humano bajo la protección especial de un santo, unían cada remedio á una forma especial de rogativa, marcaban todavía la enseñanza y práctica de la medicina. Pero el atrevido espíritu de investigación del siglo diez y seis trabajó por la medicina, como lo hizo por otras grandes cosas. Vesalio (1514 á 1564) y sus contemporáneos crearon la anatomía exacta. Paré (1509 á 1590) estampó para siempre la marca de su genio y de su carácter en la cirugía. Paracelso (1495 á 1541) ridiculizó las teorías antiguas é hizo un importante esfuerzo por emancipar el pensamiento médico. El gran método de Hipócrates de investigación detenida y concienzuda echó de nuevo raices; y abandonada la infructuosa filosofía de Galeno y sus adoradores árabes, al fin principia á brillar, saliendo de la oscuridad de tantos siglos, la medicina moderna, la medicina de la fidelidad á la naturaleza y la rebelión contra la mera autoridad humana; del escepticismo reverente y de la fe razonable; la medicina de los experimentos científicos y de la vivisección sin causar sufrimientos; la medicina que insiste en conocer las causas de las enfermedades y considera la higiene como su mas noble expresión.

La historia de la medicina europea de más de trescientos años á esta parte es una narración de la cual podemos estar orgullosos, si tenemos en cuenta los obstáculos que se han opuesto á su progreso. Vesalio y Paré, Harvey y Sydenham están relacionados con Bichat y Laennec, Húnter y Jénner, Pasteur y Líster, Virchow y Koch, formando la gran cadena de nombres inmortales que nos han dado la luz con sus descubrimientos científicos. Pero es triste reflexionar sobre lo que se ha hecho y lo que pudo haberse realizado. La ignorancia de los dominadores en cuestiones científicas, la lentitud del progreso de los conocimientos prácticos en las masas, y el predominio del imperialismo y del militarismo han impedido la promulgación de leyes que hubieran ayudado más al progreso de las ciencias médicas. Aún en la actualidad hay un contraste marcado entre lo que gastan los gobiernos más adelantados de Europa en propagar la educación y las investigaciones científicas, y lo que se desembolsa para el sostenimiento de esos grandes ejércitos y esas armadas que se dice son necesarios para el mantenimiento de la paz y del orden.

En nuestra misma época hemos visto el anuncio de la generalización más grandiosa que ha formado el entendimiento humano, en este siglo por lo ménos, anuncio hecho del modo más filosófico é inofensivo, recibido con un desbordamiento de escepticismo intelectual y de intolerancia religiosa que demuestra que las antiguas fuerzas contra las cuales protestó el Renacimiento existen todavía, aunque, afortunadamente, privadas de su anterior poderío. La maravillosa rapidez con que se han propagado las teorías de Darwin, y su incorporación en los pensamientos y las conversaciones del mundo. así como en la enseñanza de las iglesias, puede decirse que constituyen el triunfo intelectual más culminante del siglo diez y nueve.*

Si el progreso real de la medicina fué lento en Europa durante los años que se siguieron al *annus mirabilis* — 1492 — seguramente que no

*La tumba de Harvey en la iglesia de Hémpstead, tiene un epitafio que nos dice nació el 1° de abril de 1578 y murió el 3 de junio de 1657. Su obra inmortal, "Exercitatio Anatomica de Motu Cordis et Sanguinis," no obtuvo la aprobación de la censura de la prensa en Inglaterra, y no se publicó hasta 1628 en Fránkfort. Aunque susceptible de fácil demostración, aquel descubrimiento que forma época en la ciencia tuvo un influjo negativo en la teoría y la práctica médica de entonces. Darwin reposa en la abadía de Wéstminster, con los soberanos, los hombres de estado y los guerreros de una nación altiva. Su epitafio dice que nació el 12 de octubre de 1809 y falleció el 19 de abril de 1882, y su obra principal, "On the Origin of Species," se publicó en 1859, á los cincuenta años de su edad, y fué durante su vida traducida á todos los idiomas modernos, alcanzando seis ediciones y sententa y dos mil ejemplares en Inglaterra.

podemos tener queja alguna contra los primeros colonizadores de las Américas del Norte y del Sur; porque les fué imposible, en medio de sus heroicos esfuerzos para conquistar este vasto territorio, ocuparse en el cultivo de las ciencias esenciales para el estudio de la medicina.* En 1551 fundó Carlos V la Universidad de Lima en el Perú, y en 1553 la Universidad de Méjico, y sin embargo no se enseñó la medicina en aquellas universidades hasta 1700.†

En la América del Norte, aunque el Colegio de Hárvard fué fundado en 1636, se dió primero el título de Universidad á la de Pensilvania, que en 1765 estableció la primera escuela de medicina en los Estados Unidos. Las primeras y poco numerosas colonias diseminadas en este vasto país tenían á la verdad que lidiar con problemas más importantes que el del fomento de la medicina, y separadas como estaban de la madre patria, viéndose á menudo tiránicamente dominadas por el Gobierno de la Metrópoli y en guerra contínua con los aborígenes, sin contar con las desconocidas condiciones políticas y climatológicas del país, harto tenían en qué ocupar su atención. Ya hemos visto que sólo el trabajo preliminar de exploración ocupó dos siglos. El final del tercer siglo halló aquellas luchas próximas á terminarse triunfalmente, sólo para ser seguidas de violentos cambios políticos que no se llevaron á cabo síno á costa de dispendiosas guerras.

La conquista del Canada por los Ingleses, de 1759 á 1760, la independencia de los Estados Unidos en 1783, la independencia de las Repúblicas Sud-Americanas en 1810, y los veinte años subsecuentes; tales son los sucesos que el futuro historiador escogerá para marcar el período del Renacimiento ó Decadencia en América, y á los cuales habrá que referirse siempre para determinar nuestra capacidad para el progreso en política, en literatura, en artes y en ciencias.

Por mucho tiempo aseguraban aun los críticos mas benévolos que las nuevas razas que luchaban por arraigarse en el suelo americano no podrían prosperar como en sus países natales, y que sería imposible formar un tipo de raza característico americano. Para aquellos de nosotros que hemos estudiado con ansiedad este punto, las últimas dos décadas han disipado todos nuestros temores. Sean cuales fueren los cambios futuros en la organización política ó las relaciones de los países que componen la América, está ya demostrado que las razas europeas que la han poblado y que ya suman más de cien millones de almas, no mostrarán decadencia en su vigor ó en su energía, ni en sus fuerzas físicas y mentales. No meramente por lo grande de nuestros triunfos materiales señalamos los millones que pelearon en nuestra gran guerra civil, ni las ciento setenta mil millas de ferrocarril que cubren los Estados Unidos—casi tantas como hay en todo el resto del mundo—y los

*La primera prensa de imprimir de Norte América, según se dice, fué establecida en 1639 en la casa del Presidente Dúnster, del Colegio de Hárvard.

†El Dr. Billings nos dice que hay una queja archivada de la carencia de cadáveres en la Universidad de Méjico para las demostraciones de la clase de anatomía.

$10,000,000.000 de capital invertidos en esas líneas; ó su ejército de novecientos mil empleados; ó aquella estupenda obra—el ferrocarril del Canadá al Pacífico; ó los planes que hoy se estudian para construir un sistema contínuo de ferrocarriles en todo el continente, desde Montreal ó la Bahía de Puget hasta Buenos Aires; por la evidencia que presentan de una vasta imaginación, animosa resolución, intrépida tenacidad de propósito y enorme capacidad física para las fatigas, damos valor á las empresas que han subyugado tan rápidamente este continente, y están apresurando su consolidación comercial. Podemos estar seguros de que unos países que han demostrado un amor tan tenaz á la independencia, resistiendo toda intervención extraña; que han sido tan sagaces en adaptar sus constituciones políticas á sus condiciones peculiares; que ofrecen la libertad y las franquicias é iguales oportunidades para su mejoramiento á todos cuantos viven dentro de los límites de sus territorios, lograrán labrar su destino bajo planes más vastos y más sabios de amigable cooperación de lo que podemos prever.

Turgot, en su memorable discurso pronunciado en la Sorbona, dijo acertadamente: "Tous les âges sont enchaînés par une suite de causes et d'effets qui lient l'état du monde à tous ceux qui l'ont précédés." El descubrimiento de América dependió de causas que se pueden hacer remontar á siglos muy remotos. El presente estado de nuestro continente, cuatrocientos años después, es el resultado de la acción y la reacción de poderosos movimientos en que se vieron envueltos todos los países del mundo. Este país es el primer lugar, y probablemente será el último, en que se han reunido y entremezclado todas las nacionalidades del mundo. Aquí como en ningún otro lugar, pueden estudiarse con la ayuda de las ciencias exactas los problemas de la etnología y la sociología.* Aquí es donde con mejores resultados pueden resolverse

* Fué por esto que me mostré tan deseoso de que se organizara la Sociedad Antropológica Americana, que felizmente se estableció en 1891. La acción recíproca entre la actividad funcional y el desarrollo cerebral está demostrada por tantos hechos, y los métodos de examinar y anotar la disposición exacta y la diminuta estructura de los centros nerviosos están tan firmemente establecidos, que parece haber llegado la hora de empezar á estudiar sobre una ancha y sistemática base los cambios anatómicos progresivamente efectuados en sucesivas generaciones de individuos sujetos á las condiciones ambientes estimulantes, que con tanta rapidez cambian en nuestra vida moderna. Los miembros fundadores de esta sociedad convienen en que se permita hacer la autopsia y examen *post-mortem* del cerebro. Los demás miembros no han contraído semejante compromiso; pero todos están interesados en las investigaciones antropométricas y etnológicas. El designio de la obra emprendida por esta sociedad es de vasta y profunda importancia. Se cree que en ninguna parte como en América se pueden proseguir con tanto provecho estas investigaciones. La organización tiene, sin embargo, un carácter esencialmente internacional. Difícil es exagerar el valor de una serie de fotografías exactas de la estructura macroscópica y microscópica del cerebro obtenidas en generaciones sucesivas aun durante un período que no pase de mil años. Estos comprobantes se obtendrán de los individuos de las diferentes razas que viven bajo las mismas ó enteramente distintas condiciones físicas; y

los problemas concernientes á las relaciones del hombre con su medio ambiente físico, y llegar á la demostración de que, á pesar de la aparente magnitud de las fuerzas de la naturaleza, y no obstante el admitido influjo del clima y de las condiciones físicas sobre el progreso de la civilización, el poder del hombre para el adelante intelectual y social es incalculablemente superior.

En toda esta obra le toca una gran parte á la profesión médica, y afortunadamente nuestra posición en América nos facilitará el poder trabajar unidos y con buenos resultados. El alto grado de la inteligencia común de nuestro pueblo le hará apreciar desde luego unos resultados de tan solida utilidad y de tanto valor científico. Las inmensas riquezas presentes y en perspectiva de este continente deberían aplicarse cada día con mayor munificencia al fomento de la educación y las investigaciones—si, como es de esperarse confiadamente, nos esforzamos cada vez más por asegurar la paz entre nosotros y con todo el mundo.

Nunca cesaremos de enorgullecernos de nuestros antepasados, ni de reconocer lo mucho que le debemos á Europa: sus idiomas son los nuestros; su glorioso pasado es una parte de nuestra herencia; los ilustres nombres de sus grandes hombres en las artes, la filosofía y la ciencia, son palabras de uso corriente en nuestros hogares; sus rápidos adelantos en civilización nos estimulan á mayores esfuerzos; pero se está pasando de nuevo el balance entre el Viejo y el Nuevo Mundo.

Todos sabemos como los ejemplos de nuestras nuevas y vigorosas comunidades han suministrado y alimentado los principios contagiosos de la libertad política y de la igualdad social.* En todas las luchas por los derechos del hombre, desde el terrible pero beneficioso drama de la Revolución francesa hasta nuestros días, se ha invocado nuestro ejemplo y nuestro apoyo.

No puedo deteneros ahora con una enumeración de los servicios que ha hecho la América á las ciencias médicas. Casi inmediatamente después del descubrimiento se anunciaron importantes adiciones á la farmacología, especialmente de la América del Sur, y desde la introducción del guayaco hasta la fecha han seguido aumentándose sin cesar. Todo el mundo médico estuvo agitado durante la última mitad del siglo diez y

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es de esperar que se puedan obtener semejantes comprobantes de un número de familias individuales en muchas generaciones sucesivas, cuyo inteligente interés en semejantes investigaciones colectivas pueda mantenerse suficientemente vivo. La buena obra de esta sociedad progresa ya con actividad. Sus archivos se conservarán en los edificios á prueba de fuego del Instituto de Anatomía y Biología "Wistar," que forman parte de la Universidad de Pensilvania. Sin duda alguna la profesión médica de toda la América estará dispuesta á cooperar, desde su punto de vista técnico, en la gran obra etnológica y arqueológica que tan vigorosamente han emprendido los americanistas.

* Este es el único principio contagioso que hemos trasmitido. La fábula que atribuye á la América la procedencia de la sífilis europea ha sido victoriosamente confutada con pruebas concluyentes.

siete sobre los méritos de la cáscara de la quina,* introducida en Europa en 1640 por Juan del Vego; y no se puede aducir argumento más convincente sobre el valor de la ciencia médica y de la higiene que lo mucho que se ocuparon las obras y escritos médicos de los siglos diez y siete y diez y ocho de las enfermedades palúdicas, en comparación y contraste con el sentimiento de impunidad con que hoy se tratan esas afecciones. Entre los resultados de esta reunión que pueden pronosticarse, espero que sea uno la adopción de un plan bién preparado para el estudio sistemático y asociado de los remedios americanos y sus preparaciones farmacéuticas; á fin de obtener una clasificación científica y mayor uniformidad en su preparación, y finalmente una sola farmacopea para todo este continente.

La introducción del protóxido de nitrógeno (en 1844) y del éter (en 1846) en la práctica de la medicina, con cuya introducción están tan honrosamente asociados los nombres de Wells y de Morton; la operación de la ovariotomía, fundada sobre una base científica segura, por McDowell, de Kentucky—éstos y centenares de otros triunfos médicos de menor brillantez son demasiado conocidos para que se requiera mencionarlos. Todos saben cuán superfluo es decir una palabra en defensa de la literatura americana, y ciertamente los que sabemos cuán poderosamente han influido las obras médicas americanas en las opiniones y la práctica de los facultativos de Europa y el mundo entero, podemos contemplar con alguna complacencia nuestra posición. Y sin embargo, un examen de lo que América ha añadido realmente á la literatura médica demuestra claramente cuanto nos falta para estar á la altura de las naciones que van á la vanguardia del progreso en los conocimientos médicos. En 1879 dió la Bibliotheca de Rupprecht* el número total de nuevos libros médicos, publicados en el mundo, excluyendo los folletos, periódicos y actas, fijándolo en 419, divididos como sigue: Publicados en Francia, 187; en Alemania, 110; en Inglaterra, 43; en Italia, 32; en los Estados Unidos, 21; en las demás naciones, 26; y para el año de 1891 hallo que la misma Bibliotheca presenta el número total de 1,063, divididos así: en Alemania, 360; en Francia, 243; en la Gran Bretaña, 141; en los Estados Unidos, 80; en Italia, 78; en Austria-Hungría, 70; en España, 24; en otros países (principalmente en Suiza y Dinamarca), 67.

Por otra parte, en las formas más efímeras de publicaciones médicas

* Los motivos que influyeron en sus antagonistas fueron la doctrina de las calidades de los antiguos en parte, en parte el odio á los Jesuitas, que fueron los más activos en propagar el uso de esa droga, y asimismo, según afirma una tradición maliciosa, el miedo de que curaría tan eficazmente, que perjudicaría á los médicos. Aquí viene á la memorio el proverbio indio que dice: "Varias son las necesidades del hombre; leña pide el cargador, y enfermedades el Doctor.

* El Dr. J. S. Billings, en "Our Medical Literature." Discurso pronunciado en 1881 ante el Congreso Médico Internacional. Esos números, añade el autor, son demasiado reducidos, especialmente en lo que atañe á la Gran Bretaña y los Estados Unidos.

son muy diferentes los guarismos. He hecho contar cuidadosamente los volúmenes de periódicos ó revistas y actas médicas archivados en el Museo Médico del Ejército en Washington, indicando los países en que respectivamente se publican,† y el resultado demuestra que de esa clase de obras se publicaron en 1890 y 1891 en la América (incluyendo el Canadá, los Estados Unidos y la América Latina) casi doble el número de volúmenes de los publicados en Francia ó en Alemania, y tres veces tantos como en la Gran Bretaña.

	Totales.		América, incluyendo el Canadá, los Estados Unidos y la America Latina.		Alemania.		Francia.		Inglaterra y sus dependencias, ménos el Canadá.	
	1890.	1891.	1890.	1891.	1890.	1891.	1890.	1891.	1890.	1891.
Número de volúmenes de revisitas....	985	1,021	278	297	159	168	153	160	81	87
Número de volumenes de actas.......	319	300	104	84	48	48	35	38	36	33

	Italia.		España.		Austria-Hungria.		Bélgica.		Otros países.	
	1890.	1891.	1890.	1891.	1890.	1891.	1890.	1891.	1890.	1891.
Número de volúmenes de revistas.....	106	103	36	37	39	38	23	21	110	110
Número de volúmenes de actas........	27	27	1	1	4	6	10	10	54	52

No debemos olvidar, por supuesto, que en la prisa con que vivimos hoy muchas observaciones é investigaciones de gran valor se publican en la prensa periódica general, en vez de insertarse en las revistas profesionales de que se forman volúmenes de mayor consideración; pero creo que no puede dudarse que el gran número de periódicos médicos dados á luz en América, en contraste con el número comparativamente pequeño de nuevas obras médicas, justifica completamente la reconocida superioridad de Alemania, Francia, y la Gran Bretaña en las ciencias médicas. El hecho de que Alemania ha subido del segundo lugar que ocupaba en esa lista, con 110 volúmenes contra los 187 de Francia, en 1879, al primer lugar que hoy tiene, con 360 obras nuevas en 1891 contra las 243 publicadas en Francia el mismo año, es un elocuente testimonio de los enérgicos esfuerzos con que la nuevamente unificada Alemania está rápidamente adelantando en ciencia, como en otros terrenos. La verdad es que el número aparentemente extraordinario de publicaciones periódicas médicas en América obedece á una causa poderosa, causa que influye también en la formación de numerosísimas escuelas y sociedades médicas: tal es la vasta extensión de territorio y lo relativamente esparcido de la población, que hacen imposible poder servir al país con

†Tengo gusto en expresar mi reconocimiento por la ayuda que me dispensó en la preparación de estos interesantes datos estadísticos el National Bureau of Medical Bibliography. Esa admirable empresa, establecida en Wáshington para tener á mano las obras de la gran biblioteca del Surgeon-General's Office, merece el aprecio y apoyo de la profesión.

un promedio tan bajo de facultativos, escuelas, sociedades y revistas como es posible en países más densamente poblados. En cuanto á otras causas menos satisfactorias que han influido, particularmente en los Estados Unidos, para producir el gran número de escuelas médicas mal provistas y de periódicos médicos escasamente sostenidos, no es necesario mencionarlas aquí. A la verdad, el grado cada vez más alto de conocimientos científicos que se requiere hoy, tanto en los facultativos como en la literatura médica, y el aprecio creciente por todas partes con que se considera el hecho de que una educación médica superior interesa no solamente á la profesión sino también al público en general, están llevando á cabo la obra de poner coto al mal aconsejado establecimiento de nuevas empresas médicas, y de estimular las existentes á seguir un curso más formal y encaminado á fines más elevados. Tan cierto es esto respecto á nuestras revistas médicas, en particular, que ninguno que haya tenido ocasión de consultar con regularidad las colecciones de cualquier número de ellas, ha podido dejar de impresionarse profundamente con el mejoramiento decidido y constante de su redacción y el mérito científico de los trabajos en ellas publicados.

Este Congreso se reune en un período de interés crítico y especial para la educación médica, y me place manifestar que por primera vez en la historia médica de los Estados Unidos podemos enorgullecernos de que se celebre aquí una reunión semejante, é invitamos á todos á que hagan un examen detenido de nuestros modelos docentes y de sus facilidades para la enseñanza. Faltaría á las reglas de la urbanidad, así como á la verdad, si no reconociese lo mucho que vale el ejemplo que tan consecuentemente han dado la América Latina y el Canadá al mantener un alto grado de educación y de conocimientos en la profesión médica.

Hace quince años la profesión médica de los Estados Unidos denunció severamente el manejo de sus numerosísimos colegios médicos.* Mientras que el Canadá exigía un examen razonablemente estricto para ser admitido á un curso de estudios médicos que ocupaba cuatro años, con una sesión de seis meses en cado año, y mientras que en todos los países de la América Latina se requería un bachillerato ó un rígido examen para la admisión á un curso de estudios médicos de más de seis años, era costumbre general en los colegios médicos de los Estados Unidos conceder un diploma, confiriendo plenos derechos para practicar la medicina á todo estudiante que lo solicitaba después de haber seguido, sin examen preliminar de admisión, y sin examenes de prueba, dos cursos de conferencias de unos cinco meses cada uno, y haber pasado por un solo examen final, dirigido por sus mismos maestros ó profesores, cuyos honorarios dependían del estipendio pagado por esos estudiantes. Esta poco honrosa prostitución de la enseñanza fué el efecto de causas que no quiero comentar ahora. Empero con justificable satisfacción podemos señalar hoy las radicales y admirables reformas que se han hecho

* Escuelas alopáticas, 65; homeopáticas, 11; eclécticas, 4; total 80, en 1877.

después. Es verdad que todavía permiten las leyes de muchos de los Estados la incorporación de escuelas médicas sin ninguna garantía sobre el carácter de la enseñanza en ellas mantenida. Pero el espíritu que se ha despertado en la profesión y en la comunidad ha insistido, en un número cada día mayor de los Estados, en que no se permita ejercer la profesión de médico á los que se han recibido, ántes de someterse á un examen dirigido por una junta de facultativos imparciales nombrada por el gobernador. Las escuelas médicas, sea dicho en honor de ellas, han sido, con pocas excepciones, las primeras que se han esforzado per conseguir esta sabia y provechosa legislación. Han hecho más aún, pues adelantándose á esas leyes, las facultades de cierto número de los colegios principales exigieron primero cursos obligatorios de tres años, y ahora de cuatro años, con ocho meses de estudios en cada uno, y un plan de estudios acertadamente graduado, y rígidos examenes ántes de ser los estudiantes admitidos al colegio, al terminar cada curso y finalmente antes de recibirse.

Al recordar que esto se ha hecho sin la más ligera ayuda del Gobierno, y más aún, cuando se considera que, á causa de la reinante creencia quo los colegios médicos han producido pingües ganancias á sus facultades, no se han encauzado todavía hacia ellos las corrientes de los donativos particulares, podréis apreciar cuán grande es la conciencia del deber y la devoción á la ciencia que han impulsado á esas facultades á tomarse mucho mayores trabajos con la perspectiva de una remuneración muy disminuída por la más reducida asistencia de estudiantes y el aumento de los desembolsos.

La Comisión de Orden de este Congreso ha decidido acertadamente que se haga una excursión para inspeccionar algunas de esas instituciones, y se confía en que todos los delegados extranjeros, y tantos como sea posible de los demás miembros del Congreso, aprovechen esta oportunidad para examinar los recursos de algunas de nuestras principales escuelas médicas. Creo que les será grato encontrar en nuestros hospitales y laboratorios, lo mismo que en nuestras bibliotecas y museos, ventajas que pueden compararse con las de Europa. Encontrarán un plan de estudios, y sobre todo una organización para la instrucción clínica diaria que deja poco que desear. Fácil es de prever que otro de los resultados apetecibles de reuniones como la presente, celebradas sucesivamente en diferentes partes de América, será aumentar de tal modo el conocimiento y la confianza en nuestros respectivos métodos de enseñanza y tratamiento médicos, que esto retendrá en nuestro continente á muchos de nuestros estudiantes y de nuestros invalidos que han acostumbrado ir más lejos sin obtener mayor provecho.

Un vasto campo se abre ante nosotros para estudiar, con la cooperación colectiva en las investigaciones, el curso y distribución de la tísis, reumatismo y de otras enfermedades principales, desde el punto de vista de las influencias de raza y localidad. Las fiebres endémicas, no incluyendo las palúdicas, la tifoidea y la amarilla, que se dice reinan en varias partes de las Américas del Norte y del Sur, hace tiempo que exigen investigaciones sistemáticas para completar el estudio que de ellas inició el ilustre Drake. Ahora tendremos la oportunidad de estudiar, igualmente por medio de la investigación colectiva, los efectos relativos de los diferentes climas sobre las numerosas razas representadas hoy en América, y de determinar con mayor exactitud las cuestiones científicas y prácticas relativas á nuestros innumerables sitios balnearios y sanitarios, que abrazan lo mejor de cada clase. Fué el conocimiento de la urgente importancia de este último asunto, especialmente en nuestros días, lo que indujo al Gobierno de los Estados Unidos á extender la cordial invitación que ha sido uniformemente aceptada de parte de los otros gobiernos Pan-Americanos. Estoy persuadido que este acto ha asegurado para la higiene, y para la medicina preventiva del Estado una aceptación formal que jamás se les había dispensado ántes en este continente, y que debe ser indudablemente continuada por la disposición de los respectivos gobiernos á valerse de su influjo para obtener la promulgación y estricto cumplimiento de leyes que estén de acuerdo con las recomendaciones de este cuerpo de eminentes peritos.

Cuando se reunió en Filadelfia, en 1876, el Congreso Médico Internacional, el discurso sobre la higiene y la medicina preventiva, pronunciado por el distinguido Bowditch, uno de los primeros campeones de la ciencia sanitaria, fué uno de los más persuasivos pronunciados en aquella importante ocasión. La revista hecha en él de los trabajos de este país en la ciencia sanitaria el siglo pasado no es muy lisonjera; pero con el ardiente entusiasmo que caracterizaba á un hombre de tanto talento, predijo que iba á inaugurarse inmediatamente la época más grandiosa en la historia de la medicina. Son de citarse las palabras con que terminó su discurso: "Nuestro deber ahora es el de organización nacional, del Estado, municipal y de aldea. Desde el lugar más alto en el concejo nacional hasta la última junta de sanidad de aldea necesitamos organización. Con esas organizaciones podremos estudiar, y á menudo precavernos contra las enfermedades." Estas estimuladoras palabras estaban en armonía con el espíritu de nuestro tiempo y el desarrollo de la ciencia. Cuando los brillantes descubrimientos de Koch dieron á luz el bacilo específico de la tuberculosis y del cólera é indicaron el método científico que debía seguirse en lo venidero para semejantes investigaciones, se obtuvo un argumento irrefutable contra el escepticismo, el indiferentismo ó la penuria gubernamentales. Necesitó valor y demostró una rara latitud de ideas progresistas Lord Pálmerston al expedir su célebre contestación al Presbiterio de Edimburgo, con motivo de la amenazadora invasión del cólera en 1853, en la cual insistió con urgencia en que el bien ó el mal del género humano dependía de la observancia ó descuido de las leyes naturales que regulaban los asuntos del mundo; y que si no se destruían las causas locales de la enfermedad antes de volver los calores, reaparecía irremediablemente la epidemia, á pesar de las rogativas y ayunos de una nación unida pero inactiva.

Mucho se hizo, es verdad, en medicina preventiva, entre 1853 y 1876, cuando habló Bowditch; pero es apenas exageración decir que el progreso de los últimos veinte años ha sido mayor que el de los veinte siglos precedentes. Es cierto que todavía no hemos descubierto el veneno específico de todas las enfermedades contagiosas; aún con respecto á la muy conocida y estudiada fiebre amarilla, las últimas publicaciones del distinguido médico mayor del ejército de los Estados Unidos indican que aún no se ha resuelto definitivamente este punto. Ha habido, sin embargo, un cambio radical en toda esta materia, habiendo cedido las hipótesis su lugar á los hechos; pues todo el mundo sabe hoy, ó debiera saber, que las más temibles enfermedades están inseparablemente relacionadas con bién definidos organismos, y que esos organismos ó gérmenes se desarrollan y distribuyen bajo leyes especiales; que destruyéndolos ó eliminándolos se evitan esas enfermedades, y que al tolerar las condiciones que favorecen su desarrollo se dá pábulo y se invita al ataque de la enfermedad. Cuando se consideran estas simples y demostrables proposiciones en conexión con azotes tales como el cólera, la fiebre amarilla, el tifo, la fiebre tifoidea, la escarlatina, la difteria y la meningitis epidémica, no se necesita otro argumento para probar el valor y la necesidad de las cuarentenas y la eficacia de la inspección y protección médicas. Ni se requiere mejor argumento para demostrar lo acertado que es establecer laboratorios de higiene en muchos puntos en todo el país, habilitándolos liberalmente con el personal más competente y con los más delicados aparatos, y dotándolas generosamente, de modo que se pueda continuar con vigor incesante la investigación de las causas desconocidas aún de las enfermedades, y descubrir los mejores métodos para impedir el desarrollo de semejantes causas.

Fácil es lograr hoy se preste atención á estas observaciones; ahora que se hallan trastornadas las comodidades públicas, amenazada la riqueza pública y despierta y susceptible la conciencia pública. En estos momentos descansan nuestros centros comerciales confiados en las medidas sanitarias adoptadas por nuestros gobiernos, de acuerdo con los consejos médicos, para restringir y excluir esas dos temibles epidemias—el cólera y la fiebre amarilla. Recuérdese el terror popular del verano pasado; recuérdense las espantosas pérdidas de vidas y los efectos desastrosos sobre el comercio causados por las invasiones anteriores de esas enfermedades, cuando las poblaciones azotadas eran más pequeñas y menos ricas de lo que son actualmente las nuestras. No tenemos que remontarnos á la Edad Media á buscar los cuadros de desolación, efecto de las enfermedades epidémicas: recuérdese la trágica historia de la gran plaga de fiebre amarilla que azotó á Filadelfia hace justamente cien años, según la describe Rush; calcúlese el resultado, si hubiera invadido el cólera la ciudad de Nueva York en 1892, y hallando favorables las condiciones del clima y la localidad, hubiese propagado sus gérmenes mortíferos por el Norte, el Sur y el Oeste: la bella Ciudad Blanca que á la sazón se estaba levantando en las riberas de aquel distante lago, como tocada por la vara mágica del arte y de la industria, habría en tal caso recibido un golpe de muerte, y habrían sido incalculables las pérdidas que hubieran agobiado á este país.

El pueblo entero contemplaba lleno de ansiedad la lucha que se libraba en la bahía de Nueva York, y un himno universal en acción de gracias se elevó al cielo cuando el terrible invasor fué finalmente rechazado por los enérgicos y sostenidos esfuerzos de las autoridades sanitarias. El no presenciar nosotros hoy en América la agravada repetición de la epidemia, de conformidad con los invariables antecedentes, sólo se debe á la continuación de los mismos esfuerzos, apoyados por una autorización más lata, y ayudados con una sanitación local más eficaz. Cuando tan grato resultado se asocia con el éxito que de algunos años acá han obtenido nuestros esfuerzos por impedir la entrada á la fiebre amarilla, no es necesario aducir más poderoso argumento para exigir la adopción de aquellas medidas uniformes que en lo venidero nos protejan contra la invasión de esos males. Estos ejemplos demuestran del modo más convincente la necesidad y el valor de los convenios sanitarios internacionales que puede hacer mucho este Congreso para recabar. Pero otras muchas cuestiones importantes se nos ocurrirán á todos nosotros que sólo un trabajo asiduo y colectivo podrá resolver; ni podrá llevarse á buen término semejante trabajo hasta que no se corresponda más completamente que hasta aquí ál clamor por organización lanzado por Bowditch: sólo la organización y la cooperación, y más aún, el establecimiento como parte del gobierno de cada nación civilizada de un departamento de sanidad pública, podrán proporcionar la continuada y eficaz atención que requiere una empresa de tal magnitud. Debería haber, y no está muy distante el día en que haya en el gabinete de todos los gobiernos aquí representados un secretario (ministro) de la salud pública, revestido con el mismo rango, influjo y prerogativas que los demás miembros del gabinete.

Este es pues, el último y el mayor servicio que puede hacer nuestro Congreso á la ciencia y al Estado. Nuestro influjo combinado será irresistible cuando lo usemos para abogar en pro de una educación superior; para llevar á cabo vastos planes para el estudio científico de nuestra vida nacional, hasta donde la afectan el medio ambiente social y el clima; para adoptar los remedios ó tratamientos de mérito demostrado, y para que se reconozcan más completamente las altas funciones de la medicina preventiva. "*Salus sanitasque reipublicæ, suprema lex.*" Séanos permitido unirnos aquí más íntimamente unos con otros; tener una fe más profunda en nuestra profesión y sus nobles fines, y hacer el firme propósito de trabajar en fraternal cooperación por realizar el sublime ideal que consiste en servir á la ciencia y á la raza humana.*

* No sería justo dejar de hacer mención aquí de las obras de varios autores que hemos consultado para preparar este discurso, especialmente El Descubrimiento de América, por Fiske; Historia de la Medicina, por Baas (traducida por Hánderson, 1892); El Descubrimiento de Norte América, por Henry Harrise (París y Londres, 1892); La Historia del Nuevo Mundo, llamado América, por E. T. Payne (Vol. I, Oxford, 1892); Historia de la Civilización en Inglaterra, por Buckle; Historia del Desarrollo Intelectual de Europa, por Dráper; La Historia Primitiva de la Precisión Instrumental en Medicina, por el Dr. S. Weir Mítchell; Historia de la Bibliografía de la Medicina Española, por A. H. Morejón; Publicaciones y Cartas Inéditas del Dr. Daniel G. Brinton; Informe sobre la Etiología y Prevención de la Fiebre Amarilla, por George M. Stérnberg, 1890 (hoy Médico Mayor del Ejército de los Estados Unidos); Origen de la Civilización, por Lubbock, y también sus Tiempos Prehistóricos; Antropología, y también Indagaciones sobre la Historia Primitiva del Genero Humano, por Tylor; La Sociedad Antigua, por Lewis Morgan, Nueva York, 1877.

Tengo también mucho gusto en expresar mi reconocimento al Dr. R. P. Robins por la ayuda que me prestó, especialmente en el examen de la Medicina Española Primitiva.

FOURTH GENERAL SESSION.

SEPTEMBER 7, 1893.

Prayer by the Rev. George Elliott, D. D.

Almighty God. Thou art the maker of our bodies and the Father of our spirits. Help us that this day we may glorify Thee in our bodies and in our spirits which are Thine. We give Thee thanks for all the revelations Thou hast made in the world fashioned by Thy wisdom and displaying Thy power. We thank Thee that Thou hast given good gifts unto men, that Thou hast placed in the hands of men the skill of healing. The children of the Great Physician are called here to consider the sanitary needs of this great country, and we pray Thee, Our Father, that Thou hast held in the fastness of Thy purpose this new world for the solving of great problems and the leading up of races of men to new and larger achievements. Grant that by similar meetings the nations may be brought to a closer union. Grant that we all may be led out through the larger realms of spirit and through the deep mercy of Christ Jesus our Lord, with those of our families from whom we are absent, separated by all the miles and distances, and may we feel near to each other because we are near to Thee, the center of all love and of all hearts. Receive us into Thy hands; live this day by Thy wisdom in this people; keep even step beside us through all the journeyings of our days. Hear us as we continue to pray in the words Thy Son taught us:

Our Father which art in Heaven, hallowed be thy name; Thy kingdom come; Thy will be done in earth as it is in Heaven. Give us this day our daily bread; and forgive us our trespasses as we forgive those who trespass against us. And lead us not into temptation, but deliver us from evil: For thine is the kingdom, and the power, and the glory forever. Amen.

Dr. PEPPER. I have the pleasure of introducing the distinguished representative from Venezuela.

Dr. RIVEARO SALDIVA. It is with profound pleasure that I arise to express my great gratification in being privileged to attend this congress as a representative of Venezuela, with so many notable members of the medical profession gathered together for the exchange of thought on so many great and absorbing questions concerning the state of medicine in America and the world generally. After the close of these proceedings we will return to our respective spheres of usefulness imbued with fresh ideas as to the treatment of disease which suffering humanity is called upon to endure. I take this opportunity of extending, on behalf of my Government and my country, our sincere thanks for the cordial invitation extended to us to participate in these proceedings, and offer our heartfelt congratulations on the success which has attended this meeting.

Dr. PEPPER. I have now great pleasure in introducing Mr. Ernest Hart, of London, who has been invited by the committee of arrangements to speak briefly upon some of the general interests of the medical profession in England and in this country.

Mr. HART. Mr. President, ladies and gentlemen: We are told traditionally that Ciest D. Cooper, one of the great surgeons of this century who divided the honor of modern surgery with Von Buren and others, and who remains with us not only as a model of a brilliant surgeon, but an accomplished gentleman, was in the habit of addressing every candidate for a degree from the college with which he was connected, something after the following manner: Gentlemen, you are about to enter upon a noble and difficult profession, and your success will depend principally upon three things: First, upon your knowledge; second, upon your continuous industry; and third, upon your moral character. Without the first, no one could wish you to succeed; without the second, industry, you will never be able to succeed; and without the third, strength of moral character, even if you do succeed, success can bring you no happiness. Now, those words might form a very adequate summary, a short text-book of the conduct, private dignity, and conduct in relation to public affairs of all medical men; and, one might very well ask, whether anything more than that is at all necessary, whether there is any necessity for a detailed and elaborate code when the whole philosophy can be summed up in so few words. And some do ask that question: and just now in our country, and I think to some extent in this, it has become a question as to just how far it is necessary to add to the simple rules of ethics, which govern the conduct of gentlemen, Christian gentlemen and honorable gentlemen in all professions. Is it necessary to add to this a detailed code of medical ethics? That question is one which has been solved. It was held in no doubt until these recent times. But, nevertheless, I think it is clear that never at any time, if there were a necessity for such a code, could that necessity be nearer and more apparent than at the present moment, for under the stress of a complex civilization with the keenest competition, and with the temptations and difficulties induced by the enormous facilities for advertisement, and with all the arts of those who make advertising a business, and the profit to tempt the medical man from the ancient bond of modesty and diffidence, there is now the strongest reason for fortifying every professional man by a code so precise, by deductions so exact, so comprehensive, and so far-reaching that he shall never be overcome by such temptations, but shall be able to know at once, and under all circumstances, what is his duty, what is the rule of his profession in any one particular case in which he may be tempted. By possible excuses, which his vanity, his interests, his natural love of prominence suggests to him, he may be tempted to decide a doubtful case in his own favor and against the general good and welfare of the profession as a whole.

Now, I want to say that such a code as this does exist, and exists upon a logical and strong basis, exists for the benefit of the public, at least as much if not more than for the benefit of the profession; that it is not a trade's union business, it is not an elimination of public liberties and rights for the benefits of a private interest, but that it is, on the contrary, a movement which is made far more for the interests of the public in general than for the interests of the profession, and that applies not least but even more to those regulations of the medical code, which have from time to time been stigmatized by the public press as narrow and oppressive, and stigmatized as useless by those who call themselves the bolder and younger spirits among us. But not even the youngest among us, as you know, are infallible, and I think it is precisely the youngest and boldest which in this case are likely to go wrong. Now, first of all, let me remind you that the medical profession is only one of many professions. We have standing alongside of us the profession of law and the profession of the church. It is interesting, from a universal standpoint, to consider what is the code of the legal profession, why is that justified and how does it compare with the medical code? Just before I came to attend this congress I wrote some legal men concerning some details of the legal profession. One of them said: "After all the general spirit of a code may be summed up in a few words: That every practicing lawyer ought to be a gentleman and do only what is honest and honorable and fair to others, and, if he does not act like a gentleman and is not honest and honorable and true to his profession, honorable men ought to have nothing to do with him."

Now, you notice the deduction, that if he does not, honorable men of the profession ought to have nothing to do with him. That is precisely our position to-day. Questions in the bar and with the legal profession are strengthened by this, that the discipline of the bar is absolutely in the hands of the Attorney-General of England, and is decided without appeal by judges, so that any solicitor who is guilty, not only of any technical offense against his duty as a lawyer, but any solicitor who is guilty of anything which brings dishonor upon him as a gentleman is frequently not only temporarily suspended but subjected to deprivation of the right to plead or the right to practice his profession. My friend sent me a case which occurred last June, in which it was decided that a solicitor in a provincial town who had, in virtue of certain house property which he held, been a party to immorality, and used the house for immorality, and had left a stain upon his character as a gentleman, should be excluded from legal practice for a number of years, subject to reinstatement upon proof of good conduct. So, the legal profession have a code far stricter than ours, but a code which every one admits is for the benefit at least as much of the public as of the profession. Now, let us take one or two other examples of legal etiquette. There are several things a lawyer must not do. One of these I was instructed in by an eminent lawyer with whom I spent a few days not long since. He may not conduct a speculative suit. That is to say, he may not conduct a suit in which his pay depends on the issue of the suit. Well, that looks like a restriction upon liberty. O, how that word liberty is licensed! Liberty is a blessed word, but compulsion is sometimes a more blessed word.

That looks like a restriction upon liberty, but if a lawyer is personally and financially interested in the result, and the case goes against him, he is angry with the judge and is apt to not do his duty, because it is his duty to see that justice is secured. So, although it looks like a restriction on the lawyer, it is only right he should have no financial interest in the cause he conducts. So with many other elements in the legal code of ethics, which I will not dwell upon. I will pass at once to the code of medical ethics, and I will ask you to consider whether you are of the opinion that you can safely cast aside all the precedents of past experiences, all that you may call the case law. Shall we reject the deductions which have been carefully and deliberately arrived at in respect to the applications to the medical life of the general principles of ethics?

For example, a medical man is prohibited from consultation with quacks. Now, in order to determine the meaning of the word quack, I have looked up Dr. Johnson's definition. "Quack—a boasting pretender to arts which he does not understand; a boasting pretender in physic: one who proclaims his own medical abilities in public places; an artful, tricking practitioner in physic." Thus you see there is no distinction between the quacks who have medical degrees and the quacks who have not. Another thing, no respectable physician should advertise. That is an essential of the quack. He is a person who seeks advertisement. This advertisement may be in the way of an interview by a representative of the secular press, or it may be by a published letter, by the description or criticism of some new alleged system of treatment, or it may be by divulging the secrets of the sick room and reporting without authority or permission the incidents and course of the illness of the distinguished or notorious somebody whom Dr. ——— is treating. Such arts are in direct contravention of medical ethics, and deserve the scorn and reprobation of every honorable person, as well as every honorable medical man.

It is in the interest of the public in general that the medical profession and every member of it shall be worthy of the confidence of the community, and that the physician shall earn his reputation, not by dishonest means, not by advertisement of himself or his books, not by the prominence accorded to him by the journalists, but by the judgment of his colleagues as to his approved knowledge and in view of his conscientious and modest application of that knowledge. As to the rule which prohibits the medical man possessing or profiting by any secret remedy, not only is this an offense against professional morality but it is a source of great public danger as well. The physician owes his knowledge as well as his capacity for practicing medicine to the open communications of bygone practitioners, and daily he continuously receives such aid from his colleagues. Indeed it is to their published knowledge and experience that he owes the greater part of his means and ability of practicing his art. A new treatment, drug, or medical dogma is like a doctrine, dogma, or deduction in theology. The one is for the purpose of aiding the body for physical salvation, while the other is an aid to spiritual salvation.

From traditional law, and in virtue of the mission of the physician or priest, both are alike the common birthright of humanity, and any man who for profit keeps as a secret a new treatment or a new doctrine is a traitor not only to his profession but to all humanity. The physician who trades in or palters with secret remedies is untrue to his obligations, unfaithful to the world, a shame to himself, and a dishonor to his calling. It is only right that he should be treated accordingly under the professional code, and that he should not have a standing equal to the man who is true to his profession, true to humanity, and true to himself.

Nor can the alleged value of any so-called secret remedy be held to condone such an offense, for never in the whole history of mankind has there been one of these so-called secret remedies which when divulged or discovered by examination has proven of the least value.

Again, a medical man can not take charge of the patient of another without previous consultation and approval of the physician who previously had the case in hand, or rather under whose care the patient was at the time. A physician is prohibited criticising or advising a patient on any matter relating to another man's work, except under certain stated circumstances and conditions. The consultant is forbidden under any circumstances to take the place of the practitioner who called him in. All of this is as much, at least, and perhaps more for the public good than for the good of the profession and of the individual.

A resolution was then offered by Dr. Reed, concerning certain officials becoming ex-officio members of the international committee, which was passed.

The section on hygiene offered two resolutions, one concerning cholera and the other having to do with the Congress of the United States. They were read and referred to the international executive committee.

Adjourned.

FIFTH GENERAL SESSION.

SEPTEMBER 8, 1893.

Prayer by Rev. Byron Sunderland, D. D.:

O Thou Almighty and Eternal Jehovah, Father of angels and men, we know that Thou art a rewarder of all them that diligently seek Thee, for Thou has confirmed Thy faith in this by all Thy wonderful work in the world. Among us there has been all manner of disease and death, and Thou has raised up this new order and fraternity of men, and endowed them with the genius of sanitary power. Great are the labors of these servants, to whom Thou hast given so largely to apprehend the laws of life and health among mankind. We thank Thee, O Thou Father Almighty, for the gracious gifts to this great medical and surgical profession in all its departments, which has made its members so valiant against the mighty host of evil that has so long desolated our homes and caused so much suffering. Vast is the needful courage to cope with so many invisible, formidable, and deadly forces, and yet we pray Thee that thou may ever fill us with impulses which lead to new discoveries for the mitigation of human sufferings, and may they ever bear before their eyes that wonderful prediction, the last enemy that shall be destroyed is death. We thank Thee, O, Thou divine ruler and director of all things, that Thou hast made it possible to assemble here this Continental Congress in this great year of expositions. And now we invoke Thy special benediction upon all the officers and members of this great association, upon their families, their countries, their nations, and whatsoever they represent, both at home and abroad. Be ever gracious unto them, and do Thou abundantly abet their endeavor, that they may be able more and more to open the volume wherein are enfolded the sources of vigor and strength for the coming generation, and when they shall have seen the monuments of this land, and shared its hospitality, wilt Thou guide them, each and all, to their nations, that they may lead upon new researches, and that they may follow the lines of nobler triumph in the chosen work of their lives, and may the favor of the Almighty and Eternal God rest and abide upon each and all of them, now, and evermore, which we ask through Jesus Christ our Lord. Amen.

Dr. PEPPER. I have pleasure in introducing the distinguished representative of Honduras, Dr. F. C. Valentine, ex-surgeon-general of the army of Honduras.

Dr. VALENTINE. Mr. President, ladies and gentlemen: The president of the congress has kindly excused me from addressing you in the language of Honduras. He does that, I presume, under the impression that you know a little more English than you do Spanish.

In the name of the Republic of Honduras, I beg to thank you. I thank you because you remember that it exists; that it has a scientific being worthy of mention in a conclave like this; that it is not solely a land of gold, silver, precious stones, hides, mahogany, and rubber, commingled with volcanic upheavals and political revolutions. I say this not in deprecation of the writers, who must make their letters readable, because I am somewhat of a journalist myself—at least I am so called by newspaper men and women when they would flatter me.

But, to speak of Honduras itself. It is a small country with a large debt. For its acreage, the largest debt in the world. But the debt was not of its own making. People in the "mother country," from whence most of you sprang, pledged the building of a railroad to unite the Atlantic and Pacific oceans, and pocketed the money. Had North American enterprise undertaken the work, the road would have been built thirty years ago and the country enriched by development of vast natural resources.

You know, of course, that the finest sarsaparilla in the world grows in Honduras. And it was in Honduras that the *carica papaya* was first used as a digestive ferment. It may be transgressing the limits of modesty to tell you that a medical official of the army of Honduras was the first to prescribe the plant, whose juice, by dissolving the pseudo-membrane of diphtheria, enables us to save many little ones from a horrible death.

From the paucity of literature on Honduras, it may not be known to you that it is anything but a hot, unhealthy country. Within three hours' ride from either coast is a land of eternal spring, with an average temperature of 72°, and a diurnal variation of but five degrees between midnight and noon. There the strawberry and the orange ripen in June as they do in December; there one drinks water sterilized in the great workshop of nature, charged with carbonic acid gas so that it purls like the best champagne, vying in purity with the waters of the most noted spas in Europe.

There consumptives live without a hemorrhage or even a cough, and there Koch's bacillus need not be sought or feared. There asepsis need hardly be employed in surgery, for there the air is so pure that meat exposed to it remains unchanged interminably.

Honduras is proud that it was the first Latin-American country to adopt the North American system of education. Honduras was the first tropical country to institute absolute liberty of the press, life's post-graduate school. In consequence, it expects to emulate the United States in everything, save in the minor details of size. You read much of political disturbances and seismic convulsions in Honduras. During the past thirty-five years there have been but four changes of government; one ex-President is now living abroad and another, after two consecutive terms of office, is farming in Honduras. This shows that the Presidential term in Honduras does not expire by bullets, but by ballots. And as to earthquakes and volcanic eruptions, not one has occurred for half a century. Yet Honduras is not recognized as fully as it merits. It will be as soon as this practically undeveloped land is placed within six days' travel of the port of New York, and that will be within less than twelve months. Then the glorious star-spangled banner will greet the modest white and blue of Honduras in brotherly salutation; then the greatest people in the history of mankind will know, and consequently reciprocate, the esteem in which it is held by its little sister; then science will accomplish another of its triumphs, the way being opened it by the first Pan-American Medical Congress.

REPORT OF THE INTERNATIONAL EXECUTIVE COMMITTEE.

The secretary-general read the report of the International Executive Committee as follows:

The International Executive Committee assembled, pursuant to call, at the Arlington, at 3 p. m., September 7. On invitation of the committee, Dr. Pepper, president of the congress, assumed the chair.

The following countries responded to the roll call by the presence of original members of the committee, viz., Argentine Republic, Dr. Pedro Lagleyze; Mexico, Dr. Tomás Noriega; United States of America, Dr. A. Vander Veer; Venezuela, Francesco A. Risquez.

The following countries responded by report of election to fill vacancies held by their respective representatives as follows, viz: British West Indies, Dr. John C. Phillipo; British North America, Dr. F. Montizambert; Costa Rica, Dr. Juan J. Ulloa; Guatemala, Dr. Juan Padilla; Haiti, Dr. V. L. Gilles; Peru, Dr. Manuel A. Muñiz; Republic of Colombia, Dr. Alfredo Garcés.

Proxies for the meeting were recognized as follows: United States of Brazil, Dr. Mauricio W. Gilmer; Honduras, Dr. Fred. C. Valentine; Spanish West Indies, ——.

The secretary-general presented the following resolution, adopted by the general session of the congress:

"*Resolved*, That the International Executive Committee be, and is hereby, requested to amend regulation 5 by adding the following provisions, viz:

"1. The general officers of the congress shall be *ex officio* members of the International Executive Committee until the next succeeding meeting of the congress. The president of the congress shall be *ex officio* president, the secretary-general shall be *ex officio* secretary, and the treasurer shall be *ex officio* treasurer of the International Executive Committee.

"2. The International Executive Committee shall have power to appoint standing committees to carry out the purposes of the congress, with the power to report *ad interim*. Such standing committees shall consist of an equal number of members for each constituent country or colony, or for so many of them as may be required for the object in view; shall be appointed by members of the International Executive Committee, each member making the required appointments for his respective country. Such committees may be appointed *ad interim* by members of the International Executive Committee, at the request of the *ex officio* president of that committee. Members of the International Executive Committee, upon the recommendation of the president of the committee, shall endeavor to have appointments made in accordance with this provision confirmed by their respective governments."

Dr. Montizambert (British North America) moved the adoption of the amendments. Seconded by Dr. Ulloa (Costa Rica). Carried unanimously.

The secretary-general reported the following as the present organization of the International Executive Committee for the Second Pan-American Medical Congress:

Argentine Republic.—Dr. Pedro Lagleyze, Calle Artes 46, Buenos Ayres.

Bolivia.—Dr. Emilio di Tomassi. Calle Ayacucho 26, La Paz.

British West Indies.—Dr. John C. Phillipo, Kingston, Jamaica.

British North America.—Dr. F. Montizambert, Quebec.

Chile.—Dr. Moises Amaral, Facultad de Medicina, Santiago.

Costa Rica.—Dr. Juan J. Ulloa, San José..

Dominican Republic.—Dr. Julio Leon, Santo Domingo.

Ecuador.—Dr. Ricardo Cucalon, Guayaquil.

Guatemala.—Dr. Juan Padilla, Guatemala City.

Haiti.—Dr. V. D. Gilles, Port au Prince.

Hawaii.—Dr. John A. McGrew. Honolulu.

Honduras (Spanish).—Dr. George Bernhardt, Tegucigalpa.

Mexico.—Dr. Tomás Noriega. Hospital de Jesus, Mexico.

Nicaragua.—Dr. J. I. Urtecho, Calle Real, Granada.

Paraguay.—Dr. ———.

Peru.—Dr. Manuel A. Muñíz, Lima.

Republic of Colombia.—Dr. Alfredo Garces, Popayan del Cauca.

Salvador.—Dr. David J. Guzman, San Salvador.

Spanish West Indies.—Dr. Juan Santos Fernandez, Calle Reina No. 92, Havana.

United States of America.—Dr. A. Vander Veer, 28 Eagle Street, Albany, N. Y.; Dr. Wm. Pepper, *ex officio* president, 1811 Spruce street, Philadelphia; Dr. Charles A. L. Reed, *ex officio* secretary, 311 Elm street, Cincinnati; Dr. A. M. Owen, *ex officio* treasurer, 501 Upper First street, Evansville.

United States of Brazil.—Dr. Carlos Costa, Rua Largo de Misericordia 7, Rio de Janeiro.

Uruguay.—Dr. Jacinto de Leon, Calle de Florida No. 64, Montevideo.

Venezuela.—Dr. ———.

Dr. Phillipo (British West Indies) moved the adoption of the foregoing as the organization of the international executive committee for the Second Pan-American Medical Congress. Seconded by Dr. Vander Veer (United States). Carried unanimously.

Dr. Vander Veer (United States) moved that the next Pan-American Medical Congress be held in 1896.

Seconded by Dr. Montizambert (British North America). Carried.

Dr. Reed (United States) moved that general regulation 8 be amended to read as follows:

"SEC. 8. The sections of the congress shall be as follows: (1) General medicine, including pathology and therapeutics. (2) General surgery, including orthopædic surgery. (3) Military and naval surgery and surgery of transportation. (4) Obstetrics, including gynecology and abdominal surgery. (5). Anatomy, including physiology. (6) Diseases of children. (7) Ophthalmology. (8) Laryngology and rhinology, including otology. (9) Dermtology and syphilography. (10) General hygiene and demography, including marine hygiene and quarantine. (11) Diseases of the mind and nervous system, and medical jurisprudence. (12) Dentistry. (13) Medical pedagogics."

Seconded by Dr. Muñiz (Peru). Carried.

Dr. Noriega (Mexico), on behalf of his colleagues of the delegation from that country, and on behalf of the general profession and the Government of Mexico, extended a cordial invitation to the committee to appoint the meeting of the Second Pan-American Medical Congress, to be held in the City of Mexico.

Dr. Montizambert (British North America) extended an equally cordial invitation for the next Congress to be held in the city of Quebec, but stated that in view of the fact that the impression prevailed that the next meeting ought to be held in a Spanish-speaking country, he would not urge the invitation as warmly as he might under other circumstances.

On motion, duly seconded, the City of Mexico was unanimously selected as the place of meeting for the Second Pan-American Medical Congress.

The secretary-general here read the following resolutions, which had been adopted by the section on hygiene, climatology, and demography, and referred by the general session to the International Executive Committee for final action:

"No 1. *Resolved*, That in the opinion of the section on hygiene, climatology, and demography of the Pan-American Medical Congress the interest of the public health, in every country, should be and must be intrusted to a department of the government especially charged with their administration, and that, while the precise form of administration be left to legislation, the indispensable requisites are that it shall be national; that it shall have parity of voice and influence in the national councils; that it shall have independent executive authority under the limitations common to other departments, and that it shall be intrusted to educated and experienced medical men, who alone are competent to assume its responsibilities.

"No. 2. *Resolved*. That it is the sense of this section that in view of the prevalence of Asiatic cholera in Europe at the present time, and the constantly increasing number of foci of infection, immigration from European countries in which cholera exists should be temporarily suspended, as this action affords, in our opinion, the only certain means of averting a threatended invasion by the disease of the countries of the American continents. And be it further

"*Resolved*, That this resolution be reported to the general session of the Pan-American Medical Congress, with a request for its adoption and speedy transmittal to the executives of the several countries officially represented therein.

"No. 3. Whereas, in the language of a British journalist, 'greater energy and more systematic administration are much needed in regard to the sanitation of India, and England's imperial responsibilities in this matter are very heavy;'

"Whereas the question has been asked in Austria, Russia and France, 'You English have by your sanitary improvements prevented cholera from gaining a foothold in England, why do you not attack it in its birthplace and prevent it from spreading into life in India?'

"Whereas this question has been asked in America, 'Why should the whole civilized world be allowed to suffer through the constant dread of invasion or invasion itself of cholera on account of the religious fanaticism of the East?' Therefore, be it

"*Resolved*, That we respectfully submit to Her Imperial Majesty's secretary for India these recommendations:

"1. An imperial sanitary department attached to the Government of India.

"2. A provincial sanitary department attached to each of the provincial Governments.

"3. A local sanitary department.

"*Resolved*. That the secretary-general of this Government be directed to furnish a copy of this to Her Imperial Majesty's ambassador at Washington to be forwarded to Lord Kimberly, Her Majesty's secretary for India."

Dr. Vanderveer (United States) moved that the International Executive Committee considers it undesirable to take action upon the foregoing resolutions at the present time. Seconded. Carried.

The secretary-general read the following resolution from the section on hygiene, climatology and demography:

"*Resolved by the section on hygiene, climatology and demography*, That the Congress of the United States of America be most earnestly requested to cause a large edition of the very valuable report of Dr. Edward O. Shakespeare, of Philadelphia, of his researches on cholera, to be printed for distribution among the several countries represented in the Pan-American Medical Congress."

Dr. Vanderveer (United States) moved the adoption of the resolution. Seconded Carried.

Dr. Owen (United States) moved that the secretary-general be requested to print on a prominent page in the transactions the following:

"*Resolved*, That the International Executive Committee, on behalf of the Pan-American Medical Congress, disclaims responsibility for the views expressed by any individual contributor to its proceedings."

The secretary-general read a resolution which had been adopted by the section on hygiene, climatology, and demography, upon motion by Dr. Ulloa (Costa Rica), urging that the congress take active steps to secure the adoption of a uniform set of quarantine regulations for all of the countries and colonies of the Western Hemisphere.

Dr. Ulloa (Costa Rica) urged the adoption of the resolution.

Dr. Reed (United States) stated that in view of the fact that the committee had already established the precedent of declining to take action on matters calculated to interfere with the administrative policy of the constitutent countries, and for the purpose of carrying out at once the meaning of the second amendment to regulation 5, as well as conforming to suggestions made by President Pepper, he offered the following, which would, in a measure, meet the purposes not only of the resolutions which had been sent in from the section on hygiene, climatology, and demography, but would supplement actions which were known to have been taken in other sections. He therefore presented and moved the adoption of the following:

"*Resolved*, That in conformity to general regulation 5, as amended at this meeting, the International Executive Committee hereby authorizes the appointment of the following International American committees, viz:

"(1) A committee, consisting of one for each constituent country and colony, whose duty it shall be to formulate a series of quarantine regulations which shall at once furnish the maximum of protection to public health with a minimum of interference to commerce, and shall be acceptable to each of the American countries and colonies. It shall be the further duty of each member of such committee, when such quarantine regulations shall have been formulated, to secure, as far as may be practicable, the appointment, by his respective government, of at least one delegate to an international American quarantine conference, vested with treaty-making powers, to which conference the regulations previously agreed upon shall be submitted for formal adoption. Each member of this committee may, at his discretion, appoint such coadjutors resident in his respective country or colony as may be required to carry out the purposes of the committee.

"(2) A committee, consisting of one person for each constituent country or colony, whose duty it shall be to investigate the expediency of formulating a Pan-American Pharmacopœa, and, if found expedient, to proceed with the work. Each member of this committee may, at his discretion, appoint three coadjutors resident in his respective country or colony.

"(3) A committee, consisting of one member for each constituent country or colony, whose duty it shall be to investigate and report upon the medicinal qualities of the flora of the various American countries. Each member of this committee may, at his discretion, appoint three coadjutors resident in his respective country or colony.

"(4) A committee, consisting of one member for each constituent country or colony, whose duty it shall be to cooperate with the object of placing the care of the public health in charge of experienced and educated medical men and to secure the establishment in each of the several governments of a department of public health with parity of voice and influence in national and colonial councils and with independent executive authority under limitations common to other departments in the same government. Each member of this committee may, at his discretion, appoint such coadjutors resident in his respective country or colony as may be required to carry out the purpose of this committee.

"(5) A committee, consisting of one member for each constituent country and colony, whose duty it shall be to investigate and report upon a plan to secure the adoption of a uniform or equivalent course of instruction in medicine in each of the several American countries, and to secure the reciprocal recognition in law of graduates in medicine from each of the American countries who shall have graduated from institutions exacting the requirements of such uniform or equivalent course of instructions. Each member of this committee may, at his discretion, appoint two coadjutors resident in his respective country.

"*Resolved*, That the *ex officio* president of the International Executive Committee shall appoint the president of each of the foregoing committees from among those appointed as members of the same, and that the president of each committee shall appoint the secretary of his respective committee from among either the members or the coadjutors of the same.

"*Resolved*, That the foregoing committees shall be governed by the following general rules, viz:

"(1) Each committee shall have power to prosecute to a conclusion the work assigned to it.

"(2) Any member of either of the committees may report progress at any time through the medical press, providing that in making such report he shall sign the same officially as "Member of the committee on ——— of the Pan-American Medical Congress, for ———."

"(3) Copies of any or all reports thus published, or of records of work accomplished, shall be forwarded at once by the member making the same as follows: One copy to the president of the respective special committee and one copy to the *ex officio* secretary of the International Executive Committee.

"(4) The president of each committee may at his discretion prepare and publish, officially, a summary of the reports of progress of his respective committee in the several countries and colonies.

"(5) The president of each committee shall prepare a final report of the detailed work of his respective committee, and submit the same to the Second Pan-American Medical Congress.

"(6) The *ex officio* secretary of the International Executive Committee shall preserve the original copies of all reports transmitted to him officially by members of the foregoing special committees and shall file the same with the archives of the First Pan-American Medical Congress in the library of the Surgeon-General's Office at Washington. He shall prepare a brief summary of the work of all the foregoing special committees, and of such additional committees as may hereafter be appointed, and shall submit the same, in connection with the report of the *ad interim* work of the International Executive Committee, to the Second Pan-American Medical Congress."

The adoption of the resolutions was seconded by Dr. Montizambert (British North America). Carried by unanimous vote.

Dr. Muñiz (Perú) moved that the appointment of members of these committees be deferred until the members could return to their respective countries to take counsel regarding the appointments which should be transmitted as soon as made to the secretary-general who should promulgate the lists as soon as completed. Seconded by Dr. Gilles (Haiti). Carried.

Dr. Vander Veer (United States) moved that the address of President Pepper be published in pamphlet form under the auspices of the International Executive Committee in advance of the publication of the transactions, and that it be published in the transactions in the English, Spanish, and French languages.

Dr. Ulloa (Costa Rica) moved that the following resolution be reported for formal adoption by the general session, viz:

"*Resolved,* That the thanks of the Pan-American Congress be, and are hereby, tendered to the President of the United States for his cordial cooperation in promoting the interests of this congress; to the Congress of the United States in adopting a joint resolution and in appropriating funds by which the present successful meeting was held under the auspices of the National Government; to the Surgeon-Generals of the Army, Navy, and Marine Hospital Service respectively, for courtesies extended in their official capacities; to the general officers of the Congress and to the officers of sections for their devotion to the success of the Congress; to the committee of arrangement and their respective subcommittees for the delightful entertainment of the members, and to the press, medical and lay, for its cordial support of the congress from its inception, and for its careful reports of the meetings now drawing to a close."

Dr. Montizambert (British North America) seconded the adoption of the motion. Carried by unanimous vote.

Adjourned *sine die.*

WILLIAM PEPPER,
Ex officio President.

CHARLES A. L. REED,
Ex officio Secretary.

Dr. L. I. McMurtry (United States) moved that the report of the International Executive Committee be adopted. Seconded by Dr. Francisco A. Risquez (Venezuela). Carried unanimously.

Dr. J. C. Phillippo, Kingston, Jamaica, then spoke on behalf of the foreign members as follows:

MR. PRESIDENT, LADIES AND GENTLEMEN: It is with considerable diffidence that I rise before you on this occasion to return the thanks which are due to you for the kindness with which you have received the members of the foreign delegation in this, your magnificent city. I have talked with several of them from the isles of Cuba and Hayti, and Mexico, and find they cordially unite with me in returning to you their thanks for your kindness and hospitality, which to them has flavored almost of perhaps too much kindness in some instances, but always an invariable amount of fellowship and good feeling.

Gentlemen, I do not want to make a long speech on this occasion, but I can not leave you without recalling to mind that in this year you are celebrating the discovery of America by the great Christopher Columbus. I have heard some people say they are tired of Christopher Columbus. But I am sure that those who think properly and quietly over the matter will always remember the life of that great man with feelings of veneration and esteem. Columbus discovered this continent and gave to Castile and Leon a new world. I do not think that he ever dreamed that in discovering this New World he would give to the world a mighty nation. This mighty nation has arisen, springing from the first men who came here, good, wise, faithful, conscientious men, men who were persecuted in their own countries and who found in the barren rocks of Plymouth homes where they planted their standard, and did more than Christopher Columbus to create this mighty nation. And this mighty nation, thus established, has folded in its arms the struggling and oppressed masses of Europe. You have here amongst you people from every nation, people who claim and look to the United States of America as their mother and their friend.

But gentlemen, if Christopher Columbus gave to Castile and Leon a new world, the United States has given the world a mighty name, a man who, greater than any other man, stands unrivaled in the history of the world. In talking of Christopher Columbus, I have heard but little of that man, who from my earlier years I have almost worshiped. I refer to that man who was said to be first in war, first in peace, and first in the hearts of his countrymen. You all know to whom I refer, to George Washington, whose name has been given to this city of great and magnificent distances. It stands as a monument to him who helped to found this great Republic; and, when I think of Washington, I remember how he, like Christopher Columbus, suffered during his lifetime through the jealousy of his friends. But, his name is now imperishable; no other name stands in the history of the world to compare to that of George Washington, and there are few cities in this world that can compare in beauty and magnificence with this city, in which we are now meeting.

As I look upon the emblems of peace that surround us, I can not refrain from calling to mind the condition of Europe, where the roll of the drum and the clank and the tramp of warlike men is heard, while pestilence and famine are ravaging the people, and thousands and hundreds of thousands are dying, and I thank God this Pan-American Congress has met in this place. When I think of these things, I remember that though all these nations are ready to go to war, and there are men ready to be let loose like the sleuthhounds, and they are devising all the ingenious schemes for the destruction of their fellowmen, war comes but rarely. Pestilence and famine we hear of, and they carry away hundreds of thousands, but their visitations are infrequent. But, there is a greater foe than these; there is a foe that lives and dwells in every civilized country; there is a foe that lives almost in every home. I mean ignorance, and superstition, and immorality. Ignorance of hygiene causes the death of one third of the human race in earlier infancy. And, now, it is for this great association, in this country, where there is no need of standing armies, to devote all energies to the alleviation and to the prevention of disease and to the rescue of those infants who are thus annually slaughtered.

I hope and trust that this Pan-American Association will live and thrive for years, and that the association will soon see the time when human life will be held more sacred than it is. I think I can almost hear the ancient seer crying out, "Watchman, what of the night? Watchman, what of the night?" The night is far spent and the day is at hand, the morning star arises in the East, the nations shall no more war against nations: kings shall be nursing fathers and queens nursing mothers; governments, instead of warring and fighting, instead of seeking to increase the number of their fighting men, shall seek for the perpetuation of human life, for how much better it is to save life than to destroy it! Those are the words of our veteran poet and physician, the autocrat at the breakfast table. His word is our law, and I hope the autocrat will once more tune his harp and give us an ode to the Pan-American Association.

And now I must conclude. I fear I have taken up too much of your time. And if we shall meet again in three or four years I presume it will be in the halls of Montezuma, which, for so many thousands of years, have been a monument of the early power and talent of men. But in taking farewell of you on this occasion, my friends of the Pan-American Association, I can only say that I and all the foreign delegates are delighted to have met you. You have been only too kind to us; you have made us think more of ourselves than we ought, and if we remained much longer we would think so much of ourselves we would not care to go away. And now I bid you farewell. Farewell.

Dr. PEPPER. We have enjoyed very much the coming of several European gentlemen of distinction, and it gives me great pleasure to present to you Mr. Ernest Hart, of London, who will respond on behalf of the European guests.

Mr. ERNEST HART. Mr. President and gentlemen: No task could be happier or more welcome than that of expressing to you, on behalf of those whom I represent, especially on behalf of the British guests of this congress, our sense of deep admiration of the great thought which inspired it, and of the remarkable success with which a most difficult task has been carried out. With the thought which stimulated those who convened this congress, British physicians must especially be in sympathy. First, because the principle of scientific association passing beyond the barriers of nationality has always been a leading thought and a constant method of action in Great Britain, and nothing has ever given us greater pleasure than to welcome, for the last century, visitors from this great continent to our annual scientific conventions.

One great imperial object dear to the heart of every resident in Great Britain and of all the British colonies and dominions, is the desire for the confederation of all useful and benevolent public purposes of the English-speaking race. We are doing everything in our power to promote it in our sphere by advancing what is known with us as imperial confederation. That is to bring together for common purposes of good all the dominions, colonies, and empires in which the English language is spoken within the range of British Government. This Pan-American confederation is, I hope, a step, and by no means the first step, and not, I hope, the last step, for the confederation of all the British-speaking and foreign-speaking races upon this great American Continent. And we may claim to have this much of a share in it, to show how close is the relation of the American with the British race, that even in this Pan-American Congress you necessarily include British America, British West India, and a large number of British subjects, whom you claim justly as Pan-Americans. So, here, we can claim that British and Americans stand shoulder to shoulder in the successful promotion of science. I thank you most heartily and most sincerely for the kindness with which you have entertained your foreign guests.

Dr. PEPPER. We have accepted the cordial invitation of the Republic of Mexico as the place of the next meeting of this congress, and I have the honor to present Dr. Lavista to respond for that country. (Spoke in Spanish; remarks not furnished.)

CLOSING REMARKS BY THE PRESIDENT OF THE CONGRESS, PROF. WILLIAM PEPPER, M. D., LL. D., PHILADELPHIA, PA.

Finally, members of the Pan-American Medical Congress, it remains only for the society to adjourn; it is not *sine die*, but to a date. This date is left in the hands of the International Executive Committee, and the reason it is not definitely fixed in 1896 or 1897—for no one suggested an earlier date than three years—was because the date of the next European congress can not be settled until after the meeting in Rome in April. If that congress shall then decide to adopt the new schedule, meeting in 1894, 1897, etc., it would be better for us to meet in 1896, but if it meets in 1896, possibly it would be to the interests of this congress to have the meeting in 1897. So, too, doubtless the season chosen will be one which will render the visit to that country most satisfactory. This congress completes, apparently, the needful organization of these continents, and of the profession of this entire hemisphere. We are all determined to stand by it and develop it with all our power. This congress constitutes the great American democratic confederation of our profession, and, with the sister society, the association of England, it is to go hand in hand.

We have evidently developed the need of a number of special societies, and these have come to meet once in three years, a body of specialists limited in their work. Now, it seems there is need for this larger body, supplementing, complementing, and I think we may hope completing, the organization; so we now have a body which apparently has a very different function from any of the others, because it has become the organic link between all the governments of this continent and the profession, and for the first time there is this organic relation created. The remarkable courtesy of the governments where the International Congress has met, and the presence of royalty have given grace to the occasion, but it has never met under the auspices of a joint resolution of Congress and the official invitation of the President, as has the first Pan-American Congress. This has been from the start the central conception, and I think the main impulse, in this whole movement, that we were creating a new mechanism, which if allowed to grow by its own inherent merit would demand the respect of nations, and would come to have a most important organic official relation with these governments. Thus it would seem this Pan-American Congress has completed the union of the profession of this continent by its immediate success, and by the warm sympathy which we have all felt toward it. Think, this year, with the very successful meeting of the American Medical Association, with the attractions at Chicago, with the uncertainty of the congress at Rome, and the financial stringency, and yet we have had countless expressions of sympathy, for we have had the strongest and most cordial testimony of those who have spoken, as well as of many others, stamping with approval this Pan-American Association.

So, my brethren of this first Pan-American Congress, in adjourning it I feel we have consummated an important step in the progress of American science. For the unfailing courtesy extended to me, and for the charming cordial relations which have in all instances existed between the officers of the congress, I can not express sufficient thanks. All sorts of blunders have been made, but we have all overlooked them. Everybody has apparently been standing by his brother; there has not been for a moment the slightest feeling or divergence of opinion, but only work for the advancement of our profession. Dr. Reed was initiative, and it is only right I should speak of the incessant work, and of the cooperation of all those connected with the organization. I have, then, only to say farewell, thanking you for the courtesy extended to us, and asking you to join with the International Executive Committee with the determination that we do not intend to allow it to go down, and with a determination to secure the continuous influence and the growth and the strength of the Pan-American Medical Congress in all future years.

Farewell.

PART II.

SECTIONS OF THE CONGRESS.

SECTION I.—GENERAL MEDICINE.

Honorary presidents.

Dr. MANUEL CARMONA Y VALLE, City of Mexico.
Dr. FRANCIS DELAFIELD, New York, N.Y.
Dr. ISRAEL F. DUNN, Portland, Me.
Dr. REGINALD H. FITZ, Boston, Mass.
Dr. J. O. HIRSCHFELDER, San Francisco, Cal.
Dr. HENRY M. LYMAN, Chicago, Ill.
Dr. ALFRED L. LOOMIS, New York, N. Y.
Dr. EMILIO MARTINEZ, Havana, Cuba.
Dr. WILLIAM OSLER, Baltimore, Md.
Dr. JOHN A. OUCHTERLONY, Louisville, Ky.
Dr. WILLIAM PEPPER, Philadelphia, Pa.
Dr. F. PEYRE PORCHER, Charleston, S. C.
Dr. G. ISAAC UGARTE, Santiago, Chile.
Dr. ARMANDO VELEZ, Lima, Peru.
Dr. H. A. WEST, Galveston, Tex.
Dr. JAMES C. WILSON, Philadelphia, Pa.
Dr. CARLOS E. BERNHARD, Tegucigalpa, Honduras.
Dr. J. J. CORNILLIAC, St. Pierre, Martinique.
Dr. HENRY HUN, Albany, N. Y.
Dr. GUZMAN, Nicaragua.

Executive president.

Dr. VICTOR C. VAUGHAN, 15 S. State street, Ann Arbor, Mich.

Secretaries.

Dr. JUDSON DALAND (English-Speaking), 317 S. Eighteenth street, Philadelphia, Pa.
Dr. GÜEMES (Lavalle 869), Buenos Aires, Argentine Republic.
Dr. A. A. DE AZEVEDO SODRÉ, Rio de Janeiro, United States of Brazil.
Dr. MOOREHOUSE, London, Ontario.
Dr. A. J. WILLIAMS, Georgetown, British Guiana.
Dr. JOHN FULLOCK, Tobago, Trinidad, West Indies.
Dr. IGNACIO GUTIERREZ PONCE (2 Rue Pierre Charron 2), Paris, France (for Republic of Colombia).
Dr. MARTIN BONNEFILLE, San Jose, Costa Rica.
Dr. J. CARREAU, Point à Pitre, Guadeloupe, French West Indies.
Dr. RAMON L. MIRANDA (Spanish-Speaking), 139 W. Forty-sixth street, New York, N. Y.
Dr. SAMUEL GONZÁLEZ, city of Guatemala, Guatemala.
Dr. ARCH. DÉSERT, Port au Prince, Haiti.
Dr. G. P. ANDREWS, Honolulu, Hawaii.
Dr. RÓMULO COLINDRES, Comayagua, Honduras.
Dr. BASILIO MARIN, Leon, Nicaragua.
Dr. VINCENTE B. VALDÉS (Teniente Rey 101), Havana, Cuba.
Dr. ENRIQUE FIGARI (Uruguay 190), Montevideo, Uruguay.
Dr. FRANCISCO A. RÍSQUEZ, Caracas, Venezuela.
Dr. DEMETRIO MEJÍA (San Andrés 12), City of Mexico, Mexico.
Dr. G. E. PIERREZ, Antigua, British West Indies.

ADDRESS BY THE PRESIDENT, VICTOR C. VAUGHAN, M. D.,

Professor of Hygiene and Dean of the Department of Medicine and Surgery, University of Michigan, Ann Arbor, Mich.

THE PRINCIPLES OF IMMUNITY AND CURE IN THE INFECTIOUS DISEASES.

Gentlemen of the Section on General Medicine of the First Pan-American Medical Congress: I wish to extend to you a hearty greeting, and to thank you for your presence and for the interesting and valuable papers which many of you have prepared, and which will make the work of this section worthy of the profession of the New World.

In opening the labors of this section, I have decided to bring before you for your consideration a theory concerning the principles of immunity and cure in the infectious diseases. I shall at first discuss the question of immunity and shall then endeavor to ascertain the differences, if there be any, between the fundamental principles upon which immunity is secured and those by which cure may be brought about.

Upon the subject of immunity many valuable contributions have been made, and theory after theory has been proposed. Both the researches and the theories have their value, that of the former being permanent and that of the latter consisting principally in suggestions that stimulate and systematize investigation. The value of a theory does not wholly depend upon its truth, but is rather to be measured by the fruitfulness of the lines of investigation that it opens. Indeed, a theory may be wholly erroneous and yet it may lead to most important discoveries.

It is not my purpose to assail or even to discuss the theories concerning immunity that have heretofore been brought forward, but to suggest one that, in my opinion, will harmonize the results already attained by scientific workers, and which, I hope, will lead to other investigations.

Immunity may be natural or acquired. Natural immunity may be peculiar to the species or race, or to the individual. An example of natural immunity is that of the domestic fowl to anthrax. As has been shown by Lazarus and Weyl, the chick, even at the time of coming from the shell, is immune to the most virulent culture of the bacillus anthracis. It is true that this animal may be made susceptible to anthrax, but this is an artificially-induced susceptibility. The immunity is natural to this bird at every period of its life. Another example of racial immunity is that of the frog to anthrax. This animal can also be rendered susceptible, but again it is true that the susceptibility is artificial and the immunity is natural. Racial immunity must be inherent in the parent cell.

The natural immunity, which is peculiar to the individual, usually comes with adult life. The young are susceptible to a given disease, but adults of the same species lose this susceptibility and become immune. The young rat is susceptible to anthrax, while the adult is naturally immune, but can be rendered susceptible by exhaustive exercise. The child is highly susceptible to scarlet fever and diphtheria, while the adult, though not wholly immune to these diseases, loses very much in susceptibility and is likely to become infected only when greatly reduced in vitality or after prolonged and aggravated exposure to the poison. The only reasonable explanation of this immunity is that it is inherent in the parent cell and comes on as naturally as do the changes in form and voice at puberty or the growth of the beard in early manhood. The evolution of the condition of immunity in these cases is due to the natural development of the functional activity of certain cells of the body. The cause of the difference in the effect of the anthrax bacillus on the young rat and that of the same germ on the adult rat exists in the rat and not in the bacillus. A child and an adult are exposed to the Löffler bacillus from the same source; the former becomes infected, the latter does not. The germ is the same, but in the development that converts the child into the adult, the resistance with which the germ must contend has been strengthened. The immunity that comes with adult life must be due to altered cell activity.

Ehrlich has shown that immunity from poisoning with the vegetable proteids, abrin, ricin, and robin, is transmitted from the mother to the fetus and retained by the latter for more than a month after birth, when it is quickly lost, and that the second generation fails to show any immunity. He concludes that there are two kinds of immunity: One he designates as active, the other as passive. The immunity that he found to be transmitted, as already stated, from mother to child he classifies as passive, and thinks that it is due to the transmission of ready-formed antitoxins from the mother to the child and that these antitoxins being soon eliminated the immunity is lost. In active immunity he supposes that the body has acquired the property of manufacturing the antitoxins, but upon this point he is not clear. He also demonstrates that immunity may be transmitted from the nurse to the child, even when the latter is not the offspring of the former and has come from a highly susceptible mother.

This division of immunity into an active and a passive form is convenient and plausible, but Ehrlich's active immunity must be cellular in origin. Can any chemical products be elaborated in the animal body except by the activity, either direct or indirect, of cells? The most earnest opponent of vital energy—which now means cellular activity—admits that the active principles of the digestive juices are the products of specialized glands, and even the absorption of the products of digestion, which we once believed to be effected in accordance with the comparatively simple laws of osmosis, is now known to be dependent upon cellular activity. But can it be said that the temporary immunity that is transmitted from mother to child or from nurse to nursling is of cellular origin? The mother and the fetus are physiologically one, and the same is true of the nurse and the nursling. The blood of the mother flows through the fetus, and the products of the cells of the nurse feed the nursling.

Ehrlich made six experiments, in which it was found that the offspring of an immune father and a susceptible mother did not possess even a temporary immunity, and this forms another reason for his belief that immunity is humoral; but Tizzoni and Cattani have shown that an immunity to tetanus artificially induced in the sire is transmitted, though lessened in degree, to his offspring, although the mother remains susceptible; and Tizzoni and Centanni, that a like immunity to rabies may be transmitted from father to offspring. If these statements be true the humoral theory of immunity must be modified so that the noncellular elements can be considered as inducing immunity only by their effects upon the cellular elements. As is claimed by Ehrlich immunity transmitted from the mother to the offspring may be explained by supposing the introduction into the latter from the former, through the fetal circulation or through the milk, of immunity-conferring substances in soluble form; but in the transmission from father to children we can conceive only of the idea that the immunity must reside in the cellular elements of the spermatic fluid, because our knowledge of fecundation teaches us that the head of the spermatozoön fuses with the ovum and produces the child.

Artificial immunity may be induced by either of the following methods:

1. By an attack of the disease, ending in recovery. Until the discovery of Jenner this was the only known cause of immunity, and even at present it is supposed to be, as far as man is concerned, the most potent cause. However, we now know that the period of time through which immunity thus obtained holds good has been overestimated. A man may have smallpox the second time, provided several years have elapsed since the first attack, and provided the second exposure brings him in contact with a highly virulent form of the infection or the exposure continues through an unusually long period or happens at a time when the health is much reduced from any cause. Moreover, the period of immunity conferred by an attack of some of the infectious diseases is so short that many have reasonably questioned its existence.

It is true, I believe, that the more grave and virulent the disease may be, the greater and more persistent is the immunity that follows. I mention this in order to call attention to the fact that there is a quantitative relation between cause and effect in the production of immunity. Please bear in mind that in this method of inducing immunity the substance of the germ itself is introduced into the body. This method found a practical application in inoculation for the prevention of small-pox.

2. By vaccination with a modified and less virulent form of the infection or by the introduction of at first a very small number of the virulent germs and successive inoculations with larger numbers.

The successful inoculations against chicken cholera and anthrax made by Pasteur consist in vaccination with a modified germ, and the valuable investigations of Emmerich and his students in immunizing certain animals to swine erysipelas have demonstrated the results that may be obtained by employing the virulent germ first in small numbers and then gradually increasing the dose. Again, it may be observed that the germs themselves are introduced into the body, and again it is also true that the more potent the cause the greater and more persistent the effect. The immunity that follows inoculation with a germ of full virulence is more marked and extends through a longer period than that which is induced by a vaccine.

3. By one or more treatments with sterilized cultures of the germs.

Immunity against the germs of typhoid fever, cholera, diphthera, tetanus, hog cholera, and several other diseases, has been secured by one or more treatments with sterilized cultures of these germs. An interesting question arises in this connection: What constituent of the sterilized culture is it that confers immunity? All will agree that it is not due to the ptomaines that are present in some of the cultures. Another important class of substances present in these sterilized cultures contains the so-called toxalbumins, and to these we may possibly look for the cause of the immunity.

The teaching of some of the German investigators is that each pathogenic germ produces both toxins and a special immunizing substance. This is a very convenient theory. It supposes that each germ, while elaborating its harmful products, also produces a substance that will prevent its growth. Please bear in mind that this theory is wholly different from that which teaches that the germ may be finally killed by its own products. We know that many living things, both vegetable and animal, are killed by their own excretions, when the latter are allowed to accumulate about the former, but the theory of the production of a special immunizing substance by each specific germ is wholly different from this. The theory teaches that the germ produces a substance that confers immunity against itself and that the object in the production of this body is to confer the immunity. If we should find in nux vomica a substance that would render animals insusceptible to the action of strychnine, this fact would be analogous to the theory of the formation by each germ of a specific immunizing agent. This theory certainly presupposes a foresight and kindness on the part of the deadly germs of diphtheria and other infectious diseases which we hardly expected to find.

Fraenkel states that the toxic and the immunizing substances produced by the diphtheria germs are two distinct bodies, the former being destroyed by a temperature of from 55° to 60° C., while the latter will bear a temperature of 70° C. or higher. He recommends that the cultures, sterilized by filtration through porcelain, be heated to from 66° to 70° C. and then be used in the production of immunity. However, he admits the possibility that the toxic substance may be converted into the immunizing body by the effect of the heat in lessening the virulence of the former, and there are many reasons for believing that this is the true explanation.

Brieger and Wassermann produced in guinea pigs a certain degree of immunity from cholera by previous treatment with bouillon cultures of the germ heated to from 65° to 80° C. Shall we conclude from this that the cholera germ elaborates a special immunizing substance? Wassermann has shown that the immunizing substance in sterilized cultures of the comma bacillus is contained in the germs themselves and is identical with the specific proteid poison of this germ. In other words, the substance that in larger doses kills, in smaller doses gives to the animal immunity from the living germ.

I think that we can answer the question as to which constituent of sterilized cultures gives immunity with considerable confidence if we recognize the following facts:

(1) Marked artificial immunity to an infectious disease has not been obtained except by the introduction into the animal of the germ substance, either inclosed in the cell wall or in solution.

(2) Sterilized cultures contain the germ substance in one or both of these forms.

(3) The same immunizing substance exists in the bodies of bacteria grown on solid media and killed by the action of chloroform.

(4) The same immunizing effects, varying, however, in degree, are obtained with the bodies of dead bacteria morphologically intact or in solution, with living bacteria modified and reduced in virulence, and with very small numbers of the virulent germ.

With these demonstrated facts before us, I am ready to believe that the immunizing substance is a constituent of the bacterial cell itself; and as each kind of germ has its own peculiar poison (which in small doses confers immunity), this poison can not come from the cell wall; nor is it really a split product of the germ's action, but it is the essential characteristic part of the cell—that part which gives to the germ its distinctive properties. I believe that it is the nuclein.

The three methods of inducing immunity which we have mentioned reduce themselves to one and the same principle, i. e., the introduction of germ-nuclein into the body.

The immunity that results from an attack of the disease is caused by the introduction of germs, living and more or less virulent; that which comes from vaccination is due to the introduction of germs, living but modified and reduced in virulence or administered in small quantity; that which is secured by one or more treatments with sterilized cultures is secured by the introduction of germ nuclein so modified that it is no longer capable of reproducing itself.

Understood in this way, the production of immunity from disease becomes analogous to that which Sewall obtained with the venom of the rattlesnake, and Ehrlich with ricin and abrin.* Indeed, the venom of snakes, the poisonous vegetable proteids, abrin, ricin, and robin, and the cellular proteids of the pathogenic germs, have many characteristics in common. All are proteids, intensely poisonous; they lose their poisonous properties on being boiled in aqueous solution; different species of animals vary in their susceptibility to these poisons; they are much less poisonous when given by the stomach than when injected hypodermatically (the difference in the amounts necessary to produce fatal effects when administered by these different avenues being much greater than with either the vegetable or the putrefactive alkaloids). The immunity which is secured by all of these substances is gradually lost. A further resemblance between the vegetable and the bacterial poisonous proteids is to be found in the fact that immunity to one of these substances obtained from a given source does not confer immunity to another from a different source. An animal rendered immune to ricin is still susceptible to abrin, and one rendered immune to tetanus remains susceptible to diptheria. Whether or not an animal made immune to the venom of one species of poisonous snake would still be susceptible to the venom of another species is not, so far as I have any knowledge, known.

The immunty obtained by Brieger, Kitasato, and Wassermann by inoculating

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* Ehrlich tells us that one gram of ricin would be sufficient to kill one and one-half million guinea pigs. The poison of tetanus can scarcely be more virulent.

with cultures grown in thymus-bouillon is due to the same principle that governs in the methods already discussed. Immunity was secured by the introduction of a modified bacterial proteid, the lessened virulence of the poison being due to a certain constituent of the thymus extract. The nature of this constituent of the thymus gland will be discussed later. That the tetanus germ is physiologically modified by its growth in the thymus-bouillon was demonstrated by the fact that it failed to produce spores in this medium, as well as by its diminished virulence.

Behring rendered about 40 per cent of the animals experimented upon immune to tetanus and diphtheria by previous treatments with small amounts of cultures to which iodin trichlorid had been added. This is also most probably due to the fact that the chemical compound modified the bacterial proteid. Behring himself gives this explanation. He also states that it is a matter of indifference whether he employed cultures containing bacteria or those that are germ free. By the latter he means cultures in which the germs have been deprived of their vitality or from which they have been removed by filtration. In either case the cell proteid of the germ is present either in the form of cells or in solution, and this cellular proteid is the agent that induces immunity.

(5) By treating a susceptible animal with the blood serum of an immune animal. Strange as it may seem, the principle upon which immunity is secured when the blood serum of an immunized animal is injected into a susceptible one is essentially the same as that which holds good in the methods already discussed. A horse is rendered immune to tetanus by previous treatment with the modified bacterial proteid of that disease. As a result of these treatments a tetanus antitoxin is generated in some organ or organs of the horse and circulates in its blood. When the blood clots this antitoxin is found in the serum, and if the serum be injected into a mouse in sufficient quantity this animal becomes for the time being immune to the tetanus poison, provided that the poison is not introduced in quantities so large that it will not be destroyed by the antitoxin that has been brought over from the horse.

The immunity actually does not belong to the mouse. It still belongs to the horse. It is stolen property, and will soon be lost. The cells of the horse, not those of the mouse, make the antitoxin. The mouse for the time being becomes physiologically a part of the horse, and it is by virtue of this relationship that the former is for the time being immune to tetanus.

The quantity of blood serum that must in this supposed case be transferred from the horse to the mouse in order to give immunity to the latter will depend upon the relative weight of the animals and upon the degree of immunity possessed by the horse; and the degree of immunity induced in the mouse will be governed by these same factors.

Subsequent inoculation of the mouse with the tetanus nuclein, in order to prove its immunity, may awaken the cell activity of this animal, and then the immunity belongs to the mouse; but this is not true before the introduction of the germ. Behring has understood this point and has given this explanation.

We have seen that in all cases the cause that brings into existence the condition of immunity is a bacterial proteid. Now, in order that this inciting cause may induce the condition of immunity, it must act upon something. We say that it acts upon the animal, but with this general statement we can not be satisfied. Upon what organs of the body does it act? This question can be answered only tentatively at present, and the answer is founded upon the fact that we suspect that certain organs are acted upon, because certain results follow. Certainly, the cell activity of the invaded host must be altered. The cells upon whose altered activity immunity depends are probably those of the spleen, the bone marrow, the thyroid and thymus glands, and possibly other glandular organs. As already stated, this answer, which it may be noticed is given with reserve, is founded upon inference rather than upon direct demonstration. However, experimental evidence on this point is not wholly wanting.

The disastrous effects that follow the removal or atrophy of the thyroid gland, and the wonderful alleviation following the treatment of myxedema with extracts of this gland, are now well known to every member of the profession. These facts show that this gland must furnish an antitoxin, which is essential to the preservation of health and life. Lindemann has shown that the normal dog will bear doses of caffein which can not be borne by the same animal after extirpation of the thyroid. Tizzoni and Cattani have found that rabbits from which the spleen has been removed can not be immunized to tetanus.

These facts, together with others to be mentioned further on, render it altogether possible that the organs mentioned are concerned in the production of immunity.

Here an interesting question arises: In what way are these organs concerned in the production of immunity? Do they elaborate antitoxins, and if so, what can be said about the nature of these antitoxins? These are questions in which I have been deeply interested for some time, and which I have attempted to solve. In this attempt I have borne in mind the fact that these organs are the sources of the nucleated white blood corpuscles. Do these corpuscles contain a germicidal or antitoxic substance; and, if so, what is its nature? They differ from the red corpuscles in being nucleated, and, from all other tissues in containing proportionally larger and more numerous nuclei. The chief chemical constituent of nuclei is a substance called nuclein, some of the general properties of which are known to physiologic chemists. Can it be that nuclein is the germicidal or antioxic substance? Have the nucleins in general or as a class any germicidal action? As methods of isolating the nucleins are known, this question can be answered by experimentation. But before we begin with our experiments we will ascertain whether or not we can find that any such properties have ever been observed in the nucleins. I find that others have thought of the possibility that the nucleins may play a role in the production of immunity. In their very valuable paper, Ueber Immunität und Giftfestigung, Brieger, Kitasato, and Wassermann have the following to say:

> With the idea that the highly vitalized leukocytes or lymphocytes are concerned in the destruction of bacteria within the body, and that antitoxin substances are formed by the breaking down of these cells, we began our experiments with the best known and relatively most thoroughly studied decomposition-products of the white blood-corpuscles, the nucleins and the nucleinic acids, which we had prepared directly from pus. Later, Prof. Kossel had the goodness to make like preparations for us from pus and yeast, for which we again give him our best thanks. Cholera-cultures served us for the most part in these investigations. However, we found neither a decrease in the toxicity of these cultures on being treated with the nuclein bodies, nor could we render animals proof against the poison by previous treatment with cholera-cultures to which nuclein had been added.
>
> *A priori*, these negative results were probable because the preparation of the nucleins and nucleinic acids requires such powerful chemical manipulations that the resulting substances could only be such as would be devoid of all active energy. Moreover, we knew from previous researches with the bacterial poisons how susceptible similar compounds are to apparently indifferent chemicals, like alcohol, ether, etc. * * * Therefore, we concluded to prosecute our studies with simple, aqueous, feebly alkaline extracts from organs rich in cells.

Having reached these conclusions, Brieger and his coworkers proceed to make their investigations with a feebly alkaline extract of the thymus gland.

This is the only instance, so far as I know, in bacteriologic literature, up to the time of the first publication of my results, in which anyone has even suggested that the nucleins might be germicidal or in any way concerned in the protection of the body against bacterial invasion, either in the production of immunity or in effecting a cure; and it must be admitted that this reference did not afford much encouragement to my theory. However, I was not altogether discouraged, because certainly no one should expect to find a highly active nuclein in pus-cells, the nuclein of which in the very formation of pus has been altered, probably more deeply and destructively than would result from "the apparently indifferent chemical reagents, alcohol and ether." As these German investigators failed to tell how the yeast nucleinic acids with which they experimented had been prepared, the hope was left to me that in this might rest the explanation of their failure. This hope found support in the fact that in the preparation of their thymus extract they heated it to 100° C., and certainly this temperature must have had quite as much effect in depriving the living nuclein of its energy as indifferent chemical reagents could have had. The fact that they obtained the results which they did with this extract after it had been heated to 100° is an evidence of the power originally possessed by the nuclein of this gland, for I think that it must be admitted, from the results which I have obtained, that the active agent in the thymus extract with which Brieger and his coworkers experimented is a nuclein.

At first I tried to prepare an active nuclein from compressed yeast, but the results were not satisfactory. Compressed yeast contains a large amount of water and starch. The large proportion of the first-mentioned constituent caused a very small yield of nuclein, and there were many difficulties in this complete separation of the starch. There were, however, two other and more serious objections to the use of compressed yeast. The first of these is due to the fact that such yeast contains bacteria to begin with, and the task of preparing an active nuclein from it is similar to that of obtaining the same substance from pus. The second difficulty lies in the fact that compressed yeast contains many dead cells, and an active nuclein can be obtained only from living, healthy cells.

Next, I attempted to prepare an active nuclein from the ordinary brewer's yeast. But I found this also contaminated with bacteria.

At last, I was supplied, through the kindness of the Ann Arbor Brewing Company and through Dr. Laasche, of Chicago, with unlimited quantities of pure cultures of yeast, without cost, and my thanks are due to the manager of the company named and to Dr. Laasche for this material.

With the aid of Drs. McClintock and Novy I have succeeded in preparing active nucleins not only from yeast, but from several organs of the body as well, and as the further elaboration of the principles of immunity and cure in the infectious diseases depends so closely upon the action of these nucleins, I must be permitted to go somewhat into detail concerning their preparation, their chemical reaction, germicidal properties, and physiologic effects:

Yeast nuclein.—The cells from pure cultures of yeast are washed with sterilized water, then treated with a 5 per cent solution of potassium hydrate, and filtered through paper (the Falten filter paper of Schleicher and Schull being used for this purpose). Sterilization of the filter paper is not necessary. The filtrate is feebly acidified with hydrochloric acid, and the proteid precipitated with 96 per cent alcohol. The precipitate is washed with alcohol by decantation until the supernatant fluid remains colorless. The precipitate is then collected upon a filter, and, after all the alcohol has passed through, it is dissolved in very dilute potassium hydrate (0·25 to 0·50 per cent). That this solution contains other proteid bodies besides the nuclein is shown by the fact that it promptly responds to the biuret, xanthoprotein and Millon reactions, but notwithstanding these impurities, solutions of nuclein prepared in this manner have markedly germicidal effects.*

A purer form of yeast-nuclein may be obtained by digesting out the other proteids from the alcoholic precipitate with hydrochloric acid and pepsin, in the manner which will be described in the preparation of animal nucleins.

The following experiments, in which the impure nuclein-solution was used, will illustrate its germicidal effects. In all cases the nuclein-solution was diluted with sterilized normal salt-solution, then placed in quantities of 5 c. c. in sterilized test-tubes, inoculated with the germs mentioned in each experiment; and plates made after varying intervals of the time show the germicidal effects. In making the plates, a platinum loop of constant size (with a diameter of 2 millimeters) was employed.

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*In fact, this is a nucleo-albumin rather than a nuclein.

In the first four experiments, 2 c. c. of a 0·25 per cent alkaline solution of nuclein, containing 0·9 milligram of impure nuclein per cubic centimeter were diluted with 3 c. c. of normal salt solution, inoculated with the germ, and plates made as follows:

EXPERIMENT I.

Staphylococcus pyogenes aureus.

Time	5 minutes.	1 hour.	2 hours.	14 hours.	23 hours.
Number of colonies	1,110	0	0	0	0

EXPERIMENT II.

Staphylococcus pyogenes aureus.

Time	5 minutes.	1 hour.	2 hours.	14 hours.	23 hours.
Number of colonies	1,490	20	0	0	0

The strength of alkali in this dilute nuclein-solution, not taking into consideration the fact that some of the alkali is absorbed by the nuclein, is 0·1 per cent. The culture of the aureus used in these experiments grows abundantly in a 0·5 per cent aqueous solution of potassium hydrate.

EXPERIMENT III.

The same solution nuclein as the preceding inoculated with the staphylococcus pyogenes albus.

Time	Immediate.	20 minutes.	1 hour.	2 hours.	17 hours.	24 hours.
Number of colonies.	680	0	0	0	0	0

EXPERIMENT IV.

The same solution of nuclein, inoculated with the bacillus anthracis without spores.

Time	Immediate.	20 minutes.	1 hour.	2 hours.	17 hours.	24 hours.
Number of colonies.	45	0	0	0	0	0

The total amount of impure nuclein in the 5 c. c. of dilute solution employed in these experiments was 1·8 milligram, or the strength of the solution was 1 part of impure nuclein to 2,777 parts of water.

EXPERIMENT V.

The 5 c. c. used in this experiment contained 10 milligrams of impure nuclein dissolved in 0·1 per cent of potassium hydrate. The germ was the aureus.

Time	Immediate.	30 minutes.	1 hour.	3 hours.	5 hours.	24 hours.
Number of colonies.	Countless.	5,000	550	490	400	0

Many other experiments similar to this were made, but as the results were uniformly the same, repetition is unnecessary.

EXPERIMENT VI.

A loop of tuberculous sputum, showing from forty to sixty bacilli in each field when stained, was stirred up in beef tea, allowed to stand for twenty-four hours, and injected into the abdominal cavity of guinea pig No. 1. Another loop of the same sputum was added to a solution of 30 milligrams of impure yeast nuclein in 0·08 per cent of potassium hydrate, and this was also allowed to stand in the incubator at 38° for twenty-four hours, and then injected into the abdominal cavity of guinea pig No. 2.

At the expiration of fourteen days both of these animals were killed. The omentum of No. 1 was a tuberculous mass throughout, while No. 2 showed not the slightest evidence of the disease.

The solutions of impure nuclein in dilute alkali may be kept at ordinary temperature in glass-stoppered bottles for months, without undergoing putrefactive changes. I have now one bottle of such solution, which was prepared on the 20th of December, 1892. One hundred and fifty milligrams—possibly a much larger quantity—of this nuclein may be injected, when properly diluted, under the skin, without any inconvenience, save slight pain at the time of injection and some soreness in the part, which disappears after a few hours. The last statement is true when the initial dose is small and the quantity is gradually increased. In one case, in which I gave an initial injection of 25 milligrams, an erysipelatous redness, as large as a saucer, appeared in a few hours. The temperature went up 3° and the patient felt some nausea. The redness, however, rapidly disappeared, the temperature fell, and two days later I repeated the same dose without any ill effects. In some other instances I have noticed an elevation of temperature within an hour or two after the injection. This has happened only in those patients in which the size of the dose has been rapidly increased. Yeast nuclein appears at times to have a cumulative action. When employed in large doses for several consecutive days the temperature may be markedly elevated.

Testicular nuclein.—I have prepared this from the testicles of the bull, dog, guinea pig, and rat. The testicles are stripped of their investing membranes as soon as removed, rubbed up and extracted repeatedly with a mixture of equal volumes of absolute alcohol and ether. Then the testicular substance is digested for some days (until the supernatant fluid fails to respond to the biuret test for peptones) at 40° C. with pepsin and 0·2 per cent hydrochloric acid. The undigested portion, which contains the nuclein, is collected on a filter paper and washed first with 0·2 per cent hydrochloric acid, then with alcohol. Finally it is dissolved in a 0.5 per cent solution of potassium hydrate and filtered through a Chamberland filter, without pressure.

This solution is clear, more or less yellow, and feebly alkaline. On the addition of nitric acid a white precipitate forms and dissolves colorless in the cold on the further addition of nitric acid. This nuclein does not give the biuret reaction, but does respond to the Milion test. The nitric acid solution of the precipitate becomes yellow on the addition of ammonia.

This nuclein also has germicidal properties, as is demonstrated by the following ments:

EXPERIMENT I.

A solution of nuclein of unknown strength, obtained from the testicles of a bull, was diluted with 4 volumes of physiologic salt-solution, inoculated with the bacillus anthracis, and plates made, with the following results:

Time	Immediate.	30 min.	1 hr.	2 hrs.	3 hrs.
Number of colonies	730	6	0	0	0

EXPERIMENT II.

The same solution inoculated with the aureus.

Time	Immediate.	30 min.	1 hr.	2 hrs.	3 hrs.
Number of colonies	Countless.	2,850	0	0	0

EXPERIMENT III.

A solution of nuclein from the testes of a dog diluted with 4 volumes of salt solution and inoculated with the staphylococcus pyogenes aureus.

Time	Immediate.	20 min.	1 hr.	2 hrs.	17 hrs.	24 hrs.
Number of colonies	680	0	0	0	0	0

EXPERIMENT IV.

Another solution from the same source diluted in the same manner and inoculated with the aureus.

Time	5 min.	1 hr.	2 hrs.	14 hrs.
Number of colonies	250	0	0	0

EXPERIMENT V.

As several authors have reported the finding of a germicidal substance in the glycerin extract of certain organs, the following experiment was made: The testicles of a white rat were stripped of their tunics and extracted with glycerin. This extract, diluted with 4 volumes of salt solution and inoculated with the aureus, gave the following results:

Time	5 min.	1 hr.
Number of colonies	1,240	75

I have used this solution of nuclein in doses of from 5 to 20 drops, diluted with saline solution, hypodermatically in one case of nervous exhaustion, and from the markedly stimulant effects observed I conclude that it is to the testicular nuclein that the Brown-Séquard fluid owes its action. These effects, as I have observed them, with the very small doses given, soon pass away, but they are extraordinary.

Thyroid nuclein.—The fresh gland is cut into fine pieces, extracted with alcohol and ether, and then digested with pepsin and 0·2 per cent hydrochloric acid at 40° for two or three days, the digestive fluid being renewed several times and the digestion being continued until the supernatant fluid fails to respond to the biuret test. The undigested residue is collected upon a filter, washed with 0·2 per cent hydrochloric acid, then with alcohol and ether, and finally dissolved in 0·25 or 0·5 per cent solution of potassium hydrate.

This solution of nuclein gives a faint opalescence on the addition of nitric acid. It does not color on heating with nitric acid, but becomes markedly yellow on the further addition of ammonia.

A 0·25 per cent alkaline solution of this nuclein dissolved with an equal volume of physiologic salt-solution and inoculated with the aureus showed a germicidal action as indicated in the following figures:

Time	Immediate.	10 min.	1 hr.	20 hrs.
Number of colonies	805	830	256	0

I have not tested the effects of this nuclein on man.

Egg nuclein.—The yolk (2 dozen eggs furnish a convenient amount of material to work with in the laboratory) is extracted with absolute alcohol repeatedly and until all the coloring matter is removed. The substance is then digested for some days with pepsin and 0·2 per cent hydrochloric acid. (In one instance I continued this digestion for four weeks, hoping to obtain a residue which would not respond to the biuret test, but this desire was not attained.) The undigested portion is collected on a filter, washed with dilute hydrochloric acid and subsequently with alcohol, and then disolved in 0·25 or 0·50 per cent of potassium hydrate and filtered through porcelain.

This solution of egg nuclein is colorless or slightly yellow. Nitric acid produces a slight, white precipitate, which dissolves in excess; this does not turn yellow on heating, but does so beautifully on the subsequent addition of ammonia.

Experiment I.

A solution of this nuclein in 0·25 per cent potassium hydrate was diluted with 4 volumes of saline solution, inoculated with anthrax, and the following figures show the germicidal results:

Time	Immediate.	30 min.	1 hr.	2 hrs.	3 hrs.
Number of colonies	2,490	350	30	0	0

Experiment II.

Another portion of the same dilution, inoculated with the aureus, gave the following results:

Time	Immediate.	30 min.	1 hr.	2 hrs.	3 hrs.
Number of colonies	Countless.	2,000	137	0	0

Besides the foregoing sources, I have obtained nucleins from the brain and the spleen, and these also are germicidal in their action. I have not tested the physiologic effects of the nucleins from the egg, brain, or spleen on man. I have employed the egg nuclein on guinea pigs without any apparent deleterious effects.

I have introduced this sketch of some experimental work, illustrating a few of the many experiments that I have made bearing on this point, for the purpose of giving some correct idea of the ground upon which I make the assertion that nucleins are powerful germicides.

I think that all will now agree with me that the nuclein-forming organs of the body most likely have some concern in the production of immunity.

The nucleins formed by these cells or in these organs pass into the blood partly in solution and partly in the form of the multinuclear white corpuscles—the so-called phagocytes.

The germicidal properties of blood serum are due to soluble nucleins. This statement rests upon work done by McClintock and myself, and the evidence upon which it is founded will be set forth in a paper to be read before this section.

There are three reasons (only one of which has heretofore been recognized) why the germicidal properties of blood serum are greater than those of blood plasma. These are: (1) The lessened amount in the serum of those substances that favor bacterial growth; (2) the concentration in the soluble nucleins that occurs as a result of clotting of the blood; and (3) the passage of the substance of the multinuclear cells into solution.

When I speak of the solution of the substance of the multinuclear cells I do not wish to commit myself to the theory that the entire cells break down. I refer simply to the fact—and I believe it to be a fact, as I have found nuclein in solution in blood-serum—that the nuclein passes from the cell into solution. Whether this process is due to the breaking down of the cell or to an active secretion on the part of the cell, I am as yet unable to determine.

As is claimed by Metschnikoff, there are obvious advantages to the animal in having the germicidal constituents of its blood (partly) in the form of ameboid bodies. Concentration at a desired place can be more easily accomplished and the walls of the arteries and other tissues may be traversed without injury. But these cells do not eat and digest the invading bacteria. There are reasons for believing that they have no power to retard the progress of the invading bacteria until the constituents of the cells pass into solution. Germs often grow and multiply in these cells.

The fact mentioned by Metschnikoff, as a proof of his theory, that in the apyretic stage of relapsing fever all of the spirilla are found in the splenic cells, while in the pyretic stage they are free in the blood, is capable of a wholly different explanation from that which he attributes to it. It seems to me more likely that the spirilla seek the interior of these cells as a place of rest, where they reproduce themselves, and from which they go forth with renewed energy. In the monkey the splenic cells fail to afford this protection, and the pyretic stage does not return. Metschnikoff himself states that the malarial hematozoön, during the ameboid stage of its existence, finds its way into the corpuscle, and from the substance of this the parasite takes its nourishment.

The action of the soluble or alkaline nucleins on germs may be either inhibiting or directly toxic, or both. It is not necessary that the invading germ be killed in order to prevent it producing disease. If its growth and multiplication be inhibited the disease will not follow. Metschnikoff has shown that some of the germs taken even after many days from the local abscess formed in an immune animal inoculated with a pathogenic germ, and injected into a susceptible animal, may cause the disease. These nucleins are not only germicidal; they are also toxicidal. They render inert the bacterial nuclein, whether this be present in living or dead cells, whether it be in suspension or in solution.

In order to state my views upon immunity in a condensed form, and to bring this address within the limits of the time allowed, I will summarize as follows:

There must be three factors in the production of immunity in an animal naturally susceptible. First there must be an inciting or immunizing substance introduced into the body. We are acquainted in a rough manner with the nature of some of these substances, such as the venom of the snake, the vegetable proteids, abrin, ricin and robin, and certain bacterial proteids. I call these proteids, and I wish it to be understood that I do so tentatively, and that I recognize the fact that the exact chemical nature of none of them is known; but for the present we may call them proteids. For reasons already given, I believe that these proteids, which induce immunity, belong to the class of nucleins. I am aware of the fact that physiologic chemists do not always classify the nucleins among the proteids, but among the albuminoid bodies. These substances, be they nucleins, proteids, or albuminoids, have the property, when introduced into the bodies of certain animals, in certain amounts and under certain conditions, of so stimulating the activity of certain organs in the animal that these organs produce and supply to the blood an antidote to the substance introduced.

Secondly, the organs whose activity is stimulated by these immunizing agents are those, such as the spleen, thyroid gland, and bone marrow, which manufacture nucleins.

Thirdly, the antidotal substance is a nuclein. The kind and amount of nuclein formed will depend upon the nature of the inciting agent and the condition of the organ or organs acted upon.

I use the word "nuclein" in a broad sense, including the true nucleins, nucleinic acids, and nucleo-albumins. By the term "nuclein" I mean that part of the cell which under normal conditions is endowed with the capability of growth and reproduction, which assimilates other proteids and endows these assimilated substances with its own properties. It is that part of the cell which gives it its individuality. Whether these nucleins, while in solution and devoid of morphologic unity, are still capable of assimilating allied bodies or not, can not at present be positively determined. There is no *a priori* reason, so far as I know, for denying this. These different nucleins, that of the bacterial cell, and that of the blood, may be isomeric bodies, one of which may be designated as the α compound, and the other as the β compound, and one of these, by simply causing a rearrangement in the atoms within the molecule of the other, may assimilate the second. There are some good reasons for believing that certain proteid bodies contain a cyanogen group, and Kossel has shown that nuclein contains a basis substance, adenin, which has the formula $C_5H_5N_5$ and is a polymer of hydrocyanic acid, and Gautier has synthesized another constituent of nuclein, xanthin, by simply heating hydrocyanic acid in a sealed tube in contact with water and a little acetic acid. Indeed, the readiness with which cyanogen bodies polymerize is well known to chemists. Thus, liquid chlorid of cyanogen CNCl converts itself spontaneously, under certain conditions, into solid chlorid of cyanogen, $C_3N_3Cl_3$; cyanic acid into cyilid; methyl cyanic ether, $CON(CH_3)$ into methyl cyamin ether, $C_3O_3N_3(CH_3)_3$, and cyanogen into paracyanogen.

I do not mean to say that the process by which a nuclein assimilates another proteid is as simple as would be indicated by these examples, but they may suggest something of the nature of the chemistry of assimilation. We may suppose that when an alpha nuclein and a beta nuclein are brought together, one will assimilate the other; and which one will absorb the other will depend upon the relative strength or vitality possessed by them, and in measuring this strength several things must be taken into consideration. A vaccine has less of this power of assimilation than a germ of full virulence, and a nuclein in a sterilized culture less than either of the others.

An organ that has once been stimulated by a given excitant responds more quickly the second time to the same excitant, provided that the interval of time is not too great. This explains the gradual loss of acquired immunity.

Again, an organ that is stimulated by one excitant may not be responsive to another, and this accounts for the fact that an animal rendered immune to one disease remains susceptible to another.

The poison that is introduced is destroyed by the activity of certain cells. In order, however, to accomplish this destruction, it is probably not necessary that the poison should come in contact with the cells. For instance, the activity of the spleen has been found necessary, as the experiments of Tizzoni and Cattani have shown, to the production of immunity to tetanus. We can suppose that the process of immunizing an animal proceeds in something like the following manner: The modified virus of tetanus is introduced into some distant part; in some unknown way, the spleen is stimulated to action, and secretes a nuclein which is carried partly in solution, partly in the form of multinuclear cells, to the invaded part of the body, and the tetanus poison is converted into the nuclein coming in contact with it, or is otherwise rendered inert. Later a larger quantity of the tetanus poison is introduced, and now the spleen acts more promptly and energetically than before. This promptness and energy of action are increased by exercise, and finally an amount of tetanus-culture, of full virulence sufficient to kill an animal whose spleen has not been subjected to this training, may be introduced without ill effect. On this theory the production of immunity consists in a special education of certain cells, and artificial immunity becomes essentially cellular.

The difference between immunity and tolerance I conceive to be this: In the former the cells of certain organs become aggressive; a special function is developed; the poison introduced is destroyed. In tolerance, there is no aggressive action on the part of any organ; there is no development of special functions; the poison introduced is not destroyed; it only fails to kill.

Now, what can be said about the relation between the principles of immunity and those of cure? Are they the same? I think that there are essential differences. In the first place, the substances with which immunity is induced are not applicable in the production of a cure. They are already in the body, and have failed to stimulate the nuclein-forming cells in such a manner as to cause their own destruction. To introduce more of the bacterial poison after the invading virus has established itself in the system will only strengthen the invader. No disease, after being well developed, has been cured by the administration of the bacterial poison. I believe that vaccination, first performed after exposure to smallpox, may altogether prevent the development of the disease, or may modify it, but this is not cure. Of what service would vaccination be when the body is already covered with smallpox pustules.

Some experimenters have found that if a certain substance be introduced into the animal simultaneously with, or a few minutes, or at most a few hours, after the introduction of the virulent germ, the disease either does not appear, or it appears later than it does in control animals, and they have claimed that these are instances of cure. Thus, Behring speaks of *curing* diphtheria in guinea-pigs with iodin trichlorid. He injected this "curative agent" immediately after inoculation, and at the place of inoculation, and found that, of the animals thus treated, some, although they sickened, did not die. He may have induced immunity in this way by the action of the chemical agent on the bacterial proteid, though this has been experimentally denied by Tizzoni and Cattani, but certainly such results do not deserve to be designated as cures.

Koch attempted to cure tuberculosis by introducing the proteid of the specific bacillus into patients. Theoretically this was a mistake, because this proteid in living, virulent form is already present in the patient, and, indeed, is the cause of the disease. Immunity to tuberculosis has been tested by nature in each tuberculous person and has been found wanting. Some step in the process has failed. Either the poison was first introduced into the body in a form too virulent to be resisted, or the cells of the body have been unable to act with normal energy.

If I am right concerning this difference between the agents of immunity and cure, to what source shall we look for curative substances in the infectious diseases? Either we must introduce into the body some germicide formed by other cells, or we must employ other agencies for the purpose of stimulating the nuclein-forming cells. Blood-serum therapy offers the first of these alternatives, and now that we know that the germicidal constituent of the blood is a nuclein, blood-serum therapy will give place to nuclein therapy, and with the latter there is more hope of accomplishing good results, because it reduces the size of the dose.

I say that the germicides from which we now hope for good results in treatment must be of cellular origin. The experience of the medical profession for the past twenty years has demonstrated that there is no known chemical substance which can be introduced into the animal body in sufficient quantity to effect a cure by its germicidal action without harm. Time after time the discovery of a nonpoisonous, powerful germicide has been announced, but experience has invariably shown either that the substance is poisonous or that it is not germicidal. This universal experience of the profession has been scientifically demonstrated to be a fact by the researches of Behring, who after a large number of experiments came to the conclusion that, computed on the body weight of the animal, antiseptic substances reach a fatal dose when injected in absorbable form under the skin in one-sixth the amount which is necessary to prevent the development of the anthrax bacillus in the blood serum.

Now that we have learned that the animal body itself generates a germicide more powerful in its action than corrosive sublimate, and since we know how to increase the amount of this substance in the blood, and can isolate it, and inject it into other animals, renewed hope comes to us.

I have stated that one advantage which nuclein therapy will have over blood-serum therapy is to be found in the fact that it may enable us to employ the active substance in larger doses. We have seen all along that quantity as well as quality must be taken into consideration in the production of both immunity and cure, and that the effects are in proportion to the quantity. Even the ultra-bacteriologist does not now claim that a single bacillus of the most virulent kind introduced into the most susceptible animal will cause disease. The animal body is no longer to be regarded as a mere culture flask, in which germs grow without meeting with the slightest resistance; and after the germs of tuberculosis have gained the ascendancy, and are multiplying by the millions daily, possibly hourly, we need not hope to find a tuberculin which in doses of the fraction of a milligram will, within a few days, or within any period of time, destroy this great mass of living, growing poison. The miraculous effects of small doses need not be looked for. These will have no place in the therapy of the infectious diseases.

If it be possible to kill the germs or destroy the bacterial poison after the development of an infectious disease by the introduction of a germicide or a toxicide formed by other cells than those of the infected person, then we may expect that cures for diseases of this kind will be found in the near future. Experimentation offers the only means of ascertaining whether or not this be possible. The recently reported cases of tetanus successfully treated with the antitoxin of Tizzoni and Cattani, obtained from the blood of animals which have been rendered immune to this disease, are in accord with this principle.

If nuclein therapy fails us, we must strive to find agents that will stimulate the nuclein-forming glands. This probably is the chief factor in the climatic treatment of tuberculosis, but so far as our knowledge of medicinal substances that will accomplish this result goes we are practically and wholly ignorant. The field of special cellular therapeutics lies before us a *terra incognita*. Important discoveries in this direction are not likely to be made soon.

I have used the word "cure," limiting its meaning to the destruction of the germs or other poison. If we could destroy all of the bacilli in the body of a tuberculous patient would a cure be effected? If we ever reach this desideratum nature will probably do the rest.

I have thus imperfectly placed before you certain ideas that have for some years been slowly formulating in my mind. They have enabled me to demonstrate, first, that the nucleins are powerful germicides, and, secondly, that the germicidal constituent of blood serum is a nuclein. Whether or not they will lead to further elucidation of the perplexing problems of immunity and cure I can not predict.

PAPERS READ BEFORE THE SECTION.

THE TREATMENT OF GOUT.

By JAMES TYSON, M. D.,

Professor of Clinical Medicine, University of Pennsylvania.

That there can be no rational treatment of gout without a correct understanding of its pathology is evident. It can not, on the other hand, be claimed that the pathology of gout is thoroughly understood, although all admit that many facts bearing on it are well determined. One of these is that uric acid is in some way causative. Whether, however, the uric acid thus responsible is the result of increased formation or diminished exerction, or both, is not so generally acknowledged. Thus, Garrod, whose work first published in 1859, is to-day regarded as one of the classics in medicine, held that there is no increased formation of uric acid in the gouty, but a diminished excretion which results in an accumulation in the blood and other fluids of the body, and that this is true of almost every phase of gout. This Garrod showed by his well-known thread test.

Although the methods of analysis employed by him were not those acknowledged at the present day to be the most reliable, the more recent work of Pfeiffer, conducted in accordance with modern methods, essentially confirms the original statements of Garrod.

Thus Pfeiffer,* using Salkowski's method, determined the uric acid in the urine of certain cases of gout, of which he made two classes. Of these the cases of the first category had not passed over into the chronic stage—that is, had not acquired changes, such as stiffness of the joints, gouty tophi, atheromatous blood vessels, and the like—but had suffered acute attacks with intervals of complete freedom from symptoms. The second category included cases which had undergone the changes referred to. His results he contrasted with those of the urine of healthy men at corresponding periods of life, as follows:

In Class I, in which the urine of the exempt period was examined, the quantity of uric acid in the twenty-four hours per 100 kilos of body weight was—

Age.	In gouty subjects.	In healthy men.
	Gram.	*Gram.*
30 to 40	0·885	0·965
40 to 50	0·818	0·882
50 to 60	0·701	....
60 to 70	0·651	0·752

It will be seen that it was less in the gouty subject than in the healthy man in Class I.

The same was true of the urea, which amounted to only 28·8 grams in gouty subjects for each 100 kilos of body weight instead of an average of 33·1 grams for each 100 kilos in the healthy man, observations being made on men from from 33 to 65 years old.

Thus it will be seen that in the urine of such cases in the intervals between attacks there is a very decided diminution in the quantity of uric acid eliminated, as compared with persons in health.

* Pfeiffer, ueber Harnsäure und Gicht, Berliner klin. Wochenschrift, No. 17, Apr. 25, 1892, 5, 415.

Class II.—In those in whom chronic gouty changes had established themselves Pfeiffer noted a somewhat different result. Thus while the average elimination of uric acid in a healthy man from 33 to 45 years old was ·860 gram, that of the gouty subject between 33 and 65 years amounted to ·973 and even more, while the ratio of the urea to uric acid, which was 33·7 for the healthy person, amounted for the gouty to 35. Thus in this class of cases, the gouty with chronic changes, there is an increased excretion of uric acid as compared with health. This is a reversal of the original results of Garrod who found in the urine of this class of gouty subjects no uric acid at all, or only traces. This is ascribable to defect in the older method of analysis, that of Heintz by hydrochloric acid. It is now known that this fails to get out the whole of the uric acid.*

It will be seen, however, that the difference in favor of increased excretion is very slight, while the average excretions in the two classes of cases between 35 and 73 years old is still a trifle less than in the non gouty, being ·855, as compared with ·860, while the urea is also somewhat less, being 31·3 instead of 33, the ratio of urea to uric acid being 36 to 1 as contrasted with 38·5.

Now, if we turn to another modern observer, Alexander Haig,† who used also Salkowski's method for the determination of uric acid, and whose work seems to have been done with unusual care, we find his studies entirely confirm the original results of Garrod. Haig claims that there is "almost never" an excessive formation of uric acid at any time, and that its accumulation in the blood and body at any time is generally due to retention or failure of excretion; that uric acid is on the whole continuously formed in the proportion of 1 to 33 of urea. In certain states of the blood constituted essentially by increased alkalinity uric acid is held in solution in larger quantity constituting uric acidæmia. At such times, too, it is eliminated in increased quantity by the urine by which it is also readily held in solution because of the alkalinity of this secretion.

In opposite states of the blood the uric acid is driven out of this fluid and deposited in the tissues of the joints. Haig holds also that these opposite conditions, which are fluctuations in secretion only, can be artificially produced by drugs, food, temperature and other conditions influencing the reaction of the blood. Thus alkaline foods and warm weather favor the former, while acids and cold weather favor the latter and it is under influences like these that uric acid in the shape of urates is stored up in the body. He further says‡ that the blood never becomes loaded with uric acid except as the result of previous imperfect excretion, and such imperfect excretion or retention is sufficient to account for the largest quantities he has ever seen in the human body, and that there is no need of excessive formation as an explanation. Further, that he does not assert that excessive formation never occurs, only that he has never met any conclusive proof of its occurrence, while all the other phenomena of disease can be explained without postulating the excessive formation of a single grain.§

The result is, however, the same. Whether there be diminished excretion or increased formation, or both, there is an accumulation of uric acid in the blood which is responsible first for certain premonitory symptoms of gout, and second for

* Pfeiffer says that this indisposition of uric acid to be thrown down on the addition of hydrochloric acid, formerly regarded as characteristic of gout, becomes more marked as age advances, and may be said to be almost the rule with persons over 60. "Possibly," says P., it may present itself earlier in gouty subjects than in the normally constituted."

† Uric Acid as a Factor in the Causation of Disease. By Alexander Haig. London. 1892.

‡ *Op. cit.*, p. 7.

§ Notwithstanding these observations it is not unusual to find even medical men under the impression that gouty subjects excrete much more uric acid than the healthy, an error probably due to the fact that the urine of gouty subjects is apt to contain large sediments of uric acid especially during acute attacks whence is erroneously inferred increased excretion.

It should be mentioned that in a communication to the Tenth Congress of German Physicians so recent as 1892, Mordhorst, of Wiesbaden, also asserted that the average of the entire uric acid excretion of the gouty is considerably greater than in the rheumatic and healthy. These results are ascribed by Pfeiffer to the careless selection of material for the observation and defective method of analysis.

certain local symptoms. The latter are of an inflammatory nature and consist essentially in pain, swelling, and redness of the joints, preferably of the smaller ones, and especially of the metatarso phalangeal articulation of the great toe, more frequently, perhaps, of the left great toe.

It may be worth while to dwell a moment on the relation of the uric acid compounds to the local inflammations. It is scarcely necessary to say that uric acid does not exist as such in the blood, even in pathological conditions. The normal urates originally shown by Bence Jones, and recently confirmed by Sir William Roberts, are quadri-urates. In the pathological state these are converted into the less soluble bi-urates, which make up the blood deposits. It has all along been considered that these deposits are the direct cause of the gouty inflammation. Haig, as the result of his recent researches, reasserts this view in the following graphic language.*

Then I also noticed that in curing a headache by giving an acid to diminish the excretion of uric acid, I always produced a certain amount of pricking and shooting pain in my joints (generally in those which had been most used on the day in question) and it naturally occurred to me that the uric acid was held back in these joints and produced the pains. The uric acid which had failed to appear in the urine must have gone somewhere. What more natural than to suppose that it had been retained in the joints (where in gout it is found) and that the pricking pains were the evidence of its presence?

Then, on turning to Sir A. Garrod, I find that he had described precisely similar joint pains as occurring in gouty subjects immediately after the ingestion of beer or wine, and a very little investigation sufficed to prove that all wines and beers are strongly acid, so that a very simple explanation could be given of the facts.

In striking contrast to these heretofore-acknowledged views are those recently announced by Pfeiffer based on experiment and confirmed, he believes, by clinical facts. He introduced under the skin chemically pure crystallized uric acid suspended in water, with absolutely no immediate result. In the course of twelve to eighteen hours, as the uric acid began to be dissolved, irritation and skin inflammation presented themselves. These symptoms were further totally prevented if large doses of mineral acids were introduced into the body, by which solution of the uric acid was prevented, while the use of alkalies caused them to set in earlier and with greater intensity. So, also, the phenomena of irritation presented themselves earlier if the injection of uric acid was immediately followed by the introduction of alkaline solutions in the same locality, pain and inflammation present themselves promptly if solutions of uric acid are injected. The results of these experiments are also in accord, says Pfeiffer, with the clinical fact that the tophi of gouty patients are usually painless; often, indeed, they form without the knowledge of the patient. Not the precipitated uric acid, therefore, but the dissolved uric acid according to this view must be regarded as the irritating agent. According to it an acute attack is the result of a resolution by the blood of previously deposited uric acid, the impulse to this resolution being an increased alkalescence of the blood and body juices, the deposit being the result of diminished alkalescence.

Pfeiffer, in further support of this view, calls attention to the fact that the most recent chemical analyses by Lecorche, Ebstein, and himself show that the excretion of uric acid during an attack of gout is increased, and not diminished as taught by Garrod. I can, of course, have nothing to say of Pfeiffer's experiments, but so far as the clinical facts which he adduces to prove his position are concerned, my own experience is not in accord with his. The most recent studies on this subject, those of Sir William Roberts, embodied in the Croonian lectures and just republished in a small brochure entitled, "Uric Acid Gravel and Gout" support the older view that the "mechanical theory offers a natural and complete explanation." The crystalline urates precipitated in the cartilaginous and fibrous structures of the joints necessarily act as foreign bodies: they excite irritation, clog the lymph channels, exercise pressure on the tissue.

*Op. cit., p. 2.

We are now ready for a rational treatment of gout. Whether it be an irritant in solution or an irritating precipitate, uric acid is its cause. Hence, whatever diminishes the amount of uric acid in the economy must tend to relieve gout. It is plain also that we may diminish uric acid in two ways, first by confining the gouty person to such food as produces a minimum of uric acid; second by administering such medicines as will promote its solution and elimination. The first of these constitutes in the main the dietetic treatment, the second the medicinal.

I. The dietetic treatment.—I have said the elimination of urea and uric-acid producing substances from the dietary constitutes the dietetic treatment, which is by far the most efficient of the treatments of gout, without which all else is only palliation.

This consists essentially in the elimination from the food of all nitrogenous or albuminous principles, whose complete combustion results in urea and incomplete combustion in uric acid. As to these there should be no half course. They ought to be excluded as far as possible from the dietary. I say as far as possible, for it is practically impossible to eliminate them altogether. The foods which are the type of this class should, however, be altogether omitted. Such are the meats of the butcher shops, the albumen of eggs, and the cheeses. The first include beef, veal, mutton, lamb, and pork, whether salt or fresh, and for the most part fish. As to cheeses, as one-half pound of cheese contains almost as much nitrogenous matter as a pound of meat, 27 per cent when made of the whole milk, and 28 per cent when made of skim milk, it is evident that they are contraindicated. If we consider only the edible parts of beef, i. e., meat deprived of the refuse represented by bones, skin, and shells, it contains, according to its source, 17 to 23 per cent of proteids; mutton from 15 to 18 per cent. Of fish, flounder contains 13·8 per cent, mackerel 18, halibut 15, and salmon 21 per cent, or quite as much as beef and more than mutton; salt codfish contains 15 per cent, smoked herring 20, and canned sardines 24. Poultry contains 14 to 15 per cent of albuminates and game 22 per cent. The hen's egg, including albumen and fat, contains 13·7 per cent protein, whence it is plain that the yellow of eggs contains a very small quantity and becomes a suitable food.

On the other hand milk contains but 3 to 4 per cent protein, butter 1 per cent, and oleomargarine 0·6 per cent. The fat oyster contains 8 per cent and the lean 4·2 per cent and the lobster 5·5 per cent. Other fish than the above mentioned 5 to 10 per cent.

Of vegetable foods wheat bread contains 8·9 per cent protein, wheat flour 11, and graham flour 11·7; rye bread 6·7, buckwheat flour the same, corn (maize) 9, rice 7·4, sugar 0·3, potatoes 2, sweet potatoes 1·5, turnips and carrots 1, cabbage 1·9, melons 1, apples and pears 0·4 and bananas 2 per cent. Again, beans contain 23·2 per cent and oat meal 12 to 15 per cent, large proportions of proteins.

Thus the typical foods permissible from the standpoint of composition are milk, butter, the succulent vegetables, except beans and oatmeal, and fruits. To these oysters and lobster may be added moderately, fish except those named as containing a large amount of protein, and where extreme rigidity is not required poultry in moderate amount; but all butcher's meat should be strictly forbidden.

It is usual also to interdict the use of carbohydrates, i. e., starches and sugars, as well as the hydrocarbons or fats, but I have never been able to see any reason for this. There is absolutely none from the standpoint of chemical composition, since they are totally without nitrogen, and, so far as my own experience goes, none from the clinical standpoint. Only in the event they produce indigestion and fermentation, with the generation of acids, can they become a cause of gout, and then only, I should say, exciting cause. I am in the habit, therefore, of permitting the use of rice, potatoes, and other farinacea, and, to a reasonable extent, sugar.

I am glad to be able to say that I am sustained in this view by Sir William Roberts, who, in the brochure just quoted, says also—

The most trustworthy experiments indicate that fat, starch, and sugar have not the least direct influence on the production of uric acid; but as the free consumption of these articles naturally operates to restrict the intake of nitrogenous food, their use has, indirectly, the effect of diminishing the average production of uric acid.

Basing his conclusions upon experiments with solutions of blood serum impregnated with common salt (0·1 per cent) in which he found the precipitation of crystalline biurate always appreciably hastened, Sir William Roberts for some years past has directed gouty patients to restrict as far as possible the use of common salt with meals.

There is, however, another sort of ingesta, also entirely or almost free from nitrogen acknowledged to be both a predisposing and exciting cause of gout, and that is malt liquors and wines. These are composed of water, alcohol and other carbohydrates, and a trace of mineral matters, but no nitrogen. It is not easy at first thought to understand why these substances should be harmful. Experience, however, shows that the strongest wines, such as port, Madeira, and sherry, by their continued use, are very likely to produce gout; while the lighter wines, the clarets, hocks, and Moselle wines, if taken in moderation, rarely produce it. After these, stout, porter, and the strong ales induce gout. Even lager beer, which contains but 3 per cent of alcohol, is capable of acting similarly; and I know many men who have been forced to give up this beverage because of this effect. Cider and perry, also, predispose to gout to a less degree. On the other hand distilled spirits, especially whisky, are almost entirely without effect in producing gout. Why is this? Plainly, the amount of alcohol is not the measure of the effect, for whisky, gin, brandy, and rum all contain more alcohol than any of the wines alluded to. If reference is made to the wines most apt to produce gout it will be found that they are those which contain a considerable quantity of both sugar and alcohol. Such as port, sherry, and Madeira, all of which contain more than 15 per cent of alcohol and much sugar; also sweet champagnes, containing 11 per cent alcohol. On the other hand some very sweet wines, as Tokay, Malaga, and the higher sauternes, which contain much sugar, produce gout less rapidly. It would seem that those liquors which contain alcohol in combination with other substances, especially sugar, are potent gout producers, especially where they excite indigestion.

That the acidity of alcoholic drinks acts as an exciting cause can not be doubted. Whatever be the explanation few facts in the clinical history of gout are better established than that the ingestion of acid is an exciting cause.

In the same way act acid fruits, such as strawberries, acid oranges, and lemons. On the other hand, to such influence I have known the most divergent response. Thus, a gouty patient of my own could bring on an attack by drinking a single glass of lemonade, while a gouty friend would drink a pitcher of lemonade at dinner without any effect whatever. It is to be remembered that the otherwise harmful effects of the strong distilled spirits, such as are well born in gout, are no less serious in gouty subjects than in others, and are often induced by the careless prescription of whisky as less harmful than wines in gout.

II. The medicinal treatment of gout.—From the earliest history of the disease practice has recognized two classes of remedies in the treatment of gout, alkalies and purgatives, the object of both being to eliminate the offender, the first by producing soluble combinations which pass off by the kidneys, the second by the bowels. It is plain that a combination of the two principles might be expected to be more efficient than either one alone.

First, as to alkalis and alkaline combinations. My experience places the salicylate of sodium easily at the top, and while it is not so rapid in its effect in relieving the pain of an acute attack of gout as it is in rheumatism, it is nevertheless an invaluable remedy, excelling all others. During an attack it should be given in doses as large as can be borne. As a rule adult men easily bear 15 grains four times a day, or 10 grains may be administered every two hours. Even larger doses may be given with advantage if borne by the stomach.* With relief to the acute symptoms the dose should be reduced, but, as in rheumatism, the remedy should not be discontinued, and between attacks smaller doses should be kept up for some time. These, however, may be substituted by the natural mineral waters to be presently alluded to.

After the salicylates the alkaline carbonates have always held a high position in the treatment of gout. Half an ounce a day should be the initial dose reduced when the acute symptoms are relieved, but continued in smaller doses. It may be combined with a little lemon juice to improve the flavor, or the citrate of potassium may be given in the same doses.

The lithium compounds, the carbonate and citrate, have not proven so useful as to cause me to prefer them to salicylic acid. Indeed the early result of Garrod with them can not be said to have been realized in modern therapeutics. Sir Dyce Duckworth says of lithia that it is a remedy better adapted to the chronic than the acute phases of gout. Five grains four times a day, freely diluted, is the dose usually administered, and with this the potash salts are sometimes combined.

A most valuable adjuvant to the medicinal treatment are mineral waters. The waters which have heretofore received almost universal approval are the alkaline waters, although those possessing purgative properties also possess much reputation. In America, however, so few of these waters are native, while those which are, are so far inferior to the foreign waters that it is practically impossible to fulfill these requirements by them alone; while the costliness of the foreign waters imported to this country is a very serious obstacle to their use.

The native waters commonly employed and which are highly vaunted by their owners on apparently insufficient grounds, are of the kind known as negative waters; that is, they have no mineral ingredient in a quantity to justify their classification in any of the four principal varieties of mineral waters, viz, the alkaline, the saline, the purgative, or sulphurous. Any therapeutic power they possess must be ascrebed to their diluent effect. At the same time it has been noted that these waters are not without effect in relieving gouty symptoms. Reasoning from these facts I have long been in the habit of prescribing native drinking waters, such as are accessible to the patient, or distilled water may be used with this end in view, the simple diluent and solvent effect which comes from an increased proportion of water in the blood. The further propriety of such a course is found in the fact that gouty and lithæmic patients are often small drinkers, never drinking water between meals and very little at meals. To such, 8 ounces of water ordered on rising, between meals, and at bed time will often clear up a dark-hued urine of high specific gravity and substitute a light-hued, clear urine without any sediment.

The positive mineral waters that have acquired the greatest reputation in the treatment of gout are those of which sodium bicarbonate is the chief ingredient, to which the calcium bicarbonate is a valuable adjuvant. Such are the alkaline waters of Vichy, Evian-les-Bains in Switzerland, Neuenahr, and Fachinglen in Prussia, Contrexéville, and Vittel in the Vosges, and Dax in France.

Other waters possessed of reputation in the treatment of gout, in which the quantity of alkaline bicarbonate is smaller, owe this reputation to their combined alkaline and aperient properties, chiefly due to sodium sulphate and magnesium sulphate, and belong to the second category of remedies for gout. Such are the alkaline waters of Carlsbad and Marienbad in Bohemia, Kronthal in Nassau, and Brides-

*In this connection I desire to call attention to a method of administration of sodium salicylate by the rectum, the source of which I can not now recall: (1) The rectum is cleaned out of fæcal masses, preferably by warm water, and some time allowed to elapse after this before the drug is injected. (2) From 90 to 120 grains of salicylate of sodium are dissolved in 3 fluid ounces of warm water, to which 25 minims of tincture of opium have been added. (3) A 3-ounce syringe, with a long, soft gum tube attached to the nozzle, is filled with the solution, the gum tube introduced about 8 inches into the bowel, and the injection made once daily. (4) After the injection the syringe is withdrawn from the gum tube, which is allowed to remain in the bowel, the syringe filled with air, and this forced into the tube in order to retain the enema. The precaution must be taken of informing less intelligent persons that the injection is to be retained.

les Salins in Savoy. Then there are the saline waters represented by Baden-Baden, Ems, Hamburg, Kissingen, and Ischl, Wiesbaden, and our own Saratoga waters, and those of Bedford, Pa.

Finally, there are the bitter acidulated and purgative waters Hunyadi Janos and Friedrichshalle in Hungary, Püllna in Bohemia, and Rubinat in Spain, rarely resorted to for gout, but useful as eliminating agents.

The use of these mineral waters is especially indicated in a continuous manner between attacks with a view to averting them. Especially useful are the thermal waters in the chronic arthritic complications in which their internal use is combined with bathing. In this connection may be mentioned Carlsbad and Marienbad, where also the mud baths are employed, Baden-Baden, Ems, Wiesbaden, Hammon R'Irha in Algeria, available in winter, Plombieres in the Vosges, and Dax in France. Homburg, Kissingen, and Ischl are also resorted to for their baths, although the waters are cold.

Sulphurous waters also have some reputation in gout. Especially is this the case with the waters of Aix-la-Chapelle in Rhenish Prussia, and Aix-les-Bains in Savoy, Harrowgate in England, and Richfield Springs, Sharon, and St. Catherine's in America. In all these places the bath treatment is an important adjuvant.

The second category of remedies, the aperients, are decidedly useful in gout, both as eliminators and to prepare the way for the absorption and prompt action of the alkaline bicarbonates. They are not, however, used at the present day as freely as a century ago and they are commonly reserved for the acute attack.

Among the eliminating remedies is the time-honored colchicum, a remedy which is of undoubted value in gout, but which in my experience in most cases must yield the palm to salicylic acid. For a long time its action was inexplicable, and it came to be spoken of as a specific in gout, as quinine in chills, and mercury in syphilis. Modern studies have, however, solved this problem. Prof. Rutherford has shown that it is one of the most powerful cholagogues known. This, taken in connection with what we now know of the office of the liver in urea formation, simplifies very much the solution of the problem. This explains, too, why colcihcum produces its sedative and anæsthetic effect without necessarily producing purgation. Indeed, some (as Sir A. B. Garrod) consider that its effects are best attained without purgation, and Garrod says that if cathartic action is required it is better to combine some aperient with the colchicum, as when much purging and vomiting result from colchicum, nervous and vascular depression follow. I confess I like to secure a little action on the bowels by increasing the dose gradually, and it is not necessary to produce either violent purging or vomiting. The preparation commonly used is the wine. In this country the wine of the seeds is no longer officinal, so that if the wine is ordered that of the root is dispensed. This is more powerful than the wine of the seeds. The dose of the latter is from half a drachm to a drachm or a drachm and a half during the attack, but of the root 15 to 30 minims, reducing the quantity when nausea or purgation ensues.

The acetic extract of colchicum was a favorite preparation of the older physicians, especially Scudamore, who introduced it and who considered its action milder than any other form. It is still sometimes used and has the advantage that it may be put into pill form. Its dose is 1 to 2 grains.

I am not in the habit of using colchicum in the interval between attacks of gout, and indeed use it less in the acute attacks since the salicylates have come into use, but still value it highly. Colchicum has also been regarded as a diuretic, but later observations go to show that it does not increase the elimination of uric acid or urea. It should not be omitted that some of the physicians of the third quarter of this century who had large experience with colchicum thought it caused gouty attacks, but Garrod and Sir Thomas Watson, whose combined experience is probably greater than that of any other two men, both deny it. It may be worth while to add here what the latter says of its efficiency: "This drug has certainly the property of easing in an almost magical manner the pain of gout." "How it operates," he says, "is not so clear." We have seen that at the present day, however, a rational explanation is not wanting.*

The aperients commonly used in gout are the salines, of which the magnesium sulphate is the favorite. Sodium sulphate is also used, and it is the constituent of the most actively purgative mineral waters, the Hunyadi, Janos, and Friedrichshalle, already mentioned, which are now largely used instead. A favorite combination of the older physicians was magesium sulphate two drachms, magnesium carbonate a scruple, suspended in an ounce of cinnamon water, two or three times a day until active purgation results. These two substances may be combined with colchicum, and with it form a popular gout medicine.

Colocynth is also employed as an aperient in gout, and advantage has been taken of this fact in the preparation of the secret remedy known as Lavelle's tincture, which is very largely used by the laity and which undoubtedly has a very prompt effect in many cases of acute gout.

The following has been published† as the composition of Lavelle's remedy, the result of analysis: Quinine, 5 parts; cinchona, 5 parts; colocynthin, 2·5 parts; lime salts, 5 parts; water, 85 parts; alcohol, 100 parts; port wine, 800 parts.

Doubtless it will be expected of me to make some allusion to a remedy which has recently been introduced as efficient in the treatment of gout. I allude to piperazin. I regret to say that I have been disappointed in it. In my early trials I thought it useful, but soon learned that it was less efficient than the salicylates and colchicum. An acknowledged solvent for uric acid when dissolved in water, its failure as a uric acid solvent in the system is well explained by some recent experiments by Dr. Martin Mendelsohn, who placed small uric acid gravel in a 1 per cent aqueous solution of piperazin, in urine containing 1 per cent of piperazin, and in urine derived from a person during the administration of piperazin. The first solution produced a decided effect upon the stone, reducing its bulk one-half and liberating parts of the organic framework, but the stone in the second and third solutions remained uninfluenced. Mendelsohn further placed on a filter a known quantity of uric acid and passed over it the urine of a person who had taken two grams of piperazin in the course of a day, and found that at the end of this time the uric acid weighed more than it did before the urine passed over it, so that instead of the uric acid being dissolved away something more was added to it.

It will be remembered, too, that Pfeiffer has shown that it is one of the peculiarities of the gouty diathesis that the urine possesses a marked "precipitability" for uric acid; that is, it parts with its uric acid with great readiness, and it possesses, further, a disposition to give off uric acid to the uric acid filter above described in an especially high degree, and that under the use of certain mineral waters as those of Vals or Fachingen the urine loses this property. Now, if piperazin is an efficient agent to the end claimed it ought to produce the same effect on the urine as the mineral waters referred to did. In very carefully conducted experiments, however, Mendelsohn showed that this was not the case; so that it is true of piperazin, as of other substances, that while in aqueous solution it dissolves uric acid there is something in urine which interferes with this solvent power. For the relief of the acute attack of gout, leeches, blisters, and cold have all been discontinued of late years, not only because they are useless, but also because their use has been followed by fatal attacks of the so-called internal gout.

Warmth and moisture do, however, have a mollifying effect, which is increased if the liquid preparations of opium be associated with such applications. Cocaine, which might be expected to be useful, operates only through open surfaces.

All pressure by boots on joints disposed to gout should be carefully avoided as well as injuries, as such influences undoubtedly act as predisposing causes.

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* Colchicine, the active principle of colchicum, is also employed. Its dose is the one-fiftieth grain. The same dose may be employed hypodermically. The fluid extract may be administered in doses of 2 to 6 minims.

† Druggist's Circular, October, 1889.

YELLOW FEVER: PATHOLOGY AND TREATMENT.

By F. PEYRE PORCHER, M. D., LL. D., Charleston, S. C.

I wish, in this paper based on the study of several epidemics of yellow fever in Charleston, to make three points which are of the first importance; also to give some of the results of my experience as regards treatment and pathology, which I do not think have attracted the attention they deserve:

First. That this fever in Charleston has always been accompanied by what is known as "breakbone fever;" this, though extremely mild, is not distinguishable, but being counted in with cases of true yellow fever prevents all accuracy in the mortality reports.

Second. That yellow fever is fully susceptible of successful management in fair cases, seen early.

Third. That life is compromised in the first six to ten hours of the disease; so that it is essential that treatment should be begun early.

Coexistence of yellow and breakbone fever.—Invariably two forms of fever existed together, namely, yellow fever, and a milder and more ephemeral, intercurrent species known and designated as "breakbone." Yet this was not by any means always ephemeral, for it often had a duration of several days. Whether they constituted two distinct species, or were only varieties of one and the same malady, has, strange to say, never been decided—no distinct lines of demarcation between the two have ever been satisfactorily established—no physician, however acute, having clearly pointed out any precise diagnostic difference. Though many cried "eureka," upon more rigid scrutiny the hopes they offered of a solution of the difficulty proved fallacious.

Among the observers there were to be found the lax and the strict constructionists, so that the usual confusion prevailed: *quot homines tot sententiæ*—there were as many opinions as there were persons to utter them. The question was, it must be confessed, surrounded by many difficulties, for whilst some forms of fever were very mild, and some characterized by black vomit and suppression of urine were very fatal, others presented every intervening shade of difference between the two; and though the access of what proved to be the simplest cases was sometimes severe and violent, the intensity of the disease was dependent for the most part, I think, upon the amount of climatization enjoyed by the party suffering; and its gravity and its termination, whether favorable or unfavorable, would be modified, it seemed to me, by neglect, by delay, or methods of management injurious or beneficial in their effects.

Individually, I am of the opinion that many who, by careful and assiduous attention on the part of the attendants were rescued from falling into a dangerous condition, and who recovered—the result would have been quite the opposite had they been managed otherwise. So that it was the early treatment and the appliances, and the eternal vigilance which sufficed to change the issue, and which did change it; and I hold that such cases, so metamorphosed by the simple, but important difference of management, would have had a very different termination; and would then, even by the most skeptical, have been placed in the category of true yellow fever, which was denied them if they did not get almost or quite into the third stage. The mild cases (breakbone, so called) may get well with little or no interference. The difficulty was that they could not be surely distinguished at their early inception; and the stranger, in my experience, sometimes had attacks, which, when vigorously managed at the beginning, were fully as innocent as those from which natives suffered, and which in these received the designation of breakbone. But in a fever like this, which does its work so rapidly, it was at least plausible to believe and to argue that neglect, delay, the avoidance of the proper means and appliances for reducing temperature, etc., would have very much to do with modifying the nature, history, and ending of each case. This need not excite surprise, for did we treat scarlet fever or even measles with agents as active as those we were in the habit of administering in yellow fever, they would inevitably be made quite as fatal.

Pathology.—The peculiar poison when first introduced in the system produces (through nervous paralysis of the capillary arteries, perhaps) intense fever and great excitement of the circulation, with torpor of the glandular and secretory apparatus. It shuts up all the secretions and excretions, and with a high fever which it creates, rapid destructive metamophosis of the tissue occur, caused by the intense combustion going on; so that spoliative treatment, in the shape of mercurial, saline, or other purgatives, is imperatively demanded at this inceptive stage. These are to be accompanied by revulsives, hot foot baths, and the application of cold to the upper extremities, in order, severally, to empty the intestinal canal and the torpid glandular organs, to diminish temperature, and to contract capillaries. All these means, also, serve incidentally, but powerfully, to lessen the tendency to nausea, and to irritability of the stomach. The latter does not decidedly lead to, or induce black vomit, as is commonly supposed, though the one often accompanies or precedes the other. Both result from the same efficient cause, namely, the altered condition of the blood, induced by the fever. The peculiar vomit is probably owing to what Warren calls "mortified blood," blood thinned by the decomposing action of excessive fever (a quality peculiar to the yellow fever poison alone) transuding into the stomach and blackened by its acids. I could discover by the microscope,* frequently used, no distinct difference between this and other bloody matters vomited, which have been acted upon by the gastric juice, as where blood from a cancer is poured into the stomach and afterwards ejected.

The temperature in this peculiar fever, if unsubdued, leads infallibly and of necessity to subsequent trouble, to destructive tissue changes, to blood poisoning, to black vomit, to albuminuria, to coma, or to convulsions. I have seen thorough and persistent sponging with ice-cold water, when combined with the use of the other agencies advised, reduce the temperature, lessen all the bad symptoms in a surprisingly short time; having the power seemingly to change the entire character of the disease and imparting comparative mildness to its whole subsequent career. I will stand to this truth, for in the perception and practical carrying out of it lies the whole virtue of the plan which I advocate and assert to be successful.

In general terms, then, our first efforts must be directed to the relief of the intestinal and glandular torpor which always exist and which is marked by costiveness; we must diminish the cutaneous and general heat, empty the vessels of the system which are laden with impure blood, and obviate the tendency to renal engorgement indicated by the frequent presence of albumen. This is effected by the revulsives, aided by a mild alkaline diuretic, to be referred to subsequently. Then we must strive cautiously at construction, and whilst allowing the recuperative powers full exercise, we are to do nothing to impair the strength remaining, or weaken the energies of the constitution which have become greatly enfeebled. The unacclimated who are seized with the fever are nearly or quite always in a quasi-critical state, ready at any moment to take the descending path and to become dangerously ill; hence they require as careful handling as children do with scarlet fever. Whilst, therefore, nothing is omitted which will tend to diminish the fever, their strength must be carefully husbanded, for the slightest neglect, the failure to keep down the temperature by the application of cold water, or too much medication, though these may seem light transgressions, are powerful and weighty in turning the balance.

Mercurial and antiphlogistic purgatives, used at the beginning, serve to diminish the heart's action, to lessen the inflammation by spoliation, by the drain of fluids from the body, augmented by the cooling operation of the salines. All of these are measures only to be employed at the beginning, using the agents in sufficient amounts

*Illustrations of Disease with the Microscope. Prize Essay. Charleston, C. S. A., 1861.

to effect our object, which is to empty the bowels once thoroughly and effectually, without, as I urged, weakening the patient any more than is absolutely required. Purgatives are on no account to be persevered in. The failure to discontinue them after the efficient action of those used on the first day is procured, is, I am sure, a grievous error.

Several authorities commit the fatal mistake of repeating the mercury and cathartics and pushing their use much too far. Even Blair, though in my judgment eminently on the right track, and for this reason very successful, permitted his XX of calomel and XXIV of quinine to be repeated under emergencies, and be used again and again as often as six times; I prescribe it invariably, but never more than once, unless it is not retained or does not act.

In a fever like this, of one paroxysm (but with a remission somewhere between the twelfth and thirty-sixth hour, occurring more distinctly when the proper means are used early), which is exceedingly violent at the beginning, if unchecked, it does all the violence it is capable of in a very brief period.

I have been the first, I believe, to make a most important declaration: that life is virtually compromised in the first fifteen hours of its career. In such a fever, where the danger and the terrible sequelæ are owing entirely to the extreme intensity of the eremacausis, and the injury worked in the system by the high combustion which acts principally upon the blood, a certain treatment flows logically. There is no time to be lost in setting about it, and it is only to be regretted that our measures can not anticipate the invasion of the attack.

I sincerely believe that thousands of lives could have been, and can be, saved by a system of management begun at the very commencement of an attack of the disease, before the fever has had time to produce its direful effects, and by methods simple in their operation, perfectly compatible with reason and common sense, and also based upon a view of the pathology and progress of the disease.

That, consequently, where the demand for medical aid is so urgent, when physicians can not see their cases early—such precious time being lost by their enforced absence—an exception must be made to our usual procedure, and the people in such need must be told what to do before the physician arrives. This is required by the fact, which should be recognized by every one, that death results from the insidious and peculiar fever of the first six to ten hours—whenever this is permitted to go on unchecked—through failure to use these means which are perfectly adequate to restrain and keep down the temperature. So that when a man has been ill for twenty-four hours or forty-eight hours with yellow fever, the attendant is not responsible, and treatment which would have been efficient used early is not to be condemned because it fails at the stage where irremediable organic changes have taken place; and the practitioner who boasts that he has 50 or 60 patients on his list does not know that the last installment (those he can not see for ten to fifteen hours) are, in many instances, already irretrievably doomed.

In fair cases and temperate individuals, treated early, there is no need for any violent third stage, for any black vomit, albuminuria, suppression of the urine, etc.

It is a mistake to suppose that yellow fever is necessarily a fatal malady, that epidemics vary greatly in malignity, and that we must fold our hands supinely. The truth is that physicians in this city and elsewhere report at the end of the season very few deaths. Belot, of Havana, claims that 95 out of 100 fair cases seen early may be cured, and I agree fully with him. I have practised with success the method to be related in detail (see also Charleston Medical Journal and Review, since 1858, and president's address before State Medical Association of South Carolina, 1872). Dr. C. W. Horsey adopted the same treatment in the fever of Fernandina, Fla., 1878, others have employed it successfully, and Surgeon Sternberg refers to it approvingly in his elaborate and able article in Wood's Hand Book of the Medical Sciences. I had long shown that by the adoption of Blair's system, materially modified, the application also of cold water was the foundation fact in the treatment. In confirmation of this, Prof. T. O. Summers, of Nashville, says, "Cold water is the remedy in yellow fever" (paper on treatment of yellow fever in 1879).

Treatment.—The treatment consists first in sponging assiduously the head, hands, and arms with ice-cold water at the very commencement of the attack, not losing an hour, and repeating this at intervals whenever the temperature rises, ice water being quite capable of reducing the temperature. Towels soaked in the ice water are preferable to sponging; fifteen to twenty minutes generally suffice for each application, its necessity being determined by the existence of pyrexia. Few perform this simple but essential procedure as efficiently as they should do. Secondly, give immediately Blair's "Calomel, grs. xx; quinine, grs. xxv" (in proportion to ages), and but once. I have never seen the quinine produce a single ill effect, though given when the fever is intense. Thirdly, follow in three or four hours with a saline cathartic (sulphate of magnesia), which is cooling and antiphlogistic. Fourth, apply mustard plasters to the entire abdomen, and use hot mustard pediluvia from the beginning of the attack, and repeat them frequently. These may be followed by a cantharides plaster upon the abdomen—which certainly does no injury. After the saline has acted, give an effervescent or antacid mixture of this nature (which also had the support of the late Prof. E. Geddings). Potas. acetate, 1 dram ad 2 drams; potas. citrate, 1 dram; morphia, 1 grain; water, 6 ounces. A dessert spoonful every two or three hours. Used to quiet gastric irritation and to act slightly as a mild antacid and diuretic.

No other treatment or active medication are required save the continuance of the cold application and pellets of ice given internally if necessary. Doubtless a few drops of tincture of aconite added to the mixture, or given separately, might prove serviceable.

By this method those recover, according to my experience, carefully recorded, who are seen early; who possess their organs in a state of integrity; with the intestinal canal, liver, kidneys, and other emunctories in a fair condition. This surely is not asking too much; and to claim that recovery will almost invariably ensue in such cases, under the plans detailed elsewhere, and on this occasion, is, if I am correct, making what I can not regard but as a true and important advance. This I hope and believe will one day be fully acknowledged. It is spoken seriously and earnestly without lightly coming to the conclusions, and I sincerely trust that the expression of them will not be regarded as presumptuous or premature.

How different is this from a former system of mercurial purgatives repeated every five or six hours, or a constant effort to induce ptyalism by giving mercury with opium at any and every stage of the disease—with the omission of other measures insisted on here as of the first importance. Persons seized with such a fever, who are not seen for ten or twenty hours, those who already suffer from organic lesions, whether of the stomach, liver, or kidneys, whose digestive organs (so essential to the nutrition, growth, and repair of the system) are irritated and inflamed by the use of intoxicating drinks, can not be expected to respond to any treatment, however judicious and appropriate.* In such subjects there is great tendency to irritability of stomach; the purgatives are not retained, the inflammatory stage (fever) runs high, and can not be subdued. Congestion of the internal organs, kidneys, etc., with albuminuria, occurs; black vomit sets in; and uræmic poisoning, with coma, generally closes the scene—during attacks of violent convulsions. Under such conditions, all agents prove nugatory; every effort is necessarily unavailing; and these cases—falsely and illogically reasoned from—bring reproach upon true and legitimate treatment, which can be shown to be serviceable in those who, from the beginning, are not plainly beyond the reach of art.

In my humble judgment, if not the height of folly, it is at least extremely unfair, to decry, or, which is worse, to abandon, a course of management which is eminently

* "There is no hope for the drunkard."—S. H. Dickson.

and strikingly successful in nearly or quite all the cases of the class previously described, because it fails to cure those who have no right to expect a miracle to be worked in their behalf.

Any treatment which is successful is not so by accident, but because it is based upon the requirements and real nature of the disease and throughout does the patient no harm. It is high time for the intelligent members of our profession, particularly if they be at all apathetic, to give up the pleasing idea that the practice of physics is all guess work, in which one artist does full as well as another; that fate and the disease have the control, and that always when a child or man dies, the "physician who heals is death."

THE DIAGNOSTIC VALUE OF STETHOSCOPIC PERCUSSION.

By HENRY SEWALL, Ph. D., M. D., of Denver, Colo.

That it is through the means of physical exploration that medical diagnosis most nearly approaches an exact science is a doctrine which should be fruitful in good results. When a method of physical examination for which masters in medicine have claimed unusual advantages has not come into general use, there must be some strong and pratical reason; and it will be the object of this paper to discover that reason and to urge the value in physical diagnosis of the application of stethoscopic, or, as it is more commonly termed, auscultatory percussion.

In 1840 Drs. G. P. Camman and Alonzo Clark published in the New York Journal of Medicine and Surgery an article entitled "A new mode of ascertaining the dimensions, form, and condition of internal organs by percussion." These authors recommended in carrying out their method a special form of stethoscope made of a single piece of wood, some 6 inches long and an inch in diameter, wedge-shaped at the end to be applied to the body, and broad at the other to fit the ear of the observer. Percussion was carried out by the use of a pleximeter, which was presumably manipulated by an assistant. No work which has been done on this subject bears the evidence of such exact and thoughtful observation as that of Camman and Clark, and their own words form an admirable description of the application and results of the method. They say:

> The observer, suppose, practices first over the heart, listening and percussing on the same region. With each blow of percussion the ear receives a sudden, clear, intense sound of high tone, attended with a degree of impulse even painful, appearing to be immediately under the instrument or produced within it; of short duration and ending with some degree of abruptness. Now find the longest diameter of the heart in contact with the walls of the chest—it may be 3 inches—listen at one extremity and percuss at the other. The sound is the same in character and has lost little of its energy. Percuss at the point where the lung begins to overlay the heart; the sound is instantly modified and mixed, yet its cardiac type is still preserved. Recede still further with percussion, moving by short steps toward the body of the lungs. At a certain point the sound suddenly changes; it loses its intensity and high tone; it is no longer impulsive; it is grave and distant, much more distinctly heard by the open ear than by that applied to the instrument. Again, let the observer in like manner explore the hepatic region. Within short distances the sound is sudden, clear, intense, and immediately under the instrument as before; yet it is less intense, less acute, and more prolonged; it is even semireverberant. As he increases the distance between the points of auscultation and percussion, the sound diminishes more rapidly than over the heart, though it is not entirely lost till percussion passes off from the organ on to another medium. By this mode of exploration the heart and liver become distinguishable through a class of signs which, judging even from the analogous consistency of these organs, would not be supposed to exist.

In 1880 T. A. McBride described in the New York Archives of Medicine a form of binaural stethoscope, composed of solid wooden pieces, by which auscultatory percussion could be conveniently carried out by a single observer. These authors restricted themselves chiefly to the determination of the outlines of the heart and liver. Various other observers, including Roussel, de Mussy,* Zuelzer,† and, according to Weil,‡ even Laennec and Piorry have called attention to the facility with which organs and morbid growths could be differentiated by the stethoscope applied to one side of the chest while percussion was carried out by an assistant on the opposite side. It is extraordinary, as is remarked by McBride, that in the recognized treatises on physical diagnosis the method of auscultatory percussion has received but little attention and no indorsement. Gerhardt§ appears to make no reference to it. Weil speaks slightingly of the method and declares that, as a rule, it offers no special advantages. Loomis‖ and Page¶ mention the procedure on the authority of Camman and Clark; but all these writers refer to the subject as if at second hand, as though they had failed to give it personal investigation. It is therefore not surprising that the active members of the medical profession are, for the most part, either wholly unfamiliar with the practical application of auscultatory percussion, or, in isolated instances, only use the method when some accident of experience has illustrated its value.

The reasons why physical examination by the method of stethoscopic or auscultatory percussion has not come into general use are not far to seek. In the first place, the mechanical impediments to pursuit of the practice have been made burdensome; special forms of stethoscopes, useful only in this particular kind of examination, have been recommended, and usually the services of a skilled assistant required to carry out the observations. In the second place, most descriptions of the findings of stethoscopic percussion enter so fully into the pitch and quality differences of sounds elicited by percussion of various organs, as would manifestly need for their appreciation such a musical cultivation and training in the physics of acoustics as might well discourage the student in medicine from attacking so cumbersome a method.

The writer of this paper has never employed the special instruments described by Camman and Clark or McBride, though it seems probable that the results so obtained must be particularly striking and accurate. But it is the particular design of this essay to show that auscultatory percussion may be advantageously and readily carried out by any single observer who uses a stethoscope; that it is the easiest of all methods of physical examination; that it allows the accurate outlining of organs and deposits impossible to delineate by ordinary means; and that, though capable of extensive development as a means of diagnosis under the acoustic skill of the observer, its limitations are so well marked as to instruct without confusing any ear that can hear.

My own work has been done with the simplest form of binaural stethoscope. The diameter of the bell for applying to the body is but five-eighths of an inch at its mouth, so that it can usually be inserted between the ribs of a patient. It should be remarked, however, contrary to McBride's statement, that by this method it makes little apparent difference whether the mouthpiece of the stethoscope overlaps the ribs or lies wholly between them. I was first impressed with the value of auscultatory percussion on attempting to outline the stomach in the case of an old man, the victim, apparently, of chronic peritonitis, whose intestines were inflated with gas. It was not possible by ordinary percussion to determine the lower border of the stomach. The stethoscope was applied over the upper left border of the epigastrium, and with the pulp of the middle finger of the right hand the abdominal wall was gently tapped, so gently that no sound was audible to the unaided ear, the finger being carried in a straight line from the stethoscope outwards. With each blow of the percussing finger a peculiar shock, with a certain loudness and quality of sound, was conveyd to the ear, gradually decreasing in intensity as the percussing finger receded from the stethoscope until a certain point was reached; then the loudness

*Quoted by McBride.

†Berlin. Klin. Wochschr., 1877.

‡Topograph. Percussion.

§Lehrb. d. Auscult. u. Percussion.

‖Physical Diag.

¶Phys. Diagnosis.

of the tone and the intensity of the shock suddenly diminished; at the same time the quality changed. But it is desired to especially observe that quality differences in sound are to be left to the unconscious appreciation of the examiner, and are not to be depended on in this description. Having marked the spot at which this change in sound occurred, the percussing finger was carried from the stethoscope as a center along other radii, and it was found that the line joining all the points so determined represented the shape of the greater curvature of the stomach. Whenever the outline of an organ was determined in this manner, the result was verified by placing the stethoscope outside its limits and percussing up to it. It frequently occurs that the boundary between two adjacent organs can be more readily determined when auscultation and percussion are performed on one than on the other.

In outlining an extensive body, as the stomach or the liver, it is frequently of advantage to shift the position of the stethoscope along the line of percussion. I have paid more attention to the determination of the outlines of the stomach than of any other organ, because the difficulties to be overcome are in this case, perhaps, on the whole the greatest. In six different autopsies the stomach was outlined in the manner described, the boundaries being marked by inserting pins into the abdominal wall perpendicular to the surface and their position among the viscera afterwards determined by section. In one of these cases the stomach was dilated, reaching far into the right hypochondrium, was wholly covered by an enlarged liver, and the abdominal cavity contained free gas. In another the stomach was contracted into the form of a tube, having a diameter of less than two inches. Nevertheless, the greater curvature of the organ was outlined in each case with almost perfect accuracy. The greatest error occurred in a case in which the border of the stomach lay just under the free margin of the ribs. One pin was found to have been inserted into the stomach three-fourths of an inch from its edge, and another one-half inch below it. It is worthy of remark that, though the stomach and colon are thus usually easily distinguishable, the stomach and duodenum do not appear to be, and my pins sometimes traced the course of the gut for a distance beyond the pylorus. Leichtenstern, quoted by Weil, used a somewhat similar mode of stethoscopic percussion to differentiate the stomach from colon, depending, however, on the pitch and quality of the notes elicited from the two organs. But it is worthy of being insisted on that though the pitch and quality of the percussion note vary with the organ struck, and are at least unconsciously appreciated by the examiner, the most important factors to be noticed when the percussing finger passes from one organ to another are the changes in loudness and shock of the note.

In those not infrequent instances in which the stomach gives to ordinary percussion a dull sound, stethoscopic percussion is at no loss to distinguish the true boundaries. In a recent clinical case in which this stomach dullness made it impossible to outline in the ordinary way the contiguous borders of liver, spleen, and lung, the difficulty disappeared at once under use of the stethoscope.

In another patient in whom the determination of the superficial area of the liver was of great importance, the liver dullness as made out by ordinary percussion extended over only one costal interspace; stethoscopic percussion, however, declared the liver to reach the margin of the ribs, giving the organ a normal volume. The next day, after free purgation, the normal limits of liver dullness were determinable by ordinary percussion. Probably few examiners are capable of outlining with certainty the border between the liver and a superincumbent pleural effusion; by stethoscopic percussion, however, the matter is easily accomplished. In an autopsy on a case of pyo-pneumo thorax it was found possible to define within one-fourth inch the boundaries of both relative and absolute liver dullness, as verified by aspiration of the fluid and by section. To fix the line of division between air and fluid involved, of course, no difficulty. The method offers valuable assistance in determining the level of effusions, pleuritic or abdominal. In the latter case spleen, liver, and kidneys can easily be distinguished. The splenic borders are readily determined when obscured to ordinary percussion by contact with a distended stomach. The cranial sutures can usually be made out by stethoscopic percussion of a bald head or shaven scalp. I have watched in vain for an opportunity to outline, if possible, a superficial brain tumor.

The most interesting application I have found for this method was in a case of pneumonia in which an encysted empyema developed outside the left lower lobe of the lung. The pus touched the chest wall in contact with and parallel to the sixth and seventh ribs throughout their anterior and lateral portions. Neither by ordinary percussion nor by auscultation could the empyema be with certainty distinguished from the adjacent solid lung tissue; but by stethoscopic percussion the cyst was outlined, and my colleague at the county hospital, Dr. John Boice, resected a rib near the lowest point of the area so determined, and declared that no better place of incision could have been chosen. Had the chest been open in the ordinary region the cyst would have been missed altogether. In another case of a large empyema, encysted over the liver, stethoscopic percussion assisted the surgeon by exactly locating the top of the latter organ. The delicacy of this method is nowhere better illustrated than in examination of the normal lungs. When the stethoscope is placed over one lobe and the percussion finger made to travel across to another, there is a distinct change in the sound as the interlobular fissure is passed. Though but little attention has been paid to this part of the subject, I have on two occasions at autopsies inserted long needles with considerable accuracy into the line of the interlobular fissures as determined by auscultation percussion.

The limits of usefulness of the method of stethoscopic percussion as thus described are obvious. While a trained ear by the aid of special instruments, such as devised by Camman and Clark and McBride, could, no doubt, determine the physical condition of the organs investigated, as to their fluid, solid, or gaseous content, the present paper does not treat of this possibility. The sudden diminution in the shock and intensity of an auscultation-percussion note as the body surface is tapped by the finger moved along radii centering in the stethoscope, simply means that the percussion has reached an organ, growth, or effusion outside that over which the stethoscope is placed. This result is altogether to be expected, since vibrations set up in any homogeneous body must suffer great diminution in energy when transmitted to an adjoining body of whatever consistence. Stethoscopic percussion must be used in cojunction with ordinary percussion and with consideration of topographical anatomy. For example, the position of the border of the left lung upon the heart can usually be accurately determined; but whether this line does or does not mark the lower or upper margin of the heart, the sound elicited does not make clear.

In fact, twice, at autopsies, needles were inserted into the margin of the lungs covering the heart with the thought that the lower border of the latter organ had been outlined; further experience corrected such mistakes.

An advantage possessed by the method of stethoscopic percussion deserving of special mention, is the feeling of certainty with which its results usually impress the examiner. In post mortem observations I have been interested to note that when stethoscopic percussion had given distinct evidence of the outlines of organs, no mistake was ever made. On the other hand, whenever an error was committed, the examination itself had been dubious in its indication.

FORMAS DEL IMPALUDISMO Í UN MEDIO DE RECONOCERLAS.

Por el DR. FRANCISCO A. RÍSQUEZ, de Venezuela.

En Venezuela el paludismo reviste formas tan variadas i anómalas, que ofrece grandes dificultades al práctico para reconocerlas.

El corto tiempo de que puedo disponer para esta communicación no me permite describirlas detalladamente. Por tanto, he de limitarme á mencionarlas, señalar las dificultades del diagnóstico é indicar el medio fácil i seguro de que acostumbro valerme para descubrir la existencia del elemento palúdico, convencido de que el diagnóstico diferencial de ese Proteo de la patología intertropical es indispensable, so pena de esponer la vida de los enfermos, ya por falta de quinina, ya por la administración inoportuna de este agente.

Me atendré en esta somera descripción á las cuatro formas clásicas del paludismo, á saber: (I) Formas intermitentes; (II) Formas continuas; (III) Formas perniciosas; (IV) Formas larvadas.

I.

Las formas intermitentes son, en lo general, de tipo cuotidiano, á veces terciano, mui raras veces de otros tipos.

De ordinario pueden reconocerse por sus caracteres clásicos: un acceso brusco que comienza por escalofrío, en los adultos, ó por enfriamiento de los estremos, en los niños; seguido de elevación térmica notable, casi nunca ménos de 40° C., í que termina por un sudor que hace descender la cifra termométrica á ménos de 37° C.; un acceso semejante, con tendencia á repetirse con una periodicidad regular, modificable por la influencia del tratamiento, ó por la persistencia del elemento causal, será siempre de origen palúdico, pués los accesos piohémicos í los de origen tuberculoso, que se le parecen notablemente, pueden reconocerse por la presencia de focos supurados, ó tuberculosos.

Sinembargo, casos se presentan en que el diagnóstico se hace dudoso, ya porque el acceso se prolonga más de 24, 36, í aún 48 horas; ya por alguna anomalía en su evolución; ó bién por la coexistencia en la localidad de algunas otras afecciones febriles, endémicas, ó epidémicas. I necesitándose en todo caso sin tratamiento apropiado, se requiere, como circunstancia indispensable, un diagnóstico exacto í precoz.

II.

Las formas continuas afectan dos variedades: (*a*) la gastro-hepática; (*b*) la tifoidea.

La primera (*a*) da la fiebre biliosa simple, caracterizada por fiebre moderada, lengua saburosa, vómitos, sensibilidad epigástrica í á veces diarrea. En un grado mayor de la intoxicación sobreviene la ictericia, la albuminuria, las hemorragias gástricas, intestinales ó urinarias, los vómitos negros, la adinamia, constituyendo las modalidades de fiebre biliosa grave, fiebre ictero-hemorrágica, fiebre hematúrica.

En la biliosa simple, el diagnóstico, aún siendo dudoso, no es urgente, porque se trata de una afección que se cura pronta, fácil i aún espontáneamente.

Pero la biliosa grave se parece tanto á la fiebre amarilla, algunas veces reinante como endemia, ó epidemia, á la par del paludismo, que la duda subsiste aún después de observados varios casos.

Ahora bién; la necesidad de la distinción entre estas dos pirexias es tanto mayor cuanto que el tratamiento es enteramente distinto en una í otra, pués la quinina, que en la primera sería la tabla de salvación, en la segunda sería inutil, si nó perjudicial.

Ese diagnóstico diferencial ha sido fuente de largas discusiones, de las cuales todavía no se ha deducido un carácter discriminativo seguro; í fué justamente en vista de esa oscuridad, que me propuse buscar un medio fácil é inequívoco para declarar la existencia, ó la ausencia del paludismo, en casos al parecer enteramente iguales.

La segunda variedad (*b*) constituye la tifoidea palúdica, ó tifo-malaria, pirexia híbrida que puede ocurrir, ya porque una paludosa desarrolle una apariencia sintomática que semeja el estado tifoideo (yo las llamaría pseudo-tifo-maláricas); ya porque en un impaludad se presenta el tifus abdominal; ya, en fin, porque el germen malárico se determina en el curso de una tifoidea. De todos modos, la semejanza entre la tifoidea pura í la tifo-malaria es tan estrecha, que la sola observación de los sintomas í marcha es insuficiente para la oportuna discriminación í la necesidad de establecerla de un modo cierto es tán urgente como en la primera de estas dos variedades de formas continuas.

III.

Las formas perniciosas propiamente dichas, llamando así aquellas en que el germen palúdico exagera uno de los estadios del acceso, ó provoca determinaciones sobre algún órgano ó aparato, que según las oscilaciones de la fiebre periódica, son por lo general fáciles de reconocer, sobre todo si han precedido algunos accesos intermitentes, simples ó perniciosos. Así, pueden presentarse sudores, algides, congestiones, hemorragias, estados comatosos, diarreicos, convulsivos, ó paralíticos, que desaparecen í reaparecen con el acceso febril, constituyendo otras tantas variedades de fiebres perniciosas.

Pero no siempre se podrá esperar tranquilamente la evolución de un accidente pernicioso, ó su repetición, para diagnosticarlo, sabido que toda fiebre perniciosa es grave í debe tratarse con el específico desde su aparición; de donde la urgencia de un diagnóstico seguro í precoz.

En la variedad de perniciosas á las cuales reservo yo el nombre de complicadas, í cuyo carácter estriba en una determinación sobre un órgano, bastante profunda para persistir en los intérvalas de apirexia, como si fuera una enfermedad aparte, el diagnóstico se hace más difícil. Pero es urgente precisarlo, á fin de dedicarse á combatir al mismo tiempo la afección principal, con el específico quinina, í la secundaria con el plan especialmente dirigido á ella. En esta variedad ocurre de ordinario que la complicación esconde el elemento causal, í descuidando el combatirlo, se dificulta í aún imposibilita la curación.

IV.

Las formas paludosas larvadas son de dos variedades:

(*a*) Unas veces están constituidas por un accidente, como una neuralgia, una congestión, una hemorragia, una parálisis, etc., que, acompañadas ó nó de elevación térmica, pueden reconocerse por la prontitud con que desaparecen í la periodicidad con que se renuevan. Sinembargo, en el primer acceso larvado, á veces en el segundo í hasta en el tercero, puede desconocerse su origen palúdico, í no siempre podrán repararse las consecuencias de semejante error.

(*b*) Otras veces, el accidente larvado es una enfermedad en cuya marcha ningún carácter revela su naturaleza paludosa, viéndose entonces resistir el mal al tratamiento, en tanto que no se reconoce la verdadera causa í se aplica el específico quinina.

De esta clase he visto colerinas, diarreas, disenterías, hematemesis, pulmonías, pleuresías, bronquitis, pseudo-tuberculosis, hemoptisis, meningitis, parálisis, convulsiones, í muchas otras manifestaciones mórbidas que, apareciendo como entidades protopáticas, no son sino accidentes palúdicas que no ceden sino á la quinina.

Algunos prácticos niegan la posibilidad de que el paludismo pueda originar ciertas afecciones, es decir, que haya, por ejemplo, disenterías, pulmonías, etc., palúdicas. Pero es un hecho de diaria observación que un impaludado presente, como única manifestación del infectivo, una disentería, una pulmonía, una orquitis, etc., í que es inútil tratarlas por los medios ordinarios empleados contra ellas, pués no ceden sino al antimalárico. Como se explique el hecho, no es de este lugar; pero me atrevo á creer que las embolías pigmentarias í las aglomeraciones de parásitos en los vasos sanguíneos, que no se destruyen sino con la quinina, pueden esplicar perfectamente esas complicaciones.

Es en estas formas larvadas de la segunda variedad, principalmente, que el diagnóstico se hace á veces imposible, dando lugar á vacilaciones, í á que, ó se deje de administrar oportunamente el específico salvador, ó al revés, que tomando por palúdicas afecciones que no lo son, se agrave la enfermedad por la administración inoportuna de la quinina.

V.

Se ve, según lo dicho, que por los solos síntomas del paludismo, en las formas larvadas de la segunda variedad, lo mismo que en el primero í segundo accesos de la variedad precedente, el diagnóstico es casi siempre imposible; que en las perniciosas, sobre todo en las complicados, es por lo regular difícil; que en las continuas es aún dudoso en ocasiones, í en las intermitentes, á veces inseguro ó tardio. I sinembargo, repito: la exactitud de ese diagnóstico es necesaria, í hasta urgente en muchos casos: la quinina, como piedra de toque, es muchas veces útil, í aún he observado que desenmascara las formas larvadas, apareciendo bajo su influencia la fiebre al desaparecer el accidente larvado. Pero este es un medio de efecto tardio, í no siempre seguro, por lo cual se hace necesario un medio inequívoco í suficientemente sencillo para hacerlo práctico, í ese medio lo suministra el examen de la sangre.

El descubrimiento de Laverán ha dado á la ciencia una prueba cierta para reconocer la malaria; pero la investigación de los hematozoarios de Laverán, como el mismo lo reconoce, requiere un conocimiento de la técnica microscópica, una habilidad para la observación í un tiempo para los detalles de manipulación, que no están al alcance de todos los prácticos.

De esas dificultades ha nacido el medio que acostumbro í propongo, el cual no es nuevo en su fundamento, aunque si lo es en su aplicación á la clínica.

Sábese hoi que la intoxicación palúdica produce siempre la melanemia, í que esta es una manifestación esclusiva del paludismo; luego la presencia del pigmento negro en la sangre es un carácter patognomónico del impaludismo.

Si en un sugeto que se sospeche impaludado, se toma una gota de sangre, por la picadura de un dedo, í se estiende en capa delgada entre dos laminillas de vidrio, bastará un pequeño aumento de 300 á 500 diámetros, para encontrar en medio del plasma las masas negras irregulares de pigmento. Si alguna duda quedare respecto á la naturaleza de alguna masa negra que se hallase, bastaría agregar una gota de ácido sulfúrico concentrado que, destruyendo todos los glóbulos í las masas de hemoglobina, dejaría intacto el pigmento.

Como se ve, el procedimiento es sencillo: el práctico puede llevar en su bolsillo algunas láminas de vidrio, tomar la sangre á la cabecera del enfermo, como queda dicho, í guardarla para el examen, que no exige más de cinco minutos, ni grandes aumentos, ni los procedimientos delicados de coloración requeridos por todo examen bacteriológico. Es más fácil í breve que el examen clínico de una orina.

Las observaciones hechas en los enfermos de la práctica civil í en los del Hospital Militar de Carácas, donde es ya un examen corriente entre los estudiantes, me han dado los siguientes resultados:

(1) En los accesos intermitentes, en las fiebres paludosas continuas, en los accidentes perniciosos, en las formas larvadas í en la caquexia palúdica, se encuentra siempre pigmento;

(2) La abundancia í magnitud de las masas melánicas guardan relación con el grado de la intoxicación palúdica;

(3) El pigmento disminuye en los intérvalos de los accesos; pero no desaparece sino cuando queda cortada la manifestación palúdica;

(4) En las demás afecciones no palúdicas no se encuentra pigmento; á menos que el individuo afectado de otra enfermedad sufra al mismo tiempo de paludismo.

De todos modos, la presencia de la melanemia indica siempre paludismo í reclama el empleo de la quinina, sea el paludismo la enfermedad única, ó sea concomitante de aquella.

A mi modo de ver, pues, en las localidades maláricas el médico debe estar provisto de vidrios porta-objetos, í siempe que sospeche intervención palúdica, debe examinar la sangre como el medio más sencillo, rápido í al alcance de todos para diagnosticar un accidente del paludismo í precisar con toda certidumbre la indicación del específico quinina.

La cuestión es de vida ó muerte en ciertas fiebres continuas, accidentes perniciosos í formas larvadas: sólo puede curarlas la quinina osadamente administrata; mientras que si se toma por manifestación paludosa lo que no es, la quinina administrada por simple sospecha puede causar la muerte del enfermo.

AN OUTBREAK OF TYPHOID FEVER PRESENTING UNUSUAL FEATURES.

By WM. C. DABNEY, M. D.,
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The atypical forms of typhoid fever during the past few years have received much attention, and doubt has frequently been expressed whether atypical cases should be considered typhoid at all. A singularly favorable opportunity for studying cases of this character was furnished by an outbreak at the University of Virginia in the winter and spring of the present year (1893), and I propose to give a brief account of the outbreak in this paper.

In order to understand the origin of these cases, it will be necessary to state briefly the arrangement of the lodging rooms and eating rooms at the institution.

The buildings of the university used as dormitories by the students are scattered over a space of 10 or 12 acres, and there are four hotels, or "mess halls," at which the students get their meals. A student can select his own boarding house, so that each hotel has "table boarders" from all parts of the university grounds.

At the time of the outbreak—on February 17—there were about 530 students at the university. Of this number, about 350 roomed in the university buildings and took their meals in the university hotels.

There had been no typhoid fever at the institution for many months, nor were there any cases in the vicinity except one, of which I shall speak later.

On the 19th of February I was consulted at my office by Mr. D. D. H., a law student, who complained of loss of appetite, debility, and headache. His temperature was between 101° and 102°. Influenza was prevailing at the time, and I thought it probable that he was suffering with an attack of that disease, but a few days later he sent for me, and I found him with a well-marked attack of typhoid fever, which pursued a mild but typical course and ended in recovery.

A few days later I saw Mr. K., an academic student, who had a severe headache, a temperature of 104°, aching in his limbs, and constipation. He had been sick only twenty-four hours. He was given salophen in six-grain doses every four hours, and the next day he went to his home in a neighboring city, where, as I was informed, he had a mild attack of typhoid fever.

These two young men lived in different parts of the university, but took their meals at the same boarding house and sat at adjacent tables.

Perhaps, before going further, I should mention that the water supply of the university is perfect in all respects, and the system of sewerage is excellent.

Just after the occurrence of the second suspicious case, I found that there was a negro man—a waiter—ill with typhoid fever in the basement of the hotel where these young men got their meals. On further inquiry, I found he had been ill for about four weeks, and that another waiter, who lived outside of the university grounds, also had the disease. I did not see either of these cases, but was informed by the physician who attended them that they were typical cases of typhoid, one being quite severe in character.

Between this time and the 1st of April there were ten additional cases, making fourteen in all, and these patients lived in different parts of the university grounds, some being a quarter of a mile apart, but all took their meals at the same hotel.

Immediately after the occurrence of the second case and the discovery of the ill man in the basement of the boarding house, the dining room was closed and a thorough inspection of the building and premises was made by the health committee, consisting of three physicians and two engineers. Nothing was found about the house to account for the sickness, and an examination was then made of the milk supply. It was found that a part of the milk supply of this boarding house came from the dairy of the keeper of the house. An inspection showed that the dairy was situated some distance from the university and on the banks of a creek, into which one of the main university sewers opened and at a point above the dairy. It was further found, by questioning the milkman, that he got water from a point about 20 yards below the opening of the sewer, to wash the cows' udders before milking. Besides this, there had been a case of typhoid fever on this creek a mile above the dairy during the previous autumn, and the discharges from this patient—an ignorant negro—were thrown upon the ground without disinfection.

Before proceeding to consider the peculiar features of some of these cases, I wish to emphasize certain points that I have already mentioned:

(1) There had been no typhoid fever in or around the university for several months, so far as I could learn, except one case in the vicinity, from which infection was practically impossible.

(2) Between the middle of January and the 1st of April there occurred fourteen cases of continued fever among persons living or employed in the university grounds.

(3) The persons who had this continued fever had rooms in many cases widely separated from each other, but all took their meals at the same hotel.

(4) The water supply of this hotel was the same as that of the other hotels and of the other parts of the university, and the sanitary condition of the building was good.

(5) A part of the milk supply was obtained from cows whose udders had been washed with water contaminated by sewage and probably infected with typhoid-fever germs. It was in evidence also that at least five of the fourteen persons used milk at every meal. Probably there were others who did so, but I could only get definite information as to five.

Of the fourteen cases of this continued fever ten were under my professional care and four under the care of other physicians, though I saw one of these four cases at the commencement of the attack and another near convalescence; several of my cases were seen also by my colleagues, Drs. Towles and Barringer, of the University of Virginia. Of the fourteen cases one was in a child 12 years old, the daughter of the hotel keeper; the others were in young men between the ages of 18 and 25 years.

Of the ten cases under my immediate care there were but three that pursued anything like the typical typhoid-fever course. The first patient, Mr. D. D. H., was taken sick on February 17, and his evening temperature was normal for the first time on March 5. His temperature during this time ranged between 101° and 103°. The eruption in this case was well marked. The bowels usually moved spontaneously, but there was at no time any diarrhea. The only complication was an inability to pass urine, which for a week necessitated the use of the catheter.

Mr. G. was taken sick on March 4 with nausea and vomiting. His temperature ranged from 101° to 105° till March 25, when he had a profuse hemorrhage from the bowels, with extreme prostration; the hemorrhages recurred at intervals until the 30th; there were no more hemorrhages after that time, but the stools were liquid, very offensive, and passed involuntarily. On April 5 the morning temperature was 101° and the evening temperature 103°, and by the 10th the patient was free from fever, but there was still some delirium. In two or three days, however, this passed away, and he seemed to be progressing very favorably for a week, when he was suddenly taken with violent convulsions, which recurred in rapid succession till his death, twelve hours later. No autopsy could be obtained.

There was but one other fairly well-marked case of typhoid fever among my ten cases. Mr. W. was taken sick on March 14, but I did not see him till the 19th; his temperature then was 104·5°; his pulse was rapid and his skin wet with sweat; he had severe headache, but there was no other disturbance of any kind. His evening temperature did not fall to the normal for four weeks, and ranged during the attack between 103° and 99°. A peculiarity about this case was that the temperature was higher during the first week than at any subsequent time. His bowels were constipated throughout and had to be moved by enemata. There was no eruption in this case, nor was there any tympanites, and though I have placed it in the list of well-marked cases, it was far from typical.

The seven remaining cases presented more or less atypical features, and I shall consider the different symptoms in order to show their atypical course:

(1) The onset was gradual in six cases and sudden in one, commencing in this latter with a chill.

(2) The duration was six days in one case, eleven days in another, fifteen days in a third, eighteen days in a fourth, and over four weeks in the remaining cases.

(3) The temperature in five cases was higher during the first three days than at any subsequent time; the evening temperature on the day that I was called—the first or second day of sickness—being 103·7°, 102·8°, 102°, 101·8°, and 102·6° in the respective cases. One of these cases lasted over four weeks. In the remaining cases the temperature was very variable and the attack in each lasted over four weeks. For example, Mr. A. C. I., a medical student, had a temperature of 102° on the morning of April 1, 103·4° in the evening; on April 3, a. m. 100·6°, p. m. 103·4; April 9, a. m. 99·6°, p. m. 103·5°; these striking variations were entirely irrespective of treatment and were marked throughout the whole attack; this was the only case, except the fatal one already mentioned, in which there was diarrhea.

The following case presents somewhat similar variations of temperature: Mr. D.P. was taken sick on—

Date.	Temperature.	
	A. M.	P. M.
	°	°
March 26	100·5	103
April 1	100·6	103·2
April 3	100·2	101·6
April 9	100·6	99·1
April 11	98·2	99·4
April 15	99	99·9
April 17	99	102

Neither of these patients had ever had malaria in any form, nor did they live in malarial districts, one being from Highland County, Va., the other from Winchester, Ky.

(4) The pulse presented no features of especial interest; it was rarely over 100, except in two cases—the one in which there was hemorrhage from the bowels, and in another, that of Mr. D. P., which ran a mild but tedious course.

(5) *The digestive symptoms.*—There was loss of appetite in all cases after the first week, but during the first week two of the patients complained of being very hungry. Nausea and vomiting were present for a short time in two or three of the cases, but these symptoms were not marked. Diarrhea occurred in only two cases—that

of Mr. G., in which there was hemorrhage from the bowels, and that of Mr. A. C. I.; in both it was very obstinate and troublesome. In all the other cases constipation was a marked symptom. Iliac tenderness was present in five cases, and tympanites in two.

(6) The eruption was present in only two of the ten cases under my care.

(7) The urinary symptoms were not marked. In one case there was retention of urine, requiring the use of the catheter. Ehrlich's test (for diagnostic purposes) was not employed in any of the cases, as previous experience had satisfied me that it was of little value.

(8) Weakness, emaciation, and anemia were marked symptoms in the later stages of all the cases.

I have thought it well to put the history of this outbreak of fever on record for the following reasons:

(1) It furnished a singularly favorable opportunity for studying an unusual source of infection.

(2) In an outbreak—of which the cause could be determined with reasonable certainty—occurring at a time when no form of continued fever was prevailing in the community, we find a number of persons infected from the same source, some of whom presented the typical features of typhoid fever, while others had a fever which would never have been classed with typhoid but for the surrounding circumstances.

It is of course conceivable that the cases that seem to me to be atypical typhoid fever were really of a different character, but in view of the facts that all originated from the same source and all grades of severity were observed, such a conclusion seems to me scarcely tenable.

REST AS A THERAPEUTIC AGENT IN CHRONIC PULMONARY TUBERCULOSIS.

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It is not my purpose to introduce this subject with a review of the opinions held by the profession on the value of rest as a therapeutic agent in general, nor even to cite many of the contributions of recent years as to its utility in pulmonary tuberculosis; and I am induced to bring it to your attention only because of a manifest tendency to overestimate its value and to recommend it as a general means for a cure.

In a recent paper by Dr. Mays, of Philadelphia, read before the American Climatological Association, May 25, 1893, this tendency is particularly manifest, and in it the author compares the condition of the phthisical patient to nutritive bankruptcy, due to excessive expenditure induced by wasting disease, and on that account he advocates rest in bed for prolonged periods as a means for limiting excessive expenditure and for storing up new capital, implying that if the nutrition of the patient be thus restored the disease would then be cured.

Regrettable as it is, this simple formula does not act so specifically as we might wish it to do, and while I insist upon rest under certain complications, in the course of phthisis, as highly essential, I can see in it only an aid toward complying with indications which may or may not be present in a given case. I therefore object to the recommendation of rest just because a patient is a consumptive, and proceed to consider more particularly its indications and limitations as I have found them in the course of my experience with many hundreds of phthisical patients.

I presume that we are all agreed that rest in bed for prolonged periods is not conducive to the best nutrition of the healthy organism; if we resort to it nevertheless, we find our subjects soon to lose in appetite, they take and assimilate less food, their muscles become soft and diminish in size, and after a time anæmia and loss of flesh and strength are apt to result. If we attempt to counteract these effects by forced feeding, we find that larger quantities of solid food than the patient's appetite demands, soon lead to gastrointestinal complications and to loathing of the food offered, and that in most cases it is not appropriated even if we can induce the subject to take it. Thus we soon become restricted to a more or less liquid diet, and considerable quantities, even of it, are apt to cause derangements of the digestive organs.

To keep such a healthy subject in good condition under prolonged rest in bed we find it necessary to substitute massage or electricity, or both. Such a subject may then store up fat, which is, however, not always synonymous with improved nutrition.

All this is equally true in chronic pulmonary tuberculosis, as long as no complications have occurred by which the tubercular deposit is caused to break down and to suppurate; in other words, as long as the patient is in the so-called early stage.

Such patient has either acquired or inherited conditions which temporarily or permanently left their stamp upon his constitution and resisting power, and which under the existing mode of life of the individual frequently induce defective nutrition, which makes the tubercular infection possible, or causes it to extend, and these same conditions, as well as the tubercular involvement of the lung, limit the amount of physical and mental labor that can be taken with advantage, but absolute rest for prolonged periods is not only not indicated; on the contrary, at this stage of the disease, an out-of-door life with proper exercise, limited for the individual to fall short of the production of sensible fatigue, is highly essential for the improvement of nutrition, and as an aid to an ultimate cure.

I would therefore be understood that in my experience the chronic *"purely tubercular"* affection of the lung is not responsible for the nutritive deficiency, but that the latter precedes the manifestation of the tubercular disease and that the subsequent wasting and fever are not caused by the tuberculosis directly, but are complications which may or may not arise in its course.

In some of the complications which occur in the course of the disease, rest in bed is essential until their removal is accomplished, and among these I may particularly mention pleurisy, hemorrhage, and septic fever. With an acute pleurisy or a pulmonary hemorrhage the patient seeks his bed voluntarily; not so with the septic fever, especially when it is mild or intermittent. Indeed, many practitioners allow their patients to be about and advise exercise, regardless of its presence.

The absorption into the circulation of noxious products which induce the septic fever can only occur when certain other pathogenic germs have gained entrance to the tubercular deposit, causing its softening and breaking down, and without such additional infection tubercular deposits do not undergo suppurative and destructive changes; on the contrary, they remain quiescent for indefinite periods and tend to the development of connective tissue proliferation and fibrosis, which lead to encapsuling and atrophy of the tubercular tissue and thus to a relative cure of the disease.

If now prolonged rest in bed could prevent the additional infection spoken of, or if it could hasten or favor the connective tissue changes and encapsuling of the tubercular deposit before septic infection has occurred, then the treatment could be recommended in the early uncomplicated stages of the disease also; that is to say, for the tubercular disease itself. That it can not do the former I need only mention, and since we can only with difficulty keep such a patient at his present nutrition under absolute rest, it remains only to inquire how and to what degree it may be useful to aid the patient in overcoming septic complications which, when once established, control the entire situation.

In the presence of sepsis, no direct treatment for the tubercular disease can be of avail, and to give such a patient tuberculin, creosote or other supposed specific remedies against tuberculosis, I consider not only useless but as injurious, and as diverting our efforts from the real issue.

Rest in bed becomes now imperative, not because of the tuberculosis, but because of the complicating septic fever, which damages the heart, induces degenerative processes in its muscular fibers, and causes other deleterious effects upon the organism, all tending to wasting and exhaustion of the organism.

Even before the septic fever occurs, the heart of the patient is called upon for extra labor on account of mechanical obstruction in the lung to the free flow of blood from the right to the left ventricle, and on that account the amount of physical and mental labor needs always to be regulated and often materially restricted from the very beginning of the disease. I have heretofore called attention to this subject in a paper presented to the American Climatological Association, entitled "The Detrimental Effects of Over-Exertion in Pulmonary Tuberculosis," and published in the transactions of the association for 1890.

In the presence of such complicating fever, the heart is called upon for additional labor still, and if its contractile power is steadily diminished by the fever, it is not difficult to see that the conditions for passive congestion, hemorrhage, and defective nutrition of the involved lung tissue and the progressive breaking down of the tubercular deposits are highly favored.

The indication under such circumstances is to secure a good heart action and to preserve it by lightening the heart's labor. For the former purpose we nourish our patient as well as possible, and use stimulants whenever they appear necessary. For the latter, rest in the recumbent position is one of our most important means, and it thus becomes an indirect aid to nutrition, not only in septic fever engrafted upon tuberculosis, but in all prolonged febrile states.

I find from a large practical experience that the more severe septic or so-called hectic fevers of pulmonary tuberculosis can not be successfully managed without rest in the recumbent position, and that even slighter degrees are more quickly controlled by such rest; yet in severer cases we can not depend upon rest alone, although without any other aid we note its favorable influence upon the pulse as well as upon the local processes, and observe the cough and expectoration to diminish and the fever to become less intense; nevertheless it is not often entirely controlled, and the patient continues to go down only at a slower pace.

Fortunately we can under such a contingency bring to our aid other very useful remedies, of which deserve particular mention hydropathic applications and the subcutaneous use of nitrate of strychnine; and there are few severe cases of septic fever in connection with tuberculosis in which we are not obliged to resort to one or both to help us through the critical period.

Even so simple an application as an ice-bag over the region of the heart may turn the scale in the right direction, and with the combined therapeutic resources at our command, when wisely chosen and applied, we may bring a severe septic process to an arrestment.

During this enforced rest the application of massage and the exposure of the patient to pure air and sunlight must be carefully attended to; when improvement is well under way and the temperature remains normal, or nearly so, the patient may be permitted to sit up and walk out of doors, beginning with a quarter of an hour, and increasing the time slowly as the general condition and strength will permit.

These liberties must be controlled by their effect upon the circulation, and when unfavorable must be abandoned, to be resumed at a later date. Only when the pulse remains good and is not materially increased in frequency beyond the degree observed in comparative health, and after the temperature has for several weeks remained at or near the normal, can we think of allowing light exercise, and then its employment within the limits of fatigue will be found to aid still more rapid general improvement in the advanced, the same as in the early stage cases.

ON THE OCCURRENCE OF A FORM OF CHRONIC BRIGHT'S DISEASE, OTHER THAN TYPICAL FIBROID KIDNEY, WITHOUT ALBUMINURIA.

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Since Bright first directed attention to the relationship existing between albuminuria and diseases of the kidney, the presence in the urine of serum-albumin in quantity detectable by time-honored tests has properly been accepted to indicate renal derangement. So necessary is this association generally regarded that many otherwise acute clinicians, in pinning faith to the presence of albumin as an infallible guide to the recognition of nephritis, are not infrequently led into the error of interpreting this fact into the necessity of excluding kidney disease with the absence of albumin; for not infrequently do we encounter in published reports of cases, otherwise admirably presented, in which a diagnosis may hinge upon the renal condition, the conclusion stated as if none other were possible, that the kidneys are sound, the urine being free from albumin. Search may also have been made for casts, which, unencountered, naturally strengthens the opinion previously reached.* In such cases no cognizance is taken of often a more important examination, the determination of the nitrogenous output; or of the highly momentous fact, apparently little known, that albumin may be totally absent from the urine throughout the course of chronic Bright's disease, and casts may be only detectable after much search, yet the case progresses steadily to a fatal termination, the remote ailment perhaps never being suspected, either *ante* or *post mortem:* the determining cause of death, a pneumonia or an inflammation of a serous membrane, alone being recognized. It is, indeed, not improbable that chronic nephritis without associated albuminuria is of no uncommon occurrence. That it exists undetected and untreated there is no doubt. It thus must increase to some degree the mortality record of other ailments; death, in these cases, often ensuing less from total renal failure than from visceral or serous complications induced by long-continued partial renal inadequacy.

My attention was first directed especially to this subject by encountering the first two of the cases herein recorded. One of these, with certain symptoms suggestive of decided renal inadequacy, but without those that are usually regarded as typical of chronic Bright's disease, had consulted several clinicians of note in this city, and Charcot in Paris, as to his ailment, which he suspected to be renal because of the small amount of urinary solids habitually excreted; but, because of nondetection of albumin and casts, the case had been dismissed by these as one of hypochondriasis or of neurasthenia. As laboratory work brought me not infrequently into contact with this case, several cursory surveys of the symptoms, subjective and objective, caused me to suspect a latent kidney ailment, despite the negative opinions previously given. I then instituted a careful examination of the urine for sometime. A brother of this patient, with somewhat similar symptoms, who also came under observation, was believed on examination to be affected similarly. Encountering these cases suggested a search for others. A number of these were so soon collected as to indicate that the combination of chronic Bright's disease without albuminuria was of no unusual occurrence, and that I had probably overlooked many instances in the past. It likewise clearly showed that similar cases were undoubtedly commonly unrecognized.

*In instances such as this it is not improbable that a microscopic examination is often not thorough, the absence of albumin prejudging the observer against more than a perfunctory search; for in any condition with nonalbuminous urine, or urine containing but minute traces of albumin, detectable only by most delicate tests, renal epithelia or casts can not be numerous. Their discovery often, then, necessitates painstaking search, even under such favorable conditions as the use of the centrifugal machine, to obtain concentration of sediment and intelligent employment of a low-power lens as a searcher.

Not that the occurrence of this supposed unusual condition is absolutely unknown, or, in connection with symptoms of typical granular or cirrhotic kidney, has passed altogether undetected; for more than four decades ago Wilks,* of Guy's Hospital, the birthplace of our knowledge of albuminuria and of Bright's disease, in first describing the two principal forms of chronic nephritis,† to which description all later English writers have more or less adhered, also pointed out that the granular kidney‡ could occur and run its course quite symptomless, albuminuria sometimes being absent. Since that time, however, though the occasional occurrence of typical fibroid kidney without albuminuria has not been forgotten, the likelihood of its existence has only been recognized by a few. No text-books on general medicine especially notice the occurrence, and few special treatises on renal disease more than barely mention what Wilks observed. Some of our leading authorities fail even to lay stress upon the occasional absence of albumin in typical granular kidney. These not only overlook the class of cases I now report, but neglect to note that, even with classical symptoms of fibroid kidney, such as pale, plentiful urine, fibroid vessels, and hypertrophied heart, occurring at middle life or in the aged, chronic Bright's disease may occur and run its course without albuminuria.

Bartels,§ it is true, cites a case carefully studied in the five weeks preceding death, in which albumin was totally absent from the urine except during a few days in which high fever occurred, due to vaccination. Though with symptoms suggestive of renal fibrosis, because of the absence of albumin, an antemortem diagnosis was not made. In narrating this case Bartels indicates his idea of the infrequency with which similar cases occur, though he states that he has repeatedly witnessed the temporary absence of albumin in chronic Bright's disease.

Jaksch, whose work on laboratory and clinical medical diagnosis is our accepted authority, totally fails to recognize these cases. He speaks of periods of temporary absence of albumin in granular kidney, but states that an examination of the total twenty-four hours' urine will nearly always reveal its presence, which has not been discovered in a single specimen passed perhaps in the forenoon. Even the late Fagge, under whose eye in Guy's Hospital cases of typical arterio-capillary fibroid kidney, reported by Mahomed, were studied, in which albuminuria was absent or was but an inconspicuous feature, lays little emphasis upon such a combination in his splendid classic on medicine. Our own writers on general medicine remark still less the occasional absence of albumin in these cases. The most recent and most widely read text-book is that of Osler, a name occupying a preeminent position in medical science. This work, because of its inherent worth, embodying the results of years of faithful observation and patient research, and because of the deserved wide fame of the author, is easily first of its kind. Yet Osler, too, here fails to assist in the recognition of the class of cases in question. He speaks only in this relation of that variety of granular kidney, such as was described by Wilks, in which polyuria is common. In this he merely states that traces of albumin are found, but may be absent at times, particularly in the early morning urine.

But two writers on diseases of the kidney, and these Americans—Millard and

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* *See* Guy's Hospital Reports, Vol. VII, second series.

† The term nephritis is not used here in a strict pathological sense, but refers equally to true inflammation of the renal structure as to a condition which is actually *noninflammatory*, but of the nature of a degeneration. Sir William Gull pointed out, in describing the arterio-capillary fibroid kidney (American Journal Medical Sciences, 1886, Vol. XCI, p. 407) what previously, I believe, had been recognized by others, that the renal changes are not really of an inflammatory nature, so that the term *nephritis* is strictly not justified here. There is no acute stage; no acute hyperæmia; no diapedesis of leucocytes and blood cells, characteristic of ordinary inflammation; and no local or general symptoms indicating nephritis.

‡ Looked upon Wilks as an indication of senility, with its associated tortuous thickened radials, characteristic pale abundant urine, and tendency toward uræmia or apoplexy.

§ V. Ziemssen's Cyclopædia, Vol. XV, p. 440.

Purdy*—have especially directed attention to the occurrence of chronic nephritis without albuminuria, referring, however, only to the usually described variety of granular kidney with typical symptoms. Millard relates two cases in which albumin, though frequently examined for, was at no time found. One of these was shown *post-mortem* to be interstitial nephritis, with a limited glomerulo-nephritis. The second was a probable case of renal fibrosis. Death did not occur while this case was under observation. The general health was good. Casts were repeatedly found in the urine, though albumin remained absent.

Both Millard and Purdy refer to the important papers by Mahomed†, in which are analyzed a number of cases of granular kidney, under observation in Guy's Hospital during 1879 and 1880, in which albumin was more or less constantly absent from the urine in the period in which observations were made. Most of these cases were in the degenerate period of life, with fibroid arteries and hypertrophied heart, but were without special symptoms referable to the kidney.

Though a strikingly interesting series of cases, and ably reported by Mahomed, his description of at least a minority of them‡ does not make it clear that renal disease was a certain accompaniment of the symptoms described—referable in the main to other organs. In this minority, no account of microscopic examination of urine is given, and in a number of cases the urine is described as normal. Estimations of nitrogenous excretion in any save a few, and in these to but an imperfect extent, were also not attempted. In a few of those in which death occurred while under observation and a necropsy was obtained, the kidneys were also stated to be healthy, though the cases were regarded by Dr. Mahomed as those of chronic Bright's disease, as he understood the term.§

* The former in his work on Bright's disease; the latter in a special paper, "The pre-albuminuric stage of chronic Bright's disease," Chicago Medical Journal and Examiner, May, 1885. Purdy refers only to the typical arterio-capillary fibroid kidney of Sir William Gull. Curiously, in his work on Bright's disease, published a year subsequent to the appearance of this paper, Purdy barely states, in discussing cirrhosis of the kidney, that "albúmin may be temporarily absent in the early stage, but as a rule it will be found, if it is sought for over a sufficient length of time."

† "The clinical aspect of chronic Bright's disease," Guy's Hospital Reports, 1879, Vol. XXIV. "Chronic Bright's disease without albuminuria," Guy's Hospital Reports, 1880-'81, Vol. XXV.

It is necessary here to state that in reviewing Mahomed's statistics, Dr. Purdy places the figure of nonalbuminuric cases among these as too high. He also assembles with these, I think improperly, 76 cases out of a total of 98 in which a diagnosis of Bright's disease was not made, observed at the Birmingham General Hospital, reported from post-mortem records by Dr. Saundby, in a paper "On the occurrence of dropsy in granular kidney." Though it is not stated by Saundby that albumin was searched for in the urine of the 76, Dr. Purdy thinks that it may be fairly assumed that such examinations were made, since the cases were under observations in hospital, and perhaps subjest to the usual rule for daily examination of urine. But as many of these were cases of hernia, bronchitis, fractures, amputations, burns, ulcers, skin diseases, and the like, in which a urine examination could not have seemed especially indicated, and as no account of such examination appears in Saundby's report it is unfair to assume that albumin was habitually or even occasionally absent. [Since writing the above note, Dr. Saundby has kindly informed me by letter that Dr. Purdy is wrong in his assumption; that so far as he (Dr. S.) knows, no examinations for albumin were made; the cases came from anybody, and that he knew nothing of their clinical history. Dr. Saundby also tells me that he does not think albuminuria often absent in Bright's disease.] In the first report of Mahomed's, on 100 cases of granular kidney observed in Guy's Hospital, in which death occurred in 26 directly from kidney disease, it is stated by Mahomed that albumin was absent from the urine, not in all, but in a large proportion (exact number not stated), so that Dr. Purdy's figure of 74 per cent of nonalbuminous urine in 259 cases of granular kidney (Mahomed's and Saundby's) is not a little excessive. Apart from this, as I have elsewhere stated in this paper, it is not certain that a number of Mahomed's cases, though perhaps rightly styled by him cases of chronic Bright's disease, as he understood this term, were in reality suffering from actual renal disease.

‡ Such as cases 16, 17, 18, 19, 22, 23, 24, 25, 27, 30, 37, 42, , 43, 47, 48, 52, 53, and 56.

§ As a result of certain considerations, which Dr. Mahomed thought supported his view, he recognized three stages of chronic Bright's disease. Of these the first, a functional stage, he regarded as limited to a condition of simple persistently high arterial tension, without organic changes in the vascular system or in the kidneys. This stage, he believed, might precede for years the onset of degeneration in the kidney. The second stage, he termed chronic Bright's disease without nephritis—using the term nephritis in the strict pathological sense of a true inflammatory condition o f the kid-

Mahomed adopted the term chronic Bright's disease as a convenient generic name for a condition which Gull and Sutton had previously described of generalized arterio-capillary fibroid change. Contrary to the view of Johnson, an extension of that of Bright, and following in the lead of the above-mentioned investigators, Mahomed viewed the condition underlying the various stages of granular or fibroid kidney as a systematic disorder in which the cardio-vascular alterations were not dependent upon, but either antedated the development of the kidney fibrosis, or, more rarely, existed without renal change.* It was not necessary for him that the kidney should actually be the seat of degeneration to constitute Bright's disease. Fibroid kidney was but an unnecessary, if more or less to be expected, incident in the general morbid state. Renal fibrosis did not always appear, though general arterial change occurred. Yet Mahomed thought kidney alterations present in most of the cases he reported at this time, although in a number of them, as has been stated, there seemed no positive evidence of this, and in two it is recorded that a necropsy showed healthy kidneys.

Mahomed's views were extreme in that he regarded a thickened vessel as a certain forerunner of fibroid kidney, if the latter were not already existent. Without desiring to discuss here the still unsettled question as to the sequence of events in chronic Bright's disease, whether cardio-vascular alteration precedes or accompanies the renal, claiming a common origin, or follows the latter, dependent upon kidneys already inadequate through disease, I may say that I am by no means prepared to admit that a diseased kidney is the sole cause of increased vascular tension and subsequent arterial degeneration; nor can I accept Mahomed's teaching that persistent high arterial tension or a thickened vessel is a certain indication of present or expected kidney change.†

Apart, however, from the doubtful cases of renal disease among those reported by Mahomed in which albuminuria was absent, there remain a good number in which, with the urine free from albumin, undoubted granular kidney existed. Be that as it may, Mahomed's cases were all in middle or advanced life. There were present decided cardio-vascular changes, such as hypertrophied heart and thickened vessels. These cases were reported especially to show that in the stage of Bright's disease in which epithelial alterations in the tubules were absent—or, if occurring, were but transitory in character—albuminuria was absent, the urine remaining practically normal, and symptoms referable to the kidney, i. e., those of renal inadequacy, were uncommon. Death in these cases, as Mahomed remarks, is usual in granular kidney, resulted from failure of other organs, notably the heart.

The few cases I here report, in which the character of symptoms, together with result of frequent urine examinations, leave no doubt as to the existing diseased kidneys, although albumin is absent from the urine, are of a class distinct from the cases hitherto described in which a diagnosis of fibroid kidney could be made from the association of age with cardio-arterial disease and with such a common symptom as abundant, low-gravity urine. In the latter, apart from general fibroid changes,

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ney. In this stage the organic changes are apparent in the vascular system and in the kidney (arterio-capillary fibrosis—red granular kidney). The kidney, post-mortem, is found to be the seat of interstitial change, without epithelial alteration. In the third stage, which Mahomed classed as chronic Bright's disease with nephritis (the mixed or mottled granular kidney), he regarded as the natural but by no means invariable termination of the ailment. In this stage, epithelial changes have occurred in the kidney, the cirrhotic alterations are marked, and the symptoms of renal disease prominent. This, he stated, is the stage in which the disease is usually diagnosticated. The 61 cases which he reported characterized by the absence of albumin from the urine, he considered as belonging to the second of these stages.

*See preceding foot-note.

†Mahomed styled a high-tension radial a *renal* pulse. He suggested that visible and tortuous temporals were an indication of renal disease, and regarded this as a point to aid in the separation of a mitral insufficiency, the result of a previous rheumatic endocarditis, from that arising from overstretching of the left ventricle as a result of resistance *a fronte* in the arterial sclerosis of fibroid kidney.

the kidney was in most cases fairly healthy and functionated accordingly. In my cases, without cardio-vascular symptoms other than increased tension, there are present those referable to the kidney, with, in several, marked renal inadequacy, both as regards excretion of water and of solids.

In the urine examinations of all the cases here recorded, the following methods were employed: Albumin was in every case examined for in mixed specimens of the twenty-four hours' urine, as well as in single specimens voided at varying times in the day. The tests used were a saturated solution of plain picric acid—this was in every instance the test first applied to each specimen of urine examined;* Millard's phenicacetic acid solution†—this was used when no response occurred to picric acid, and on other occasions to confirm results obtained by picric acid; metaphosphoric acid was also often employed, not alone, but in addition to the other tests. Indications of even a slight contact ring occurring to picric acid or Millard's solution, either immediately or after standing for some time, a second specimen of urine was treated with glacial acetic acid. If the urine was concentrated—rich in salts—an excess of acid was added to insure complete precipitation of any mucin present.‡ This, after agitation, was subsequently filtered and the filtrate exactly neutralized with strong (25 per cent) NaHO solution.§ The filtrate was then slightly acidulated with acetic acid and the various tests above mentioned once more applied. Any indications of response now occurring, separate portions of the urine were further carefully tested with heat, with HNO_3, and often also with acetic acid and potassium ferrocyanide.

In all the microscopic examinations the centrifugal machine was employed to ob-

* Recent experiments in these and in other cases have convinced me that even plain (unacidulated) picric acid solution *will* precipitate mucin. This I had before doubted, on the authority of Johnson, and was inclined to accept as an indication of serum-albumin any slight though sharply-defined ring obtained by the contact method with cold picric acid solution and *clear* urine, not subsequently dissipated by heat. Recent experiments have shown me that mucin is occasionally present in non-(serum) albuminous urines in amount sufficient to respond to the picric acid test even so applied, and also to Millard's test, and to metaphosphoric acid. This is not, however, usual, as I have repeatedly failed to obtain any response to clear urine by the overlying method with plain or citrated picric acid, examining the tube even after several hours' contact. It is usual to obtain a mucin reaction to the boiling test with acetic and picric acid, which is improperly sometimes employed as a *delicate* test for serum-albumin. The slight cloud obtained with acetic acid and boiling, in urines not rich in salts, is undoubtedly often due to mucin, as can readily be proved. Fortunately little harm can usually result, in cases of suspected kidney disease, from the error of mistaking mucin for serum-albumin, since the presence in the urine of the former, with evidences of renal derangement, is often only the precursor of the latter, and probably arises from faulty metamorphosis of the cells of the renal tubules—of course, excluding vesical, urethral, and vaginal catarrh as a factor in its production.

With several years' steady use of the picric acid test, I still regard it as the most delicate reagent for the detection of traces of albumin, and, intelligently used, as the best of the many tests in use. Millard's phenic-acetic acid test I rank second, and frequently use. It must be recalled that this also, like picric acid, will respond to so-called peptones, to mucin, and to urates. Response, therefore occurring with these, unless very decided and leaving no doubt as to its nature, requires confirmation by the method above suggested. Tanret's solution, and other tests with mercuric chloride and those with tannin, such as Sebelein's reagent, are unreliable for the detection of albumin because of other sources of error even than those just mentioned. The same may be said of the trichloracetic acid test.

† Glacial carbolic acid (C. P.) 95 per cent, ℨij; glacial acetic acid (C. P.) ℨvij; mix and add solution of potash, ℥ij, ℨvj. Filter. The specific gravity of this solution is 1027.

‡ Concentrated urines, rich in salts, will not yield mucin, if present, to a small amount of acetic acid. An excess of that necessary to form acetates with the salts present must be added before precipitation can occur. This is a practical point of great importance little attended to.

§ NaHO was used in preference to KHO, as an excess of the potash salt present in the urine would, in subsequently testing with picric acid, form a precipitate of potassium picrate, thus interfering with the reaction for albumin. A strong solution of alkali was used, so that if but traces of albumin were present the latter be not so diluted by addition of these reagents as to cease to respond to tests used for its recognition.

tain a sediment, and usually from the precipitate taken from the urine which had been standing for some hours.*

Urea was estimated by the hypobromite process (bromine itself always being employed), with a modification of the Russell and West apparatus, which, as comparison with a tried and more complicated apparatus had shown, was very accurate clinically.

Uric acid was estimated by the method of Haycraft. Acidity, when taken, was estimated by titration with $\frac{N}{10}$KHO or NaHO. The chlorides were estimated as total chlorine by Volhard's method.† The figures indicating total urinary solids ‡ in the tables are simply calculated in grains by multiplying the last two figures of the specific gravity by the number of ounces of urine passed in the twenty-four hours.§ This method, of course, furnished only a very rough approximation, but used with coincident urea, or urea and chlorine estimations, it is all that is necessary. It alone may be made to furnish results of some clinical accuracy, provided the amount of NaCl excreted is also ascertained.‖ It is, of course, most essential that an accurate urinometer be employed and corrections for temperature made.

Case I.—W. B., analytical chemist; aged 29 years; unmarried; weight, 147 pounds. No history of lead, syphilis, or alcohol. Habits studious and temperate. No diseases of childhood. As a boy, robust. Family history as to renal or cardiac disease negative. His father has been a generous liver, and has had several attacks of typical gout. For the past three years W. B. has suffered from severe headaches and incapacity for exertion, worse in the latter half of this period. Constant headaches and muscular weakness have been present, increased by slight physical exercise or mental strain. Two years ago, during a period in which he was feeling particularly bad, his urine, examined by himself with nitric acid, showed the presence of albumin. This was discovered in a single unmixed specimen of the morning urine, and once only, though often afterward frequently examined for. An estimation then of the total urinary nitrogen excreted showed a considerable diminution from the normal. Fancying himself the subject of kidney disease, he shortly after this consulted at odd times several practitioners in this city, and in the summer of 1892 Charcot, in Paris. These were unable to find either albumin or casts in the urine, and gave on this account a negative opinion as to renal disturbance, though the symptoms certainly were suggestive of grave inadequacy. There was no improvement on the lines of treatment suggested, but rather an aggravation of symptoms. After a course of spinal and loin douching under Charcot, loin pain developed, which is now present, with headache, vertigo, and general malaise on any extra exertion or when a nonnitrogenous dietary is departed from. There is but little

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* Both the two-bottle milk-testing machine made by Mr. J. E. Lonergan & Co., of this city, and the equally efficient, and, for clinical work more practicable, smaller apparatus of Messrs. Queen & Co. were used. The utility of the centrifugal machine as an aid in the production of urinary sediment for microscopic work is great indeed. In my experience the deposit resulting is both richer in quality and quantity than that obtained by gravity. Clear urines showing little or no sediment after some hours' standing can be readily made to yield a precipitate by its use, and casts but scantily present in the sediment resulting from standing without its employment, which might not be found, can often readily be secured by the aid of this adjuvant to the production and concentration of a precipitate.

† Estimations of chlorides were made as probably the most important mineral constituent of the urine, and that which has been found diminished in cases of chronic nephritis.

‡ Normally, the total urinary solids excreted average about 65 grams, or 1,000 grains. The daily amount of urine averaging 1,500 cubic centimeters (50 fluid ounces), and the specific gravity = 1.020, then 50 × 20 = 1,000 grains, or 66 grams. The average daily output of urea is between 30 and 40 grams (450 to 600 grains), or about one-half the total solids, the amount varying considerably with sex, body weight (about 1 gram should be excreted for each 5 pounds of body weight), and amount and character of food eaten.

Daily excretion of chlorides, calculated as NaCl, equals 10 to 15 grams (154 to 216 grains), or somewhat less than one-half the urea. Calculated as chlorine, chlorides equal 6 to 9½ grams. The daily amount of uric acid excreted is varyingly placed, the average probably being 0.5 grams (7 to 10 grains).

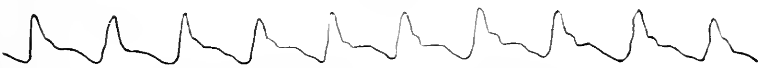
§ This method is much more convenient, and gives approximate results of greater accuracy, than those obtained by the use of Christoson's (Haesen's) or Trapp's formula. It furnishes a figure midway between that of the two. By the former the last two figures of the specific gravity are multiplied by 2·33; the resultant is multiplied by the total number of cubic centimeters of urine passed. This product divided by 1000 = the total amount of solids in grains. Trapp's factor is 2.

‖ As my friend Dr. Leffmann suggests to me.

anæmia. Digestion is fairly good. No indications of external œdema have ever been noticed. There are no eye changes. I have had the case under observation about a year and a half. When first examined physically shortly before this, persistent high arterial tension was noted, with accentuation of the aortic second sound at the apex. The area of cardiac dullness was not increased, nor has it since become so. The apex beat is still in the normal situation, about two inches below and a half inch within the nipple. Persistent high tension, without as yet signs of notable thickening of the arterial coats, has always existed since, except in the past three months, during which he has been on a strictly vegetable diet, eating no meat, meat soups, eggs, or fish. The influence of this diet upon symptoms and pulse tension is quite remarkable. Under it, if no extra physical or mental exertion is undertaken, very little headache, vertigo, or loin pain is felt.

The accompanying sphygmogram is one of several, all practically similar, taken at various times after having been between two and three months on a nonnitrogenous diet. It is practically a normal tracing, showing a moderate degree of tension.

FIG. 1.



W. B., June 10, 1893. Pressure, 1½ ounces; sitting.

Since the single occasion on which he detected albumin in his urine by nitric acid, two and a half years ago, very frequent observations, in both mixed twenty-four hours' specimens, and that passed at various times in the day, have never resulted in showing the slightest trace to heat or to nitric acid. For a long time metaphosphoric acid was used in addition to heat and nitric acid, as a more delicate test for the recognition of small amounts. Though the tests with the last named were always resultless, a slight response was often obtained with metaphosphoric acid; but as mucin, also precipitated by this acid, was not eliminated as a source of error, minute traces of albumin may or may not then have been present, as they are occasionally now.

When urine is ordinarily pronounced albumin free, it is meant, almost without exception, absent to tests commonly employed, such as heat and nitric acid, which, applied with care, detect albumin in small amount, but not in minute traces (less than 1 to 100,000).* In the cases of granular kidney before referred to, such as those of Wilks and of Mahomed, in which no albumin was found in the urine, heat and nitric acid were the tests probably employed for its detection.† In my cases the absolute absence of albumin was most usual, for during the period in which examinations were made, as a rule, reactions did not occur to tests (picric acid, the phenoacetic acid solution) showing traces as minute as 1 to 200,000 to 300,000.

In the past year, besides examinations by the patient and by myself, with picric acid as the reagent, of a number of unmixed specimens at short and more lengthy intervals—specimens passed at various times in the day, as regards food and exercise—I made careful daily tests of mixed twenty-four hours' samples in the period named in the accompanying table, except when piperazin was taken. As a rule, not a trace of a response could be obtained with the untreated, clear urine overlaid with picric acid; occasionally a mucin response occurred, and, rarely, a ring which further treatment showed to be serum albumin. No marked response was ever thus obtained to the picric acid or Millard's solution, and the results were always negative with heat and with nitric acid. In microscopic examinations, at various times, of specimens of the mixed urine typical granular and hyaline casts, broad and narrow, were found on several occasions, but never in any amount, and only after some search. Cylindroids were also present. Besides a variety of epithelium from the bladder and its accessories and cells of undetermined origin, occasionally those typical of the

*I accept this limit of reaction, more extreme than is usually given, on the authority of Millard (Bright's Disease, third edition, p. 85).

†In a very courteous letter recently received from Dr. P. H. Pye-Smith, senior physician to Guy's Hospital, he informs me the tests employed by Dr. Mahomed were: (1) Heat, with the addition of acetic acid, to neutralize alkalinity, if present, and to neutralize any calcic phosphate precipitated by heat; (2) cold nitric acid, carefully overlaid by the urine. Dr. Pye-Smith also says that, though other tests, such as ferrocyanide of potassium and acetic acid, acidulated brine, and picric acid were employed from time to time in the hospital in 1879 to 1881, the date of Mahomed's observations referred to, the tests by heat and by nitric acid only were those in constant use in the wards. Had other than these two been used by Dr. Mahomed in his observations, Dr. Pye-Smith remarks, Mahomed would have mentioned the fact in the Guy's Reports.

convoluted tubules were seen in small number. Isolated pus cells also were occasionally encountered. An abundance of calcium oxalate crystals were present in nearly all specimens, and often considerable free uric acid. Spermatozoa were occasionally seen. As a rule, the urine, of light amber color, yielded but little sediment, and in cool weather remained undecomposed longer than is common. But while piperazin was being taken, sediment was abundant and decomposition occurred early, as is usual. At this time but three microscopic examinations were made, and these were cursory. No casts were seen. There was an abundance of bacteria, calcium oxalate crystals, free uric acid, ammonium urate, and amorphous urates.

The following is an analysis of the most important constituents of the urine over a period of twenty-three days. Much more fluid was ingested than was required to satisfy thirst, during the greater part of this time, in order to stimulate the kidneys to greater activity. Schering's piperazin, in doses of five grains four times daily, was tried for the same purpose for a period of a week. Apparently the only effect of the piperazin was to render the urine more readily decomposable without markedly lowering acidity. The average daily quantity of urine passed in the twenty-three days (1085 c. c.) is in excess of that usually voided. Polyuria has at no time existed. Prior to onset of symptoms of renal inadequacy the urine had been of normal amount. Subsequently it was commonly diminished in quantity, and has remained so. Nitrogenous excretion during the twenty-three days, though in excess of that passed when analyses were made by himself some months previously, is considerably below (100 to 150 grains daily) what should be excreted by a healthy male adult in active life. Though on ordinary diet during this time, urea elimination was only about one-half the normal average of 35 grams (18.56 grams). The daily average ratio of uric acid to urea (1 to 26) is much lower than what is regarded as normal. In this case, urea excretion being diminished and elimination of uric acid probably not being interfered with, the ratio would, of course, be less than the physiological figure of 1 to 40 or 1 to 50. The average excretion of chlorides (as chlorine) is considerably below normal. This, however, does not necessarily indicate impaired renal excretion, though the latter is probably here present, as other causes, notably gastric hyperacidity or hypersecretion, which, apart from renal inadequacy, produce similar diminution, are absent.

Date.	Daily average amount of urine, cubic centimeters.	Daily average amount of urine, fluid ounces.	Color.	Specific gravity of mixed 24-hour specimens.	Degree of acidity, calculated on 100 cubic centimeters of urine.	Daily elimination of urea, in grams.	Daily elimination of urea, in grains.	Daily elimination of uric acid, in grams.	Daily elimination of chlorine, in grams.	Approximate daily amount of fluid taken.	Remarks.
1893.										*Pints.*	
Jan. 31	1740	58	Light amber...	1013	7	22·70	352	·761	(*)	Over 4	Meat diet throughout the 23 days.
Feb. 1	1659	55	....do	1014	11	18	277	·329	(*)	Over 4	
Feb. 2	1400	$46\frac{2}{3}$	....do	1015	18	20	308	·950	(*)	Over 4	
Feb. 3	1390	$46\frac{1}{3}$	....do	1012	20	19·50	300	·780	5·60	Over 4	
Feb. 4	950	35	Darker amber..	1021	20	19	292	·729	4·20	$1\frac{3}{4}$	
Feb. 5	920	$30\frac{2}{3}$	....do	1020	13	18·40	283	·934	4	$1\frac{3}{4}$	
Feb. 6	770	$25\frac{2}{3}$	....do	1020	24	17·75	273	·569	2·70	$1\frac{3}{4}$	
Feb. 7	1160	$38\frac{2}{3}$	Light amber...	1015	15	21	323	·779	3·50	$2\frac{1}{4}$	
Feb. 8 / Feb. 9	1550	$51\frac{2}{3}$	....do	1016	....	21·75	335	·989	6·37	$2\frac{1}{4}$	
Feb. 11	931	31	....do	1018	15	18	277	·729	(*)	$2\frac{1}{4}$	gr. xx piperazin taken.
Feb. 12	1130	$37\frac{2}{3}$	....do	1020	20	23·75	365	·987	4·50	$2\frac{1}{4}$	Do.
Feb. 13	875	29	....do	1021	20	17·50	269	·666	3·50	$2\frac{1}{4}$	Do.
Feb. 14	700	$23\frac{1}{3}$	....do	......	40	19	292	·600	4·60	$1\frac{1}{2}$	Do.
Feb. 15	850	$28\frac{1}{3}$	....do	1021	30	15	237	·456	2·20	$1\frac{1}{2}$	Do.
Feb. 16	1025	34	....do	1021	25	16·80	258	·725	6·45	$1\frac{1}{2}$	Do.
Feb. 17	960	32	Darker amber..	1022	22	16·32	251	·693	3·50	$1\frac{1}{2}$	Do.
Feb. 18	1400	$46\frac{2}{3}$	....do	1021	20	19·60	201	·700	7·10	$1\frac{1}{2}$	
Feb. 19 / Feb. 20	1025	34	Light amber ..	1021	20	20	308	·725	5.50	$1\frac{1}{2}$	
Feb. 21	955	$31\frac{2}{3}$	Darker amber..	1024	25	20	308	·765	6·35	$1\frac{1}{2}$	
Feb. 22	1000	$33\frac{1}{3}$	Light amber...	1021	18	22	338	·924	5·25	$1\frac{1}{2}$	

* Not estimated.

Average daily amount of urine passed, 1085 c. c., or 36 fluid ounces; average daily amount of urea excreted, 18·56 grams, or 285·82 grains; average daily amount of uric acid excreted, 0·713 grams, or 11 grains; average daily ratio of uric acid to urea, 1 to 26; average daily amount of chlorides calculated as chlorine (18 days), 4·82 grams; approximate daily average amount of total urinary solids, 43 grams, or 666 grains.

Case II.—J. B., aged 31 years; brother of Case I; unmarried; best weight 140 pounds. No lues; no lead-poisoning. Had slight attack of scarlatina when aged eight years; no complications attended it. Between the ages of 18 and 20 occasionally drank a trifle to excess of beer and wine; but excess for him would be moderation in another of more robust build. He was easily affected by alcohol. Has been very temperate since 20 years of age. Has always been looked upon as delicate; was in best condition when roughing it on the plains four years ago. Began to visibly fail in health two years ago, shortly subsequent to a two weeks' vacation, during which he had indulged in a little mild dissipation incident to hotel life at a fashionable seaside resort. Lassitude, attacks of severe headache about vertex and nucha were first noticed. Spells of headache have since been frequent. Though these appear independent of exertion, they are especially induced by it, especially by a long walk, as is the case with the brother. More or less steady pain across the loins has been noticed for over a year. Accompanying it is a feeling of tired, weak back. During the past six months vertigo has frequently accompanied headache. These are often present on rising in the morning. Recently an attack of vertigo occurred, in which he states that, though he did not lose consciousness, he felt "queer" and nearly fell. He was dazed afterward and was not himself for over two days. Digestion has never been above the average. Within the past year

Fig. 2.

Pressure, 1½ ounces.

it has been impaired. He is flatulent, and nausea after meals is frequent. A stomach examination recently made showed motility lowered, with diminution in free HCl. The latter is probably usual. There is no venereal addiction, and no seminal losses occur. There are no cardio-vascular changes evident. Apex of heart is in normal situation. At the time of the first examination a systolic murmur was noticed, most distinct immediately below and to the left of the apex. It was also distinct in the axilla. It was inconstant, audible steadily for two or three min-

Fig. 3.

Pressure, 1¾ ounces. Pulse, 60.

utes, and then not evident save with chest fixed in full inspiration. On each occasion the second sound at the apex was much accentuated. The murmur could not be distinguished when a cardiac examination was again (and last) made, several months after the first. There is no history of rheumatism. The pulse tension, when first under observation, was high. Later, after some time on a strictly vegetable diet, without meat, meat soup, fish, or eggs being eaten, it is quite normal, as the accompanying sphygmogram (Fig. 2), one of a number similar, shows.* No tracings were taken before meat was abandoned.

Immediately after first sphygmogram was obtained a meat diet was begun. Tracing second (Fig. 3), taken one week later, indicates the effect of retained nitrogenous waste on the pulse. Meat then had been eaten somewhat freely once to twice daily. Other conditions which might modify the tracings were similar. The sphygmogram shows a typical high-tension pulse,* indicative of inadequte kidneys.

The eye-ground, kindly examined for me by Dr. Schneideman, shows nothing abnormal.

During the past two years the urine of different periods of the twenty-four hours has been frequently and carefully tested for albumin by heat, nitric acid, and metaphosphoric acid by the brother, who is a skilled chemist. A response has never been obtained to heat or to nitric acid. Occasionally, though more rarely than in Case I, a slight reaction has occurred to metaphosphoric acid and to picric acid; but mucin not having been eliminated, it is uncertain if the response was due to serum-albumin. Since February, 1893, the urine has been frequently tested by myself. The

* The upstroke is vertical, the tidal wave slight, and below a line drawn from the apex of the upstroke to the aortic notch (Mahomed's test of low tension). The pressure used was 1¼ to 1½ ounces, a greater amount extinguishing the pulse, which was 74, taken sitting.

* The upstroke is less vertical, the tidal wave more pronounced, a portion of it occupying a position above a line drawn from apex of upstroke to aortic notch, which latter is placed high. Pressure from 1¾ to 2 ounces, no minor pressure tracing pulsations. Pulse, 60; that and tracings taken sitting.

result has always been negative with heat and with nitric acid. On three occasions a reaction has been obtained with picric acid. In one of these only was acetic acid used to remove mucin by the method before mentioned. On that occasion only, the untreated urine was also tested with Millard's solution. No trace of haziness or ring occurred, and after removal of mucin by acetic acid no trace of response could be obtained with picric acid. Granular and hyaline casts have been found on several occasions. Hyaline were in excess of the granular, but even hyaline occurred only in small number, as in Case I. A few epithelia, the character of which indicated their probable origin from the convoluted tubules, were also occasionally encountered. Calcium-oxalate crystals abounded in all specimens examined, whether the urine was examined immediately after voiding or, as on some occasions, after standing twelve to twenty-four hours.

An analysis is subjoined of the most important constituents of the urine for a period of six days. The amount, specific gravity, and total daily output of nitrogen, frequently before estimated, tallies so closely with this that it may be accepted as a sample of the usual condition. These also agree, as do the clinical symptoms, with those of Case I. Uric-acid elimination, however, in Case II is somewhat higher than in Case I. The ratio to urea is 1 to 24.

Date.	Daily amount of urine passed, in cubic centimeters.	Daily amount of urine passed, in fluid ounces.	Specific gravity of mixed 24-hour specimens.	Color.	Degree of acidity, calculated on 100 cubic centimeters of urine.	Daily elimination of urea, in grams.	Daily elimination of urea, in grains.	Daily elimination of uric acid, in grams.	Daily elimination of chlorides, calculated as chlorine.	Daily elimination of total urinary solids, in grains.	Approximate amount of fluid drunk, in cubic centimeters.
1893.											
Feb. 28	875	29	1026	Amber	31	13·88	200	1	6·75	654	800
Mar. 1	870	29	1028	....do........	30	14	215	·646	6·50	832	800
Mar. 2	900	30	1029	....do........	40	18	277	·814	6·85	870	800
Mar. 3	900	30	1030	... do........	(*)	22·50	346	·740	7·40	9[illegible]0	800
Mar. 4	900	30	1030	....do........	30	21·60	322	·749	8	900	800
Mar. 5	850	28⅓	1028	... do........	30	22	338	·828	5·59	784	800

*Not calculated.

Average daily quantity of urine, 882 c.c., or 29¾ fluid ounces; average daily elimination of urea, 18.66 grams, or 287 grains; average daily elimination of uric acid, ·794 grams, or 12 grains; average daily elimination of chlorides calculated as chlorine, 6·8 grams; approximate average daily elimination of total urinary solids, 53 grams, or 816 grains.

The following case is apparently of a type similar to the preceding, though of an age and with symptoms indicating a more advanced kidney ailment. The patient came under observation while this paper was in process of preparing. I could not forbear reporting the case at this time, though not studied for a lengthy period, because of its suggestiveness. In the few days that opportunity has permitted seeing the case, it has been carefully studied. Whether the urine has been previously, as now, altogether albumin-free, or whether in the future this condition will continue, it is, of course, impossible to more than conjecture. But that it should be so now, when marked renal incompetence and symptoms referable thereto are present, renders it well worthy of mention in connection with the other cases:

Case III.—J. MacC., aged 55 years; married; weight, 150 pounds; stationary engineer. No history of lead, syphilis, or alcohol. First seen June 11, 1893. About a year before he had been much overworked and had what was regarded as a slight attack of influenza. He had had no severe ailment prior to this and had always been robust. During the past nine months he had visibly failed in health. There was increasing general muscular weakness and incapacity for exertion. Generalized headache was common, and, lately, had increased in severity; it was worse toward afternoon and at night, and was associated with sleeplessness and, on rising in the morning, with vertigo. The bowels were always inclined toward constipation, but had been maintained in a soluble condition by aperients. No other digestive disturbance was present. Tongue was moderately clean. Appetite was poor. Shooting pains occasionally occurred about the body. No indications of œdema were present, nor had there ever been, so far as he could tell. Knee jerk, station, and tactile sensation were normal. Some tremor of lips and rather pronounced of hands, on extending the latter, were remarked. Temporals are prominent and radials tense, but the arterial wall was not more than slightly appreciable to the finger when emptied above by pressure. The pulse was small and gave the suggestive tracing of high tension, shown in the accompanying sphygmogram.

FIG. 4.

J. MacC. Pressure, $1\frac{3}{4}$ ounces; sitting.

The second aortic sound was markedly accentuated at the apex, but the heart's impulse was normally placed within the linea mammalis. Both palpation and percussion showed no cardiac hypertrophy. He habitually passed but a moderate amount of urine, never rising at night. The color, so far as he had noticed, is never very light.

His condition at the first visit, when the above symptoms were noted, suggested either plumbism or chronic Bright's disease. But as there was no blue line, history of colic, or other suggestive symptoms of the former, and as he had not worked at the branch of his trade for a year or more which necessitated handling lead, and no other source of exposure was evident, I informed him, on his asking for an opinion as to the nature of his ailment, that I felt confident the seat of the trouble was in the kidney. I then had him send the total twenty-four hours' urine. To my surprise not a trace of albumin could be detected by any test, even the most delicate. The urine was of normal, yellowish-red color, not resembling that of a case of contracted kidney. This, with freedom from albumin and a history of no nocturnal bladder disturbance, was misleading, and had not I been on the watch for such obscure cases and noted that not only the amount of urine but of urea was considerably subnormal, I might have been longer in arriving at an accurate diagnosis.

Careful consecutive daily examinations of the twenty-four hours' urine for albumin have been made up to the present writing. The urea, uric acid, chlorides, etc., were also calculated for a period of eleven days. Albumin, examined for daily, has at no time been present, even in the minutest trace. On two consecutive days, when the urine was especially concentrated and the weather excessively warm, a slight ring occurred with picric acid and a trifling cloud with Millard's reagent. But this was undoubtedly mucin. A second specimen treated with acetic acid,* filtered and neutralized with strong NaHO, and then again slightly acidulated, gave no trace of response to these tests, even after standing several hours. Considerable mucoid sediment was always present in the urine after it had stood for some hours. Two microscopic examinations were made and two to three hours occupied on each occasion. In the first examination a medium-breadth hyaline and a narrow granular cast were found. An aggregation of small cells forming a somewhat irregular-shaped epithelial cast was also seen. Free uric acid was present in large amount; calcium oxalate crystals and a few leucocytes were also noted. On the second occasion a sample of mixed urine of two days was used. A number of narrow and broad hyaline casts (8 to 10) were found. Cylindroids, amorphous urates, free uric acid crystals, a few small round and oval nucleated cells with granular contents were also present, but no calcium oxalate.

Date.	Daily amount of urine in cubic centimeters.	Daily amount of urine in fluid ounces.	Specific gravity of mixed 24-hour specimen.	Color.	Daily elimination of urea in grams.	Daily elimination of urea in grains.	Daily elimination of uric acid in grams.	Daily elimination of chlorides in grams calculated as Cl.	Approximate daily elimination of total urinary solids in grains.
1893									
June 12	870	29	1013	Reddish yellow	12·25	188	(a)	(a)	377
June 13	670	22	1013	... do.................	8·78	135	·185	1·80	b289
June 14	520	$17\frac{1}{3}$	1026	....do.................	13	187	·340	4·42	350
June 15	500	16	1016	Yellow...............	6·50	100	·168	2·15	256
June 16	410	$13\frac{1}{2}$	1013	Reddish yellow	8·20	126	·134	1.57	178
June 19	760	25	1011	Yellow...............	10·64	163	(a)	(a)	370
June 20	670	22	1010	....do.................	6·70	103	·268	1·68	220
June 21	810	27	1022	Reddish yellow	19·20	200	·379	5	590
June 22	570	19	1028	Deep reddish yellow.	12·50	192	·400	4·33	532
June 23	459	15	1029	....do.................	12·15	186	·287	2·75	435
June 24	850	28	$1017\frac{1}{2}$	Light yellow........	17	261	·340	4	485

a Not estimated.

b Exact estimation of the total urinary nitrogen eliminated on the 13th and 14th instants was kindly made for me by Dr. Leffman by the Kjeldahl-Gunning method, to compare the results thus obtained by the more ready approximate method for ascertaining total urinary solids. The figures are: 13th instant, 18 grams or 277 grains; 14th instant, 28 grams or 431 grains.

Daily average amount of urine in the 11 days, 643 c. c., or $21\frac{1}{3}$ fluid ounces; daily average amount of urea in the 11 days, $11\frac{1}{2}$ grams, or 177 grains; daily average amount of uric acid (9 days), 0·29 gram, or $3\frac{3}{4}$ grains; daily average amount of chlorides estimated as Cl (9 days), 3 grams, or 46 grains; daily average amount of total urinary solids, $23\frac{1}{2}$ grams, or 362 grains.

* See footnote §, p. 195.

The total daily output of urine and total urinary solids in this case is much diminished. Urea is especially low.

After the eleven daily observations were made, during which the bowels were moved once daily by laxatives, ℥j, three times daily, of potash bicarbonate, taken effervescing with lemon juice, was prescribed, with excellent effect, as a diuretic. This, and free purgation by calomel every third day, caused a prompt amelioration

FIG. 5.

J. MacC. Pressure, 2¾ ounces; sitting.

in symptoms. The pulse tension, however, continued raised, though not so markedly as at first. The accompanying tracing was taken fifteen days after the preceding one, and two days after beginning the potash. He had then been for a week on a vegetable diet. The pulse volume is greater than in the first tracing, with a prominent predicrotic wave. Uric acid was then probably in excess in the blood, and nitrogenous excretion greater than before. The diuretic, mercurial laxatives, and nonnitrogenous diet being continued, recently pulse tension is considerably lower than before, with amelioration in symptoms.

The following is the report of the eye examination in this case, furnished me by Dr. Schneideman:

Vision just short of normal. Fields of normal extent for form and color. Right eye: Nerve head reddened and somewhat hazy; outlines indistinct; marked venous pulse; maculæ normal. Left eye: Not essentially different from right. I think that the nerves are redder and more hazy than is ordinarily met with in conditions of the refraction as noted.

The accompanying case is very similar clinically to the preceding. It was recently seen in consultation with Dr. Lewis Brinton, who has kindly permitted me to report it here. From the absence of albumin, though the symptoms were suggestive of chronic Bright's disease, Dr. Brinton had been somewhat inclined to doubt this diagnosis which he has made, and sought my aid for a verification.

Case IV.—Mrs. M., aged 51 years; weight about 110 pounds. Throughout her life the patient had been subject to headaches, but during the past seven years frequent spells of another character occurred. The ache is in the occiput and nucha. It comes on more often on rising, once in about five days. During the past four or five years she has had backache and loin pain; is tired on slight exertion. Occasionally puffiness about eyes has been noticed. She is very nervous. Appetite is poor. No marked digestive disturbances exist; no vomiting. Pulse shows raised tension, but no thickening of arterial coats. No cardiac enlargement exists. Heart was noted to be irritable. A distinct apical nontransmitted systolic murmur was heard in the early part of the first examination. This was evidently due to temporary incompetence. It could no longer be heard at the end of a half hour, during which she had been sitting quietly. Dr. Brinton had not noticed it before this examination that we made together. Second sound was accentuated at the apex, more distinctly so when the murmur ceased to be heard.

She stated that she had been passing but about a pint of urine daily for some years. Could not recall ever passing a large amount, but may have averaged 3 pints some years ago. The specific gravity of a number of specimens examined by Dr. Brinton ran between 1012 and 1020. Dr. Brinton could never discover even traces of albumin, though he had frequently examined the urine. The specimen examined on the day of consultation was of amber color, specific gravity 1021, and gave no reaction with heat or nitric acid, but a ring occurred with picric acid not dissipated by heat. It is impossible now to state if this reaction was due to serum-albumin or to mucin. The urine was concentrated, and but a few drops of acetic acid were added, entirely too little to precipitate mucin in presence of excess of salts.

A number of other examinations were made, a response occurring only on one other occasion to picric acid, and never to heat and acetic acid, or to nitric acid. But one microscopic examination was made. In this a considerable number of hyaline casts were seen, and one granular cast studded with minute oil globules. There were also present cylindroids, a few leucocytes, a few red cells, and several small, finely granular, nucleated polyhedral cells of apparent renal origin.

The elimination of urea, uric acid, and chlorides in this, as in the preceding case, is much below normal. Estimations could only be made over a period of a few days, but as the urine is believed to vary little in quantity, the averages here given are believed to probably represent the usual condition.

Date.	Daily amount of urine in cubic centimeters.	Daily amount of urine in fluid ounces.	Specific gravity of mixed 24-hour specimen.	Color.	Daily elimination of urea in grams.	Daily elimination of urea in grains.	Daily elimination of uric acid in grams.	Daily elimination of chlorides calculated as Cl in grams.	Daily elimination of total urinary solids.
1893.									
Apr. 27	480	16	1016	Yellow...........	7	107	·32	2·18	256
Apr. 28	540	18	1021	Reddish yellow ...	9	141	·23	2·90	378
Apr. 29	420	14	1020	....do...............	8·40	136	·25	1·75	280
Apr. 30	540	18	1027	Yellow............	8·60	152	....	....	486

Average daily quantity of urine on 4 consecutive days, 500 c. c., or 16 ounces; average daily quantity of urea on 4 consecutive days, $8\frac{1}{4}$ grams, or 127 grains; average daily quantity of uric acid in 3 days, 0.26 gram, or 4 grains; average daily quantity of chlorine in 3 days, 2·3 grams, or $35\frac{1}{2}$ grains; approximate daily quantity of total urinary solids, $22\frac{3}{4}$ grams, or 350 grains; ratio of uric acid to urea, 1 to 31.

The next case, V, also resembles the foregoing. She was first seen during last May in the dispensary of the Episcopal Hospital. Since then she has been constantly under observation, for a time in the wards of the hospital.

Case V.—Miss R. L., aged 17 years, of delicate build; weight, 110 pounds. The symptoms of her ailment first noticed were that for the past two years there has been almost constant loin pain, with frequent spells of vertigo and headache. She was losing strength and was unable to attend to daily duties. There was anorexia and a feeling of weight in the epigastrium after meals, and constipation. When aged 6 years had had scarlatina, during the subsidence of which slight general dropsy occurred, lasting about a week.

Fig. 6.

R. L. Pressure, $2\frac{1}{4}$ ounces; sitting.

When first seen she was of anæmic appearance. For a year or more she had not been getting the proper sort or amount of food because of the straightened circumstances of her people. An examination showed no cardiac hypertrophy. The first sound of the heart was distinct at the apex and the second was there accentuated. The pulse was rapid, and furnished the subjoined tracing (Fig. 6), one of several, all showing a similar condition of low tension and well-marked dicrotism with the aortic notch low.

Fig. 7. shows a tracing taken three weeks later, after a week spent in recumbency in hospital on soft diet (chicken once daily). In this tracing it will be noticed that

Fig. 7.

R. L. Pressure, 2 ounces; sitting.

tension is higher, the predicrotic as well as the dicrotic wave being quite well marked. Rest in bed and a more wholesome diet had evidently increased arterial tone.

During the two and a half months that she was under observation no drugs were given; a mild laxative was prescribed. An accurate record was kept of the daily quantity of urine for over one month. The average was 550 c. c. (18 fluid ounces). More or less loin pain, and spells of headache and vertigo continued throughout this time. These symptoms have since ameliorated somewhat under free purgation and large doses of potassium citrate, the last given to stimulate diuresis.

The urine in this case always deposited considerable mucoid sediment, and a reaction was obtained on three occasions to picric acid, and on two a slight cloud was evident on cooling after boiling a specimen slightly acidulated with acetic acid. This was evidently due to the presence of mucin, as a specimen subsequently treated with excess of acetic acid, in the manner before described, gave them no trace of albumin response to any test.*

In three microscopic examinations casts were found on two occasions, once by Dr. Frank Massay, who kindly made an examination for me. Dr. Massay noted pale granular and hyaline cylinders of medium breadth, and cylindroids. In a later examination by myself, broad and narrow hyaline casts only, were seen. Calcium oxalate crystals were present in very large quantity in all examinations.

The figures in the accompanying table indicate that urea elimination in this case

Date.	Daily amount of urine in cubic centi meters.	Daily amount of urine in fluid ounces.	Specific gravity of mixed 24-hour specimen.	Color.	Daily elimination of urea in grams.	Daily elimination of urea in grains.	Daily elimination of uric acid in grams.	Daily elimination of chlorides calculated in grams, as Cl.	Daily amount urinary solids in grains.
1893.									
Apr. 30	100	13	1031	Reddish yellow......	11·40	221	(a)	(a)	403
May 16	400	13	1029	... do..................	15	225	3	2·38	377
May 17	380	12[illegible]	1031	... do	10	154	(a)	2	395
June 11	440	14[illegible]	1031	....do	16·75	255	(a)	(a)	352
June 12	470	15[illegible]	1032	... do	22	338	(a)	(a)	500
June 13	480	16	1033	....do	18·25	280	(o)	(a)	528

Average daily amount of urine in the 6 days recorded above, 130 c. c., or 14 fluid ounces; average daily amount of urea in the 6 days, 16 grams, or 246 grains; approximate daily amount of total urinary solids in the 6 days, 27 grams or 421 grains.

a Not estimated.

is considerably diminished. The average daily amount for her weight should be about 350 grains, against the 246 noted. But one examination for uric acid was made. This (1[illegible] grains) showed diminution. Chlorine elimination, too, as shown in the two examinations, is considerably below the normal, which would account for the ratio of urea to the daily amount of total solids being less than the usual one-half.

The next case is interesting in that, with few symptoms suggestive of chronic Bright's disease, renal degeneration in all probability exists. It was seen through the kindness of Dr. de Schweinitz, under whose care the patient was for failing vision. A renal ailment was not especially suspected by Dr. de Schweinitz, who had examined several specimens of urine for albumin with negative result. A cause for the symptoms—"chronic headache, with a curious form of optic neuritis in one eye and some degeneration in streaks in the other," as reported to me by Dr. de Schweinitz—not being apparent, he had sent the total twenty-four hours' urine to me for examination. On the urea being found somewhat diminished and casts being detected in the urine, I was permitted, through the courtesy of Dr. de Schweinitz, to see the patient on several occasions and to make further examinations of the urine.

Case VI.—Mrs. T., aged 51 years; widow; seamstress; weight 150 pounds. Had influenza two years ago. Following that has been subject to severe headaches, chiefly about vertex and frontal region. Has been subject to vertigo for a number of years. At times it is so severe that she has almost fallen with its occurrence when on the street. She has had more or less loin and sacral pain for some years, aggravated by being much on her feet. A tendency to constipation has always existed. No other symptoms are present save that eyesight began to fail unaccountably some months ago. That, lately, has improved under Dr. de Schweinitz's treatment. She never has passed large quantities of urine. Can not recall how long the small amount now voiding has been habitual.

A cardiac examination showed a strong first sound and a highly accentuated apical second sound. No enlargement was detectable. Apex beat was in normal situation. Pulse tension was high, but after radial was emptied by pressure, arterial wall scarcely distinguishable. Temporals not prominent. Considerable pressure necessary to develop tracing, but sphygmograms taken with from 2¾ ounces pressure up to 3¾ ounces similar; 4 ounces causes rounding of apex of upstroke. The accompanying

* This case has, of course, been under observation for too short a time, and too few examinations for albumin have been made to permit it, like Cases III and IV, to be more than suggestive. Albumin may only have been absent for a time in the course of the chronic malady from which she is undoubtedly suffering. It is, however, significant that with small amounts of urine, with the presence of casts, and symptoms indicating renal incompetency, albumin was at least then absent.

tracing, with which others, taken with the same degree of pressure, on this and other occasions are similar, is very significant, and by it alone a diagnosis of probable renal degeneration might be made. Though there is no history of lues, and

FIG. 8.

Mrs. T. Pressure, $3\frac{3}{4}$ ounces; sitting.

nothing to definitely indicate a present or past infection, Dr. de Schweinitz is inclined to regard the eye condition * as of specific origin, especially since improvement in this has been decided while on antiluetic treatment. However that may be, there is little doubt that an underlying kidney ailment is contributory to certain of the symptoms.

There were indications of albumin to picric acid in the first specimen of urine examined, acetic acid not being used to separate mucin. The urine was concentrated, and deposited, after a few hours' standing, a heavy cloud of mucus and oxalates, to the former of which the reaction may have been due. No response of any sort occurred with subsequent specimen. But 1 specimen was examined microscopically. Several hours' search of 5 slides revealed 3 typical granular casts, 1 long, very typical waxy cylinder and a number of pale, broad hyaline casts. There were also present small polyhedral nucleated granular cells, bladder and vaginal epithelium, a few leucocytes and red disks, and a profusion of calcium oxalate and uric acid crystals.

The urea elimination in this case is more diminished than is that of the preceding. The amount calculated for body-weight should be from 400 to 450 grains, while there is actually excreted but about one-half of this, or 230 grains. The total urinary solids excreted do not much exceed what the figure for urea should be were the renal tubular structure doing full work.

Date.	Daily amount of urine in cubic centimeters.	Daily amount of urine in fluid ounces.	Specific gravity of mixed 24-hour specimen.	Color.	Daily elimination of urea in grams.	Daily elimination of urea in grains. *a*	Daily elimination of uric acid in grams.	Daily elimination of chlorides calculated in grams as Cl.	Daily amount total urinary solids in grains.
1893.									
May 5	480	16	1031	Reddish yellow.....	16·80	258	(*b*)	(*b*)	496
May 10	553	18	1030	....do	15	237	·57	5·50	540
May 11	490	$16\frac{1}{3}$	1030	....do	14	215	·43	3·80	490
May 12	465	$15\frac{1}{3}$	1030	....do	15	225	(*b*)	2·19	460
May 13	500	$16\frac{2}{3}$	1030	....do	15	225	·50	(*b*)	500
May 14	470	$15\frac{2}{3}$	1032	....do	14	215	·40	4·11	470

Average daily amount of urine, 500 c. c., or $16\frac{2}{3}$ fluid ounces; average daily amount of urea, 15 grams, or 230 grains; average daily amount of uric acid, ·$47\frac{1}{2}$ gram, or $7\frac{1}{3}$ grains; average daily amount of chlorine, 3·90 grams; approximate average daily amount of total solids, 32 grams, or 493 grains, ratio of uric acid to urea, 1 to $31\frac{1}{2}$.

a The urea determinations in this case were kindly made for me by Dr. Leffmann.

b Not estimated.

In addition to the foregoing cases, through the courtesy of Dr. Charles A. Oliver I am able to report one, followed to its termination, in which albumin was evidently totally absent from the urine throughout the course of the disease. This case was originally sent to Dr. Oliver for an eye examination. No suspicions of renal trouble had been entertained until the fundal changes were noted.

* Dr. de Schweinitz's report is as follows:

Central vision, after the correction of an astigmatism, 6/6; field of vision for form normal, slightly contracted for colors. In the right eye iris somewhat sluggish to the reactions of light and shade; moderate optic neuritis, the apex of the swelling being 1 D. above the level of the surrounding eye-ground, the grayish swelling being chiefly confined to the disk; no hemorrhages or splotches. In the left eye, a vertically oval optic disk, gray in its deeper layers, the upper and lower edges hidden and the nasal edges veiled; a patch of atrophic retino-choroiditis up and out from the papilla, numerous glistening reflexes in the macula, and above the fovea some dark radiating streaks, apparently in the retina. Under the influence of iodide of potash and bichloride of mercury, in dose of 5 grains and one twenty-fourth of a grain, respectively, three times a day, the appearances of the eye-grounds steadily improved, and at the last visit, May 23, 1893, one month after instituting the treatment, the disk upon the right side was less swollen, the temporal edge being visible. The disk upon the left side had improved in appearance, but there was no change in the patch of choroiditis or in the macular lesions.

Dr. Oliver has furnished me the following note of this case:

Miss X., aged 19 years, an apparently strong and healthy girl of refinement and education, without any hereditary taint, was sent to the writer by her attending physician for recurrent frontal cephalalgia, associated with muscular and accommodative asthenopias. Careful examination of the fundus oculi showed the existence of a few faint flecks and dots in each macular region. So highly significant of renal disease were these changes that the medical adviser was warned as to their nature. Repeated chemical and microscopic examinations of samples of urine, voided at different hours of the day and under varying conditions, up to within one week of her death (the last examination), failed to reveal either to her physician, the writer (Dr. Oliver), and more competent authority, any albumen, tube casts, or other characteristic organic or mineral excreta—the specific gravity always remaining about normal. In spite of these negative results, low grades of neuro-retinitis, with and without fine spray-like hemorrhagic extravasations, came and went, until in about seven months after her eye-grounds were first studied, a uræmic attack suddenly appeared after exposure to cold, resulting in coma and death. Post-mortem examination revealed the presence of granular kidneys, with cardiac hypertrophy.

In reference to your inquiry as to the tests for albumin employed, I would state that, in every instance in which I examined the urine, the specimen was filtered and boiled, followed by the careful and slow addition of either nitric acid or acetic acid; this method was invariably followed by Heller's test, both by superimposing the urine upon the acid or allowing the acid to flow drop by drop beneath the urine along the incline test tube. In quite a number of instances I supplemented this by the application of heat, proving the presence of acid urates, which I afterward confirmed by the microscopic appearances of the ordinary six-sided rhombs. The specific gravity in some of these latter specimens, I remember, was somewhat high—1,024.

The specific gravity of the urine never fell below 1016, and 1024 was the highest.

Since beginning this investigation specimens of urine have been submitted to me from several cases of undoubted chronic Bright's disease in which the accompanying symptoms and the presence, in three, of so-called "albuminuric" retinitis had rendered the diagnosis very clear. In these, changes in the fundus were present in all, and considerable hesitancy had been felt by the medical attendants in accepting the opinion of the oculists as to the probable renal nature of the retinal condition because of the absence of albumin. In two of these cases albumin had been frequently examined for by heat and by nitric acid, over a long space of time, but never found; and casts had not been detected, save a single hyaline cylinder on one occasion in the urine of one of these. These examinations of the urine had not been made for some time when daily specimens of the twenty-four hours' urine were submitted to me. Examinations for urea and uric acid over some days, as in the preceding cases, were instituted, the result of which need not be detailed here. In one, a senile case, passing scanty, light-colored urine, of low gravity, out of 5 specimens of the mixed twenty-four hours' urine examined, response for albumin occurred twice; on one of these occasions to acetic acid and potassium ferrocyanide, and, slightly, to heat and acid—these two tests were then the only ones used. No casts could be detected in two examinations, no sediment being obtainable even with the employment of the centrifugal machine.

In the other case, under the care of the same physician, out of 8 specimens examined on different days, response to albumin occurred twice; on one occasion only to the more delicate tests, and on the other slightly also to heat. Epithelial and granular casts were found in the urine of this patient. Since these examinations the physician reports detecting albumin on a single occasion by nitric acid, and also by heat. Because of the even occasional presence of albumin in these cases I have not included them in my list. Both pass a diminished amount of urine, but are without dropsy. Slight uræmic symptoms are present. The arterial tension in both is habitually high. In one cardio-vascular changes are present. In the other, aged but 32, no arterio-sclerosis exists.

One other case of which I have notes, in which retinal changes occurred without albuminuria, is interesting, and may here be briefly referred to. This I recently saw through the courtesy of Dr. L. Wolff.

Symptoms of digestive disturbance had at first alone been complained of. For these the patient, a woman aged 50 years, was treated by Dr. Wolff. Subsequently, when not under the doctor's care, her eyesight began to fail markedly. She then sought the eye dispensary of St. Agnes's Hospital for relief. The attendant there told her the trouble was renal, advising her to seek her physician, that her urine might be examined. Repeated search was then made by Dr. Wolff for albumin, without result. Examinations were then also made by the oculist, who was unable to understand the absence of albumin with such symptoms. It is needless to state that his search at the time of Dr. Wolff's examinations was also resultless. Later, Dr. Wolff lost sight of the case, but recently sought her out for my benefit. We found her suffering with pyelitis, which prevented the further study of the kidney condition from the point of view of absent albumin.*

As to the probable pathological nature of the kidney lesion in the preceding cases, the histories of which I have detailed, little more than conjecture is possible. Clinically, they form a series of various stages of a common ailment. Three of the 6 are young adults, and 3 in middle life. All present certain common symptoms which are referable to derangement of the renal functions, such as headache, vertigo, loin pain, high-tension pulse, diminution in the amount of urine, and in the most important of its constituents; the presence of casts, hyaline, granular, and waxy, and of isolated renal epithelia: the absence of albumin and of dropsy.

Detectable cardiac enlargement, hypertrophy, or dilatation, is absent in all, and thickening of vessel wall is recognizable in but one (Case III), although raised arterial tension, save on a strictly nonnitrogenous diet, is habitual in all save Case V.

It may be said that the assemblage of symptoms presented by these cases is typical of no distinct form of chronic nephritis, though their trend is suggestive of granular or cirrhotic kidney, or of the form described by Delafield† in his pathological classification of renal disease, as chronic diffuse nephritis without exudation.

The only form of chronic Bright's disease of which we have knowledge, in which the urine may be persistently albumin-free, is this or the red, granular, or cirrhotic kidney. Yet several, as regards age and absence of cardio vascular changes, and all as regards diminution in the amount of urine habitually passed, with coincident more or less marked diminution in elimination of urinary solids, and especially of urea, do not respond to the type of so-called fibroid kidney. But that fibroid changes are present in the kidney in all, accompanying whatever other alterations that may exist, there is probably little doubt.

As regards epithelial involvement, the absence of albumin, of dropsy, and of epithelial casts are against any extensive affection of the tubules; yet the presence in the urine in all of tubular epithelium, of granalar, numerous hyaline, and, in one, of waxy casts, and the marked diminution of urinary solids indicate some involvement of these parts, though perhaps not as yet to a degree more than what may be termed *functional*.

Glomerular nephritis of pronounced type is quite impossible without albuminuria, yet glomerular changes, of the nature of thickening of capsules, of tufts and of vessels, are not improbable,‡ and may account for diminution in amount of urine, a symptom present in all, and especially in Case V., a young girl in whom scarlatinal dropsy occurred when aged six years, and in whom also, now, slight ephemeral disseminated œdema of the skin occasionally occurs.

Little further comment need now be made on these cases, the purpose of this paper not being subserved by mere speculation. It is not claimed for them that the urine is perpetually albumin-free, or that it will remain so to the end, as in Dr. Oliver's

*Dr. Wolff informs me, as this paper is going to press, that she recently died suddenly. No autopsy was obtained.

† American Journal Medical Sciences, October, 1891.

‡ Mahomed believed that absent albumin, in certain cases of chronic Bright's disease, may be due to thickening of vessels of Malpighian tufts, through which it is difficult for albumin to transude; and also to thickening of the capsules of the tufts, preventing distention of vessels; and again, though less often in chronic Bright's disease than in acute, to protective contraction of the renal artery.

case. The present report is intended but as preliminary, to direct attention to a very similar class of cases of chronic Bright's disease apparently of not uncommon occurrence, in which, during the period of observation, albumin has been invariably absent to ordinary tests, and usually to those most refined—at a time, too, when marked indications of renal derangement have been evident.

Subsequently a further report on these cases will be made, with the addition of others that I may be able to encounter and study. My one object now, to which all other thoughts are subordinate, is to direct especial attention to this class of cases, the pathological classification of which will readily come when they obtain general recognition clinically.

The most important teaching of this paper, to which all should give heed, is that there is no doubt that but little stress can be laid on the mere absence of albumin from the urine in rejecting or confirming a diagnosis of chronic Bright's disease; that in any instance in which an examination for albumin is demanded as a part of an investigation to detect or exclude disease, no decided opinion dare be ventured as to the absence of the latter without further search of the urine, to determine not only the mere presence or absence of morphological kidney elements,* such as casts or epithelium, but also to discover the condition of the secretory renal function. As the latter can only be determined by an examination of a mixed twenty-four hours' specimen of urine, the total daily amount passed must be known. It should, therefore, be a rule, admitting of no deviation, in all cases of suspected Bright's disease in which albumin is undetectable in a single unmixed specimen, to obtain that of the total of one or, better, a consecutive series of twenty-four hours. Then, too, when albumin is absent in a single unmixed specimen, it may sometimes be discovered in that of the total twenty-four hours, when the more delicate tests are intelligently employed.

PSILOSIS (?) PIGMENTOSA.

By CUTHBERT BOWEN, M. A., M. D.,

General Hospital, Barbados, West Indies.

During the past four years I have seen so many cases of chronic diarrhœa—often ending fatally—in which a peculiar inflammation of the mucous membrane of the mouth is accompanied by a clearly-defined symmetrical pigmentation of the dorsal aspects of the hands and feet, that I have been forced to the conclusion that this triple association is not an accidental one, but is pathognomic of an epithelial disease *sui generis*, possibly peculiar to Barbados, or else closely allied to a specific disease of the alimentary canal which has its habitat in the East Indies, and has been accurately described by Dr. Thin, of London, as "psilosis linguæ et intestini."

The main features of this latter condition, as described by Dr. Thin, are "inflammation of the mucous membrane of the mouth and alimentary canal and chronic diarrhœa, portions of the tongue and the whole of the œsophagus being denuded of epithelium, and the entire mucous membrane of the ileum found in a shrunken, wasted, and sclerosed condition." The Dutch physicians of Java recognized the condition as possessing characteristics sufficiently unique to distinguish it from the ordinary chronic diarrhœas and dysenteries prevalent in tropical countries, and

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* Nor should these be excluded until a search of sediment, obtained by the use of the centrifugal machine, is made. Notwithstanding it is accepted that the mere presence of hyaline and granular casts, though highly suggestive, is not pathognomonic of an actual coarse kidney lesion, their presence in the urine always indicates at least functional disturbance of the kidney: and when not due to alterations in blood-pressure (congestion and associated albuminuria), and when accompanied by the presence in the urine of renal epithelium, or when associated with symptoms of renal inadequacy and persistently raised blood-pressure, it may be safely asserted that chronic nephritis exists.

Fig. I THE TONGUE IN "INDIAN SPRUE" (OR PSILOSIS) AS DESCRIBED BY D^{r} THIN.

Sackett & Wilhelms Litho Co N.Y.

Fig. 2. THE TONGUE IN "PSILOSIS PIGMENTOSA" AS DESCRIBED BY Dr. CUTHBERT BOWEN SHOWING INJECTED PAPILLÆ AND FOUR APHTHOUS SPOTS.

Sackett & Wilhelms Litho Co. N.Y.

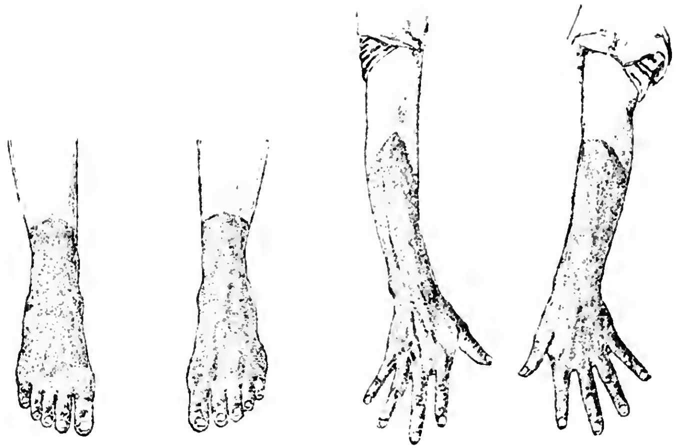

Fig. 3.—PIGMENTATION OF HANDS, ARMS, FEET, AND LEGS IN PSILOSIS PIGMENTOSOS.

gave it the name of "sprue," a term also employed in certain parts of Scotland to designate aphthous stomatitis.

Like many terms still in use, the word "sprue" carried with it no indication of the nature of the disease; and in order to emphasize the peeled condition of the mucous membrane of the alimentary canal always found in cases of "sprue," Dr. Thin suggested the adoption of the word *psilosis* instead.

This term, which is derived from the Greek ψιλόω (pluck, make bare, or strip), simply calls attention to the state of the tongue and mucous membrane, *i. e.*, that they are stripped or denuded of their epithelium, a symptom not confined to "sprue," but seen in cancer of the pyloric orifice, dysentery, and the final stages of exhausting intestinal maladies. Hence I take it that any condition in which the tongue and mucous membranes are found bare of epithelium may, without impropriety, so far as the etymology of the word is concerned, be spoken of as a *psilosis*. It is in this limited sense that I have ventured, in the absence of any etiological data from which to elaborate a more appropriate or original nomenclature, to borrow from Dr. Thin's vocabulary the term *psilosis* as a temporary heading under which to introduce the disease I am about to describe, it being distinctly understood that I do not believe that in Barbados we are dealing with the identical disease to which the term *psilosis*, in its technical adaptation by Dr. Thin, strictly speaking, belongs, although clinically there is a strong resemblance between their respective alimentary manifestations. The difference in the tongues is well shown in the drawing (fig. 1), and there appears to be no accompanying cutaneous pigmentation in Dr. Thin's psilosis. At any rate, the qualifying adjective "pigmentosa" will prevent confusion of the condition which forms the subject of this paper with the class of cases recognized as psilosis in the East Indies, and at the same time will call attention to one of the most prominent features of the former.

The external manifestations of *psilosis pigmentosa*, as we see it in Barbadoes, are a crimson peeled condition of the mucous membrane of the tongue and buccal cavity. The lips externally, as shown in the drawing (fig. 2), are bright red and especially vivid in black people. In mulattoes the contrast with the surrounding skin is less marked, while in the latter the pigmentation on the dorsum of the hands and feet is naturally more pronounced. The tongue, when protruded, assumes a long, narrow, pointed shape. Its papillæ are elevated, and aphthous ulcers are often, though not invariably, found on its lateral margins. Saliva constantly dribbles from the mouth, the patient filling cup after cup, both by day and night. This salivation, Dr. Thin tells me, does not occur in East Indian psilosis. Partly owing to the rawness of the mouth and partly to the constant accumulation of the saliva, speech is both painful and difficult, the secretion having to be swallowed or expectorated with every sentence. When the disease attacks the robust, the general appearance of the patient may be healthy, but in the latter stages the condition is one of extreme emaciation. The redness of the lips and tongue can be recognized from a considerable distance. In addition to these alimentary symptoms, the backs of the hands only in some cases, in others the dorsal aspects of the feet as well, are seen to have taken on a coal-black pigmentation. In light mulattoes it is more marked. It often assumes the form of a gauntlet. The pigmentation of the extremities, in the only two instances in which I have seen the disease in white persons, was of the hue which results from painting the skin with tincture of iodine. As will be seen on reference to the accompanying drawings, the pigmentation is very symmetrical, its limits being almost identical on the two sides of the body. It often extends no higher than the flexures of the wrists, but in the majority of cases reaches the level shown in the illustration (fig. 3). The symmetry of these lesions is most striking and highly suggestive of syphilis; and, indeed, in the first few cases which came under my notice, there was undoubtedly a syphilitic accompaniment.

Latterly, however, I have been able in several cases entirely to eliminate syphilis as an etiological factor. As regards the etiology of this curious disease I have at present no suggestions to offer. The pathological process giving rise to the foregoing picture is by no means clear. Its clinical features are, however, unique, and will, I think, best be appreciated by a record of a few typical cases which I have selected out of some thirty which have presented themselves to my notice at the general hospital, Barbadoes. The features of the disease are unmistakable and constant. The only variation is in their severity.

On October 23, 1890, a black woman, Mary Lynch, aged 50, was admitted to the general hospital in what appeared to be the final stage of *psilosis pigmentosa*. Her family history was good. She had been the mother of ten children, eight of whom, at the time of her admission, were dead. The fourth and tenth child, aged 15 and 9 respectively, were alive and well. She had never had an abortion or premature labor. There was no history of rheumatism, alopecia, or sore throat. Her reputed husband had always been a very healthy man, and was at the time cohabiting with another woman, by whom he had several other healthy children. As far as I could gather from her statements, there had not been any syphilitic taint in any of the children. Still, the fact of eight out of ten being dead looked suspicious, and although I could detect in the mother no evidence of syphilis, I placed this case at the time in the category of "doubtful cases,"—*i. e.*, among a certain number in which I was unable absolutely to exclude syphilis as an etiological factor. According to her own account she had always been a healthy woman until two years previous to her admission, when she began to have dyspeptic symptoms,—*i. e.*, a sense of distention at the epigastrium, eructations of gas, and water-brash, the fluid eructated leaving a burning sensation in the pharynx and down the œsophagus. With this there has been an increased secretion of saliva and irregularity of the bowels. For some weeks there would be diarrhea and then spells of constipation.

Finally, there had been constant diarrhea, salivation, and loss of flesh. On her admission this woman's condition was most pitiable. She was terribly emaciated, worn almost to a shadow, the lips and entire mucus membrane of the mouth glazed and red. Confluent patches of aphthæ covered the tongue and lining mucous membrane of the mouth. The tongue was scarlet, perfectly raw, devoid of moisture, and, when she fell asleep, apt to adhere to the gums and roof of the mouth. Swallowing of the blandest materials caused most excruciating pain. She had constant diarrhea of a grayish, frothy character, the passages so numerous that no record could be kept of them, and so offensive that the patient had to be isolated. The backs of the hands, as far as the flexures of the wrists, were pigmented. With the gradual amelioration of the symptoms the pigmentation wore off, and when in six months' time she left the hospital, there were no traces of it to be seen.

The treatment in this case was purely empirical. Absolute milk diet, with flaxseed tea to moisten the tongue. Bismuth, pepsin, and opium, chlorate of potassium, turpentine, and nepenthe, and extract of coto, were all tried in various combinations, but without apparent success. Finally, on February 10, Kirby's mixture was tried, and coincidently with its administration there appeared to be a marked improvement. By March 12 she had so far recovered her digestive powers as to be able to assimilate raw chipped beef treated with hydrochloric acid, and on March 23 she was given the "full" diet of the hospital. The points worthy of note in this instance were the apparent amenability to dietary and therapeutic measures of a case in such an advanced stage, which is the more puzzling when the severity of the pathological lesions in the intestines in similar cases is considered. I have heard nothing of the woman since she left the hospital, but I can not believe her relief was more than temporary, and I suppose she will return to the hospital when the final outbreak of the disease comes on. From this case we also get a typical picture of the third stage of *psilosis pigmentosa*. Death invariably ends the scene in a short time. I have not since seen a case in that advanced stage recover.

October 10, 1891, a healthy looking mulatto woman, aged 54, came to the outpatient department of the general hospital, complaining merely of constant eructations of gas and salivation. She had been suffering for two months in this way, but had had no medicine. The salivation in cases of *psilosis pigmentosa* bears no resemblance to that caused by mercury, and is not likely to mislead any one. This woman's general condition, family history, and previous history were excellent, with one exception. She was a nurse, the daughter of two well-known, respectable married people, and had had thirteen brothers and sisters. All her brothers and sisters had been quite healthy. Both her parents had lived to extreme old age. Twenty years previous to my seeing her, the elder Dr. Manning had amputated her left breast. (Cancer?) With this exception, she had never had a day's illness. Her tongue was narrow and pointed, slightly glazed, and of the typical scarlet color. The lining of an ordinary red pill box is approximately the color of a *psilosis pigmentosa* tongue in the acute stage. Saliva was being constantly secreted so as to interrupt her conversation, and she complained of her intestines feeling "as though a pot was boiling inside them."

At first there was no diarrhea, but great irregularity in the movements. A fortnight before her admission she stated that her hands had turned black on the dorsal aspects, but at the time of her admission they were normal again. She stated that they had been black two months previous to that, and had similarly become normal by the blackened skin peeling off. This often occurs, and in the recurrent cases patients assure me they can always associate the acuteness of the diarrhea with the increased pigmentary deposit on the hands and feet. On her admission she was placed on a milk and arrowroot diet, and given a mixture of bismuth and *pulv. kino comp.*

This, however, failed to check the diarrhea entirely. Rectal injections of nitrate of silver were also tried, and by November 10 she had so far improved as to be able to eat broth diet, and by November 19 full diet with meat. On December 9 the diarrhea came on again, and from this time her progress was rapidly downward. No medication seemed to check the constant diarrhea, and she died of exhaustion on the 31st of December, *i. e.*, in eighty-two days from the time she presented herself in the out-patient department, complaining only of dyspeptic symptoms.

In the later stage of the disease the symptoms were identical with those of Mary Lynch, and need not be recapitulated. The lips fiery red, the tongue raw, adhering to the inflamed buccal cavity when not artificially moistened, and yet saliva constantly pouring from the mouth so as to fill many cups in a day; the body wasted to a shadow, and yet no physical signs to indicate trouble in any other organs than the intestines. At no time was there any vomiting, fever, or headache. In this case the post-mortem appearances, as in all the others, were in accord with the clinical features, and will be described later on, together with the microscopical appearances of the intestine, which are identical in all cases.

This woman had a history of possibly cancer of the breast, and in a great many of the cases which I have seen there has been great difficulty in eliminating syphilis, cancer, leprosy, tubercle, etc., as possible antecedent conditions. I will therefore omit the details of all but those in which I feel certain of the disease being purely idiopathic.

F. I., aged 23, was sent to me by Dr. Bannister, in April, 1892. He had been for some time under treatment for chronic irregular diarrhea. He was a healthy-looking young man and presented the typical signs of *psilosis pigmentosa*—*i. e.*, the backs of his hands to the elbows were pigmented and the tongue long, narrow, pointed, glazed, and scarlet. I made a note of his condition, and he returned to Dr. Bannister's care.

I then lost sight of him until August 1, when he was admitted to the hospital. He was placed on a milk diet, and given nitrate of silver and opium in pill form. By August 9 his diarrhea had so far improved that he was given middle diet, and a week later full diet. On September 13 he had diarrhea, and was put on milk diet exclusively. He was also given a mixture of bismuth, tincture of catechu, spirits of chloroform, and infusion of krameria. On this he seemed to improve, and September 30 he could take small quantities of chicken tea. On September 30, as the diarrhea seemed to linger on, he was ordered injections per rectum of sulphate of copper (gr. v–℥i) after each movement. By October 11 his diarrhea was better, apparently, and his diet was changed to rice, milk, chicken, bread, and English potatoes. From November 2, quinine and arsenic were given him as a tonic. November 19 he was given full diet, but two days later, as there were symptoms of diarrhea, he was placed on absolutely milk diet, and was kept on it until his death on February 17, 1893, the usual astringent drugs being tried in succession, but to no purpose.

At the time of his death he had been in the hospital seven months consecutively. I thus had an opportunity of watching a case of this curious disease from its inception in a healthy young man until its fatal issue in eleven months' time. The features of the disease in its later stages were identical with those recorded before. At the post-mortem, which I made the day following his death, I found the condition of the organs as follows: The lungs were pale, white, friable, and apparently free from any tuberculous infiltration. Microscopically, a slight catarrhal bronchitis was revealed, which during life had given evidence of its presence by a few moist râles, but otherwise the lung was perfectly healthy. There were no pleuritic adhesions on either side. The pericardium and heart were normal and all the valves competent. The liver appeared smaller than normal, but not to a greater extent than would be accounted for by the general wasting of the body. There were no signs of gummata about it. The spleen was somewhat softened, the œsophagus was reddened, apparently denuded of its epithelium, while the stomach was normal. The kidneys were unaltered. The intestines were very thin, white, and transparent looking, the small intestines at intervals of a few feet being puckered, as though they had been ligatured at these spots. This puckering corresponded to a circular ulceration on the inner side of the gut, which had destroyed the entire mucous membrane at the intervals indicated above. The remaining portion of the intestine between the sides of this annular ulceration was highly inflamed. The large intestine was a mass of ulceration, being spotted with tiny circular ulcers varying in size from a pin's head to a split pea. The ulceration was very intense in the rectum, but presented none of the characteristics of syphilis. Microscopically, the villi of the small intestine were found to be entirely devoid of their columnar epithelium. This is well shown in the drawing (Fig. 7). Towards the seat of the annular ulceration they diminished gradually in size. The ulcer itself extended only partly through the submucous tissue. The glandular structure of the intestine was entirely destroyed, its place being taken by a purely adenoid reticulum infiltrated with leucocytes. The circular muscular fibers gradually disappeared as they approached the annular ulcer, and were finally lost, the submucosa, greatly thinned, forming the floor of the ulcer. As tubercular ulceration often runs, as in these cases, transversely round the bowel, it may be as well to draw attention to the fact that the villi in tubercular ulceration are enlarged and infiltrated and the circular muscular fibres swollen and enlarged. The peritoneal coat also is thickened and vascular, a condition not observed in my case. Giant cells would of course be found in the submucosa, the tubercular nodules extending into the muscular coat.

Besides this, there are no indications of *psilosis pigmentosa* being clinically like tuberculosis.

While the pathological process underlying cases of *psilosis pigmentosa* is very evident under the microscope, the etiology of the disease is obscure. Neither age, sex, nor occupation can be considered as etiological factors. The earliest age at which I have seen the condition is three years, yet the pigmentation of the hands and the scarlet tongue were as well marked as in the adult. In the majority of cases, however, my patients have been adults. It occurs more often, I think, in women than in men, but I have not seen enough cases to speak positively on the subject. The disease is liable to intermissions, but may run its course without abatement in six or seven months.

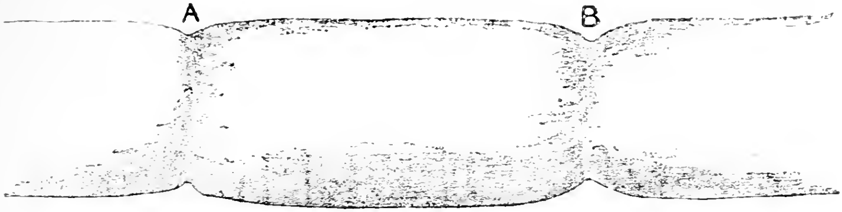

Fig. 4.—THE INTESTINES IN PSILOSIS PIGMENTOSA. THE ILEUM AS SEEN FROM THE OUTSIDE.

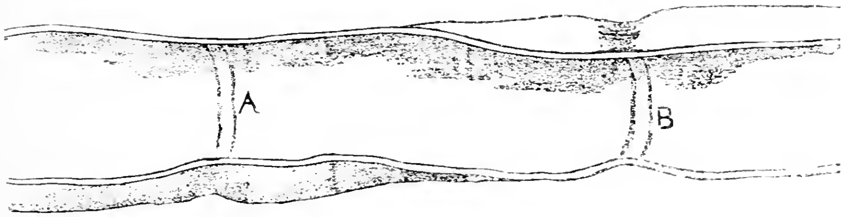

Fig. 5.—THE ILEUM AS SEEN FROM THE INSIDE.

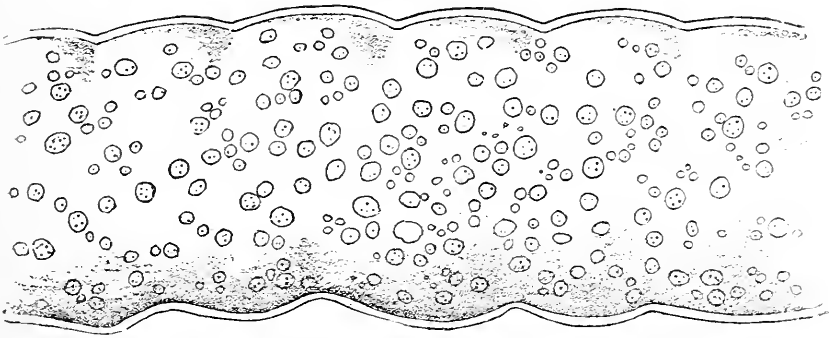

Fig. 6.—INTERIOR OF THE LARGE INTESTINE, SHOWING THE EXTENT OF THE PUNCTIFORM ULCERATION.

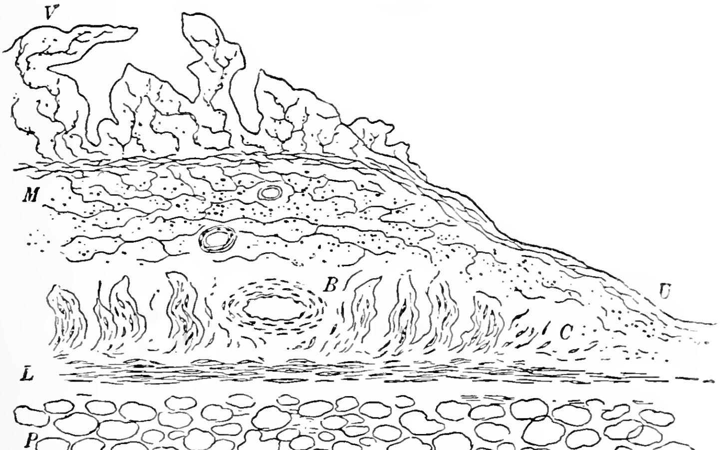

Fig. 7.—MICROSCOPICAL APPEARACE OF THE SMALL INTESTINES IN PSILOSIS PIGMENTOSA.

V, vili entirely denuded of ipithelium; *U*, site of annular ulceration, the vili entirely destroyed; *B*, blood vessel in circular muscular coat, showing thickening of wall; *C*, circular muscular coat, gradually disappearing; *L*, longitudinal muscular coat; *P*, peritoneal fat; *M*, submucosa with entire loss of gland structure.

In constitutions previously undermined by syphilis, leprosy, tuberculosis, or alcoholism, its course is more rapid.

Until further researches reveal the cause, treatment can only be palliative. In mild cases absolutely milk diet and intestinal astringents will at any rate not aggravate the disease. Nitrate of silver and opium by the mouth and rectal injections of the sulphate of copper seem to be indicated at times; but so far as my therapeutic knowledge goes we have no remedy capable of restoring the epithelium to an intestine *psilosed* to the extent shown in the drawings. As Dr. Thin aptly remarks to me in a private letter, "We are only now beginning to distinguish separate tropical intestinal affections which have been all roughly jumbled up together on account of diarrhea, an abnormal tongue, digestive symptoms, and emaciation being common to all." In an association of medical men in which the tropics are largely represented, I trust much additional light may be thrown on this at present obscure condition.

THE CULTURE OF ANAEROBIC BACTERIA.

By FREDERICK G. NOVY, Sc. D., M. D.

Of the two classes of micro-organisms with which the bacteriologist has to deal, the aerobic bacteria have received the most, and the anaerobic bacteria the least attention. The introduction of liquid and of solid transparent media has enabled the culture of the former to be carried on with the greatest ease, and for that reason the vast majority of bacteria known at the present day and all those forms, with the exception of three or four, which are commonly cultivated in laboratories belong to the aerobic class. Systematic and thorough examinations are constantly being made of the bacteria found in water, air, soil, in disease and in fermentation, and yet as a rule such examinations are conducted wholly with reference to the presence of aerobic bacteria. It is true that most of the pathogenic bacteria known at the present day belong to this class, but it is likewise true that in the anaerobic class are to be found bacteria equally important.

The first known representative of this group was described by Pasteur in 1861 under the name of "vibrion butyrique" or "butyric acid vibrio." This discovery and the subsequent work carried on in this connection firmly established the existence of micro-organisms which were not only capable of living, but were actually compelled to live in the absence of oxygen. The next important step was made in 1878, when Pasteur, Joubert, and Chamberland described the first pathogenic anaerobic bacillus, the "vibrion septique" which at present is known to the scientific world through the labors of Koch and of Gaffky as the bacillus of malignant œdema. Since then two other pathogenic anaerobic bacteria have been described, namely, the bacillus of symptomatic anthrax by Arloing, Cornevin, and Thomas (1880) and the bacillus of tetanus by Nicolaier (1885).

As already stated, most of the bacteriological work carried on hitherto has been with aerobic bacteria, and as a result, the known representatives of this class may be numbered by hundreds, while, on the other hand, the much neglected group of anaerobes scarcely includes a dozen. It must not be imagined for a moment that this great difference actually represents the relative numerical existence of the representives of these two classes, for such is not the case. There is every reason to believe that the number of pathogenic and nonpathogenic obligative anaerobic bacteria is much greater than is commonly supposed.

The explanation for this marked difference must therefore be sought elsewhere. It may be said that the chief reason lies in the ease and convenience with which aerobic bacteria can be cultivated, whereas the culture of anaerobic bacteria is tedious and difficult and requires special apparatus. Suitable apparatus and suitable culture media, especially the latter, are prime requisites in growing anaerobic bacteria. Numerous methods and different kinds of apparatus have been at various times described, and while some of these are good yet most of them, it must be confessed, are far from being satisfactory.

The methods of anaerobic culture can be described under the following heads: (1) Exclusion of oxygen; (2) exhaustion of air; (3) absorption of oxygen; (4) displacement of air; (5) cultures in the presence of air.

I. EXCLUSION OF OXYGEN.

The methods that have been described under this head attempt to exclude or prevent access of oxygen to the culture medium. This object can be accomplished, to a greater or less extent, by the following methods:

(1) *Layer of oil.*—Pasteur, as early as 1861, resorted to the covering of culture medium with a layer of oil, and this method was subsequently used by others and tested by Liborius. Approximately anaerobic conditions can thus be obtained, but the method is not one that can commend itself for neatness or exactness.

(2) *Mica plates.*—In 1884 Koch suggested covering ordinary gelatin plates with a thin film of mica, but this was shown by Liborius to possess little or no merit when applied to the culture of obligative anaerobic bacteria. More recently Sanfelice has employed, with good results, a modification of this method. Gelatin or agar plates are made as usual and then covered with a sterilized glass plate. The colonies which thus develop can be readily examined under the microscope and are accessible for transplantation.

(3) *Deep layer culture.*—This method, so commonly and successfully employed at the present day, was introduced by Hesse (1885) and later was more extensively applied by Liborius. It is exceedingly convenient and enables one to obtain stick cultures or isolated colonies in gelatin or in agar. All that is necessary is to employ a deep layer of the nutrient medium 4 to 6 cm. high. Growth takes place in the lower part of the tube since access of oxygen is prevented by the upper layer of the medium. Very often an extra layer of agar or gelatin is poured upon the surface of the inoculated medium, but this, as a rule, is unnecessary. Colonies may be obtained by inoculating the culture medium while liquid, and then, after solidification, covering the contents of the tube with an extra layer of gelatin or agar. The latter addition, however, is not necessary, since growth occurs without it, beginning at about 1 cm. below the surface of the medium. The colonies are usually reached, for purposes of transplantation, by breaking the tubes. The procedure of Sanfelice is undoubtedly preferable. In this the bottom of the agar tube is warmed and the agar cylinder is then shaken out upon a sterilized plate or dish, where it is cut up into parallel disks or sections. The colonies can then be examined under the microscope and transplantations made in the usual manner.

Liborius, in his work on the anaerobic bacteria, made plate cultures in the usual manner and then covered these with an extra layer, 1.5 cm. deep, of agar. In this way he succeeded in obtaining colonies of malignant œdema, which he failed to obtain with ordinary plates in hydrogen.

The roll-culture method has also been recommended by Esmarch for obtaining colonies of anaerobic bacteria. For this purpose the gelatin or agar is inoculated and dilution made, as usual. The medium is then caused to solidify on the inside of the tube in a thin layer, and while cold the tube is filled with liquid gelatin or agar.

The principle of deep-layer culture was applied in 1887 by Vignal to the so-called glass-tube culture. A tube about 1 m. in length is drawn out at one end and plugged with cotton at the other. When sterilized it is inserted into the inoculated gelatin or agar, and by suction this is now drawn up into the tube. When full, both ends are sealed and the tube is set aside to solidify and develop. Isolated colonies in this way are readily obtained and can be reached by cutting the tube. This procedure of Vignal has virtually been redescribed in 1890 by Van Senus, who employed a tube bent in U-form so as to siphon off the inoculated liquid gelatin from the test tube.

The Roux pipette cultures, where special pipettes are filled with inoculated gelatin and then sealed at both ends, may also be spoken of as modified glass-tube cultures. Capillary tubes have similarly been used by Klebs and by Salomonsen and more recently by Nikiforoff.

Another modification of the deep-layer culture is to exclude the oxygen, not by an extra layer of the culture medium, but by growing on the surface of the agar or gelatine some germ which has marked avidity for oxygen. With this object in view Roux (1887) recommended the bacillus subtilis. The proteus vulgaris has been employed for a similar purpose by Liborius (1886).

Under this same head may be mentioned the egg-culture of Hueppe (1888) and the deep potato cultures of Gaffky (1881), by which he cultivated the bacillus of malignant œdema.

II. EXHAUSTION OF AIR.

It would almost naturally suggest itself to obviate the deleterious action which the oxygen of the air exerts on the growth of anaerobic bacteria by exhausting the air from the culture tube or apparatus by means of a suitable air pump.

(1.) Direct vacuum cultures.—The principle of vacuum culture was applied by Pasteur, Joubert, and Chamberland in their study of the "vibrion septique." These investigators employed a special and complicated form of glass apparatus consisting of a U tube, with sealed ends and with lateral attachments. The convex portion of the tube is connected with a glass tube which is sealed as soon as a vacuum is made.

The method of Gruber (1887) is commonly employed at present for obtaining vacuum cultures. Special large-sized test tubes, with constricted necks, are employed. When inoculated the tube is connected with an air pump, or an aspirator and is finally sealed in the flame of a Bunsen burner or blast lamp. A somewhat similar vacuum tube, provided with a side tube connection, has been employed in the same way by Roux (1887). An excellent advantage of this method lies in the fact that it can be utilized in obtaining colonies. For this purpose the tubes as soon as sealed, may be converted into Esmarch roll cultures.

To obtain colonies in a vacuum, Roux recommended the use of a large tube, with constricted neck, which is evacuated, then sealed, and placed on its side to develop.

The apparatus described by Klebs is adapted to show the effect of partial vacuum (or compression) and consists of a tabulated bell-jar inverted over mercury.

(2.) Instead of producing a vacuum direct by exhaustion some investigators have resorted to the expulsion of air by aqueous vapor. The special tube or flask contains the nutrient medium which is boiled until all the air is expelled by the aqueous vapor, then sealed, and when cool the medium is inoculated from a side tube attachment. Such apparatus has been employed by Pasteur, Hüfner, Rosenbach, Liborius, and Aitken. This process, however, may be said to be obsolete at the present day, inasmuch as any desirable vacuum can be readily obtained with a pump without concentrating the culture fluid to such a marked extent as is usually done in this method.

III. ABSORPTION OF OXYGEN.

All methods based upon this principle utilize the fact that an alkaline solution of pyrogallic acid absorbs oxygen with avidity. This method was first employed by Nencki, in 1880, to demonstrate the existence of anaerobic organisms. A practical application, however, was not made until 1888, when H. Buchner devised the method which bears his name. The culture tube is placed inside of a larger one, in the bottom of which is an alkaline solution of pyrogallic acid, and the outer tube is then closed with a rubber stopper. As can be readily seen, this method is exceedingly simple and can be resorted to at any time. Babes and Puscariu have employed the same method with excellent results for serial cultures of the bacillus of tetanus. For this purpose the tubes were placed in a Fresenius desiccator, in the bottom of which was a large quantity of alkaline pyrogallate solution.

Trambusti (1892) has constructed a special apparatus for obtaining plate cultures of anaerobic germs by means of this solution. The principle has also been applied in two different ways in making hanging-drop examinations of anaerobic bacteria. Thus, Braatz (1890) designed a special slide made by Desaga, of Heidelberg, whereas Nikiporoff (1890) employed the ordinary concave slide, or that of Schultze.

IV. DISPLACEMENT OF AIR.

This can be readily accomplished by passing through the culture apparatus a current of indifferent gas. Hydrogen is commonly used for this purpose, inasmuch as it is ordinarily held to be an inert gas. There seems to be considerable reason to believe, however, that hydrogen is not absolutely inert, inasmuch as it is a matter of frequent experience to find cultures fail of development where hydrogen has perfect access, as in plates, Esmarch roll tubes, and surface streaks on agar. Nevertheless, it may be truly said that hydrogen is the best gas that we have at present for anaerobic culture.

Carbonic acid has been used a great deal by the French bacteriologists. It is not, however, an indifferent gas, inasmuch as when absorbed by the culture medium it may render it acid and thus prevent growth. Fraenkel showed, in 1889, that symptomatic anthrax bacillus in bouillon, and malignant œdema bacillus in bouillon and gelatin, failed to develop in carbonic acid, and the experiments of Frankland (1889) also seem to show that carbonic acid not only inhibits the growth, but may even kill bacteria. Kitasato likewise failed to obtain growths of symptomatic anthrax in carbonic acid, although the French investigators of this disease employed this gas almost exclusively. Pasteur, Joubert, and Chamberland employed carbonic acid in cultivating their "vibrion septique," but Gaffky succeeded but once in obtaining cultures of the germ in this gas.

The failure to obtain cultures in carbonic acid has led to its practical disuse for anaerobic work. The difficulty, however, does not lie so much in the deleterious action of this gas as it does in the quality and reaction of the culture medium. As already stated, the culture medium must be given the first attention, as it is the most important condition for the growth of anaërobic bacteria. By using fresh or reheated bouillon, especially 2 per cent gelatin bouillon, or ordinary glucose gelatin having a suitable degree of alkalinity, no difficulty has been experienced in cultivating the bacilli of tetanus, malignant œdema, symptomatic anthrax, and a new anaerobic bacillus, the "bacillus œdematis maligni No. II," which will be separately described. Not only that, but cultures of the latter bacillus and of tetanus have been kept in carbonic acid for a month without losing their vitality.

Nitrogen has also been recommended as an inert gas, and possibly it may prove to be best adapted for anaerobic work. It has not been used to any extent, chiefly owing to the difficulty of obtaining the gas in quantity. In the absorption methods already described the residuary gas is nitrogen, containing small amounts of carbon monoxide.

Other gases, as carbon monoxide, hydrogen sulphide, nitrous and nitric oxides, and sulphurous acids have been studied by Frankland. All these are said to either inhibit the growth of bacteria or actually destroy them and are, therefore, not utilizable.

Illuminating gas has been highly recommended as a convenient means of displacing air from culture tubes and flasks by Wurtz and Foureur (1889). Kladakis subsequently tested the action of illuminating gas on a large number of aerobic bacteria, and also on the tetanus bacillus, and found that with the exception of "proteus vulgaris" the growth was inhibited, and that in some cases the micro-organisms were actually destroyed. For this reason he condemned the use of this gas for anaerobic culture. The conclusion arrived at is not strictly correct, inasmuch as he tested the action of the gas on Esmarch roll tubes made after Fraenkel's method. It is a fact that similar roll-cultures, and even plates often fail in hydrogen, and yet this gas is usually held to be inert and is highly recommended for anaërobic-culture. Furthermore, it shuold be borne in mind that the composition of the gas in different localities may vary considerably and that, therefore, the gas of one locality may be suitable for culture, whereas that of another place may be wholly unfit.

With a suitable culture medium it is not at all unlikely but that cultures of the anaerobic bacteria can thus be readily made. What has been said in connection with carbonic acid is equally true here, and cultures in illuminating gas have been obtained of the tetanus bacillus and the new bacillus mentioned. Such cultures preserve their vitality in that gas for a considerable length of time.

Having thus somewhat briefly considered the various gases which may be used to effect displacement of air, it is desirable to touch upon the various forms of apparatus which have been recommended for use in this connection.

The complex U-shaped apparatus of Pasteur, already mentioned as employed for vacuum cultures, has also been utilized for cultivating anaërobic germs in atmospheres of carbonic acid and hydrogen. The apparatus, however, is far from being satisfactory for general work and is scarcely employed at the present time.

The first attempt at approximating the ordinary tube-culture was made in 1885, by Hauser, who employed test tubes with two lateral tubes through which a current of gas could be passed after which the tubes were sealed. This tube has been improved upon by Liborius, and with this well-known modification anaerobic-cultures can be readily made. As a convenient substitute for the Liborius tube, which may not always be on hand, Roux (1887) recommended an ordinary test tube somewhat constricted below the neck by means of a lamp. Through the cotton plug a sterile capillary tube is inserted and through this hydrogen is passed until all the air is expelled. The delivery tube is then carefully withdrawn and the culture tube sealed in a flame. This same modification has been practically redescribed by Heim and by Ogata (1892).

In the method of Liborius, or its modification, as just given, one serious disadvantage is encountered. The tubes can be employed but once, and this at times—as where a large number of cultures are to be made—may be a source of considerable expense. To obviate this difficulty and to combine the advantanges of the Liborius tube with that of Gruber, led Fraenkel (1888) to introduce a simple and excellent method. He employed ordinary wide test tubes which are closed with a double perforated stopper, through which pass two glass tubes, one of which extends almost to the bottom, and the other reaches just below the stopper. This culture tube, when filled with nutrient gelatin or agar, is sterilized, then inoculated and a current of hydrogen passed through the tube. When all the air is expelled the glass tubes are sealed and the stopper covered well with hard paraffin. In this way cultures can be readily prepared at a trifling expense. A further advantage of this method lies in the fact that the tubes can be used, if desirable, for Esmarch roll-culture, and moreover the growth is always readily accessible.

Sternberg has slightly modified the Fraenkel method in this way. The cotton of the inoculated tube is cut off, then pushed down into the tube and the rubber stopper with two glass tubes is inserted and hydrogen passed into the tube. The glass tubes are finally sealed and the cultures set aside to develop. Essentially the same process as that of Fraenkel was employed about the same time by Brieger and by Hueppe for flask cultures.

The tube-cultures just described are ordinarily employed for bouillon or gelatin cultures. For surface growths on agar or blood serum the method of Fuchs or any of its modifications may be utilized. According to Fuchs (1890) the agar or blood-serum tube is inverted and a current of hydrogen passed in for one-half to one minute. The tube is then rapidly closed with a sterilized rubber stopper, which is rendered perfectly tight by means of paraffin, and set aside in an inverted position to develop. Van Semes (1890) modified this method by first constricting the neck of the tube, and then, after passing hydrogen through a capillary tube inserted through the cotton plug, the culture tube is sealed in a flame. This procedure it will be seen is virtually the same as that employed by Roux, Ogata and Heim. Blücher (1890) inverted the inoculated tubes over dilute glycerin and then passed in hydrogen, whilst still more recently Hesse has advised the use of mercury. The culture tube is inverted over a crucible containing mercury, placed on the bottom of a narrow tall beaker, and hydrogen is passed into the tube until all the air is displaced.

The principle of displacement of air has also been utilized for obtaining colonies of anaërobic bacteria by the usual plate method. Liborius in 1886 employed ordinary glass plates or Petri dishes which were placed on a rubber base and covered with a flat strong cylinder provided with two tubulures through which hydrogen could be passed. The apparatus was rendered gas-tight by compressing the glass jar against the rubber base by means of thumbscrews. Blücher (1890) recommended a simple and easily constructed apparatus consisting virtually of a funnel inverted over a glass dish containing dilute glycerin. Hydrogen is passed through the funnel and the air is forced out at the bottom. A more convenient apparatus is that of Botkin (1890). In this apparatus as many as six Petri dishes can be placed at the same time. Air is excluded by means of liquid paraffin. Hesse has suggested the inversion of a bell jar over mercury contained in a circular trough on a cast-iron plate.

Kitasato in connection with his study of the bacillus of tetanus employed a somewhat peculiar apparatus for plate purposes. This is flat and flask-shaped with the rather wide neck turned upwards. On the upper surface near the farther end is a narrow glass tube which serves to connect with the next dish. These dishes of Kitasato are sterilized and the gelatin or agar, previously inoculated, is then poured in and allowed to solidify on the bottom in the same manner as in a Petri dish. They are now connected together and hydrogen is passed through. When all the air is displaced the ends of each flask are securely clamped, sealed with paraffin, and the flasks are then set aside to develop. A modification of Kitasato's dish has been recently (1893) described by Roth.

The tube recommended by Roux for obtaining plate-cultures in a vacuum may also be employed in connection with hydrogen or other gases. The gas may be introduced by means of a capillary glass tube inserted through the cotton plug, and when the air is expelled this tube can be carefully withdrawn and the neck of the flask sealed in a flame.

Special single plate dishes for anaërobic-culture have been devised by Gabritschewsky (1891), Kamen (1892), and by Ahrens.

It is perhaps well to repeat in this connection that the tubes of Liborius or of Fraenkel can be treated as Esmrach roll tubes and in this way anaerobic colonies can be secured.

V. CULTURES IN THE PRESENCE OF AIR.

All the methods thus far described are more or less complicated, and the ideal method for the growth of anaerobic bacteria would be the one which would do away entirely with special apparatus and in which the growth would take place under conditions similar to those employed in connection with the culture of aerobic bacteria. With such an object in view Kitasato and Weyl studied the action of a large number of reducing and oxidizing chemical compounds in the hope of finding some substance which would enable anaërobic bacteria to grow under ordinary conditions. Although they were unsuccessful in their search they have nevertheless shown that certain reducing compounds, as sodium formate, sodium indigo sulphate, resorcin, etc., can be used to advantage in cultivating anaerobic bacteria.

Penzo (1891) has succeeded in obtaining growth of anaerobic bacteria in air by imitating the conditions which undoubtedly exist in nature. He showed that tubes inoculated with the bacillus of malignant œdema would develop in the air if inoculated at the same time with an aerobic germ as the micrococcus prodigiosus

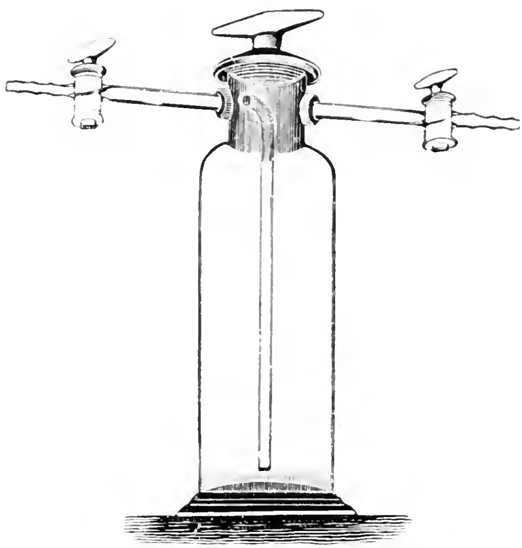

FIG. 1.—One-fourth natural size.

or the proteus vulgaris. The cultures thus obtained are highly virulent, but are impure.

On first consideration it would seem to be impossible to obtain pure cultures of anaerobic bacteria in liquid media in the presence of air. Nevertheless this can be accomplished by paying special attention to the culture medium. Thus ordinary glucose gelatin, especially when colored with litmus, readily furnishes cultures, at a temperature of 37–39° C., of the 4 anaërobic bacteria already referred to. Similar results have been obtained with a fresh 2 per cent gelatin glucose bouillon. Furthermore an interesting fact bearing on this point may be mentioned. In freshly solidified glucose agar a drop or two of water of condensation usually accumulates on the surface and if stick cultures are made in such tubes growth takes place not only along the stick but the surface liquid becomes turbid, gas bubbles form and on examination it will be found to swarm with actively growing anaerobic bacilli. This has been observed thus far with the bacillus of malignant œdema, the bacillus of symptomatic anthrax, and the "bacillus œdematis maligni No. II."

Of the methods thus briefly described only a small number have met with favor among bacteriologists. The methods, more or less, in general use are: The deep layer culture of Hesse and Liborius. The vacuum tube cultures of Gruber. The hydrogen cultures in Liborius or Fraenkel tubes, or in Botkin's apparatus. The alkaline pyrogallate method of Büchner.

For occasional single cultures either of these methods give excellent results. On the other hand there are times, as in the extended study of a given anaerobic germ, when it is desirable to make a large number of cultures, very often in sets. In such cases the insufficiency of the above methods soon becomes apparent. Thus, the vacuum tubes of Gruber and the hydrogen tubes of Liborius possess the disadvantage that they can be used but once, and therefore where a large number of cultures are to be made the expense becomes considerable. The matter of expense so far as hydrogen tubes are concerned has been reduced to a minimum by Fraenkel's modification, but even this, convenient as it may appear, has at times serious drawbacks. Thus the tubes require sealing in a flame, and while this operation is simple and easy it becomes very tedious and is not without danger when a large number of cultures are to be made. Furthermore sets of cultures made in this way are not strictly comparable, one with another, inasmuch as there is no positive uniformity in the series. The pressure of hydrogen in the different tubes may vary; the air may be more or less incompletely displaced, or a leakage may result without being noticeable. Similar objections may be likewise brought up against the vacuum tubes of Gruber. Moreover the operation of sealing tubes, whether with a vacuum or with hydrogen, is not one which commends itself for general and extended use.

These objections to the methods commonly in use were forcibly felt in connection with the study of the new pathogenic anaerobic bacillus, the bacillus œdematis maligni No. II. The attempt was therefore made to devise or construct some simple apparatus which could be used for vacuum or for hydrogen cultures and which would permit the use of the ordinary 12 or 15 cm. test tubes and would not require sealing in a flame.

The following apparatus has satisfied all requirements in that direction. It has been in constant use during the past year, and with it many hundreds of cultures of various anaerobic germs, including the bacilli of tetanus, malignant œdema, and symptomatic anthrax, have been made either in vacuum, hydrogen, carbonic acid, or other gases.

This apparatus was made for me by Greiner & Friedrichs, of Stützerbach, i. Thüringen, and is constructed on the principle of the well-known gas wash bottle of these makers. The glass stopper is hollow and opens below, and on opposite sides are two openings into one of which is fused a glass tube which extends down to the bottom of the bottle. Into the neck of the bottle are fused two glass tubes, the openings of which correspond to the openings in the stopper. All that is therefore necessary to seal this bottle is to turn the stopper at an angle of 90°.

Not only can this apparatus be employed for culture with various gasses, but it can likewise be used for vacuum cultures. In that case it is desirable to attach either by fusion or by strong rubber tubing, a glass stopcock to each arm. Screw clamps can, of course, be also employed, but are less desirable. This is necessary, since when a vacuum is produced within the bottle it is almost impossible to turn the stopper. The accompanying fig. 1 represents a bottle of this kind.

The method of using this apparatus is briefly as follows: Ordinary culture tubes (12 or 15 cm. in length) are inoculated. The cotton plugs are cut off close to the tubes and are then raised slightly so as to be perfectly loose and thus aid diffusion. The tubes are placed by means of a pair of long forceps in the bottle, the bottom of which it is best to cover with a layer of cotton. In this way it is possible to make as many as 40 or 50 cultures, side by side, and under exactly the same conditions. The stopper is then introduced, care being taken that the openings in the stopper correspond with the openings of the tubes in the neck of the bottle, and the apparatus is connected with a Chapman aspirator or other form of air pump. A vacuum, sufficient for all purposes. can be readily obtained. Thus a partial vacuum of 600 to 650 mm. readily grows such well-known anaërobic germs as those of tetanus malignant œdema and symptomatic anthrax.

Instead of producing a vacuum in the culture bottle the air present may be displaced by hydrogen, or any other gas that it is desirable to experiment with. It is best to allow hydrogen to enter at the top and to leave the bottle at the bottom through the long tube. With carbonic acid the reverse is done; it is passed through the long tube to the bottom and leaves the bottle at the top. The exit tube is connected with a small wash bottle containing water which serves as a valve to prevent the entrance of air into the bottle. The gas is rapidly passed through for one to two hours. The stopper is then turned at right angles, and the bottle disconnected and set aside to develop.

The displacement is accomplished more rapidly by first creating a vacuum in the bottle and then admitting the hydrogen. or whatever gas is used, through one of the lateral stopcocks. When the bottle has become filled with gas it may be reevacuated and hydrogen again admitted. By repeating this once or twice and then passing a steady current of the gas for about a half an hour perfect displacement is obtained. When working with a vacuum the stopper should not be turned so as to seal the bottle, inasmuch as it then would almost be impossible to open it. The lateral stopcocks or screw clamps must be used instead to hold the vacuum.

Not only can such a bottle be employed for either vacuum or gas cultures, but it can and has been used to obtain cultures by the absorption method. For this purpose the inoculated tubes are placed within the bottle on the bottom of which is a strong solution of sodium or potassium hydrate. The stopper is inserted and a concentrated solution of pyrogallic acid is aspirated into the bottle through the glass side tube which connects with the inner tube that extends to the bottom. The glass stopper is then turned and the bottle is ready to be set aside for development.

The above apparatus can be obtained of Greiner & Friedrichs (or through Messrs. Eimer & Amend, of New York) in two sizes. The stoppers have a diameter of 4 cm. No. 1 has an internal diameter of 10 cm. and the height of the bottle to the neck is 20 cm. It is intended for the large 15 cm. culture tubes. No. 2 has an internal diameter of 8 cm. and the height of the bottle to the neck is 15 cm. It is intended for the small (12·5) test tubes. Either size can also be obtained with glass stopcocks already fused into the lateral tubes. The price of the bottle without lateral stopcocks is about 6 marks, and with stopcocks, about 10 marks.

A convenient substitute for the apparatus just described can be constructed by any one in a very short time and at little expense. A strong wide-mouth bottle is selected which has an internal diameter of about 9 cm. The height to the neck is about 15 cm. The mouth of the bottle should be about 5 cm. wide and is closed with a double perforated rubber stopper. It is desirable, especially when it is to be used

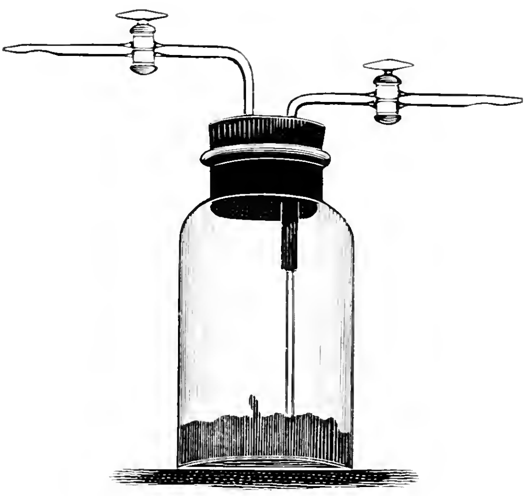

FIG. 2.—One-fourth natural size.

for vacuum purposes, that the sides of this stopper slant at a considerable angle in order to prevent the forcing of the stopper into the bottle by atmospheric pressure. The stopper for the above bottle has a lower diameter of 5 cm. and an upper diameter of 5.7 cm.

Two glass tubes with glass stopcocks are now selected and one arm of each is bent at right angles and inserted into the stopper. Below the stoppper one of these tubes is connected by means of a piece of rubber tubing with a glass tube which nearly reaches to the bottom of the bottle. The end of the other tube terminates on a level with the lower surface of the stopper. Such an apparatus is represented in fig. 2.

With this simple apparatus cultures can be made in the same manner as with the previously described bottle. The anaërobic pathogenic bacteria already mentioned can thus be readily grown in vacuum, or in hydrogen or other gases. The alkaline pyrogallate method can be used in the same way as that given in connection with the former bottle.

The glass stopcocks will hold a vacuum perfectly if covered well with vaseline. As a matter of precaution it is desirable to seal the rubber stopper with paraffin having a high melting point, 46 to 56° C.

The commendable features of the apparatus in either form may be summarized as follows: (1) It is cheap, clean, simple, and effective. (2) It is adapted for culture with alkaline pyrogallate solution, or in vacuum, or with any desirable gas. (3) It does not require special culture tubes—ordinary test tubes are used. (4) It permits parallel cultures to be made, even in large numbers, and all under exactly the same conditions. (5) It can be used for bouillon or gelatin cultures; for stich cultures; for streak cultures on agar, blood serum, or potato, and also for esmarch roll cultures. (6) It requires no sealing in a flame.

Colonies of anaerobic bacteria unless on plates or in Petri dishes are very difficult to study and to photograph. As plate cultures very often fail for some unexplainable reason, the following method has been used to obtain colonies: The flat bottles or dishes (6 cm. in diameter and about 0·8 cm. in thickness) as recommended by Král for making permanent bacteriological collections of colonies are filled about two-thirds full with the nutrient medium, sterilized and then inoculated with the germ and set aside to develop. Owing to the flat, shallow form of the dish, it can now be placed on the stage of the microscope, and the colonies can be examined with as much ease as on a plate. Unfortunately the colonies in these flat-dish cultures are not accessible for transplantation.

Culture media.—The essential requirement to success in the culture of anaërobic bacteria lies in a suitable nutrient medium. In general terms it may be said that a slightly alkaline medium is best adapted for this purpose. Exceptions to this statement will be found among the anaerobic in the same way as such exist in the aerobic bacteria. The bacillus of symptomatic anthrax, for instance, is best grown according to Kitasato on slightly acid media. It can, however, grow on distinctly alkaline media, although perhaps less abundantly.

The anaerobic bacteria readily grow in strongly alkaline bouillon, but the vitality of such cultures is rapidly lowered and finally they die out completely. Some times death results within two days after the inoculation and that in spite of the fact that the growth at first was excellent This was especially the case with "Bacillus œdematis maligni, No. II."

Great stress is also frequently placed upon the use of perfectly fresh culture media. There can be no doubt but that fresh bouillon or agar is better adapted than old material for the growth of these organisms. Thus it is frequently observed in working with a given set of bouillon tubes that in the course of a week after they are made and often in less time the cultures develop more slowly and less abundantly than when the material was fresh. This difference in growth can be demonstrated by making parallel cultures in old bouillon and in the same after heating it in the steam sterilizer for about a half an hour. The set of heated bouillon tubes will show a much more abundant growth and more gas formation than the cultures in the old unheated bouillon.

It is therefore desirable, when working with old bouillon or agar, to heat it up about once or twice a week to expel the dissolved gases. Gelatin tubes apparently do not require this precaution. At least the same set of gelatin tubes have been used for more than six months without encountering any difficulty.

Failure to grow, however, is more often traceable to the culture employed than to the medium itself. Thus experiments with bouillon tubes of diverse age, ranging from one day to four months, were found to give negative results with most of the old tubes when the inoculation was made from old cultures, but when made from perfectly fresh, vigorous cultures, no difficulty was experienced in obtaining positive results in all of the tubes.

In cultivating anaerobic bacteria, it is therefore desirable to employ either fresh or reheated nutrient media and to inoculate from fresh, vigorous cultures.

With reference to the nutrient-media proper, it can be readily shown that the addition of peptone favors the growth of anaerobic bacteria. Bouillon without peptone is a very poor medium for this purpose. When 1 per cent of peptone is added the nutrient qualities of the medium are strikingly improved and this effect is still further brought out by increasing the amount to 2 per cent. Any considerable addition above this amount is without value and if anything tends to diminish the nutrient value of the medium.

The culture media can be still further improved by the addition of 2 per cent of glucose as was originally recommended by Liborius. The sugar is said to act as a reducing substance whereby any free oxygen that may be present is removed and thus the growth of the anaerobic germs is assisted. The action of other reducing substances has been tested by Kitasato and Weyl, and although similar beneficial effects may be obtained by the use of small amounts of various organic reducing substances, nevertheless their more or less poisonous action prevents their general use. Several of these, as sodium formate, sodium indigo sulphate, and resorcin have been strongly recommended by Kitasato and Weyl. There are times undoubtedly when the addition of these substances may prove useful. Thus, sodium indigo sulphate may serve as an indicator of the reducing action of a given germ. For general purposes, however, they possess no marked advantage.

Sodium indigo sulphate was used to indicate reduction changes as early as 1858 by Traube. In 1887 Spina employed this compound and also indigo blue and methylene blue for similar purposes. Finally in 1890 Kitasato and Weyl, independently of the others, studied the action of sodium indigo sulphate on the growth of anaerobic bacteria, and recommended its use in additions of 0·1 per cent. Braatz employed it in smaller amounts, 1,000 to 6,000 or 7,000.

The addition of litmus to the nutrient medium is often of very great value. Litmus was originally recommended by Buchner to indicate changes in reaction produced by bacteria. Subsequently Cahen proposed to use it, not only as an indicator of the reaction, but also for its reducing powers. Many bacteria, especially the anaerobic forms, readily reduce litmus to a colorless luco-substance which, according to the reaction, becomes converted into a red or blue color as soon as oxygen is admitted. If glucose is present acids are formed and as a result the litmus is colored red, otherwise it remains violet.

To some extent the addition of litmus favors the growth of these micro-organisms but its special value rests in the protecting action which it exerts on anaerobic germs. Cultures of anaërobic bacteria, as those of tetanus, malignant œdema and symptomatic anthrax preserve their vitality for many months even in liquid media, exposed to air, provided they are colored with litmus. This peculiar and valuable action is perhaps due to the litmus absorbing certain rays of light which tend to destroy these organisms.

Another substance which can be employed to very great advantage in the culture of anaerobic bacteria is gelatin. This substance has not to my knowledge been recommended as an addition to nutrient media for improving their value for anaerobic work. As a matter of fact the addition of small amounts of gelatin is of as much value as the addition of peptone. Additions of 2 to 5 per cent gelatin have been used with great satisfaction.

Perhaps of more importance than this beneficial action of small amounts of gelatin is the fact that suitable additions of gelatin to the nutrient media render it possible to obtain cultures of all of the pathogenic anaerobic bacteria under ordinary aerobic conditions. It has been previously stated that the ideal method of growing anaerobic bacteria would be to cultivate them in the presence of air, without any special apparatus, as is ordinarily done with aerobic bacteria. This goal is partially reached by deep stich cultures in glucose agar and gelatin, but these media are solid and the access of air is prevented by the upper layer.

The object is more nearly attained by the following method in which liquid media are employed, presumably with full access of air. The method has been used during the past year with perfect success in cultivating the bacilli of tetanus, malignant œdema, symptomatic anthrax, and the Bacillus œdematis maligni, No. II, and is adapted for keeping up pure cultures of these bacteria.

The medium employed is ordinary nutrient 10 to 12 per cent gelatin containing 2 per cent of glucose and colored distinctly blue with litmus. Ordinary test tubes are filled with this medium to a height of 4–5 cm. These tubes when inoculated with pure cultures of the anaerobic bacteria and set aside in the incubator for twelve to twenty-four hours at 37° to 39° C. develop rapidly. The litmus is completely decolored, an abundant growth of the germ takes place, and considerable gas is given off. All this, in spite of the fact that the gelatin is liquefied, and that the oxygen of the air, at least apparently, has full access to the growth. It has not as yet been ascertained whether this development of the anaerobic bacteria is due directly to the gelatin that is present, or whether it is the result of the viscosity of the liquid which may possibly prevent penetration of oxygen.

In the above manner it is possible to obtain with the greatest ease a large and abundant growth of anaerobic bacteria in a liquid medium. Furthermore, it should be stated that these litmus-glucose gelatin cultures preserve their vitality for a greater length of time than ordinary agar stick cultures. Thus, cultures of the four anaerobic bacteria mentioned, when four to six months old, possess apparently as much vitality as when perfectly fresh.

Attempts have been made to obtain a liquid medium which would grow the anaerobic bacteria as readily and as surely in the presence of air and at the body temperature as the 10 per cent glucose gelatin. This has been partly realized by employing an alkaline bouillon containing 2 per cent each of gelatin, peptone, and sugar. Anaerobic bacteria taken directly from the body grow in this bouillon under ordinary aerobic conditions. Care must be taken that the bouillon is fresh, or but recently reheated, and that it is not less than 7 or 8 cm. in height. The bacilli of symptomatic anthrax and malignant œdema, and the B. œdematis maligni No. II have thus been grown successfully in the presence of air. The cultures, however, have not been obtained with any degree of constancy. Failures frequently occur for some unaccountable reason.

In conclusion, by way of recapitulation it may be said that the following nutrient media, with or without litmus, and slightly but distinctly alkaline in reaction, have been employed with best results in cultivating anaerobic bacteria. (1) Beef bouillon with addition of ½ per cent common salt, 2 per cent glucose, 2 per cent peptone. (2) Beef bouillon as above with the addition of 2 per cent of gelatin. (3) Nutrient 10 to 15 per cent gelatin with the same additions of salt, peptone, and glucose as above. (4) Nutrient 1½–2 per cent agar with the same additions of salt, peptone, and glucose as above.

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A NEW ANAEROBIC BACILLUS OF MALIGNANT ŒDEMA.

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Under the name "Septicémie" Pasteur, in 1877, described a new experimental disease. The affection, according to Pasteur, was characterized by a most intense inflammation of the muscles of the abdomen and extremities, by accumulation of stinking gas in divers places, especially in the axial regions. The lungs and liver were decolored, while the spleen, though not enlarged, was often softened, and the heart was free from clot. These effects were ascribed by him to a bacillus—vibrion septique—which formed threads so transparent as to easily escape observation and in the blood they were said to attain considerable length. This bacillus, the first anaerobic disease germ, was successfully cultivated by Pasteur, Joubert, and Chamberland, and later by Gaffky and others.

In 1881 Koch pointed out that the characteristics of the disease as described by Pasteur were largely due to secondary causes—that is, to the presence of foreign bacteria—and that when pure material was employed the result was quite different. In such cases the fluid which fills the subcutaneous tissue, to a greater or less extent from the point of inoculation, is no longer of a gelatinous consistency, but is composed rather of a faint reddish colored serum, free from odor and gas. The internal organs show but slight changes. The spleen is usually enlarged and darker and the lungs are of a pale grayish-red color. In the subcutaneous exudate anthrax-like bacilli are found which are usually non-motile, although occasionally some will be found possessing motion. These are also found in varying numbers in the blood, at times appearing to be entirely absent and again are very numerous. They are never absent from the surfaces of the organs in the thoracic and abdominal cavities. In mice it is not possible microscopically to distinguish the disease from anthrax; the serous exudate in the subcutaneous tissue of these animals is very small. The spleen is enlarged, dark colored, and softened as in anthrax, and the bacilli do not predominate on the serous surfaces of the internal organs, but, as in anthrax, are present in large numbers in the organs and blood vessels.

Owing to the fact that in other animals than mice the bacilli are especially common in the subcutaneous tissue and are rare in the blood, the term "septicémie," as used by the French school, was deemed inappropriate by Koch, and he therefore suggested for this disease the name malignant œdema.

From the above description it will be seen that the chief characterestic of the disease lies in the œdematous condition brought on by the presence of a well-defined microörganism. Although at first a purely experimental disease, it was shown later to occur in domestic animals, as the horse (Kitt, Jensen, and Sand), and also in man (Brieger and Ehrlich), and was described by Chauveau and Arloing as the "septicémie gangreneuse."

In recent years a number of instances of malignant œdema have been reported in man, but unfortunately the diagnosis usually rests on the œdematous condition and on the presence of bacilli which from their microscopic appearance are assumed to be those described by Pasteur, Koch, and Gaffky. A thorough and exact identification has been made in but few instances. In view of these facts it is proper to ask whether or not such cases are true instances of malignant œdema. The production of an œdematous condition is not a sufficient criterion, either taken alone or in connection with the presence of a bacillus having the size and form of the well-known bacillus of malignant œdema.

An œdematous condition is induced to a greater or less extent by the bacilli of anthrax, and of symptomatic anthrax. The bacillus cadaveris of Sternberg has a similar action and only recently Klein has described an aerobic bacillus of malignant œdema which is regarded by Sanfelice as identical with his "bacillus pseudo-œdematis maligni." All of these microorganisms therefore give rise to chemical products which, by their action on the animal body, induce a more or less marked œdema.

The bacillus of Pasteur and Koch is therefore a cause, but not the only cause, of œdema. It must be evident on *a priori* grounds that other bacilli may exist which give rise to the same or similar products as the classical bacillus of malignant œdema, and that therefore they may give rise to the same condition in animals. The only distinction, if any, is to be sought in the microorganisms which induce these effects.

A very interesting case of this kind was met with last winter, and furnishes the subject-matter of this paper. Three guinea pigs were injected, in connection with another line of work, with a solution of milk nuclein. The latter was prepared from fresh casein obtained from milk after Hammarsten's method. The casein was digested at 37° C. with pepsin and hydrochloric acid, and the precipitated nuclein, after filtration and washing, was dissolved in 0·25 per cent sodium carbonate, and the solution thus obtained was the one employed for the injections.

Within a few hours the animals became very quiet and unwilling to move. The respiration became labored and a marked swelling over the abdomen was noticeable. This, on examination, gave fluctuation and crackling, showing the presence of fluid and gas. All three animals died in from twenty-four to forty eight hours, and on post-mortem examination the same striking condition was observed in all.

The subcutaneous tissue was permeated with a thick (about 1 cm.) reddish or dark-colored gelatinous œdema, which at times was so adherent as to necessitate the use of a sharp scalpel in reflecting the skin. The subcutaneous blood vessels were deeply engorged; hemorrhagic spots were also present, and the muscles of the trunk were colored deep red. The thoracic and abdominal cavities contained considerable serous exudate. The heart was in diastole and the lungs pale or mottled red. The liver was soft, but the spleen was not enlarged.

Cover-glass preparations made from the subcutaneous tissue and peritoneum showed enormous numbers of a slender, rather long bacillus, which was almost invariably single. This was also present in the heart blood, lungs, liver, spleen, and kidney. Streak preparations made from the peritoneum and stained with gentian violet showed, in addition to the bacilli which possessed the form and size of the bacillus of malignant œdema, the presence of colorless spiral bodies, the exact significance of which was at first overlooked, but later on in the work they were found to be large flagella. Such a preparation showing bacilli and three spirals is seen in photogram No. 1.

The post-mortem appearances and the microscopical characteristics of the bacillus present suggested at once that these were cases of malignant œdema. This view was still further strengthened when attempts at culture showed that the bacillus was an obligative anaerobe. On further study, however, the bacillus was found to be distinct from the classical one described by Pasteur, Koch, and Gaffky. It is proposed to provisionally designate this new micro-organism as the bacillus œdematis Maligni No. II.

Morphological characters.—The bacillus, as it occurs in the animal body, as for example in a streak preparation from the peritoneum, presents the form of a perfectly straight, slender rod with slightly rounded ends. The rods are almost invariably single and vary in length from 2·5 to 5 μ. The most common length is from 3·5 to 4·3 μ. The width is 0·8 to 0·9 μ.

Very short, straight threads may also be found occasionally. These are usually about 8 to 11 μ in length and only very rarely do they attain a length of 22 to 35 μ.

The streak preparation from the above source, stained with gentian violet, usually shows, on careful examination, colorless spiral forms, which usually vary in length from 17 to 25 μ, and occasionally some 43 and 63 μ in length have been observed. In width these spirals vary from a thin, wavy line, having the same thickness throughout its length, to forms which are spindle-shaped, tapering at both ends to a scarcely visible line. The width of such spindle forms usually ranges from 1·7 to 2·6 μ.

At first it was supposed that these colorless forms might be artificial in nature due to shrinking of the proteid matter on coagulation, but this view was soon untenable, since on examining hanging drops of the reddish serous exudate in the abdominal cavity the same bright, colorless spirals could be found. Subsequently these spirals were found in pure cultures of the germ, and are demonstrated to be giant flagella.

When cultivated under the usual anaerobic conditions, the form sometimes undergoes marked changes. Thus in stich cultures in agar the germ forms straight, or but slightly bent narrow rods, and also short threads which are usually bent, twisted, or wavy. On inclined agar the rods appear to be much more bent, or comma-shaped, and at the same time very long threads form which are oddly twisted and rolled up, as if involution changes were taking place. When grown in bouillon the protoplasm of the cell is markedly granular or contracted, and numerous small round refracting bodies, many of which are free, while others are in the end of the bacilli, can be observed.

Motion.—The bacillus is motile, and this condition can be best observed by examining the colonies in deep agar cultures with a suitable objective, as the D of Zeiss. In hanging drops, however, only a very slight movement of an oscillatory character is to be made out. In this respect it differs strikingly from the bacilli of symptomatic anthrax and malignant œdema, which are actively motile. Sometimes a marked forward, wavy motion can be observed, and this is especially true where young culture is employed and the examination is made as soon as possible, that is before the air begins to exercise an inhibitory action.

The flagella are readily stained by Löffler's method, without the addition of acid or alkali to the mordant. Cover-glass preparations stained in this manner present a striking appearance. Each bacillus is equipped with several long, wavy flagella, which are attached to the sides and ends, as is the case with Eberth's bacillus, the bacillus of malignant œdema, and several other well-known organisms. The flagella vary considerably in size and thickness. But by far the most characteristic feature of these preparations is the occurrence of those enormous flagella which Löffler described in 1890 in connection with symptomatic anthrax. These giant whips, as they may indeed be called, are usually spindle-shaped, tapering slowly on both sides from the thickened middle to the slender, scarcely-visible ends, and the border has a beautiful wavy appearance. This form of spiral is well represented in photograms No. 2 and No. 5.

The length varies considerably, but in artificial cultures is usually from 40 to 50 μ, and some have been found 72 μ, and even more in length. The width at the middle portion likewise varies greatly, and is not necessarily proportionate to the length. Thus we may find giant whips, without any median enlargement, presenting the form of a simple long, wavy line often with as many as twenty bends. This appearance, however, is rare, and is met with only occasionally under conditions not yet clearly made out. The usual form, however, is spindle-shaped, and the width of the center varies from 2 to 4 μ, and not infrequently attains 7 μ or even more. A better idea of these dimensions can be obtained by comparing them with the length of the bacillus and of the ordinary flagella. The average length of the bacillus can be placed at about 3 μ, and the average length of the ordinary flagella at 6 to 9 μ.

In order to find these giant whips it is not necessary to resort to the staining method of Löffler. Indeed they were first met with in examining hanging drops of the thin bacillus. Their size is such that they can be readily seen in unstained preparations with a Zeiss D or with a one-twelfth homogeneous oil immersion objective, and, when stained, the larger spirals can be even found with an A objective.

The large spindle-shaped whips possess invariably sharp, wavy borders, but fail to show any special structure. In very wide spirals, however, this is not the case. By careful focusing the central thickened portion can be resolved into several wavy lines running parallel to the border. In one instance five such lines were observed, but at other times only one or two could be found.

Another peculiar feature deserves mention in this connection. Instead of the characteristic spindle-shaped whip already described, we may meet with forms which are double spindle-shaped, and look as if two large spirals were connected together at one end and then diverged. The common end is attached, as has actually been observed, to the bacillus. The attachment of the single giant spirals can often be seen in carefully-prepared specimens. Similar double spirals have been observed in agar cultures in hydrogen of the bacillus of symptomatic anthrax.

The formation of these large spirals is closely connected with the nature of the nutrient medium on which the bacillus has developed. Thus bouillon cultures are not satisfactory. Gelatin cultures are better, and the best results are obtained with agar. Streah cultures on inclined agar in hydrogen, or deep stich cultures in agar in hydrogen or in air furnish excellent material. Especially is this true of the condensed liquid which accumulates in the bottom of the inclined agar tubes or on the top of perfectly fresh agar stich cultures. In bouillon, in an atmosphere of carbonic acid, the spirals are either small or entirely lacking, whereas the germ itself is in excellent condition—a marked contrast with hydrogen cultures.

The spiral forms described as occurring in the body of guinea pigs and rabbits that died after inoculation are identical in form, size, and appearance with these flagella.

As already mentioned, similar spirals have been found and photographed by Löffler in cultures of the bacillus of symptomatic anthrax on inclined blood serum in hydrogen. I have found these same spirals in stich cultures of symptomatic anthrax bacillus in fresh glucose agar, in air, and more especially in the condensed liquid which accumulates on the top and which is turbid from actively growing bacilli.

Similar long spirals have been also found in hanging drop examination of the bacillus of malignant œdema growing in the condensed liquid in the bottom of tubes of inclined agar, in hydrogen. The spirals, however, appear to be much more rare, and are therefore more difficult to find than in the two bacteria mentioned.

Tetanus cultures have not been specially examined for these large spirals, but at various times during the last year or two, cover-glass preparations made from agar-cultures and stained with concentrated gentian violet have shown distinct long slender spirals. It would seem, therefore, that all of the anaerobic pathogenic bacteria known thus far are capable of giving rise to unusually developed flagella.

As to the nature of these giant flagella very little can be said. Löffler who was the first, and to my knowledge the only one, to observe these strange forms regarded them as bundles or aggregations of flagella (Haarzopfen). This, however, can scarcely be considered a satisfactory explanation, inasmuch as the border of these large whips is almost invariably sharp and clear-cut. At no time has a spiral been found to be attached to more than one cell, and then always it is attached by the slender end. If made up of aggregations of flagella we might occasionally expect to find frayed out edges to the spirals and bacilli attached to different parts of the spiral, but such is never the case. Furthermore, as already stated, we may have exceedingly long slender whips without any dilation of the middle portion. The conditions which give rise to the latter form, or elongated flagellum, undoubtedly also produce the characteristic spindle-shaped form. It remains to be seen whether it is best to consider these abnormally large flagella as involution forms analogous to the malformations which the bacterial cell itself at times undergoes.

Spore formation has at no time been observed. In this respect it differs markedly from the three well-known anærobic bacteria, those of tetanus, malignant œdema, and symptomatic anthrax, which invariably, under parallel conditions, readily yield an abundance of spores. In liquid media, as bouillon, in an atmosphere of hydrogen the protoplasm of the cell, which is ordinarily homogeneous, becomes granular, and a bright refractive body appears at one end. Occasionally two such bodies are observed, one at each end. The original form of the cell is in nowise changed as a result of the presence of these bodies, which moreover are readily stained by the aniline dyes.

Although the existence of spores can not be demonstrated as yet, the bacillus nevertheless possesses a very high degree of resistance. Thus when exposed to a temperature of 58° C. for one hour it develops readily when subsequently placed under suitable conditions.

Extreme cold is also apparently without effect, since cultures may be frozen solid for twenty-four hours and still maintain their vitality.

It is readily stained by the aniline dyes and also by Gram's method, which is especially valuable in staining of sections.

Cultural Properties.—The bacillus is an obligative anaerobe, and therefore requires special care in its culture. The best media for its growth are a slightly alkaline bouillon, gelatin, or agar containing 2 per cent of peptone and 2 per cent of glucose. The addition of 2 per cent of gelatine likewise seems to assist its growth to a marked degree. The addition of litmus to the nutrient media not only appears to favor the development of the bacillus but also seems to exert a protective action. Thus, litmus bouillon or gelatine cultures preserve their vitality better than cultures exposed to the light. Strongly alkaline media permit the growth of the bacillus, but such cultures soon lose their vitality—some in a few days.

All the cultures referred to in the following description were made in the special apparatus which is described by me in a separate paper.

No growth takes place at the ordinary temperature, that is below 24° C. Above this limit it grows readily, and its optimum is about 35° to 38° C.

Growth takes place in a vacuum, or in an atmosphere of hydrogen, carbonic acid, nitrogen, or even in illuminating gas. In this respect the bacillus behaves the same as the tetanus bacillus, which develops under the same conditions, whereas the bacilli of malignant œdema and symptomatic anthrax have thus far failed to develop in an atmosphere of illuminating gas, but have been successfully grown in carbonic acid.

Carbonic acid, contrary to the commonly accepted view, does not seem to exercise any poisonous or even inhibiting action on the growth of this bacillus and those of tetanus, malignant œdema, and symptomatic anthrax. Cultures of the first two have been kept in carbonic acid for more than a month without any apparent effect. Furthermore, bouillon cultures in this gas show excellent well-formed rods which are much more favorable in appearance than cultures grown in hydrogen. The granulation of the protoplasm and the small terminal refractive bodies met with in hydrogen cultures are lacking in carbonic acid cultures. Giant whips have been absent in the few examinations that have been made for that purpose. It may be stated that in order to be successful with carbonic acid it is necessary to employ perfectly fresh, or reheated, distinctly alkaline culture media and that the inoculations be made from fresh vigorous cultures.

Colonies can be easily obtained in deep cultures in agar in ordinary test-tubes. The flat bottles or dishes employed by Král for his bacteriological museum are well adapted for this purpose, as they can be placed on the stage of the microscope and examined with ease. Not only can thus the form of the colony be observed but also the presence of motion can frequently be ascertained. Photogram No. 4 is made from such a culture. Colonies can also be obtained by making successive streaks on inclined glucose agar, or by resorting to Esmarch roll tubes or agar plates in Botkin's apparatus. The latter, however, have not been very satisfactory for some as yet unexplainable reason.

Under favorable conditions excellent colonies develop in fifteen hours in glucose agar at 38° C. They then appear as small white pinhead growths, which, under the microscope, look as if composed of a dense whorl of threads. The smaller colonies simply form a network of branching lines, resembling very much the branching colonies of tetanus bacillus. The larger colonies have a dark center, which is surrounded by an irregular, frayed border of very delicate filaments. These irregular borders on higher magnification are distinctly granular in appearance, and numerous small round dark spots are seen, which are usually at the end of the threads.

Stich cultures in glucose agar are characterized by a distinctly visible growth along the entire line of inoculation, with the exception of the upper layer of about 1 cm., where no growth takes place owing to the presence of air. The growth, however, is much less distinct than either that of the bacillus of malignant œdema or that of symptomatic anthrax. At a temperature of 38° C. development takes place in twelve to sixteen hours. During the next twenty-four hours the growth reaches its maximum, after which the stich gradually becomes less visible. An energetic production of gas appears, and, as a result, the agar is torn apart and forced up the tube. The production of gas is marked in alkaline tubes and is almost entirely absent in neutral or acid nutrient media. No marked odor is observable in cultures of the bacillus after it had been grown for several months, but the earlier cultures, shortly after it had been isolated, possessed a strong penetrating odor of butyric acid.

When placed in an atmosphere of hydrogen, growth takes place along the entire stich, and even the surface of the agar becomes covered by a thin white film. Stich cultures in hydrogen, and even in air, made in perfectly fresh glucose agar—that is, immediately after solidification—frequently have a drop or two of water of condensation on the surface, and in such cases this liquid is turbid and full of small gas bubbles from the presence of actively growing bacilli. This peculiar instance of growth, apparently in contact with air, has also been observed with the bacilla of symptomatic anthrax and of malignant œdema. In all three cases this liquid is an excellent place for the spiral forms already described.

Streak cultures on the surface of inclined glucose agar, grown in hydrogen, form a distinct white pellicle. Isolated colonies are roundish, white, somewhat elevated, and show markings. The water of condensation in the bottom of the tube likewise has an abundant growth. These cultures are likewise an excellent source for giant whips.

Owing to the relatively high temperature which the bacillus requires in order to grow it follows that no development takes place in solid gelatin. Nevertheless cultures can be obtained in liquid gelatin with as much ease as with ordinary aerobic bacteria. These cultures are noteworthy because they are apparently made in the presence of air. With the exception of deep cultures in agar they are the only means of obtaining growths of the bacillus without resorting to the usual special apparatus for anaerobic bacteria.

The medium employed is ordinary, 10 to 15 per cent gelatin containing 2 per cent glucose, with or without litmus. The tubes are inoculated and set aside in an incubator at the body temperature. The gelatin of course, is liquefied, but in twelve to eighteen hours gas bubbles will be seen rising to the surface and at the same time the liquid becomes turbid. The maximum growth is reached in twenty-four to thirty-six hours. The germ then subsides in flakes and forms a light florculent sediment 1 to 2 cm. in height, while the liquid above becomes perfectly clear and the surface is free from scum. When set aside now at the temperature of the room the gelatin does not solidify but remains permanently liquefied.

The other anaerobic bacteria, as the bacilli of tetanus, malignant œdema and symtomatic anthrax can be cultivated in the same manner.

Attempts have been made to replace the 10 to 15 per cent gelatin by bouillon media containing a less amount of gelatin—2 to 5 per cent. These attempts have been partly successful, but often failure in growth results for some unexplainable reason. Litmus-colored media are apparently better than uncolored for this purpose. The greater number of tubes which then develop can only be ascribed to the favorable action of the litmus in excluding certain rays of light. The best medium found thus far is a fresh alkaline bouillon containing 2 per cent each of gelatin, glucose, and peptone. The tubes should be filled to a height of 6 to 8 cm. With such a medium perfectly pure cultures have been grown from inoculated animals under ordinary aerobic conditions at 38° C.

Bouillon tubes when inoculated and placed in hydrogen almost invariably develop. Failure to grow is commonly due to the culture from which the inoculation is made, since it may be weak or dead. The bacillus develops more or less abundantly in bouillon media of most varied composition. Old bouillon tubes are almost as good as when freshly prepared, and in this respect a marked difference exists between the bacillus of symptomatic anthrax, which, according to Kitasato, requires perfectly fresh media in order to grow.

The addition of 2 per cent of Witte's peptone and 2 per cent of glucose to the bouillon furnishes an excellent nutrient medium. Gelatin appears to favor the growth of the bacillus to the same extent as peptone. Equally good results can be obtained by substituting 2 per cent of gelatin in place of the peptone. The best results, however, have been obtained by the addition of 2 per cent each of gelatin, peptone, and glucose.

The addition of sodium-indigo sulphate to bouillon or other culture media is without any beneficial effect, and the only advantages it possesses is to indicate the reducing action of the bacillus. Culture media containing this substance are discolored by the growth of the bacillus in hydrogen, but on exposure to air the color returns.

Litmus, for reasons already given, is to be preferred to sodium-indigo sulphate. Furthermore, it is of value as an indicator of the reducing action and also of the reaction. Thus, the litmus-colored medium is first discolored, showing a strong reducing power of the organism. The coloring matter is reduced to a colorless leuco-compound, which on subsequent exposure to air takes up oxygen and becomes converted into a pigment. If the bacillus has given rise to acid products their presence will be indicated by the wine-red color of the culture medium.

In this manner it is easy to demonstrate the production by this bacillus of an acid reaction in bouillon containing glucose, whereas in the absence of glucose the color returns to a violet or blue. In this regard it agrees with the bacilli of symptomatic anthrax and of malignant œdema, whereas the bacillus of tetanus does not give rise to an acid reaction in glucose media, and hence is colored blue.

The characteristics of the bouillon culture are the same, no matter whether developed in hydrogen, carbonic acid, illuminating gas, or in a vacuum. In from ten to fifteen hours at 38°C. the liquid becomes turbid and a greater or less amount of gas is given off, depending upon the age and alkalinity of the bouillon. Subsequently, in one and one-half to two days the suspended growth gathers in flakes which settle to the bottom and form a light flocculent sediment 1 to 2 cm. in height, which readily rolls about when the tube is inclined. The supernatant fluid is perfectly clear and free from surface scum. The bouillon cultures are very distinct from those of either symptomatic anthrax or malignant œdema. Thus, the latter two form a fine growth which partly settles to the botton, forming a white, compact, nonrolling sediment scarcely one-half cm. high, while the liquid above is turbid and remains so for several days.

Vacuum cultures can be readily obtained. A perfect vacuum is not necessary, since excellent growths are obtained by the apparatus mentioned when the pressure is diminished by 60 to 65 cm. It may incidentally be added that the other three anaerobic bacilli likewise grow under these conditions.

The so-called "mixed" aerobic cultures of this bacillus have also been thus far successful, and will be described later in connection with experiments on animals.

The differences that exist between this new bacillus and the bacilli of symptomatic anthrax and of malignant œdema may be briefly summarized as follows:

Bacillus of malignant œdema No. II in bouillon cultures, etc., is slightly longer and thicker than either of the other two. It shows no such active motion as the others, nor does it form spores. Giant whips are much more common. In bouillon culture the bacillus is often bent or comma-shaped and is single or forms short threads of 2 to 5 cells, which are invariably bent or twisted; whereas both of the others show usually straight single rods and only rarely short threads, which are straight.

Cultural differences in bouillon and in agar are also marked and have already been mentioned. Further differences exist in the greater pathogenic action and in the more rapid effect on temperature, as seen in Table VI.

Pathogenesis.—The extremely virulent character of this new bacillus can be readily demonstrated on a large variety of animals. The rabbit, guinea pig, white mouse, white rat, pigeon, and cat have been employed for this purpose, and all are highly susceptible. Subcutaneous injection into these animals of a one-fourth cc., or even one-tenth cc., of a pure culture invariably results fatally, and death takes place usually in from twelve to thirty-six hours.

The first symptoms observable after injection is an indisposition to move about; the animal rests quietly in one corner and will not stir even when prompted. Later the animal becomes uneasy, frequent cries of pain are given, and marked swelling over the abdominal region takes place. The animal then usually lies on its side and can not stand up. Distinct crackling and fluctuation can be made out over the abdomen. Slight twitchings or convulsive tremors sometimes pass over the animals. The respiration becomes very slow and finally death results.

The most marked effect is seen in the rapid fall of temperature. This takes place within a few hours after the injection, without any previous rise in temperature, and continues falling till death occurs. In rabbits the temperature has been observed to sink as low as 29° C. a half an hour before death. A similar fall in temperature has likewise been observed in guinea-pigs. Table VI shows the comparative effect on temperature in guinea pigs injected subcutaneously with one-half cc. of fresh bouillon cultures, one and one-half days in hydrogen, of œdema bacillus No. II, bacillus of malignant œdema, and of symptomatic anthrax.

On post-mortem examination essentially the same condition is found as that which was observed in the original guinea pigs that died of infection. Thus an extensive, colorless, jelly-like subcutaneous œdema covers part or whole of the anterior part of the body and at times extends to the extremities. Occasionally it is slightly colored red. Gas is usually present, although in very small amount, and is often confined to the median line over the abdomen or to the axillæ. Owing to the consistency of the œdema the skin can be readily reflected from the body. The subcutaneous blood vessels are as a rule engorged; slight hemorrhagic spots are often present and the abdominal wall bright red in appearance.

The pleural cavity contains an enormous amount of colorless serous exudate, which at first is liquid, but if the examination is delayed some time after death it becomes gelatinous. The colorless fluid when transferred to a sterilized test tube coagulates to a solid mass in a few minutes. In rabbits and guinea pigs this condition of the pleural cavity is especially marked. The cavity is often full, and from such cases 50 to 60 cc. of the serous fluid have been removed.

The lungs are usually pale and flabby. The heart is in diastole and its blood vessels are gorged full of blood. In the abdominal cavity a similar condition is observable. The amount of exudate, however, is relatively much less. The same tendency to gelatinize is seen, and in the larger animals a fibrous network often covers the intestines. The peritoneum is almost invariably bright red in appearance. The internal organs show very little change, and usually the bladder is full.

One marked difference is noticeable in the appearance of the subcutaneous tissue in the animals inoculated with pure cultures and in the guinea pigs inoculated with milk nuclein. The latter presented what might indeed be called a terrible condition. The subcutaneous tissue was filled with a solid gelatinous or fibrinous exudate which was exceedingly tough and so firmly connected the skin with the walls of the body that it necessitated the cutting away of the skin with a scalpel. Furthermore, the exudate and muscles were strongly colored red and more than a centimeter in thickness.

In the experiments with pure cultures this frightful condition was, as a rule, absent. The subcutaneous œdema was colorless, soft, and gelatinous in consistency, and not adhesive. Occasionally, however, the same condition is met as described above, and in such cases no foreign bacteria could be found present.

Another striking difference was observable on microscopical examination. Cover-glass preparations from the œdema, fluids, muscles, peritoneum, etc., of the milk-nuclein guinea pigs showed enormous numbers of this new bacillus, as shown in photogram No. I. On the other hand, in animals that died after inoculation with pure cultures the bacilli were found in only relatively small numbers. Very often it was necessary to examine half a dozen cover glasses before their presence could be established, and not infrequently it was impossible to find any. In the few exceptions mentioned the bacteria, however, were also found in enormous numbers.

The fact that the experimental animals died very frequently without the presence of the bacillus showed that death was directly due to the toxic products injected and not to any development of the bacillus in the body. In the original guinea pigs, however, it was clearly evident from the enormous numbers of the germ present that it did find in the body suitable conditions for its development, and death resulted when it had produced a sufficient amount of poisonous chemical products within the body. In the latter animals, then, the bacillus was capable of developing, whereas in the experimental animals inoculated with pure cultures no such favorable conditions for growth was as a rule present.

A rational explanation of this difference would be that in the experimental animals the natural resistance is such as to prevent or greatly retard the growth of the bacillus, whereas in the original guinea pigs this same resistance must have been lowered by some product or organism to such an extent that the animal became an excellent medium for the development of the germ.

These original guinea pigs, as already stated, were injected with a milk-nuclein solution, prepared by digestion of casein with pepsin. The precipitated nuclein was filtered off, washed, and dissolved in dilute alkali carbonate. This solution therefore contained nuclein, small amounts of salts of lactic acid, besides any bacteria that might be present and resist the action of the alkali. Experiments were made to ascertain which of these elements favored the growth of the bacillus in the body. Several trials were made with fresh nuclein prepared in exactly the same manner, but without effect.

Injections of lactic acid were more successful. Butyric acid was also tried, but the results were not apparently as good. Thus, white rats Nos. 18, 21, 27, and 28, Table III, which received subcutaneously one-fourth cc. of a fresh bouillon culture and immediately afterwards one-tenth cc. of a 20 per cent lactic-acid solution, yielded on post-mortem examination the characteristic appearances, and enormous numbers of the bacilli were found. Control animals died in about the same time, but the bacilli were as scarce as usual.

Small amounts of phosphoric acid have effects similar to lactic acid, as seen in rat No. 22, Table III. In several instances injections of lactic or phosphoric acids did not produce the characteristic appearances or perceptibly increase the number of bacilli in the tissues. On the other hand, the animals that gave positive results were found to contain foreign bacteria, which undoubtedly had secured entrance into the body through the slight local slough.

A number of experiments were next made to ascertain to what extent foreign bacteria were capable of favoring the growth of this bacillus in the body. Instances of microbic associations are not entirely unknown. Thus, Roger (1889) was the first to show that pure cultures of the bacillus of malignant œdema, which in small doses produced no effect in rabbits, became intensely active and produced death in twenty-four hours if a culture of micrococcus prodigiosus was injected at the same time. More recently (1891) Penzo has shown that Proteus vulgaris acts in a similar manner, and, furthermore, the equally interesting and important fact was brought out that cultures of the anaerobic bacillus of malignant œdema could be obtained in the presence of air if the culture tubes were inoculated at the same time with either of the above germs.

The following experiments were therefore made to ascertain if this new bacillus was capable of growing in the presence of air, in "mixed" cultures. Ordinary bouillon tubes were inoculated with this œdema bacillus and also with the bacillus acidi lactici, micrococcus prodigiosus, Proteus vulgaris, and a coccus obtained from one of the milk-nuclein guinea pigs.

The tubes were then set aside in the incubator at a temperature of about 35° C.

for fifteen hours. At the end of that time the tubes were taken out and examined. A marked difference was observed between the "mixed" cultures and control tubes of the aerobic bacteria. The growth in the former was considerably more vigorous than in the control tubes. The "mixed" culture of Proteus vulgaris and œdema bacillus was most marked. A heavy flocculent sediment was on the bottom, considerable gas was being given off, and a strong butyric-acid odor was present. The "mixed" culture with lactic-acid bacillus also gave rise to much gas. Microscopic examination showed the presence in all four tubes of actively growing œdema bacilli.

A guinea pig (No. 16, Table I) inoculated subcutaneously with one-fourth cc. of the œdema-proteus vulgaris culture was found dead in nineteen hours. A post-mortem made at once showed a terrible condition. The skin was firmly adherent to the muscular walls of the body by a thick, reddish fibrous œdema. Considerable gas was present throughout the œdema, which, over the abdominal walls, was almost 1 cm. in thickness. The blood vessels were highly injected. The peritoneum was bright red; considerable serous exudate in the abdominal and thoracic cavities. The lungs were pale and collapsed; the heart was in diastole. A fibrous network covered the intestines. Microscopical examination showed the presence of enormous numbers of the œdema bacilli in the subcutaneous tissue, and on the peritoneum and in the spleen. The heart, blood, and the liver likewise contained the bacilli, but in small number.

The picture presented in the above animal was an exact counterpart of that in the milk-nuclein guinea pigs. This experiment and others of a similar nature show conclusively that this new œdema bacillus gives rise to intensely poisonous products, and that the fatal results following the injection of a pure culture of this germ are usually due to the toxic products injected. As a rule no appreciable multiplication of the bacillus takes place in the normal animal, but if, on the other hand, impure cultures are employed the conditions become so changed that an enormous multplication rapidly takes place, and the death which then results is due to the poisons elaborated within the body.

This is a striking illustration of a "mixed" infection. A small number of this anaerobic bacillus may be introduced into the body without any bad effect so long as it is simply a question between the germ and the normal resistance of the body. If, however, this resistance is lowered or the germ is enabled to multiply through the assistance furnished by such common saprophytic bacteria as may accidentally have been introduced, the outcome then becomes quite different and death results. What has thus been shown to be true for this bacillus is equally true for the other anaerobic pathogenic bacteria. The danger of infection lies not so much in the introduction of any of these bacteria by themselves as it does in the simultaneous or subsequent introduction of other nonpathogenic bacteria which, by their presence, render the body, or a portion of it, a suitable nidus for the development of these anaerobic forms.

A further study of this new microorganism, and more especially of its chemical products, is reserved for the near future.

EXPLANATION OF PLATE 1.

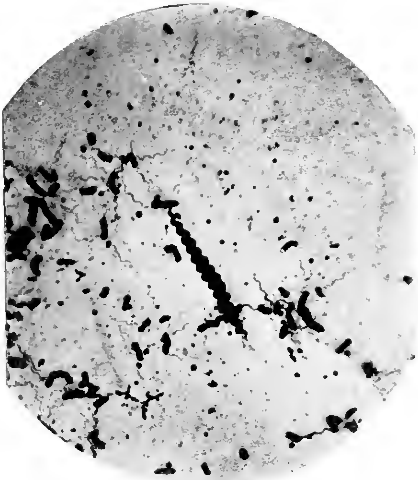
Photogram No. 1 shows a streak preparation from the peritoneal exudate of a guinea-pig, and is stained with gentian violet. In addition to the well-formed rods, two short and one long colorless spiral can be seen just above the middle. 340 × lamplight.

Photogram No. 2 shows a giant whip from an inclined agar culture in hydrogen, stained by Löffler's method. Near one edge are two rods with ordinary flagella. 340 × lamplight.

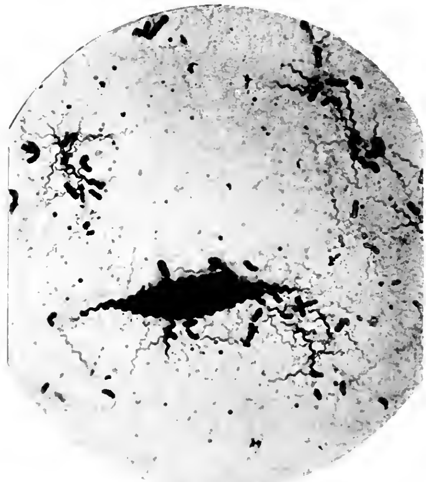
Photogram No. 3 shows a culture in Kral's flat tube, on foot, in glucose agar, presence of air, with colonies and production of gas. Natural size.

Photogram No. 4 shows a colony in glucose agar. 50 × sunlight.

Photogram No. 5 is made from the same cover-glass preparation as No. 1, and shows a spindle shaped giant whip. Two smaller ones are to be seen above it. 500 × sunlight.



No. 1.



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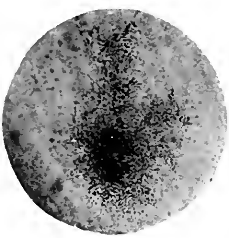

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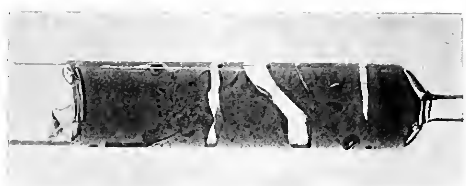

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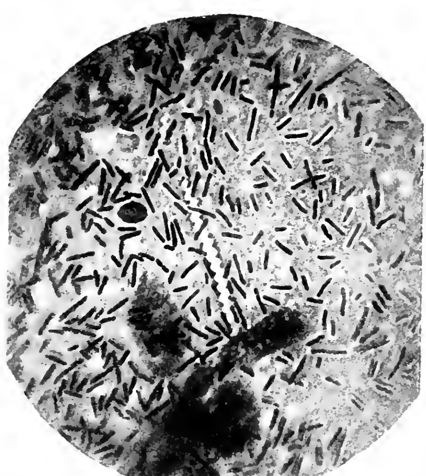

No. 6.

A NEW ANACROBIC BACILLUS.

TABLE I.—*Experiments with guinea-pigs.*

[In all cases bouillon cultures were used unless otherwise stated, and the injections were made subcutaneously over the abdomen.]

No.	Weight.	Culture used.	Dose.	Death in—	Bacilli.	Remarks.
	Grams.		*cc.*			
1	....	9 d. vacuum.......	4	About 10 hours.	Few	
2	....	....do	2	About 15 hours.	Good	
3	335	....do	1	18 hours	Few	
4	270	....do	$\frac{1}{2}$	17 hours	....do	
5	140	....do	$\frac{1}{4}$	About 12 hours.	Very few .	
6	322	3 d. vacuum.......	$\frac{1}{4}$	About 15 hours.	....do	
7	289	....do	$\frac{1}{4}$	28 hours	(?)	
8	398	3 d. hydrogen	$\frac{1}{4}$	About 15 hours.	Few	
9	381	3 d. vacuum.......	$\frac{1}{4}$	....do	Very few .	
10	385	4 d. hydrogen	$\frac{1}{4}$	About 12 hours.	None	
11	348	....do	$\frac{1}{10}$	About 14 hours.	....do	
12	530	....do	$\frac{1}{100}$	....	....	Recovered.
13	267	3 d. hydrogen.....	$\frac{1}{4}$	17 hours	None	
14	228	7 d. hydrogen.....	$\frac{1}{4}$	About 15 hours.	....do	Received previously two injections, $\frac{1}{2}$ c. c. each, of 20 per cent lactic acid.
15	295	....do	$\frac{1}{4}$	....do	....do	Received similar injections of butyric acid.
16	550	1 d., air, 37°	$\frac{1}{4}$	19 hours	Very numerous.	Received mixed culture of the bacillus and Proteus vulgaris.
17	....	... do	$\frac{1}{4}$	....	....	Recovered. Received mixed culture of bacillus and lactic acid bacillus.
18	452	$1\frac{1}{2}$ d. hydrogen....	$\frac{1}{2}$	11 hours	Very numerous.	Spirals present.
19	725	....do	$\frac{1}{2}$	About 15 hours.	....do	Do.

TABLE II.—*Experiments with rabbits.*

1	1,860	3 d. vacuum.......	$\frac{1}{4}$	About 15 hours.	(?)	
2	2,039	....do	$\frac{1}{4}$	27 hours	Very numerous.	Spirals present.
3	1,760	....do	$\frac{1}{4}$	About 15 hours.	(?)	
4	2,052	$2\frac{1}{2}$ d. hydrogen....	$\frac{1}{4}$	$4\frac{1}{2}$ days	Few	Received injection of sodium lactate.
5	1,660	4 d. hydrogen.....	$\frac{1}{2}$	20 hours	None	Received 1 c. c. of 20 per cent lactic acid.
6	1,966	... do	$\frac{1}{2}$	About 30 hours.	....do	Received no lactic acid.
7	420	7 d. hydrogen.....	$\frac{1}{4}$	42 hours	....	Received previously 4 injections, 5 c. c. each, intraperitoneally, of sterilized serous fluid from thorax.
8	402	4 d. hydrogen.....	$\frac{1}{4}$	39 hours	Very few .	
9	479	....do	$\frac{1}{4}$	41 hours	(?)	Received 5 c. c. nuclein subcutaneously.
10	1,400	$2\frac{1}{2}$ d. hydrogen....	$\frac{1}{4}$	About 36 hours.	Numerous.	Received $\frac{3}{4}$ c. c. of 20 per cent lactic acid.
11	512	....do	$\frac{1}{4}$	About 14 hours.	None	Received $\frac{1}{2}$ c. c. of 20 per cent lactic acid.
12	554	....do	$\frac{1}{4}$	....do	Numerous, but contaminated.	Do.
13	315	....do	$\frac{1}{4}$	....do	Few	Received no lactic acid.

TABLE III.—*Experiments with white rats.*

No.	Weight.	Culture used.	Dose.	Death in—	Bacilli.	Remarks.
1	35	9 d. vacuum	$\frac{1}{2}$	About 12 hours	Numerous.	
2	40	....do	$\frac{1}{4}$	20 hours	Few	
4	61	3 d. vacuum	$\frac{1}{4}$	About 15 hours		
5	59	....do	$\frac{1}{4}$	About 30 hours	Very few	
6	160	....do	$\frac{1}{4}$	....do	....do	
7	101	....do	$\frac{1}{4}$	....do	....do	
8	91	3 d. hydrogen	$\frac{1}{4}$	About 16 hours		
9	142	2 d. hydrogen	$\frac{1}{4}$	17 hours	None	
10	96	9 d. vacuum	$\frac{1}{4}$	39 hours	Few	
11	100	3 d. vacuum	$\frac{1}{4}$	51 hours	Very few	
12	79	6 d. hydrogen.	$\frac{1}{4}$	About 33 hours	....do	
13	90	9 d. hydrogen	$\frac{1}{4}$	27 hours	Fairly numerous.	
14	85	3 d. hydrogen	$\frac{1}{4}$	31 hours	Very few	
15	86	2 d. hydrogen	$\frac{1}{4}$	About 15 hours	(?)	
16	57	....do	$\frac{1}{4}$	....do	(?)	
18	157	$2\frac{1}{2}$ d. hydrogen	$\frac{1}{4}$	About 36 hours	Very numerous.	Received previous injection of $\frac{1}{4}$ c.c. of 20 per cent lactic acid.
19	137	....do	$\frac{1}{4}$	8 hours	None	
20	32	4 d. hydrogen	$\frac{1}{4}$	About 15 hours	....do	
21	56	$2\frac{1}{2}$ d. hydrogen	$\frac{1}{4}$	31 hours	Very numerous.	Received previous injection of $\frac{1}{10}$ c.c. of 20 per cent lactic acid.
22	42	....do	$\frac{1}{4}$	About 15 hours	Numerous	Received previous injection of 1 drop of phosphoric acid.
23	31	....do	$\frac{1}{4}$	About 40 hours	Very few	
24	43	....do	$\frac{1}{4}$	About 12 hours	(?)	
25	35	....do	$\frac{1}{4}$	....do	None	
26	40	....do	$\frac{1}{4}$	....do	....do	Received previous injection of $\frac{1}{2}$ c.c. of 20 per cent butyric acid.
27	42	....do	$\frac{1}{4}$	About 60 hours	Numerous.	Received previous injection of $\frac{1}{10}$ c.c. of 20 per cent lactic acid.
28	38	....do	$\frac{1}{4}$	About 15 hours	Very numerous.	Do.
29	39	....do	$\frac{1}{4}$	....do	Numerous.	Received previous injection of $\frac{1}{10}$ c.c. of 20 per cent butyric acid.
30	30	4 d. hydrogen	$\frac{1}{4}$	....do	None	
31	25	....do	$\frac{1}{10}$	About 13 hours	....do	
32	43	....do	$\frac{1}{100}$	10 days, 19 hours	Few	

TABLE IV.—*Experiments with white mice.*

1	20	4 d. hydrogen	$\frac{1}{4}$	About 13 hours.	Very few	
2	12	....do	$\frac{1}{10}$	About 15 hours.	None	
3	12	....do	$\frac{1}{100}$	About 21 hours.	....do	
4	18	....do	$\frac{1}{4}$	About 14 hours.	Very numerous.	Received previously $\frac{1}{10}$ c.c. 20 per cent lactic acid.

TABLE V.—*Experiments with pigeons.*

1	290	4 d. hydrogen	$\frac{1}{2}$	About 12 hours.	Few	
2		....do	$\frac{1}{2}$	3 days 20 hours.	Good	Received previously $\frac{1}{2}$ c.c. 20 per cent lactic acid.
3	317	....do	$\frac{1}{4}$	17 hours	Very few	
4	371	....do	$\frac{1}{4}$	About 12 hours.	Few	Received previously $\frac{1}{4}$ c.c. 20 per cent lactic acid.

TABLE VI.—*Experiments with guinea-pigs.*

[Shows comparative effect on temperature of the three anaerobic pathogenic Bacteria. Each animal received ½ c.c. subcutaneously of a bouillon culture grown 1½ to 2½ d. in hydrogen at 38°.]

Time.	Œdema Bacillus II.—No. 18, weight 452 grams.	Œdema Bacillus II.—No. 19, weight 725 grams.	Bacillus of symptomatic Anthrax.—No. 20, weight 377 grams.	Bacillus of malignant Œdema.—No. 21, weight 512 grams.
Aug. 26, 1893—	° *C.*	° *C.*	° *C.*	° *C.*
8:15 a. m	37·8	38·3		
9:15 a. m	38·3	38·4	40	
10:45 a. m	38·6	39·5	38·9	
Inoculated at 11:30 a. m.				
Aug. 26, 1893—				
12 m	38·5	39·2	38·5	38·7
12:30 p. m	38·3	39	38·5	38·8
1 p. m	38·2	39	38·5	38·8
1:30 p. m	38·2	39	38·5	
2 p. m	38·3	39	39·2	38·8
2:30 p. m	38·1	39	39	38·7
3 p. m	38·2	39	39	38·7
3:30 p. m	38·2	39·1	39·3	38·7
4 p. m	38·2	39	39·1	38·4
4:30 p. m	38·2	39·4	39	38·4
5 p. m	37·7	39·3	39	38·3
5:30 p. m	37·9	38	38·8	37·7
6 p. m	37·6	38·2	38·3	37·7
7 p. m	37·9	38·2	39·2	38·2
8 p. m	37·6	37·7	39	38
9 p. m	36·6	37·5	38·5	38
10 p. m	33	37	38·5	37·7
11 p. m	Dead.	36·1	38·8	
12 p. m		35·7	38·8	
Aug. 27, 1893—				
1 a. m		34·4	38·5	
9 a. m		Dead.	38·2	37·5
10 a. m				37·6
11 a. m				38·1
12 a. m				38·6
3 p. m				38·1
5 p. m			*38·5	*38·3

* Recovered.

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THE NATURE OF THE GERMICIDAL CONSTITUENT OF BLOOD SERUM.

By VICTOR C. VAUGHAN, M. D., PH. D., and CHARLES T. McCLINTOCK, PH. D.

As early as 1872, Lewis and D. Cunningham* demonstrated the fact that bacteria injected into the circulation rapidly disappear. In the blood of twelve animals, which had been treated with such injections, bacteria could be found in only seven after six hours. In thirty animals bacteria were found in the blood of only fourteen after twenty-four hours, and in seventeen animals bacteria were found in only two when the examination was made from two to seven days after the injection.

In 1874 Traube and Gscheidlen† found that arterial blood taken under antiseptic precautions from a rabbit, into the jugular vein of which one and one-half cubic centimeters of a fluid rich in putrefactive germs had been injected forty-eight hours previously, failed to undergo decomposition for months. These investigators attributed the germicidal properties of the blood to its ozonized oxygen. Similar results were obtained by Fodor ‡ and by Wysokowicz.§ The latter accounted for the disappearance of the germs not by supposing that they were destroyed by the blood, but that they found lodgment in the capillaries.

The first experiments made with extra-vascular blood were conducted by Grohmann,‖ under the direction of A. Schmidt, in his researches upon the cause of coagulation. It was found that anthrax bacilli, after being kept in plasma, were less virulent, as was demonstrated by their effect upon rabbits. Grohmann supposed that in some way the bacteria were influenced by the process of coagulation.

In 1887¶ Fodor made a second contribution to this subject, and in this he combatted the retention theory of Wysokowicz. One minute after the injection of one centimeter of anthrax culture into the jugular vein, in eight samples of blood, Fodor found only one colony of the bacillus. Then he took the blood from the heart with a sterilized pipette and added anthrax bacilli to it. This was kept at 38° C., and plates made from time to time showed a rapid diminution of the number of germs, which, however, after a time, when the blood had lost its germicidal properties, began to increase.

In 1888 Nuttal,** working under the direction of Flügge, used defibrinated blood taken from various species of animals, rabbits, mice, pigeons, and sheep, and found that this blood destroyed the bacillus anthracis, bacillus subtilis, bacillus megaterium and staphylococcus pyogenes aureus when brought in contact with them. He also confirmed the further finding of Fodor that after awhile the blood loses its germicidal properties and becomes a suitable culture medium in which the germs grow abundantly.

Nissen†† continued this work under Flügge's direction, and reached the following conclusions: (1) The addition of small quantities of sterilized salt solution or bouillon to the blood does not destroy its germicidal properties. (2) Cholera germs and Eberth's bacilli are easily destroyed by fresh blood. (3) For a given volume of blood there is a maximum amount of bacilli which can be destroyed. (4) Blood whose coagulability has been destroyed by the injection of peptone is still germicidal. (5) Blood, in which coagulation is prevented by the addition of twenty-five per cent of magnesium sulphate, has its germicidal properties decreased. (6) Filtered blood plasma from the horse is germicidal.

Behring†† has attributed the action of the blood serum of the white rat on anthrax

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* Eighth Annual Report of the Sanitary Commission of the Government of India.

† Schlesische Gesellschaft f. vaterland. Cultur, 1874.

‡ Archiv f. Hygiene, B. 4.

§ Zeitschrift f. Hygiene, B. 1.

‖ Ueber die Einwirkung des zellenfreien Blutplasma auf einige pflanlziche Mikroorganismen, Dorpat, 1884.

¶ Deutsche medicinische Wochenschrift, 1887.

** Zeitschrift f. Hygiene, B. 4.

†† Zeitschrift f. Hygiene, B. 6.

bacilli to the unusual alkalinity of the blood of the animal. He has made a number of titrations by which he shows that the blood serum of the white rat is somewhat more alkaline than that of certain animals which are more susceptible to anthrax, such as the rabbit, guinea pig, and cow. His deduction is not justified, because there are many other and more important points in which these animals differ more markedly from the white rat than in slight differences in the alkalinity of the blood serum. Had he shown that the blood of the adult rat, which is not susceptible to anthrax, is more alkaline than that of the young rat, which is susceptible, his argument would have been more plausible; but even then it would not have deserved the dignity of positive evidence.

In 1890 Buchner,* aided by Voit, Sittmann, and Orthenberger, made a most valuable contribution to our knowledge of the germicidal properties of blood. The results of this work are stated as follows:

(1) The germicidal action of blood is not due to phagocytes, because it is not influenced by the alternate freezing and thawing of the blood by which the leucocytes of the rabbit are destroyed.

(2) The germicidal properties of the cell-free serum must be due to its soluble constituents.

(3) Neither neutralization of the serum, nor the addition of pepsin, nor the removal of carbonic acid gas, nor treatment with oxygen have any effect upon the germicidal properties of the blood.

(4) Dialysis of the serum against water destroys its activity, while dialysis against 0·75 per cent salt solution does not. In the diffusate there is no germicidal substance. The loss by dialysis with water must be due to the withdrawal of the inorganic salts of the serum.

(5) The same is shown to be the case when the serum is diluted with water and when it is diluted with the salt solution. In the former instance the germicidal action is destroyed, while in the latter it is not.

(6) The inorganic salts have in and of themselves no germicidal action. They are active only in so far as they affect the normal properties of the albuminates of the serum. The germicidal properties of the serum reside in its albuminous constituents.

(7) The difference in the effects of the active serum and that which has been heated to 55° C. is due to the altered condition of the albuminate. The difference may possibly be a chemical one (due to changes within the molecule) or it may be due to alterations in mycelial structure. The albuminous bodies work upon the bacteria only when the former are in an active state.

We wish at this point to call attention to an inconsistency between the results obtained by Buchner and the conclusions which he draws. In experiment No. 45 he renders the serum slightly acid and adds 0·1 gram of pepsin to each 5 c. c. of serum (showing by a side experiment that this pepsin actively digests coagulated egg albumin in neutral solution) and finds that the digestive action of the pepsin does not lessen the germicidal properties of the serum. In fact, he states this in his conclusions, but his ultimate opinion, and the one held by him in his latest contribution is that the germicidal constituent of the blood is the serum albumin. How much serum albumin remains in blood serum after it has been thoroughly digested with pepsin? He could scarcely have chosen a more positive method of demonstrating that the germicidal constituent is not serum albumin. Either his pepsin was not active, and on this supposition his experiment is without value, or the active constituent of blood serum is a substance which is not destroyed or materially altered by peptic digestion. We know that the peptones not only have no germicidal properties, but belong to that class of proteids which is most favorable to the growth and development of germs. We recognize this fact when we add peptones to the various artificial media on which we cultivate germs. However, we

*Archiv f. Hygiene, B. 10.

will return to this subject again. At present we will proceed with the literature of the subject.

The successful researches of Buchner led many other investigators to enter this field of experimentation, and some of them have made valuable contributions to our knowledge of the germicidal action of the blood under varying conditions, but so far as the nature of the germicidal constituent is concerned but little or no progress has been made. Prudden* found that ascitic and hydrocele fluids restrain the development of certain germs. Rovighi †reported that the germicidal action of the blood is increased in febrile conditions. Pekelharing ‡inclosed anthrax spores in bits of parchment and introduced them under the skin of rabbits. Thus treated, the spores soon lost their virulence and finally their capability of growth. The destruction of these spores could not have been due to phagocytes, which did not penetrate the parchment, but must have been caused by soluble substances.§ Behring and Nissen found that the serum of the white rat, dog, and rabbit destroy anthrax bacilli; while serum obtained from the mouse, sheep, guinea pig, chicken, pigeon, and frog have no such action. It will be observed from this that there is no constant relation between the germicidal action of the blood of animals of different species and their susceptibility to the disease caused by the germ. Thus, the rabbit is highly susceptible to anthrax, notwithstanding the fact that its blood destroys large numbers of these germs. On the other hand, the chicken is immune to anthrax from the moment when it comes from the shell, and yet the bacillus anthracis grows luxuriantly in the extra-vascular blood of the chick. This demonstrates that there is a great difference between the action of extra-vascular blood and that circulating in the body and constantly fed, and, in case there may be need, altered in composition by certain glands.

Halliburton has prepared from the lymphatic glands a globulin which he designates as cell globulin 3, and which agrees with fibrin ferment in inducing coagulation in plasma. Hankin has tested the germicidal properties of this cell globulin. His experiments have been conducted in the following manner: The lymphatic glands (in later experiments the spleen also) of a dog or cat are freed as much as possible from fat and connective tissue, then finely divided and extracted with dilute solution of sodium sulphate (one part of a saturated solution to nine parts of water). The cell globulin passes into solution while the other proteids are but sparingly soluble. After twenty-four hours the fluid is filtered and mixed with an excess of alcohol. The voluminous precipitate containing the cell globulin is collected on a filter and washed with absolute alcohol. For use, a part is dissolved in water and a small quantity of a bouillon culture of the anthrax bacillus is added. Plate cultures are made along with control plates from time to time, and in this way the germicidal properties of the substance is demonstrated.

Hankin‖ closes this contribution with the following conclusions: (1) Halliburton's cell globulin 3 has marked germicidal properties (2) In this respect it differs from fibrin ferment. (3) The germicidal properties of this substance seems to be identical with that of serum as described by Buchner, Nissen, and Nuttal. (4) The active properties of the serum are probably due to this or an allied body.

Bitter¶ has repeated the experiments of Hankin, but fails to confirm them. Bitter states that he has followed Hankin's directions exactly. However this may be, it is certain that the spleen contains a germicidal substance, but whether it can be extracted by the method of Hankin or not we do not know. That the germicidal constituent of the spleen is identical with Halliburton's cell globulin or with any other globulin we very much doubt. It certainly is a nuclein and it is altogether possible that Hankin obtained traces of this nuclein in his extracts. In this case the extract would show, or fail to show, germicidal properties according to the

* Medical Record, 1890.

† Atti della Accad. Med. di Roma, 1890

‡ Ziegler's Beitraige, B. 8.

§ Zeitschrift f. Hygiene, B. 8.

‖ Centralblatt f. Bakteriologie, B. 9.

¶ Zeitschrift f. Hygiene, B. 12.

relative amounts of nuclein and other substances present. The less globulin and the more nuclein present the more marked would the germicidal effect be.

Christmas* has prepared a germicidal substance from the spleen and other organs by the following method:

The animal is killed with ether, opened under antiseptic precautions and the organ removed, cut into fine pieces, covered with 50 c. c. of glycerine and allowed to stand for twenty-four hours, then filtered. The filtrate is precipitated with five times its volume of alcohol, and this fluid immediately decanted. The precipitate is washed with absolute alcohol in order to remove the glycerine. Then the traces of alcohol are removed by pressure and the precipitate dissolved in 25 c. c. of distilled water. Through this solution air is driven for some hours in order to destroy the last traces of alcohol. Then the fluid is filtered and its germicidal action tested. Bitter has also examined this method, and the impartial reader must see that he has not done so with fairness. However, this fact renders the work all the more valuable, because his results confirm the statements of Christmas. Bitter killed his animals by venesection, and, in some cases at least, prepared the substance in unsterilized vessels; but even when this was done the solution was germ free and manifested marked germicidal properties. Bitter finally finds a difference between this substance and the germicidal constituent of blood serum; the latter, he states, is certainly destroyed by a temperature of 65°, while the solution of Christmas, after having been heated to this temperature, is still able to destroy from 35,000 to 40,000 typhoid bacilli within four hours. Buchner† in his latest contribution on the subject has the following to say in condemnation of Christmas:

A method given by Christmas for the preparation of germicidal solutions from the organs of normal rabbits has also been tested by Bitter. Germicidal solutions were indeed obtained, which, however, differed materially from active serum, for in three experiments, notwithstanding heating to 65°, the germicidal action remained.

It is altogether possible that the more powerful action of the solution made by Christmas is due to the fact that it contains the germicidal substances in more nearly a chemically pure condition than it exists in blood serum. It is also highly probable that the cause of the arrest of the germicidal activity of blood serum by a temperature of 55° is not due to the destruction of its germicidal constituent, but is due to the action of the heat on other constituents of the fluid.

Some attempts have been made to determine the nature of the germicidal constituent by the action of precipitating reagents on the proteids of blood serum. In his latest contribution Buchner states that he has not been able to obtain a germicidal solution by precipitating all the proteids with absolute alcohol, freeing the precipitate from alcohol, drying it, and then redissolving. He does not give the methods employed in freeing the precipitate from alcohol, the temperature or conditions under which it was dried or the nature of the menstruum by which resolution was effected. In the absence of these needed details, his conclusion that alcohol destroys the germicidal substance must remain open to question. On the other hand, Christmas states that when the proteids are precipitated with alcohol and the precipitate dissolved in a volume of water equal to that of the original serum, the solution thus obtained has a more powerful germicidal action than the serum. Bitter,‡ in an experimental review of the statement of Christmas, gives the following detailed statement of one experiment:

Ten cubic centimeters of serum were poured into 50 cubic centimeters of alcohol (strength of alcohol not given), stirred, and the precipitate immediately separated from the alcohol by filtration. (He fails to state whether or not sterilized filter paper was used.) The precipitate was freed from alcohol by pressure between folds of filter paper (again he fails to state whether or not this paper was sterilized), then dried at 37°, and mixed with 10 cubic centimeters of sterilized distilled water. On being allowed to stand for a short time at 37° nearly all of the precipitate was redis-

* Annales de l'Institut Pasteur, T. 5.

† Archiv f. Hygiene, B. 17.

‡ Zeitschrift f. Hygiene, B. 12.

solved. The solution was then separated from the deposit by filtration (through unsterilized filter paper?) and tested.

It can scarcely be a matter of surprise that Bitter found germs nearly always present in the solution obtained in this careless manner. However, he did find that the germs present did not develop when the solution was kept at 37° and, moreover, that germs added to this solution were destroyed. Bitter concludes that in truth anthrax and typhoid bacilli are destroyed by "precipitated serum," but not so energetically as by normal serum.

Emmerich, Tsuboi, Steinmetz and Löw* have made interesting and valuable contributions relating to the effect of precipitation of the proteids upon the germicidal action of blood serum. An active serum was dialyzed in a sterilized parchment paper tube against water for from twelve to eighteen hours. By the expiration of this time the serum globin, becoming insoluble on account of the withdrawal of inorganic salts, was deposited. The dialyzer was dried with sterilized filter paper and the globulin-free serum was precipitated with several volumes of alcohol. The precipitate was collected on a sterilized falten-filter and the alcohol removed from the precipitate by sterilized porous plates and filter paper. The precipitate was then finely divided, dried for half an hour in vacuo at 36°, then rubbed up in a sterilized mortar and dissolved in sterilized water to which salt solution had been added. In the solution thus prepared germs did not show, after from three to four hours, either a marked increase or decrease, but when the solution was heated to 100°, allowed to cool, and then inoculated with germs, the increase was four hundred-fold within four hours. Next, it was found that if instead of water, a 0·05 per cent aqueous solution of potassium hydrate was employed in dissolving the alcoholic precipitate in the globulin-free serum, this solution possessed all the germicidal strength of the original serum. The same was found to be true of dilute alkaline solutions of the alcoholic precipitate in serum from which the globulin had not been removed. The dilute alkali was shown not to have any germicidal action in and of itself.

From these experiments, the above mentioned investigators conclude that the germicidal constituent of blood serum is an alkaline compound of serum albumin. They also found that heating the serum-albumin alkaline solution to 65° or higher destroyed its germicidal action, and they explain this effect of heat on blood serum and on their artificial solution by supposing that the high temperature breaks up the combination of the alkali with the serum-albumin. Furthermore, they found that a serum which had been rendered inactive by a temperature of 55° could be regenerated in part at least by the addition of the small amount of alkali mentioned above.

Since Fodor † and Zuntz ‡ have shown that freshly drawn blood rapidly decreases in alkalinity on standing in vitro, an explanation of the fact that blood serum rapidly loses its germicidal properties naturally suggests itself. Emmerich and his coworkers confirm their belief in this theory by demonstrating that blood serum which has been rendered very feebly acid (0·67 part of sulphuric acid per mille) has no germicidal action, but furnishes a good culture medium.

The above mentioned investigations are very valuable inasmuch as they show the important role which the small amount of alkali plays in the germicidal action of blood serum. This had, indeed, already been demonstrated by Fodor † by quite a different line of investigation. This experimenter had found that the resistance of rabbits to anthrax is markedly increased by the administration by stomach or subcutaneously of sodium phosphate, carbonate or bicarbonate or of potassium carbonate.

Löw concludes that the introduction of alkali into the albumin molecule increases its lability and he cites examples from organic chemistry in support of this view.

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* Centralblatt f. Bakteriologie, B. 12.

† Centralblatt f. Bakteriologie, B. 7.

‡ Centralblatt f. Med. Wissenschaft, 1867.

There are some additional points of interest in the theory of Emmerich and his assistants. As has been stated, they believe that the serum-albumin is the germicide, but they think it highly probable that only a comparatively small part of the albumin is active and this small part, they suppose, originates in the albumin of the daily food, which is converted into lymph cells, and by the disintegration of these it passes into solution in the blood. They admit, however, that there are some reasons for believing, with Buchner, that the whole of the serum-albumin is active. They state that it is possible, but highly improbable, that the germicidal agent is not the serum-albumin, but some substance which is precipitated along with this by alcohol and other agents.

We hope to show that the germicidal agent is not serum-albumin, and that this "highly improbable" substance does exist.

In a short and somewhat unsatisfactory review of the report of Emmerich and his coworkers, Buchner * devotes himself to a consideration of the question of the regeneration of serum rendered inactive by heating to 55° on the addition of an alkali. He details one experiment made by himself on this point. The experiment confirms the work of Emmerich, but Buchner offers an interpretation which is wholly theoretical and by no means convincing. He finds that the regenerated serum when heated to 60° still has a retarding effect upon the growth of germs, and he argues from this that the germicidal action of the "regenerated serum" is due to its being less suited (for some unknown reason) to the growth of bacteria. No one knows better than Buchner the influence of the various chemical substances on the temperature at which an active serum is converted into an inactive form, and yet he overlooks altogether the possible effect of increased alkalinity on this conversion. Had he heated the regenerated serum to 100° he would have then found that it forms a very fertile culture medium.

Hankin* has recently published a paper which is more valuable in its suggestions than in its experimental details. He suggests that the germicidal substance is a special secretion of the eosinophile-granular cells. The granular matter in these cells is, according to his theory, the antecedent of the germicidal substance.

There are many other minor contributions to this subject, but those mentioned above contain all the essential points, and there is no necessity of a further review of the literature. It is true that Aronson† has very recently announced to the Berlin Medical Society that he has isolated a powerful antitoxine from the blood serum of animals rendered immune to diphtheria and that with this substance he has cured guinea pigs infected with this disease. Following the example of another illustrious German investigator, he refuses to tell how this curative substance is prepared. It is needless for me to say that this manner of dealing with scientific investigations has not as yet found favor with the unsophisticated profession in the new world.

From a careful and critical study of the investigations, which have been briefly reviewed, we have come to the following conclusions: (1) The serum-albumin is not the germicidal substance in blood serum. As has been stated, either this must be true or the experiment by which Buchner demonstrated that an active pepsin does not destroy the germicidal action of blood serum must have been an error; because peptic digestion readily and completely converts serum-albumin into peptones and we know that peptones are especially favorable to bacterial growth. (2) The germicidal substance must belong to the proteids. Otherwise it would be difficult to explain the fact that a temperature of 55° renders blood serum inactive. (3) The only proteid likely to be present in blood serum and which is not destroyed by peptic digestion is nuclein.

Having reached these conclusions, the following questions naturally present themselves: (1) Is there a nuclein in blood serum? (2) Has this nuclein, if there be one, germicidal properties? These questions we have attempted to answer.

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* Centralblatt f. Bakteriologie, B. 12. †Berliner klin. Wochenschrift, 1893.

Dogs and rabbits were the animals from which the serum was obtained. Healthy animals, which had not previously undergone any experimentation, were selected. The animal was firmly fixed in a holder; the carotid was laid bare under antiseptic precautions. A ligature and a small clamp were applied to the artery about 2 inches apart, the former distally and the latter centrally. Then a slit in the artery was made with a sterilized knife, and a small sterilized glass canula, with sterilized and dried rubber tube leading into a sterilized Erlenmayer flask, was introduced into the artery and held in place by another ligature. Then the clamp was removed and the blood flowed into the flask. In each case the animal was bled to death. The flask containing the blood was placed in the ice chest and allowed to remain for twenty-four hours. By the expiration of this time a wine-colored serum had separated. This serum was poured into a second sterilized flask and about ten volumes of a mixture of equal parts of absolute alcohol and ether were added. This produced a voluminous precipitate which was nearly white. This was allowed to stand twenty-four hours, and in some cases much longer, the alcohol and ether being decanted and replaced by equal volumes twice or oftener during the time. Then the supernatant fluid was decanted and an equal volume of a 0.2 per cent solution of hydrochloric acid, containing active pepsin, was added and the flask placed in an incubator at 38°, and the digestion was continued until the fluid failed to respond to the biuret test for peptones.

Each time this test was made the fluid was decanted from the undigested portion and replaced by an equal volume of fresh digestive fluid. In some instances the flask containing this fluid was allowed to stand in the incubator for some days. This was not necessary in order to complete the digestion, but was allowed as a matter of convenience. In all cases the digestion was prompt, and proceeded to a certain point, when it ceased altogether. The undigested portion was small in amount and grayish in color. This was collected on a small sterilized filter, and washed first with 0·2 per cent hydrochloric acid and then with alcohol. After the washing with alcohol the filter was allowed to stand exposed to the air for half an hour or longer in order that all of the alcohol might pass through or evaporate. The precipitate was then dissolved in a sterilized solution of potassium hydrate. The strength of this alkaline solution usually employed was 0·12 per cent. Usually this solution contained, in addition to the alkali, 0.6 per cent of sodium chloride. In some instances a solution, containing 1·2 grams of potassium hydrate, 6 grams of sodium chloride, and 1 gram each of sodium bicarbonate and disodium hydrogen phosphate to 1 liter of water, was employed as a solvent. The solution was filtered through a Chamberland tube and received in a sterilized flask.

The solution obtained as above stated was perfectly clear, colorless, and did not respond to the biuret test. The addition of strong nitric acid produced a cloudiness, which dissolved on the further addition of the acid. This acid solution did not become yellow on being heated, but did so after the addition of ammonia.

We have now answered the first question. Blood serum contains a nuclein. We hope to investigate, at some time in the future, the relation between this nuclein and fibrin ferment.

The origin of the nuclein found now for the first time in blood serum is an interesting question. Does it come from the disintegration of the polynuclear cells, or shall we regard certain white blood corpuscles as unicellular organs whose function it is to secrete this nuclein?

In proceeding to determine whether or not this nuclein has germicidal properties the solution was distributed in sterilized test tubes, five c. c. being placed in each tube. It should be stated that, in dissolving the nuclein, the volume of the solvent employed was in all cases the same as that of the blood serum from which the nuclein was obtained. These tubes were inoculated with different germs and plates made at varying intervals of time in order to test the germicidal action. One and the same platinum loop was used in the preparation of each plate. The diameter of this loop is 2 millimeters.

EXPERIMENT I.

A nuclein tube was inoculated with the bacillus of Asiatic cholera and plates made from this gave the following results:

Time	Immediately.	5 min.	15 min.	30 min.	1 hr.	1½ hrs.	22 hrs.
Number of colonies.	2,100	43	54	71	90	115	1,200

That the alkali in which this nuclein was dissolved did not cause the decrease in the number of germs is shown by the subsequent increase.

EXPERIMENT II.

Staphylococcus pyogenes aureus.

Time	Immediately.	1 hour.	4 hours.	7 hours.	24 hours.
Number of colonies	4,000	1,720	1,050	810	0

EXPERIMENT III.

Anthrax bacillus without spores.

Time	Immediately.	1 hour.	4 hours.	7 hours.	24 hours.
Number of colonies	100	43	10	1	0

EXPERIMENT IV.

Cholera germ.

Time	Immediately.	1 hour.	4 hours.	7 hours.	24 hours.
Number of colonies	470	45	1	0	410

It may be stated here that the final increase in the number of cholera germs occurred both in the nuclein solution prepared from the serum of the rabbit and that of the dog.

EXPERIMENT V.

Staphylococcus pyogenes aureus.

Time	Immediately.	1 hour.	5 hours.	19 hours.	24 hours.
Number of colonies	Countless.	22,000	12,525	155	0

EXPERIMENT VI.

Anthrax bacillus without spores.

Time	Immediately.	1 hour.	5 hours.	19 hours.	24 hours.
Number of colonies	1,120	155	0	0	0

All of the foregoing experiments were made with the solution of nuclein in sterilized water containing 0·12 per cent potassium hydrate and 0·6 per cent of sodium chloride. The following were made in the other solution mentioned above. It may be stated that the culture of the aureus experimented with grew in water containing 0·5 per cent of potassium hydrate.

EXPERIMENT VII.

Staphylococcus pyogenes aureus.

Time	Immediately.	1 hour.	4 hours.	7 hours.	24 hours.
Number of colonies	5,000	2,500	1,600	1,200	0

EXPERIMENT VIII.

Anthrax bacillus without spores.

Time	Immediately.	1 hour.	4 hours.	7 hours.	24 hours.
Number of colonies	43	7	0	0	0

Experiment IX.

Cholera bacillus.

Time	Immediately.	1 hour.	4 hours.	7 hours.	24 hours.
Number of colonies	350	105	150	42	0

Experiment X.

Staphylococcus pyogenes aureus.

Time	Immediately.	1 hour.	5 hours.	19 hours.	24 hours.
Number of colonies	Countless.	25,000	5,525	65	500

Experiment XI.

Anthrax bacillus without spores.

Time	Immediately.	1 hr.	5 hrs.	19 hrs.	24 hrs.
Number of colonies	430	0	0	0	0

We have made many other tests of the germicidal action of this nuclein obtained from blood serum, but, since all of them gave practically the same results, further repetition is unnecessary.

We have also made many experiments on the effect of heat and other agents on the germicidal action of this nuclein, but we prefer to report these later, since we have obtained some unexpected results. Suffice it to say that while boiling destroys the germicidal action, the temperature to which these solutions may be heated and still show some retarding action on germs has surprised us.

The fact that the germicidal constituent of bloo l serum can be isolated has an important practical bearing. Blood-serum therapy has proven impracticable on account of the large amount of the fluid which must be injected. Now, nuclein therapy promises to enable us to avoid this difficulty, and possibly the near future may find us using this agent in the treatment of disease. The nuclein may be obtained from an animal rendered immune to diphtheria and a sufficient quantity of this injected into the blood or under the skin of a child suffering with this disease may effect a cure, but we will not prophesy. The future will tell us what it has in store when it becomes the present.

VASOMOTOR ATAXIA: A CONTRIBUTION TO THE SUBJECT OF IDIOSYNCRASIES.

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The present paper is intended merely as a record of personal observations, and presentation of conclusions based thereon; it will not, therefore, refer to facts and theories in literature, though many observations parallel with, and confirmatory of, the views expressed have been found. The exigencies of time necessitate citation of a few only of the cases studied, which, excluding the more numerous instances of slight departure from the norm, altogether number sixty-odd, accumulated in hospital and private practice during the course of some eight years; and such reports as are made must be brief. I would request, therefore, that it be assumed, in discussion, that despite brevity of account these cases have been investigated from all standpoints, with as much thoroughness as I am capable of, or as the opportunities permitted.

The varying susceptibilities of different individuals, and of the same individual at different times, to the same influences has long been a matter of every-day observation. Of a number of persons exposed to cold and wet at the same time and place, one shall have articular rheumatism, another pneumonia; one shall contract tonsillitis, another nephritis; others shall escape apparently unharmed. Evidently there is something at work in addition to inclement weather and specific microbes; and this something, which is the determining and, therefore, the principal etiologic factor, is a something special to the individual—a physical personal equation. We call it, whether exhibited in relation to the exciting causes of disease or to the action of drugs, individual liability, predisposition, idiosyncrasy; and though our terms are singular in type, we recognize that the singularity is relative and may be exhibited by several persons.

For every idiosyncrasy there must be a physiological basis. By comparing the phenomena, special and general, exhibited by a group of persons presenting similar or identical idiosyncrasies, we take a step toward the recognition of the basic physiological conditions.

I would invite the attention of the section to-day to an idiosyncrasy of the circulatory mechanism, which, in its extreme degrees, manifests itself in the form of well-recognized symptom-complexes; in its minor degrees gives rise to puzzling manifestations of great variety of detail; and in its least-developed forms often passes unnoticed. For this condition—which seems to depend upon a feebleness in the coordinating mechanisms, in consequence of which the balance of the cardio-vascular action becomes disturbed by influences that in the great majority of persons have no such effect, and greatly disturbed by influences that normally have slight effect, while the restoration of equilibrium is slow and imperfect—I would propose the self-explanatory name of *vasomotor ataxia:* ataxia rather than hyperkinesis, or hypokinesis, because excessive vascular dilatation and excessive vascular constriction may be either spasmodic or paretic, or both spasmodic and paretic, as dilator or constrictor nerves, or both, are affected; and even in the extreme and opposite types of vasomotor ataxia, the phenomena, while always more or less paroxysmal, are neither exclusively those of dilatation nor exclusively those of constriction, but both abnormal dilatation and abnormal constriction are usually present in varying degree in the same patient. The influences under which these phenomena are displayed are, more especially, temperature—and cold more than heat—emotion, visceral or internal reflex excitation, and the action of toxic agents formed in the organism or introduced from without.

The most striking and easily recognized phenomena are those exhibited by the heart and by the peripheral vessels (arterioles, capillaries, and venules); but analogy indicates that similar manifestations occur in the vessels of glands and viscera, while certain symptoms are only to be explained by disturbance of cerebral circulation. The stimulus that results in cardiac and vascular disorder may be applied centrally or peripherally, but the defective inhibition upon which the phenomena depend must be relatively central, and is probably the expression of functional or nutritional defect in the great ganglia of the sympathetic system, or in the medullary centers, or in both.

Functional and nutritional disturbance may result in structural, and finally in organic change; but the discovery of gross anatomical change at necropsy would not prove that it had existed from the first. It is likewise to be borne in mind that functional, nutritional, or structural defect in the sympathetic ganglia or nerves may be primary, or the result of primary or secondary disease elsewhere. Furthermore, as a result of disturbed innervation and consequent malnutrition, degenerative changes may take place in the vessel walls and in the myocardium. The phenomena of vasomotor ataxia may thus occur independently, or be merely a part of the symptomatology of functional and organic diseases of various kinds. In either event the mechanism is essentially the same, and it will facilitate study to consider the circulatory symptoms apart from other and complicating conditions.

With the pronounced types of vasomotor ataxia, to which at the one extreme—

that of vascular relaxation—the name of Graves's disease or exophthalmic goiter, and at the other extreme—that of vascular tetany—the name of Raynaud's disease, local syncope, local asphyxia, acroasphyxia, symmetrical gangrene, acrosphacelus, etc., have been given, all are familiar. All are familiar, too, with the association of other phenomena of vasomotor paresis or vasomotor spasm, with Graves's disease and with Raynaud's disease. For example, angina pectoris occurs in both, and angioneurotic œdema and spontaneous gangrene have been observed in Graves's disease. As pointing toward more than a superficial or accidental resemblance in such association of the two affections, the following two cases are submitted:

*Case I.** *Acro-asphyxia, with intermittent enlargement of thyroid gland, and paroxysmal tachycardia.*—Sarah O'N., unmarried; seamstress; aged 25 years; native of Ireland; having fair skin, brown eyes, black hair; was seen at the Philadelphia Polyclinic, April 11, 1892. For three or four months she has had almost constant headache, with occasional dizziness. Vision at times misty. The feet sometimes swell. At times she has pain in the precordium, with cardiac palpitation. These attacks occur paroxysmally. For about two years she has noticed that several times a day, especially if exposed to cold, either by immersion in cold water or otherwise, the fingers suddenly become discolored—purplish. Both extremities are affected at once. The discoloration begins in the palm of the hand and extends downward. It lasts but a few minutes, and disappears quickly. The first phalanx of the middle finger of the right hand is thickened, the skin glossy, the veins much distended There is a depressed cicatrix on its inner aspect. The patient states that twelve years ago there was a swelling at this place, which was lanced, and kept on discharging until within a few months, when the sinus finally closed. The bowels are constipated. The patient does not rise at night to micturate. Menstruation is irregular. Examination shows all over the arms mottled areas of irregular distribution, indicating by their varying color, and by the appearance of the distended vessels, both capillary and venous congestion. Over the upper part of the chest, anteriorly and in the back, especially beneath the scapulæ, are congeries of distended superficial venules. The legs and feet appear not to be affected. No lesion of the lungs can be detected. At the first examination of the heart the rate is 96. At the base a soft systolic murmur is heard, more distinctly on the left. In the veins of the neck a marked musical hum is heard, louder on the right. It is continuous, with systolic intensification. The thyroid gland is easily demonstrated, but not markedly enlarged. Hæmoglobin is 65 per cent by Fleischl's scale; red corpuscles number more than 4,000,000; there is no excess of white cells. Urine is 1018, acid, no albumin, no sugar, no casts, no red cells (Dr. Eshner). The fundus of the eye is normal; there is compound hyperopic astigmatism (Dr. Jackson).

Relief of constipation, together with correction of visual error by glasses, apparently relieved the headache. After a few doses of nitroglycerin, the local asphyxia did not return while the drug was taken.

Some three months later the patient returned, complaining of recurrent headache, with attacks of precordial pain and violent palpitation. The nature of these attacks seemed to be that of tachycardia rather than simple palpitation. While under examination the pulse rate was variable, about 130. The thyroid gland was slightly enlarged, and a bruit could be heard over the gland on auscultation.

Picrotoxin, $\frac{1}{60}$ grain t. d., was prescribed, with apparent relief to headache. During some ten weeks the thyroid was observed to enlarge and diminish irregularly, without reference to menstruation, which occurred twice during the period. The swelling was soft, not expansile, and greatest on the right side. The patient was last seen some four months ago, when the thyroid gland was apparently normal; pulse-rate 96.

Case II. Epilepsy; acroasphyxia; enlargement of thyroid gland.—Mary N., aged nineteen years; domestic, unmarried; of American birth, Irish parentage; fair skin, brown hair, blue eyes; seen at the Philadelphia Polyclinic, January 4, 1893, has had mild epileptic paroxysms of about one-half hour's duration once a week since the preceding October. There is no aura. She screams and turns pale before losing consciousness. The bowels are regular; the menses regular but painful. The patient is subject to paroxysmal flushing, with subjective and objective heat, especially of the face. There are irregular sweats. She has urticaria in summer time. She is easily excited; and has frequent attacks of palpitation and rapid thumping of the heart. The heart is not enlarged; the impulse is jerky; the rate is 100; the first sound is short, the second sound is accentuated at the aortic cartilage and at midsternum. There is a soft systolic murmur over the sternum, near the articulations of the second cartilages; it is not transmitted. The thyroid gland is enlarged, especially in the right lobe; it is soft and pulsating; there is no thrill and no bruit.

* *Vide* The Philadelphia Polyclinic. June, 1892, p. 89.

The hands are of a dusky-blue color, which slowly fades on elevation; the nails are purplish. Upon immersing the hands in ice-cold water they soon become red. If one hand only is placed in the cold water, that one becomes red, the other a deeper blue. Dermographism is marked. Factitious urticaria is produced by pressure, followed by cold.

The patient states that only recently has she noticed occasional blueness of the hands; that it is not constant, and is usually produced by cold, but may come on while at work in a warm room.

There are on the cheeks of this patient three or four small reddish elevations, surrounded by little radiating lines—a star, as it were—of dilated vessels. A number of small telangiectases are found on the arms and breast. She states that she bleeds easily if cut, but blood is stanched in a reasonable time. She frequently bleeds from the nose. No family history is attainable.

Taken by themselves, these two cases might not appear to be of special significance; but to me they were of great interest, because they seemed to supply the links between two groups of cases that had occupied my attention for a number of years, and which I believed to be related to each other, as to Graves's disease in the case of the one group, and to Raynaud's disease in the case of the other group; and thus to complete the chain of observation, as of reasoning. This will become more apparent if I relate briefly, but in some detail, the case that first drew my thoughts to the subject.

Case III.—In February, 1885, Miss X., of American birth and parentage, Hebrew race; fair complexion, brown hair, gray eyes; an intelligent and truthful, and not hysterical young lady, some 17 or 18 years of age, apparently in perfect health, was alarmed at a sudden dimness of vision, progressing in the course of a few minutes to total blindness, which lasted "about a second." The return of sight was followed by intense headache, lasting about ten minutes. Ophthalmoscopic examination, some hours afterwards, and at different times since, has never detected any abnormality.

Examination of the urine, passed the morning following this attack, showed the presence of a quantity of albumin too slight to be quantitatively estimated, a few leucocytes, a few uric acid crystals, many red blood-cells, and in one or two fields a hyaline tube-cast, or a mucous cast. This condition lasted for two or three days. The urine was acid in reaction, and 1015 to 1018 specific gravity; the quantity was normal. Inquiry revealed the fact that the patient blushed easily, and that in addition, without known emotional cause, there occurred at times what she termed "burning flashes," in which the skin at various areas, sometimes circumscribed, as to a cheek, sometimes generalized, would for a few minutes, or a few hours, become intensely red, and with both subjective and objective sensation of heat. On one or two occasions the peculiar distribution of the red areas and their persistence for a day, had led to a false domestic diagnosis of measles. But the repetition of the attacks, their peculiar development and course, and the absence of all other morbid phenomena, soon proved the error. As a child, too, she was said to have had measles three times and rubella once. In one of these attacks that I saw, as the rash was fading, the skin of the arms, chest, and neck was covered with little pink spots, not elevated above the surface, the largest of which was no larger than an ordinary pin-head; and I was told that the rash began in the same way, but that when at its height it presented either a uniform scarlet flush or the mottled appearance simulating measles. On another occasion I saw the patient when the right cheek was the seat of a vivid blush, the left being apparently normal, and was told that the left cheek had been the blushing one some hours earlier. The flushed right cheek had a surface temperature of 97° F., the left cheek 95° F., while the axillary temperature was 98·4° F.

Over the middle portion of the left lower jaw this patient's skin invariably presents during menstruation an area of fixed blushing: that is, it is reddened in an oval patch about two inches long and half an inch wide, the color being deepest in the center, and fading at the periphery into that of the surrounding skin. Her nails are slightly convex, pink in color, longitudinally striated, and exhibiting crescentic markings. She has been under observation continuously since the attack of blindness recorded, and during that time has presented, in addition to the flushes spoken of, an attack of erythema nodosum; several attacks of urticaria; one attack that I did not see, which appears from her description to have been a circumscript œdema of the arm; and one that I did see, which was circumscript œdema of the calves of the legs. The transient blindness has been repeated, affecting only one eye, however, and there was one attack of hemiopia, likewise transient, in which she did not determine which eye was affected, or whether both were involved. In 1889 an attack occurred, which (my notes being defective) she describes as follows:

"Having been in good health for two years, I awoke one night with a great desire to urinate; this was followed by a feeling of faintness and great pain in the heart—I must have been partly unconscious, as I walked down stairs without remembering how. When I became aware of my surroundings, there was intense itching of the palms of the hands and soles of the feet, and a trembling of the whole body, which, for some minutes, I was unable to control. In the morning there was a red-blotchy appearance on the chest, lasting several hours, and welts on the wrists. I felt well, and had no pain. I remember that the urinalysis for the next six months frequently showed albumin, but I felt perfectly well and strong. The rash and welts occasionally appeared."

The urine is for months normal, but occasionally shows a trace of albumin, uric acid crystals, casts, cylindroids, or hæmocytes. Sometimes all of these will be found together, sometimes albumin only, or blood cells only. General health and strength keep good; the eyes are emmetropic (Dr. Jackson), with large pupils, and the blood is normal. Though there are occasional attacks of palpitation, the heart and, so far as I can determine, the lungs and all the other viscera—for I do not believe there is organic renal disease—are normal. Menstruation, however, is irregular at times, and there is occasional dysmenorrhœa. The attacks described are not related with menstruation. The thyroid gland is demonstrable, but not enlarged.

The family history in this case is of great interest. It can hardly be a series of meaningless coincidences. The patient's father died of acute pneumonia, after having for forty years suffered with pulmonary hemorrhages, attributed to "disease of one lung," of what nature I do not know.

Several paternal cousins have leucoderma; one has had renal colic, passing uric acid gravel; another, highly myopic, has obscure symptoms of disturbance of the sympathetic nervous system, diagnosticated by one observer as incipient Graves's disease; another has had chorea, and is very liable to epistaxis and to panaris; another, likewise highly myopic, has had retinal hemorrhage; another has chilblains every winter, and is subject to sudden syncope from slight indigestion; another has blueness of the hands every winter, with tendency to deep fissuring of the finger-tips, unless constantly protected by woolen mittens; another will get circumscript œdema from slight knocks that in others would pass unnoticed, and that even in him do not cause discoloration of the skin. A paternal aunt, still living, is affected similarly to the father. A brother of the father's died at the age of thirty, of suffocation, in the course of a pulmonary hemorrhage. His son has progressive myopia of high type. There is likewise a rheumatic tendency in this family; one of its members has had diabetes mellitus. The patient's mother is living and healthy, at past sixty years of age. Severe mental shock, however, not long ago prostrated her in bed for a few days, during which time the heart's action was feeble, excited, and irregular; the temperature was slightly subnormal; albumin, tube-casts, red and white blood cells were found in the urine. I am satisfied that she has no organic lesion. Several members of her family have had diabetes mellitus, living, however, to advanced age, and two of her sisters and one niece have had carcinoma of the breast. There is also a gouty and a neurotic heredity in this family.

As further exhibiting the essentially constitutional basis of vasomotor ataxia may be briefly stated:

Case IV.—A brother of the preceding patient, aged 35 years, dark-haired, blue-eyed, has been for some eight years the subject of ophthalmic migraine, and has attacks of spasmodic asthma if exposed to the emanations of feathers, or to moist atmosphere at the seashore. He has hyperopic astigmatism (Dr. Gould). His thyroid gland is slightly enlarged. He exhibits along the borders of the ribs the peculiar appearance which I have termed the *costal fringe*, namely, a network of telangiectases, following the outlines of the costal arches. This appearance is found in some cases of hepatic cirrhosis, but this patient's liver is apparently normal. He has no pulmonary or other visceral lesion, but is seized at times with gastric crises (pain relieved by vomiting), that appear to correspond with periods of lithuria and oxaluria. His urine has never shown albumin or casts; and red blood-cells have been found on but one occasion. His reflexes are normal, or perhaps slightly exaggerated.

These two patients, and a sister of theirs who is subject to profuse epistaxis, occurring without apparent cause, but is otherwise healthy, exhibit three symptoms upon which I would lay special stress:

1. *Dermographism.*—That is to say if, with a blunt probe, and using very light pressure, letters or other device be traced upon the skin of the patient, especially upon the inner aspect of the limbs, or over the sternum, the tracings soon appear in a rosy-red tint that lasts for some minutes, or even half an hour.

2. *Factitious urticaria.*—If in tracing upon the skin, one uses a little deeper pressure than before, the red lines soon broaden, and finally the reddened portions show a more or less decided elevation, like the wheals of urticaria. In some cases the red color fades, in others it persists. The elevation remains in some instances, notably in cases of chorea and of exophthalmic goiter, for several hours. When factitious urticaria is not immediately apparent upon the use of pressure merely, it may in some cases be quickly developed by applying cold to the part, as with a lump of ice; in other cases the application of hot water will cause it to appear. When cold or heat is applied, the wheals are always reddened, and sometimes a diffuse redness that slowly fades is likewise seen upon the intervening skin.

3. *A modified form of Stellwag's eye-sign of exophthalmic goiter.*—When the patient looks fixedly before him, and opens the eyes, a distinct white rim of sclera is exposed above the cornea. It may be spontaneously exhibited in the excitement of conversation, or may have to be developed by the physician in the course of examination.

I lay stress upon these signs on account of their occurrence in Graves's disease. Unfortunately I have not been systematically employing these tests for much more than a twelve-month, during which time I have not seen a large number of typical cases of exophthalmic goiter. I have records, however, of seven undoubted cases (one male, six females), in which dermographism and factitious urticaria were marked; and, indeed, I have never seen factitious urticaria so readily produced, so persistent, or so striking, as in the case of a colored woman with exophthalmic goiter, in the wards of one of my colleagues at the Philadelphia Hospital. I may briefly record in this connection, as a case linking the preceding ones with those to follow, a case from my own service at that hospital.

Case V. Exophthalmic goiter with acro-asphyxia.—(Notes taken by Drs. Claribel Cone and S. Stivers, resident physicians, Philadelphia Hospital, February 23, 1893.) Charles P., aged 33 years, waiter, native of Ireland, unmarried. His mother died of cancer of the breast; his maternal grandmother, of cancer of the nose; a maternal cousin, of phthisis. There is no neurosis in the family. The patient had the infective fevers of childhood. He has been a hard drinker. He had syphilis and gonorrhœa about twelve years ago. He has not had rheumatism. When a child he had attacks of palpitation of the heart, which ceased as he grew older. Twelve years ago he was occasionally attacked in the same way. Six years ago, after a debauch, more persistent rapid action of the heart developed, and has continued at intervals since. Attacks may be brought on by his being startled. The cardiac disturbance sometimes prevents sleep. It is accompanied with dyspnœa. There is no cough. For the same length of time he has been very nervous, easily frightened; his hands tremble, and at times there is a general tremor. The cardiac storms and general nervousness develop synchronously. He has occasionally spat blood; not sufficient to cause him to give attention to it. The present attack began about a month before admission. There is no pain, no anæsthesia, no motor paralysis. The eyes were always large, but have been getting more prominent for the last two years. Graefe's and Stellwag's signs are both present. Goiter has appeared and disappeared. No data of this are attainable. At present there is no demonstrable enlargement of the thyroid gland. The pulse rate varies from 81, under treatment, to 140 without treatment. The cardiac impulse is not strong. There is no murmur. In the vessels of the neck, especially the jugulars, there is a marked musical hum. Examination of the blood shows: Hæmoglobin (Fleischl's scale), 30 per cent; red corpuscles, 4,036,000; white cells, 11,000. There is no pulmonary lesion. There is nothing abnormal in the urine. The patient has frequent cold sweats. The skin is usually warm and moist. The hands, from time to time, become bluish and cold. They are always moist. At times after an atack of coldness and lividity, they become pink and warm. The attacks are independent of weather and of the temperature of the ward, but can be induced by exposure to cold. The duration is variable. The patient has an irregular temperature but no relation can be traced between temperature curve and paroxysms of acro-asphyxia. Dermographism and factitious urticaria are marked. The hands immersed in warm water (110° F.), become slightly red in about three minutes. In cold water (40° F.) they become quite red in two minutes. One hand being placed in cold water becomes red; the other, left free, becomes blue. White spots made by pressure on the bluish or reddened skin remain for a long while. Elevation reduces lividity slowly, but has no effect on the pinkish discoloration. The patient exhibits telangiectases at different portions of the trunk, and has a hard, pinkish, sessile growth about the size of a bean, on the left cheek.

Incidentally, it may be remarked that this patient professed to feel better, and exhibited slight objective improvement during the administration of desiccated thyroid gland. The only abnormality observed in the urine was during this time, and consisted in an intense blood-red coloration. It did not respond to tests for hæmoglobin, and Dr. John Marshall kindly examined the specimen, and reported the color to be due to a modified form of indican.

Bearing the foregoing case in mind, the observation now to be recorded finds its place and explanation. The case is in many respects similar to one that I observed in 1886 at the Jefferson Medical College Hospital, and in which Prof. Bartholow concurred in my diagnosis of vasomotor paresis, as against cardiac hypertrophy. In the earlier case acro-asphyxia was not present; temperature was elevated during paroxysms of flushing of the face. There was much headache.

Case VI. Hæmoptysis; tachycardia; acro-asphyxia.—I. H., aged 16 years, of Russian birth and parentage; Hebrew race; dark skin, hair, and eyes; a poor boy, who during the day teaches languages to beginners, and at night, in a cold room, studies to fit himself for college, was sent to me by his attending physicians, Dr. C. D. Spivak, February 26, 1893, with a note stating that for a week he had had daily hemorrhages, slight in amount, believed to be pulmonary, the blood being bright red and sometimes mixed with saliva. There was no cough, no expectoration. Physical examination revealed no pulmonary or laryngeal lesion. The heart was rapid (130) and forcible, but not demonstrably enlarged. The first sound was somewhat short, the second sound accentuated. The pulse was tense. The hands were discolored, the terminal phalanges being of a deep purple, the rest of the fingers and the dorsum of the hand being of various shades of pink, red, and blue, the palms being mottled red and blue. Elevation slightly lessened the color, and secured a more even distribution of shades. The thyroid gland was slightly enlarged, and there was a faint hum in the vessels of the neck. The pupils were widely dilated, and there was evidently great eye-strain; the patient complaining of headaches brought on by reading, and the left eye showing a tendency to wander. Later in the case, Dr. George M. Gould kindly examined the eyes, and found a high degree of compound hyperopic astigmatism; the eye-ground being normal. The urine has never contained albumin or casts, and red blood-cells were found on but one occasion.

The patient was put to bed, with regulation of diet and secretions; ice was applied over the heart, and tincture of aconite given until the pulse fell to 60. In the course of a week he was permitted to rise, when the pulse immediately shot up to 100. Dark glasses and paralysis of accommodation, adopted at Dr. Gould's suggestion, failed to quiet the heart. Suitable glasses were then prescribed, and aconite again administered until the pulse, in a sitting posture, fell to 80. On stopping the aconite, tachycardia again manifested itself. Examination of the urine showed nothing abnormal. Examination of the blood showed corpuscles and hæmoglobin about 75 per cent. The accentuation of the second heart-sound, and the high pulse-tension now received the consideration that perhaps they should have had earlier. Aconite was stopped, and nitroglycerin given in ascending doses until physiological effect was manifested. The pulse-rate fell to 80 in the sitting posture, 90 in the standing position. It was still further increased upon exertion. Aconite was now given in conjunction with nitroglycerin, and tincture of chloride of iron administered concomitantly. Under this treatment, with gradually decreasing doses of aconite and nitroglycerin, the pulse has become steady at about 80. There has been no further hemorrhage. No sign of pulmonary lesion is to be discovered. There has been no history of rheumatism. While in the house, the room being kept warm, the discloration of the hands faded to a light duskiness. While going about in cold weather, the condition previously described returned. The hands sweat profusely at all times, even in cold weather. Since warm weather has set in the hands have become normal in appearance. The patient exhibits dermographism, factitious urticaria, and the eye-sign already described. The pupils are persistently and equally large.

Case VII. Œdematous acro-asphyxia.—The brother of the preceding patient, a peddler, a native of Russia, aged 23 years; is subject to chilblains. I had one opportunity to examine him—July 17, 1893, a warm day. The hands were of a dusky color, mottled red and bluish; the nails purplish, and exhibiting the peculiar crescentic markings. There was considerable sweating of the hands; he says that they get almost black in cold weather, and sometimes when not cold. At times they suddenly swell, and are often dark blue when they swell. The swelling lasts a few hours, rarely a day. Sometimes there are white patches on the hands when they are otherwise blue. The duskiness present on the occasion of my examination lessened on elevation. The heart was strong: there was no murmur; pulse 84 in sitting position, somewhat tense.

There was mydriasis; the sclerotic was exposed on opening the eyes. Dermographism and factitious urticaria were present. The hands trembled on being held out for a short time. This was said to be of frequent occurrence. The thyroid gland was not demonstrable. There was no history of cardiac palpitation. This patient likewise has hyperopic astigmatism.

Additional cases might be narrated were it necessary (and some will be published hereafter) in which what we may, for convenience of designation, call the Graves group of phenomena and the Raynaud group of phenomena are mingled in varying degree. But those selected are sufficiently indicative of the gradual transitions by which two diseases, apparently so opposite in their nature, may be brought under one clinical generalization. Leaving, now, the Graves group and those cases that stand on the far side of it, I desire to briefly submit some interesting cases on what we may call the hither side of the Raynaud phenomena; and it will be found, I think, that gradual transitions may also be traced here down to normality, which, like the sigil, completes our ring.

Case VIII. Anæmia; hæmatemesis; gastric ulcer (?); acro-asphyxia.—Mary T., aged 17 years; of American birth and Irish parentage; fair skin, dark hair, gray eyes; syphilitic inheritance; was under my care in 1888 for profound anæmia with hæmatemesis and symptoms suggestive of gastric ulcer, and recovered under treatment based on such a diagnosis. Early last winter she returned, rosy in hue, without anæmia, but again complaining of spitting blood. Her hands were of a deep-blue color, which was unaffected by position. I sent her to a friend to have her hands sketched, and on the way to his office they resumed a normal color. Frequently during the cold weather they would become red or blue, or mottled red and blue. On severe exposure they once became dead white and were excessively cold. When blue the hands are sujectively and objectively cold; when red they are objectively warm, but subjectively cold. The same changes take place in the feet. Both hands and feet sweat profusely. Capillary pulse was seen in the lips and nails. Occasionally she has a film before her eyes. There is no lesion of the eye ground, but glasses are worn for relief of headache (myopic astigmatism, Dr. Jackson). There is no cardiac or pulmonary lesion. The thyroid gland is not abnormal to palpation. The pulse is 80, and of low tension, as shown by sphygmogram. Examination of the blood showed: hæmoglobin, 80 per cent; corpuscles normal. The urine contained a few red corpuscles.

Case IX. Hæmoptysis; tuberculosis; acro-asphyxia.—M. M., a drug clerk, a native of Russia, of fair complexion, light hair, blue eyes, applied at the Philadelphia Polyclinic February, 1893, on account of pulmonary hemorrhages. Attention was attracted to the blueness of his hands. This was said to have manifested itself while out of doors during cold weather for several years, and to slowly fade into a pinkish tint while the patient remained in doors. Elevation caused very gradual disappearance of the discoloration. The heart was normal. There was found slight dullness and crackling at the left apex, and large and small mucous râles over both sides of the chest. After repeated examination of the sputa a few tubercle bacilli were found. The patient stated that his mother's hands were similar to his, as were also those of one sister and one brother younger than himself. His father and his elder brothers and sisters did not exhibit it. The sister and brother who had blue hands were quite subject to bleeding from the nose; with the sister, epistaxis ceased with her first pregnancy.

This patient showed dermographism and factitious urticaria. There was no cardiac lesion and no abnormality of the thyroid gland. His hands and feet were constantly sweating both in hot and cold weather. He had paroxysms of polyuria. His urine while under observation showed occasionally red blood cells, no albumin, no sugar, no excess of urates. He has myopic astigmatism (Dr. Jackson). Under treatment, with rest and calcium chloride, the pulmonary hemorrhages ceased, and the hands improved while kept wrapped in cotton and treated daily with a descending galvanic current.

In these cases of blue hands, and in many others of which I have record, there is a striking series of phenomena to be observed, which I have not thought it necessary to relate in detail in each case. If, during a period of quiescence, that is to say, in warm weather, or after the effect of treatment, or if the warmth of the room has made the hands somewhat less blue, one hand be placed in ice water it will, in a few minutes, become a bright red, while the other hand, not exposed to local cold, becomes a deep blue. Control observations on normal hands do not show the same result. If, during an attack of local asphyxia, the blue hands be placed in warm water, one of two things may occur: 1st. The hands may quickly become red. In that event, on removal from the warm water the red fades to a dead white, then the normal color returns, then an abnormal blueness. Stroking the hands, either up or down, increases the rapidity with which the whiteness develops—and in some few mild cases, stroking alone, without resorting to immersion in cold water, will produce it. 2d. In other cases the hands become white on immersion in warm water, and red or pink when removed into the air. In all cases, whether the hands be blue, pink, red, or mottled, pressure produces a whiteness which does not quickly disappear. In some cases the experiment was made of immersing the blue hands, during an attack, in cold water. They would either become red and warm, or almost black and intensely cold.

I have alluded to the appearance of the finger nails. Setting aside the well-known appearance in typical Raynaud's disease and that produced by panaris, to which latter affection these subjects seem quite prone, I have observed many varieties that fall into two groups: a clubbed finger end, with broad and flat or Hippocratic parrot-beak nail; and secondly, a tapering finger end, with long and transversely curved nail. The nails are usually striated, sometimes thickly ridged longitudinally. They are sometimes a bluish, sometimes a purplish, sometimes a pink color. The broad, flat nails are more frequently a leaden blue; the long nails more often pink. Both the pink and the blue nails exhibit crescentic markings. In the pink nails there is usually one narrow and deep-red crescent between two wider and whitish crescents near the tip. The flat, leaden-colored nails usually show one wide, whitish crescent centrally. These markings differ from the whitish or reddish discoloration produced by varying pressure in normal persons.

To resume the development of our circle of cases, I have now to submit two instances that would be merely curious in themselves, but find place and explanation through each other, especially in relation with the cases of hæmoptysis and hæmatemesis recorded, and with the occurrence of blood spitting in Graves's disease. I have seen two cases of hæmoptysis in exophthalmic goiter, in both of which pulmonary tuberculosis finally developed.

Case X. Paroxysmal numbness of extremities; chlorosis; hemoptysis; pulmonary tuberculosis; acute hemorrhagic varices (?) of pharynx.—Miss V., of American birth and parentage, Scotch descent; fair complexion, brown-gold hair, gray-brown eyes; not hysterical; first had indications of numbness in the left hand and arm on nearing the menstrual period at the age of 14 years. Previous to this she had enjoyed good health, with the exception of an abscess on the left side of the neck, at the age of 8, and frequent paroxysms of hard, barking cough. She was subject in warm weather to an eruption on the hands, which was relieved by applications of black wash. The frequency of the attacks of numbness and their extent continued to increase until the age of 20, when the patient was treated for anæmia. She had then had no menstrual period for six months, had lost flesh, was very pale, had cough, and constant headache. At this time the patient came under my care (1883) for pulmonary hemorrhages with fever, and physical signs of tuberculous infiltration of left apex. Under treatment complete recovery ensued, the menses appeared, and the general tone of the health was restored. The numbness disappeared for about four years, when the attacks returned and still occur, with not so much frequency but more severity, and affecting likewise the tongue and throat. The face becomes very pale; the arm and hand seem perfectly lifeless, and can be placed in almost boiling water. When feeling is restored a violent headache follows and the patient is weak for two days. The attacks generally follow disorder of the stomach or mental disturbance, or occur about the menstrual period. At times, not connected with the attacks of numbness, there occur in the throat during glutition what she terms "blood blisters," which consist of little bluish elevations about the size of half a pea, and apparently of the nature of varices, that when ruptured, artificially or spontaneously, discharge black blood. Her sister is subject to similar but larger "blood blisters," which, however, do not always discharge themselves, and it is said that it is sometimes necessary to puncture them to prevent suffocation. Her grandmother was liable to attacks of numbness from about the age of 30 until the age of 80.

This patient exhibits dermographism, factitious urticaria, and the eye sign. Her nails are curved, pink, marked with crescents. She has hyperopic astigmatism (Dr. Turnbull). The thyroid gland is not enlarged; there is no heart lesion.

Case XI. Blue œdema of pharynx and uvula, with urticaria of fundament; angioneurotic œdema of trunk and face; paroxysmal tachycardia.—Mrs. B., aged 60 years, on June 26, 1892, complained of sudden dyspnœa of a few hours' duration, and soreness of the throat. For a day the patient has had urticaria of the fundament. She is subject to this form of urticaria at irregular intervals. The uvula is swollen, more upon the left, and the mucous membrane is of a grayish-blue color; the left posterior palatine fold is similarly discolored and œdematous. The swellings pit upon pressure. Scarification gives exit to less than a drachm of black blood. Two or three days ago the patient had, without known exciting cause, an attack of sudden violent beating, of the heart. She became quite faint, and lay down, and in the course of about half an hour the heart became quiet. An attack less violent and of shorter duration occurred later in the day. The attacks were accompanied with flushing and heat of the entire body. The patient has not menstruated for some years. She has had similar attacks previously. The first followed a mental shock twenty years ago. The attacks usually last twenty-four hours. Different portions of the body are swollen. Once the œdema occupied half the face; at another time half the abdomen. On three occasions it has begun in half the lip, afterwards extending to the whole structure. The tongue has been swollen.

Her urine, examined on the day following the attack reported, was amber in color, turbid, acid reaction, 1019 specific gravity, containing no albumin, no sugar; leucocytes and red cells were present.

The patient exhibits dermographism and factitious urticaria. She is not specially susceptible to cold. Her family, while long-lived, is gouty and neurotic. One of her daughters has aggravated hysteria. One sister has diabetes mellitus. This sister likewise exhibits dermographism and factitious urticaria, and as a child and young woman was subject to paroxysmal flushing of one cheek.

The following case will serve as a transition to a comparatively large group, in which digestive disorders are prominent:

Case XII. Hysteria; burning and coldness of extremities; herpetic (?) eruption; hungry dyspepsia; exophthalmos.—July 11, 1892. Mrs. R. O'D., a typical brunette, of American birth, French parentage, aged 25 years; complains of subjective and objective coldness of the legs below the knee, for a week. There is cold perspiration of the feet. For a year the patient has been feeling worn out and languid. During this time the hands have been swollen, red, and burning when she rises in the morning. The redness passes off quickly.

Sometimes there is a similar condition for half an hour toward evening. The patient is hysterical and easily frightened—the heart palpitates violently when she is nervous or excited. For three months subjective vertigo has occurred at irregular intervals. There is no dimness of vision; she sees neither flashes of light nor dark specks. Ten years ago she had "fainting spells," in which, however, she did not lose consciousness. She became dizzy, then clenched her teeth and hands, and fell; the image of the last object seen remained impressed on the retina. The attack lasted a few minutes; there was no convulsion, no subsequent drowsiness. There have been six such attacks in one day; they have become less frequent since marriage; the last was six months ago.

About a year ago there would, from time to time, appear on the legs and disappear after about two days, a papulo-vesicular eruption associated with itching. It did not pustulate and dried without scabbing. The bowels are constipated. There is headache. Sometimes there is pain referred to the stomach and relieved by eating. There is no nausea, no vomiting, no pyrosis. Appetite is excessive. There is no polydipsia. The urine is excessive in quantity, and the patient rises at night to urinate. Menstruation is irregular. The eyes are prominent, the eyelids tremble when closed. The sclera is exposed when the eyes are opened. The reflexes are all exaggerated. The heart is irregular, not specially rapid; no murmur. The thyroid gland is not enlarged. Urine: acid, 1013, no albumin, no sugar; numerous disks that may be decolorized red cells. (Dr. Eshner.)

The phenomena of disturbed and incoordinate circulation are often even more strikingly manifested in the cases diagnosticated of recent years as "neurotic dyspepsia" and "neurasthenia." In this connection I will briefly enumerate the salient features only of two additional cases:

Case XIII. Neurasthenia; lithæmia; vertigo; membranous enteritis.—Mr. J., aged 30 years; attorney; American. Hyperopic astigmatism; nausea; no vomiting; paroxysms of vertigo, with pallor, chilliness, and sweating; aggravated neurotic dyspepsia; lavage proves absence of morbid secretion; emaciation; inability to attend to business; morbid attention to symptoms; no heart or lung lesion; throbbing and murmur in abdominal aorta; exaggerated reflexes; mottled hands; pink, crescent-marked nails; dermographism, factitious urticaria; eye-sign; paroxysms of polyuria. Urine contains no albumin, no sugar; at times leucocytes, red cells, uric acid, calcium, oxalate, phosphates. Patient has membranous enteritis. Has had attacks of urticaria; is extremely susceptible to both heat and cold; hands and feet frequently become cold without apparent cause. His child has a curious mottling of the skin of the trunk and limbs that resembles measles. At times it is a vivid red, at others it fades to a delicate pink or faint brown.

Case XIV. Hysteria in a male, with neurotic dyspepsia, hæmatemesis, paroxysmal flushing, and sexual crises.—The principal points in this case, of which space forbids a full report at present, are as follows: The patient, a merchant, aged 45 years, and happily married, is highly emotional and of an hysterical family. He is stout, heavily built, with red cheeks, and dusky pink hands. His nails are of the leaden-blue variety. Dermographism, the eye-sign, and the costal fringe are present. Factitious urticaria can readily be produced, and the patient has had hives repeatedly. He is quite susceptible to moderate heat, flushing and perspiring when others feel comfortable. He has a habit of working feverishly, and is an interminable talker. After a period of overwork his digestion fails. He has burning pain in the stomach, with excessive thirst, and inability to retain anything except iced liquids. There are crises of gastric and abdominal cramp with vomiting—at times vomiting of blood—with serous diarrhea, and at times passage of membrane. He does not use alcohol or tobacco, and always has been chaste. At times when suffering with indigestion he will have sudden sensations of heat in the head and coldness below the knees, or general heat followed by chilliness, which, as he lives in a malarious region, has been called malaria. A peculiarly distressing form of the paroxysm is a feeling of heat beginning at the navel and spreading over the body, with pain in the testicles and unnatural sexual imaginings provoked by the sight of a strange man or woman "perhaps ugly as Satan;" his face becomes dusky red and his whole body trembles. This is followed by insomnia, anorexia nervosa, and finally for two or three nights by excessive nocturnal micturition, the urine being colorless as water. Such urine has a specific gravity of about 1002, and contains nothing abnormal. His ordinary urine contains neither albumin nor sugar. On two occasions colorless blood cells were found in large quantities. His blood is apparently normal, and when examined in Philadelphia during a paroxysm of subjective heat, without elevation of general temperature, malarial organisms could not be found. Lavage proved entire absence of gastric catarrh, and examination of stomach contents after test breakfast showed absence of free acid with diminished total acidity. The eyes are normal. The knee jerks are sluggish. The heart is slow (60) and feeble; dilatation not demonstrable. There are attacks of palpitation with dyspnœa. The abdomen is not sensitive to pressure. Hepatic dullness is normal. The splenic dullness is not enlarged.

In some cases of vasomotor ataxia there is a pronounced idiosyncrasy toward drugs, the most remarkable instance I have seen being the following:

Case XV. Paroxysmal headache and vertigo: circumscript œdema caused by strychnine and by picrotoxin.—Mrs. E. S., aged 47 years; of American nativity and parentage; dark hair and eyes: full habit, flushed face; was seen in April, 1890. She complained of paroxysmal headache, subjective vertigo, and flushes of heat, the symptoms being of several years' duration. There is no visual disturbance. Headache and vertigo occur together or independently. The headache is not localized, but sometimes there is a feeling as of whirling inside the skull, in the vertical region. At times there is a sensation as of cold water being poured down the back. There is no rheumatic or other personal or family morbid history. The patient is regular in menstruation. There is no indigestion, but the bowels are inclined to be constipated. The thyroid gland is not enlarged; there is no thrill or bruit. There has been no urticaria, nor can factitious urticaria be produced. Dermographism is marked. The nails are pink and purple; they are striated and exhibit pink and white crescents. The hands are always warm, frequently sweating. The feet are cold even in warm weather; at times there are paroxysms of icy coldness, without loss of sensation or change of color. The urine is scanty, less than a quart in twenty-four hours; it contains nothing abnormal. The pupils are much dilated. Dr. Hansell examined the eyes, and reports "presbyopia, no lesion of fundus, veins overfilled." The heart is slow and steady (rate 60), the pulse is full but not strong; superficial veins are not prominent. Strychnine ($\frac{1}{60}$ grain t. d.) administered medicinally caused marked œdema of the face. The patient recalled a previous experience of the same kind. Nux vomica and picrotoxin caused similar effects. Hyoscyamine relieved the headache: alkaline diuretics increased the urine. The patient improved, but passed out of observation. August 31, 1893, she reported at request. She is going through the menopause. The flushes of heat are more frequent. The head, neck, chest, and arms to the finger tips become red. The redness passes off in a few minutes. Sometimes it is accompanied by a numbness of the left hand and arm, and tingling with coldness in the last two phalanges of all the fingers. Sometimes the numbness will last for two hours after the redness has disappeared. A second flushing may occur before the numbness ceases. There is no periodicity in these occurrences. Perhaps they are worse when constipation exists. The hands are usually warm and moist, the feet cold. Immersing one hand in ice water it becomes quite red and slightly swollen. The wrist and forearm become blue in patches, with marked distention of venules. The hand is objectively cold, subjectively warm. The other hand is not changed in color, but quite cold. On removing the reddened hand from the cold water the finger tips first become white and numb, but after a few minutes redness returns, with a sensation of pins and needles, and both subjective and objective warmth.

Not now to detail additional instances, it may be stated that among other morbid associations found in cases of the same general character as those reported have been ecchymoses, petechiæ, hæmaturia, retinal hemorrhage, organic heart lesion, organic kidney lesion, arterio-capillary fibrosis, chorea, rheumatism, hay fever, paroxysmal engorgement of turbinate bodies, angina pectoris, and pseudo angina and glycosuria. In one case hæmoptysis occurred only during epileptic paroxysms; in another case of epilepsy, tachycardia and flushed face accompanied the convulsions. In both these cases there was a soft enlargement of the thyroid gland.

The obscurity in which the pathology of diseases of the sympathetic, or, to use Gaskell's term, the visceral nervous system, is still involved, cautions against premature assertion of other than clinical facts.

I believe that the phenomena herewith submitted for the consideration of the section are of considerable clinical significance.

Leaving out of consideration for the present the diseases other than exophthalmic goitre (akromegalia, myxœdema) known to be associated with abnormality of the thyroid gland, there are four affections of great moment in which functional or structural alteration of some portion of the visceral nervous system is an important element, if not the essential feature. These are Graves's disease, Raynaud's disease, Addison's disease, and certain forms of diabetes mellitus.

The cases here reported show the existence of lesser degrees of disturbance of that system; and indicate that in some instances, at least, there is a congenital tendency of such disturbance. They suggest, moreover, that this congenital want of balance in the circulatory apparatus may be the germ from which, under the fructifying influence of various exciting causes, the more serious disorders develop. Thus mental or even physical shock in a subject of congenital vasomotor ataxia might cause the sudden development of exophthalmic goiter; and an exposure to cold, from which a normal individual would quickly react, causes, in the subjects of this condition, local asphyxia, chilblains, frost-bite, or even extensive gangrene. So, too, slight indigestion, itself the result of influences that would be ineffectual in a normal individual, may, in the subjects of vasomotor ataxia, induce crises of vertigo, migraine, syncope, or even paroxysms of epilepsy. And similarly, other sources of peripheral irritation—eye-strain, nasal abnormity, exposure to pollen, and the like, result in the production of an exaggerated reaction. The relationship of hay fever with the group of cases under consideration, may be best exhibited by comparing two of the descriptive names it has received: "Idiosyncratic coryza" (J. Solis-Cohen) and "Periodic vasomotor rhinitis" (J. N. Mackenzie); in which connection I would cite the case of one of my patients with blue hands, who was compelled to give up his position in a drug house because of his excessive susceptibity to ipecacuanha.

The occurrence of diabetes mellitus in members of the families of patients exhibiting the phenomena of vasomotor ataxia; of intermittent glycosuria in one of my cases of menstrual migraine with urticaria and almost constant flushing of the face; and of intermittent polyuria in many of my cases, are circumstances worthy of note—.

especially in relation with the well-known occurrence of glycosuria in some cases of Graves' disease, and with the investigations of Thiroloix upon pancreatic diabetes.

The tendency to hemorrhage must not be overlooked, especially in connection with the diagnosis of pulmonary tuberculosis, of gastric ulcer, and of hypertrophy of the heart. Cases such as those I have reported may develop tuberculosis or cardiac hypertrophy, but these conditions need not necessarily be present at the time of hemorrhage, or later. I would call especial attention to the extraordinary frequency with which, in cases of vasomotor ataxia, red blood cells are found in urine not discolored; a fact rendered significant to my mind by personal observation of hæmaturia in a case of undeveloped Graves' disease that later exhibited the full complexus of symptoms, and by the records of hæmaturia and hæmoglobinuria in Raynaud's disease. Unfortunately, the single case of paroxysmal hæmoglobinuria from cold that has come under my observation was not studied from the standpoint of the present paper, and is not available for comparison. In this connection, too, an interesting relation with hæmophilia, and with the purpuric group of affections is suggested; but it would not be advisable at present to more than indicate this subject.

The frequent association of refractive errors, and especially of hyperopic astigmatism, with instability of the circulatory equilibrium, raises the question whether the ocular defects are to be classed in the category of exciting causes acting by reflected irritation, or whether there is a more fundamental relation. I am inclined to the opinion that abnormity of circulation and nutrition bears a causative relation to the ametropia. The eye-strain may then react additionally upon the centers, increasing their irritability.

Finally, as exemplified by the case which first drew my attention to the subject (Case III), and by the case last reported (Case XV), we must recognize a class of cases to which, as yet, no definite nosological place has been given, and in which a varied symptomatology of circulatory disorder can not be referred to disease of any organ; though lesion of the digestive tract, of the kidney, of the heart, or even cerebral or spinal lesion may be suggested. For these cases, depending as they must, upon a want of control in the nervous system governing the caliber and tension of the vessels, a defect clearly of inhibition, and by the radius of its effects evidently central in location, it seems to me that the most appropriate name is *vasomotor ataxia*.

SUMMARY.

(1) By the term *vasomotor ataxia* it is proposed to designate the condition of instability of the mechanism of circulation present in certain persons and characterized by abnormal readiness of disturbance with tardiness of restoration, of the equilibrium of the cardio-vascular apparatus. The manifestations are most strikingly displayed by the heart and by the peripheral vessels of the extremities, but analogy indicates the occurrence of similar phenomena in the vessels of the glands and o the viscera, more especially in those of the kidney, of the gastro-intestinal tract, and of the brain. They may occur apparently spontaneously, but often there is a recognizable exciting cause. Among the influences acting as excitants, are temperature, especially cold; toxic agents formed in the body, or introduced from without; visceral or internal reflex excitation; and emotion. The stimulus may be applied centrally or peripherally, but in either case the resulting phenomena indicate a defect of central inhibition; the expression, probably, of functional or nutritional aberration in the great ganglia of the visceral nervous system, in the medullary centers, or in both. The morbid anatomy is uncertain, and the results of necropsies necessarily inconclusive.

(2) Vasomotor ataxia may be acquired as a sequela of disease; in many cases it is congenital; in some cases inherited; the condition is not rarely present in several members of a family.

(3) In some cases the phenomena are of paretic, in others of spasmodic charac-

ter. Usually the two kinds of phenomena are displayed in varying degree in the same patient. Whether spasmodic or paretic the symptoms are suggestive of incoordination. They are always in some degree paroxysmal.

(4) In exophthalmic goiter, especially such cases as are produced by emotion or are markedly intermittent, is found the extreme type of the "relaxing" variety of vasomotor ataxia.

(5) The form of Raynaud's disease, known as "local syncope" furnishes an extreme type of the "constrictive" variety; while "local asphyxia" exhibits phenomena of both abnormal relaxation and abnormal constriction of the vessels.

(6) Between these extremes are numberless gradations down to the slightest departure from normality; while even the extreme symptom groups represent merely exaggerations of phenomena that under certain conditions occur in normal individuals.

(7) Dermographism is an essential feature of vasomotor ataxia, and in most cases factitious urticaria can be readily produced by cold or by pressure or by both; mottlings of the skin, certain peculiar markings of the nails, telangiectases, and stigmata are common.

(8) There is usually a hemorrhagic tendency, as shown by ecchymoses, petechiæ, epistaxis, hæmoptysis, hæmatemesis, hæmaturia, and retinal hemorrhage.

(9) Even in the absence of hæmaturia, red blood-cells are often found in the urine; uric acid, urates, and oxalates are likewise common; the presence of albumin, tube casts, and cylindroids is less common, and is usually intermittent. Glycosuria has been observed.

(10) In many striking cases there has appeared to be morbid alteration of the thyroid gland.

(11) The action of the heart is usually rapid, irregular, and easily disturbed; palpitation is common, and in some cases intermittent tachycardia had been noticed. Hæmic and functional murmurs are not uncommon.

(12) Among other symptoms and morbid associations observed are anæmia, hysteria, drug idiosyncrasies, urticaria, local œdema, hyperidrosis, angina pectoris and pseudo-angina, organic heart disease, pulmonary tuberculosis, asthma, hay fever, vertigo, migraine, and other forms of headache, transient hemiopia and other visual disturbance, persistent mydriasis, astigmatism, myopia, hyperopia, menstrual irregularities, intermittent polyuria, rheumatism, rheumatoid arthritis, contractures of digits, chorea, epilepsy, neurasthenia, neurotic dyspepsia, gastralgia, enteralgia and membranous enteritis—most of which are doubtless fundamentally related, as effects of a common cause, or as secondary results.

(13) In making the diagnosis of simple vasomotor ataxia it is necessary to exclude primary organic disease. The occurrence of such disease later does not invalidate the original diagnosis. The development of pulmonary tuberculosis in some cases is probably a sequence of vascular and trophic disturbance in the lung. Cardiac hypertrophy and renal lesion may likewise be among the results of disordered circulation.

THE IMPORTANCE OF ELIMINATING PELVIC DISEASE IN GENERAL DIAGNOSIS.

By MARY H. McLEAN, St. Louis, Mo.

In this age of refined specialties many hoarse notes of warning are heard from the general practitioners about allowing one's special department to become a beam in one's own eye, shutting from view all other diseases and conditions.

Very especially, gynecologists have been arraigned again and again for their single eyes and shortsightedness, and for their great ingenuity in tracing all the ills of woman to some lesion in the pelvis. Not only so, but "hands off" has been the cry to the gynecologist; and some neurologists have traced long series of severe and complicated nervous symptoms to a pelvic examination and gynecological treatment.

No doubt all of this brotherly counsel has been needed and has answered a good purpose. But sometimes an unusual series of cases or an occasional review of one's case book will lead the gynecologist to feel that, in justice to his fellows, the neurologist and general practitioner, he too must utter a note of warning, and must point out another danger quite on the other side of the stream.

Valuable time is often lost and a woman's strength wasted through useless efforts to overcome a distressing disorder, or through the general treatment of a protracted fever, in either of which the casual relation of a deep-seated pelvic trouble has been overlooked.

In the days when uterine displacements were the cause and substance of nearly all pelvic disease, and when the sympathetic nervous system was an unknown quantity, it is not strange that the general profession should have been skeptical as to the role played by pelvic disease, and should have persisted in general therapeutics in the tedious chronic disorders of women.

But since the endometrium with its extension into the Fallopian tubes has assumed so important a role in pathology, and since we have begun to learn something of its intimate connection with the brain, heart, lungs, stomach, and entire alimentary canal, and of its subtle influence on the vaso motor and trophic nerve centers, it ill becomes the phyeician to ignore the possibility of a pelvic lesion in any disease which does not quickly respond to a careful general therapeusis.

Within a few years Dr. Formad, of Philadelphia, has astonished the world by publishing the real pathological findings in cases whose deaths were attributed to "heart failure." In thirty-five cases of sudden death occurring in one city in one year, a ruptured extra-uterine pregnancy was found, a condition which is now thought to be due to a preexisting disease of the endometrium and Fallopian tubes. If statistics could be gathered, we would probably find an equally startling number of sudden deaths over the country from ruptured ovarian and tubal abscesses, and from perforative appendicitis.

But the sadness of such a list of deaths does not at all compare with the sadness of years of invalidism treated on general principles, which might have been relieved through the recognition of a causative pelvic pathology.

Gynecologists have been arraigaed for subjecting young girls to unnecessary pelvic investigations, and the advice is still frequently given to treat the general condition, to surround the girl with all the hygienic advantages, and to let nature work the cure. To my mind the injury inflicted upon a girl by allowing a possibly incipient pelvic disease to develop, to gain control of the sympathetic nervous system, to weaken the digestive and muscular systems, and to limit the growth of the intellect, is far more serious and irreparable than any possible injury which could result from a properly conducted pelvic examination.

A young woman, aged 19, was sent to me from southern Kansas. She had been a great nervous sufferer for almost three years. The origin of the trouble seemed to have been a jump from a barn 20 feet high to the ground. She was supposed to be suffering from some obscure injury to the spinal cord. She had constant headache and backache increasing in severity, great mental apathy, insomnia, and frequent hysterical convulsions. She had been treated during all the time by general practitioners with little or no improvement. She was considered too young for a pelvic exploration.

I found on examination a severe endometritis with a left salpingitis, and some thickening and contraction of the left broad ligament drawing the uterus back and to the left. Under gynecological treatment the patient steadily improved and entirely recovered her health within a few months; but she greatly regrets the loss of those valuable years of her life.

Another young lady of 19 years was sent to me by a general practitioner after she had been under various other physicians for about three years. She had a most obstinate gastric irritability. For three or four weeks at a time she vomited literally all of the food she took. At all times even the most carefully selected foods were digested with great discomfort. A great variety of treatment, several climatic changes, and faithful use of the stomach pump failed to check progressive emaciation and debility.

A pelvic examination revealed an endometritis, which was treated by aseptic curettement and relieved. Afterwards the stomach responded to treatment formerly used in vain, and the patient gained flesh and strength.

A married woman of 40 years of age, the mother of four children, had spent eight years of invalidism under the care of a well-educated physician and surgeon. She was a neurasthenic, put to bed for several days by any little domestic excitement, suffering several times a month with violent headache and nausea, lasting from forty to seventy hours, quite unable to endure the noise of her nursery, and haunted with a constant dread of insanity. She was treated with tonics, sedatives, and stimulants, including bromides, phenacetine, antipyrine, brandy, and finally with increasing doses of morphine.

An examination of the pelvis revealed a subinvoluted uterus with granular endometritis, and old lacerations of both cervix and perineum.

Preparatory gynecological treatment and subsequent operative measures quite entirely relieved her, so that she had absolutely no headache, no gastric trouble, no nervous irritability, and no mental anxiety afterward. Rest and good food completed a brilliant cure, which might have been attained years before, had not the pelvic disease been overlooked.

My friend, Dr. Bertha Van Hoosen, of Chicago, has given me the history of the following case which well illustrates the principle we wish to establish:

Mrs. L., aged 35, married fifteen years; at 15 years of age had what the doctor called an abscess of the ovary, although he made no examination. She made a poor recovery from the attack and had other attacks similar to this before marriage. At 20 she was married in her bed, being too sick to stand during the ceremony. She has been an invalid ever since, unable to do her housework or to enjoy social life. Last January (1893) she had an attack of peritonitis, ending in a rectal fistula that has been discharging large quantities of pus ever since. She has been treated for years for gastralgia and nervous prostration without benefit. No local examination was made until July, 1893, when I found a large exudate filling up the cul de sacs and embedding in it the uterus and appendages, with a fistulous opening high in the rectum discharging daily two ounces of offensive pus.

No one can doubt for a moment that such pathological findings easily account for the years of suffering spent under the constant care of a general practitioner.

A number of cases have been published during the past few years, in which appendicitis was found and relieved by surgical measures after several weeks of fever diagnosticated as typhoid or typho-malarial fever. Such a case of recent date which failed to receive surgical relief has come to my knowledge.

A brilliant young woman from Michigan was taken sick with a fever, pain in the right iliac region, abdominal distension, etc., and was treated through many weary weeks for typhoid fever. During what was supposed to be a slow convalescence she was taken to her Michigan home, where, after a sudden furious peritonitis, she died.

The autopsy revealed a general purulent peritonitis, resulting from a secondary rupture of a perforative appendicitis.

Dr. H. T. Byford, of Chicago, in a recent lecture on tubercular diseases of the Fallopian tubes and peritoneum before the Chicago Post-Graduate School of Medicine, stated that in two cases of supposed typhoid fever of over two months' duration, to which he had been called in consultation, he had found tubercular disease of the tubes to be the cause of the typhoid symptoms.

The cases cited are sufficiently convincing to warrant us in drawing a few practical conclusions: First, pelvic diseases have a wide and varied symptomatology, by reason of which they may simulate various general and nervous disorders; second, grave errors in diagnosis have been made through neglect of a thorough examination of the case, especially of the pelvis, thereby entailing upon the patient prolonged suffering and even death; third, in the diagnosis of any disease which might be complicated or induced by disease in the pelvis it is far better to make an unnecessary gynecological examination than to incur the risks of a mistaken diagnosis.

TRATAMIENTO QUIRÚRGICO DE LA FIEBRE AMARILLA.

Por SEGUNDO BELLVER MATEO,
Médico Mayor Principal Primero del Cuerpo de Sanidad Militar Español, Isla de Cuba.

En otra nota* he consignado sintéticamente mi opinión sobre la naturaleza toxi-infecciosa del cólera americano y su localización gastro-intestinal: allí expongo el tratamiento que sigo y los resultados verdaderamente concluyentes que se obtienen cuando es empleado desde las primeras horas de la invasión y que cuando el caso es descuidado y se acentua la oliguria, la terapéutica ordinaria mejor dirigida resulta impotente para vencer la auto-intoxicación urémica.

Una serie de trastornos, facilmente concebibles, explican satisfactoriamente este complexus sintomatico que cierra con broche negro el cuadro al parecer halagüeño del periodo de remisión. La disminución creciente de oxihemoglobina dificulta el desdoblamiento de los cuerpos azoados en la glándula hepática, y por retención de uno de sus productos se provoca la infiltración grasosa imposibilitando las oxidaciones regresivas. Sin sufrir las sustancias coloides la transformación cristaloide no pueden ser dialisadas por los filtros renales y por lo tanto la colemia, la acolia y finalmente la uremia son las fases sucesivas de la auto-intoxicación amarilla.

Dos formas suele presentar la uremia: la adinámica y la ataxo-adinámica. En la primera algunos casos raros conservan la inteligencia; la segunda es la más comun en la Isla de Cuba; no puede quedar en firme la opinión de M. Havelburg de Rio de Janeiro que asegura, que en los enfermos de fiebre amarilla† "la inteligencia permanece normal hasta la muerte;" en la Habana el $\frac{98}{100}$ mueren inconscientes presentándose la perturbación intelectual veinte y treinta horas antes de la muerte.

La terapéutica seguida en esta fase de la enfermedad es en general lo más pueril que puede darse; todos casi sin escepción mueren solicitamente atendidos por los clínicos sin intentar algo que salga del patron cortado que, á semejanza de los uniformes contratados para el ejército, á ninguno viene bién; es preciso tomar las dimensiones y "poner el remedio á la altura del mal."

Creo firmemente que hay algo más que hacer y que la oxigenación rectal, pulmonar é intersticial tienen una neta indicación: la hipodermo-clisis y especialmente la inyeccción intravenosa de suero artificial esterilizado practicadas con oportunidad, ántes que la uremia se acentue, evitarán la graduación del envenenamiento y salvarán muchos, sentenciados á muerte por la timorata terapéutica.

Si la uremia es muy intensa, aun cuando se recurra á estos medios, suele acontecer que el enfermo sigue comatoso, á pesar de haber eliminado grandes cantidades de orina, pasadas seis ú ocho horas de la inyección intravenosa de dos á tres litros de suero artificial esterilizado á 31°, morirá el enfermo irremisiblemente. Deberá sin pérdida de tiempo procederse á practicar nuevamente otra inyección intravenosa de suero, al par que se dá salida por una vena de otra estremidad, á igual cantidad de sangre ampliada, pudiendo ambas calcularse en tres litros, y terminando por la transfusión de un litro de sangre humana ó en su defecto de siete á ocho cientos centímetros cúbicos de sangre animal. Á la combinación de la inyección de suero con simultanea

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* Tratamiento médico del vómito negro.
† Semana Médica, 2 marzo 1892.

depleción de sangre seguida de transfusión sanguinea la donomino difusión de los venenos ó *toxidifusión.**

Un frasco de baca inferior sirve bién para la transfusión serosa: para la *toxidifusión* los transfusores Colin. Mathin, etc., pudiendo remplazarlos por un embudo de cristal grande ó en último caso de hoja de lata que en cualquier parte se puede encontrar, una lanceta, un trocar-aguja y tubos de goma: escusado es recomendar la más rigorosa técnica aséptica.

Once casos, anúricos de veinte á treinta horas, urémicos acentuados y la mayoría agónicos he tenido ocasión de tratar por la transfusión serosa y de ellos tres se han salvado; los restantes he pronosticado su muerte sinó se recurria urgentemente á la toxidifusión. Circunstancias que no es pertinente exponer,† hicieron imposible su práctica.

TRATAMIENTO MÉDICO DEL VÓMITO NEGRO.

Por SEGUNDO BELLVER MATEO,
Médico Mayor Principal Primero del Cuerpo de Sanidad Militar Español. Isla de Cuba.

La bacteriología hasta el presente demuestra que la fiebre amarilla no es infección general y que al localizarla únicamente el tubo digestivo es el órgano indicado.

En espera de la demostración esperimental cree el autor fundado en la observación clínica y necrópsica que es una infección gastro-intestinal con toxemia microbiana concomitante y auto-intoxicación urémica consecutiva por la acción que las diastasas ejercen sobre la sangre, rebajando su función respiratoria, dificultando la oxidación de la hemoglobina y disminuyendo considerablemente por lo tanto la cantidad de oxigeno circulante, resultado final que dá cumplida explicación de la uremia por retardo ó suspensión del proceso de oxidación regresiva.

Desde el año 1878 en que en estas ideas se afirmó, con ellas consecuente, el autor ha tratado los enfermos por los purgantes, los antisépticos y los hiperoxidantes, cambiando frecuentemente los segundos á medida que la química y la clínica, nos los daban á conocer: desde 1888, en que á la naftalina relevó el naftol A, antiséptico ideal del tubo digestivo, no ha inducido cambios en el tratamiento, á escepción de dar la preferencia al benzoato de sosa sobre el salicilato.

He aquí como procede: Administra por primera intención de 60 á 100 gramos de sulfato de sosa, en 300 de agua, repitiéndole si es devuelto por vómito: á las dos horas, sin esperar el efecto purgante, una cápsula con medio gramo *a* naftol, que se repite cada hora ó cada dos, segun la intensidad del caso: diez gramos de benzoato de sosa por litro de agua azucarada para tomar cien, tras cada capsula, mezclada con igual cantidad de agua de Selz, permitiéndole ademas la beba *ad libitum*, natural ó fria.

La más rigorosa dieta absoluta durante los cinco primeros dias por lo menos: al colera americano, como al asiático hay qui matarlos de hambre y en agua ahogarlos. La medicación sintomática en el primer período, no debe distraer la atención de los asistentes, mas que en el caso que los trastornos que la exijan sean de tal naturaleza que dificulten el tratamiento, intolerancia gástrica, ó pongan en peligro el funcionalismo orgánico, hiperpirexia.

Para lo primero hielo interiormente é inyección atropomórfica. Para lo segundo baños prolongados á la temperatura ambiente 25 á 30 centígrados y huir de los antitérmicos farmacológicos, que por acción retardadora de las oxidaciones deben ser proscritos en absoluto. Los vinos generosos y las pociones tónicas alcoholizadas, la estricnina, la cafeina, la entero-clisis de suero artificial frio ó caliente alternativa-

* Revista de Ciencias Médicas, agosto 1891, Habana.

† Resistencias oficiales, temores de los encargados de su asistencia; falta de sangre.

mente, para levantar las energías y aumentar la tensión arterial, generalmente tan deprimidas, son medios que deben ser usados, si bién con muy pocas esperanzas de éxito, cuando el caso es grave y la oliguria se acentua.

Las hemorragias no son detenidas ni con el percloruro de hierro por el estomago ni con la ergotina en inyección hipodérmica.

Contra la anuria y la uremia se han agotado todas las medicaciones y demostraria no haber visto enfermos, quien en medicación alguna confie: todo resulta desesperantemente inútil.

Los enfermos tratados como queda dicho, en las doce primeras horas de la invasión dan una mortalidad tan pequeña que apenas se llega al 1.50 por ciento: el grupo de los que recibieron el tratamiento desde las doce segundas horas del primer dia clínico da un promedio de 3 por ciento, los del segundo dia 13 por ciento, los del tercer dia 30, los del cuarto y quinto 70 por ciento, cifras aproximadas.

Las estadísticas de otras medicaciones seguidas tambien en el Hospital Militar de la Habana, dan cifras elocuentísimas, en los dos primeros grupos, ó sea en los que el tratamiento comienza en el primer dia, pues resultan decuplicadas, en los de segundo dia triplicadas, siendo escasa la diferiencia en los demas. Cuatro años y más de dos mil casos dán valor á estos datos comparativos.

THE COMPLICATING CONDITIONS, ASSOCIATED DISEASES, AND MORTALITY RATE IN ERYSIPELAS.

By JAMES M. ANDERS, M. D., Ph. D.,

Professor of medicine and clinical medicine at the Medico Chirurgical College; physician to the Philadelphia Hospital, etc.

During the year just past I have been engaged in conducting an investigation into the disease erysipelas. A portion of the results obtained from these researches were given in a recent paper on "The seasonal influences in erysipelas, with statistics." * More recently I read an article on "Some points in the etiology and clinical history of erysipelas, with statistics," before the section on the practice of medicine of the American Medical Association at its last meeting, in which article additional results were reported. To some of the conclusions reached in the latter paper I desire to make brief reference presently. While collecting data, with a view to determining the duration of erysipelas, I had occasion to inquire into the effect of complications on the general course of the disease. Upon this point the following inferences may be found in my last paper:

The average duration of the affection was computed in 1,880 cases and found to be (including relapses) 25·13 days. At any period of life, according to these observations, the stay in a hospital or the duration of a case in private practice was lengthened almost indefinitely when the patient had been previously in an enfeebled condition on account of chronic disease and when complications existed. The average course was found to be much less in uncomplicated cases occurring in persons under 40 years, which is the time of life corresponding with a preponderating proportion of cases, viz, about fourteen days.

These results also point strongly to the important practical fact that "erysipelas in a typical form is a self-limited disease; that the length of the attack is greatly influenced by the age of the patient *per se*, its average duration in persons over 50 years being considerably longer than in younger subjects. Sex has no influence in this direction."

I have directed attention to the influence of age upon the course of the disease—a factor that is especially operative at a period of life when cases are relatively infrequent—for two reasons: First, because it is an interesting and novel fact; and,

* Read at the meeting of the American Climatological Association, 1893.

secondly, that the other and more notable factors, as complications, etc., shall not be overrated.

Respecting those associated diseases that are not to be classed as true complications additional data will in this connection be adduced. In my published article, before alluded to, may be found an analysis of 1,665 cases, and the data show which affections predispose most potently to erysipelas, as well as the comparative frequency of their occurrence, as follows: In the course of chronic leg ulcers 67 occurred; in chronic pulmonary tuberculosis and chronic nephritis, 15 each; in chronic rheumatism, 14; in organic heart disease, 10; in urethral stricture, 6; in syphilis and synovitis, 5 each; in asthma, chronic pleurisy, and chronic alcoholism, 4 each; in bone necrosis, malaria, locomotor ataxia senile debility, and puerperal state, 3 each; in typhoid fever and sciatica, 2 each, these being 7·8 per cent of the total number of instances.

The result just narrated fitly corroborated the broad fact—one long since appreciated by the profession—that certain conditions and diseases increase the liability to the complaint.

I purpose to present, in the next place, the results obtained from a study of a series of 1,674 cases which were analyzed with particular reference to complications. Of the latter there were: abscesses, 105 (of which the following only were classified: Of eyelids, 5; abscesses with ulcers, 2; of leg, 3; of foot, 3; of finger, scalp, elbow, glands at angle of jaw, 1 each); rheumatism, 20; pneumonia, 7; catarrhal pneumonia, 2; pleuritis, 7; delirium tremens, 10; delirium, 7; albuminuria, 8; acute nephritis, 6; synovitis, 5; phlebitis, 7; diarrhea, 5; tonsilitis, 3; otitis media, pharyngitis, acute bronchitis, œdema of larynx, 2 each; angina pectoris, iritis, epistaxis, scurvy, hemiglossitis, neuralgia, sciatica, mastoiditis, pyæmia, endocarditis, eczema, jaundice, paralysis, meningitis, carbuncle, hysteria, apoplexy, insanity, arthritis, diphtheria, followed by leg ulcer and repeated hemorrhages, 1 each. Not a few of the complications which are mentioned by authors of modern text-books and other recent writers as being leading ones are, according to the results of these observations, actually rare. On the other hand, certain complicating conditions not emphasized in medical literature occur relatively frequently, notably acute articular rheumatism. With reference to this latter affection it should be pointed out that the attention of the profession has not hitherto been directed to the fact that it is quite frequently associated with erysipelas. It is seen that, according to the above table, it ranks next to abscesses in point of frequency, and that it is present twice as often as delirium tremens, which stands third as to frequency of occurrence. In only 3 instances did the rheumatic attack precede the appearance of the erysipelas by two or three days. The symptoms of rheumatism usually came on several days after the onset of erysipelas. I will not at this time venture an opinion to explain why acute articular rheumatism should develop in the course of an existing erysipelas as often as would be indicated by these researches. So long as the specific agent on which rheumatism depends is not known, so long must we remain in ignorance of the true explanation of this combination of diseases.

It might be argued with considerable show of reason that the arthritic disturbance is purely symptomatic of a pyæmic condition, and hence nonrheumatic in nature; but this latter view can not be correct relative to at least one half-dozen instances in which a detailed description of the symptoms was given. Moreover, I have endeavored to eliminate what might be regarded as doubtful cases, classifying them as "synovitis," etc. In connection with this, the fact before stated, that in fourteen instances chronic rheumatism preceded the attack and most probably operated as a predisposing factor, should be borne in mind. From these statistics it may be seen that pneumonia and pleuritis complicate erysipelas in a small proportion—less than 1 per cent—of the cases. In some instances pneumonia appeared early, hence it was due, most probably, to a special localization of the specific streptococcus. To such the term "pneumo-erysipelas" is here applied. The cases—2 in number—in which acute nephritis developed during the first few days of the attack should be termed "nephro-erysipelas."

I do not doubt that pneumonia, both lobar and catarrhal (the latter probably always), and acute nephritis, as well as pleuritis, may also occur as secondary results. It should be pointed out that acute endocarditis was present in but a single instance, and, since this complaint is held to be a relatively common complication by most recent authors, the present results may excite considerable surprise. Meningitis, which was formerly thought to be quite frequent, but is believed to be rare by a few recent writers, was present in one instance only, thus corroborating the latter view. Active delirium in this disease points to a severe type of infection, and not, as a rule, to meningitis. Precisely what is implied by "a complicating synovitis" it would be difficult to determine, unless we believe it to be a pyæmic manifestation—a not unlikely theory, I think. Perhaps certain other conditions, supposed to be complications, are to be regarded as pyæmic indications, such as jaundice, etc. Mastoiditis, otitis, media, tonsilitis, and œdema of the glottis are to be looked upon as secondary developments.

Some interesting facts relating to the mortality rate of this disease were also brought to light by these researches. In the opinion of all authors the death rate is exceedingly variable, ranging, according to some writers, from 1 to 50 per cent. That it does exhibit great variations in this respect can not be reasonably denied, but the limits of its diversities have been by many too widely separated. The correctness of this latter assertion will be evident after a glance at the accompanying table, which gives the number of cases from the different institutions separately, in which the terminations were recorded, with the number and percentage of deaths for each hospital, as well as the same points with reference to the cases derived from private practice:

TABLE I.

Source of cases.	Number of terminations recorded.	Number of deaths.	Percentage of deaths.
Blockley Hospital	1,095	73	6·29
Pennsylvania Hospital	523	27	5·1
Episcopal Hospital	71	9	12·6
Johns Hopkins Hospital	16	3	18·75
German Hospital	9	3	33·3
Private practice	96	4	4·16
Total	1,810	119	6·57

General average mortality, 6·57.

It will be observed that the variations in the percentage of deaths are not so great in the larger individual series, which are composed of sufficient cases on which to base reliable inferences. The general average mortality rate, it is seen, is 6.59 per cent. The cases from private practice gave a lower death rate, or 4.16 per cent. In the female sex it is 1.5 per cent lower than in the male, according to these statistics. Surgical or traumatic erysipelas has a higher ratio of deaths than indicated by the general average. There were 101 cases classified as purely traumatic, and for these the percentage of deaths was 14·5.

A careful study of the cases which were preceded by chronic illness shows that they swell the general average mortality list, the increase being not less than 25 per cent. When occurring in the course of chronic Bright's disease the percentage of deaths was as high as 40, while in pulmonary tuberculosis (first and second stages) it was 30. The disease proved fatal in 2 cases that occurred during convalescence from typhoid fever.

The effect of complications upon the frequency of deaths is a question of lively interest and primary importance. This point also was investigated.

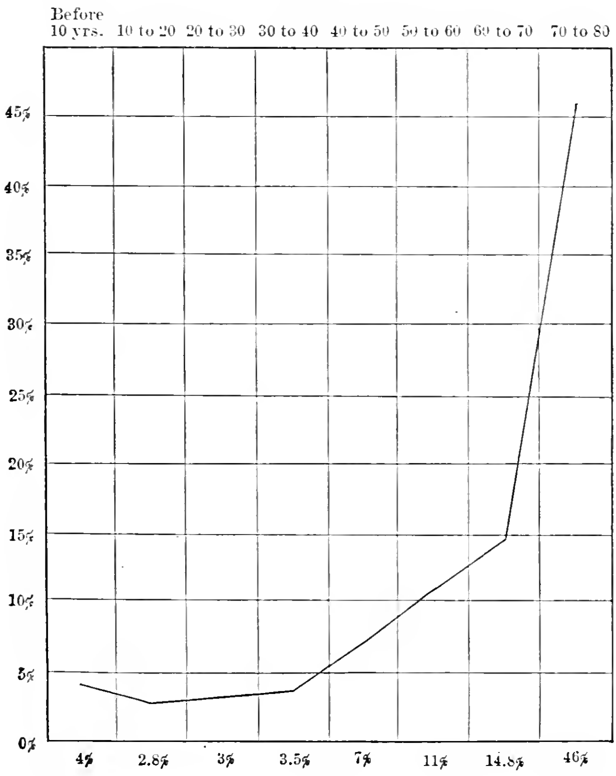
The comparative gravity of the leading complicating conditions and diseases is shown by the following table:

TABLE II.

Complications.	Instances.	Deaths.	Percentage of deaths.
Abscesses	105	8	7·6
Acute rheumatism	20	2	10
Pneumonia	7	4	57·1
Pneumonia, catarrhal	2	......	......
Delirium	7	4	57·1
Delirium tremens	10	8	80
Pleuritis	7	1	14·3
Acute nephritis	6	3	50
Phlebitis	7	......	......
Synovitis	5	......	......
Diarrhea	5	......	......
Œdema of larnyx	2	2	100
Pyæmia	1	1	100

It will be seen that while abscesses are common they do not to any extent augment the mortality rate. Pneumonia, delirium, delirium tremens, and acute nephritis are among the graver complications. Acute rheumatism, on the other hand, stands second in frequency, but is comparatively harmless. To account for the increase in the percentage of fatal cases due to acute articular rheumatism we possess no positive knowledge. The opinion is, and long has been prevalent, that erysipelas benefits and even cures acute articular rheumatism and other affections, including carcinoma and sarcoma.

AGES.



Age modifies the mortality. Above may be found a tracing which represents the percentage of deaths in erysipelas, for the different decades, from the time of birth to 80 years of age. The line rises in increments of five. The mortality, it will be seen, is much less than the general average—i. e., 6.57 per cent—from birth to 40 or 45 years, and then it gradually becomes greater until we reach 60 years. After 60 each year increases considerably the percentage of deaths, while after 70 the percentage rises rapidly to 16. While age, *per se*, as has been stated, influences the death rate quite materially, it does so only in persons over 45 years of age. Other factors must not be overlooked. It was among middle-aged and old persons that, comparatively speaking, most of the cases occurred in which chronic affections were associated. These latter, as previously shown, exert considerable influence upon the mortality. The various complications before mentioned did not prevail more extensively during the later than during the earlier periods of life.

In conclusion I would submit a few deductions which may serve not only to reiterate some of the leading demonstrated facts, but also to facilitate a discussion of the same:

(*a*) In typical cases erysipelas is a self-limited disease, the average duration in persons under 10 years of age being fourteen days.

(*b*) The course of the disease was greatly lengthened when complications were present or chronic affections preexisted, as well as when occurring in persons over 50 years of age.

(*c*) Certain chronic affections, notably pulmonary tuberculosis, chronic nephritis, chronic rheumatism, and organic diseases of the heart, increase the susceptibility to the complaint, having been present in 7.8 per cent of the total number of cases.

(*d*) The most common complications were abscesses and acute rheumatism; the rarest meningitis and ulcerative endocarditis, pericarditis not having furnished a single instance.

(*e*) The general average mortality was 6.57 per cent, while in the cases from private practice it was 4.16 per cent; in persons under 49 years it was only 3.5 per cent, in those over 70 years 16 per cent, and in the traumatic cases 11.5 per cent.

(*f*) The mortality list was augmented as much as 25 per cent by the presence of coexisting chronic affections.

(*g*) The numerous complications also increased the percentage of deaths, and certain of them in an especial degree, notably lobar pneumonia, acute nephritis, delirium tremens, and active delirium.

(*h*) Age has a decisive influence upon the mortality after the forty-fifth year, this effect becoming more pronounced after the sixtieth year.

ALGUMAS PESQUIZAS SOBRE O HEMATOZOARIO DE LAVERAN.

Por MONCORVO FILHO,

Chefe de clinica encarregado do serviço bacteriologico da Clinica de Pediatria da Policlinica do Rio de Janeiro, Assistente do Laboratorio de Biologia, Membro effectivo do Gremio dos Indernos dos Hospitaes, actual Bibliothecario do mesmo Gremio, Socio fundador da Sociedade Nacional de Acclimação, etc.

Encetei ha cerca de tres annos algumas investigações sobre o hematozoario do paludismo, assignalado por Laveran em 1881. Durante o anno de 1892, 21 casos serviram para o exame do sangue, alem de muitos outros observados nos annos anteriores. Usei nestas pesquizas dos processos de Laveran, Grand, Romanousky, Roux, etc. Tive ensejo de fazer, por vezes, em dias consecutivos, o exame do sangue do mesmo doente, accusando ora maior, ora menor ascenção thermica, desde a temperatura pouco acima da normal ate acima de 40° e mais, ouainda no periodo de apyrexia. Todos os cuidados antisepticos presidiram os meses estudos. Escrupuloso como deve ser todo o experimentador, eu não me julgo, em vista das indicisões que paivam ainda em meu espirito, autorisado a tirar uma conclusão definitiva sobre grande numero de casos observados no Serviço de Pediatria da Policlinica do Rio, debaixo do ponto de vista microscopico.

Direi apenas que taes observações, realizadas com muito interesse e rigor scientifico, deixaram-me ate agóra, grande duvida sobre os resultados colhidos, pelo menos no tocante a infancia, sobre a qual convergiram as minhas pesquizas, incitando-me dest'arte a nellas proseguir com o maior empenho, para mais tarde pronunciar-me a respeito.

O Prof. Treille, da Algeria, cujas observações foram colhidas em fecundo campo de estudo, bem como o Prof. Guido de Baccheli, muito hesitam ainda em aceitar as conclusões de Laveran. O primeiro havendo encontrado o hematozoario na urina de individuos não affectados de malaria e o segundo não o havendo encontrado no sangue de doentes de febre palustre.

Parecem-me pois dignas de nota as objeções de tão distinctos investigadores.

Não devo, a proposito, esquecer um facto curioso que verifiquei tambem no correr das observações do anno proximo passado. Alguns observadores relatam que tendo occasião de examinar ó sangue de seus doentes malaricos submettidos as azul de methyleno encontraram as hematias coloridas daquella substancia. Tal tentamen tambem por mim foi practicado em alguns doentes do Serviço de Pediatria da Policlinica, sob a acção daquelle agente therapeutico; os globulos de sangue, porem, a presentavam-se com a sua coloração normal e mesmo não pude verificar a existencia da menor particula daquella materia corante apezar de se acharem coloridas de azul, a urina e as dejecções dos referidos doentes.

ESTUDO SOBRE A IDENTIDADE DO MICROBIO DA LYMPHANGITE E DA ERYSIPELA.

Por MONCORVO FILHO,

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Como tivesse ensejo de examinar diversos casos de lymphangite aguda debaixo do ponto de vista microscopico, e conseguisse um resultado bastante satisfactorio, entendi dever publicar as minhas pesquizas a respeito.

Eis porque apresso-me em fazer esta pequena nota. Encontrei logo, que me decidi a estudar tão momentosa questão, 15 casos de lymphangite aguda onde pude operar os meros estudos.

Foram Verneuil e Clado (1889) os primeiros a demonstrar a identidade da erysipela e da lymphangite aguda; depois delles Sabouraud, interno do Prof. Besuier, encontrou no serosidade e no sangue extrahidos de membros elephanciacos no periodo de crises lymphangiticas o streptococcus de Fehleisen, ó qual seria dest'arte para elle o microbio determinante das lymphangites e da elephantiasis européa.

Em 12 dos 15 casos por mim examinados, encontrei o streptococcus de Fehleisen quasi sempre em estado de pureza. Foram practicadas culturas, ora em caldos liquidos, ora em caldos solidos de gelose ou gelatina.

A technica usada para a extracção da serosidade era a seguinte: Depois de bem lavada a região doente com uma forte solução antiseptica e em seguida com agua distillada, com o auxilio de uma lanceta esterilisada, fazia-se uma picada, a segunda gotta de sangue ou de lympha que apparecia era recebida em balõezinhos esterilisados e soldados a lampada. Ao cabo de dezoito ou vinte e quatro horas, delles me servia para semeações em caldos ou para preparações microscopicas.

Trez cães e trez ratos brancos serviram para a verifição experimental. Tiveram a erysipela bem caracterisada se bem que o streptococcus inoculado tivesse provindo de casos de lymphangite aguda.

Emfim para terminar, passo a inserir as conclusões do meu longo trabalha aqui resumido nesta pequena nota:

1°. Que diante das demonstrativas investigações bacteriologicas de Verneuil e Clado, de Sabourand e das minhas proprias realizadas sobre 15 casos, a lymphangite aguda e a erysipela nada mais são do que modalidades diversas de uma mesma affecção infecto-contagiosa e bacteriana.

2°. Que o germen dellas productor é o streptococcus do Fehleisen, microorganismo hoje perfeitamente estudado e conhecido; de facil pesquiza, cultura e inoculação experimental.

3°. Que o streptococcus erysipelatus póde em certos casos coincidir com a presença de outros microbios, como sejam o streptococcus pyogenus (aliás reputado identico áquelle por H. Roger), o staphylococcus albus, ou aureus, ou citreus, etc.

4°. Que as crises lymphangiticas successivas, com curto intervallo de interrupção muito notadas em certos individuos, principalmente em nosso clima, tem perfeita explicação, pela permanencia do microbio de Fehleisen no sangue podendo ahi conservar-se sem virulencia algum tempo devido a causas diversas, e tornar a adquiril-a e ainda mais proliferar, desde que certas outras causas para isso concorram.

5°. As contraprovas positivas das pesquizas de Verneuil e Clado, parecem demonstrar definitivamente a identidade de cauza e natureza da lymphangite aguda e da erysipela, outrom reputadas entidades morbidas distinctas.

HISTOIRE DU PALUDISME ET SES COMBINAISONS AVEC LA FIÈVRE TYPHOÏDE ET LE TYPHUS DANS LA VALLÉE D'ORIZABA (MEXICO).

Rapport du Docteur GREGORIO MENDIZABAL.

Investi par le gouvernement de l'État de Véra-Cruz, un des plus importants de la République Mexicaine, de l'honneur de représenter cet État au 1[er] Congrès Médical Pan-Américain, je n'ai consenti à accepter cette mission difficile à remplir que pour rendre ce faible service à mon pays, et tout particulierement à l'État où j'ai reçu le jour, et ainsi que pour satisfaire mon vif désir d'augmenter au soin de cette notable assemblée le contingent de mes connaissances médicales, tout en ayant la certitude de mon insuffisance pour occuper avantageusement un poste aussi élevé.

Pour mieux comprendre ce que je vais exposer, je commencerai par faire une description de la vallée où est assise la ville d'Orizaba, de sa situation topographique, de son altitude, de sa latitude, des traits les plus saillants des phénomènes météorologiques qui y ont été observés, de son orographie, de son hydrographie, des conditions hygiéniques de la ville, et, sans sortir des limites étroites que m'impose ce travail, de tout ce qui peut contribuer à nous rendre compte de la manière d'être du paludisme dans ces contrées, ainsi que de son influence sur les maladies qui compliquent, très spécialement, la fièvre typhoïde et le typhus.

Les plaines élevées du plateau central, formées par le développement et le partage de la Cordillière des Andes, qui, depuis les confins de la côte occidentale de l'Amérique du Sud, produisent une chaîne non interrompue avec les montagnes gigantesques que nous appelons au Mexique "La Sierra Madre," vont terminer par une descente graduelle et lente aux plages embrasées du Golfe du Mexique et à la côte du Pacifique, créant de superbes et splendides versants qui font de notre pays un des plus beaux, des plus pittoresques de la terre.

Dans un des multiples versants orientaux de cette vaste chaîne qui sépare l'État de Véra-Cruz du plateau central, ayant pour noyau au point de départ le pyramidal "Citlaltepetl" (Volcan d'Orizaba), se trouve une vallée riante et fleurie, au sol très fertile. Par ses paysages, l'une des plus belles, des plus agréables par son climat, des plus saines par sa situation topographique, un printemps éternel y règne comme dans la plupart des régions tempérées.

Le voyageur qui descend du plateau central en suivant l'audacieuse voie ferrée qui relie Mexico à Véra-Cruz commence à se rendre compte de la situation de cette vallée, en sortant tout à coup du tunnel numéro 10. Il se remet bien vite de l'effrayante impression qu'il a reçue dans la vertigineuse descente des "Cumbres de Maltrata," que le train a côtoyée en serpentant au bord du précipice; et après avoir traversé les défilés terrifiants de "La Joya" et de l'Infiernillo," il embrasse du regard, dans toute son étendue, le surprenant vallon, toujours vert, toujours gai, sillonnée de petits ruisseaux, qui conduit le passager par une pente majestueuse et lente dans la grande et charmante vallée d'Orizaba.

La ville d'Orizaba est située par 18° 50′ et 56″ de latitude N. et par 2° 7′ et 54″ de longitude E. de Mexico. Elle se trouve à 1,236 mètres au dessus du niveau de la mer, et à 104,263 mètres de la côte du golfe. L'azimut de l'aiguille magnétique est de 8° 25′ E. La ville est située dans une plaine qui part du pied du coteau du "Cerro del Borrego;" l'inclinaison de son sol est tellement accentuée que dans une extension de 3,352 mètres que la ville a du levant au couchant, il y a une pente moyenne de 3½ mètres.

Les terrains de la vallée d'Orizaba appartiennent au cretacé supérieur (terrains à hippurites et à radiolites), composés en général de calcaires, alternant avec des marnes et des argiles; ils sont recouverts d'une couche de terre végétale variable, mince dans de certains endroits, comme, par exemple, au nord-ouest, mais présentant des qualités favorables à la culture.

Les modifications atmosphériques et les engrais que produisent les détritus des plantes répandues dans les champs ont fertilisé de plus en plus les terrains où séjournent les végétaux mêlés avec la terre qui leur sert de base, en augmentant dans certains lieux la couche de terre détritique. A proprement parler, il n'y a point de champs complètement stériles dans la vallée d'Orizaba.

Au nord de la ville plusieurs marais disparaissent graduellement, grâce à des travaux de canalisation.

Ce n'est pas sans raison que les aborigènes de la vallée d'Orizaba lui donnèrent le le nom poétique de "Ahuaializapam," mot composé signifiant dans la langue expressive des anciens Mexicains: Gaîté dans, 'ou sur l'eau.'

En effet, il y a à Orizaba une infinité de sources qui fertilisent les terres. Grâce aux pentes des Cordillières et aux inégalités du sol, leurs eaux coulent impétueusement et se précipitent de très haut, offrant de puissantes chutes aux industriels qui les utilisent chaque jour d'avantage.

Parmi les cours d'eau les plus remarquables, citons le "Rio Blanco," qui prend sa source à 30 kilomètres en amont d'Orizaba, sur le versant de la montagne appelée "Cumbres de Acultzingo." Il s'enrichit d'autres tributaires qu'il reçoit dans sa source.

Ce ruisseau, un peu avant d'arriver à Orizaba, reçoit un autre affluent formé par les sources de "Nogales," qui charge ses eaux de produits calcaires, les rendant impropres aux usages domestiques et impropres à l'alimentation des chaudières à vapeur.

Ce ruisseau court au sud de la ville, du couchant au levant, et opère sa jonction avec le "Papaloapam," débouchant dans le Golfe du Mexique par la barre "d'Alvarado."

La rivière appelée "Rio de Orizaba" prend son origine dans les montagnes de "Fesmelaca," et dans son cours augmente son volume d'eau par les diverses sources qui surgissent des coteaux adjacents. Elle passe en serpentant par le centre de la ville qu'elle traverse du nord-ouest au sud-est, et va déboucher dans le "Rio Blanco" au sud-sud-est. De cette rivière aux eaux pures et limpides la plupart de l'année la ville s'alimente d'eau potable, et quoique chaque jour son débit diminue par suite du déboisement de nos coteaux et des nombreux emprunts que l'on y fait sans cesse pour les moteurs des fabriques et des moulins établis sur ses rives.

Le ruisseau nommé "Arroyo Caliente," qui traverse la ville au nord-est et jaillit dans les marécages appelés "Tepetlaxco," fertilise une grande étendue de terrains qu'il croise pour aller se perdre dans le "Rio Blanco."

Au coin du pied du "Cerro de Escamela," au nord-est aussi de la ville, naît un autre ruisseau appelé "Ojo de Agua," qui sort aussi du versant du "Cerro de Escamela" à la ville d'Orizaba. Cette eau, toujours constante, pure, fraîche et abondante, possède presque toutes les meilleures conditions de l'eau potable, et serait la plus convenable pour l'usage des habitants de la ville, pouvant fournir 80 litres par personne et par jour.

Il y a un projet facile à réaliser qui probablement sera prochainement mis à exécution pour l'introduction de cette eau dans la ville.

Les vents qui dominent à Orizaba sont le nord-est, alternant pendant l'hiver et le printemps avec les violents vents du sud-ouest, en forme d'ouragans. Ces derniers sont secs, chauds et tellement impétueux que l'on croirait s'asphyxier quand ils soufflent, à tel point ils raréfient l'atmosphère. Ils exposent beaucoup aux hémoptysies et aux congestions cérébrales; mais en change ils sont grandement salutaires, parce qu'ils chassent au loin tous les germes d'infection et dessèchent considérablement l'air et les appartements. La température moyenne d'Orizaba est de 21 centigrades. Il tombe en terme moyen 2.5[illegible] mm. d'eau dans l'année.

La ville comptait il y a trente ans 2[illegible] habitants. Ce nombre a doublé de nos jours.

En fait d'hygiène, la ville laisse beaucoup à désirer. Elle a assez d'eau de bonne qualité, mais les détritus organiques que la rivière d'Orizaba entraîne pendant la saison des pluies la rendent nuisible, et produisent fréquemment des catarrhes intestinaux.

Dans la partie nord-est de la ville, qui est la plus basse, on se sert de l'eau des puits. Cette partie, que traverse "l'Arroyo Caliente," d'origine marécageuse, est celle qui a toujours le plus souffert des maladies paludiques.

Jusqu'à il y a très peu de temps les latrines de la ville n'étaient en général que de fosses fermées et, aujourd'hui, encore les maisons où l'on a établi les améliorations que recommande l'hygiène sont peu nombreuses. Il y a une huitaine d'années que l'on a commencé à construire des égouts souterrains dans quelques rues de la ville pour recevoir les résidus, eaux sales, ordures, matières fécales, etc.; mais ces égouts sont tellement défectueux qu'ils sont plutôt nuisibles à la santé qu'utiles.

Les rues de la ville sont étroites. Le pavage est incomplet et négligé. Les maisons, en général, sont humides, à l'exception de celles que l'on construit depuis peu d'années, mais avec le désavantage qu'avant elles étaient spacieuses et bien aérées; elles avaient des grandes cours converties en beaux jardins; on en bâti de moins humides il est vrai, mais beaucoup plus réduites, avec des très petites cours et peu d'ampleur dans les appartements, au détriment des commodités et de la santé des habitants à cause de l'avarice des propriétaires.

On ne connaît point la misère à Orizaba. La vie y est relativement chère, et néanmoins aucun ne manque du nécessaire pour subvenir aux premiers besoins.

Les gens sont généralement propres et coquets, et se nourrissent assez bien. Les habitudes du peuple sont bonnes. L'ivrognerie était un accident fort rare parmi la basse classe jusqu'à il y a dix ou douze ans. Depuis que l'usage du "pulque" a été introduit dans la contrée, en même temps que les gens du plateau central y sont venus travailler aux fabriques à filature nouvellement établies, ce vice répugnant s'est enraciné, au grand préjudice de la population pauvre, qu'il plonge dans une misère physiologique, l'exposant aux maladies de tout genre dégradant et avilissant l'homme. Malheureusement, le vice dégoûtant de l'ivrognerie a aussi jeté des racines profondes dans la classe éclairée.

Il y a vingt ans, avant la construction du chemin de fer, les saisons étaient assez régulièrement marquées à Orizaba. Les pluies y étaient bien distribuées, les températures extrêmes y étaient à peu près inconnues, et le sol, autant que le sous-sol, conservait un degré d'humidité qui donnait la constance aux sources d'eau. D'après les calculs approximatifs on aurait abattu au Mexique pour la construction de chemins de fer 30 millions d'arbres, et pour alimenter l'insatiable ventre des locomotives on en aurait consommé 100 millions! En ajoutant à ces chiffres ceux qui se consomment dans les fabriques comme combustible les quantités de petits arbres que l'on reduits en charbon, le bois de teinture et de construction que l'on exporte tous les jours en si grandes quantités, le bois que nos menuisiers, charpentiers et ébénistes travaillent, on aura une idée de l'abattage effréné et nuisible que nos forêts ont souffert.

On calcule que les chemins de fer du Mexique consomment comme combustible 1,000 tonnes de bois par jour. Il ne faut donc pas s'étonner de ce que à Orizaba (et là sans doute moins qu'en d'autres endroits du pays, par suite de ses conditions particulières) la météorologique ait subi des changements aussi remarquables. Avec les pluies il tombe peut-être aujourd'hui la même quantité d'eau dans l'année qu'auparavant, mais celle qui tombe dans quatre ou six averses torrentielles tombait avant dans cinquante bien distribuées, et le manque d'arbres sur les cimes et les coteaux pour retenir la rapidité de ces eaux, donne lieu aux débordements et aux abondantes crues qui ravagent tout ce qu'elles trouvent sur leur passage, emportant la couche mince d'humus qui constitue la fertilité des terres, et inondant les bas-fonds, semant partout la desolation et la ruine. Nous avons eu deux ou trois de ces exemples dans les dix dernières années, tels que d'anciens octogénaires ne se souviennent point avoir jamais assisté à de pareils dégâts.

Par suite de cette coupe immodérée des arbres les sources qui approvisionnent la ville d'eau potable ont tellement diminuées qu'elle fait déjà complètement défaut. Les arbres qui ombrageaient le ruisseau formé par ces eaux de sources manquent, et l'évaporation a appauvri notablement leur volume. Autrefois, pendant presque toute la durée de l'hiver, les vents de l'est et du nord-est entraînaient les nuages suspendus sur la mer qui restaient, pour ainsi dire, accrochés au feuillage des arbres de nos bois, se condensant et se transformant en pluie fine que l'on appelait avec raison "la salud del pueblo." Dans ce temps là on ne voyait pas le soleil de quinze ou vingt jours, ce qui imprimait à la ville une teinte mélancolique. L'air etait tellement saturé d'humidité qu'on aurait pu le couper au couteau; les brouillards constituaient l'état normal de notre atmosphère pendant tout l'hiver. On jouissait, il est vrai, de plus de santé, les inflammations des organes respiratoires n'étaient point connues et les fièvres intermittentes fuyaient, pour ne plus reparaître, jusqu'à l'été suivant. Les températures les plus basses étaient de 12 à 14° au-dessus de zéro.

Aujourd'hui, les étés sont brûlants et très prolongés. Les pluies parfois très rares dans certaines années sont torrentielles dans autres. Nous avons des hivers accompagnés des fortes gelées. Les températures extrêmes se succèdent souvent sans transitions lentes, notre ciel, autrefois couvert de nuages, laisse tomber d'aplomb, pendant des jours et mois entiers, les rayons du soleil sur la terre qu'il dessèche et qu'il gerce, anéantissant les germes de la végétation. Les plus médiocres ruisseaux se convertissent subitement en courants dévastateurs; et si une main puissante n'y porte pas remède au plus tôt nous courrons le grand risque de subir un jour le sort des départements alpins, où le sol disparaît sous les pieds de l'homme, et où les plus fertiles et riches contrées sont devenues des plaines arides et sèches et des tristes campagnes déserts.

Le paludisme, cette maladie infectieuse et spécifique, parasitaire, produite par la pullulation dans le sang des protozoaires, si bien décrits, il y a douze ans, par M. Laveran, règne depuis longtemps dans la vallée d'Orizaba, et d'après ceux de mes collègues qui ont exercé la médecine pendant les cinquante dernières années écoulées il était si bénin, il se présentait sous des formes si simples, qu'il ne préoccupait personne, et on le guérissait sans l'intervention de l'art. La faiblesse de l'empoisonnement ou de l'intoxication était telle, et peut-être aussi l'organisme de nos ancêtres se trouvait dans de meilleures conditions générales que nous, qu'ils luttaient souvent avec avantage contre les parasites, sans employer aucun médicament spécifique.

On avait rarement besion d'administrer aux malades anémies, surmenés et mal nourris, deux ou trois doses de sulphate de quinine, 30 centigrammes au plus, pour se rendre maitre de la maladie. Un bon régime et du repos diminuant l'anémie complétait le traitement. Les rechutes ne se connaissaient presque pas alors.

Les laboureurs des alentours de la ville, des villages ou plutôt des fermes situées dans les bas-fonds, dans les plaines humides, qui le plus souvent vivaient sur les bords fangeux des cours d'eau, isolés dans la campagne, près des marais ou des terres irriguées, allaient habituellement chercher les secours des médecins pour se soigner des "frios," comme l'on nomme vulgairement à Orizaba les fièvres intermittentes; et il n'était pas rare de voir disparaitre la maladie par le seul changement de climat. De temps à autre il arrivait des cachectiques provenant des mêmes endroits, dont la cachexie ne se déclarait jamais d'emblée, si ce n'était qu'après une série d'accès intermittents ou continus.

Dans ces entrefaites survint l'année 1867, époque à laquelle les travaux de chemin de fer mexicain commencèrent à Orizaba, travaux herculéens pour lesquels il a fallu fouiller profondément la terre; et pendant l'automne de cette même année les fièvres paludéennes éclatèrent inopinément sous les formes les plus graves, constituant un des plus grands fléaux qui aient jamais affligé notre population, causant des désastres terribles, et occasionnant la mort de centaines d'individus, et assouvissant avec plus d'acharnement encore sur les travailleurs mêmes.

Deux ans après, j'arrivais à Orizaba. Le tiers des cas de maladies que je traitais étaient dû au paludisme sous la forme très aiguë du commencement. Mes collègues, qui étaient profondément épouvantés, appliquaient à temps la quinine par doses massives, et employaient déjà, comme un secours héroïque, les injections hypodermiques, essayées avec beaucoup de succès en 1868 par les professeurs Talavera, Mesa et Fernandez. On employait le bi-sulphate de quinine additionné d'acide tartrique, et on faisait des injections dans le dos. Il survenait assez souvent des abscès ou des eschares sur la peau.

Sans ces secours nous aurions perdu la plupart de nos malades, parce qu'il y avait de cas où présentaient sous de formes très graves des accidents pernicieux procédant uniquement de l'infection palustre, qui amenaient rapidement la mort avant l'absorption lente de la quinine par les voies digestives.

Au moins pendant huit ans consécutifs nous eûmes la même constitution médicale. Il n'y avait pas une maladie quelle qu'elle fût, où le paludisme ne se greffasse pas, en la compliquant et l'aggravant toujours. Ce fut alors que je vis les cas les plus caractéristiques de typhus malarien et de "typhoïde malarienne," dont je parlerai après. Ce fut alors aussi que j'ai eu l'occasion d'observer le paludisme sous toutes les formes que nous décrivent si bien Laveran et Fernand Vidal.

La maladie s'acharnait dans les quartiers bas et humides de "Santa Gertrudis," "Tepatlaxco" et "La Concordia," qui sont arrosés par le ruisseau "Arroyo Caliente."

Les logements de ces quartiers sont très mauvais et habités par les gens les plus pauvres, et par conséquent ils se trouvent dans les meilleures conditions pour faire pulluler les germes infectieux de toute maladie quelle qu'elle soit. Pour éviter les fréquentes récidives et les rechutes, nous faisions déménager les malades dans les quartiers élevés de la ville, où le paludisme n'a jamais fait autant de ravages que dans les quartiers bas.

Pendant huit ou dix ans nous avons eu le paludisme comme maladie saisonnière. L'endémie apparaissait aux mois de mai et juin, et affectait la forme endémo-épidémique au mois d'octobre après les grandes pluies, époque à laquelle les chaleurs provoquent les fermentations du sol maréeageux, et développent les miasmes palustres. Quand à la pluie abondante succédait ces coups de vent impétueux du sud-ouest, qui amenaient la sécheresse et produisaient l'évaporation du sol, la maladie éclatait tout de suite. Les premiers cas de fièvre de première invasion se présentaient au printemps. Pendant cette saison les formes dominantes étaient les rémittentes et les continues.

Les quotidiennes et les tierces étaient de préférence les formes de l'automne. Le type quart était très rare et résistait à la médication spécifique; et lors que nous l'avions il se présentait toujours en hiver, prouvant ainsi l'influence de la chaleur sur le rapprochement des accès et sur la tendance à la continuité.

Plus l'individu était intoxiqué, et par conséquent plus sujet aux récidives, plus il avait de prédispositions au type de paroxysmes éloignés; et au contraire, plus était grande son immunité, plus chez lui la tendance aux types d'accès très rapprochés ou continues, était moindre.

Nous observâmes alors toutes les formes que plus tard j'ai trouvé si bien décrites par Laveran, Fernand Vidal et tant d'autres; depuis la forme bénigne et franche jusqu'à la sidération pernicieuse aucune n'a fait défaut.

Parmi les formes continues graves nous avions fort souvent la typhoïde palustre, entièrement semblable à la typhoïde vulgaire. Le malade était plongé dans un état typhoïde ou de stupeur grave; la fièvre était irrégulière, parfois sans rémission, parfois avec rémission vespérale, terminant brusquement par une crise, ou par la mort, avec des accidents pernicieux redoutables. D'autres fois c'était la forme bilieuse, et nous savons bien quelle est l'importance des phénomènes biliaires, et quel est le caractère frappant qu'ils ont dans la pathologie tropicale des fièvres de toutes formes.

Il n'était pas rare de voir parmi les formes pernicieuses quelques unes qui se compliquaient d'entérorragies indomptables qui tuaient presque toujours les malades. Cette forme s'annonçait constamment par des taches purpuriques et des grandes ecchymoses à la peau de bras et des jambes. Parmi les formes pernicieuses que j'ai eu occasion d'observer à Orizaba (celles que Torti appelle fièvres *comitées*, dans lesquelles un des phénomènes morbides prédominait constituant tout le danger) les plus saillantes étaient celles à accès comateux diaphorétiques, délirantes et surtout les cholériques dont les celles avaient parfois l'aspect riziforme typique.

Les accidents pernicieux éclataient même chez des individus bien portants qui jamais n'avaient été atteints de paludisme; ou se produisaient pendant le cours d'une fièvre intermittente ou continue, mais si brusquement que toute prévision était déroutée. Souvent ils se déclaraient aussi sans fièvre, et alors les cas étaient des plus graves.

Chez les enfants la forme éclamptique dominait. Les cas étaient toujours très graves, et sans la prompte intervention de la quinine ils étaient toujours mortels.

Par moments nous nous trouvions en présence de ces troubles non fébriles qui reviennent périodiquement, dans le fonctionnement des organes, que l'on appelle formes larvées, et se guérissent par la quinine. Parmi ces formes les métrorragies et les pseudopneumonies, qui cédaient rapidement à la quinine, éveillèrent mon attention à cause de leur fréquence et de leur gravité.

A cette époque je vis la cachexie palustre survenir d'emblée ou à la suite d'un premier accès de fièvre. Les Indiens qui restaient dans les bas-fonds, qui se nourrissaient mal et se livraient à des excès alcooliques, étaient souvent attaqués d'une façon que l'on pourrait appeler "galopante." Cette cachexie résistait au meilleur traitement institué, et les malades succombaient irrémissiblement, enlevées par une maladie aiguë, comme la dyssenterie ou la pneumonie, d'une gravité d'autant plus portée à l'extrême chez ces gens là à cause des mauvais terrains dans lesquels elle évoluait, ou victimes de la tuberculose dans ses multiples manifestations.

Les cachectiques étaient contraints de quitter les régions insalubres, et malgré cela ne réussissaient à se guérir qu'à grande peine.

Je ne laisserai point passer inaperçu un fait fort curieux que nous avons observé assez fréquemment pendant les endémo-épidémies. La maladie s'acharnait, comme je l'ai déjà dit plus haut, dans les quartiers bas et malsains, et quand elle étendait sa sphère d'action aux quartiers élevées elle limitait toujours ses invasions aux maisons situées dans les rues larges, exposées aux vents dominants venant des lieux infectés. Les rues étroites, abritées du vent, paraissaient être garanties contre l'invasion des miasmes générateurs des fièvres.

Dans les quartiers les plus élevés de la ville, qui sont aussi les plus populeux, le paludisme a toujours fait moins de ravages.

Dix ans après s'être stationné à Orizaba le paludisme, avec ses exacerbations endémiques et épidémiques, est venu en perdant sa force graduellement à un tel point qu'aujourd'hui — je ne dirai pas qu'on ne le trouve plus sous ses formes aiguës, avec leurs types variés, et leur intensité différent depuis la fièvre dite larvée jusqu'à la rémittente et, très extraordinairement, la pernicieuse — mais je dirai qu'elles sont de plus en plus clair semées et sans gravité; et que les formes chroniques, avec leurs complications viscérales et organiques, sont aussi déjà excessivement rares, quoiqu'il soit de grande notoriété que l'intoxication tellurique imprime une physionomié spéciale dans nos contrées aux différents états morbides dont pâtissent les habitants. Dans toutes les maladies zymotiques, dans les affections saisonnières et même dans les traumatismes, on trouve presque toujours des paroxysmes réguliers, certaines allures particulières qui témoignent assurément d'une influence spécifique propre à la région. Le traitement apporte comme un critérium définitif et indisputable, et prouve que chez nous la quinine constitue le panacée du pays, le palladium souverain.

Il ne nous reste que ce que nous pourrions appeler la constitution médicale, mais les véritables endémies ou épidémies, que l'on peut considérer comme l'expression la plus achevée de l'intoxication paludéenne, qui désola pendant quelques années nos contrées, et produisant une mortalité considérable; celles-là ont disparu. A quoi donc pouvons nous attribuer cette amelioration? Il est vrai que l'on a desséché les marais que nous avions aux environs de la ville. Il est vrai aussi que la culture de la terre s'est étendue notablement à la suite de la hausse dans le prix du café, et surtout comme résultat de la paix dont nous jouissons, heureusement, depuis seize ans. Ce sont certainement des facteurs importants dont il faut tenir compte, mais il y en a aussi d'autres non moins intéressants.

Il faut d'abord se souvenir que les marais n'ont pas été la cause efficiente des premieres irruptions, ni des manifestations aiguës du tellurisme à Orizaba.

Nous avions de vastes étendues de terrains marécageux depuis de temps indéfinis, et cependant la grande intoxication n'est née qu'avec les grandes défrichements, les grandes remuements de la terre, faits pour les travaux du chemin de fer. Nous étions dans de magnifiques conditions pour la culture du microbe de Laveran, mais nous n'avions pas la semence que nous a fournie la terre remuée, la terre qui peut renfermer le germe toxique dans des conditions très variables, sur lesquelles la lumière n'est pas encore faite, et que les études micro-biologiques autant que les recherches minutieuses sur l'étiologie contribueront à éclaircir.

"L'existence des marais n'est pas, proprement parlant, nécessaire au développement des fièvres," dit Laveran, et nous pouvons aussi dire qu'avec des grandes étendues marécageuses on peut avoir des contrées indemnes de fièvre.

Nous avons des villes lacustres dont les conditions caractéristiques sont l'humidité, les brouillards, la chaleur et l'influence palustre. Venise, par exemple, dont le golfe est sillonné de canaux marécageux, et Venise est remarquable par sa salubrité, et l'immunité dont elle jouit contre toute apparence au point de vue des fièvres de marais. "Cette innocuité au profit de la ville est si connue," dit Ed. Carrière, "que les malades s'y rendent pour changer d'air et de se débarrasser, en y vivant dans des conditions nouvelles, des accès contractés sur d'autres points." La condition d'eau stagnante n'est donc pas nécessaire pour la production des miasmes palustres.

Le remuement du sol a eu lui-même une influence fébrigène (Fonssagrives). Lind nous dit que dans les pays chauds des matelots envoyés à terre pour y creuser une fosse sont souvent pris d'accès simples ou pernicieux.

Les fièvres d'accès sont devenues plus communes à Paris depuis les grands travaux qui ont métamorphosé cette belle ville. On a vu éclater la malaria à Paris en 1811, lorsqu'on creusa le canal Saint-Martin. Elle éclata aussi en 1840, lors de la construction des fortifications.

Avignon a vu une épidémie de fièvres pernicieuses se manifester à la suite de grands travaux d'excavation.

Mais, à quoi bon multiplier les exemples pour confirmer un fait avéré que tout le monde scientifique connait. C'est pour cela que Pepper propose de faire disparaitre du langage scientifique les appellations si diverses de fièvre paludéenne, palustre, intermittente, d'impaludisme, de paludisme, de malaria, de tellurisme, et de n'avoir qu'un terme pour exprimer cette chose unique : l'intoxication par un agent spécifique, répandu dans le sol, sec ou humide, palustre ou non, et dont seulement les formes et les modalités sont variables, suivant l'intensité de sa diffusion, les conditions de son absorption, et le milieu organique où il fait élection de domicile. Pepper propose l'expression "Aérotellurisme protéiforme," comme étant, dit-il, le mieux en rapport avec les connaissances actuelles de la science, ne préjugeant ni un symptôme inconstant et même jusqu'à l'origine exclusivement marécageuse ou alluvionnique, ni le caractère essentiellement variable de ce symptôme, et conservant une sage prudence sur la nature, le rôle exclusif, spécifique ou prépondérant d'un micro-organisme ou des micro-organismes, incriminés dans une question aussi complexe de genese et d'étiologie.

Pourquoi les effets terribles de l'impaludisme se sont-ils prolongés avec ce caractère à Orizaba? Premièrement, parce que notre sol vierge était constitué par les détritus d'une foule de générations de végétaux très riches en conditions propres à produire en grand le miasme palustre. En suite, parce que nous avons les meilleures conditions de culture de micro-organismes, marais, chaleur, humidité, etc.; et finalement, parce que pendant les huit ans qu'a duré l'endémie faisant ses ravages nous étions en pleine guerre civile, la ville a été constamment fortifiée, on faisait de fréquents remuements de terre, les fosses étaient remplies d'eaux chargées de matières organiques en complète décomposition; et comme complément l'affaiblissement de notre race par l'ivrognerie et autres vices également spoliateurs. A part cela, il ne faut jamais oublier que la génération, qui se trouve aujourd'hui dans toute la plénitude de la vie, a eu pour générateurs des gens qui ont vécu à une époque où le paludisme se trouvait dans toute sa force, et que beaucoup d'eux, étant cachectiques, ne devaient point se trouver dans les meilleures conditions pour engendrer une progéniture saine, robuste et vigoureuse.

Les ravages du tellurisme à Orizaba ont été réduits à leur expression minime, parce que les marais, que nous pouvons pas appeler les "générateurs," mais bien "les conservateurs," du miasme tellurique, ont été restreints dans des limites plus étroites par les barrières que leur imposent la civilisation et la densité de la population. L'homme dispute chez nous, comme partout ailleurs, sa vie, ses forces et sa fécondité aux influences paludéennes. Les cultures aussi ont beaucoup contribué à cette amélioration. Les cultures chassent la malaria d'un pays, dit Laveran. Les arbres et les plantes, dit le même auteur, assainissent le sol en le drainant et en le desséchant bien plus tôt qu'en mettant en œuvre sa puissance végétative, et les cultures ont été très étendues dans la vallée d'Orizaba; mais ce ne sont pas là les seules et principales raisons, et il est juste aussi de reconnaitre qu'à cet heureux résultat ont également contribué les habitudes nouvelles qui, peu à peu, s'introduissent chez nous, l'amélioration du logement et de la nourriture, les vêtements meilleurs, l'instruction plus répandue, moins de routine et de sots préjugés . . . Les paysans, réfractaires avant à la quinine, la gardent aujourd'hui parmi leurs meilleurs médicaments et la prennent ou la donnent aux leurs aussitôt qu'ils se croyent envahis par l'aérotellurisme protéiforme.

Relativement au traitement que nous suivons dans le cas de formes aiguës d'intoxication tellurique j'aurai peu de chose à dire. Quand nous pouvons compter sur l'absorption par les voies digestives, et que nous ne sommes pas pressés par l'acuité des symptômes ou par quelqu'accident insolite, de ceux qui donnent de la gravité à la maladie, et mettent en danger la vie du malade après un purgatif ou un vomi-purgatif si l'état saburral de l'estomac l'exige, nous administrons le remède héroïque par excellence, la quinine. Dans les formes continues, deux ou trois grammes dans la journée associée à l'antipyrine, jusqu'à faire descendre la température; et quand la fièvre prend la forme intermittent, alors nous soutenons l'action de la quinine en l'administrant le plus possible avant l'heure périodique des accès. Dans les formes graves solitaires ou comitées on court un grand risque en ne profitant pas la rapide et sûre absorption par la voie subcutanée. Au commencement, comme je l'ai dit ci-dessus, nous employions le bi-sulphate de quinine additionné de l'acide tartrique, pour mieux la faire dissoudre, et nous faisions les injections dans la peau du dos ou des bras.

Ces injections étaient très douloureuses et déterminaient souvent des abcès et des eschares. Quand nous avons eu le bromhydrate acide de quinine, nous le préférions comme étant plus soluble, moins douloureux et apportant moins d'accidents locaux; mais pour réussir il fallait augmenter la dose d'un 50 pour cent. Aujourd'hui nous donnons la préférence au bi-chlorhydrate ou au chlorhydro-sulphate, très soluble et très riche en quinine. Nous faisons les piqûres dans les fesses, en introduisant profondément l'aiguille dans ces régions très riches en tissus cellulaires sous-cutanés, prenant bien garde à ce que la solution soit bien claire, tiède et qu'elle ne tienne jamais rien en suspension, ayant aussi le soin de bien nettoyer et désinfecter l'aiguille avant de s'en servir. Avec ces précautions les accidents deviennent très rares.

J'ajouterai un mot sur la manière de traiter les formes éclamptiques des maladies chez les enfants, qui nous a toujours donné des résultats splendides. Ces formes, accompagnées de grandes hyperthermies, et parfois rapidement mortelles, réclament des secours soudains que nous faisons connaitre de suite aux familles. Aussitôt que possible, plonger le petit malade dans un bain tiède (30 à 35° centigrades), affusions d'eau froide à la tête. Si les convulsions ne cessent pas, faire prendre des inhalations de chloroforme, appliquer des injections de quinine à doses proportionnés à l'âge du malade.

Quand nous sommes sûrs de l'absorption et de la pureté du sel quinique employé, et nous observons que la fièvre se montre rebelle malgré l'application de 5 ou 6 bonnes doses, nous trouvons de l'avantage à ne plus insister sur l'administration du spécifique; nous laissons la quinine de côté, et la fièvre ne revient plus.

Nous savons assez que beaucoup de personnes présentent de véritables idiosyncrasies à l'égard de la quinine, et que la moindre dose de ce médicament leur cause de pénibles urticaires et eczémas très aiguës et de grande durée, et quelque fois des accidents de plus grande importance. Eh bien, chez ces mêmes personnes la quinine en injections hypodermiques ne produit pas la moindre de ces manifestations-là.

Comme prophylactique pour les personnes qui vivent dans des lieux palustres, ainsi que pour éviter les rechutes ou récidives, l'hydrothérapie et l'acide arsénieux m'ont toujours donné les meilleurs résultats; et pour les malades très anémiques qui ne pouvaient pas quitter les lieux malsains je n'ai eu qu'à me louer de l'emploi de l'excellente formule suivante, recommandée par le professeur Baccelli, de Rome:

Tartrate double de terre et potasse	grammes..	12
Acide arsénieux	centigrammes..	10
Bi-sulphate de quinine	grammes..	2

Pour faire cent pilules, à prendre de huit à dix dans la journée au besoin. Avec l'usage de ces pilules, aidées de l'hydrothérapie, j'ai vu disparaître en peu de temps, et comme par enchantement, l'anémie, la bouffissure du visage et des extrémités, le teint blême, quelques fois livide, les grosses viscères, rate et foie, la faiblesse générale, la perte de l'appétit et de l'énergie vit ale, et, en un mot, tous les symptômes qui caractérisent l'intoxication chronique.

Au sujet des formes combinées, anciennes, proportionnées ou compliquées du paludisme, je veux m'occuper seulement du typho-malarien et de la typhoïde malarienne. Je tiens à faire cette distinction des formes parce que en effet ce sont deux choses entièrement différents.

Sous le nomme du typho-malarien j'ai toujours vu décrire le mélange du paludisme avec la fièvre typhoïde, et c'est pourquoi il me semble que cette dénomination induit en erreur, et comme le paludisme complique souvent l'une et l'autre des dites fièvres et forme des entités morbides parfaitement caractérisées, il m'a paru convenable de désigner chacune d'elles par un nom qui rapelle la combinaison dont il est question, réservant le nom de typho-malarien au typho-exanthématique associé au paludisme, et celui de typhoïde malarienne à la fièvre typhoïde compliquée du paludisme. Mais avant tout je vais dire quelques mots sur la modalité de ces grandes pyrexies dans la vallée d'Orizaba.

J'ai entendu dire par mes anciens collègues qui exercent la profession médicale à Orizaba depuis longtemps, qu'ils ont vu de temps à autre le typhus exanthématique se présenter plus souvent que la fièvre typhoïde, mais n'ayant jamais les allures endémiques et encore moins les épidémiques. J'habite Orizaba comme médecin depuis deux ans après l'éclosion des formes graves du tellurisme dans la vallée en 1867. Depuis cette époque je me suis souvent trouvé en présence de ces formes qui caractérisent si bien ces deux pyrexies, mais c'était toujours dans de cas isolés qu'elles apparaissaient accidentellement dans l'évolution saisonnière de la chaleur sans acquérir droit de domicile et ne jouant que le rôle d'épisode ou d'incident passager.

Quand dans les contrées du plateau central. et surtout dans la capitale du Mexique, une de ces terribles épidémies de typhus éclatait et faisait tant de ravages parmi la population, nous avons eu à Orizaba des cas isolés, quelques fois très graves, mortels, qui se présentaient comme d'origine spontanée, génération *a novo*, comme Murchison appelle cette origine indépendante du typhus, mais sans les conditions que demande cette espèce de génération, telles que l'accumulation d'individus en état de grande malpropreté et de défaut ou manque d'aération pour ces individus agglomérés et sans pouvoir attribuer non plus la génération du poison aux émanations concentrées d'êtres humains sales de corps et porteurs de vêtements malpropres. Comme les idées contemporaines s'accordent très mal avec cette hypothèse de génération *a novo*, et qu'il est deficile de comprendre, selon ces idées, comment le germe du typhus peut se créer de toutes pièces, il faut donc croire de deux choses l'une: ou que l'on a méconnu l'apport primitif, ou que nous ne savons encore que très peu de choses concernant l'agent pathologène du typhus, et par conséquent sur sa manière de naitre et de se propager. A Orizaba le typhus revêt certains caractères très spéciaux qui méritent d'être connus. Depuis huit ans cette maladie nous fait ses visites sous la forme endémique. Elle n'est contagieuse à aucun dégré, ni par le contact direct du malade, ni par celui des objets qu'il a souillés; pour le reste elle se comporte dans ces manifestations cliniques entièrement d'accord avec les descriptions fidèles que nous devons aux travaux de Perry, Gerhard, Lombard, Valleix et Rochoux, Barlow et Stewart qui établissent si bien l'autonomie de cette fièvre.

J'ai dit qu'avant les huit dernières années les cas de typhus étaient rares et n'apparaissaient pas sous la forme endémique. Le cas de cette nature n'eûrent lieu qu'après la construction des premiers égouts, dont j'ai parlé plus haut, lesquels ne remplissent pas les conditions que l'hygiène moderne réclame. Depuis une huitaine ou une dizaine d'années la population de la ville d'Orizaba est devenue plus dense, plus encombrée. Cette augmentation s'est produite surtout depuis la venue d'un grand nombre de personnes descendues du plateau central pour travailler aux fabriques de tissus qui ont été établies récemment aux environs de la ville; et comme en général ces ouvriers sont des gens malpropres, on commence déjà à noter dans quelques endroits populeux, tels que les maisons citées, cette odeur fétide spéciale que l'on sent dans ces bouges qui abondent à Puebla et à Mexico.

"On peut faire naître le typhus à volonté. On n'a pas besoin de l'apport primitif du germe typhique pour le développement épidémique du typhus," dit Murchison. Je ne sais pas jusqu'à quel point cette assertion pourrait être vraie; mais s'il est difficile de trouver la cause première, si elle nous échappe encore, il est tout à fait hors de doute que les plus sérieuses épidémies éclatent où il y a agglomération, et avec le manque d'aération, c'est un des plus énergiques moyens de diffusion. Il est bien prouvé aussi que la misère exerce une influence manifeste sur la prédisposition au typhus. C'est pour cela qu'il a été surnommé "la maladie des faméliques et des misérables."

Il y a de huit à dix ans que nous avons à Orizaba les égouts et de l'encombrement. Nous n'avons pas encore la misère, quoique nous ayons déjà la gêne; mais elle viendra plus tard, comme l'apanage de toutes les villes industrielles.

Or, nous avons les causes de la génération, quoiqu'elle nous soit inconnue, et les plus énergiques moyens de diffusion; donc il est vrai que nous avons aussi les foyers de l'endémie. Jusqu'à présent les cas qui se sont présentés ont été isolés, clairsemés dans la ville, mais ils se sont produits dans les maisons qui se trouvent dans le voisinage des égouts et quoique elles soient habitées par des gens de la classe élevé, la maladie n'a pas moins fait payer un tribut sensible aux habitants. Dans cette classe, comme dans l'autre, je n'ai jamais observé que la propagation eût en lieu par contagion.

C'est pendant l'année dernière seulement que j'ai pu remarquer quatre cas qui se sont présentés dans l'intervalle de trois mois, chez des personnes aisés, et je suis encore à me demander si les habitants de cette maison ont été empoisonnés par le même foyer d'infection, ou s'ils se sont communiqués la maladie par contagion. Il s'agissait de la famille d'un des riches épiciers de la ville, dont le magasin, les entrepôts et les caves malpropres sont dans le même bâtiment où se trouvent aussi les apartements; et dans la rue, devant la maison, tout près aussi des logements, il y a un de ces égouts infectes où viennent aboutir traversant la cour, les immondices de la cuisine, de la basse-cour et des latrines, malproprement entretennes. Eh bien, il s'est produit un fait de plus curieux: les personnes qui administraient les soins aux malades, et celles qui étaient en contact immédiat avec elles, furent précisément celles que la maladie épargna, ce qui prouve évidemment l'absence de toute probabilité de l'existence de la contagion. Il arrive de même avec les malades qui viennent à Orizaba attaqués du typhus, provenant de Mexico, de Puebla, de Guanajuato et de tant d'autres villes de l'intérieur du pays où cette maladie règne sous des formes épidémiques plus franches.

Moi-même j'ai pris le typhus dans la capitale en 1883. J'ai attrapé une des formes les plus graves. Aussitôt que je me sentis malade, je me fis transporter à Orizaba, pour m'y faire soigner au soin de ma famille. Je fus en grand danger. J'échappais miraculeusement. Il est vrai que l'on prit les plus grandes précautions de propreté et de ventilation; mais aucune de personnes qui m'entouraient ne ressentirent absolument aucun mal, ni la maladie non plus ne fut transportée dans d'autres maisons, malgré les visites réitérées que je recevais de mes nombreux amis et de mes clients.

Un de mes collegues qui me soignait tomba malade; il eut une fièvre que l'on disait avoir été prise par contagion. Il n'en fut rien. La fièvre était tout simplement une rémittente paludéenne très bien caractérisée.

Ces traits nous disent assez éloquemment, que le typhus exanthématique se diffuse ordinairement avec une grande rapidité, quand il trouve de conditions à propos pour faire repulluler ses germes quels qu'ils soient; mais si, comme on le dit, il était si contagieux, on ne pourrait point s'expliquer les cas que nous observons à Orizaba.

La scarlatine, la grippe, la rougeole, la variole et la coqueluche, par exemple, à peine nous arrive-t-il un malade de Véra Cruz, de Mexico, de Puebla, etc., atteint d'une de ces maladies-là qu'elle se propage immédiatement [malgré les meilleures précautions que l'on prend pour isoler les premiers attaqués, comme dans le cas de maladies nettement contagieuses.

Lorsque nous avions le paludisme à Orizaba sous des formes très aiguës, j'ai pu observer les cas les mieux accentuées de cette forme combinée que j'appelle le "typhus malarien," et alors j'ai pu apprécier aussi l'influence pernicieuse que le miasme tellurique exerce sur la marche et sur la gravité du typhus exanthématique.

Si le typhus attaquait les cachectiques, ceux-ci succombaient presque irrémissiblement, les forces de leur organisme étant trop affaiblies pour pouvoir lutter victorieusement contre un enemi semblable.

Quand le poison tellurique opérait sa première invasion, en même temps que le germe typhique, on sentait de suite son influence par l'aggravation subite.

On craignait que les malades mourissent dans la période prééruptive et quelques uns succombaient en effet, telle était l'hyperthermie, 42° et parfois 42½° au soir, telle était l'action foudroyante exercée sur le système nerveux, telle était l'entrave opposée aux procédés ordinaires de défense de l'organisme par la présence dans le sang des toxines élaborées par l'infection paludéenne; le délire, l'excitation bruyante jaillissait bientôt, du quatrième au cinquième jour, remplacée peu après par le coma; les douleurs dans les membres et la rachyalgie étaient épouvantables. L'éruption se présentait aussitôt après le cinquième ou sixième jour abondante, de couleur tres foncée et prenait rapidement la teinte purpurique, c'étaient de véritables taches échymotiques; le foie et la rate surtout, extraordinairement agrandis; de copieuses et indomptables épistaxis et entérorhagies se présentaient souvent, l'urine était chargée d'albumine . . . Et quand l'intervention de l'art avec la quinine se faisait sentir, ou quand l'organisme vaillant résistait à cette double et formidable attaque, quelle convalescence si pénible! Point de ces passages rapides des symptômes des plus défavorables aux symptômes de bon augure, qui caractérisent le typhus simple. . . . quelle destruction de l'organisme! . . . Quelle séquelle longue et fâcheuse. . . .

Ce fut alors que j'ai pu trouver les spécimens les mieux accentuées d'aphasies, d'hémiplégies, de monoplégies faciales, de toute sorte de paralysies localisées temporaires, il est vrai, mais pas moins pénibles et trainantes. Quelles cachexies si plaines d'entraves et si difficiles à dompter après la profonde atteinte soufferte par l'organisme par ce redoutable mélange de ces deux germes infectieux!

Par bonheur à mesure que le miasme urbain prend droit de domicile à Orizaba, le tellurisme perd graduellement sa force, se replie à la campagne et redevient rural comme ci-devant, et maintenant, comme il arrive du reste avec toutes les autres maladies, à peine si le typhus prend les allures que lui imprime notre constitution médicale.

Aujourd'hui le typhus commence par une fièvre intermittente qui devient continue, avec l'intervention de la quinine, et, parfois, aussi sans elle. Le typhus suit alors son évolution naturelle bénin ou grave, selon le terrain, selon le milieu où il se développe et selon la virulence du germe. Quand le processus typhique est terminé on se rappelle qu'il était associé au paludisme par l'intermittence qui revient, mais doucement, et qui cesse avec facilité au traitement spécifique, ou parfois avec la restoration des forces seulement. A cette heure nous pouvons dire que le tellurisme sert d'avant-garde, d'escorte et d'arrière-garde au typhus, mais sans l'aggraver beaucoup, parce qu'il est domptable, et ceci prouve sa bénignité.

Comme on le voit par le tableau que je viens de tracer, dans les cas très graves les accidents sont mixtes, mais dominant dans la première période ceux qui sont dus au tellurisme.

Dans la deuxième période, quand l'organisme seul, ou aidé par la médication spécifique, arrive à triompher, alors ce sont les symptômes typhiques qui prédominent, mais notablement aggravés par l'extrême faiblesse du malade, par sa résistance notoirement diminuée à la suite de l'empoisonnement paludéen.

A la fin, dans la convalescence, il semble que le prétendu "parasite du typhus" laisse de nouveau le champ libre au microbe de Laveran, qui était comme assoupi et qui se réveille, prenant prise sur un corps en ruine, sensible et délicat, lui causant de grands dégâts dus plutôt qu'à la vitalité du microbe à la faiblesse de résistance et d'énergie du pauvre organisme, où le terrain est plus apte à la végétation et où le phagocytisme est mourant et n'existe presque plus.

Nous devons nos meilleurs triomphes aux opportunes injections hypodermiques de quinine, comme s'il s'agissait d'une forme pernicieuse maligne associée, ou suivie, d'un traitement symptomatique du typhus qu'est si bien connue.

Mais je dois faire mention spéciale des injections d'arséniate de quinine, que j'ai pour habitude d'appliquer journellement depuis le commencement à la dose de 3 à 4 milligrammes distribués dans la journée, avec les meilleurs résultats. On voit palpablement l'organisme se refaire sous l'action de ce médicament. Sans doute les cellules se trouvent plus aptes à combattre le virus, plus aptes à supporter le double empoisonnement, et comme protégées contre les nouvelles sources d'infection et d'intoxication qui prennent leur naissance dans les auto-infections qui occasionnent les fermentations anormales des intestins.

Comme la fièvre typhoïde se présente très rarement dans la vallée d'Orizaba, je ne puis dire grand chose tant sur les modalités que la localité lui imprime, que sur l'influence qu'exerce sur elle le poison tellurique, donnant naissance à cette infection combinée qui résulte du développement simultané de deux germes chez le même individu. Cette association morbide, si bien étudiée par Laveran parmi les troupes françaises en Algérie, et aussi par M. Woodward au sujet des armées opérant dans la vallée du Mississipi pendant la guerre de "sécession," à reçu le nom de "typho-malarien," que j'ai voulu changer pour celui de "typhoïde malarienne," pour éviter les confusions.

Dans les cas types que j'ai pu observer de la typhoïde malarienne, le rôle principal dans l'association, dans la première période appartenait presque toujours au paludisme, modifiant ou aggravant la marche du processus typhoïde, se dérobant après pour reparaitre à la terminaison de la dothienenterie qui se faisait souvent par des crises.

Au commencement, comme dans le typhus malarien, il était fort difficile de diagnostiquer la forme typhoïde. Elle commençait comme une véritable fièvre intermittente à types quotidienne ou double-tierce, dont les accès se modifiaient, mais ne disparaissaient pas, sous l'action de la quinine; moins forts, mais de plus longue durée, les accès devenaient subintrant, et à la fin la fièvre se faisait continue; mais en pleine continuité, en plein cortège, des symptômes typhoïdes, l'intoxication palustre se traduisait sans cesse par les allures irrégulières de la fièvre, les rémissions brusques qui se faisaient extraordinairement le soir, les gonflements très douloureux de la rate et la profusion de sueurs qui amenaient le pauvre malade jusqu'au collapsus.

Comme on devait l'attendre, la perniciensité dans les cas graves prenait rarement la forme solitaire, résultant de l'ensemble des troubles morbides; presque toujours elle était comitée: c'est à dire, qu'un des phénomènes morbides prédominait. Dans la première période c'était ceux du paludisme, et dans la deuxième et troisième période ceux de la fièvre typhoïde. Dans la première période l'hyperthermie, les sueurs profuses, le délire et le coma constituaient le danger; de la deuxième en avant, la diarrhée, les hémorrhagies de tout genre, et les perforations intestinales étaient à craindre.

La convalescence de la typhoïde malarienne, étant plus longue que celle du typhus malarien, mais à mon avis moins pénible et moins grave, malgré la durée de la fièvre qui se prolongeait pendant vingt-huit jours, et même plus. Un des phénomènes très curieux que j'ai observé fréquemment dans la typhoïde malarienne c'est le ralentissement du pouls, malgré les températures élevées, 40° et 41°, il n'était pas rare de ne compter que 70 à 80 pulsations. Ces cas étaient habituellement fort graves. Les taches rosées, l'éruption péculière de la fièvre typhoïde, quoique très fugaces dans quelques cas, nce manquait jamais dans la typhoïde malarienne, et apparaissaient souvent à la fin du premier septénaire. Comme complication fréquente de la typhoïde malarienne, j'ai vu la myocardite infectueuse, se manifestant par sa série d'accidents connus depuis les simples modifications dans le bruit et le rhythme du cœur jusqu'au collapsus algide mortel; et comme infection secondaire, j'ai vu la typhoïde malarienne être suivie de l'infection purulente, et chez les enfants de la gangrène de la bouche.

La fièvre typhoïde n'a jamais revêtu chez nous ni la forme endémique ni l'épidémique; et quand par hasard elle s'est présentée dans ces derniers temps à Orizaba, combinée du paludisme, celui-ci la masque et la modifie, mais ne l'aggrave pas extraordinairement, comme dans les années où nous avons eu l'impaludisme aiguë. Comme on le conçoit et le savent très bien, les médecins qui exercent leur profession dans les climats comme celui d'Orizaba, entre les formes les plus simples et les plus graves de la typhoïde malarienne, sont comprises toutes les intermédiaires, toutes les graduations que peuvent déterminer la plus grande ou la plus faible virulence des germes mêlés, la saison où elles se présentent et l'idiosyncrasie, la vigueur, la résistance, et mille autres conditions de l'individu chez qui elles se développent.

Décrire chacune de ces formes serait une tâche impossible et peut-être sans objet, dans un ouvrage comme celui-ci.

Dans le traitement de la typhoïde malarienne j'ai suivi la ligne de conduite exprimée à propos du typho-malarien, et dans les deux formes combinées j'ai toujours obtenu d'excellents résultats de l'hydrothérapie tiède (méthode Bouchard), moyen précieux pour faire perdre du calorique au malade, sans chocs nerveux, sans spasmes des vaisseaux cutanés.

Voilà l'histoire du paludisme et ses combinaisons avec la fièvre typhoïde et le typhus dans la vallée d'Orizaba, que je voulu faire à grands traits, avec la crainte toutefois d'avoir dépassé les limites que ce genre de travaux impose.

Je répète que je n'ai pas la prétention d'avoir dit quelque chose de nouveau, mais je crois que les faits que j'ai rapportés, rigoureusement constatés, peuvent être de quelque importance, ne serait-ce que pour aider à tracer la carte de la malaria et ses formes. J'ose espérer que l'on ne trouvera pas tout à fait inutile ce travail que j'ai pris plaisir à exécuter dans le but de prendre part à l'œuvre éminente que les congrès de ce genre ont entreprit, et de correspondre ainsi à la confiance que m'a accordée le gouvernement de l'État de Véra-Cruz (Mexique) en m'honorant de sa représentation au 1er Congrès Médical Pan-Américain, siégeant à Washington en 1893.

ARE THE CASES OF FEVER WITH EXCESSIVE SWEATING OBSERVED AND DESCRIBED OF LATE A MANIFESTATION OF INFLUENZAL POISON, AND ARE THEY IDENTICAL WITH THE "SWEATING SICKNESS," THE "PICARDY SWEAT," CARDIAC SICKNESS, AND MILIARY FEVER, AS DESCRIBED BY ANCIENT WRITERS AND HECKER IN HIS "EPIDEMICS OF THE MIDDLE AGES?"

By ROLAND G. CURTIN, M. D., and EDWARD W. WATSON, M. D.

The question of the identity with influenza of the cases of excessive sweating seen frequently in the last four years is scarcely open to dispute, since in the cases observed either the initial symptoms were those of influenza or the sweating was evidently a sequel to a well-marked influenzal attack. All influenza, as a rule, was marked by relaxation of the skin, after the initial period and the subsidence of the earlier symptoms; and this often continued in a mild form (sweating on slight exertion, sweating when in bed and on slight exposure to cold) for days and weeks. But the cases directly under consideration were marked by such excessive relaxation, and so entirely different from any previously observed in any other disease (except possibly in rare cases of convalescence from malarial and rheumatic disease, from which they differed in the odor of the perspiration), that they could not but strike the observer as unique. (We might add that, since the epidemic, sweating in phthisis and in other diseases, has been much aggravated.) This may be explained by a combination of the general catarrhal conditions, a hydrorrhœa of the skin, or what might be termed, for the want of a better name, a cutaneous catarrh of the sudoriforous glands.

In the early epidemic of 1889-'90, a number of cases were observed in which there was this tendency to a remarkable degree, continuing for weeks without emaciation or exhaustion, or induced anæmia. These cases often perspired to such an extent that in cold rooms they seemed enveloped in steam, and at times as they were observed in bed the ear which was uppermost and the corresponding hollow of the cheek were full of water. At times the sweat moistened the mattress, and from below upward the moisture would outline the form of the patient on the coverlid.

In one case this condition lasted one week, in another four weeks, in another three months, in others five months, and in two six months, and one case affected a year ago, even now on slight exposure to cold continues to sweat profusely.

Many practitioners alluded in conversation, or in periodical medical literature, to similar cases. One writer in the South reporting an epidemic in his locality, of what he termed a "sweating fever," and in the communication referred to asked information as to its nature. From the description given it was evidently something more than ordinary epidemic influenza, or simple catarrhal fever as usually observed, but resembled closely some of the cases seen by the writers in the past four years. Our cases generally began with an attack of influenza or had some of the complications and sequallæ of influenza, viz, the pulmonary or cardiac symptoms (angina pectoris, pericarditis, and heart failure), or affections of the peripheral nerves of one or both arms, rheumatoid pains, meningitis, neuritic diarrhea and other catarrhal affections, and insomnia. With this profuse sweating the temperature night and day was generally near the normal, often either merely a little above or below.

It is easy to understand from what we have seen of influenza, that in different periods of an epidemic, different structures may be predominantly affected, viz, an epidemic of influenza in which cardiac symptoms predominate might under depletion and the unwise use of depressants come to resemble the so-called "cardiac disease" of ancient times; or where the vasomotor nerves especially suffered under like improper management, overheating, excessive covering, and the abuse of diaphoretics, a genuine "sweating sickness" might be produced; or the extreme sweating producing copious miliary eruption, we might with justice call it the miliary "fever." In fact the recent epidemic has by turns exhibited the characteristics of the various disorders described and preserved to us in the writings of several ancient observers, and it may prove of some value to contrast them with those extant observations.

The following shows what symptoms and conditions were common to all the above-mentioned diseases. They were all: Epidemic; sudden in onset; commenced with chilliness or rigor; accompanied by more or less intense headache and fever; the strong were attacked rather than the weak, the comfortable classes rather than the extreme poor; all were attended by sweat of unpleasant or fetid odor; occasional varied hemorrhages in all; vomiting or purging at times in all; meningeal and other nervous symptoms; nervous prostration and prickling pains; sudden paralysis, heart excitation, heart failure, pericarditis; rheumatic pains—gouty symptoms; all were infectious or contagious; all had catarrhal symptoms, and sudamma or other eruptions; milliaria rubra or milliaria papulosa; in all the atmospheric conditions favoring spread of the disorder were fogs and humid atmosphere; stimulants were in all beneficial; excessive secretion of urine and sweating came together; all were alike sensitive to colds and drafts; checked perspiration caused diarrhoea; relapses were frequent.

Mortality light in acute influenza, heavy in all others (this can be somewhat accounted for by modern therapeutics and hygiene), and much in this respect depends upon the peculiarity of the epidemic.

The sequellæ in all very similar; the general constitution was shaken—dropsy, consumption, heart failure, low fevers or forms of fever followed, and insanity and suicide were frequent.

A brief study of the foregoing will show how very analogous, to say the least, were all these diseases. Certain marked peculiarities not found in other diseases generally were common to all. The most marked is sweating, so that from the descriptions which have come down to us one could see little reason why the name of "sweating sickness" might not have been applied to many of them (at least in some of their extreme and varied manifestations). The group of nervous symptoms common to all is very striking and peculiar. These diseases seem to have been all recognized as contagious or infectious, and occurred as epidemics and often seemed to supplant (follow or succeed) one another rapidly. The rheumatoid and gouty symptoms, the heart complications, while in some more prominent, existed in all. The description of the cardiac disease might be applied line for line to some of the severer cardiac influenzal cases recently met with, and at times associated with these was associated profuse sweating, as profuse and overwhelming as that described in the "sweating sickness" of antiquity, lacking only its extreme malignancy.

The sequallæ also seem to closely resemble each other in all, and the atmospheric conditions—fogs and rain, and a warm moist wet state of weather seem to have in all been exciting causes.

We are almost forced to the conclusion that if not identically the same, these diseases belong to the same group or family, and are intimately correlated. They seem to have preceded, replaced, or followed each other in close succession through quite an extended period or prevailed in different countries almost simultaneously, at times seeming to be conveyed by contagion or infection. Of their real origin we have no more accurate knowledge to-day than our forefathers had, but it seems a reasonable and probable deduction that there exists almost constantly in the world a form of influenza (generally transient and mild) known to us as the cold we take under various atmospheric causes, which under vicious atmospheric conditions and climatic variations is capable of developing in one or another direction—and so into the various forms which we have been considering. If not the same in origin, when once their microbic cause is really isolated and identified beyond a doubt, it will in all probability be found to be but varying forms and outgrowths of the same germ, or that varying germs exist (as in other cases is already recognized) of similar influences, causing these different diseases which may be considered as but malignant varieties of that influenza with which the world is at present so unpleasantly familiar.

A CONTRIBUTION TO THE CLINICAL STUDY OF PROLONGED REMITTENT FEVER.

By DAVID LOBO, M. D., Caracas, Venezuela.

It is my purpose to describe, under this heading, a certain form of malarial infection which, I believe, has not sufficiently attracted the attention of standard writers on tropical diseases. This description, the material for which I will borrow from clinical observation exclusively, refers to all the different conditions of individual life, and is intended to import my personal views in regard to the malady, as it is wont to occur in the capital city of Venezuela.

ETIOLOGY.

So far as my own experience shows, conjointly with the information obtained from prominent members of the profession, the normal type of malarial fever, the intermittent form, is rarely met with in the city of Caracas. Its presence, when noticed, can nearly always be traced to an original infection at some of the genuine sources of the disease, either on the banks of the Orinoco River and Lake Valencia, or over the plains of Guarico.

I have seen many a patient with pale yellowish skin, enlarged liver and gigantic spleen, that have entirely recovered at Caracas, under the combined action of arsenic, small doses of quinine, and proper diet; while, on the other hand, a thorough and close examination will seldom, if ever, succeed in detecting any marked congestion of the above-mentioned organs, in the majority of cases primarily developing within the bounds of the city. Acute catarrhal hyperæmia of the liver is apt to occur occasionally, but then it must be regarded as a special complication, requiring immediate attention on account of its injurious influence on the course of the fever.

In such cases, in fact, hepatic congestion is merely a complication, not a necessary sequela, not even a general sign of malarial poisoning, for the gland is affected in the same manner with other viscera of the body, and by the same powerful cause under which the whole system is laboring. So this special condition of the liver and spleen, which, as a rule, is always present in regular malaria, will never be found as a characteristic manifestation in any one case of the fever now under consideration, be it of short or protracted duration, mild or grave; nor is there, besides, any constant similarity between the ordinary general symptoms corresponding to the two varieties of disease.

The wide clinical difference existing between them which, in numerous instances, is strikingly confirmed by the inefficiency of the specific treatment appears to be indicative either of some peculiar systematic condition of the patient or of certain uncommon changes in the constituents and quality of the pathogenic germ. That we can safely disregard the former cause and acknowledge the probable existence of the latter is proved, however, by the facts that true intermittent fever is unfrequent at Caracas, and that persons from this city easily acquire it in other regions of the country.

The aspect and extraordinary course of the Caracas fever may be due to corresponding variations in the power and quality of Laveran's corpuscles, to overpoisoning of the blood, or perhaps to some distinct element operating simultaneously with the paludal germ. For as there are recognized alterations in the number, morphology, and mode of development of these minute organisms seemingly connected with the tertian, quartan, and irregular types, so there is no reason whatever why similar conditions should not be admitted as productive of the fever now to be described.

The subject involves so many important questions that I do not hesitate in commending it to the attention of my distinguished colleagues here assembled and of the profession in general.

I will lay aside the mild forms of remittent fever, the pernicious and other manifestations where one or more of the ordinary stages are always present, and consider, in particular, that variety to which the name of prolonged remittent fever may be properly assigned. This, as the term implies, is distinguished from all others by its long duration, extending through a period of from three weeks to three months, and even more occasionally, as it will be shown hereafter.

GENERAL SYMPTOMS.

Temperature.—In no other disease have I ever noticed a more startling course of the bodily heat. Variations in temperature actually take place, but they do not respond to any fixed law of recurrence. Remission occurs either in the early morning, which is frequently the case, or in the evening; sometimes it does not occur at all during a full lapse of twenty-four hours. In many instances the highest termic point is attained at noon or sometime after it, and then the heat gradually drops to an almost normal figure at sunset.

The temperature, again, may remain quite low, not exceeding 37·5 or 38° C., during two, three, or more successive days, thus misleading the practitioner's prudence into untimely avowals; an abrupt rise, however, supervenes, the thermometer promptly marks 40 or 41° C., and the fever resumes its previous course, regardless of treatment. In the case of a patient fifty-two years old, whom I had under my care sometime ago, a complete intermission of the fever suddenly took place two weeks after the outset, and lasted six days without interruption; yet early on the seventh, I found to my surprise, that the temperature had run up to 39·6° C., and that, together with the recurrence of this symptom, several other grave phenomena had made their appearance. The man subsequently sank into coma, and died in thirty-six hours, notwithstanding the vigorous exhibition of drugs to which he was submitted.

It may be stated, summarily, that temperature in long remittent fever generally ranges from 38·5 to 40·5° C., and follows no regular course, although the morning remission is observed in a great number of cases. It may fall to a normal figure, and even considerably lower, and the decrease may either last a few minutes, or be maintained through a number of hours or even days. In the latter case, the disease assumes a deceitful air, against which the physician can not be too earnestly cautioned.

Chills and sweating are likely to occur, but never at definite stages of the fever. Every rise of temperature may or may not be preceded by one or many chills, the duration of which is commonly very short. This unpleasant symptom may be wholly absent. Defervescence is sometimes followed by perspiration, other than that induced by antithermic remedies. No rule whatever can be pronounced in regard to the two preceding phenomena.

SPECIAL SYMPTOMS.

Circulation.—As it is the case in all other fevers, the pulse rate varies in accordance with the quantity of heat developed. The contractile power of the heart naturally becomes impaired as the disease progresses, but the general rule will hold true so long as no complication will intervene. Any divergency arising between pulse and temperature should be looked to and carefully treated, as it is the warning of some serious disturbance of the sympathetic functions.

Respiration.—The same principles set forth in respect to circulation hold good for the respiratory organs. Pulmonary complications, such as paludal pseudo-pneumonia, pleurisy, etc., will be examined hereafter, along with other serious conditions that are apt to endanger the patient's welfare.

Digestion.—The appetite is always entirely lost, or at least very poor. Tongue is generally smooth, clean, and moist. Bowels act well; there are one or two passages every day, and the fæces have their normal appearance and color. Diarrhea of a simple character is sometimes present, at others, constipation may be observed. Intense abdominal pain, meteorism, profuse diarrhea, and obstinate constipation, especially if accompanied by frequent vomiting, reveal the existence of some pathological process located in the digestive tract. Vomiting is apt to occur, but never to a distressing extent. Emesis commonly takes place after the indigestion of food, and is partly ascribable to the marked reluctance with which patients take their nourishment.

Urine.—No changes worth mentioning are ever offered by urine in genuine cases of this pyrexia. The excretion of albumen or blood, except in the so-called *"hæmaturic fever,"* is denied by most writers on malarial diseases, and my experience entirely agrees with theirs. The existence of either substance in urine must be imputed to hyperæmia of the kidneys, not to dyscracy. As to quantity and color, slight variations may occur, which, being common to all fevers, do not call for description in this place.

Liver and spleen.—In regard to these organs, which seldom escape the action of the malarial poison, the reader's attention is referred to the preliminary considerations contained in this paper. But I desire to lay particular stress on the fact that the spleen is seldom, if ever, enlarged or congested in long remittent fever. My own observation fully justifies the assertion, at least from a clinical point of view.

Nervous system.—Headache is not a common symptom, neither is vertigo or giddiness, but insomnia often distresses the patient. Delirium is never present. There is no impairment of sensibility and motility; cerebral and spinal functions do not, in act, exhibit any deviations in uncomplicated cases of remittent fever.

COURSE DURATION.

The fever frequently runs its entire course free from any important derangement of the deep-seated organs. A fatal issue, in such cases, can hardly be attributed to other cause than deteriorating from continued overheating of the body. Occasionally, however, serious disturbances make their appearance, which superadd their destructive action to that of fever, and either jeopardize the patient's life or actually put an end to it. In the majority of cases such complications spring forth unexpectedly, baffling the physician's views, and changing altogether the previous character and prognosis of the disease. They may supervene at any moment, and their gravity depends entirely on the importance of the organ attacked. The condition of the patient should be constantly examined, in order to recognize the slightest signs of mischief and trace them to their real cause and origin.

The temperature may suddenly fall, not to rise again, or it may gradually diminish until the normal figure is reached; both modes are observed, but the latter is decidedly the more common.

As regards duration, the following table will show that remittent fever is not governed by any cyclic law, as typhoid or yellow fever commonly are. Not one among a large number of cases that have come under my observation in city practice has run its full course in less than fifteen or twenty days. This I consider to be the briefest period ever observed, as evidenced by the 21 clinical cases in the table. As to the extreme limit of duration, it may be drawn within an ample space of time, comprised between twenty days and three months; very few cases are protracted beyond this term. In that of a young female, mentioned in the table, the fever lasted ninety-five days and terminated in death, undoubtedly from exhaustion. By comparing the figures, the average duration of the fever can be estimated at thirty-five days.

It is obvious, from the preceding description, that the whole clinical history of the disease may be summed up and condensed into two main and prominent facts, viz, an irregular, fluctuating temperature, and a long, weary career not equaled by that of the most protracted typhoid fever. Day after day close observation will fail to detect any abnormal condition of the viscera. We search in vain; no organic lesion underlies the trouble. And whether the patient die or recover, we must ultimately conclude that there existed no other apparent phenomenon than an undaunted conflagration of the tissues.

Sex.	Age	Duration.	Termination.	Cause of death.	Remarks.
		Days.			
Female....	19	70-75	Recovered..	....	Intense ovarian pain during convalescence.
Do....	12	43-45	....do.......	....	
Male......	9	20-23	....do.......	....	
Do....	4	46-48	....do.......	....	Diarrhea lasting two weeks, accompanied by slight hepatic trouble.
Female....	$1\frac{1}{2}$	28-30	....do.......	....	Cerebral congestion, coma during three days.
Male......	23	65	Death.......	Exhaustion...	Acute liver congestion, diarrhea, rectitis, after the first month.
Do....	9	30	Recovered..	....	Profound debility from the outset.
Female....	12	20-23	....do.......	....	
Male......	42	23-25	....do.......	....	Slight congestion of the liver.
Female....	22	23	....do.......	....	
Do....	18	25-28	....do.......	....	
Male......	55	20	Death.......	Brain lesion..	Pseudo-pneumonia, right side. Six days' truce, simulating recovery. Sudden drawback; cerebral congestion and coma.

Sex.	Age.	Duration.	Termination.	Cause of death.	Remarks.
		Days.			
Male	46	18–20	Recovered		
Female	28	30	....do		Intestinal hemorrhage twice. High temperature.
Do	25	30–35	....do		Twenty days under treatment, after which fever gradually abated without medicine.
Male	14	20–22	....do		
Female	12	95	Death	Exhaustion	Vomiting, diarrhea, absolute anorexia.
Male	9	25–28	Recovered		Diarrhea, rectitis. Profound debility.
Do	28	16–20	....do		
Do	20	52	Death	Peritonitis	Intercurrence of measles. Peritonitis on the fiftieth day.
Female	32	20–22	Recovered		Intense chills. High temperature.

Diagnosis.—There is no considerable difficulty in discriminating prolonged remittent fever from other pyrexias. The difference between this and the other malarial forms lies mainly in its uncommon course, its lack of regularity as regards temperature, the absence of marked stages, and of splenic or hepatic troubles, and the unconquerable resistance it opposes to the action of quinine.

No confusion between it and typhoid fever is possible, as the latter is subjected to a definite thermic cycle, is invariably accompanied by intestinal lesions, and presents certain eruptions which, sudamina excepted, are never found in the former. Typhoid, besides, is extremely rare at Caracas.

With the so called typho-malaria the differential diagnosis can be easily established, if we bear in mind that in regular remittent no typhoid symptoms are ever present, whether abdominal, nervous, or other.

Yellow fever is apt to be, and often is, mistaken for bilious remittent, a disease quite distinct from the one under consideration, but yellow fever runs a rapid career—six to ten days—and exhibits among its symptoms vomiting of black matter and albuminuria, neither of which is ever observed in remittent.

As for pernicious fevers, their duration is generally so brief and their aspect so characteristic, that no particular line of distinction need be drawn to separate them from their congener.

Prognosis.—It may be asserted, as a general rule, that unless the course of the disease be interfered with by complicating or intercurring processes, a fatal issue is seldom to be feared. When death does occur, it is reasonable to ascribe it either to irremediable debility and anæmia, or to degenerative changes wrought in the most vital tissues by the continued hyperthermia to which the system had been subjected. Hence, very high temperature, extreme weakness, frequent vomiting, copious sweating, and diarrhea impart in every case a serious character to the disease, as they denote bad conditions for repair and actually hinder the proper assimilation of food and drugs.

Prognosis is utterly different when we have to deal with organic complications. These are all dangerous occurrences, but not to the same extent. Cerebral disorders rank first, as they bring on a fatal termination almost without exception. Pulmonary congestion is more tractable; its curability greatly depends on the intensity and magnitude of the process. Acute entero-colitis with watery discharges, ulceration of the bowels, peritonitis, I consider almost as serious as cerebral determinations. Congestion of the liver generally yields to proper treatment. Patients previously laboring under chronic conditions, such as tuberculosis, intestinal catarrh, rheumatism, infarction of the liver, etc., are especially liable to complications and the consequences thereof.

Accidental diseases are seldom met with. I have seen the grafting of measles six days after the start of the fever; the exanthema reached full development and presented all its stages. A fatal result took place later on, but it was entirely due to peritonitis. (*See* table.)

Complete recovery should not be declared before absolute certainty has been acquired that the symptoms shall not recur, and that all danger of complication is over. I think prudent reserve during eight or ten days will cover all chances of error.

Complications.—The respiratory organs are those most frequently attacked by the malarial poison during the course of long remittent fever. The lungs become congested, and parenchymatous inflammation is kindled, which, being widely different from ordinary lobar phlegmasies, have been denominated spurious pneumonia. I believe the term "pseudo-pneumonia" is preferable. The process may be accompanied by pleurisy or bronchitis, but the former is unquestionably more apt to occur.

Pseudopneumonia does not exhibit the ordinary stages ruling genuine pneumonia, nor do its signs and symptoms accord with those of the latter disorder. It often happens that auscultation furnishes no evidence of crepitant rales, a fact that may be possibly accounted for by the rapidity with which the fluxion takes place. Tube respiration is generally heard from the very onset of the affection, denoting, as already mentioned, the short time required for the production of hepatization.

The souffle coincides with expiration rather more frequently than with inspiration. Pain is absent in the majority of cases, and when it exists there is but little doubt that the pleura has been involved. Sputa are viscid, scanty, and bloody; rusty expectoration properly is seldom observed. A whole lobe, or only a restricted portion of a lobe, may be affected, but the disease is in most cases confined to one side. The seat is also subject to change. In the space of a few days, or even a few hours, the process may disappear from one lobe to rush upon another, or may entirely release one lung to invade its fellow. Gangrene and suppuration I have never seen. Pseudopneumonia runs its career in six or eight days, and often leads to a fatal termination.

Among nervous complications none is so terrible as cerebral congestion. There are no premonitory signs ushering it, nor any special feature of the fever capable of giving the practitioner a timely warning. The posion abruptly determines to the brain, there to exert its dire action.

The cerebral trouble may assume either a convulsive or a comatose form, the latter being decidedly more common. In this complete relaxation of the body and unconsciousness are prominent symptoms from the beginning. Now and then the patient may be aroused, and even succeeds in answering a few questions, but he gradually resumes his slumber when allowed to rest, until deep coma is settled. Retention of excreta, insensibility of pupils to light, Cheyne-Stokes respiration, and other symptons of ordinary comatose conditions are all present in this most intractable complication.

As to the convulsive form, I am inclined to believe that its production must be mainly ascribed to meningeal congestion. Whether this view is correct or not, however, I can not decide, as only one case of the affection has fallen under my observation. True encephalitis, localized lesions of the brain, and spinal derangements I have never found as complications of remittent fever. The issue is fatal in nine cases out of ten.

Active hepatic congestion is also a possible occurrence, although not necessarily connected with this fever, as previously stated. The condition sometimes gives rise to jaundice, pain, and frequent vomiting, but diarrhea is more likely to ensue as a consequence of the functional trouble of the gland. Abcess must be very rare, since I have never noticed its existence. There is no doubt, however, that it may rise from dysentery or any other infectious condition of the bowel, complicating the disease. Congestion of the liver speedily recedes under proper treatment.

Acute enterocolitis, dysentery, and choleriform diarrhea may be originated by the paludal germ at some moment or other during the normal progress of the fever. The two last mentioned I consider to be the most intractable intestinal complications. None of them assumes a periodic or paroxysmal form, as they are wont to do in ordinary pernicious fever, a distinction that I have already noted in reference to diagnosis. Hemorrhage and acute peritonitis are apt to occur as secondary phenomena subsequently to ulceration of the alimentary duct. Symtoms of peritoneal irritation may be noticed, which, not being due to perforations, must be attributed either to direct agency of the poison or to extension of the inflammatory process beyond the mucous membrane. I have no record, however, of peritonitis having interfered with the fever without a previous serious lesion of the intestine.

The kidneys generally undergo no injury at all. In normal remittent fever urine is never albuminous. Hematuria appertains to pernicious malaria, a special variety of which has been described under the name of hematuric malarial fever. None of my patients ever passed bloody urine.

Treatment.—I have already mentioned the fact that this variety of remittent fever does not respond to the action of quinine so speedily as other forms of malaria generally do. There are cases, not few in number, where the exhibition of the drug is absolutely useless, as it will neither abridge the duration of the disease nor modify its character. I have prescribed 2, 3, and even more grams of quinine per diem without deriving any benefit whatever from so liberal a therapeutic measure. Far from this, irritation of the stomach, vomiting, diarrhea, depression of the heart, and collapse are apt to follow a long-continued administration of the remedy or the ingestion of considerable doses at a time. I am quite confident that 1½ grams, divided into three equal portions, to be given at separate intervals, will answer the purpose without producing any unpleasant effect. But if there be no evidence of improvement after a period of ten or fifteen days the quantity should be restricted to a single half-gram dose in the morning, thus allowing room for the administration of other agents. The view assumed by some practitioners that full doses of quinine will prevent complications is merely hypothetic, as no clinical facts can be produced to its support. Quinine may be given subcutaneously where obstinate vomiting is present or in cases of extreme gravity.

Aconite, arsenic, and carbolic acid may be resorted to whenever there is a tendency to protraction. Aconite is rather a sedative, operating indirectly upon temperature, than an agent capable of subduing the fever. I rely very little upon it. Arsenic seems to be a good remedy, but it has proved entirely inefficient in a large number of cases. The same may be stated of carbolic acid, whether alone or combined with the tincture of iodine, according to Bartholow's formula.

Warburg's fever tincture, a tonic febrifuge containing quinine, has been of great service in some of my cases, yet in others it has proved valueless.

Salicylate of sodium, antipirine, antifebrine, and similar agents are employed to diminish temperature, and thus provide a favorable opportunity for the administration of quinine. Their effects should be carefully watched, as hypothermia, depression, and collapse may follow their use.

Tonics should be ordered *larga manu.* Nux vomica, cinchona, serpentaria are the most reliable.

Chlorate, iodide, and bromide of potassium have been known to act beneficially in some very chronic cases.

Cool baths or lotions are an innocent and efficient means of lowering the temperature. They may be given every two or three hours, or as often as required. They should not be spared, inasmuch as they are a source of pleasure for the overheated organism of the patient.

A proper diet should be established from the first. Beef tea, light broth, milk, arrowroot, sage, etc., must be regularly given, along with good wine and small doses of brandy conveniently diluted. If there exist nausea or vomiting, ice may be prescribed, together with other antiemetics.

Complications call for a special treatment, entirely dependent on the nature of each case.

A CASE OF ACROMEGALY IN A GIANTESS.

By WOODS HUTCHINSON, A. M., M. D., Des Moines, Iowa.
Professor of anatomy, State University of Iowa.

About the middle of February, 1893, "Lady Aama," a French giantess, was brought to this city to be exhibited in a dime museum. A week or so later she was taken ill, and on the 27th of the month her death was reported.

Negotiations were opened with the party under whose escort she was traveling, and her body was secured for the museum of the State University at Iowa City, and an opportunity was thus afforded me for examining what proved to be a most interesting anomaly.

Owing, however, to the unavoidable pressure of other work at the time of the autopsy and previous to the use of the body in the dissecting room I was unable to work out many of the details at all as thoroughly as I should have liked or as the importance of the subject deserved, and my only excuse for presenting such an imperfect sketch as follows is the great interest and unusual nature of the case. For the careful measurements of the skeleton and the photographs I am indebted to the kindness of Dr. J. W. Harriman and Mr. Frank Carroll.

"Lady Aama" had been reported and advertised to be "over 8 feet" in height but this was of course recognized as merely the "regulation stature" of all giants thought worthy of an introduction to the public and it was no surprise to find that her height, or more properly, length when carefully measured five days after death was exactly 6 feet 7¾ inches, though possibly it might have exceeded this slightly during life when the arch of the instep would be better supported and the intervertebral disks unshrunken. The measurements were taken between two uprights standing perpendicular to the table on which the body lay and pressed against the vertex of the head and heel and ball of the foot respectively.

Her baptismal name was Emma Alline Batallaid and her birthplace on the slopes of the Jura in France, her age being variously stated, by her sisters, at 19 and 17 years, the latter appearing most probable on later examination, as scarcely a third of the epiphyses in her skeleton were united with their apophyses, although this may have been a part of the general imperfect development of all of her tissues. The "oldest" epiphysis united was that at the lower end at the tibia, eighteenth year (Quain).

The cause of her death was given as "quick consumption," which had lasted for only six months or so, but on more careful inquiry it was found that she had been failing gradually in strength for some four or five years past and had died quite suddenly—she was exhibited within three days of her death—in what appeared to have been an attack of la grippe or of acute bronchitis; death occurring from syncope after a severe fit of coughing.

She suffered very little pain during her illness, and the muscular weakness was so extreme that for weeks before her death she was obliged to support herself, when standing, by holding on to an upright rod fixed in the floor. In fact, her death appeared mainly due to a general state of collapse hastened by an acute coryza. She was the fifteenth child of a poor laborer, all the others being of normal height (one sister accompanying her and shown in Fig. 1). The latter declared that she was still increasing in height up to the time of her death. Her intelligence was decidedly poor, but in no way abnormal.

The body was extremely emaciated and the first thing which arrested the attention was the apparently small size of the chest and trunk, as a whole, compared with the greatly elongated extremities. This, of course, was merely in accordance with what I believe is the rule in such cases, viz, that the increase in height in giants

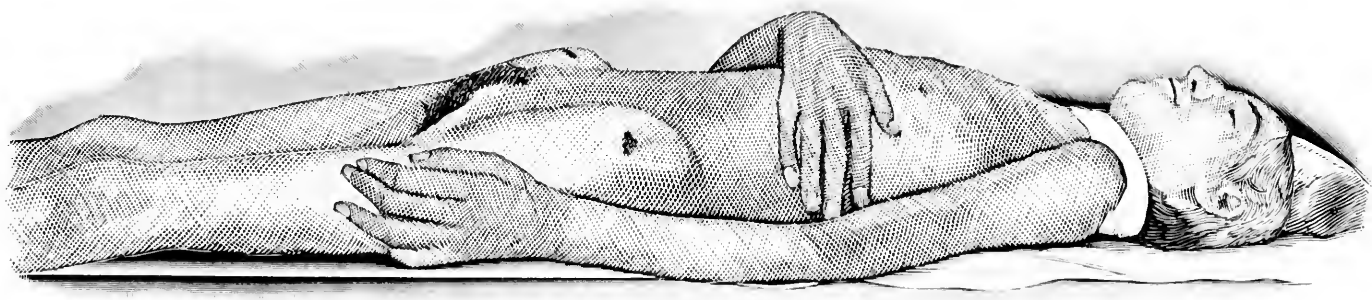

Fig. 1. PHOTOGRAPH TAKEN AFTER DEATH, SHOWING HANDS, ARM, AND FEATURES.

and the decrease in dwarfs is principally in the limbs, the body being comparatively near the normal standard in both cases.

This impression was found to be correct by the measurements, which revealed that the length of the lower extremity from the top of the great trochanter to the lower border of the os calcis was 47 inches, or nearly 60 per cent of the total height, while the mid point of the latter usually lies about an inch below this level—upper border of symphysis (Quain). According to Blanc's canon,* as followed by the ancient Egyptian artists, the length of the lower limb from this point should be ten-nineteenths of the entire height, which, in Aama's case would be 41$\frac{3}{5}$ inches, or 5$\frac{1}{5}$ inches less than the actual measurement. The same was found true at the upper extremity (acromion to tip of middle finger), which, by the same canon, should have been eight-nineteenths of the total stature, 33$\frac{1}{5}$ inches, but actually measured 37 inches.

The same relation is found to be carried out in the measurements of the bones of the chest, the sternum measuring 8$\frac{1}{4}$ inches, or barely a quarter of an inch longer than that of the average adult male (Duval), and the clavicle 7 inches, or only 1 inch above the same standard.

The extent to which the excessive height consisted of length of limb can be seen by comparing Aama's lower limb with that of the average of her race, which would be ten-nineteenths of 5 feet 5·2 inches (Quatrefages) = 34·3 inches, a difference of 12·6 inches, or nearly three-fourths of the total excess of height.

The next noticeable feature was the disproportionate size and peculiar shape of her hands, feet and lower jaw, which is fairly shown in Figs. I and II.

Measurements were again found to confirm this impression, the hand instead of being, according to the artistic canon, one-tenth of the total height (7·9 inches) was actually 11·25 inches in length or nearly one-seventh of the height, and of a peculiarly "spade-like" shape with long square-tipped fingers of uniform breadth throughout their length. The foot instead of three nineteenths of the height (12·6 inches) measured 13·75 inches, while not only the jaw but also the nasal bones, as shown in Fig. III, were decidedly enlarged. The lower jaw measured 6$\frac{1}{4}$ inches from angle to symphysis as against the 3$\frac{3}{4}$ inches which is the norm for male adults. The skull proper, on the other hand, was found to be barely above the average size, measuring 21$\frac{1}{5}$ inches in circumference as compared with the norm (female) of 20 inches.

There was absolutely nothing in a view of the trunk above the pubes to indicate the sex, the mammary glands being almost completely absent, and the circumference of the chest being only 2 inches less than that of the hips (39 inches).

The nipples were flat and small, and upon dissection a mere trace of gland tissue and of a suspensory ligament could be made out. The integument of the body was thickish and earthy-looking, but not otherwise abnormal, and the hair of the scalp was thin and sparse, but of about normal length.

AUTOPSY.

I was not able to be present at the autopsy and it was performed by my prosector, unfortunately without special reference to the possibility of acromegaly.

Emaciation extreme. Heart slightly above normal size. Left ventricle enlarged and dilated valves and pericardium normal.

Lungs.—Normal except in size, which appeared below the average. Light in color and completely collapsed. No pleural adhesions.

Spleen.—Greatly enlarged. Weight 2 pounds. Pulp grayish. Capsule thin and surface lobulated.

Kidneys.—Normal, capsule nonadherent.

Liver.—Slightly enlarged but otherwise healthy. Supra-venals enlarged.

Thyroid gland.—Normal in size and appearance. The brain was pale and sodden-looking, but, owing probably to the fact of its being impossible to make an autopsy

* Artistic Anatomy, Duval.

until nearly a week after death, in such degenerated condition that it was difficult to remove it entire. This was especially marked at the tip of the left temporo-sphenoidal lobe, which was removed as a putty-like mass of débris. From the same cause the pituitary body, which was greatly enlarged, was torn across in removing and its form and outlines completely destroyed.

Its dimensions (reported as "about the size of the last joint of the thumb"), however, can be judged by those of the fossa—well shown in Fig. III—which measured $1\frac{1}{4}$ inches in its antero-posterior and $1\frac{1}{2}$ inches in its transverse diameters.

The weight of the brain (after hardening in alcohol to permit of its handling) was 36 ounces or 8 ounces, below the average (female).

The lateral ventricles appeared somewhat dilated, the tip of the anterior horn being enlarged and rounded and the cavity of the third extended down into the infundibulum There were no hemorrhagic patches and the membranes were healthy. The convolutions, fissures, and general proportions were normal, except for a peculiar thickening and compression backward of the temporo-sphenoidal lobes causing the anterior third of the fissure of Sylvius to run almost vertically and the uncinate gyrus to project internally.

The most striking abnormality was found in the generative organs.

The mons veneris and labia majora were flat and poorly developed. The clitoris was nearly half an inch in diameter and extremely prominent and with the large clitoridal folds, $1\frac{1}{2}$ inches in length, presented no very fanciful resemblance to a small and imperfectly developed penis. This probably was the cause of the reports circulated during "Aama's" lifetime that she was an hermaphrodite. The vagina was small and straight, barely capable of admitting the fore finger.

The uterus was $1\frac{1}{4}$ inches in length and two-thirds inch broad—about the size and shape of the last joint of the little finger and weighed 2 drachms.

The Fallopian tubes were barely recognizable and their abdominal extremities had only three or four rudimentary fimbriæ (none attached to the ovary). The ovaries were small granular looking masses about the size of the finger nail, adhering to the posterior surface of the broad ligament.

THE SKELETON.

After the removal of the softer tissues the bones were macerated and cleaned with the hope of being able to mount them for the Museum, but such was their spongy, crumbling condition that it seemed doubtful whether they were firm enough to hold the wires and support their own weight. The whole osseous system appeared to be in a condition of osteo-porosis, a touch would dislodge the teeth from their sockets, the ribs and slighter bones would snap across at the slightest strain and the epiphyseal plates upon the bodies of the vertebrae could be lifted off with the finger. In fact it literally appeared as if there was no more actual osseous material in this gigantic skeleton than would be required to make a sound, firm, bony framework of the average size. The bones, though much larger, were very little heavier than normal, the radius, scapula, and fibula, for instance, being found to exceed the average of healthy bones in weight only 10 per cent.

The skull (Figs. III and IV).

	Inches.
Circumference at level of glabella	$21\frac{1}{8}$
Distance between ext. orbital processes	$5\frac{1}{8}$
Superciliary ridge to point of symphysis	$6\frac{3}{4}$
Angle of inferior maxilla to symphysis	$6\frac{1}{4}$
Length of nasal bone	$1\frac{1}{4}$
Breadth of nasal bone	$\frac{3}{4}$
Glabella to occipital point	$7\frac{3}{4}$
Breadth index	74
Height index	76

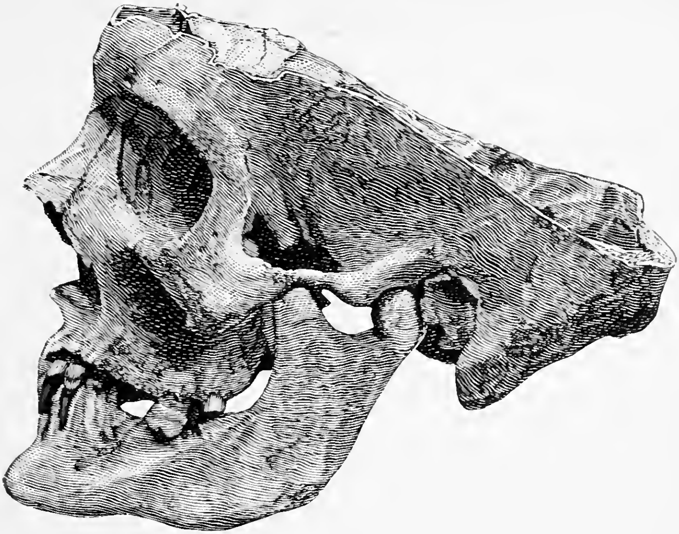

FIG. II.—LATERAL VIEW OF SKULL.
(Nasal bones and lachrymal groove outlined in crayon.)

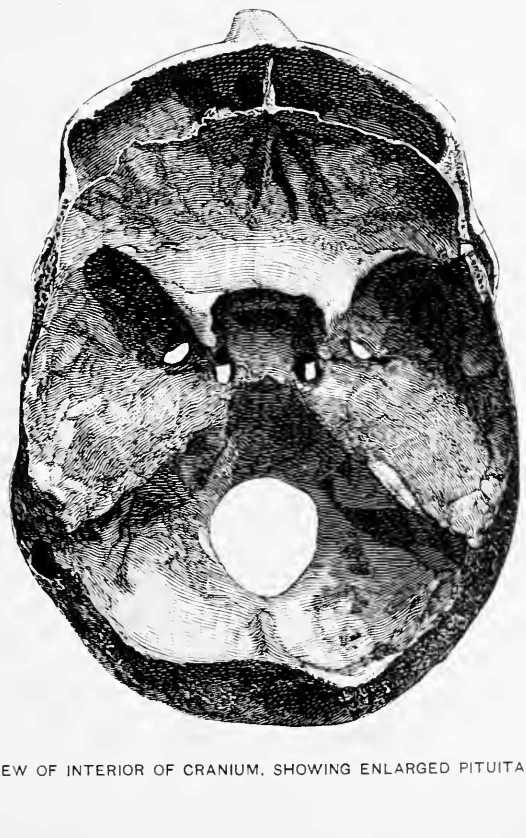

FIG. III.—VIEW OF INTERIOR OF CRANIUM, SHOWING ENLARGED PITUITARY FOSSA.

A most striking illustration of the highly rarified, not to say cavernous condition of the bones, is seen in the condition of the frontal sinuses (Fig. III), which are huge cavities, 2 inches from side to side on the right side, and 2⅝ inches on the left, three-fourths inch from before backward, and 1½ inches in depth, the bony tissue being expanded to a mere shell of the thickness of writing paper. The same condition was found in the maxillary antrum, which was actually cribriform in the tuberosity, while the squamous plate of the temporal was so extremely thin that the groove for the middle meningeal artery actually causes a perforation half an inch long on the right side. The zygoma is also reduced, at one point, to the thickness of pasteboard.

Except the great size of the pituitary fossa, the only noticeable alteration of the cranial interior is a peculiarly shortening and thickening (antero-posteriorly) of the petrous bars (which can be seen in the photograph) accompanied by an internal auditory meatus, nearly double the normal size, and placed well down upon their posterior surface. This has almost the appearance of having been caused by the pressure of an enlarged pituitary body during embryonic life, preventing their growth inward and forward, and causing them to enlarge laterally. As if this had actually been the case, the caroted canals are considerably larger than normal (three-eighths of an inch in antero-posterior diameter), while the jugular foramina are overlapped by this bulging to such an extent that their diameter, as seen from the interior of the cranium, is reduced on the right side to less than two-thirds of what it is on the under surface of the skull, and on the left to less than one-third. On the right side, a spur of bone projects completely across the aperture and by the left side, it is an elongated irregular slit.

The large size of the nasal bones, outlined in crayon, and the width of the upper end of the lachrymal groove are seen in Fig. III. The lachrymal canal is proportionately dilated, measuring, at the level of the floor of the orbit, no less than three-eighths of an inch in transverse and one-fourth of an inch in antero-posterior diameters. An ordinary female silver (No. 18, French) catheter can be readily passed down it into the nose.

The crumbling condition of both upper and lower alveolar processes and the looseness of the teeth can also be seen (Fig. II), many of the fangs being exposed. All the upper incisors, canine, bicuspids, and first molar on the left side have disappeared, and the alveolus is atrophied, while the remaining teeth are either loose in their sockets or have large cavities in their crowns. An upper plate was worn during life.

Pelvis and trunk.

Pelvis:

	Inches.
Circumference around crest	38
Transverse from ant. sup. spine to same	15
Superior strait	6½
Inferior strait	6
Depth	7
Transverse diameter	6½
Antero-post diameter	7
Sym. of pubis to tuberosity of ischium	6½
Crest of ilium to tuberosity of ischium	11
Ant. sup. spine to post. sup. spine	8
Ant. sup. spine to post. inf. spine	9½
Crest of ilium to sacro-sciatic notch	7
Length of sacrum and coccyx (internal)	9½
Length of sacrum and coccyx (external)	10½
Long. diam. of sacro-sciatic foramen	2¾
Diameter of acetabulum	2¼, 2½
Depth of acetabulum	1¾, 1½
Depth of pubic symphises	2¾

Lumbar vertebra (4th):

	Inches.
Tip to tip of transverse processes	$5\frac{3}{4}$
Body	$2\frac{1}{4}$, $2\frac{3}{4}$
Spine—atlas to end of coccyx following curves (ant.)	42
Sternum, length	$8\frac{1}{4}$
Inferior maxilla (straight line from symphyses to condyle)	$6\frac{1}{4}$
Clavicle, length	7
Scapula (inf. angle to tip of acromion)	$10\frac{3}{4}$

The sternum presented a central round perforation one-third of an inch in diameter in the third piece of the gladiolus and the fourth price was cleft and broad at its extremity.

The acromial epiphysis was in two pieces.

Upper extremity:

	Inches.
Whole arm and hand	37
Humerus	$15\frac{1}{4}$
Olecranon to tip of second finger	23
Ulna	$11\frac{3}{4}$
Radius	$11\frac{1}{5}$
Middle metacarpal and finger	$9\frac{2}{5}$
Metacarpal (middle)	$3\frac{7}{8}$
First phalanx (middle)	$2\frac{5}{8}$
Lower extremity:	
Head of femur to os calcis	$47\frac{1}{2}$
Femur (head to int. condyle)	$23\frac{1}{4}$
From depression for ligt. teres to outer side of trochanter major	$5\frac{3}{4}$
Width at condyles	$5\frac{1}{2}$
Greater to lesser trochanter	$5\frac{1}{2}$
Greater to int. condyle	$22\frac{3}{4}$
Circumference of neck	$6\frac{3}{4}$
Circumference of head	8
Circumference of shaft of middle	$5\frac{1}{2}$
Tibia:	
Length from int. tuberosity to int. mal	$18\frac{3}{5}$
Width of tibia and fibula at ankle	4
Circumference of shaft (middle)	$5\frac{3}{5}$
Foot:	
Length	$13\frac{3}{4}$
Depth of tarsal arch	$4\frac{1}{4}$
Girth of foot	$10\frac{1}{2}$
Fist metacarpal (length)	3

There was a distinct bossy, "velveay"looking elevation at the postero-internal surfaces of both tibiæ in their middle third.

I have ventured to call this case one of acromegaly on the following grounds: (1) The excessive developement and peculiar shape of the hands, fingers, feet, jaw, and nasal bones. (2) The hypertrophy of the pituitary body and enormous size of the pituitary fossa. (3) The history of mental deficiency and long-standing progressive failure of strength, ending at last in death by syncope.

The enlargement of the pituitary body would appear to be the principal pathological characteristic of this disease, as it has been found to be present in ten out of the twelve cases hitherto reported in which autopsies were held. Its probable size in this case would appear to conform pretty closely to the average hypertrophy as reported, which ranges from 1 inch to $1\frac{1}{4}$ inches in antero-posterior and $1\frac{1}{5}$ inches to

$1\frac{3}{8}$ inches in transverse diameters, the diameters of the pituitary fossa here being $1\frac{1}{4}$ and $1\frac{1}{2}$ inches, respectively.

Of course the interesting question suggests itself at once—what connection, if any exists between the acromegaly and the giantism and although the facts at our disposal are so few that any speculation upon the subject must be purely tentative, yet one is tempted to string them together upom some sort of a theory.

In the first place it is interesting to note that giantism so far as accurately recorded would appear to be actually mainly an "acromegaly" extending to the whole extremity (both upper and lower) instead of merely confined to the last segment, the lower limb contributing such a large proportion of the excess of height. An approach to this condition even is recorded in some cases of acromegaly occuring in adult life, in which not only the hand, but the forearm was enlarged. (Pel, Dercum, Long.)

Arnold * reports a case where the shoulder-girdle was thickened and Berkley † one where the clavicles were enlarged. Dercum ‡ records another where both forearms and legs and chest were greatly enlarged. The scapula and pelvis were enlarged in Osbornes case §. The forearms, patellæ and clavicles in Pel's case ‖, and the forearm and legs in Long's¶. The bones of the leg were thickened in Péchardre's case **. In the four instances above where the weight was given the average was $215\frac{1}{2}$ pounds.

Then, again, the picture of the giant given almost unanimously by secular (nonromantic) literature, is that of a loose-jointed, weak-minded, stoop-shouldered sort of a being with splay feet, huge hands, and projecting features.

The condition itself appears to be almost a diseased one, as the vast majority of these "freaks" die young; and from all the records obtainable by me, none pass middle life. The few actual ages at death, which I have been able to find, are as follows:

	Height.		Age at death.
	Ft.	*In.*	*Years.*
Charles Byrne	8	2	22
McGrath	8	6	20
Winkelmaur	8	9	22
James Toller	7		24
Tall girl of Basle	7		(*a*)

a In childhood.

We must remember that the actual range in human stature, even in giants, is much more limited than is popularly supposed, or even than is usually assumed by most of us. Popular literature abounds with 9-foot and 10-foot men, but statures above 8 feet are extremely rare, and Du Quetélet even declares that the tallest man reliably recorded was Frederic the Great's "Scottish giant," who measured 8 feet 3 inches. "Chang," the Chinese giant, was only 7 feet 8 inches in height, and Patrick Cotter, 7 feet 10 inches, while the majority of "giants" actually barely reach 7 feet, and it does not seem at all incredible that the same nutritive disturbance which can add an inch to the hand or jaw of an adult can literally "add a cubit to his stature" if beginning its operation during the fœtal or infant life.

Indeed, the former would, abstractly considered, appear the more remarkable of

*Beiträge zur Pathologischen Anatomie, Bund. x No. 1.

†Johns Hopkins Hospital Bulletin, September, 1892.

‡ American Journal of the Medical Sciences, March, 1893.

§ American Journal of the Medical Sciences, June, 1892.

‖ Berliner Klin Wochenschrift, 1891, No. 3.

¶ Lehigh Valley Medical Magazine, 1891, No. 3.

** Revue de Med., February, 1890.

the two. In adult life the increase merely occurs at the points of least resistance, the ends of the extremities and features, or as Klebs asserts the ends of the long bones.

The situation of the characteristic pathologic change in the pituitary body is in itself extremely interesting and suggestive from an embryonic point of view. Little as is known of the function or physiologic relations of this "gland" it is generally regarded as marking the point of junction of the spinal and alimentary canals (neurenteric canal) and termination at the notochord. This makes it the "uppermost" end of that neurenteric loop which bounds the stature of the embryo and thus developmentally the "highest" point in the body, so that one would almost expect upon *a priori* grounds to find at this point marked traces of any nutritive disturbance affecting the length and size of the body or appendages.

The connection becomes still more suggestive if we accept Beard's ably supported view that the pituitary and pineal bodies together with the pineal "eye" in *Natteria* represent the remains of the primordial mouth opening axially (from which the present mouth and pharynx are a secondary development laterally) and around which the encephalon developed after the fashion of the esophageal ganglia in Mollusks and the "esophageal nerve-collar" in Crustaceans to preside over the structures concerned in securing food materials.

As this is at bottom the primary and essential function of the extremities (including the jaws) we should hardly be surprised to find their nutrition in some way presided over or represented in this region.

Would it not appear probable that at least one form of giantism is merely acromegaly beginning in fœtal or infant life?

NOTE.

Since the abstract of the above was read at Washington, Dr. C. L. Dana, of New York has reported in an extremely interesting paper (Journal of Nervous and Mental Disease, Nov., 1893) two similar cases.

One almost exactly parallel in a Bolivian Indian, 6 feet 7 inches in height and weighing 300 pounds, who presented a well-marked case of acromegaly, including enlargement of the pituitary body. He died at the age of 30 with symptoms extremely similar to Aama's.

The other case was of a giant 7 feet 4 inches in height and weighing, at the age of 20 years, 325 pounds, who presented many acromegalic symptoms, including enormously developed feet and hands. Kyphosis, sclerosis, coarse hair, feeble muscular development, and a curious enlargement at the left nasal and maxillary bones.

Dr. Dana supplies also a valuable "missing link" in the chain of my suggestions by giving a list of six other cases of acromegaly in which the height exceeded 6 feet (ranging from 6 feet to 6 feet 4 inches) and the average weight was 242$\frac{5}{8}$ pounds.

ESTUDIO CLÍNICO DE LA BUBA.

Por L. RAZETTI y N. GUARDIA HIJO,
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RESUMEN.

Sinonimia.—Frambueza, pian, epian, botón de las molucas, dermitis ulcero-fungosa circunscrita, yarrs, kandgé, mebarrha, abukué, etc.

La buba es una enfermedad endémica en ciertas regiones de la zona tropical, trasmisible por contagio, inoculable, caracterizada por una erupción vesículo-pustulosa seguida de ulceraciones fungosas y de evolución determinada.

Descripción clínica.—No existen prodromos. La enfermedad principia por la aparición en los miembros, en el cuello ó en la cara de una vesícula llena de serosidad que pronto se hace purulenta, se rompe y deja en su lugar un pequeño agujero. Al rededor de la primera vesícula se forman otras que siguen el mismo proceso hasta que al fin se constituye una úlcera de base indurada, de superficie fungosa generalmente cubierta por una costra amarillenta que se reproduce sin cesar.

Esta úlcera primitiva, conocida con el nombre de buba madre, es el sitio de comezones al principio y según el sitio que ocupa puede dificultar las funciones de la parte.

La presencia de la buba madre no es un fenómeno constante de la enfermedad, al menos así lo hemos observado en este país. En muchos casos la erupción aparece generalizada desde el primer momento.

En la generalidad de los casos el accidente primitivo desaparece ántes de que las manifestaciones que pudiéramos llamar secundarias hagan erupción; pero en muchos otros la úlcera madre persiste durante toda la evolución de la enfermedad, y en algunos, aunqué raros, alcanza una duración mayor que la del resto de los otros accidentes.

El segundo período, es decir, la generalización de la enfermedad á todo el cuerpo, está caracterizado por una erupción vesículo-pustulosa que puede afectar dos formas distintas: la discreta y la confluente.

En diversas partes del cuerpo aparecen pequeñas vesículas acompañadas de comezón, que aumentan de volumen y se convierten en pústulas llenas de un líquido amarillento que se concreta y forma costras que se desprenden con facilidad. Debajo de estas costras que caen expontaneamente ó son arrancadas por el enfermo, aparece una superficie ulcerosa, mamelonada, fungosa, de aspecto lardáceo, bordes lívidos é irregulares.

Estas úlceras son dolorosas y despiden un olor fétido *sui generis*, á la vez que dan al enfermo un aspecto de lo más repugnante. Se presentan por grupos más ó menos confluentes; no presentan base indurada como la buba madre; los tegumentos que las rodean conservan su consistencia y coloración normales.

Generalmente después de la primera aparición de las bubas que acabamos de describir y mucho antes de que estas entren en el período de reparación aparece otra erupción semejante, y este fenómeno puede repetirse durante el curso de la enfermedad dos y tres veces.

No nos parece racional ni verdadera la división entre bubas húmedas y secas. Creemos que todas segregan un líquido fétido y que la diferencia clínica solo estriba en la mayor ó menor confluencia de la erupción.

La buba es una enfermedad de larga duración: de nueve meses á dos años y más. No presenta fenómenos generales; los enfermos continuan sus ocupaciones habituales; los niños siguen viviendo como si estuviesen sanos; no hay pérdida del apetito ni del sueño; los dolores que hemos señalado en las ulceraciones son muy moderadas.

Como accidentes consecutivos de la enfermedad señalaremos, fuera de la cicatriz indeleble que deja la buba madre, el clavo y la flema salada, como dicen los negros de Venezuela.

El clavo que los negros de Africa llaman osondo aparece en la planta de los pies. Es al principio una vesícula que luego es reemplazada por una escrecencia carnosa semejante á ciertas verrugas y separada de los tegumentos por un surco bastante profundo. Esta escrecencia está rodeada de una base indurada y es en extremo dolorosa sobre todo durante la marcha.

La flema salada se presenta en las palmas de las manos y plantas de los pies. Es una afección semejante al eczema y dudamos mucho que sea un verdadero accidente de la buba. Como esta enfermedad, en la casi totalidad de los casos, afecta á hombres y mujeresque se ocupan de las faenas del campo y están siempre descalzos, es racional considerar que la flema salada sea simplemente el eczema de los trabajadores independiente de la buba.

Etiologia.—La buba es una enfermedad hoy endémica en ciertas regiones de Venezuela, pero que probablemente fué importada del Africa por los negros esclavos. Ataca casi exclusivamente á la raza negra, pero no por esto los mestizos y los blancos están exentos de ella. Se observa en todas las edades de la vida, pero es mucho más frecuente en la infancia. En la vasta región bañada por el rio Fuy es muy raro encontrar un negro que en su infancia ó en su pubertad no haya sido víctima del mal.

La enfermedad no repite jamas, al menos esa es la creencia popular entre nosotros y en un inmenso número de personas que hemos interrogado pudimos comprobar el hecho.

Esto, unido al contagio evidente, demuestra la naturaleza parasitaria de la enfermedad, y es de sentirse que hasta ahora no se haya podido, por medio de inoculaciones experimentales comprobarlo en el laboratorio y aislarse el microbio propio, que por inducción debemos suponer sea la causa de la dolencia.

Nosotros negamos el origen sifilítico atribuido á la buba por muchos autores.

(1) Si la buba fuera una manifestación de la sífilis ¿porqué se encuentra limitada, no solo á la zona intertropical, sino á ciertas regiones de esta zona?

(2) Semejante manifestación sifilítica no podría curar expontaneamente sin mercurio, ni yoduro de potasio, como sucedo con la buba.

(3) Fuera del clavo la buba no deja ningún accidente consecutivo de los propios de la sífilis. Pasadas las manifestaciones de la enfermedad, el individuo queda completamente curado.

(4) La buba ataca generalmente á los niños, en tanto que la sífilis, fuera de la herencia, es una enfermedad de la edad adulta.

(5) La buba madre rarísima vez aparece en los órganos genitales; este es el sitio predilecto del chancro.

(6) Ni el dolor ni la comezón son propios de las manifestaciones sifilíticas y son constantes en la buba.

(7) El sifilítico conserva siempre pléyades ganglionares; el buboso jamás. Si en algunos casos se encuentran adenitis, estas deben ser resultado de infecciones secundarias que desaparecen sin dejar rastros.

(8) La buba madre no deja induración sino una lijera cicatriz como la de la vacuna.

(9) Ninguna manifestación sifilítica permanece estacionaria como la buba durante ocho á veinte y cuatro meses.

(10) La buba no hace inmune al individuo contra la sífilis, ni esta contra la buba.

(11) La herencia no se ha podido comprobar en la buba y sí en la sífilis.

Nosotros consideramos todos estos argumentos incontestables y creemos que la buba es una enfermedad específica distinta de la sífilis, que debe tener un microbio propio.

Contagio.—La buba es una enfermedad eminentemente contagiosa. El contagio es siempre directo, se hace por inoculación. Todas nuestras observaciones demuestran que es indispensable una puerta de entrada, una solución de continuidad. De aquí que la primera manifestación está siempre situada en una región desprovista de vestidos. Rarísima vez se ha observado la buba madre en el pecho, abdomen, órganos genitales, muslos; siempre aparecen en las piernas, brazos, cuello y cara, es decir, las partes del cuerpo que nuestros negros llevan descubiertas.

Es indudable que la enfermedad puede trasmitirse por el coito, pero nosotros no pudimos comprobar el hecho en los numerosos casos observados. Creemos que la rareza de este modo de contagio obedece á diversas razones: primero, la inmensa generalidad de los adultos ha padecido la enfermedad durante la niñez; segundo, la imposibilidad de ocultar la erupción, hace que las personas sanas eviten á todo trance las relaciones sexuales con los atacados por el mal.

La buba puede trasmitirse por la picadura de los insectos, bien que estos abran la puerta de entrada y el germen sea depositado allí por otros medios, ó bien que el insecto lleve consigo el elemento morbífico. El contagio por los insectos está perfectamente averiguado entre nosotros.

Diagnóstico.—La buba es una enfermedad que después de conocida es imposible confundirla con ninguna otra.

Tratamiento.—Los negros de Venezuela emplean como tratamiento de la buba, ciertos jarabes compuestos de zarzaparrilla, cedro y otras plantas indígenas.

Los médicos que ejercen en las localidades en donde reina endémicamente la enfermedad usan el tratamiento mixto de la sífilis y la antisepsia de la piel.

Nosotros no podemos asegurar la eficacia de ningún tratamiento, pero sí creemos que el mercurio y sobre todo el yoduro de potasio, acompañados de una antisepsia rigurosa de la piel, sería la terapéutica racional de la afección.

La profilaxia nos parece muy importante. El aseo esquisito de la piel y evitar el contacto directo con las personas atacadas. A estos medios profilácticos creemos que se debe la rareza de la buba en la raza blanca.

Al terminar este estudio sentimos que el capítulo sobre anatomía patológica quede vacío y nos proponemos en otra oportunidad escribir un trabajo especial sobre la naturaleza histológica de la afección y, si nos es posible, sobre su origen microbiano, que hoy sospechamos por inducción clínica.

CLINICAL NOTES ON AMŒBIC DYSENTERY.

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There is no morbid condition of common occurrence upon which there exists a wider difference of opinion than that of dysentery. The confusion of the medical mind upon this subject has arisen from various causes: First, from erroneous conceptions, imperfect definitions, and incorrect classification of the varieties of the disease as enunciated by the systematic writers upon medicine; second, from the uncertain knowledge of its etiology; third, and especially so, from the nonrecognition by the general medical profession of the causal relation of the *amœba coli* in the production of dysentery, and the wide dissemination and frequent occurrence of this form of the disease.

My attention has recently been called to this subject by a paper entitled "Lime Salts in Acute Dysentery," read by Dr. T. H. Marable, of Clarksville, and published in the Transactions of the Tennessee State Medical Society for 1891. The author describes an epidemic of dysentery which occurred in the limestone region of Tennessee, and makes the significant observation that the disease occurred only in those families who had used the spring water which had been very scarce in consequence of a protracted drought, those using cistern water escaping entirely. He concludes that limestone held in solution in the water when concentrated by a drought will produce dysentery, and discards as unproven the doctrine that dysentery is produced by microorganisms. The fallacy of such reasoning is evident, first, because there has been no adequate proof to show that limestone water, however concentrated, will produce dysentery, and, second, because such a conclusion leaves out of view entirely the probable contamination of the water through the products of fecal and other decomposing animal matter. The water of wells and springs in limestone regions, being supplied by surface drainage, is particularly liable not only to such general poisoning, but also to the specific infection of dysentery.

Having had under observation recently a number of cases of amœbic dysentery, I have been able to confirm the observations previously made by Lösch and Lambl, Osler, Councilman and Lafleur in Baltimore, Kartulis in Egypt, Dock in Galveston, Brayton Ball in New York, and others, as to the causative influence of the *amœba coli.* The views embracing the modern knowledge of the subject, with a correct definition and classification, have been so fully and admirably presented in articles by Dr. A. Brayton Ball, of New York (Therapeutic Gazette, July and August, 1892), and by Dr. Osler (Practice of Medicine, 1892), that I should not venture in this field were it not for the fact that erroneous doctrines are still taught in the text-books, and still pass current with the profession at large. Truth travels slowly and error is hard to rout.

The points to which I especially wish to direct attention are:

(1) To give my emphatic indorsement to the statement made by Dr. Ball, viz, that "dysentery is not a morbid entity, expressing itself by an inflammation of the large intestine, essentially the same in its sporadic and epidemic forms, in tropical climates and northern latitudes, and varying in its symptomatology and pathology in different cases only in accordance with climatic and other modifying conditions; and that, on the contrary, the term dysentery should be used in a general sense to express a process of inflammations of the large intestine, partly of specific and partly of nonspecific origin."

(2) That the general adoption of the following clinical classification will do much towards dissipating the existing confusion; i. e., acute catarrhal, acute diphtheritic, amœbic, and secondary dysentery.

(3) To call attention to the frequent occurrence and wide dissemination of amœbic dysentery.

(4) To emphasize the probable etiological influence of impure drinking water.

(5) To note the characteristic and uniform symptoms.

(6) To consider the chronicity and difficult cure depending upon the character and location of the lesions.

(7) The necessity of combating the excessive anæmia and wasting by a proper dietary.

(8) The importance of cleansing and antiseptic irrigations.

(9) The inutility of quinine injections in my experience.

(10) The superiority of mild injections of nitrate of silver, with salines, and salol internally.

I will first detail the cases and then briefly comment upon these points.

Case I.—John Carlson, male, 32 years of age, native of Sweden; admitted November 26, 1892; discharged February 15, 1893; came to Galveston on British S. S. *Bona*, sailing from Cardiff, Wales, September 1, 1891, touching first at Vera Cruz and remaining there thirty-nine days. Patient had diarrhea on the voyage to that port, but no blood in the stools. After remaining in Vera Cruz about two weeks actions became thinner and more frequent, blood appearing after he had been in port about thirty days. He does not know the source of the drinking water obtained for the ship, but states it was thick and of a milky appearance. Upon admission to hospital, five days after reaching Galveston, he was having twelve and fourteen bloody and mucous stools during the twenty-four hours. *Amœba coli* present in the stools. Decided emaciation and weakness. The treatment consisted in rest in bed and washing out the colon with hot water, followed by warm solutions of creolin, 1 ounce to the quart of warm water, which, failing to benefit the patient, was followed by injections of nitrate of silver solutions of the strength of 30 grains to the quart. Diet consisted of meat, toast, milk, eggs. Gradual improvement, but subject to frequent relapses. Gained in weight 20 pounds. Stools reduced in frequency; blood and mucus slowly disappeared. Patient discharged apparently cured.

Case II.—Albert Bailey, aged 43 years, native of England. Admitted February 3, 1893. For twenty years he was troubled with constipation, and for the past five years with indigestion. From England he came to the United States about four years ago, living in Michigan until August, 1892, when he came to Texas, walking the greater part of the distance, drinking water from creeks and pools along the railroad tracks. After reaching Indian Territory, found the water bad and often stagnant, and soon after reaching this point in his journey he was taken with severe diarrhea; stools at first thin and painless; after about three weeks abdominal, perineal, and scrotal pains became marked, especially before and after stools; about this time, also, blood and mucus appeared in the dejections. Since the beginning of the attack, about July, 1892, there would be periods of improvement in all of the symptoms, lasting for four or five days, to be followed by relapses with a return of all of the symptoms with the same intensity. In January, 1893, he was admitted into the hospital in Houston, Tex., where he remained ten days, and was discharged as cured.

Three days afterward the symptoms (dysenteric) returned with unabated vigor. Upon admission to the John Sealy Hospital at Galveston, stools numbered about 10 during the twenty-four hours, and were small, bloody, and mucous. Patient had lost about 35 pounds in weight since the beginning of his sickness. Microscopic examination revealed the amoeba coli. The treatment consisted in confinement to bed, injections of nitrate of silver solutions, preceded by free flushings of the colon, occasional administration of saturated solution of magnesium sulphate, with small doses (4 minims) of the tincture of opium. Diet: meat, eggs, milk, and toast. Gradual improvement, varied by frequent relapses. May 1, 1893: By this date, though stools are reduced in frequency to 1 or 2 during the twenty-four hours, examination still reveals the presence of *amœba coli*. June 1, 1893: Patient discharged and employed in wards. Stools contain no mucus or blood; they are normal in color and consistency. Apparent cure, but stools still abnormally frequent, about 3 in twenty-four hours; no blood, rather thin. Patient gained in weight, but still weak.

Case III.—Wm. Brooks; laborer; aged 18 years; native of Virginia. Lived in various parts of the country; that is, Washington, D. C., Pennsylvania, Memphis, Tenn., Texas, and finally in Arkansas, in the bottom lands of the Mississippi and Red Rivers; drank the water of these streams as well as stagnant water in the vicinity. He came to this district (Arkansas) during the latter part of August, 1892, when he was taken with diarrhea; the actions at first were watery, then became bloody and mucous, and had from 9 to 12 during the twenty-four hours. This condition continued for about six weeks, when he went to New Orleans; here he asserts got better, though the number of actions daily were still about three and were tinged with blood, contained mucus, and their discharge was accompanied by tormina and tenesmus. From New Orleans he went to Lake Charles, La., growing weaker and more anæmic. Actions became more frequent, and were accompanied by rapid loss of flesh, 30 to 40 pounds. At times the stools would contain considerable blood and mucus; again they would be watery, of a grayish color, and less frequent. When admitted to the Sealy Hospital, January 26, 1892, the patient could hardly walk from excessive weakness. There was a slight rise of temperature; he was having from 6 to 8 actions daily, these containing rose-colored mucus. *Amœba coli* were found. Treatment: rest in bed, and rather free diet, that is, milk, eggs, meat. Saturated solution of sulphate of magnesium, tincture of opium, followed by hot water sterilized, flushing of the colon, and injections of silver nitrate 30 grains to the quart. On July 4, salol 10 grains and bismuth subnitrate half a drachm were given about three times a day. Condition of patient May 1: appetite good; allowed, with a few exceptions, full diet; gained 14 pounds since admission. Actions reduced to 1 or 2 during the twenty-four hours; no blood or mucous in them. Amœba disappeared. Patient employed about the wards, apparently cured. The patient's general appearance is good, though there is a decided tendency to diarrhea, which is controlled to a considerable extent by salol and bismuth. He has about three actions during the twenty-four hours.

Case IV.—J. Bowen; seaman; native of England; aged 27 years. On S. S. *Bona* from Cardiff to Veracruz, same steamer as of Case No. I. Admitted December 23, 1892, having been at the port of Veracruz 39 days. Was taken sick with dysentery the day he sailed from that point. The bowels had previously been constipated. When admitted there was a slight fever, and 15 to 20 stools, bloody and mucous, passed daily, attended with severe abdominal pain and tenesmus. Amœba found in abundance. Treatment: rest, careful regulation of the diet, saturated solution of magnesium sulphate with tincture of opium, cleansing of colon with warm water, and 2 per cent solution of creolin. Discharged greatly improved; stools reduced to 1 daily, but still containing rose-colored mucus, and showed presence of amœba, indicative of unhealed lesions and certainty of relapses. Unfortunately the patient left the State, and the further history of the case is unknown.

Case V.—William Miller; aged 55; native of Ireland. In Texas since 1876 and in Galveston since 1880. Previous health good. About July 20, 1892, was taken sick with diarrhea, having from 10 to 12 thin, dark-looking stools during the twenty-four hours. This continued about eight or ten days; had some straining, but very little pain was present during this time. At the end of ten days the stools became smaller and contained blood and mucus, and were then more frequent and painful. This condition continued until his admission to the hospital August 26, 1892. Previous to this date he had not been confined to bed nor taken any medicine. When he came under my observation October 1, 1892, he was very much emaciated, having lost from 35 to 40 pounds, and falling off daily. There was excessive anæmia. Stools numbered now from 8 to 10 in the twenty-four hours, and were bloody and mucous; they contained amœba, and their discharge was accompanied with more or less tormina and tenesmus. Treatment: Patient had been restricted to fluid diet, milk and broths; was now allowed meat in abundance, eggs, soups, and bread. Rectal injections of strong quinine solutions were given a faithful trial, but proving useless were discontinued, and nitrate of silver substituted with good results. Same medicinal treatment, with irrigations, as in other cases. There was a decided improvement, though slow, which was more apparent in the general condition of the patient. A gain of flesh was obtained, but the bowel symptoms were extremely variable; there would be an apparent amelioration, when the actions would be reduced in frequency and improved in appearance, to be followed by relapses. Thus the condition continued until about March or April, 1892. Becoming tired the patient left the hospital, having gained from 15 to 20 pounds in weight; the stools were reduced to 3 or 4 daily, but still contained rose-colored mucus and showed amœba. After leaving the hospital the patient was not under my care, was subjected to various hardships attempting to earn his living, half-starved, and, discontinuing intestinal irrigation, and taking chiefly opiates, the result, as may have been expected, was a severe return of all the dysenteric symptoms. The bowels became uncontrollable, the desire to go to stool would have to be obeyed immediately or the action would occur involuntarily. The stools now consisted of a little bloody mucus, and sometimes almost pure blood. The patient became emaciated and so weak that he could hardly walk. He was readmitted to the hospital on April 1, 1893; was subjected to the same treatment as previously, that is, warm irrigations with sterilized water, followed by nitrate of silver, 30 grains to the quart, with salol and bismuth internally, and a liberal diet There was a rapid improvement; regained strength and color; there was also a slight gain in flesh, and the number of stools was reduced to 3 daily. Discharged from hospital about June 20. Dysenteric symptoms returned as before.

Case VI.—Adolph Bomjuris; laborer; aged 63 years; native of France. Admitted February 18, 1893. Gave an indefinite history. Dysenteric disease of twelve months' standing, with alternative periods of improvement and relapses. Was taken into the surgical ward in charge of Prof. J. E. Thompson for the treatment of some obscure bladder symptoms. On March 9 he was transferred to the medical ward under the writer's charge. From the date of admission until he was transferred there had been an irregular intermittent fever, morning temperature normal, with an evening rise to from 101 to 102 F. Examination on March 10 revealed bulging, increased area of dullness, decided tenderness, and a slight œdema of the skin over the right lobe of the liver. Suspecting abscess of that organ a hypodermic needle was introduced into the 7th interspace to the inner side of the axillary line; pus was found, examination of which showed the presence of amœba coli. The patient was then sent back to the surgical ward on March 7th, where by surgical interference a large quantity of thick pus, presenting the characteristic appearance of pus from liver abscess, was extracted. The peritoneum was found adherent to the diaphragm. The large cavity was emptied and thoroughly washed out, and a drainage tube inserted. Complete healing took place in about 30 days. There was only a slight rise of the temperature during this period. Since March 30 the temperature has been normal; there is constipation, and patient complains of pain in the hepatic region.

Case VII.—Richard Schuman; native of Germany; aged 32 years; steamboat fireman and railroad laborer; admitted June 1, giving the following history: Previous good health; in November, 1892, came to Alvine, Brazoria County, Texas (near Galveston). February 10 had malarial fever, for which he was treated and cured. February 17 was taken sick with dysentery, having six stools the first day, attended by severe pain in the abdomen, rectum, and anus, each action showing large amount of blood. The stools continued to show blood for about a month; after that they would vary, sometimes thin, of a grayish color for several days at a time; then became tinged with blood and contained mucus. At present, June 9, he is emaciated, having lost 32 pounds since beginning of his illness; his stools number from 12 to 14 in the twenty-fours. Upon admission the stools were thin, of mushy consistency, containing no blood or mucus, although some traces of the latter were found. Microscopic examination revealed *amœba coli.* The treatment consisted of what has already been stated in regard to the other cases.

It is somewhat surprising that the peculiarities of amœbic dysentery and the causal relations of this organism with intestinal fluxes should not have obtained earlier and wider recognition. The observations of W. Lambl, who first described the amœba coli, were published in 1859. F. Lösch, in 1875, confirmed the views of his predecessor. Both are quoted by Woodward, but discredited upon the ground of insufficient evidence. The rapidly growing knowledge of the etiological influences of micro-organisms in other diseases, the natural history of dysentery strongly pointing to a specific cause, stimulated inquiry in this direction; so that we find different observers in various parts of the world, as previously mentioned, demonstrating the presence of the amœba, describing the clinical features and lesions of this form of dysentery. The fact that I can report seven cases occurring in my service in the John Sealey Hospital since October last indicates the extensive prevalence of the disease in this part of the country; the necessity of its careful differentiation from other forms of dysentery, and also the discovery of possible means of prevention and better methods of treatment.

Strümpel (Practice of Medicine, edition of 1893) describes dysentery "as a disease of the colon excited by an infection with an organized pathogenic poison, about which we as yet have no further knowledge." Loomis (edition of 1889) states that "dysentery is a specific disease, with a characteristic local lesion, which lesion is an inflammation of the mucous membrane and of the solitary and tubular glands of the large intestine." Page (Practice of Medicine, 1892) states that "dysentery is an infectious febrile disease, characterized by inflammation and ulceration of the large intestine, due to a specific poison, the germ of which is not known, but which has a peculiar affinity for the bowel. It may be sporadic or epidemic, is usually acute, though it may become chronic."

A simple contrast and comparison of the clinical events of the cases herein cited, with catarrhal, diphtheritic or secondary dysentery, is sufficient to indicate essential distinctions between these varieties of the disease, and the erroneous conception of it as above defined. Amœbic dysentery is chronic from the beginning; it has no tendency to self-limitation, and is exceedingly difficult to cure. Relapse during the progress of the disease, and even after apparent cure, is the rule; rapid emaciation and profound anemia are symptoms generally present; the stools at times are diarrheic, thin, and watery. Probably a majority of cases of nontubercular chronic diarrhea and dysentery are of amœbic origin. This may be not the case in more northern latitudes, but I am sure such occurs in the South. I can go further, and assert that the amœbic is the most frequent form of dysentery met with in this portion of the country; for, during the period the seven cases here reported were admitted into my wards, there were not more than two or three of the acute catarrhal type and none of the diptheritic or secondary form. Tracing these cases to their origin we find that two of them acquired the disease upon the same steamship in Vera Cruz, Mexico; one in traveling through the Indian Territory and north Texas; one in Arkansas, the Mississippi and Red river bottom country; two in Galveston, and one in Brazoria County, near Galveston. It will be noted that two of these cases originated in Vera Cruz.

In the discussion following a paper by Dr. A. Haddad, of Alexandria, Egypt, read at the International Medical Congress held at Washington in 1886, upon the Surgical Treatment of Liver Abscess, attention was called by Dr. Frank Paschal, of Chihuahua, Mexico, to the frequency of hepatic abscess in that country, due, in his opinion, to the excess of highly stimulating food containing a great deal of red pepper, this being followed by catarrhal duodenitis, inflammation of the common bile duct, etc. But a much more rational explanation can now be given, that is, the extensive prevalence of dysentery, especially of the amœbic form, in Mexico. Amœbæ and other pathogenic organisms are taken into the portal circulation, conveyed to the liver, and produce in this organ characteristic lesions. In one of the cases above mentioned amœbæ were found in the pus obtained from the liver, by means of a hypodermic needle. Osler has found them in the sputum when an abscess had opened into the lung through the diaphragm. In four of the cases cited there was evidence of infection through the drinking water; one drank water from pools and ponds along the railroad in Indian Territory; another one used similar water in the Mississippi and Red River bottom land of Arkansas, and two were taken with the disease after using water in Vera Cruz which was evidently foul.

Contaminated water as a cause of dysentery has attracted the attention of medical observers since the times of Hippocrates. I can only mention a few of the reasons which strongly incline me to a belief in this source of infection. First, it is highly probable that the alimentary canal is the avenue of infection, and that like other specific infections affecting the intestines, for example, cholera and typhoid fever, the stomach is the most natural and obvious inlet. Second, the extensive use by multitudes of people of water liable to infection through a soil saturated with filth of various kinds, and the possibility of specific infection of such water through the discharges from previous cases of dysentery, make this source of infection highly probable. Third, such facts as those mentioned by Dr. Marable, where in an extensive epidemic of dysentery it was noted that only those who drank cistern water were exempt from the malady, point conclusively to contaminated drinking water as a source of the disease. Fourth, the extensive prevalence of dysentery in armies, camps, barracks, prisons, crowded ships, where a neglect of hygienic laws and impure water supply are apt to prevail. One of the most conclusive instances upon record, of water infection, is that mentioned by Fagge in regard to the prevalence of dysentery in the Millbank prison.

It appears that this disease had prevailed in this prison extensively and for a long time. Dr. Fagge says (Practice of Medicine, p. 197):

> In the year 1851 the prisoners ceased to be liable to dysentery, and during the next eighteen years (up to 1872) one death only occurred from that disease or from diarrhea. Indeed, as far as I am aware the immunity has continued down to the present time; now one, and only one change in its hygienic arrangement has coincided in time with this improvement in the sanitary state of the prison. Formerly the water which the convicts drank was taken directly from the Thames as it ebbed and flowed beneath the walls. But on August 10, 1851, the artesian well in Trafalgar Square was made the source of supply to the prison; this has since continued. The change was effected in the middle of a cholera epidemic; six days afterwards the disease suddenly ceased. Enteric fever too no longer attacks the convicts, and the death rate has declined to an extraordinary extent. It is, I think, impossible to avoid the conclusion that the exciting cause of dysentery in Millbank prison was the Thames water, and in all probability the noxious ingredient was derived from the sewage contained in it.

Such facts as these, which could be multiplied *ad infinitum*, indicate the necessity of a careful study of the water, to determine the origin of the amœba, as well as to urge the importance of pure water supply as the best means of prophylaxis. The essential chronicity and difficult cure of this form of dysentery is due to the nature of the lesions, that is, ulceration of different portions of the large intestine, and sometimes of the ileum, with a disposition to infiltration, and undermining the mucous membrane, thus affording a nidus for the development, growth, and multiplication and distinctive work of the microorganisms. The character of the lesions gives the key to the most successful treatment, that is, cleansing the intestine from above by means of salines, of which the sodium and magnesium sulphate are probably the best; thorough irrigation of the colon from below, first with simple warm water, and second with antiseptic solutions for destroying the amoeba, and stimulating the ulcerated bowel to heal. For the latter purpose I have tried warm solutions of quinine, creolin, and silver nitrate. Carbolic acid and bichloride of mercury are likely to be absorbed and produce toxic effects. Quinine injections in my hands failed to show any permanent good effects; the organisms would disappear temporarily only. Nitrate of silver in weak solutions, about half a drachm to a quart of warm water, proved more effective than any other agent.

Another point, in which my experience coincides with that of Dr. Ball, is the necessity of combating the excessive anemia and wasting by the use of a more liberal diet than is generally prescribed. We may restrict the diet in catarrhal dysentery within very narrow limits, for, as Dr. Austin Flint has shown, that form of the disease is likely to run its course and recovery ensue in eight to ten days without treatment, restoration of nutrition speedily taking place. But in amœbic dysentery where recovery is a matter of months, and when the tendency is toward profound malnutrition, it becomes essential to combat this result by the early and continuous use of food rich in nitrogenous elements, finely chopped meat, chicken, eggs, rich broths, milk, together with a carefully prepared starchy food in moderate quantities.

Of remedies taken internally I have found but few to be of any distinct service. These are nux vomica and the preparations of pepsin to aid digestion. Bismuth subnitrate in large doses, with salol to control excessive frequency of the stools, has produced good results.

COLD STEEL AS AN ANTIRHEUMATIC.

W. K. VANCE, M. D., Bristol, Tenn.

That the two most common venereal diseases are frequent causative factors of inflammatory rheumatism is a fact that has been long known to the profession. Such an intimate relation exists, for instance, between syphilis and rheumatism that few physicians fail in suspicious cases, or in cases that do not in a reasonable time respond to ordinary antirheumatic measures, to substitute therefor antisyphilitic treatment.

We all frequently diagnosticate rheumatism as of syphilitic origin years after the initial lesion of the latter disease, and generally get satisfactory results from instituting a line of treatment based upon this theory. And yet I should like to ask, How many in this representative body ever think of rheumatism as of gonorrheal origin in the absence of a history of a recent attack of this malady? That such cases do sometimes occur as a sequel to gonorrhea months after the apparent subsidence of that affection, and, after defying all usual plans of treatment, the subjects thereof become confirmed chronic rheumatics, who continue until the release of death living monuments to the inefficiency of our art, is, in my opinion, a fact.

Several obstinate cases of rheumatism that have occurred in my practice have forced me to this conclusion. A brief history of two of these will illustrate the grounds of my belief.

Case No. 1.—J. M.; white; American; 32 years of age; family history good. He had been a victim of rheumatism for a period of eighteen months, during which time he had been totally incapacitated for his business, which was that of a clerk. During these months he had been under the treatment of a most excellent physician; but the patience of both patient and practitioner had been exhausted, and I was called to the unpleasant duty of taking charge of the case.

Instead of the splendid specimen of health, weighing 165 pounds, as I had known him eighteen months before, I found a physical wreck; weight 120 pounds; all the articulations of the body more or less affected; the knees, ankles, elbows, and wrists very much enlarged and almost in a state of anchylosis; heart's action weak, frequent, and intermittent; appetite gone, and ability to digest and assimilate food very much impaired. Knowing the ability of my predecessor as well as something of the line of previous treatment, I prescribed with little confidence of benefit resulting therefrom. During the six weeks that he remained under my care several different plans of treatment were tried, but there was no improvement whatever in his condition.

At the end of this period he decided to follow the advice that I had given at my first visit, namely, to try the virtue of the hot baths and treatment at the Hot Springs, Ark. This he did, and during the two or three months spent there was under the professional care of one of the best physicians at that famed resort. But instead of finding the hoped-for relief he returned in a worse physical condition than when he went, his means exhausted and hope of recovery gone. With a calm determination that was remarkable he informed me that, in his opinion, it would be best for himself and his friends that his life should end, and that he was fully resolved on suicide. That he was perfectly sane and in earnest when he gave utterance to these words I shall never doubt. His condition was indeed pitiable, and I realized that a human life in all probability depended upon my being able to bring some relief to his mental and bodily suffering. Cheering him up as much as I could with the hope of ultimate recovery, the next step was to decide upon some plan of bringing it about, knowing the uselessness of continuing the medicinal and dietetic measures that had been ineffectually used for so long a time. On inquiry I ascertained that he had had three attacks of gonorrhea, the last one antedating his rheumatism more than a year. He denied the existence of any gleet or any other symptoms of stricture, and it was with considerable reluctance that he finally consented to an exploration of the urethra. Examination proved, however, that he was badly strictured, his urethra barely admitting a No. 8 French sound.

At proper intervals I gradually increased the size of the sound used, and soon succeeded in dilating the canal so as to admit a steel sound corresponding to No. 24 on the French scale. In the way of medicine I renewed a prescription I had formerly given him, and had the satisfaction of seeing him improve rapidly from the inauguration of this treatment. Within eight or ten weeks he had so far improved that he was able to walk to the office in which he had been employed and resume work.

His progress towards recovery has been uninterrupted; and instead of the emaciated crippled, despondent rheumatic he was two years ago, he is to-day a picture of health, weighs 175 pounds, has not a symptom of his former trouble except slight pain and crepitus on forced flexure of right knee, and is satisfactorily filling a responsible position on one of our Southern railroads.

Case No. 2.—This case was almost a counterpart of Case No. 1; white; American; 25 years of age; by occupation a policeman; family history good; weight before attack 170 pounds, and a typical specimen of health and vigor. He suffered with rheumatism for more than two years, during which time he had been treated by several local physicians, and likewise by one or two in Philadelphia, with little, if any, beneficial results. Coming as he finally did under my care with a history of several attacks of gonorrhea, I profited by my experience with Case No. 1, found him strictured, and used the steel sound with like satisfactory results. For the purpose of determining the real therapeutic value of cold steel, I purposely omitted in this case all internal treatment except occasional doses of bicarbonate of potassium and hyoscyamus given with a view of controlling the mild urethral irritation. He has entirely recovered, and is at this time a horse-trader, perfectly able physically to endure the hardships incident to that vocation in a mountainous country.

Each of these cases, as stated, had been under the care of skillful physicians for a period of two years. These physicians had faithfully tried different remedies and plans of treatment without affording relief. The patients were relieved, however, and in a remarkably short time restored to good health, after treatment of the morbid condition of their urethras was commenced.

Now the pertinent question is, Were these simply cases of *post hoc*, or did they owe their recovery to the use of the steel sound?

My opinion, based upon the two cases mentioned and a few others with which I have met, is that by correcting the pathological condition of the urethra superinduced by the gonorrhea, the steel sound acts as a curative agent in certain cases of rheumatism after all known medicinal agents have failed.

Again, could these cases be properly classified as gonorrheal rheumatism, which, according to the usual acceptation of that term, must occur during the course of a specific urethritis? Fournier states that the usual period for the development of gonorrheal rheumatism is from the sixth to the fourteenth day of gonorrhea. Some authorities admit that it may develop occasionally as late as the sixth or even twelfth month in chronic gonorrhea. Both my patients stated, however, that they had been free from a discharge of any character for at least twelve months prior to the first manifestation of rheumatism.

Now, the vague idea that has for so long a time pervaded the profession that gonorrheal rheumatism is nothing more or less than a local manifestation of a mild pyæmia might be adduced, on account of the absence of a discharge, by those who hold to this view of its etiology as evidence that the cases I have reported were not gonorrheal. In answer, however, to this objection, I will state that in the cases examined with reference to this point the microscope and the liquor potassæ test both showed the presence of considerable pus in the urine.

The chief strictures in all the cases that have come under my observation have been in the membranous portion of the urethra. It is more than probable that there was a considerable ulcerated patch posterior to each of these strictures and the deep perineal fascia, the pus from which flowed backward into the bladder, and thus became mixed with the urine.

Another more plausible theory as to the etiology of gonorrheal rheumatism, first advocated, so far as I know, by Prof. Peter twelve years ago, is that "the exciting cause is the irritation of the genital organs present in gonorrhea, acting through some ill-understood mechanism."

Now, adopting either of the theories mentioned, the conclusion that my cases were of gonorrheal origin is more than probable.

If this position is correct, it logically follows that our diagnosis of gonorrheal rheumatism should not be restricted to those cases of rheumatism occurring during the acute or even chronic stage of gonorrhea, but that many of the intractable forms of rheumatism with which we meet are results of lesions of the male urethra so often left as the result of improperly treated or "uncured gonorrhea," of which there is no external tangible evidence, and that a knowledge of this fact and a rational treatment based thereon will enable us to relieve a large per cent of the chronic forms of rheumatism and advance medicine one step toward the scientific position which we all hope to see it ere long attain.

FELL METHOD—FORCED RESPIRATION—REPORT OF CASES RESULTING IN THE SAVING OF TWENTY-EIGHT HUMAN LIVES—HISTORY AND A PLEA FOR ITS GENERAL USE IN HOSPITAL AND NAVAL PRACTICE.

By GEORGE E. FELL, M. D., F. R. M. S., etc., Buffalo, N. Y.

EXPLANATION OF TERMS.

It may be well to premise what I have to say by calling attention to the meaning of the term forced respiration. We understand by artificial respiration an artificial method of breathing for an individual: but since forced respiration has been used with the remarkable results here recorded, it appears that terms should be employed which would be distinctive, and some time ago I made a suggestion to the profession, which seems to have been quite universally adopted, to the following effect:

Auto-respiration.—Respiration by the individual.

Deep respiration.—Forcible respiration by the individual.

Artificial respiration.—This we understand to be that produced by the methods which have been suggested by Sylvester, Howard, Marshall Hall, and others, in which movements of the limbs of the patients and pressure are made with the view of inflating the lungs. In many instances artificial respiration can not be depended on to furnish a sufficient supply of air to the lungs; hence the need for the following distinctive term:

Forced respiration.—Those measures by which air is forcibly passed into the lungs, according to the method first systematically used successfully in the saving of human life by the author.

REPORT OF CASES.

The following cases are reported in detail simply to silence all doubters as to the serious aspect of each case, as in the introduction of a new method into medical or surgical practice it is important to state cases fully. While some of these cases have heretofore been reported, the majority by far of the members know very little regarding the work accomplished by the author or of the value of forced respiration when properly utilized as a life-saving measure.

Case I.—At 12:30 a. m., Saturday, July 23, 1887, I was called to attend Mr. Burns, bookkeeper, residing at No. 49 Morgan street. Patient in a semiconscious condition. His wife reported that he had been drinking heavily for a week past, and had been in the habit of using alcoholic liquors to excess for some years. His present excesses induced him to try chloral to produce sleep, but finding this unsuccessful he added 20 grains of morphine,* with the following result: (According to his statement, he had taken the drug late on Friday afternoon, so that sufficient time had elapsed to permit complete absorption.) When first discovered by his wife, he was breathing stertorously, and was with difficulty aroused. A draught of black coffee was given, which produced vomiting. On my arrival I supplemented this with one of mustard, sodium chloride, and water, which effectually emptied the stomach. This produced no farther effect, as the patient, left to himself, immediately passed into the deep, narcotic condition of opium poisoning. The pupils were markedly contracted, and it was evident a serious case was on hand.

At this time I administered two cathartic pills which I had with me, and at different times minim doses of fluid extract of belladonna; sent for some atropia, and frequently administered the one-sixtieth of a grain hypodermically. To keep the patient awake, he was dressed and two attendants walked him around the block in

*Mr. Burns stated, on questioning, that he had a powder 2 inches long, three-fourths of an inch wide, and about one-fourth of an inch thick, and that he took one-half of it; on measurement, found equal to grains xx.

the cool, pure atmosphere of the early morning. At each round I examined him and administered more atropia. The fourth or fifth round, when within one-half block of the house, his limbs gave out, and while being tugged and jerked along, stertorous breathing began again. He was carried into the house and laid on the floor, as I believed, to die. This was about 3:30 A. M. As the respirations failed and the intervals between them lengthened, Sylvester's method of artificial respiration was employed, and kept up at intervals long after I had given up any hopes of the man's recovery and until I was thoroughly exhausted and, farther, without apparent benefit to the patient. In the meantime I notified the family that the patient could not live.

At this juncture Father Grant, of the cathedral, appeared and performed the last rites of the Catholic Church. At my suggestion, a bed was prepared in the front parlor of the house and the patient laid upon it. From Mrs. Burns I obtained the data for the death certificate, which I confidently expected to file in the morning. I then took a last look at the patient, only to confirm my opinion that death was imminent, and then thought nothing could be done. I was too thoroughly fatigued to think of forced respiration.

The pulse, before Father Grant came, had registered as high as 180, and before I left the house it could have been counted with difficulty. The respirations at 4 o'clock in the morning were five per minute, and when I left the house for home, were intermittent, or with a long intermission followed by a few spasmodic respiratory efforts, and then apparent inanition for a time. I left for home a little after 5 o'clock in the morning, went to bed, and after a sound sleep was awakened by a call about 8 o'clock.

Dr. F. R. Campbell,* who, through illness, had been unable to respond to an early summons from Mrs. Burns, called about 8 a. m., and finding Mr. Burns still alive sent for me. I promptly repaired to the house. The patient was just alive, with respirations, however, not more than one per minute, and the pulse with difficulty to be detected at the wrist. The extremities were quite cold; the face had assumed a cyanotic appearance; pupils still contracted. The doctor suggested that more atropia be given hypodermically, to which I assented. Together we repaired to the drug store near by, had some powders prepared, and on our return were surprised to find the pupils *widely dilated*; it is needless to say no more atropia was administered. The sudden dilatation of the pupils was undoubtedly caused by the paralysis of the nerve centres controlling the iris, and is one of the frequent conditions in the last stages of opium poisoning, and indicative of general muscular paralysis; It is also known as the "dilatation of asphyxia."

Dr. Campbell made the remark, "We can do nothing more now." I agreed with him; but recalling the case of a Mr. Dyke, and my views then entertained, whom I had lost about a year previous after having used all means then utilized by the profession in such cases and failed, I mentioned to Dr. Campbell my conviction that Mr. Burns' life might be saved by opening the trachea, placing a tube in it, and with suitable apparatus keeping up the respirations until the poison could be eliminated. I informed him that I had the apparatus used on dogs in the laboratory of the college at my residence near by. He offered to assist if I would make the experiment. With the aid of a gentleman stopping at the house I obtained the apparatus. On my way I asked Mr. G. H. McMichael, then a medical student, to assist in the operation.

Details of operation.—The tracheal tube was quickly cleaned with a bichloride solution, and the operation of tracheotomy begun at 9 a. m. The hemorrhage was overcome before incising the trachea. The greatest difficulty was experienced in passing a ligature † about the trachea to prevent the air from passing up the throat. After this was accomplished, we were ready to begin the respirations.

The blood passing from the incision was of a dark coffee color, indicating an extreme venous condition. Having been deeply occupied with the operation, I had not noticed the condition of the patient farther than to be able to state that no respiratory effort had been made for some time, and that the dark blue tinge of the face had materially increased.

We began the forced respirations. The lungs were inflated; not the slightest expiratory effort was made, indicating not only paralysis of the muscles of respiration, but loss of elasticity in the lung tissue. No mention has been made of the difficulty encountered after the patient revived and began to move uneasily about. These movements loosened the tube in the trachea and started hemorrhage, and as at this time the patient was depending upon the forced respiration for his life, the

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*Since deceased.

† This is now obviated by placing a ring on the tracheotomy tube. The face mask will, however, take the place of tracheotomy or intubation in the great majority of cases. By the method used in this case, it could not be expected that forced respiration would ever come into general use. As it is now used, tracheotomy is not necessary, and it can be applied by any one qualified by a small amount of study.

result was made uncertain. This was the most serious time in the operation. In the house were boarding three soldiers of the United States recruiting service, who were quickly summoned, and performed efficient service in restraining the patient. At this time, and before the tracheal tube was inserted, considerable blood passed into the lungs; it was subsequently coughed out at the opening of the valve of the apparatus. At 12 o'clock midday, after the forced respirations had been under way two and one-half hours, the ordinary tracheotomy tube was substituted for the tube of the apparatus, and the patient allowed to breathe for himself.

This case (No. 1) was reported in a paper read at the Washington International Medical Congress in 1887, and some two months afterwards Case No. 2 occured in Vienna. It will be noted that my first case had been fully published previously. I communicated with Prof. Boehm, of the Vienna Hospital, August 14, 1888, requesting an account of the second case of forced respiration. November 11, 1888, I received from him the following account of the case, which coincided with my views previously expressed regarding the value of forced respiration:

CASE II.

ALLGEMEINES KRANKENHAUS,
Vienna, October 21, 1888.

HONORED CONFRERE: Having just returned to Vienna, I take great pleasure in answering your favor of August 14, 1888.

There has as yet been no authentic report published of the methods which were employed in rescuing Dr. Langer from death by morphia poisoning. I therefore give briefly the important points of the case.

Dr. Langer took, between the 10th and 20th of September, 1887 (nearly two months after Dr. Fell's first operation), six decigrams (8.24 grains) of morphia dissolved in water. As his servant's attempt to awaken him in the morning was fruitless, a physician from the hospital was immediately called in, and he diagnosed morphia narcotism.

The pulse was very small and intermittent; respiration had nearly ceased, the number about five per minute. The pupils were contracted to the size of a pin's head and insensible to light; corneal reflex absent; deep coma; briefly, a typical case of narcotism by morphia.

The attempts to save the patient's life were now made.

The stomach was emptied of its contents and rinsed out with black coffee. This was followed by injections of ether. Both of which were followed by apparent good results. After the respirations had increased to seven per minute, the patient was removed to the Royal Hospital, at which place artificial respiration was kept up from 8 a. m. until 12:30 p. m. As it was now apparent that *artificial respiration was not sufficient** to restore normal breathing, tracheotomy was performed. A canula connected with a bellows was introduced and "forced respiration" (künstlich Luft eingeblasen) kept up for three or four hours. At 5 p. m. the use of the bellows could be dispensed with and our attention entirely devoted to watching the natural respiration.

The attempts which the patient made to breathe for himself continued to increase in number and the next morning he became conscious. Our subsequent treatment consisted in simply caring for the wound and in elevating and enlivening the much depressed spirits of the patient.

Case No. III.†—Mr. J. A. V., aged 43, took 2 ounces of laudanum and some chloral about 9 or 10 p. m., Saturday, December 10, 1887. About midnight his wife heard him breathing heavily, and tried unsuccessfully to arouse him, and sent for a physician. Dr. Lawrence G. Hanley, of the Emergency Hospital, was the first to respond to the call, and was shortly thereafter followed by Dr. Jacob Goldberg.‡ The condition of the patient at this time, 1:15 a. m., indicated that a large dose of some powerful narcotic had been taken. Breathing was stertorus; pulse, 128; respirations, six per minute; and pupils contracted. At 1:40 a. m., Saturday morning, I was called and found the physicians were employing Sylvester's method of artificial respiration. Assuming, at their request, entire charge of the case, I had the patient placed upon a mattress on the dining-room table.

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* Italics mine—G. E. F.

† This was Dr. Fell's second case and the first in which his simple but effective apparatus devised for use on man was used. Without it he is confident he could not have saved this or any of his subsequent cases.

‡ Dr. Samuel Goldberg was present later in the case, also a number of medical students.

2:20 a. m.: The natural respirations ceased, or would last but a short time without the aid of the artificial respirations. Pulse, 72 to 84, indicating satisfactory oxygenation of the blood; however, the notes taken at the time show that the natural respiratory efforts were so irregular and deficient that it was difficult to count them.*

The inefficient character of the natural respirations, even when supplemented with the artificial method of Sylvester, was evidenced by the gradually marked increase of cyanosis. Previous to this, when noticing the first good results of the artificial respiration in this case, I informed the physicians that this would be a good time to effectually answer those who believed that artificial respiration would accomplish as much as forced respiration in cases of deep narcosis from poisons which act upon the respiratory centers. I informed them that if the life of the patient could be saved by artificial respiration, or by any other known means, my special apparatus should not be used. It was evident that the artificial respirations were doing little good, growing less and less efficient.

2:30 a. m.: Natural respirations, seven per minute.

2:40 a. m.: Natural respirations, stertorous, twelve per minute, but so "shallow" that little good was effected by them.

3:25 a. m.: Respiration failed. Owing to evident signs of heart failure, it was considered by all the physicians present that the life of the patient demanded the application of forced respiration. Time was given to demonstrate beyond question the uselessness of the artificial respiration, until it was feared that the patient might succumb before the forced respirations could be applied.

3:40 a. m.: Operation of tracheotomy begun. Blood venous. Dr. Hanley remarked at the time that it was "ebony colored."

4:05 a. m.: Forced respirations begun. In a short time the pulse became stronger, and was reduced to 78 per minute.

5:30 a. m.: Pulse, 102. 5:45 a. m.: Pulse, 64. 6:25 a. m.: The patient, up to this time insensible, opened his eyes, stared in a half-dazed manner, and raised his head above the pillow. He recognized Dr. Goldberg (by voice only, as afterwards stated) and, in answer to inquiries, stated that he had taken 20 grains of chloral with some stimulant. This was found to be untrue.

6:45 a. m.: First noted that when forced respiration is discontinued, not the slightest attempt at breathing is made by the patient, even when the cyanotic condition is extreme.

During the progress of the case water was frequently swallowed by the patient. In one or two instances the forced respirations were unintentionally kept up when the patient was swallowing. The glottis being opened at this time, water entered the lungs and was subsequently coughed up and passed out of the valve of the apparatus.†

7:00 a. m.: Pulse, 96.

8:15 a. m.: Pulse, 108. It was found that the patient could breathe for himself, but only for a short time, and the forced respirations had to be continually kept up.

9:00 a. m.: The trachea tube not being secured tightly in the trachea, permitted quite an amount of blood to pass into the lungs, and the air to pass upward into the mouth, so that the lungs were not thoroughly inflated at each inspiration. This blood gurgled ominously at each respiration. With a curved needle encircling the trachea, another ligature (quite unnecessary now, as the rings to tracheotomy tube were not devised or value of face cup known) was passed and tightened about the trachea and tube. The forced inspirations following markedly improved the action of the heart.

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* This case is reported from full notes taken during its progress by the different physicians present.

† This indicates, in part, the value of the application of the apparatus in cases of drowning; also that it would be objectionable to pass a tube into the larynx by way of the buccal cavity when the elimination of poison is important, as liquid, in swallowing, would be apt to enter the lungs. (*See* argument on intubation, p. 81.)

As the poison became more completely incorporated with the blood, the effect of even a short stoppage of the forced respirations was indicated in a weaker action of the heart. At one time the rubber tube connecting the respiratory or air valve with the trachea tube became almost completely clogged with clotted blood. It was removed and thoroughly cleaned, as was also the inner tube of the tracheotomy tube a number of times. Digitalis fluid extract, in half minim doses, was given a number of times; also atropia, one-eighth grain at one time, and smaller doses also. No dilatation of the pupil took place at this time.

The question of keeping up the forced respiration when there seemed to be no prospect of the ultimate recovery of the patient was seriously discussed. I was urged to discontinue the respirations on account of the case being considered hopeless. At one time I stopped the respirations for a longer period than usual, thoroughly discouraged and tired. The man was not dead, and we had to keep it up.

11:30 a. m.: Drank some brandy and water; vomited. As the patient had at this time been given up to die, his family were permitted to see him and "bid him good-bye."

12:00: Pulse, 117. One seventy-fifth grain of atropia administered hypodermically.

12:10 p. m.: Face cyanosed; efforts to breathe made; twitching of toes; respirations not supplying air enough.

12:40 p. m.: Owing to a solution of atropia being placed on or in the eyes, the pupils gradually dilated.* Pulse, 126.

12:55 p. m.: The patient, who had become unconscious for a short time, regained consciousness and drank some water. Pulse, after drinking, 168, weak and flickering. After this more air was administered by giving three movements of the bellows for the inspiration instead of two, as formerly.

3:20 p. m.: Temperature, 100.5° F.

6 p. m.: Pulse, 120.

After nearly 15 hours of forced respiration, at 6:15 p. m. the patient began breathing for himself. Respiration, 14 per minute. This lasted 55 minutes, when, the respirations lowering to 8 per minute, at the request of the patient the forced respirations were again proceeded with.

9:15 p. m.: Pulse, 120; respirations, 14, natural; becoming shallow they were supplemented with the forced respirations.

11:30 p. m.: Pulse, 100.

December 11, 1887, 12 midnight: It is now 20 hours since the forced respirations were begun.

1:05 a. m.: Pulse, 128, strong. The patient has been breathing for himself for the last 4 hours, but has now requested that the forced respirations be used for a time. Since then he has breathed spontaneously. For over 14 hours he could not be left to breathe voluntarily, even for half a minute, without evident discomfort and danger, viz, between 4 a. m. and 6:30 p. m. of the 10th instant, and for nearly 7 hours thereafter the natural had to be supplemented by the forced respirations.

4 a. m.: Pulse, 117. Although oleum tiglii gtt. v. has been administered, no movement of the bowels has taken place. Essence of pepsin, beef peptonoids, milk, and spiritus frumenti given a number of times. Enemata of water, soap and water, with oil and stimulants given also.

Every 6 or 8 hours the catheter was used. Up to 12:30 a. m., 11th instant, and some 27 hours after, 2 ounces of laudanum had been taken, not more than 6 ounces of urine had been drawn from the patient. This large amount of poison (2 ounces) had been going the round of the circulation, producing its maximum effect on the whole system. The left arm was partially paralyzed, the brain congested.

* This may not have been judicious, but it was done under the belief of all the physicians present that the patient could not recover.

Between 3 and 4 a. m., 11th instant, bowels moved for the first time. At 7 a. m. the patient left the table without assistance to use stool. At 9 a. m. tracheotomy tube was removed, wound plugged antiseptically, and patient put to bed. Although very seriously ill for three or four days following, no serious lung difficulty set in and the patient has fully recovered.

The histories of forty-three cases are given in detail.

Medical literature abounds with very little of any value upon the subject. There is no question that experimentation previous to my own had demonstrated that it was almost useless to attempt to save life by this means, but that artificial respiration would accomplish all that could be obtained by artificial means. The opinion also prevailed that more forcible measures than those used in artificial respiration would "endanger the delicate lung tissue," or that the "air vesicles might be ruptured." We may instance the very generally accepted Marshall Hall's Ready Method in Asphyxia, wherein we find the use of bellows or any forcing instrument strongly condemned. Even in some of our visiting lists, where we might expect to find only axiomatic phrases, this rule was laid down until lately with special stress upon the inadavisability of using any forcing measures or instrument.

While forced respiration has been practiced for many years, both here and abroad, upon animals in physiological laboratories, in vivisection experimentation, we have yet to ascertain that such application has taught it to be considered as of value in the saving of human life, the keeping up of respiration in the human organism, or as a means of resuscitation in asphyxia.

Can this be wondered at when high authorities inform us that artificial respiration will supply the blood with oxygen fully as well as forcible measures, or utter statements which convey just such impressions? In Heath's Dictionary of Practical Surgery, under the head of "Suspended animation," this statement appears:

> It is important to bear in mind that artificial respiration is purely a mechanical act, and that, if efficiently performed, air must enter the lungs even of a corpse which is hopelessly dead.

In a short discussion which ensued upon the report of my first case, presented to a section of the International Medical Congress at Washington,* several physicians took the ground that the operation of forced respiration was not needed, that artificial respiration (Sylvester's method) would have accomplished as much. With such statements accepted and supported by the mass of surgical literature, it would be ridiculous to assert that the methods employed in the physiological laboratory were considered valuable in the resuscitation of human beings in asphyxia.

I will now defend the position, based upon my own experience, that artificial respiration, as practiced by the Sylvester method, which is conceded to be one of the best, will fail to supply the lungs with air in sufficient quantity to keep up the action of the heart in deeply narcotized subjects, where forced respiration, in many cases, would prove entirely successful. In one of my cases the opinion was expressed by an experienced physician † who witnessed the operation, that the simple institution of artificial respiration, through the bodily movements required, might have proved disastrous to the patient, owing to his weakened condition through loss of blood. The contrast between the two in operation is very noticeable. In artificial respiration the patient is tugged, squeezed, and rolled about, according to the method employed; while in forced respiration he is usually entirely passive and will lie for hours without moving or appearing uncomfortable as long as the latter procedure is properly kept up. In the case just referred to, the life of the patient depended upon the forced respiration for nearly a day and a quarter, and now the patient is as well as ever. The question may yet arise, in desperate cases, as to the propriety of the early substitution of forced respiration for artificial respiration.

When I had made my third operation and saved three human lives, after all usual methods had failed, a gentleman, who presumably was a physician, stated, in an

* September, 1887.

† Dr. Carlton R. Jewett, of Buffalo, N. Y.

article furnished to the Daily Press, that "The resuscitating bellows is as well known to every physiologist as is the use of the stomach pump, and that Dr. Fell learned its use with the other students at a medical college in Buffalo, where its employment was thoroughly taught by Prof. M—— for twenty years." If this correspondent had left out the word "resuscitating" he would have been more truthful, and if he will recall the apparatus used, and the manner of using it—which will be explained farther on—he will see his mistake. Many times during my assistanceship of two years in the laboratory of the medical department, University of Buffalo, when operating upon canines for the purpose of exhibiting the thoracic viscera in action, the animal has been overdosed with the anæsthetic, and the respiration would cease. Under these conditions artificial respiration was always resorted to and kept up by pressure at intervals upon the chest, after which the operation of opening the thorax would be continued, and usually among the last procedures would be the substitution of the forced respiration by opening the trachea and using the bellows. It was not "taught" that even the life of a dog could be saved by forced respirations.

It is not necessary to refer to the literature on this subject further than to state that while spasmodic efforts have been made at times to make use of forced respiration, owing to the improper methods used the results have not proved sufficiently satisfactory to prove it a valuable procedure, but, on the contrary, to condemn it unqualifiedly.

I can not do better to indicate the general aspect of the profession toward this operation than to modify for the present occasion the utterances in my last paper read before the American Medical Association, Detroit meeting, 1892.

It is now about six years since I first saved life by systematically respiring for a human being by forced respiration. Up to the present time about 30 lives have been saved by this means. The method has been given as great publicity as possible by publication in well-known medical journals and proceedings of societies. The fullest detail as to the arrangement of the apparatus has been described, so that the successful methods could be utilized and the apparatus prepared by anyone sufficiently interested. I have always been willing to aid and assist anyone disposed to utilize the method. The most simple means by which the operation could be satisfactorily performed have been detailed, with a view of aiding the practitioner in urgent cases where the complete apparatus could not be obtained. However, what results have been accomplished, as already stated—the saving of 30 human lives—have, with some exceptions, taken place through my own individual endeavors.

Many human beings, as the reports of the daily press have indicated, have been allowed to die when preventative means existed which the members of the medical profession could have utilized had they only taken advantage of the statements and facts freely presented to them. It may not be entirely truthful to state that the medical profession in America is ultraconservative regarding the use of "new methods," in the face of the wild furor over "tuberculin," or the Brown-Sequard elixir. The latter quickly proved itself of no value, and the former the best authorities now appear to discredit as anything of a specific for tuberculosis. How has it treated forced respiration—in its success an entirely American idea, and which from the first intelligent application gave results that could not be questioned by even those inclined to be jealous and unfriendly? It has not even been made the subject of special comment in the medical institutions of the day, so that the graduates in medicine of but few colleges in the land are intelligently qualified to carry it out, and medical practitioners are not prepared to use it or apply it when supplied with the apparatus.

This was quite interestingly demonstrated in a case (No. 25) at a time when I was unable to attend, and sent my young nephew with the apparatus to assist two regular practitioners in the saving of a human life from opium narcosis. Although both residents of my native city, and the methods of forced respiration being very simple, these gentlemen were not sufficiently well acquainted with the simple details of the apparatus to use it intelligently. My student, a young man about 16 years of age, having seen it frequently in use, assumed charge, and saved the lady by his efforts. I only speak of this to show that simple methods require more or less study and consideration on the part of anyone, even capable physicians, who desires to use them intelligently; and I deprecate most fully the assertion of Prof. Horatio C. Wood that any method upon which the life of a human being may hinge may be used by "unskilled persons." Through the simplicity of the methods which may be utilized in forced respiration which have been brought to our knowledge through my efforts consists its great value to mankind—the saving of the life of many human beings has been accomplished at my hands only by the skillful use of an apparatus specially adapted for use upon man, and through practical knowledge which it has taken me some years to become satisfactorily acquainted with.

Another instance which indicates that medical-press notices and publication in State association transactions will not suffice to impress upon the profession the value of forced respiration as a life saving factor, was instanced in the case of Carlyle W. Harris,* convicted of the murder of his young wife, Helen Potts, through the administering of morphia in fairly large doses. In one report of the case it is claimed that young Harris desired or suggested to the physician who was attempting to resuscitate the young woman that he make tracheotomy, having a vague idea only of its use. The physician appeared to know nothing about the method. In this one instance I have no hesitancy in stating that the life of the young woman could have been saved by my method of forced respiration, and in the event of the execution of Harris (which did take place), we will have to record two lives lost through what will be some of these days almost criminal ignorance of physicians. There are many useless things taught in medical schools. Why not present those of value in the saving of human life and make instruction more practical?

The public press is almost daily recording cases of death from narcotic poisoning or from drowning in which the old methods have failed. Why not try something better, which has succeeded time and again where they have failed and must frequently fail?

QUESTION OF ORIGINALITY.

Regarding the question of the originality of my method, Prof. H. C. Wood has given the impression through his statements before the Berlin congress, that the apparatus I used was similar to that used in the laboratory upon lower animals, so that Dr. John O'Dwyer, of New York, has given public utterance to the statement which Dr. Wood first and, I think, unwarrantably, urged. In an article in answer to Dr. O'Dwyer, on the improved method of performing artificial respiration (*see* Archives of Pediatrics, May, 1892), I show nine marked practical features of difference between the apparatus which I have used successfully and the laboratory apparatus with which I saved my first life by forced respiration. I quote from my answer as follows:

> That used in my laboratory† before I devised my forced respiration apparatus for use upon man consisted of a large foot bellows, a rubber tube to connect it with a large brass tracheotomy tube supplied with a valve, which had to be turned by hand to let the air pass into the lungs, and turned in the opposite direction to let it pass out.
>
> With this arrangement, each time the valve is turned, for the inspiration as well as the expiration, the trachea was given a wrench. I have found that it makes a great difference whether you are wrenching the trachea of a dog or a living human being. I overcome this feature of the laboratory apparatus by making my tracheotomy tube and the valve which controlled the air column in separate parts, connecting them by flexible rubber tubing. This would permit the patient to move

* Subsequently electrocuted at Sing Sing, N. Y.

† Medical department Niagara University, Buffalo, N. Y.

about without endangering the trachea. This may be noted as the first feature differing from the laboratory apparatus, as I first used it in tracheotomy cases.

In the laboratory apparatus the trachea had to be ligated around the tube, as Dr. O'Dwyer states, but not so in my apparatus. To prevent this, I screw to the tracheal end of the tube a larger or smaller ring, according to the size of the trachea, which fills up the trachea, preventing an excess of air from passing out by the side of the ring.

This is the second novel feature of difference from laboratory methods.

Again, I made the connection between the flexible rubber tube and the tracheotomy tube so that it could be easily and quickly disconnected. This is an important feature and constitutes the third feature of difference between my own and the laboratory methods.

The valve which controls the air also has some valuable features. First, with it the air can pass into and out of the lungs at all times, except during the forcible inspiration—fourth and fifth differences from that of the laboratory apparatus. Second, the air from the bellows is constantly passing through the valve during expiration, thus allowing the air to immediately enter the lungs from the air valve when the piston is pressed down, without traversing the whole length of tube from bellows. With this arrangement, autorespirations can be assisted instead of interfered with, a factor of importance in many cases I have met with. With it we can instantly change from an inspiration to an expiration and have complete control of the air utilized, which can not be done by any other method of practical value.

This marked the sixth and seventh differences between my apparatus and that used in the laboratory.

In the construction of the bellows I used a diaphragm of rubber dam (now a double bellows without perishable rubber), which equalized and produced a steady, instead of an interrupted or jerky column of air, such as Prof. H. C. Wood unwisely, I believe, suggests in his so-called "cheaper apparatus," with common bellows, although I used a simpler apparatus previously on a human being. Here we have the eighth difference between my own and the laboratory apparatus.

If I wish to present still more features of difference, I might include the air-heater which I also have used in cases of resuscitation of human beings. The eight features of difference mentioned above will, I trust, put a quietus upon the question of similarity between my own and the laboratory apparatus. What I have accomplished in bringing about the knowledge that simple methods may be used has resulted from careful attention to the details of practical import associated with an operation which holds human life in the balance, not by slipshod methods which would have relegated this operation to oblivion and which methods some would try to revive to gain glory where they are entitled to none. If the saving of over 30 human lives, the record of results with which my work must so far be credited, is not an argument in support of my statements, what "under the stars" does or will give credence to human utterance? However, I have overlooked another dissimilarity between the laboratory apparatus and my own—the face mask, which brings the operation within the reach of the unprofessional when properly instructed. Of course, the face mask, everyone will admit who knows nothing about it, was used in the laboratories in the days of Galen. Without joking, however, this constitutes the ninth marked difference between the laboratory apparatus and my own, and yet Dr. O'Dwyer does what appears to me an injustice in speaking of the two as being identical.

I desire to state that, notwithstanding an experience in laboratory vivisection work for eight years prior to my first operation of forced respiration upon man, it was not until this first operation that I was enabled to conceive its great value. All my experiments, the gradual unfolding through operations upon human living beings of the value of the face mask, should give weight to my words above those resulting from experimentation upon dogs; the conditions are very different. All that experimentation upon dogs has revealed as to the value of forced respiration in saving life I had previously demonstrated upon living human beings; when I began my work, as stated, it was not even known that it would save a dog's life.

Now, a few words with reference to the evolution of the face mask. I had begun the operation of tracheotomy upon one of my patients, when my attention was called to the fact that he was dying, the dilatation of asphyxia taking place. I immediately placed the tube of the apparatus in his mouth, closed the lips upon it, and compressed the nostrils; inspiration then being produced, I was pleased to find the purple deoxygenized blood in the tracheotomy incision change to a bright scarlet. I had many demonstrations of this character following, which gave me the idea of the face mask. Having a rubber cup used for cupping purposes, I fitted it to the face and saved several lives with it without tracheotomy before preparing the one I now use.

While the description of an instrument may appear somewhat detailed, and indicate that the method in operation is somewhat difficult, such in this instance is not the case. All there is to forced respiration as I have utilized it is the forcing of air under suitable pressure and control, with proper periodic intermission, into the lungs. It can only be properly done with suitable apparatus. The simplicity of the method should give to the operation its widest range of usefulness; but to become practically acquainted with it, one must see it and study it before he can understand it. With proper instruction, the members of a life-saving or a ship's crew could be taught to utilize this valuable method of saving human life. I presume before the "conservative" (?) medical profession of America or the world will utilize this valuable method that thousands of its members must have their attention specially called to cases of resuscitation through its employment, must personally see it work.

Another matter I may refer to at this time: I believe all will admit that the greatest credit which it is possible to obtain as the originator of a method of wide range of applicability in saving human life consists in the largeness of the list of lives saved by it, and the just appreciation of its value by your fellow-man. There is no higher aim that we as physicians can conceive than that of preventing the vital spark from taking leave of the human organism. If this be true, it does appear unjust, unfair, and unthankful that credit should be withheld from those who are entitled to it, and the medical world, in any section, use these methods without the greatest care in giving to those justly entitled the credit due them. In the mercantile world dollars and cents, with honor, counts; in our profession, reputation only.

This is the only payment which the profession allows those who accomplish results of value in fields unexplored. Indirect financial gain for special service is not honest gain. On this account, therefore, the original labors of physicians should be guarded with the utmost care in all sections of the globe. The following quotations (with additions) from a paper presented before the last (proceedings 1891, p. 181) meeting of the New York State Medical Association will explain my reasons for the above remarks:

Through the kindness of Dr. Thos. H. Manley, of this association, I am enabled to refer to an article in the proceedings of the Paris Academy of Medicine, under the date of June 2, 1891, in which Dr. J. V. Laborde, in a discussion on "Anæsthesia" regarding the dangers of chloroform narcosis, recommends forced respiration, and has devised a face mask with which to perform the operation. This face mask is of metal, with the edges surmounted or faced with rubber, and includes the nose and mouth. It is, "to all intents and purposes," similar in detail to the one I have been using for some years, and with which I have saved a number of lives. Dr. Laborde speaks of his invention as novel, of great future value, declaims on the subject never having been brought up for discussion, etc. The members of the New York State Medical Association, who have been acquainted with my work for the first four years, will agree that our Paris physicians can well afford to look Westward to learn that progress is not confined to Continental Europe. It is quite strange, also, that Dr. Laborde has overlooked the statements of Prof. Horatio C. Wood, in his address on "Anæsthesia" before the Berlin Congress, 1890, in which he distinctly calls attention to my face mask, and which I had been using for two years previously.

I am also astonished by the statement in the Paris Academy report, that noted French physicians have been using my method by tracheotomy with remarkable success, and without giving any credit for its practical introduction to the world from this side of the Atlantic.

At the Paris Exposition of 1888, which had a department to illustrate life-saving methods, one of my instruments was exhibited by Mr. George M. Bailey, of Buffalo, N. Y., who, having witnessed the remarkable case of Julius Bare, in which instance I respired twenty-four hours for my patient before he was able to breathe for himself, requested, in the interests of progress, the privilege of taking it abroad. He had with him reprints of my articles published in the transactions of the New York State Medical Association, which were distributed among some of the physicians and jurors interested officially in the exposition. At that time, through ignorance of the value of my method, they took no notice of my work as being worthy of note as a life-saving invention. Even the representative of the United States Government at the Paris Exposition did not see anything of value in it, although no more remarkable cases are recorded in the annals of medical science than some of the first reported in my memoirs which were placed at the command of these gentlemen, but possibly not given the attention they deserved. What is most remarkable, however, they appropriated it, utilized it, and now claim originality for methods which I had previously used and first recommended in practical shape to the medical world.

I would not speak thus pointedly did I not believe these gentlemen cognizant of my work through the publications left at Paris. It may be, however, that they did not see them.

Also, let me refer you to a criticism which was made some time ago by a Dr. Herzog, of Hoboken, in which he called attention to an instrument having been devised for forced respiration, some twenty years ago, which had been donated to the Humane Society of London, England. The apparatus consisted of a large cylinder so arranged to force air into the lungs and one to exhaust it. It was costly and cumbersome and undoubtedly was never used to save human life, or if it had been would likely have failed ingloriously.

In justice to the results of my work I must give my answer to the article in question. I stated that "I would not now be surprised if some one should add that Hippocrates had thought of forced respiration, and even devised an apparatus to perform it with. John Hunter did both, and possibly others, but we have no record of any of these noted men having applied their invention to the saving of human life. See Prof. Horatio C. Wood's remarks in his address before the Berlin Congress, in which he says:

But I have not found that either Hunter or Richardson treated by forced artificial respiration an actual case of disease or poisoning.

If these physicians failed where I succeeded am I entitled to less the credit?

In all this apparatus a grave defect existed, in my opinion, in that provision was made to exhaust the air from the lungs; this complicates the apparatus, and, furthermore, is not in accord with physiological conditions, as inspiration is a forcible measure, while expiration, being passive and produced by the elasticity of the fibro-elastic tissue of the lungs, does not call for the utilization of mechanical means to produce it. I also believe that an apparatus provided with means for exhausting air from the lungs would prove a very dangerous instrument to place in the hand of the average physician in an emergency case.

However, no one will question that Richardson, Hunter, the designer of the apparatus mentioned in Dr. Herzog's letter, and several others whom I could cite, have prepared or invented instruments for forced respiration upon human beings.

With all their labor, what did they accomplish? Was a single human life saved by them? Did they demonstrate the wonderful possibilities of the method? Let us see. After my first operation with the instrument used in my physiological laboratory, and with which, notwithstanding its defects or adaptation for the purpose, I had succeeded in keeping my patient alive for nearly three hours, until he breathed for himself, I looked up the home and foreign literature on the subject. Nothing was discovered which appeared to controvert the fact that I was justly entitled to the credit of being the first to systematically and practically solve the question of the value of forced respiration in the saving of human life; or that I had demonstrated, as one physician puts it, "that air can be forced into the lungs without any damage to them." Whatever has been accomplished also should be stated was without any previous knowledge of the failures in the same field, which had antedated my efforts.

I can say, with the practical knowledge obtained from operating upon human beings, that the instruments used in the physiological laboratory do not meet the conditions to be successfully overcome in breathing for a human being for any length of time. They may answer in some instances as a makeshift, but the work is carried on at a great disadvantage, and with many chances in favor of producing, instead of averting, a fatal result. They were never intended to be used upon human beings. The instrument, with face mask, originally devised by myself, in all its practical details, and with which the results tersely detailed in this paper were chiefly accomplished, was founded upon the experience obtained in my first case, and the results of my labor with it so overwhelmingly annihilates any controversy in opposition to its use that it is needless to do more than present them to the profession. Had similar results or demonstration been accomplished at the hands of others in the past, nothing could have prevented them from receiving the widest publicity in the medical literature of the day, but no record is found which detracts from the practical value and originality of my labors. As a physiologist, I was acquainted with the apparatus used in the physiological laboratory, from the simple bellows with nozzle poked into the trachea of a dog, to the more complicated constant Sprengle blower with interrupter, which admittedly would be of no use as an emergency instrument.

The apparatus I had used meets all the requirements for forced respiration in man, with or without tracheotomy, and in the simplest manner. It covers* all the methods which can be utilized in the operation, is adapted to be used out of doors in a cold atmosphere, but may be modified by an arrangement to provide a constant air supply and automatic inspirator, which would, however, increase the cost and do away with the emergency feature of the apparatus as now used.

Dr. Herzog's article, possibly without intent, would naturally lead to the inference that the subject is old—not worth considering; its tenor is not uncertain. The truth is that the work in forced respiration, prior to my own, and running through the past century to a great extent, had simply relegated it to the list of unjustifiable procedures. Do we find anything previous, based upon results, recommending us to use forced respiration after all other methods of artificial respiration had failed? On the contrary, we do find in every medical work treating on the subject, the Ready Method of Asphyxia of Marshall Hall, the highest accepted authority, that we must avoid the use of bellows or any forcing instrument.

Now I propose to talk plainly, as it seems entirely unnecessary at this date to mince words upon this subject. The practical introduction to the world of the value of forced respiration in the saving of human life, the demonstrations which indicated its great possibilities, must be accredited to an American, and the work of others in the past had nothing to do with the results obtained by him, which were original in conception and practical in application.

The question simply amounts to the difference between failure and success. Will the credit be accorded to those who failed or the one who succeeded? In this Columbian year I might ask if Christopher Columbus had prepared his ships, but not sailed across the Atlantic, would he have discovered America?

What also must be admitted by those who are inclined to accord justice to whom it is due, is that the practice of vivisection in the colleges and laboratories of the land had no relation whatever to the saving of human life, or had it ever been taught in medical institutions, systematically or otherwise, as of any value in saving human life. For over eight years prior to my first operation of forced respiration upon a human being I had been a practical vivisectionist in the physiological laboratory, and during that time I never heard it even hinted that a human life might be saved by the laboratory methods. (A strong argument is here deduced in favor of vivisection.)

It was in the field of paralysis of the respiratory centres from opium that I began my work with forced respiration, and the demonstrations as to its efficacy, from the first, could not be questioned. Each and every case saved had passed beyond the limit of hope so far as all known and systematically applied methods of resuscitation were concerned. To be denied the credit which should, in all fairness, be accorded to the practical originator of a method of such far-reaching importance in the saving of human life is what I could not and will not quietly submit to. "Honor, gentlemen, to whom honor is due."

* I do not question that different mechanical devices might not be successfully used in forced respiration. They would not supply or accomplish more than I have done in the method recommended.

Let me also correct another impression coming from high authority. Dr. John O'Dwyer, who advocated intubation, states that there are serious objections to the use of the face mask (see his articles, Archives of Pediatrics, May, 1892,) and tracheotomy in forced respiration.

The majority of cases upon which I have operated have been cases of opium narcosis; cases, it is true, which offer the widest demonstrations of the advantage of the method in its long continued use, and yet, it must be borne in mind that the life of the patient is not out of danger until the poison is eliminated from the system.

Now, I am quite sure that Dr. O'Dwyer or no other judicious physician would recommend a method which would prevent the imbibing of fluids, through which means we may most readily aid elimination of the poison. Intubation, which he recommended, would certainly do this in preventing closure of the glottis, and therefore I have not used it; also, it is a fact that one of the difficulties we have to contend with in these cases is the danger of vomited fluids entering the larynx and obstructing respiration. I have lost lives through this occurring. I must contend, therefore, that in such cases tracheotomy offers more hope for our patient than intubation, as there is no interference with the passage of fluids to the stomach. Experience has shown again that intubation will be seldom needed when the face mask offers us as good results without any of the difficulties which must be necessarily met with in intubation. The objections Dr. O'Dwyer urged against the face mask are not in many cases borne out in actual experience; views based upon practical experience must be conceded as of more value than those of a semihypothetical nature. Nearly up to the present time, so far as can be ascertained, I have probably had more systematic operations of forced respiration upon man than all the rest of the physicians of the world combined. What I may say upon this subject is based entirely upon this experience.

Dr. O'Dwyer states that "in forcing air through the mouth or nose of an insensible patient the tongue, unless secured, is almost certain to cause obstruction, or the vocal chords may be forced together by the inrushing air and act as a valve as in paralysis of the abductor muscles, because there is no expansion of the glottis as in normal inspiration." This does not generally hold, I can safely state, from the observations I have made and now repeat tersely.

In my eleventh case, young woman, I used the face mask for 4 hours; my fifteenth case, female, for 7 hours; seventeenth case, female, 2 hours; nineteenth case, old lady, 2 hours; twenty-first case, female, 7 hours; twenty-second case, female, 4 hours; twenty-fourth case, male, 5 hours; twenty-fifth case, female, 2 hours. In all these cases, and many subsequent, for the time mentioned, which resulted in the majority of instances in saving the lives of my patients, there was absolutely no interference with the air passing directly to the lungs. Furthermore, the chest would heave and fall in many cases in the most natural manner. That such results could be obtained by the cheap apparatus mentioned in The Year Book of Treatment, 1891, p. 193, Dr. Wood being given the credit as originator, and lauded as the best, consisting of a face mask, a few feet of rubber tubing, a pair of bellows, and two sizes of intubation tubes (ordinarily not required), I do not believe. With such an apparatus, which it is stated could be used by "unskilled persons," I am quite certain I would have lost many of my patients. In the cases referred to, if too great pressure was produced the œsophagus would expand and cause stomach inflation, but by careful inspirations for a time, followed by pressure on the abdomen, it would pass away without inconvenience.

What appears to me may be urged as facts of value in this connection are the following: The passage to the lungs under ordinary conditions of unconsciousness, except, and even sometimes in swallowing, is always open. The air forced into the lungs does not, as is generally believed, cause a closure of the glottis any more than the deep auto-inspiration of ordinary respiration. Exceptions may be taken to all rules, of course.

If forced respiration by my method, use of face mask, etc., be carefully conducted, the lungs may be as fully inflated as under deep auto-inspiration, and the respirations kept up for a period of time, ranging from one to ten hours, according to size of individual and degree of obesity. Thin, spare patients appear to be better subjects than those of opposite build. In the few cases in which from continued work with complete paralysis the tongue has fallen back and occluded the larnyx, a ligature has been placed through it and the organ held forward. Usually extension of the neck will raise the glottis, but can not always be relied upon; in such cases intubation would be of value. After the face mask has failed, in one or two instances, I have saved life by performing tracheotomy, which was called for through the cases being narcotized by opium (*vide* previous remarks).

As to intubation, it may have its place in some cases of forced respiration, but to urge its value over the use of the face mask, when the latter has accomplished so much, is unwarranted.

SOME QUESTIONS OF PRACTICAL IMPORT.

Dr. J. S. McLain, of Washington, D. C., who has taken considerable interest in this subject and supplied himself with my apparatus, propounded the following questions, which have a practical bearing upon the use of the instrument. The answers may prove of value to all interested:

First question: After padding the face cup, if necessary, to make it fit the face of the patient, is it necessary to make considerable pressure thereon when the air is being sent into the lungs, to keep the air from escaping at the sides of the cup? The amount of pressure will vary in different patients, but not to a great extent if the cup fits the contour of the face snugly. I have used it upon men with mustache or whiskers and it has worked well. It is a mistaken notion that much pressure of air is needed to inflate the lungs in inspiration. The artificial lungs which I have used in demonstrations very nicely illustrate this, and with them the actual pressure used in any case may be readily obtained. (For a description of these lungs, see Transactions of the New York State Medical Association for 1888.) The presence of cyanosis is the most important condition which calls for more active or forcible inspiration. In producing it it should be borne in mind that too great pressure will distend the œsophagus and inflate the stomach and intestines. If this should take place pressure upon the stomach, or abdomen, at intervals, will relieve the condition so as not to prevent the descent of the diaphragm and interference with inspiration.

In the majority of instances I have not found it necessary to hook up the tongue. If it falls back and prevents the air from passing to the lungs a coarse ligature can be passed through it carried out at the side of the face cup and retained in place with very little trouble. Sometimes, but not always, by raising the larynx or extending the head, respirations will be much facilitated.

My experience would lead me to state that forced respiration by the face mask is more readily and successfully applied in the case of thin than in corpulent individuals.

A case in point was that of Mrs. N., who had taken eleven grains of morphia. Artificial respiration, Sylvester method, was of no avail. Four hours of forced respiration, Fell method, placed the lady out of danger. In this instance the slightest movement of the air-control valve would cause the chest to heave when the respiratory centers were almost completely paralyzed. The marked cyanosis was quickly overcome and the most complete control of the inspirations existed. Similar results have been frequently noted. In plethoric cases the results are not so satisfactory, although respiration has been kept up many hours in such cases with good results.

Second question. Is it necessary, when using the face cup, to pry the mouth open and raise the tongue, or will the air enter in sufficient quantity through the nostrils, supposing the mouth to be closed? In the majority of cases, air will enter through the nostrils in sufficient quantity to supply the respiratory needs. If the base of the tongue occludes the glottis a ligature passed through the tongue, as stated, will aid the inspirations. This will be seldom required.

The object of presenting this paper to the members of this Congress is that through the unquestioned results obtained by the methods first systematically and practically recommended and by giving a clear record of the experiences which brought them about they may be readily taken up and utilized for the benefit of the profession and humanity.

Dr. Pepper, the worthy president of this body, gave his opinion to the effect that the reading of papers, and giving demonstrations before medical bodies would do but little towards introducing a new practice, so that it would be generally utilized by the profession. He urged that I would succeed better by placing into the hands of the well-known clinicians of the country a few instruments * at cost price and await the results of their use. This I will endeavor to do, as there is no evidence that instrument manufacturers will do anything with the apparatus until the clinicians generally have demonstrated that it is a necessity and a valuable addition to our armamentarium. More than this medical opinion must be molded so that it will be considered hazardous to attempt to save life without proper appliances being provided beforehand. A physician of Syracuse, N. Y., telephoned me to send him an instrument, that he had a lady patient in danger of dying from an overdose of opium or morphia. I received the word two or three hours after it was sent and forwarded by express the only instrument I had at my disposal, offering it to the party at less than the actual money outlay I had incurred in preparing it. Next day the instrument came back with the statement that while the physician was at the depot obtaining it his patient died, that now knowing where he could procure one, he would wait until he had another patient before procuring it. If a second patient comes around he will undoubtedly have another death certificate to fill out.

The following letter in answer to an inquiry of Dr. J. Frank, of Chicago, who is supplied with an apparatus, may be of practical value to any one desiring to use the method: "Suppose a case of asphyxia from any cause as opium narcosis, drowning, inhalation of gas, a case of shock from any cause in which the respiratory centers are disturbed or in which the respirations are shallow from loss of vital energy and in which the Sylvester or any other method of artificial respiration has failed or is of no value. Use the apparatus as follows with the parts in the following relations to each other. Face mask or cup—rubber tube connecting it with air valve—air valve—rubber tube connecting air valve with bellows.

With your patient on a table, bed, or floor, as the case may be, press face cup over the nose and mouth and have bellows worked by an attendant at the rate of from 120 to 150 times per minute for an adult and less for infant or youth. For each three movements of bellows press down piston of air valve which permits the air to pass to the lungs, bulging out the cheeks and produces an inspiration. Then release piston of air valve for three movements of bellows, letting the air pass out of lungs and producing the expiration; keep it up. If cyanosis does not pass away make the inspiration a little longer. With the air valve you can absolutely control the outward or inward movement of the air and by watching. If attempts at respiration should be made by the patient you can materially assist them and change instantly from one to the other. The puffing out of the cheeks, heaving of the chest, and vibration of the vocal chords (slight snoring sounds) are all indicators of value in the progress of the work. This method of forced respiration in such a case is doing more than to keep up the life of the patient where all the old methods of Sylvester, Marshall Hall, and other methods of artificial respiration would fail. Through the extra quantity of oxygen supplied to the blood it overcomes, to a degree, the effect of the narcotic, and thus enhances the chances of recovery of the

*One manufacturer made a number of instruments and failed to have any calls for them. Another failed to see any money in it. A company was formed to manufacture them, but did not succeed in effecting any sales. Hence my remarks on this page.

patient. In addition, however, all methods calculated to tone up and invigorate the heart muscle and system generally with those calculated to eliminate the poison circulating in the system must be used. Don't fail to try forced respiration even when the prospects for successful resuscitation seems useless, as I have many instances in which life has been saved when the indications gave little cause for hope.

THE INJECTION IN PNEUMONIA AND TYPHOID FEVER OF SERUM FROM CONVALESCENTS.

By W. E. HUGHES, M. D., PH. D.,

Visiting physician to the Philadelphia Hospital; physician to the out-patient department of the Children's Hospital; instructor in physical disagnosis in the University of Pennsylvania.

Before taking up the consideration of the actual cases of these injections themselves, let us glance briefly at the conditions which have led up to them, the evolution of theories which have made them possible and the final results, toward which they are but stepping-stones. And these are all bound up within the problem of immunity, a problem which has ever engaged the attention of observers, a problem which has baffled even theory, and the solution of which will go far toward the rounding out of the circle of medical investigation.

Immunity is natural or acquired. Natural immunity is, first, inherent in races or species, due here either to processes acting along the lines of evolution, or, on the other hand, to the continued failure of the causative microbe to adapt itself to conditions existing in the host; second, sporadic, that is, existing in scattered individuals of a species, a condition resembling in many features natural immunity and difficult of explanation, a difficulty shown by the numerous theories brought forward toward its elucidation and by the warmth of support which every one of these theories has elicited.

The theory which at present is most prominent, and indeed to which all others may in some manner or other be referred, is that in which the cells play an all-important role (phagocytosis), and that which attributes the whole protective power to the blood serum. The old explanation given for immunity before the part played by bacteria in the production of disease was clearly known—that of exhaustion of the soil—has been almost completely cast aside; unfortunately so, perhaps, for, reasoning by analogy with the higher vegetable growths, it is more than possible that this may eventually demonstrate itself to be a most important factor. However, it is not my purpose here to discuss at length the theories of immunity, much less to attempt to decide between them. The ground has been so thoroughly gone over that to reharrow it would be wearisome as well as useless, and, too, the time is not yet ripe. There are as yet too few factors in our possession. Our knowledge does not yet extend far enough to make a definite decision tenable.

There are, though, some facts necessary to be made prominent lest we fall into error. While bacteria are the cause of a disease, yet its symptoms are due not to the bacteria themselves, but to products attendant upon their growth, and the destruction of these products, while causing an abatement of the symptoms, may still have no effect upon the bacteria, and may not be at all concerned in the production of immunity. Again, care should be taken not to identify the action of blood serum with that of blood plasma, for it is well known that while serum may be strongly bactericidal, yet in the plasma from which the serum was drawn the bacteria may flourish luxuriantly. Further, as the object of our investigations is the preservation of life, we must not be led away by theories looking to brilliant immediate results, but rather gather together our facts slowly and surely, looking not for an instant reward, but hoping everything at the hands of the future.

The knowledge that we have acquired of the production of immunity is briefly this. The introduction into the blood of animals of immune blood, of attenuated bacteria, or of the products of bacterial growth may render these animals unsusceptible afterward to a disease. Whether this immunity is due to a failure of the bacteria to grow or to a loss of lethal power of their products is a moot point; at least this much is evident, it is the result of some change in the condition of the immune animals. Most experiments have been done upon animals; the few on human beings are much the most valuable, but at the same time much more liable to error and to lead to false deductions. It can readily be seen why this must be so; we can not control nearly so completely the conditions which surround a man as those among which a white rat lives.

The first impulse is to attempt to produce a cure, to brilliantly imitate nature or even to improve on her, and stepping in suddenly end a disease. But it must be steadily borne in mind that the production of a cure is not necessarily the production of immunity, cure and immunity may not be strictly synonymous. It is true that after the cure immunity follows, but may not the production of cure be merely a step in the production of immunity, may it not be brought about in various ways and the destruction of the symptom-producing toxines a process so varied and indefinite that even after its nature is fairly understood it may be of little practical importance. Therefore, it would seem possible that, while the destruction of toxines may seem the simplest and easiest way of attaining our end, yet in reality that end can be attained only through a thorough understanding of the deeper processes that underlie the production of immunity, and the end to be attained may be protection rather than cure. The only disease in which such protection has been a perfect success is smallpox, and here vaccination was stumbled upon and its processes are even yet not understood. The only other disease in which efforts have been made to produce results by a process similar to vaccination is hydrophobia, and here the success is somewhat doubtful. On the other hand, in the three diseases, tetanus, measles, and pneumonia, a cure has been striven for by the injection of immune serum. Because a certain result follows a certain procedure in one disease is no good reason why this should hold good in an allied disease. We know too little of the life histories of microorganisms to generalize successfully.

That there are different methods for the production of immunity, and so different methods of cure, is probable from the existence of natural immunity. The blood of animals naturally immune seems to have little effect in conferring immunity, nor does the serum from such blood differ in its bactericidal power from serum from susceptible animals. In the three diseases above mentioned the procedure adopted has been the injection of serum from animals or persons rendered immune by previous vaccination or disease. Here, looking at the results obtained, the theory has been advanced that the cure is brought about by a neutralization of the toxines, and that it is this antitoxic material which confers immunity. In tetanus the method has been a success, in measles at least doubtful. Pneumonia, which more nearly concerns us at present, was experimented on first by the Messrs. Klemperer. They announced the following facts: Animals can be immunized by the introduction into their blood of the sterilized products of the diplococcus; heating these products to 140° F. hastens the process; this immunity is conferred only after the lapse of some time and is attended by fever; the introduction of immune serum confers immunity immediately.

Their paper was soon followed by the publication of other cases. Among others, Dr. W. S. Carter and myself published* a case where we used intravenously defibrinated blood and gave our reasons against a repetition of such a procedure Since the publication of our paper Audeoud † and others have placed cases on record till at the present time there are records of 39 cases, of which all but one have been successful.

* Therapeutic Gazette, October 15, 1892.

† Rev. Méd. de la Suisse Romande, February 20, 1893.

The present series of 13 cases, which I shall ask you to consider, were injected by Dr. Carter and myself. They were selected carefully as being typical and taken at a time when there would be little danger of confounding the result obtained from the injection with the natural crisis. In all serum was used, which was obtained most frequently by venesection, occasionally by blistering. The serum was injected subcutaneously, this having been found to be as efficacious and less dangerous and troublesome than intravenously.

Case 1.—In Philadelphia Hospital: Man (negro), *æt.* 26 years. Pneumonia involving whole of right lung. General symptoms of quite marked severity. Temperature averaging about 103° F. Diplococci in sputum. On the fourth day of the disease, at 3 a. m., 7 c. c. of serum was injected, and again at 9 p. m., 25 c. c. The first injection was followed by no change whatever in the temperature. Twelve hours after the second it fell to 101° but rose again immediately, though never to the height it had maintained before the injections. It was not till the eighth day that the crisis occurred and the temperature fell to normal. After this there was a secondary rise, the normal being finally maintained after the tenth day. Beyond the trifling lowering of the temperature after the injections, there was no effect produced upon the general symptoms. Resolution of the affected lung was rather slow than otherwise.

Case 2.—In Philadelphia Hospital: Man, *æt.* 50 years. Alcoholic pneumonia of moderate severity. Consolidation involving part of lower left lobe. Temperature not high, ranging between 101° and 102°. Diplococci in sputum. On the fourth day 25 c. c. of serum injected, which was followed in twelve hours by a subsidence of the temperature to normal and a complete amelioration of the general symptoms. The man died, however, about a week later of uræmia. The death could in no wise be attributed directly to the pneumonia, convalescence from which was complete. Albumen and casts had been noted in the urine during the febrile period, and it is probable from his history that the Bright's disease antedated by some time the pneumonia.

Case 3.—In Presbyterian Hospital: Man, *æt.* 67 years. Both lungs involved irregularly at the bases, but consolidation nowhere perfect. General symptoms of great severity, typhoid state, low muttering delirium, marked heart weakness. Temperature quite irreglar, ranging between 100° and 104°. Diplococci present in abundance in the sputum. On the ninth day, at 4 p. m., 25 c.c. of serum injected. On the next day, at 1:30 p. m., 15 c. c. The injections had absolutely no effect upon either the temperature or general condition and the man died six hours after the administration of the second one. The post-mortem examination showed a condition of lungs suggestive rather of broncho than of lobar pneumonia, although there were present copious virulent diplococci.

Case 4.—In Presbyterian Hospital: Man, *æt.* 40 years. Right apical pneumonia. Symptoms of moderate severity. Temperature averaging about 102°. Diplococci in sputum. On the fourth day at 4 p. m. 9 c. c. of serum injected. At 8 p. m. the temperature commenced to fall, and four hours later it reached 95.4°. Convalescence was rather protracted, though this was probably the result of concomitant conditions. The man gave a history of syphilis and had Bright's disease, dating back at least four years.

Case 5.—Girl, *æt.* 8 years. Pneumonia of right lower lobe. Symptoms of moderate severity. Temperature ranging between 102.5° and 103.5°. On the third day 2 c. c. of serum injected. The temperature maintained its usual range for twenty-four hours, when it commenced to fall, and by twelve hours later had reached normal. The pneumonia was followed by a trifling pleural effusion without any return of fever, but this was quickly absorbed and scarcely at all retarded convalescence.

Case 6.—In Presbyterian Hospital: Man, *æt.* 24 years. Pneumonia of right upper lobe. General symptoms of pronounced severity, verging on the typhoid state. Temperature ranging between 103° and 105°. On the fifth day at 8:30 a. m. 25 c. c. of serum injected. By midnight the temperature had fallen to 100°, delirium had disappeared, skin was cool and moist, and, in short, the general condition was immensely bettered. After this the temperature slowly rose, ranging between 101° and 103°, but never attaining its previous maximum, and the delirium and other bad symptoms returned in a measure. It is perhaps worthy of note that during this period cold sponging produced a marked temporary abatement of the fever, while previous to the injection it had but little effect. Through an inadvertence no further injection was given till the eighth day, when 5 c. c. of serum was used. Promptly after this the temperature fell to 97°. Convalescence was very rapid.

Case 7.—In Presbyterian Hospital: Boy, *æt.* 11 years. Case of moderate severity. Temperature ranging between 102° and 104°. On the fourth day at 2:30 p. m. 11 c. c. of serum injected. By 2 a. m. of the next day the temperature had fallen to 96.8°. Convalescence was rapid.

Case 8.—In Philadelphia Hospital: Man, *æt.* 28 years. Pneumonia of left lower lobe. Symptoms of moderate severity. Temperature averaging about 103°. Diplococci in sputum. On the fifth day 25 c. c. of serum injected. Twelve hours after the injection the temperature had fallen to normal.

Case 9.—Man: *æt.* 21 years. Pneumonia of right lower lobe. This case was seen from the very inception of the disease and promised in the beginning to be one of only moderate severity. On the second day at 9 p. m. (forty-six hours after the initial chill) 25 c. c. of serum was injected. The temperature up to this point had been constant at 104.4°. At 9 a. m. of the following day it was 103.4° where it continued throughout that day with no change in the general symptoms from those of the day preceding. At 9 p. m. on the third day 40 c. c. more was injected. Twelve hours later the temperature had returned to its original 104.4. At 9 p. m. on that day—the fourth of the disease—45 c. c. was injected; five hours later the temperature had fallen to 101°, but this subsidence was only temporary and unattended by any amelioration of the general symptoms, which had been growing steadily graver. Two days later meningeal symptoms became prominent. Before this there had been but the ordinary delirium of pneumonia or any other febrile state, and on the following day he died. At the time of death the temperature had reached 108°.

Case 10.—In St. Agnes' Hospital: Man, *æt.* 23 years. Pneumonia of right lower lobe. Symptoms of pronounced severity. Temperature ranged between 102° and 103°. On the fifth day 25 c. c. of serum was injected. No effect whatever was produced by the injection on either temperature or general symptoms. He died on the seventh day.

Case 11.—In Presbyterian Hospital: Woman, *æt.* 45 years. Consolidation had involved whole of right lung. The symptoms were of the gravest possible character. Temperature ranged between 102.8° and 103.6°. Diplococci in sputum. On the sixth day at 11:40 a. m. 30 c. c. of serum injected. This was followed promptly by a rise of temperature to 104.4°; then it fell, reaching in fifteen hours 101°, with a most gratifying change in the general condition. After this the temperature was irregular, ranging between 101° and 104°, but it was thought that the symptoms lacked the extreme gravity of the period before the injection. It was not till the eleventh day that convalescence, which was afterward moderately rapid, actually set in.

Case 12.—Woman, *æt.* 48 years. Pneumonia of left lower lobe. Symptoms of rather pronounced severity. Temperature ranging between 103° and 104°. On the sixth day 25 c. c. of serum was injected and a like quantity on the seventh day. Absolutely no effect was produced by the injections upon either the temperature or the general condition. The crisis occurred on the tenth day and convalescence was probably rather more rapid than the gravity of the attack would have predicted.

Case 13.—In Philadelphia Hospital: Man, *æt.* 50 years. Pneumonia of right lower lobe. Condition not at all grave. Diplococci in sputum. On the fifth day 15c. c. of serum injected. On the sixth day injection repeated, this time 25c. c. being used. Neither injection had any effect upon the temperature. Crisis occurred on the ninth day. From the time of the last injection the man complained of pain and soreness at its site—on the outer aspect of the thigh. This spot afterward became inflamed, indurated, and eventually the seat of an abscess, which was extremely slow in healing. There was no evidence of any systemic involvement from this abscess, and convalescence from the pneumonia went on uninfluenced by its occurrence.

Case 14.—In Philadelphia Hospital: Man, *æt.* 30 years. Alcoholic pneumonia. Symptoms of extreme gravity. Temperature ranging between 101° and 102°. Diplococci in sputum. On the fourth day at 4 p. m. 25c. c. of serum injected. Twelve hours later the temperature had dropped to 100°, where it remained till 8 p. m. of that day (the fifth of the disease), when 17c. c. was injected. Six hours later the temperature had fallen to 99.4°. For the next two days it ranged between 99° and 100°; then it rose rapidly and the man died, the temperature at the moment of death being 108.2°. No effect whatever upon the general condition had accompanied the lowering of the temperature following the injections. A short time before death a marked discoloration developed about the site of the second injection, persisting even after death.

Now, what conclusions can be drawn from this series of cases? In the light of my experience with the first case injected, together with the results in other published cases, I must confess to a most distinct disappointment. In cases 1 to 10 the serum used was apparently as perfect for its purpose as could be wished. It would be a useless expenditure of space and time to particularize the cases whence the serum was obtained; a careful study of them has enabled me to formulate no rules governing its irregularity of action. Suffice it to say that they were all cases of undoubted and typical pneumonia, in every one of which the presence of virulent diplococci had been established. In none of them was the interval which was permitted to elapse between the crisis and the taking of the serum more than two weeks; in many of them it was less. Having these serums, then, obtained under identical circumstances, it was surely to be expected that perfectly regular and definite results would follow their use, but the event proved otherwise. While some of the cases were marked successes, others showed equally pronounced failures. Thus, of the nine cases only five could be claimed as distinctly proving any effect due to immune serum. In another (case 5), while a crisis did occur following the injection, yet the time that elapsed before its completion (thirty-six hours) renders it doubtful that this effect was due to the serum, and the fact that an early crisis is not at all uncommon in children strengthens this doubt.

Of the three cases where no result was shown, in case 1 I am tempted to explain the at least partial failure by the fact that it was in a negro. Seeing that the diplococci in a negro's sputum seem to be so distinctly more virulent than those in the sputum of a white man, it may be imagined that the same holds good in the lungs and that a larger dose of antidote would be required. It is possible that, had the first dose been larger or been followed by others a conclusive result would have been obtained. It seems to be a fact, judging from experiments upon lower animals, that the more virulent the bacteria the less easily antidoted is their toxine. But if the failure here was due to exceptional virulence of bacteria and, consequently, large amounts of toxine we should expect an exceptionally pronounced immunity, granting that toxines have anything to do with immunity; and yet, as will be seen later, the serum of this man rapidly lost its antitoxic power. Case 3 may be explained by the seeming irregularity of the pneumonia, though, on the other hand, diplococci, that crucial test, were present in abundance. From a careful study of the case, in the light of the symptoms and of the post-mortem examination, I am strongly of the opinion that such explanation is not sufficient, and the case must be classed as an unquestioned failure. In case 9 no explanation whatever of the failure can be offered. Everything was favorable to the action of the serum. The man came under observation immediately after the initial chill, the general treatment was carried out under most favorable auspices, the quantity of serum used (110 c. c.) was certainly large enough, and yet blank failure resulted—immune serum did not antidote the toxine.

Can we reconcile these discrepancies? It would seem not, in the present state of our knowledge. That the irregular results were due to causes inherent in the persons of those injected, essential variations in disease processes, or subtle radical differences in constitution, and not to faulty conditions of the serum, is proved by the fact that different results attended the use of the same serum. Thus cases 2 and 3 had the same serum—2 was a success, 3 a failure. Again, case 4 showed a pronounced success, 5 a doubtful result.

The lack of action of immune serum in certain cases might be explained on the assumption, 1, of a quality of diplococci causative of the pneumonia; 2, of a variation in the toxines; 3, of the inadequacy of the antitoxic theory to fully explain the cure of pneumonia and the subsequent immunity.

(1) The quality of the diplococci. While we are still not perfectly familiar with the life history of the specific cause of pneumonia, yet what work has been done, and comparison with other specific diseases render this hypothesis only remotely probable.

(2) Variation in the toxines. Bacteria in the course of their growth produce at least three distinct classes of poisons, the individual action of which is not definitely understood. These toxines being somehow instrumental in the production of the fever, it is on their neutralization or disappearance that the end of the fever depends. But these toxines are constant concomitants of the growth of bacteria, and while, under differing conditions of inherent qualities or environment, it is possible that the toxines are secreted in varying proportions, yet it is not likely that the average proportions would ever be so rudely disturbed as to lead to total failure of a neutralizing agent to act. The toxines must always be the same. It requires too violent a stretch of the imagination to conceive that under practically identical conditions of production in some few aberrant cases an entirely unusual toxine had been substituted. Therefore this hypothesis is not to be entertained, and this then brings us to consider—

(3) The inadequacy of the antitoxic theory. This theory proposes a purely chemical action, and, granting that there is a single specific cause for pneumonia and that the toxines produced are always the same if there be a definite antipneumotoxine, must not its action be the same in all cases? Let me draw attention here, again, to the probable difference between cure and immunity: Cure, or the disappearance of fever, means the destruction of the fever-producing toxines; immunity, the impossibility of bacterial growth or failure of secreted toxines to produce deleterious effects. Are these two conditions necessarily identical? I am driven to the conclusion by consideration of these cases reported that they are not; the neutralization is merely a step in the production of immunity, and its causes will have to be sought deeper down. At the same time there may be a neutralization of poison by substances in the immune serum; but these substances may exist only in the serum and not in the plasma, and really not be concerned in the production of immunity.

While, therefore, it cannot be doubted that immune serum may have a most pronounced effect, yet the irregularity of its action certainly suggests strongly that there are important factors other than the antipneumotoxine concerned in the production of the crisis and the subsequent immunity. What these factors may be it is impossible to indicate, but it would seem probable that they are to be found rather in some condition of the cells than of the blood serum.

One thing in these experiments I have been most certainly unable to do, that is to duplicate the results published by several observers obtained by very small quantities of serum. In the only case where I ventured to use so small quantity as 2 cc. (that of a child, where surely a small quantity would be most likely to be sufficient) the result was practically negaitve.

I have considered hitherto only the first 10 cases, where only perfect serum was used, the other cases were injected with serum which might be supposed a priori to have a less definite effect. In cases 11 and 12 and in the first injection in cases 13 and 14 the serum was obtained from a case of abortive pneumonia, the crisis having occurred on the third day. The case was one of unquestionable pneumonia, diplococci being present in great abundance in the sputum. Such abortive pneumonia can be best explained by the incidence of pneumonia on a case almost but not quite immune naturally, and were the antitoxic theory correct, one should expect a most marked effect, instead of which the results were all purely negative except in case 10, where the result was at least doubtful. This would bear out what has previously been found to be the fact, that naturally immune serum does not protect and strengthen the hypothesis of different methods for the production of immunity.

In cases 13 and 14 the serum used was obtained from case 1—the negro—five weeks after his crisis. Within two weeks after his crisis he has been bled and the serum used with a successful result, but in these two cases the result was negative. Therefore, if these two cases prove anything, serum, which was at first actively protective, may lose its autitoxic power after the lapse of five weeks.

From a therapeutic standpoint the results of the injections are disappointing. In the ten cases where perfect serum was used there were three deaths. As this is certainly not less than the ordinary death rate in pneumonia, as a treatment, purely, of pneumonia serum-injection would scarcely commend itself. With the imperfect serum the death rate was about the same, one in four.

The injections are, however, if carried out with proper precautions, perfectly harmless. In none of the cases, either of pneumonia or typhoid fever, were any bad general effects noted. In two cases, 13 and 14, there was local inflammation following the injection, but as the serum used was obtained from one man at the same time, and as, owing to the fact that it was not obtained under my personal supervision, it was in all probability contaminated, this result might have been avoided. One word of caution here about the serum—it must not be obtained from a case where there is any suspicion of kidney-lesion, for Dr. Carter and I have found that serum drawn from victims of Bright's disease is capable, when introduced intravenously into dogs, of producing nephritis.

TYPHOID FEVER.

Stern* has found that white mice injected with a mixture of typhoid bouillon with serum from a recent convalescent from typhoid fever survive, while those treated with unmixed bouillon die. This would seem to indicate some antidotal properties in the serum. Though it is scarcely to be supposed that from two diseases so dissimilar as typhoid fever and pneumonia the same result would be obtained by the injection of immune serum, yet the following experiments were undertaken with the hope that some effect would become apparent. The serum obtained was from convalescents in whom somewhat less than two weeks had elapsed since the end of the fever. It was obtained by means of venesection.

Case 1.—In Philadelphia Hospital. Man, *aet.* 30 years. Case of average severity. Mild nocturnal delirium. Bowels moderately constipated. Heart strength well preserved. The history and symptoms pointed to the ninth day as the day on which he came under observation. The temperature would have ranged probably between 102° and 104°, but sponging and bathing kept it between 100° and 103°. On the twelfth day, at 7:15 p.m., 60 cc. of serum was injected. At midnight, after sponging, the temperature was 98.4°. Previous to the injection it had never been reduced by sponging or bathing below 100°. This seemed to inaugurate the gradual defervescence of the temperature. On the fifteenth day it reached normal in the morning, and from the twenty-second day on it was permanently practically normal. Convalescence was rapid.

Case 2.—In Philadelphia Hospital. Boy, *aet.* 19 years. First seen on seventh day. Light case; very slight nocturnal delirium. Two or three stools a day. Heart quite weak. Temperature ranged between 100° and 102°. On the twelfth day, at 7 p.m., 20 cc. of serum injected; 11 a.m. next day temperature 98.4°; then it rose to 101°. Injected again, at 5:15 p.m., 20 cc. Two a.m. next day temperature 98.4°; then it rose, till 6 p.m. it was 100.1°, when he was again injected with 20 cc. of serum. After this the temperature rose, till at 9 p.m. it was 101.8°. It slowly settled after that, and convalescence set in on the eighteenth day.

Case 3.—In Philadelphia Hospital. Boy, *aet.* 18 years. Came under observation on the eighth day. Case graver than the preceding. Quite marked delirium. Heart rather weak. Very slight diarrhœa. Temperature ranged between 102° and 104°, but could be depressed to 99° by sponging. Injected as follows: twelfth day 10 cc. of serum, thirteenth day 10 cc., fourteenth day 25 cc. No effect was apparent on the temperature till the fifteenth day, when it ranged between 100° and 101.8°. It gradually fell after that, remaining at normal from the twentieth day on.

These cases were none of them especially grave and would certainly have recovered in the natural course of events. The type of typhoid fever prevalent was mild and irregular, and these cases were selected as being the gravest and most typical obtainable at that particular time. Some of the companion cases ended as early as the end of the third week, and it may be that the cases above recorded ran a normal course uninfluenced by the injections. Still it is unusual to have three consecutive cases of typhoid fever terminate as these did on the twenty-second, eighteenth, and twentieth days, respectively. If the serum had any immunizing effect it acted as would have been expected, not by producing any sudden fall of temperature, but by bringing on the gradual termination of the fever sooner than it would otherwise have occurred. In spite, then, of the mild nature of the cases and the somewhat irregular action of the serum I am inclined to the opinion that the serum had some effect. It is unfortunate that it could not have been tried upon some severe cases.

It affords me great pleasure to express my thanks to Drs. J. H. Musser and D. F. Woods for their kindness in placing at my disposal cases of pneumonia under their care in the Presbyterian Hospital, to Dr. J. P. C. Griffith for the use of a case in St. Agnes' Hospital, and to the resident staff of the Philadelphia and Presbyterian hospitals for assistance in the observation of cases.

* Deutsche Med. Woch., September 15, 1892.

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Dr. M. M. PONTE, Caracas, Venezuela.

The section met in the hall of the medical department of the Georgetown University.

In the absence of Dr. Guitéras, Dr. Joshua M. Van Cott, honorary president, took the chair.

PAPERS READ BEFORE THE SECTION.

THE STATUS PRÆSENS OF THE ÆTIOLOGY OF CANCER.

By J. M. VAN COTT, Jr., M. D.,

Professor of Pathology at the Long Island College Hospital, and Director of the Department of Histology and Pathology, of the Hoagland Laboratory, Brooklyn.

In the last three years, and up to August of this year, no less than eighty-seven theses have appeared in various languages treating exclusively of the ætiology of cancer. Various theories have been propounded in attempted solution of the problem, and as many claims made that the goal had been reached, and cancer stood amongst the pathologic occurrences in the human body for which a definite origin could be shown.

Since bacteriology has made such enormous strides, and since these organisms have been proven to be parasitic to man, and definite forms connected causatively with specific forms of disease, it is perfectly natural that attempts should have been made to determine some bacterial organism as the responsible factor to the production of cancer; but since the exhaustive work of Sehe this effort has been abandoned, it being generally conceded that if an organism be at hand in cancer it is not a plant, but some low form of animal life.

There are three recent theories of the ætiology of cancer at present claiming particular attention throughout the scientific world, and each having its plausible side. One relates to indirect cell division, and is styled by its originator, Hansemann, "Assymmetric Cell Division in Cancer and its Biologic Significance." The second, which has for its advocates such men as Podwyssozki, Sawtschenko, Sondakewiz, Sjöbring, Pfoa, Ruffer, Russell, Pfeiffer, *et al.*, supposes that an intracellular, or intranuclear parasite—according to some a coccidium, to others a psorosperm, and still others a gregarina—infests the tissues and through its presence induces a lawless growth of epithelial and connective tissue elements.

The third supposes that cancer is parasitic; that the parasites are animals, but that no epithelial elements exist in these neoplasms at all, the polymorphous bodies found in the growth being in reality not epithelial cells, but the parasites themselves; and that these parasites produce a toxic substance, cancroin, which is responsible for the so-called cachexia. (Adamkiewicz.)

Such widely different ideas are evidence enough of our lack of definite knowledge on the subject and the difficulties at hand.

And yet on careful analysis of the three hypotheses, there are many points in each which may be made to harmonize, and which are in keeping with the clinical facts at hand.

Bacteriologic research has taught us much regarding parasitic affections, aside from the special action of specific forms of germs. It has thus been pretty clearly shown, that what is called "normal resistance" inheres in the tissues of healthy individuals, which prevents parasitism. Much light also has been thrown upon the relation of heredity to parasitic disease. It has further been shown that location has important bearing upon parasitic infection, some points being far more vulnerable than others. In the same way trauma is definitely proven to bear direct relation to the entrance of parasites into the tissues. And in this connection it has been abundantly shown that parasites are prone to focus at points where a "*locus minoris resistentiæ*" has been established (in the tissues). Finally, contagion has been settled as a fact in diseases of known bacterial origin. So that these various conditions may be regarded in the light of bacteriology as directly associated with many parasitic affections in greater or less degree; and if they can be shown to be so related to cancer, this too should be regarded *à priori* as probably of parasite origin.

One other fact connected with cancerous development should be considered, i. e., that primary foci always originate in epithelial tissue, showing the purely local origin of the disease; the tumor belongs originally to the homologous growth.

The experiments of Waterhouse and others go to show that, so long as the healthy tissues have not been devitalized they have the capacity to resist the action of pyogenic and other germs to an astonishing extent; but that when the tissues become damaged so as to show a lessened resistance, they are readily seized upon by these organisms, which may then grow and produce their most deadly effect. No one knows just what heredity is, more than that it seems to be a transmitted susceptibility to the development of disease; and bacteriology has positively shown that, even when an individual is born with a certain disease, it is only hereditary in that the offspring is capable of supporting the parasite which is its real cause. It is hard to fix an accurate standard of normal resistance, but this does not prevent the recognition of a reduced resistance, and it is this reduced resistance which is hereditary in many instances.

How far these facts can be applied to the growth of cancer is a very pertinent question, because, if it can be shown that they do in any important measure apply to these neoplasms, it would be difficult to avoid the conclusion that the disease is parasitic.

That there is a normal resistance to the growth of cancer in tissues is shown by the fact that repeated efforts to transplant the cancer tissue into healthy individuals have failed, while autoinoculations have been successfully made.

There can be no question as to the inherited tendency of some individuals to contract cancer. This has been distinctly proven for a long time. Whole families seem to be capable of harboring the process for successive generations. It is equally certain that, just as in tuberculosis, persons may acquire cancer in whom can be traced no hereditary taint whatever.

As to location as a factor in cancerous processes there seems to be a good deal to show that it does bear close connection with its origin. It is a significant fact that primary cancer has not been known to develop in places where there is not contact with the external air, and Andrews has, amongst others, studied the locations of 7,881 primary carcinomata as illustrating the probability of a cancerous microbe.

In any event cancer is prone to originate at points in the body which are constantly subjected to contact with various foreign substances oftener than at any others.

There would seem to be a close relationship between this fact of location and trauma. Abundant proof has been derived from clinical observation, that trauma is often associated as the exciting cause of cancer; and regarding as trauma any mechanical injury to the tissues, independent of its degree, it is easy to see how this might operate to enable the occurrence of this disease through the establishment of the "*locus minoris resistentiæ*." The low grade of vitality of scar tissue is well known. Rudolf Volkman has collected 128 cases of cancer developing from scars, ulcers, or fistulæ of the extremities. At least six writers have claimed by title of their papers directly that cancer is contagious and infectious, and there seems to exist a close relationship between trauma and tumor development, as evidenced by such an occurrence as the development of epithelioma upon the penis of a man whose wife was suffering with similar disease of the cervix uteri.

Clinical histories are perfectly familiar to those who have been on the alert to find them where it would be exceedingly difficult not to regard cancer as contagious.

It is also significant that primary cancer is homologous to a tissue always found in exposed portions of the body, and whose ultimate elements are regarded by cytologists as to an extent, and from the relative standpoint, wanting in resistance—a fact supposed by them to be due to their high state of differentiation.

Reasoning by analogy, there are strong proofs of a general nature in favor of a parasitic origin for cancer, for it has been distinctly shown above that the same facts which have been determined regarding the parasitic nature of the bacteria—i. e., normal resistance, heredity, location, trauma, the locus minoris resistentiæ, contagion—are all definitely related to the development of the disease.

Furthermore, the progress of cancer is very suggestive of a parasite in its resemblance to the progress of other infectious organisms; the tendency to form colonies or foci and to traverse the path of the lymphatics is exceedingly significant. Such considerations as these are ample warrant for the eager search at present in progress the world over for an organism which shall stand the test of Koch's law of the pathogenesis of germs and be competent to produce under proper circumstances cancer at will. In this hunt for spoil we labor under the one great disadvantage that no one has succeeded as yet in inoculating the lower animals successfully with cancerous material. There is an exception to this: One observer has succeeded in getting carcinoma to grow in rats.

Success in this line would very soon put us in position to progress more rapidly in the quest.

In considering the general questions involved in the parasitic theory of cancer it must not be forgotten that there are those who are bitterly opposed to the idea, and who claim for the various appearances in cells which have been denominated as parasites that they are really the results of pathologic degenerations of the cells. To establish this claim it must be clearly shown that the intracellular inclusions behave in a manner towards reagents similar to known forms of degeneration. It is obviously just as unfair to claim a degeneration the nature of which is entirely obscure as to claim for some adventitious form in a cell that it is an animal without giving at least a plausible reason for it.

Lukjanow has made it clear in his classic work on the "Elements of a General Pathology of the Cells" that degenerative processes in the cells are susceptible of classification, and insists that visible degenerations should respond to known microchemic reagents.

As an example of what is meant here, Russell's eosin bodies should be made the subject of most careful analysis before any definite stand can be properly taken concerning their true nature. The fact of the matter is, that we do not certainly know that parasites can not exist in cells without causing them much harm, and indeed for an indefinite period.

Hansemann's theory of "asymmetric karyokinesis" is based upon present knowledge regarding the indirect division of cells.

Flemming, Rabl, Carnoy, and others have shown that under normal circumstances karyokinesis progresses through a series of five phases. The first two of these are called "prophases," the last two "anaphases," the third middle or "metaphase." These phases consist of changes in the arrangement of the chromatin fibrils with regard to each other and their relation to the achromatin. First comes the mother-skein or spiral; second, the mother star or aster; third, the equatorial plate (metakinesis); fourth, the double star or diaster; fifth, double skein or spiral.

During these phases the achromatin fibrils vary in shape and relation, and the protoplasm of the cell is seen to contain exceedingly complicated structures, such as peculiar polar bodies and attraction spheres. During this process the nucleus has become divided in two, and finally the cell itself, with the result of two independent elements.

These phenomena have been utilized by pathologists to determine the progress of tumors, rapidity of growth being found in correspondence with the number and variety of karyokinetic figures.

Arnold, Martin, and others have further shown that under pathologic conditions a nucleus may undergo indirect division into three, four, or more daughter nuclei.

Finally, Hansemann has shown that many cancers contain cells in which asymmetric nuclear division into unequal daughter nuclei has occurred through the karyokinetic process. He declares that these daughter nuclei differ materially not only in size, but also in the number of chromatin segments they contain. He further supposes these nuclei with the resulting cells to still possess the property of reproduction, but denies to them their normal function. The larger of these unequal cells he supposes to be transformed into the cancer cells, with resting nuclei.

In support of his view that through the unequal indirect cell division the function of the cell is lost, Hansemann refers to the work of V. Beneden, Weissmann, and others which originate the theory of panmerismus, "which says that the biologic properties of a cell are bound up in definite formed elements of the cell, which elements originate from more than one molecule, and which, through growth and division, transmit the biologic properties of the parent cell to the daughter cells."

Nageli and Weissmann call this substance "idioplasma," Hugo de Vries "pangene."

These larger cells, according to the author of this very able article, having lost in the course of asymmetric karyokinesis portions of idioplasma, have lost also their balance and become, according to him, "anaplastic," i. e., from cells of high differentiation they become cells of lower development; and for this very reason he regards it impossible that the cells of cancer should be embryonic, because an embryonic cell must *a priori* contain all the potentialities requisite to higher differentiation. His experiments with the embryonic cells of rabbits, the results of which tend to support this view, are exceedingly ingenious.

The weak point in Hansemann's theory, or, better, what it lacks, is any conception of the cause which underlies the asymmetric process. He shows plainly that it is present in all of the cancers and in none of the benign growths and tissues he examined; but as to just what has occasioned this deviation from normal karyokinesis is not even hinted at in his paper. One statement only might be regarded as suggestive, i. e., the view of Klebs that the entrance of leucocytes into epithelial cells resulted in a fertilization of the epithelial cell through an increase of chromatin.

As Lukjanow says, "pathologic processes are often accompanied with increased, and sometimes abnormal, karyomitosis; but we are yet in the dark as to the exact relation between the two."

The prime point in the theory of Hansemann is his determination of the fact that asymmetric karyokinesis is constant in cancer, and his conclusion logical that the altered chromation is cause sufficient for the production of unbalanced cells.

From our standpoint there is nothing in the theory which forbids the idea of a parasite for cancer; on the contrary, it may very well be that the asymmetry in the chromatin is a result of the untoward influence of either an intracellular or intranuclear organism.

It would fill a book to discuss all the merits and demerits of the various species of parasites supposed to be specific for cancer, nor does the writer of this paper feel at all competent to do so intelligently, and he is not alone in this, for no less a one than Mallassez has well said "that extreme caution is to be observed in classifying these low forms which are found to infest the cells." The thought occurs, however, that no one animal form is necessarily the specific cause of this disease. Analogy would seem to bear this out: e. g., pus was at one time supposed to be caused by one germ; now it is known that at least six organisms can produce suppuration; and my friend Dr. Bristow, of St. Mary's Hospital, Brooklyn, has recently had a series of hospital cases of traumatic suppuration where bacilus pyocaneus and bacilus coli commune were found in pure culture.

As to just what the relationship between the parasites and asymmetric karyokinesis may be is not entirely clear. Lukijanow says, in a general way, that disease processes are, some of them, evidently the cause of increased karyomitosis, and, following Arnold and others, makes an effort to classify the chief varieties of indirect segmentation occurring in pathologic processes.

Reasoning from Hansemann's standpoint, two views might be held, the first of which would depend upon the capacity of the parasites to either destroy absolutely some of the chromatin segments, or by virtue of their mere presence to modify their potential energy as to inhibit the normal karyokinetic cycle, with the result of cells, such as Hansemann describes, which are only partially differentiated, but which, having descended from highly differentiated cells by an inverse process of retrogression, have at once gained in virility and lost in balance and function. Having once reached the lower plane and the power of regeneration lost, it is not hard to conceive a lawless development of cell elements such as is characteristic of cancer.

The other view is suggested by the theory of Klebs, of the fructification of the epithelial cells by leucocytes. Klebs believes that leucocytes may gain entrance to the cell, and that the latter may sustain an increase of chromatin by deriving it from the former.

Arnold, in an article in Virch. Archiv as late as last June, has shown that the white blood corpuscles have astonishing energy and great constructive power. His experiments were conducted with sterilized elder-pith plates and similarly prepared glass tubes, which were introduced, under antiseptic precautions, either into the lymph sac or peritoneal cavity of frogs.

Summing up his conclusions he says:

> In all experiments mono, tri, and multi nuclear, also polymorphous, cells were found at a time when the participation of the fixed tissues, i. e., the histogenetic migratory corpuscles, was excluded, which therefore (the cells) could only be of hæmatogenous origin.
>
> While some cells disintegrated others transformed themselves into epithelioid, giant, spindle, and branched cells, at a time when they could only be treated as hæmatogenous migratory corpuscles, throughout the entire series of experiments.

Recognizing two facts, first; the power of foreign bodies (in Arnold's experiments elder-pith plates and tubes) to stimulate or mobilize the white blood corpuscles, and, second, the remarkable potential energy of the white cells when excited, it is only necessary to attribute to the possible cancer parasite a role similar to that of the other foreign bodies and adopt the view of Klebs that these white cells do fructify the epithelia, to form a reasonable theory as to the exact origin of the polyhedral cells in cancer and the relation of the parasites to the process. Could such a hypothesis be proven, it would immediately explain the relatively few parasites to the number of cancer cells, a fact which is in strong contrast to bacterial parasitismus.

The weak point in the theory is two-fold. No one has ever actually observed the phenomenon of the transmission of chromatin substance from a white corpuscle to an epithelial cell, and such an idea would seem to be inhibited by the theories of Minot, Weissman, and others of the hermaphroditism of cells.

For a cell to be fertilized it must, according to these theories, at least in the ova of nonparthenogenetic individuals, first lose the male portion of its chromatin, and second acquire the male portion of chromatin from a genetically entirely different individual.

Assuming prima facie the soundness of these theories, it is dificult to conceive of a productive fusion between the cells of the same individual, no matter how different they may be from a differential standpoint.

Such a train of thought leads naturally up to another, which is also suggested by the third claim mentioned at the outset in this paper, i. e. the theory of Adamkiewicz, that what we have always regarded as epithelial elements in cancer are in reality the true parasites themselves.

Adamkiewicz draws attention to the facts that the cells of cancer have no "cement substance," that they produce a very toxic substance, "cancroin," and, further, that they have power of motion resembling that of the amœba—facts which are at direct variance with the normal behavior of epithelial cells.

There is some plausibility in these conclusions, but they lack what must always be the crucial test—and which would certainly seem should have been possible to such large and abundant parasites—they have not been cultivated.

Taking the hint of fructification from Klebs, and admitting the points in dissimilarity between cancer cells and epithelia, it is not entirely unreasonable to suppose that the elements of cancer are in reality the offspring of an accidental conjugation between parasites and epithelial cells.

In any event, the peculiar features ascribed to the cancer cells by Adamkiewicz form very tempting arguments in favor of such a conclusion; for they preserve not only (at least to an extent) the motion inherent in the low forms of animal life, but also the secretion of epithelial cells, or better secretion in a modified form, and lose their cement substance.

In such a view are crystallized all the others—asymmetric karyokinesis, parasitismus, fructification, and that which holds the cancer cells to be the parasites—besides explaining at once the lawless and vicious growth of the cellular elements of cancer, and many other points of doubt, and at the same time conforming exactly with the laws—so far as we know them—which govern the successful and abiding infection of the higher animals with parasites.

It is only necessary to suppose the presence in the tissues of an animal parasite, and with it, through trauma or otherwise at the point where the parasite lies, a "locus minoris resistentiæ," to make it conceivable that in the struggle between parasite and epithelial cell for the survival of the fittest they should synchronously lose complementary, i. e., male and female, portions of their chromatin, and finally wind up the contest by fusion, and by such mutual agreement to live in harmony together produce discord of grave moment to the unfortunate individual who has been the unwitting party to the conflict.

Weissmann's "Vererbungs Theorie" agrees entirely with such a view of the growth of cancer, especially as it explains the hereditary tendency manifest in some individuals to develop cancer through greater susceptibility to parasitic invasion.

The real weak point here lies in the law of the "preservation of species." Whether it is possible for a coccidium, or a psorosperm, or a gregarina to conjugate with the differentiated cells of so highly complex an animal as man, is a question that should be relegated for answer to men whose work and training fit them to consider the matter from a judicial standpoint. It must be remembered, however, that, as Hansemann himself remarks, there is vast difference in the potentiality of an epithelial cell and that of the original ovum which gave to this highly differentiated cell its existence; so that, unless it can be clearly shown that some actual difference in the essential quality of life in the two, rendering their conjugation impossible, is at hand, there may not be so great a difference in the resistance between parasite and cell as to prohibit their union with a resultant hybrid offspring; and this would eliminate at once the difficulty at hand of fixing the true relationship which exists between the parasite and the other morphologic elements of the tumor.

THE ÆTIOLOGY OF CANCER, WITH ESPECIAL REGARD TO THE PROTOZOAN PARASITES OF CANCER.

By ALLEN J. SMITH, A. M., M. D.
Professor of Pathology in the University of Texas, Galveston, Tex.

Time has not advanced more than a single generation since the most advanced scientific medical writers were satisfied to regard among that group of formations known as tumors, a number of decidedly important neoplasms which have since, because of almost positive proof of their parasitic origin, been assigned to a separate position in the classification of pathological products. Even at the present day there are pathologists who continue to classify these two groups, the infectious granulomata and the tumors, as closely related—as they are, at least in many of their peculiarities; yet the appreciation of the ætiology in the one case and the failure of any realization of the causation in the other constitute so decided a distinction, reaching into almost every aspect of their nature, relations, and treatment, that the more modern view can scarcely be held precipitate in thus separating processes such as tuberculosis, syphilis, leprosy, and actinomycosis from the true tumors, enlargements, of whose cause no actual knowledge is held. The impulse given to continued research in similar lines by the discovery of the nature of the infectious granulomata was early sufficient to call attention to the analogies presented by the cancerous and sarcomatous groups of tumors to this class of neoplasms; and these have been within the past several years the center of intense attention from microscopists, bent upon establishing their parasitic origin, and their recognition as members of the same class of new growths. These similarities consist especially in the histology and clinical course of the growths, the essential features of the histology of the infectious granulomata consist of a central group of epithelial-like cells surrounded by a greater or less zone of lymphoid cells, together with a variable connective tissue stroma. These may vary considerably in the individual examples, and do vary somewhat as to the relations and characteristics of the elements in the different forms of the granulomata.

It would require no great imaginative effort to regard the cancerous nodule, with its epithelial cells imbedded in a variable stroma of connective tissue, the whole surrounded by a greater or less amount of embryonal connective tissue elements in various stages of organization, as conforming to the same type as does the smaller gray tubercle. Nor on the other hand would it be difficult to regard the sarcoma as the result of a specific cause leading to the production of the lymphoid elements of the same type, the epithelioid elements being greatly in the minority and perhaps overlooked, or so altered in their characteristics as to be indistinguishable from the embryonal connective tissue cells which form the tumor. It is certainly suggestive of a difference between tubercle and cancer that the former, typifying the infectious granulomata, should reach a definite stage of degeneration, while no such necessary occurrence can be recognized in the cancers: nevertheless the well known fact of the long persistence of the fungoid variety of tubercle and the rather frequent degenerative accident in case of cancer are conversely suggestive of their similarity. These differences depend moreover largely, perhaps, upon anatomical relations with a blood supply which might easily be influenced by generally unimportant differences in structure, such as the amount and kind of stroma in each case. The fact that the epithelioid cells of cancer seem from histological appearances to be true epithelium, arising and growing from apparently normal epithelium, and that no such connection can be demonstrated in case of the epithelioid cells of the tubercle, should not seriously militate against the possible identity of genera of these formations, judgment being based rather upon the similarity of results than upon the apparent differences of origin. The peculiarities of metastasis, perhaps best seen in the miliary forms of both cancer and tubercle, add a further link to the chain of similarities between these formations.

One need not seek far for further suggestion of an infectious nature in cancer, although it must be confessed that the proof of such infecting power can not by any present means be more than probably predicated. The fact of its special prevalence in localities of greater or less restriction (Park, Medical and Surgical Reporter, February 18, 1893; Arnaudet, L'Union Méd., October 7, 1891; Med.-Surg. Bull., June, 1893; Fiessinger, Gaz. Méd. de Paris, March 5, 1893; Rev. de Med., January 10, 1893; Williams, Med. Chron., February, 1893; London Lancet, September 12, 1891, etc.) scattered here and there over the world strongly suggests that there are operative causes other than mere structural ones, and that these causes are such as operate from without the body. The corporeal distribution of primary cancers, at orifices and points of constriction of epithelial tubes, the lips, pharynx, pylorus, ileo-cecal valve, anus, cervix uteri, vulva, base of bladder, or at parts easily handled, as the mammæ or the general surface of the body, may, without great effort, be interpreted as suggestive of the origin of the growth from abrasions and subsequent inoculation with an infectious agent—although it is quite true that a very different interpretation may be given of these facts. The hereditary influence which popularly and professionally has been so generally accorded cancerous growths, the intsances of apparent infection related by medical writers (Fiessinger, *loc. cit.;* Arnaudet, *loc. cit.;* Guelliot, Jour. de Méd. et de Surg. Prat., March, 1893), the experiments of Hanau (Wien. Med. Presse, April 21 to June 9, 1890), Wehr (Annual Univ. Med. Sci., Vol. III, 1890), Moran (Amer. Med.-Surg. Bull., June, 1893), Von Langenbrex, O. Weber, Lebert, and others in transplantation of epitheliomatous formations to animals or among animals, of Nayet (La France Médical, June 16, 1893) in inducing epitheliomatous growths in animals by injecting a glycerin extract of epithelioma of man, and of Hahn, Bergman, and others (La Prat. Méd., June 30, 1891; Med. Presse and Circular, August 5, 1891; Cornil, La Semaine Méd., June 24, 1891); in grafting cancers to different parts of a cancerous patient's body, all stand in closest relation with the belief in the infectious nature of the growth—proof being, however, wanting.

The possibility of a parasitic origin of cancer, as well as of other new growths, was suggested years ago by Paget (Surgical Pathology; Brit. Med. Journal, 1887), who likened the growths produced upon trees by the stings of insects or by the deposition of the ova of insects to these tumors of animal structures.

While there have been at various times (Brault, Arch. gén. de méd., 1885; II, 586; Rappin, Comtes Rendus Soc. Biol., 1887; Scheurlen, Deut. Med. Wochensch., 1887, No. 48; Senger, Deut. Med. Wochensch., 1888, No. 14; Baumgarten, Centralbl. f. Bakteriol u. Parasitenk., 1888; Rosenthal, Zeitsch. f. Hygiene, 1888; Kubasoff, Wien. Med. Presse, 1890, No. 3; etc.) described vegetable microorganisms as the specific causes of cancer, the failure of confirmation and the discovery in several instances of the same microorganisms in noncancerous tissues have resulted in the practical abandonment of belief in a bacterial cause, although it is generally accepted that various bacteria may be present as parasitic incidents in cancer.

The apparent protozoan nature of certain bodies in epithelial formations as molluscum contagiosum, described originally by Virchow (Virchow's Archiv, Bd. 123 p. 149), and by a number of investigators since then (Rivolta, Dei parassiti vegetali, Turin, 1878; Bollinger, Virchow's Archiv, Bd. 58; Neisser, Viertelsjahrschft. f. Dermatologie, 1888, XV, 553; and others); and in Paget's disease of the nipple (Hutchinson, Trans. Lond. Pathol. Soc., 1890, 214; Darrier and Wickham, Archive de Méd. Expér., etc., 1890, I, 1 and III, 47; Ann. de Derm. et de Syph., 1 and 11; Maladie de Paget, Paris, 1890; Bowlby, Brit. Med. Journal, 1891, p. 1070; etc.) suggested moreover the likelihood of the existence of similar bodies in the allied cancerous formations; although there was no lack of opposition to the belief that the bodies seen in molluscum and subsequently in cancerous tumors were of parasitic nature.

In 1888 Pfeiffer (Zeitsch. F. Hygiene. 1888; Die Protozoan als Krankheitserreger, 1890—zweite Aufl., 1891) called attention to certain bodies he had observed in the cells of the tumor masses of two cases of general carcinosis. These he described as sporozoa, in their development resembling the microsporidia. The following year Malassez and Albarran (Comptes Rendus Soc. de Biol., 1889; Les Tumeurs de la Vessie, Paris, 1892) announced their discovery of bodies resembling coccidium oviforme in the cells of an epithelioma of the jaw. Thoma (Fortschr. der Med., June 1889) described about the same time small cell-like structures he had observed in the nuclei of the epithelial cells of glandular cancers of the rectum, breast, and stomach, bodies measuring from 4 to 15 micromillimeters in diameter, rounded or oval or somewhat of the shape of pseudonavicellæ, usually occurring in groups of five or six. The nuclei of the cells in these cases refused to stain well with hæmatoxylin and eosin, safranin, alum-carmine, and other reagents employed, and were apt to show numerous vacuoles, empty or containing the parasitic bodies or a little granular matter. The following year Sjöbring (Fortschr. der Med., 1890, No. 14), who had been studying the processes of nuclear division in a cancer of the breast, noticed certain bodies resembling protozoa, and after careful examination decided such to be their nature. The life history which this author attributes to these bodies is briefly as follows: Small round masses of protoplasm, 2 micromillimeters in diameter, may be met with free in the tissues or within the cell protoplasm. One of these bodies, for example, penetrates the nucleus of a cell, gradually increases in size and then passes into the cell protoplasm, where it may remain for a variable time in the shape of a slightly granular mass of protoplasm surrounded by a clear zone, but without a cell wall. It may escape entirely from the cell and be found free in the tissue spaces at this period. Eventually, however, it enters an epithelial cell, becomes surrounded by a membrane and at maturity nearly fills the host cell. Small curved rods, surrounded by bright, hyaline matter, and presently becoming encapsulated, develop within the parasitic body, 20 or 30 in number, giving rise to the appearance of a sporocyst. These spore-like bodies after a time escape from the parasite and enter fresh cells to undergo the same cycle. Sjöbring was unable to demonstrate a nucleus in these bodies, and for this reason and from the various appearances presented during the history of the organisms and their evident method of reproduction by sporocyst formation, places them among the sporozoa and probably in the class of the microsporidia. The author states that he found these bodies in six out of seven cases of cancer of the breast which he had examined, and in two cancers of other parts of the body.

These descriptions of Thoma and Sjöbring found corroboration shortly in publications by Balbiani (Virchow's Archiv, Bd. 115), Hacke (Soc. de Biol., 1890), Wright (Address at Univ. of Toronto, 1890), Strobe (Beiträge zur path. Anat. u. allgem. Pathol., 1891, XI, 1), and to a certain extent in papers by Steinhaus (Virchow's Archiv, Bd. 126, and Bd. 127), Foà (Centralblatt f. Bakteriologie u. Parasitenk., Bd. XII, p. 185), Soudakewitch (Ann. de l'Instit. Pasteur, 1892, 3.), Podwyssozki and Sawtschenko (Centralbl. f. Bakteriol. u. Parasitenk., Bd. XI, p. 93), Kürsteiner (Virchow's Archiv, Bd. 130, and others). Of the more recent writers, Soudakewitch found in the cells and cell nuclei, of glandular cancers especially, small round or oval bodies, sometimes with a membrane about them. By special hardening with osmic acid and subsequent staining in hæmatoxylin these bodies may be seen surrounded by a clear or granular or rayed zone. If homogeneous they take the stain but faintly, while the granules or rays surrounding them take a deep hue. Metschnikoff, who had opportunity to examine these preparations, states in a note added to the paper that these bodies are probably coccidia, judging from the appearance of the envelope and its protoplasmic contents. Podwyssozki and Sawtschenko fail to note the parasitic bodies within the cell nucleus, but have, in the instances studied, found numerous examples in the cell body. The second of these writers, Sawtschenko (*loc. cit.; ibid.*, Bd. XII, No. I), describes the following appearances which he was able to demonstrate in sections of a cancer of the lip in large numbers. The cell protoplasm of some of the cancer cells presented one or more vacuoles, some of which were empty and which may have been the former resting places of protozoa. In some of these vacuoles were to be seen small rounded bodies, sometimes provided with a deeply staining mass suggesting a nucleus. Often these corpuscles (within the vacuoles) had a prolongation, giving rise to a shape like that of a frog's larva—a frequently noted form.

These frog-larva bodies were of varying size, in several instances quite large and long, apparently the wandering stage of the parasite. Thus there might be seen one of these larger, worm-like bodies, passing from one epithelial cell to another, or lying between the cells. After thus penetrating an epithelial cell the parasite seems to assume slowly the rounded shape, pushing the nucleus off to one side, and presently becoming inclosed within a membrane apparently derived from itself. Occasionally several such resting forms may be witnessed lying side by side, surrounded by a separate or by a common capsule. Gradually in this rounded, resting stage the central portion seems to stain more deeply, as if of nuclear nature, and about the margins, especially without the capsule, appear small, round, highly shining corpuscles, like spores. Presently within each of these, as they increase in size, appear deeply staining masses, single or double, rounded, oval or spindle-shaped. As these spore-like bodies develop about the margin of the parasite the capsule of the latter becomes less clear, apparently giving up its substance to the growth of the spores; and within the body of the parasite there appear a large number of similar protoplasmic masses. The whole mass is now very similar to the sporocyst stage in the development of sporozoa, save that the capsule of the cyst is wanting. What becomes of all these supposed spores is uncertain; some probably pass from the vacuolated cell and pursue their life history elsewhere in the body of the infected individual. Some at least continue to develop at the site of their formation, swelling out the host cell to its greatest capacity, pushing off the nucleus to one side, and often compressing it into an insignificant size. Constantly the marginal spores develop in advance of the central ones. Eventually each of these spores form from the nuclear-like body in its interior a frog-larva-like body, which probably then makes its way into the interior of a fresh cell, assumes the resting form, and goes through a similar cycle.

Besides these stages in the life of a seeming sporozoon Sawtschenko describes what has probably been observed by other writers and interpreted by them as examples of endogenous cell formation—small epithelial-like cells within the host cell, probably the physaliphora of Virchow. The contained cell is somewhat more granular than the protoplasm of the host, and sometimes shows a very delicate meshwork in its substance. It contains a nucleous usually staining deeply, and sometimes a nucleolus. Apparently a further stage of the same kind of body is such a contained cell with two or four crescent-shaped bodies in the interior, strongly suggestive of the pseudonavicellar stage in the life history of the sporozoa. The author is unable to indicate clearly the relationship between these and the first-described bodies which entered into the formation ot the sporocysts, but the presumption is that such a relation does exist, and that the crescents in some way develop into the worm-like body of the wandering form. The strong likeness of this last, the wandering form, of the cyst form, and of the pseudonavicellar form, to the growth of sporozoa is almost convincing of the parasitic nature of these bodies. It should be recalled that a very positive difference exists between the descriptions of Sawtschenko and Podwyssozki on the one hand and of Soudakewitch on the other in that the former did not find any intranuclear forms, as did the latter and others. Foà's (Centralbl. f. Bakteriol. u. Barasitenk., Bd. XII, No. 6) descriptions are very analogous to those of the writers quoted and need not be more carefully reviewed. More recently Korotneff (Centralbl. f. Bakteriol. u. Parasitenk., Bd. XIII, No. 11, 12), describing the appearances encountered in a cancer of the lip (asserting, however, his observations of similar organisms in cancers from other positions), corroborates the statements of Soudakewitch, Podwyssozki, and Sawtschenko and a number of other investigators, but adds that he is persuaded that neither of these writers has brought forward the fully developed form of the protozoon. This fully developed stage he describes as a gregarine-like body of some length, too long to be contained in an ordinary cancer cell, having a thickened head and extended body. In the neighborhood lie, in the cancer cells, smaller, round or oval forms, younger forms, of the parasite, coarsely granular, containing nuclei, multiplying by fission and distending the host cell by pressure from a center, causing the concentric bodies of the squamous epithelioma and producing a certain amount of degeneration in the immediate vicinity. When not afforded sufficient nutriment these bodies fail to develop, become encysted and are decidedly coccidiform in appearance. In the interior of these develop bodies called "zooids" by the author, which, escaping from the coccidiform bodies pass into other cells and go through the regular gregarinoid cycle. Besides these ordinary zooids what the author terms "sporozooids," falciform bodies, are also to be found, composed of a granular mass of protoplasm surrounded by a hyaline wall. Such a body, after escaping from the host cell, fastens itself (the protoplasmic portion at least) to the surface of a new epithelial cell, thrusting out projections like those of an amœba; others of the same kind are to be found in the tissues about the epitheilal part of the tumor.

Ruffer and Walker (Brit. Med. Jour., 1892, Vol. II, p. 113; Jour. of Pathol. and Bacteriol., October, 1892), who in England have followed up the work upon the cancer protozoa, and who at first were unable to demonstrate the intranuclear form of the parasite, fully confirm the work of the continental workers, in that the former, about the close of the past year (Brit. Med. Jour., November 5, 1892) announced his discovery of this variety, and adds that he "has seen every stage in the life history of the protozoon of cancer, from the time when the parasite appears as a spore in the nucleus to the time when it leaves the latter as a young, fully formed parasite." Galloway (London Lancet, No. 5, 1893) has recently affirmed his belief before the Royal College of Surgeons in the protozoan nature of the various bodies described, on account of their apparently organized structure, their distinctive staining reactions, and their analogy to well-known protozoa. Kürsteiner (Virchow's Archiv, Bd. 130), has announced that he has found bodies corresponding to the descriptions of the above-named writers in a papilloma of the bladder and in papillary adenomata of the uterus.

Not all of the investigations into the questions of the existence of animal parasites in cancer, however, have been productive of favorable comments from their authors. There are those who have denied totally the parasitic character of the appearances described by the authors quoted, and who would explain the phenomena mentioned entirely upon the ground of cellular degenerative changes or of changes induced by faulty or special methods of technique. There are, too, those who, while acknowledging the similarity of the bodies to sporozoa, deny that sufficient evidence has been adduced to warrant a belief in their parasitic nature. Thus Van Henkelom (Centralbl. f. pathol. Anatomie, 1890, p. 704), from a study of over two hundred tumors, while able to find the bodies in question, was of the opinion that their smaller forms might easily be explained by the idea of cell degeneration—that they were perhaps leucocytes with fragmented nuclei. The larger bodies might, perhaps, be epithelial cells of peculiar shape, although he did not believe them to be necessarily degenerated cells. Borral (Arch. de méd. expérim. et d'anatom. pathol., II, p. 786, 1889), preceding the latter writer, also mentions the two groups, the small intracellular bodies and the large forms of the supposed parasites. The former, the younger, the coccidian forms of those favoring the idea of parasitism, he would regard as examples of endogenous cell formation; and the second, the forms corresponding to the sporocyst stage of the parasites, he believes to be derived from the tissue elements of the cancer by some peculiar cellular degeneration. So, too, Firket (Centralbl. f. allgemein. Pathol. u. pathol. Anatomie, 1890, No. 20) objects to the belief in the protozoan nature of these bodies because he has seen similar appearances in the epithelium of the skin covering a fibroma, where no evidences of cancer were present. He believes that from pressure by the tumor these bodies had been produced through degenerative changes.

The idea of cellular degeneration as explanatory of these various appearances is also sustained by Schütz (Mikroskopische Carcinombefunde, Frankfurt, 1890; Münch. med. Wohensch., 1890, No. 35), Torok and Tommasoli (Monatsh. f. Dermatol., 1890, No. 4), Klebs (Deutsch. med. Wochensch., 1890, Nos. 24, 25, 32), Delepine (British Medical Journal, September 9, 1872); Duplay and Cazin (Seventh Congress of Hygiene and Demography), Cazin (Arch. gén. de Med., January, 1892), Duplay (Gaz. des. Hopiteaux, 1893, p. 210); Ribbert (Deutsch. med. Wochensch., 1891, p. 1179), and recently by Gibbes (Amer. Jour. of Med. Sci., July, 1893. The last-named investigator has contributed a valuable addition to the literature antagonistic to the parasitic theory of cancer. Believing it impossible to prove the various so-called parasitic bodies to be distinct elements of protozoan nature at the present time by any but staining methods, he sought to find some differentiating reagent capable of distinguishing the supposed parasites from the tissue cells of the animal body. Employing the well-known coccidium oviforme from the liver of a diseased rabbit as the control, he produced a test-stain,* giving the parasites the desired difference of hue from that given the epithelial cells of the organ when the tissue had been hardened by the ordinary alcohol method. In sections of various cancerous growths hardened in the same manner and stained by this method, Gibbes was unable to demonstrate the parasites, although after hardening the same tissues in bichloride of mercury solution, Muller's fluid, and in several other solutions, the appearance of protozoan bodies were easily appreciable. He concludes from this that the supposed prozoa of cancer are no more than the results of faulty methods of hardening. Further study and confirmation of these results of Gibbes are exceedingly desirable at this stage of our knowledge, although it is of course possible that even the failure to take a stain except under conditions of previous hardening by special reagents may be due to peculiarities inherent to the supposed microorganisms. Cornil (Jour. de l'anatom, et de physiol., 1891, No. 1), Hausemann (Virchow's Archiv, Bd. 123) and others hold forth the possibility of mistaking various stages of cellular division for these supposed sporozoa. Ströbe (Ziegler's Beiträge, 1891, xi), and Steinhaus (Centralbl. f. allgem. Pathol., 1891, No. 2), admit that some of the bodies to be found in the cancer cells are extremely suggestive of protozoa and are inclined to believe that in some cases, at least, are real protozoa, but do not accept for that reason the belief that they are an ætiological factor of the tumors. Steinhaus, in a second paper (Virchow's Archiv, Bd. 127), distinctly denies the protozoan nature of the bodies described in the center of the "pearls" of squamous epithlioma, attributing them to cellular changes; and in the same journal Virchow adds a note reiterating his original views of the endogenous formation of these bodies and their want of ætiological significance.

Besides the supposed animal parasites which have attracted attention, Russell has recently (British Medical Journal, December 13, 1890) described as the real cause of cancer a body which he believes to belong to the fungi. This body, because of its affinity for acid fuchsin, he speaks of as the "fuchsin body," and states that it may be found, with but few exceptions, in cancer, and in no other structures. These fuchsin bodies occur in groups of two three, four, or more, generally have a clear space about them, and are bounded by a cansule, are spherical in shape, measure from 4 to 12 micromillimeters in diameter, and are homogeneous and structureless in appearance. Russell states that they appear to grow by gemmation, and are found in the rapidly-growing parts of the tumor. Numerous writers, however, have shown that these bodies are by no means characteristic of cancer, and less attention is at present paid the claims of the last-named investigator than those of the writers above mentioned (Ballance and Shattock, British Medical Journal, 1891; Dean, London Lancet, April 6, 1891; Duplay and Gazin, *loc. cit.*; Rennie, Austral. Med. Gaz., March, April, May, 1893, etc.).

Attracted by the evident sincerity of the writers describing the various suspected parasites in cancerous tissues, as well as influenced by a long-existing faith in the eventual discovery of some such parasitic cause for carcinomatous and sarcomatous tumors, the writer was lead to carry on a series of examinations in the same line, with the purpose of confirming or denying the views already advanced. From the results of these observations it is not possible to definitely assert or deny the cor-

* The stain is thus made: Dissolve 2 c.c. aniline oil in 10 c.c. rectified spirits; add enough distilled water to make 100 c.c.; filter; add 2 grams rosanilin sulphate; label No. 1. Stain No. 2 is a 1 per cent solution of iodine green. Leave sections in stain No. 1 for 10 minutes, wash in water, then in alcohol; place them next in stain No. 2 until a dull purple is assumed. Wash thoroughly in water dehydrate in alcohol, clear in cloves, mount in xylol-balsam.

rectness of the views of the older observers, however, and they may only be offered as additions to a growing study. The general impression, however, gained from these examinations is not unfavorable to the belief in the presence of protozoa in cancers, and has only added to the confidence of the writer in the ultimate success of those seeking to demonstrate the general features of the protozoan theory of cancer causation.

It is scarcely likely that all the appearances described as parasites will bear the test of continued observation, and it is just as improbable that the full list of these organisms has thus far been announced. From the writer's experience he is led to regard most of the minute, intranuclear bodies, the rhizopod-like inclosures in the pearls of squamous epithelioma, the amœboid bodies of Korotneff, as well as the fuchsin bodies of Russell, as being of cellular origin, degenerative in nature. The larger, intracellular and extracellular bodies, the various appearances of sporocyst formations, the peculiar double-contoured coccidiform bodies, the gregarine-like bodies, the bodies containing falciform and pseudonavicella-like corpuscles, and the bodies in the so-called physaliphora, evidently belong to a different class; yet the proof of their veritable protozoan nature is not established.

The various forms of these parasites encountered by the writer bear the greatest similarity to the bodies described by Podwyssozki, Sawtschenko and Korotneff; and it seems probable that the last named observer is correct in his statement that if they be protozoa these bodies should be classed (at least some of them) among the gregarinidæ. It seems quite likely, however, that there exist several varieties, some of which are coccidia, and others perhaps rhizopods. Thus the specimen presented in figure 8 can scarcely be otherwise interpreted than as a rhizopod in the process of gemmation; and it is possible that some of the amœboid bodies of Korotneff may belong to the same group (if they really exist as parasites). To the more important question as to their nature, are they really independent organisms, are they parasitic bodies? There is but one argument to be offered in answer, the analogies they present to known stages of the life-history of recognized species of protozoa. On the other hand there are grave reasons for doubt, the evident mistakes of a number of writers in relation to some of the forms described, the failure of such stains as that of Gibbes to differentiate these bodies from the cells of the structure in ordinarily prepared tissues, and the long list of acknowledged possibilities of mistake. Nevertheless the similarities to known protozoa are sufficiently strong to make one disposed to accept some of these corpuscles as independent beings, possibly the causative factor of the tumor in which they occur.

Twelve growths were examined, all hardened by the ordinary alcohol methods or entirely in absolute alcohol. Of these, 3 were epitheliomata of the lip, 2 of the penis, 1 of an inguinal gland secondary to an epithelioma of the vulva, 1 a fungating epithelioma of the breast, 2 glandular cancers of the breast, 1 a cancer of the uterus, 1 a cancer of the testicle, and 1 a cancer of the prostate. These tumors were stained either with haematoxylon, haematoxylon and eosine, borax-carmine, alum-carmine, or safranine. Of these the specimens stained with haematoxylon and those with safranine presented the most easily recognized and most numerous examples of the supposed parasitic bodies. It may have been from faults of preparation, especially of hardening and fixation, that these bodies in the specimens examined were less numerous than one would imagine from perusal of the writings of the continental investigators. Foa, it is true, has called attention to the fact that one should not expect to find swarms of protozoa in every portion of a specimen, and states distinctly that he succeeded only in a limited number of specimens and only in isolated portions of the preparations. The writer has met with the same experience. Although in most specimens there are numbers of appearances which future study may perhaps show to be parasites, yet fairly suggestive and convincing examples are by no means found in great numbers and often require prolonged search in well-prepared specimens.

Fig.9

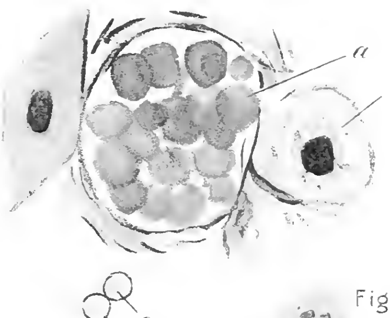

Fig.10

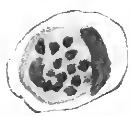

Fig.11

Fig.12

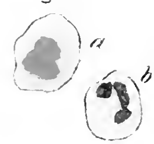

Fig.13

Fig.14

Fig.15

Fig.16

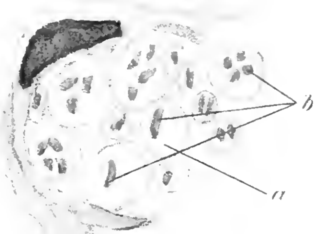

Fig.17

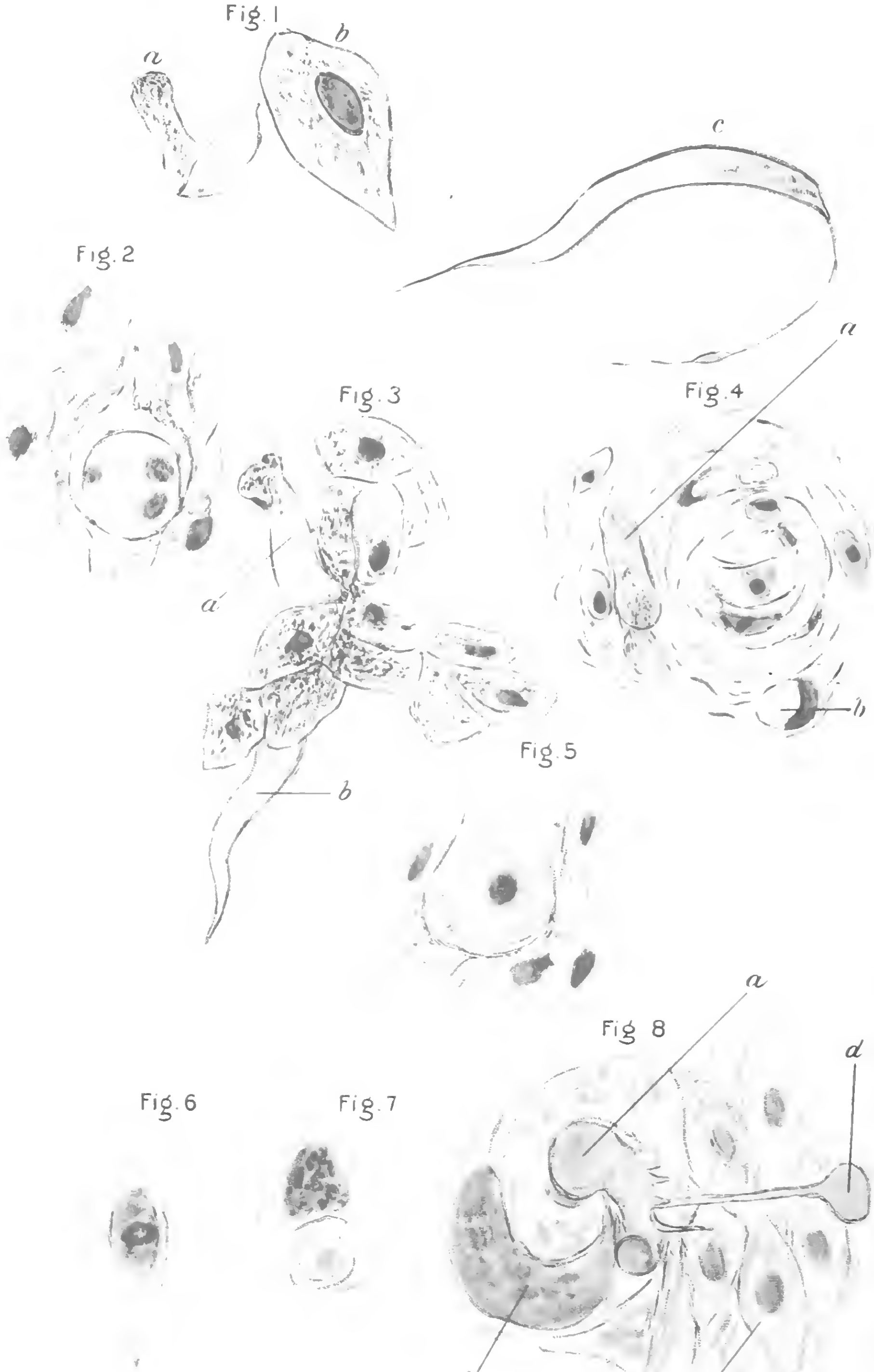

Fig. 1
a
b
c
Fig. 2
Fig. 3
a
b
Fig. 4
a
b
Fig. 5
Fig. 6
Fig. 7
Fig 8
a
b
c
d

Of these twelve specimens, in three, a cancer of the breast, a cancer of the prostate, and an epithelioma of the penis, the sought-for bodies were not found; and of the remainder, the individual specimens varied considerably in their relative frequence of exhibition of the so-called parasites. The most commonly observed variety of these phenomena was that of a single intracellular, round or oval mass, sometimes distinctly contained in a space (fig. 7), again completely filling (fig. 10) the vacuole in which it occurred. Such a mass usually measured from 8 to 15, 20 or more micromillimeters in diameter, was more or less granular, and sometimes contained (fig. 10) a large number of deeply staining, round, oval, or falciform "clumps." At times the greater portion of the epithelial cell was occupied by such a body, which generally was stained slightly more or less deeply than the protoplasm of the cell. These differences in the intensity of coloration probably depend in a measure upon the age of the parasite, the older specimens taking the stain less readily than the more actively developing bodies. The protoplasm of such a body is generally somewhat more granular and refractive than that of the host-cell. Occasionally, instead of these intracellular bodies being single, there may be found a large group in one cell. Similar bodies are to be found between the cells of the tumor in the lymph spaces, and occasionally in the structures away from the epithelial portions of the cancer. The large numbers of hollow cells (fig. 4), with their nuclei flattened out and pushed to one side by pressure, so as to create the "seal-ring" appearance, are often, doubtless, to be regarded as the former resting places of these intracellular bodies, the granular detritus often to be seen in these vacuoles being probably the remains of degenerated parasites. In but one or two instances (fig. 7) were the cell-like bodies interpreted as examples of endogenous cell formation by certain writers encountered. From our present views of cellular origin it seems unlikely that such an interpretation can be entertained, and from negative evidence at least, one can assert their probable parasitic nature. Sawtschenko, in his description of the sporocysts to be seen in cancerous formations, states that these arise from the intracellular bodies, in which he recognizes the frequent presence of a nuclear body. This was not, however, observed in the cases examined by the writer. The intracellular bodies, save those last described, were nonnucleated, and in no instance was there a cyst formation observed within the cellular limits (unless the occasional occurrence of a group of intracellular bodies, as above described, be regarded as examples of sporocyst formation). Excellent examples of sporocysts (fig. 9) were found a number of times, in all of which there could be easily shown a distinct membranous-like wall to the cyst. The spore-like bodies within these cysts were very like the intracellular bodies in structure and in coloration, but differed in the individual cysts as to whether there could be found the small, deeply staining interior masses. These deeply staining contents, usually few in number, from their frequent arrangement in pairs, are suggestive of active reproduction by fission, and are probably the germinal portions of the containing body (fig. 17).

In none of the specimens examined, probably on account of the intensity of the staining, could a structure be recognized in these contained masses, which look much like drops of some hyaline deeply-stained substance. The claim that these clumps are masses of chromatine is not to be gainsaid, but the fact that they have a decidedly deeper hue than the small chromatine masses in the epithelial nuclei somewhat sustains the belief that they are not of cellular origin. Within the sporocysts the spore bodies are found, 10, 20, 30, 40, or more, in a mass, like minute hydatids (fig. 9). They are faintly granular, quite variable in size, round, flattened and spindle-like in shape, the differences probably depending upon circumstances of pressure within the cyst. The wall about these bodies is distinct and clearly cut on the inner surface, and is apparently reinforced on the outside by adjacent flattened cells of the tumor, and by an occasional bit of connective tissue. It will be recalled that in the descriptions of Podwyssozki and Sawtschenko the intracellular sporocysts showed the spore formation as an exogenous production at first, the spores developing in size so that the larger were constantly seen on the borders of the mass, the capsule of which early disappeared from view. It is possible that the writer has failed to recognize these cyst formations until they had developed to such a stage that the epithelial host-cell had been entirely absorbed along with the original cyst membrane; yet in that event it seems quite as singular that the very clear cyst-wall observable in some of the specimens examined should have been undescribed by these authors. Rather would it appear that two distinct appearances have been noticed, and further study will be required to indicate their relation.

Besides the intracellular bodies and the sporocysts, the gregarine-like body (figs. 1, 3, 4, 11) was one of the most readily recognizable appearances when present. It was observed in 3 of the specimens examined, an epithelioma of the lip stained with safranin, an epithelioma of the penis stained with borax carmine, and a fungating epithelioma of the breast stained with haematoxylon. This body, not recognized by any of the writers quoted, save Sawtschenko and Korotneff, is spoken of by the latter as the *rhopalocephalus* of cancer, from the thickened anterior extremity. This form of the supposed parasite is an elongated worm-like body, varying in the instances studied, from about 20 micromillimeters to double that length. The anterior end is rounded, not as thickened as Korotneff describes in his specimens, and usually contains a small amount of granular matter and a few masses of a deeply staining substance. The individuals observed in the epithelioma of the penis had a head not unlike that of a minute tape-worm, the opposite end terminating in a rather blunt point (fig. 1). The interior of these bodies was structureless, granular anteriorly, hyaline about the borders and toward the posterior extremity. No nucleus was observed in any of these. It might doubtless be objected that these gregarine-like forms are but peculiarly shaped epithelial cells devoid of a nucleus, and perhaps slightly altered in their constitution, this alteration having caused them to have taken on the staining reagent in the slightly different degree observed. This may be true; but the frequent occurrence of the described shapes and the occurrence of such an apparent conjugation as shown in figure 8, lead one to considerable confidence in their parasitic nature. So, too, one can not definitely say that the appearances presented by the sporocysts and their contents are not due to some cellular change, a number of cells in one locality undergoing contemporaneously alteration to the production of a material similar to hyaline substance; yet in this case it is scarcely likely that the contents of the spore bodies should be so arranged as to suggest multiplication rather than fragmentation, or that such falciform and spindle-shaped masses (suggestive of the pseudonavicella stage in the development of the gregarines) should be assumed by degenerating elements. The same argument must be presented in case of the ordinary intracellular body.

In but a single instance has the writer been satisfied to accept any of the bodies observed as showing the double contour of the true coccidia; and never has there appeared to him any suggestion of the segmentation as described so clearly by Korotneff, Foa, and others. The failure of these forms, however, as well as of the intranuclear bodies, may depend on differences in the technique of preparation. It is not necessary, however, to accept these to fill out the probable life-history of this supposed parasite, which the author is disposed to class among the gregarines. If this conjecture be correct, it is interesting to note that the gregarine of cancer is the first gregarine parasite of man, if not of the vertebrates generally. Frequently found in the invertebrates, the gregarines have, in vertebrate parasitism, given place to the coccidia and perhaps the micro and myxosporidia.

The fully-developed parasite, for which Korotneff's term "rhopalocephalus carcinomatosus," may be tentatively accepted for want of a better, after a variable period of wandering, probably takes a permanent position between the epithelial cells (or perhaps within a cell, whose substance then forms the wall of the cyst) and gradually contracts to assume the round or resting form (figs. 2, 5). It is probable that before the assumption of this spherical shape, conjugation (fig. 4) takes place, the occasional discovery of several such round bodies within a common capsule (as noted by Sawtschenko) being in evidence of the verity of such a supposition. It is not impossible that the contained cells in the physaliphora, above described, may represent the intracellular occurrence of this resting stage of the developed parasite. From the protoplasm of this rounded body, within its substance, are next formed small, round, or oval refractive, hyaloid masses which grow rapidly and distend the wall of the host-cell or the wall formed about the parasite lying between the cells: thus is given the characteristic appearance of the sporocyst stage. These small masses or spores continuing to grow apace, within them appear the active germinants, the pseudonavicellæ of this gregarine, the round, oval, spindle or crescent-shaped, deeply staining "clumps." Either before or after the appearance of these last, the cyst-wall of the sporocyst may have ruptured from distension by the increasing size of the spores; and the latter then pass away as free bodies to enter new cells or continue within the lymph-spaces. Many of these, if one may infer from the large number of empty vacuoles and vacuoles containing granular débris in the cancer cells, perish or remain indifferent for an indefinite time. But from a few the germinal masses probably develop by direct or perhaps by indirect, and at present unknown stages, to the fully-developed gregarine, then to undergo the same cycle.

The writer is indisposed to accept Korotneff's amæboid stage, which is logically correct, it is true, but which, if the similar appearances seen in the specimens examined by the writer (fig. 15) are identical, are almost surely the result of protoplasmic change and contraction. So, too, the small, intranuclear bodies should not be unhesitatingly accepted. They may be of protozoan nature, yet the very great possibility of mistaking mitotic figures or masses of altered chromatin, and the absence of necessity for their presence in the life scheme of the parasite, have seemed to be sufficient reasons for their rejection for the present.

Among the cells, and occasionally within the cells, stained by eosin, an acid aniline dye, may be found numerous bodies which, from their shape, size, appearance, and position, the writer suspects are identical with the fuchsine bodies of Russell. If this supposition be true, the writer must deny the parasitic nature of these fuchsine bodies. Entire cells, conforming exactly to their original shape, may here and there be seen, having the same peculiarity of coloration and evidently composed of the same matter. The nature of the change is apparently a hyaline degeneration; and such a view is in strict confirmatory relation with the opinions published by several English and continental investigators into the nature of Russell's parasites.

Whatever else has been said, however, in relation to the subject, these two facts stand out in bold relief, and these may be offered as the writer's conclusions: (1) Cancer presents a course and clinical aspect analogous to those of formations of parasitic origin; (2) within cancerous tissues occur bodies which closely resemble the different life stages of protozoa, of sporozoa, of gregarinidæ.

That further study is necessary goes without saying, and that such study may be of the greatest value it should be of the most extended character, both as to the methods of study and the tissues studied. New methods of staining, efforts at differentiation under all conditions of previous preparation of the tumors, the examination of tumors from all parts of the body and from individuals all over the world, the examination of tumors other than the strictly cancerous and of normal structures—all this is demanded, as well as the pursuit of the great desideratum, a culture method for the purpose of the growth and isolation of the protozoan parasites, if the subject is to be conclusively decided.

EXPLANATION OF PLATE.

FIG. 1.—*a*, gregarine form of parasite; *b*, epithelial cell; *c*, gregarine form of parasite, with apparent flagellum. From epithelioma of penis, stained with borax carmine; $\frac{1}{12}$-inch hom. oil immersion lens; ocular 4; Zeiss.

FIG. 2.—Hyaline body lying among epithelial cells in a spore; staining slightly deeper than cells. Possibly the resting form of the gregarine. Same specimen and same amplification.

FIG. 3.—Gregarine form of parasite lying among a group of epithelial cells. *a*, apparently head; *b*, tail. It could not, however, be told surely if *a* and *b* are continuous, the cells and granular matter covering the central part of the supposed body.

FIG. 4.—Concentric body from epithelioma of lip, stained with safranine. *a*, gregarine form apparently in conjugation; *b*, vacuolated cell.

FIG. 5.—Same as fig. 2.

FIGS. 6 and 7.—Epithelial cells from epithelioma in an inguinal gland, secondary to epithelioma of vulva; stained with safranine. Fig. 6, with a small body in nucleus; fig. 7, with rounded hyaline, body in vacuole.

FIG. 8.—Group of cells from epithelioma of lip, stained with safranine. *a*, a rhizopod-like body, apparently giving origin by germination to a new body, *a'*; *b*, possibly a second similar body; *c*, epithelium.

FIG. 9.—Sporocyst lying between epithelial cells in testicular cancer, stained with hæmatoxylon and faintly counterstained with eosin. *a*, deeply stained, probably relatively young spore bodies; *b*, epithelium; *c*, red blood cells introduced for comparison of size and hue with spore bodies.

FIG. 10.—Same specimen. Intracellular body, with deeply staining interior masses (possibly pseudonavicellæ).

FIG. 11.—From an epithelioma of breast, stained with hæmatoxylon and lightly counterstained with eosin; *a*, spore bodies lying free in spaces among cells of tumor (probably after escaping from spore cyst); *b*, gregarine form.

FIG. 12.—Same specimen. Cells containing possible pseudonavicellæ.

FIGS. 13 and 14.—Same specimen. Spore-like bodies apparently within remnants of epithelial cells, and containing pseudonavicella like masses.

FIG. 15. Appearance simulating Korotneff's amœba form, apparently due to vacuolation and destruction or contraction of protoplasm of epithelial cell.

FIG. 16. Epithelial cell, containing two small spore-like bodies in vacuole.

FIG. 17. Ruptured sporocyst, showing escape of spore bodies, apparently older than in fig. 9, and therefore less deep in hue, and containing numerous pseudonavicella-like bodies.

THE EPITHELIO-GENETIC ORIGIN OF CARCINOMA.

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The title which I have chosen for this paper is probably a bad one, in that it is ambiguous, and may be construed to mean a discussion of the old question, Does carcinoma arise from epithelium alone, or can it also originate from the connective tissues? All pathologists now adhere to the former view, so that a further discussion would be useless. The title intends to convey the idea that carcinoma arises from epithelium by abnormal growth of that tissue, without any parasitic influence, in which sense the carcinoma is epithelio-genetic, not protozoo-genetic. The parasitic theory of carcinoma is not new, yet it is far from old, and the majority of the members of this congress have seen its development as the science of bacteriology developed, watched its acme under the feverish enthusiasm of Scheuerlen (Deutsche med. Wochenschrift, 1887, No. 48), Schill (Deutsche med. Wochenschrift, 1887, XIII, 1034), and Kubassoff (Wiener med. Presse, 1890, XXXI, 1145), and marked its rapid defervescence under the radical treatment of Senger (Deutsche med. Wochenschrift, 1888, XIV, 234), Baumgarten (Centralb. f. Bakt. u. Parasitenk, 1888, III, 397), and Rosenthal (Zeitschrift f. Hyg., 1888, V, 161). A year passed quietly by; then the theory suffered a relapse in a somewhat modified form at the hands of Malassez (C. R. de la Société de Biol., Paris, 1889, Mar. 23), Albarran (*ibid.*, 1889, 9 s., I, 265), Darier (*ibid.*, p. 294), and many others, who inform us that carcinoma is a parasitic disease, but that it is produced by animal parasites closely related to the coccidia of the rabbit.

The discussion of this new theory of the etiology of carcinoma naturally divides itself into two principal parts: I. Are animal parasites present in carcinoma? II. If present, are they of etiological significance?

I. ARE ANIMAL PARASITES PRESENT IN CARCINOMA?

To do justice to this very important question, it seemed necessary to combine a careful review of the literature with my own researches upon the subject, but the prosecution of this idea gave birth to so voluminous a manuscript that all hope of embodying it here was given up, and it was separately published (University Medical Magazine, September, 1893).

Given very briefly, the history of these animal parasites is as follows: The *coccidium oviforme* had long been known to infest the liver of the rabbit. Malassez (*loc. cit.*) observed similar bodies in the epithelium in Paget's disease; Thoma (Fortschritte der med., 1889, VII, 413) found similar bodies in carcinoma, and these observations were elaborated by Sjöbring (Fortschritte der med., 1890, VIII, 529). Toà (Centralb. f. Bakt. u. Parasitenk, vol. II, No. 6, 1892), Podwyssozki (Centralb. f Bakt. u. Parasitenk, 1892, XI, No. 16, 17), Sawtschenko (*ibid.*, 1892, XII, No. 1), Soudakewitch (Ann. de l'Institut Pasteur, 1892, VI, 145, 545), Ruffer and Walker (Journal of Pathology and Bacteriology, 1892, I, No. 2), and others, and the described bodies finally pronounced to be protozoa and the cause of carcinoma.

My own observations coincide with those of the preceding investigators in the discovery of the bodies in question, some of which were found in nearly every one of the 40 carcinomata which I studied

The bodies called parasites I generally found in the epithelial cells, in one instance in the nucleus, but in all others in the protoplasm. They are spherical or slightly oval in shape, smooth in outline, not infrequently seeming to be surrounded by a double capsule. Sometimes they are homogeneous, sometimes homogeneous containing a more or less distinct nucleus, sometimes are granular throughout. The size varies from an almost imperceptibly small sphere to one so large as to distend the cell and compromise the shape of the nucleus by the pressure exerted. The majority are very uniform, however, being about 2–2½ times the size of the nuclei of the epithelial cells. The separation between the inclosed body and the protoplasm is always sharp, and sometimes a space exists between the surface of the inclosure and the cavity in the protoplasm as if the foreign body occupied a vacuole. When nuclei are present, they are a trifle indistinct in outline, sometimes appearing simply as a collection of granules near the center of an otherwise homogeneous body. Occasionally forms were found in which the granules arranged themselves in a cruciform figure; again others in which, instead of the crosses and asters being made up of granules, they were caused by the absence of granules which had collected elsewhere in the cell. In none of the bodies were radiations observed.

Methods of straining, upon which so much emphasis has been placed, seem to be variable and unreliable in action. The best results were secured with hematoxylon and eosin, the granules and nuclei taking on a bluish tinge, while the homogeneous material tinges very slightly with the eosin. Biondi's method is less constant, and in my hands less clear in its action, and after a few trials I rejected it.

The best results very naturally accrue from the best methods of preservation, probably for no other reason than that the cells are all better preserved. The bodies, however, are distinctly visible in specimens preserved in Müller's fluid, alcohol, or other common preservatives.

The epithelial cells occupied by these bodies are not normal in other respects, but generally have distorted, shrunken nuclei, and often a vacuolated protoplasm. Walker and Plimmer (Journal of Pathology and Bacteriology, 1893, Vol. I, No. 4), who see these bodies originate in the nuclei, escape into the protoplasm and develop there, also see great regenerative powers in the nuclei, which rapidly heal and appear normal. My observations differ from this.

Upon the appearances presented by these bodies observers are nearly all in accord. but the inferences drawn from these data differ most widely.

What are these seemingly cellular entities so common in cancer cells? Our judgment upon this matter can not be too conservative, and in forming it, we must clearly understand the reasons given for regarding these bodies as parasites. The first is a diagnosis by exclusion. If these bodies are not parasites, what are they? To answer this in the affirmative is by no means a necessary sequence, for there are many things of which we are ignorant, perhaps more in pathology than elsewhere, and not to know what these things are does not make them parasites.

The second argument is the supposed homology between these so-called parasites and the coccidiosis of the rabbit. Now, when this homology is submitted to a careful analysis, it proves to be no homology at all. It is not morphological, for between these spherical homogeneous cellular inclosures and the large oval coccidium oviforme there is not a particle of resemblance. It is not developmental, for we know of the coccidium oviforme that when it is removed from the body and subjected to proper temperature and moisture the oval cells, divide into four smaller cells, each of which contains delicate falciforme embryos, and that these when taken into the body in food or water, protected by the surrounding capsule pass through stomach and escape into the intestine where the capsule dissolves and allows the amoeboid embryos to enter the intestinal and biliary epithelium. Of the organisms claimed for cancer, no such cycle has been seen. Neither should it be pathological, for the changes in the liver produced by the coccidium oviforme are in no way similar to cancer. The lesion produced by the former seems entirely the result of a chronic inflammation of the bile ducts, and the irregular epithelial growth that results is more like the harmless tumor known as *ajeno-cystoma papilliferum*, than it is like cancer. In the absence of any real morphological, developmental, and pathological resemblances between these cellular inclosures and the coccidia, we find the absence of all scientific grounds for the assumption that we are dealing with positive independent animal bodies.

The arguments against the parasitic nature of the inclosures is. however, much more weighty for no one has succeeded in finding similar bodies elsewhere than in cancer cells; no one has succeeded in growing them outside their customary environment, or observing their growth in that environment. They do not reproduce themselves when inoculated into animals, nor do they in any way exhibit any manifestations whatever that could not be otherwise accounted for.

But if they are not parasites what are they? Every investigator who describes these bodies is careful to tell us how to distinguish between them and leucocytes, hence sees a distinct resemblance between them. The distinguishing feature given for this differentiation is almost invariably some staining reaction, and no less reliable method could be employed. for we all know how the health or degeneration of a cell causes its staining capacity to vary. My belief is that instead of parasitic animal forms we have to deal with a variety of things, of which leucocytes are among the most important. We all know how common leucocytes are in cancer, and all of us have perceived leucocytes (sometimes numbers of them) within the epithelial cells. If there be any truth in the doctrine of phagocytosis, it is natural that one or the other cell will suffer from this relationship. That epithelial cells are phagocytic can scarcely be doubted by those who have examined cases of brown induration of the lungs or catarrhal pneumonia. If the epithelial cells of carcinoma are phagocytic it is natural that the smaller leucocytes shall be digested, and if this takes place, what a variety of appearances partially digested leucocytes shall present we can scarcely guess.

I believe that many of these so-called parasites are nothing more than partially digested leucocytes. Others of the homogeneous type I conceive to be the result of the globular hyaline degeneration, while still others, together with what some have described as "empty capsules," must be regarded as simple vacuoles.

But, and this is the exception which makes a second part of this paper necessary, there have been described by Soudakewitch and Pfeiffer (Die Protozoa als Krankheitserreger) certain forms so unlike the bodies which we have had under consideration, so unlike anything belonging to the body, so much like the *gregarinæ*, so peculiar in their radiate structure and seemingly amoeboid powers, that we can not but admit the possibility of the very rare occurrence of true protozoa in carcinoma. These bodies are large, and seem as frequently to lie between the cells as within them, and while even of these exceedingly rare forms nothing has been proven, yet their homologies of form are sufficient guarantee for our considering them true animal forms, if for no purpose other than to stimulate a study of their etiological importance.

II. IF ANIMAL PARASITES ARE PRESENT IN CARCINOMA, ARE THEY OF ETIOLOGICAL SIGNIFICANCE?

This question includes a second question of great importance—is cancer an infectious disease? Much has been written upon this subject, and an attempt to refute each argument advanced would consume so much time and space that I shall advance but three topics for discussion under this head.

a. Cancer can not be transmitted from individual to individual by inoculation.

This is the most forcible argument which can be advanced against the micro-organismal nature of the disease.

In 1840, Langenbeck (Schmidt's Jahrbücher, vol. 25, p. 104) made a mixture of carcinomatous tissue and dog's serum and injected it into the vein of a dog. This dog subsequently developed carcinomatous nodules in the lung. This experiment seems like a brilliant success but Virchaw (Krankhaften Geschivülste, bd. 1. p. 87) tells us that he examined the microscopic specimens of these tumors and found "more the appearances of that form of spontaneous cancer which I have myself found in dogs, than that of cancer elements as found in men." From this we may conclude that much doubt must be placed upon the results of Langenbeck's work.

Alibert, it is said, inoculated himself and his pupils with cancer juices but produced no cancers.

Follin and Lebert (Traité practique des malades cancerenses, Paris, 1851), after fourteen days, found distinct cancer formations in the heart and liver of a dog into whose jugular vein juices from a mammary carcinoma had been injected. The experiment is of little value because no microscopical examinations of the supposed cancerous tissue was made.

Gonjon (Jour. de Anat. et de Phys., 1867) operated upon dogs, and was successful in the production of nodular formations where carcinomatous tissue had been inoculated. The microscope was not used to confirm the appearances.

Shattock and Ballance (Trans. Path. Soc. of Lond., 1887, Vol. XXXVIII, p. 412) in a paper upon "cultivation experiments with new growths and normal tissues, together with remarks on the parasitic theory of cancer," report numerous cultivation experiments with cancerous tissues, all of which were negative.

Wehr (Verhandl. d. deutsche gesellschaft f. chirurgie, 1888, vol. 18, pt. 2, p. 86) inoculated 26 dogs with fragments of 5 vaginal carcinamata and 2 carcinamata of the penis. The dogs were killed in 3–4 weeks, and in some of them distinct and large carcinoma nodules were found. It is not improbable that these nodules were fibrous rather than carcinomatous. No microscopical examination of them was ever made.

Hahn (Berlin. klin. Wochenschrift, 1888) transplanted carcinoma nodules excised from cancer patients to remote areas in the same individual, and found that the grafts increased in size and invaded the surrounding tissue. This, however, is no more than an artificial metastasis.

Senger (Berlin. klin. Wochenschrift, 1888) failed in all his attempts to produce cancer by inoculation.

Hanau (Verhandl. d. gesellschaft f. chirurgie, 1889, vol. 18, pt. 2, p. 176) made his inoculations from one animal to another of the same species. Selecting a vaginal epithelioma occurring in a white rat, he introduced fragments into the tunica vaginalis testis of two old white rats. The first rat died after seven weeks with disseminated peritoneal carcinoma. The second was killed in eight weeks and was found to have but two tumors, one the size of a pea at the tail of the epididymis, the other very small at the guburnaculum Hunteri. A third rat was inoculated from the second, and when killed three months after, was found to have a widespread carcinosis. Hanau thinks the failure of the other experimenters due to the miscellaneous selection of animals used, and insists that the inoculations should always be from animal to animal of the same species.

Klebs (Deutsche med. Wochenschrift, 1890, Vol. XVI, p. 709) wrote a thorough paper upon the various cancer inoculations, reporting many experiments upon rats, in all of which he failed to produce a single tumor. The fragments of tissue introduced were found to be absorbed, no other change than hyaline degeneration being observed in them.

Cornil (Séance de l' acad. de méd. Par. 1891, June 23) in numerous experiments failed to produce cancer by inoculation.

Frank (Deutsche med. Wochenschrift, 1891, No. 30) also failed to produce cancer by inoculation into animals.

Shattock and Ballance (Proc. Royal Soc. of London, 1891, p. 392, and Med. Press and Circ., Lond., 1891, September 9) again enter the field and in two papers report a lengthy and comprehensive study of cancer inoculations, in which 8 monkeys, 3 rabbits, 7 dogs, 3 sheep, and numerous other animals were used, into some of which whole scirrhus tumors were introduced into the abdominal cavity. In no case was a cancerous tumor produced, and the common sequence was the absorption of the graft. These experimenters are of the opinion that the few successful inoculations reported are due to lack of thoroughness in the examination of the growths produced.

Senn (Surgical Bacteriology) mentions Billroth, Maas, Dontrelepont, Alberts, Senger, and others as having failed in their inoculations, and in his own observations, which were made upon dogs, cats, rabbits and guinea pigs, saw no other change than an invariable failure of the graft to increase in size.

Duplay and Cazin (C. R. Soc. de Biol. Paris, 1892, February 22), in a series of 22 inoculations of cancerous tissue from man to rabbits, guinea pigs, and dogs, attained no positive success, the fragments of tissue being absorbed. In a second series of experiments made in accordance with the idea of Hanau, from dogs to dogs, no other changes than inflammation and subsequent absorption could be detected.

Fischel (Fortschritt der Med., 1892, No. 1) inoculated 23 rats, using as material 3 scirrhus cancers of the mamma, 9 other carcinomata, and 2 sarcomata. All the inoculations were made within fifteen minutes after operation for the removal of the tissues, but not one of the experiments was a success.

It would be useless to add to this already long list, as its results are almost uniform. The work of Langenbeck has been rendered negative by the examination of his specimens by Virchow; that of Follin, Seburt, and Goujon, is useless because no microscopical diagnosis accompanies it; and as that of Hahn is but an artificial metastasis we are left nothing but the three inoculations of Hanau against hundreds of carefully made but unsuccessful attempts. The fact that Hanau's three experiments were all successful is a little suspicious, yet we will not reject his experiments, because spontaneous cancer in animals is not rare, because cancer seems to run in families, and because cancer occurs in the old. We can conceive of old rats with a family predisposition to cancer developing squamous epithelioma in consequence of the irritation caused by the operation, independently of what tissue was introduced.

The great weight of evidence, however, is such as to confirm the assertion with which we started out, that cancer can not be transmitted from one individual to another by inoculation.

There are numerous cases on record where carcinoma of the breast has subsequently given rise to carcinoma of the skin of an arm kept applied to it; where carcinoma of the lower lip has seemingly inoculated the upper lip, and where cancer of the penis has resulted from contact with a cancerous uterus. The first two illustrations amount to no more than the experiments of Hahn; the latter is so extremely rare that it may have arisen spontaneously in every case. We must not omit to consider in relation to such cases that the discharges from cancers are usually irritating, excoriating, and may in this way produce epitheliomatous growths on contiguous parts without the aid of any microorganism.

b. Cancer is a noninflammatory disease.

All the known infectious diseases, except malaria, are inflammatory in type. Tuberculosis, lepra, syphilis, actinomycosis, and glanders are primarily inflammatory, secondarily degenerative. Typhoid fever is more purely inflammatory, while little degeneration occurs in anthrax and charbon symptomatique. Cancer is utterly unlike any of these, being a simple hyperplasia of epithelium, extending into neighboring interstices. I expect to be challenged on this ground and to have the objection raised that the coccidiosis of the rabbit is an infectious disease, but non-inflammatory, and that the resemblance of cancer to this disease is greater than that existing between cancer and other infectious diseases. To this we must reply that coccidiosis *is* an inflammatory disease and that, while it is at first a simply parasitic disease of the epithelial cells, it becomes a chronic inflammation of the mucous membrane with subsequent fibroid thickening, hypertrophy, and polyposis. That there is little homology between it and cancer has already been explained.

The great difference between cancer and the infectious diseases can be more conveniently observed in the secondary than in the primary foci. In tubercle, for example, the secondary formations are formed by the dissemination of the bacilli, and wherever a bacillus falls chemotaxis calls forth a body of leucocytes, connective tissue cells "Wanderzellen," "Schlummerzellen," etc., which, together with the cells already present in the part, form the node. In cancer nothing like this takes place, and we can not conceive of the dissemination of "cancer germs" producing the secondary, especially the lymphatic, growths of this disease unless we believe in the transmutability of tissue which will permit the mesoblastic tissues to assume an epiblastic type, an opinion which few will support at present. The secondary growths of cancer depend upon the transportation and multiplication of cancer (i. e., epithelial) cells. In their new habitat these foreign cells not infrequently conform to the normal mode of growth and take on their normal arrangements, so that even in nodules in lymph glands, fibrous tissue, etc., distinct alveoli may be observed. I can not conceive of epithelial cells, the hosts of irritating parasites, taking on such a rapid and healthy growth with so little variation from the normal.

c. Epithelium is normally a variable tissue.

Our discussion of the subject would be far from complete should we neglect the peculiarities of the tissue in and from which carcinoma grows, which may have a most important bearing upon the development of the tumor. In youth epithelial tumors are rare, and the changes to which the tissue is subject are overshadowed by the pronounced growth of the connective tissues. As age advances a change in the body equilibrium occurs, in which the formative energy of the connective tissues ceases and distinct changes in the epithelium occur. Upon the face and hands of the aged the skin becomes thin and transparent, and there is a tendency for cellular proliferation to occur in local areas which appear as slightly elevated brownish spots. In some cases these areas send out irregular processes which descend into the deeper tissues and form the nucleus of a squamous epithelioma.

Bowlby (Brit. Med. Journal, 1892, II, p. 7) made a systematic study of the mammary glands of persons at and beyond middle life and found in all of them distinct changes in the form of proliferation of cells and alveoli. Beadles (*ibid.*) studied the noncancerous portions of mammary glands amputated for cancer, and while in all of them he found, as Bowlby had done, proliferation of cells and alveoli, in some he found cellular infiltration and irregular cellular proliferation. The former of these changes we are inclined to attribute to age, the latter to the cancer. In the Morton lecture on cancer and cancerous diseases for 1892, G. Sims Woodhead mentions his observations upon a large number of tongues which he had the opportunity to study, and tells us that in advanced age the epithelium shows a distinct tendency to thicken and grow with the production of descending processes.

In addition to these changes consequent upon advancing age, we find a great variety of appearances due to the operation of external agencies. Not to go into detail, let us simply consider the following: The hands of laborers, being exposed to friction, are subject to general thickening of the epidermis with immense thickenings or callosities at the most exposed portions. When the boot pinches the foot, a more circumscribed epidermal thickening (clavus) is produced. If one or a small group of papillæ are irritated, a very different growth, involving the lower layers of the skin, and more organoid in character—verruca—is produced. Upon delicate mucous surfaces, chronic irritation produces polypi whose epithelium contains glands. Nor are the changes of the epithelium produced solely by factors operating upon it, but may be brought about by changes in contiguous tissues. Councilman (Johns Hopkins Bulletin, Vol. 1, No. 2, p. 20, January 1890), has shown that when, in consequence of chronic inflammation, granulation tissue is found beneath the epidermis, the epithelium grows down into the cutis, giving rise to a branching system of epithelium beneath the skin, probably occupying the lymphatic vessels, presenting a picture almost identical with squamous epithelium and even containing epithelial pearls, but circumscribed in growth by the denser tissues beneath, whose resisting powers at once check its progress.

I recently obtained from a friend a portion of a uterine cervix containing a rather minute laceration of long standing. In the process of repair, the epithelium had descended to the bottom and almost filled up the fissure. At the outer part, where the tear was clean, the base of the epithelium was smooth but at the termination of the tear, where it had separated neighboring muscular bundles but partly, and left numerous crypts, the epithelium had grown with a branched arrangement fitting into these interstices, and only checked in growth by the greater resistance offered by the undisturbed tissues beyond. Had there been no healthy tissue in these two instances to check the descending process of epithelium in their growth, we must have had resulting an epithelioma. Indeed, who can say what further extension might have resulted in the course of time, had the cervical tissue been suffered to remain *in situ* instead of being excised?

In this brief fashion we have endeavored to show that the character of epithelium is such as to make a specific cause for its development unnecessary.

After all that has been said it would be folly for us to accredit to the very occasional protozoon-like forms which we have mentioned more importance than that given to the accidentally present bacteria. Bacteria of various kinds are nearly always found in carcinoma, gaining access from the air, water, or food either directly, when the tumor occupies a surface, or through ducts, etc., when it is glandular. It seems to me not improbable that if bacteria can thus enter the abnormal tissue, protozoa of various kinds could do likewise. Andrews, who studied 7,881 primary cancers (Pacific Rec. M. and S., San Francisco, 1889–'90 II, 195), does not at all prove that a specific organism is necessary for cancer by showing that primary cancers are most common upon the most exposed surfaces, but only that upon most exposed epithelial surfaces the greatest mechanical, chemical, and physiological abuse is received.

I do not believe cancer to be due to any specific cause, but to have its origin from numerous and often cooperating causes, of which much still remains to be learned, but which will show us that the principal factor in its production is an inherent proliferative tendency in the epithelium itself, in which sense the origin of carcinoma may be said to be epithelio- not parasito-genetic.

THE ACTION OF RATTLESNAKE VENOM UPON THE BACTERICIDAL PROPERTIES OF THE BLOOD.

By Dr. W. H. WELCH, *Professor of Pathology in Johns Hopkins University, Baltimore, Md.*, and Dr. C. B. EWING, U. S. Army.

Dr. W. H. Welch reported the results of experiments made by himself and Dr. C. B. Ewing, U. S. Army, to determine the action of rattlesnake venom upon the bactericidal properties of the blood. The venom was obtained directly from a living rattlesnake in a sterilized saucer, according to the method recommended by Weir Mitchell. This venom was injected in varying doses subcutaneously into rabbits, which died at intervals varying from one-half hour to four hours. Immediately after death the blood was withdrawn by means of a sterilized glass pipette from the right auricle and posterior rena cava, about 6 to 10 c. c. being readily obtainable in this way. At the same time blood was obtained for a control experiment from a healthy rabbit. In some instances the blood of the animal before it was poisoned by the venom was previously tested as to its bactericidal power. After standing twenty-four hours in the refrigerator, 1 to 3 c. c. of the venom serum and of the normal serum were pipetted off into sterilized test tubes and inoculated with the bacteria to be tested. The bacillus coli communis and the bacillus anthracis were used for this purpose. Roll or plate cultures in gelatine or in agar were made in the usual way to determine the number of bacteria inoculated into the serum and at varying intervals of time up to one week to determine increase or diminution of the bacteria planted in the serum. The experiments showed that the blood serum of rabbits killed with the venom was nearly or entirely devoid of the power of destroying the bacteria used for the experiments, whereas the normal serum was capable in a few hours of destroying thousands of these bacteria.

The bearing of these experiments upon the rapid development of post mortem decomposition following death from snake bites and also upon individual predisposition to the invasion and multiplication of bacteria in the living body was considered.

INFLUENZA: CAUSES, COMPLICATIONS, AND TREATMENT.*

By RAMON GUITERAS, M. D., New York.

HISTORY.

Influenza, or la grippe, is probably richer in names and symptoms than any other known disease. I will mention a few of the former by way of illustration. They are: Epidemic catarrhal fever, rheuma epidemicum, cephalalgia contagiosa, Ziep Schafhusten, Hühnerweh, Blitz catarrh, Russian disease, Italian fever, Spanish catarrh, etc., depending mainly on the variety of symptoms and the locality from which it comes.

We often have the question asked us "What is influenza?" I think that a safe answer to this would be, It is an epidemic cold depending upon some as yet unknown cause.

Colds have a tendency to settle in certain parts, generally the weaker ones, and influenza does likewise. The systemic symptoms occur in varying severity in all its varieties, while the catarrhal symptoms cluster about certain organs where the power of resistance seems to be naturally least. These epidemics date before the Christian era, an attack having occurred in the Athenian army in Sicily 415 B. C. After this they began to appear at irregular intervals, spreading over Europe generally in the direction of from east to west, of which no exact or complete records have been kept up to the year 1510, when it prevailed in the British isles to an alarming extent and quite an accurate account of the epidemic was written. Various well-recorded outbreaks followed in the years 1557 to 1879, about twenty in all, besides others of minor importance. These varied in severity, symptoms, number, and suddenness of the attacks.

ETIOLOGY.

Predisposing influences, none. People are attacked without distinction of age, sex, occupation, or social standing. Previous or present illness affords no protection. One attack renders no immunity from another. Overcrowded, unhealthy, badly ventilated, and damp dwellings render attacks more severe, although the dwellers

* From observations made while investigating this disease for the health department of the city of New York.

are no more prone to it. Influenza may occur in any season. It occurs usually in the autumn, often in the spring, and sometimes in the summer and winter. Latitude has no effect, as in the epidemic of 1837 it appeared at the same time in England and Cape Colony, that is, in directly opposite zones and seasons. Climate has no influence, as it occurs equally in the dampest and driest regions. Certain meteorological signs and coincident phenomena have been remarked as preceding many of the previous epidemics, such as foul fogs, volcanic eruptions, earthquakes, etc.

The rapidity with which it spreads and the great numbers who suffer from it at the same time and in the same way certainly point to some specific poison which is carried by the air as a disseminating medium and excites the disease. This poison was supposed by many for a long time to be the sulphur and other matter thrown from the volcanoes, which was carried about in dust fog currents, a foul fog having been generally noticed before an epidemic or accompanying it. In this enlightened age, however, I think we are justified in believing that the exciting cause is a micro-organism.

The investigations of the bacteriologists in searching for micro-organisms have resulted as follows:

For several years the diplococcus pneumoniae of Fraenkel and Weichselbaum, the streptococcus pyogenes, the staphylococcus pyogenes aureus, and several scattering forms were the only ones found, until Dr. Pfeiffer, of Berlin, in 1892, discovered a bacillus in the secretions of patients suffering from influenza, which was declared by Koch, Kitasato, and others to be the true germ of this disease. This bacillus was about the thickness of bacillus mouse septicaemia, but only half the length. As only the two ends stain, it is very hard to distinguish it from the diplococcus and streptococcus. Former observers seeing these mistook them for the latter. They were cultivated by Kitasato and others.

About the same time Bruschettini* found the same germ in the blood of those suffering from the disease.

The question why an epidemic may break out at one time and then for years remain dormant is not an easy one to answer. It is probable that there are cycles in which peculiar seasons recur, and that such cycles are associated with the reproduction of similar disordered conditions in the health of man.

SYMPTOMS.

There is no disease in which the characteristic symptoms vary as much in the various epidemics as they do in influenza, and there is also no other in which the symptoms vary so much in point of predilection and severity. The predilection depends upon individual weakness and the susceptibility of certain systems, as the nervous, respiratory, alimentary, genito-urinary, etc., to disease. The severity depends in a great measure on the condition of the patients, at the time of the attack, as to their resisting powers, the amount of exposure to which they have been subjected, the character of the epidemic, etc. Almost everyone during an epidemic is attacked, although some suffer to such a limited degree, as a slight headache, gastric disturbance, or a feeling of languor, that they think they have escaped. The varieties of the attacks during the different epidemics have given rise to several classifications, depending upon the different seats of the disturbance, *e. g.*, cephalic, thoracic, abdominal, cerebral, guttural or bronchial, intestinal or typhoid. This latter was the classification of Sydenham, and depended upon epidemics extending over a period of three hundred years. The classification preferred at the present date seems to be that of the nervous, catarrhal, and gastric; and this was the classification that I adopted in my last writings. At the present date, however, having watched the epidemics carefully during the last few years, I am inclined to classify the varieties into two chief groups, and to subdivide them accordingly. In doing

* Ricerche bac. sull. infl. 1a communicazione preventiva. Riforma Medica, Gennaio, 1892.

this I strike out the gastric variety, placing it under the catarrhal. The classification would then consist of but two principal varieties, viz: (1) musculo-neuralgic; (2) catarrhal; and these I believe are mixed in about 90 per cent of the cases. Musculo-neuralgic symptoms almost always complicate the catarrhal form, although catarrhal do not nearly as often complicate the musculo-neuralgic.

These varieties, with but few exceptions, have the same general symptoms and tend to conclude in the same way. They are:

Onset.—Feeling of weakness, faintness, dizziness, chilly sensations, constipation, perhaps nausea, vomiting, anorexia, languor, or high fever.

Acute stage—lasting from a few hours to a week, during which we have frontal headache, often pain in orbits and eyeballs, loss of appetite, strength, and spirits, feeling of languor, lassitude, inability to do any mental or physical work; rheumatic pains variously distributed in back of neck, small of back, costal region, or calves of legs; bowels may continue constipated; urine high-colored; foul tongue and breath; fever generally continues, of a remittent type, with evening exacerbations.

Stage of prostration—lasting from a few days to a few weeks, marked by nervous prostration, general feeling of languor, poor appetite, and generally a bronchitis of a dry nature. In children and infants the symptoms are not as marked.

In children they are as follows: Vomiting, headache, moderate fever, coated tongue, constipation, followed by a bronchitis lasting about a week. In infants symptoms of gastro-enteritis, vomiting, diarrhea, moderate fever, rapid pulse, and occasionally convulsive movements.

We will now consider the varieties individually and point out the special features of each.

Musculo-neuralgic variety.—This variety is generally associated with the catarrhal as well, but when taken individually is especially marked by severe headache, pain in the eyeballs, rheumatic or neuralgic pains in various localities, restlessness, at times wakefulness, occasionally hyperæsthesia, and following these a stage of great nervous prostration, lassitude, languor, sweating, etc.

The catarrhal variety is characterized by symptoms pointing to a congestion of certain organs or their mucous tracts, and is divided into three principal groups:

(1) The respiratory, which is the form that has hitherto been called catarrhal, guttural, bronchial, or thoracic.

(2) The alimentary, embracing the varieties spoken of as gastric, intestinal, abdominal, or typhoid.

(3) The genito-urinary, which has never before been considered.

A general catarrhal also occasionally occurs, in which form the symptoms included in the first three groups are combined in varying severity in one attack.

These groups are further subdivided according to the locality from which the symptoms arise.

The respiratory-catarrhal form is generally marked by a catarrh beginning in the upper respiratory tract, with pain in the frontal sinuses, eyes painful, congested, and watery, profuse and watery nasal discharge, feeling of stenosis over the bridge of the nose, marked angina, occasionally tonsilitis, tickling in throat, hoarseness, ending in a bronchitis lasting from a few days to several weeks. Epistaxis and hæmoptysis occasionally occur. When, as is rarely the case, it is limited to the upper respiratory tract, we have only the symptoms usually accompanying nasal and pharyngeal inflammations.

The catarrh of the middle respiratory tract is that localized in the pharynx, larynx, and trachea, principally in the latter, the former generally being inflamed sympathetically. This is characterized by a hoarseness and sense of excoriation and tickling in the trachea (tracheitis), a feeling of laryngeal thickening producing a spasmodic cough corresponding to that of croup in children. In other cases it resembles more a bark of the variety known by the Germans as Schafhusten. In still others it has a whistling note. In the catarrhal variety of the lower respiratory tract a bronchitis generally follows or is associated with the upper or middle respiratory form. It is a peribronchial congestion, giving rise to a troublesome spasmodic cough. Auscultation shows roughened breathing, fine subcrepitant râles, often sonorous and sibilant over both sides. Pulse, temperature, and respiration slightly elevated, but going down gradually to normal. Fever often remittent. Neuralgic symptoms generally associated with it.

Alimentary.—In the gastric form we have violent and frequent vomiting, nausea, pain, loss of appetite, constipation, often severe headaches, faintness, and dizziness.

The gastro-intestinal form has, in addition to the vomiting and other symptoms of gastric disturbance, a diarrhea of the usual form that accompanies a subacute gastro-enteritis.

The intestinal form is principally a colitis accompanied by marked tenesmus, stools diarrheal in character, often mixed with mucus and tinged with blood. Dysenteric symptoms of a very grave nature occasionally set in, causing death in a few hours.

The genito-urinary variety is a rare form, generally of a mild type and frequently not known to the person affected. My attention was first called to it by the great number of applicants for insurance who had to be postponed during the epidemics on account of high specific gravity and albumin. These I found to be suffering from influenza. Their symptoms constitutionally were the same as those suffering from the respiratory or alimentary form. The condition was generally localized in the kidney, and the urine showed the ordinary symptoms of renal hyperæmia, i. e., high colored, high specific gravity, albumin in small quantities, blood-corpuscles, and occasionally hyaline casts. This condition usually lasted but for a few days.

The vesical type was similar to that of cystitis of the vesical neck. It was very rare. Constant desire to pass water, pain over pubes, and a sense of heaviness in the perineum. Urine high colored, high specific gravity, some mucus.

The urethral and vagino urethral forms were still rarer, and were accompanied by a watery, glairy, mucoid discharge, attended by a congestion of the parts and burning during micturition. These were generally combined with some other forms of the genito-urinary catarrhal variety. They are very rare and ephemeral.

General catarrhal fever, i. e., catarrh of all the mucous membranes, was observed in several cases, characterized by high fever, rapid pulse, vomiting, diarrhea, painful and frequent urination of a dark-red color, with a high specific gravity and a slight amount of albumin, slight conjunctivitis, coryza, laryngitis, and bronchitis. The attack was generally very acute, though of short duration.

COMPLICATIONS.

By far the greater number of complications and the most serious are those connected with the respiratory form, which I will mention in order, going from above downward.

Conjunctivitis is generally associated as a symptom with the upper respiratory variety.

Epiphora due to stenosis of duct.

Epistaxis occurs in about two per cent of the cases. Occasionally it is quite severe, and in some cases has continued for twenty-four hours.

Follicular tonsilitis has been observed in several cases.

Quinsy, complicating many previous epidemics, has not been observed in the recent ones.

Eustachian catarrh and otitis media are complications which exist in a great many cases, and are at times only noticed by the specialists, general practitioners frequently attributing the symptoms to the neuralgic pains of the disease, or to a sense of fulness due to quinine, which is being taken by almost all influenza patients; and thus ruptures of the tympanum have occurred in many cases where paracentesis ought to have been performed.

Loss of the senses of smell, taste, and hearing sometimes occur, evidently due to a peripheral paralysis of the nerves of special sense.

Glandular enlargements have not been prevalent during the recent epidemics, probably owing to the mild forms of catarrh in the upper and middle respiratory tracts. There are two varieties of these. Enlarged cervical, such as occurred in former outbreaks, where the catarrhal symptoms of the upper respiratory tract were principally involved, and which were often very malignantly inflamed. Enlarged bronchial and tracheal glands (adénopathies bronchiques). These cause a feeling of thickening and packing about the upper bronchus and trachea, the latter having a board-like feeling. A sense of soreness is also connected with it, both bronchial and peribronchial. These glandular enlargements can be made out by percussing after the method of Gueneau de Mussy.

Hæmoptysis was observed only in a few cases and was very slight.

Capillary bronchitis and bronchitis of the smaller tubes are complications of the ordinary form of bronchitis by direct extension. They generally occur in women and at any age. They are very fatal, the great prostration seeming to affect their power of expectoration so that they "choke up" and die asphyxiated. These are often followed or complicated by a lobular pneumonia.

Lobular pneumonia is very acute, lasting from three to seven days. It generally occurs in the old, the middleaged, and the sickly, although young adults are frequently affected. It seems to be most common among females. A chill sometimes introduces this complication; in fact, I have noticed a chill in this variety more frequently than in any other. It begins at the bottom of the lung and spreads upward. Death results either from heart failure or asphyxiation.

Lobar pneumonia generally attacks patients during the stage of prostration, is frequently double, comes on generally without a chill, and is accompanied by a very high fever. It occurs generally in men, 80 per cent of those observed were between the ages of 40 and 55. Death is usually from heart-failure and occurs in from two to five days.

Grippe-pneumonia is a form often spoken of, and is a condition following a pulmonary congestion. It is generally in both sides, comes on insidiously without being accompanied by a chill or the crepitant râle as in ordinary cases. The consolidation usually begins at the base or the middle of the lung.

Pulmonary hyperæmia is a frequent and dangerous complication, and occurs with much greater frequency than it is supposed. This should be treated at once with the greatest care, and every precaution taken lest it develop into a grippe-pneumonia. It is very similar to lobar pneumonia in its early stage, excepting that it is less severe and covers a greater area. It is due to a recession of blood from the surface, or from some other adjoining organ, to the lungs by reflex action through the vaso-motor system. The lungs seem to be most favorably adapted for such a congestion on account of their great vascularity and the lack of resistance to the dilatation of the capillaries in comparison with that found in other organs. Just why this particular disease, influenza, happens to produce such a congestion is difficult to explain. It is obvious, however, that it holds the respiratory tract as a seat of predilection, as almost all its forms are accompanied sooner or later by a congestion either of the upper air-passages or a peribronchial one of the lower, although an active hyperæmia of the parenchyma itself is comparatively rare. Diarrhea occurs in many cases, but is simply the intestinal form of the alimentary variety.

Dysentery is a dangerous form of the colitis occurring in the same variety. In the two cases which came under my observation death resulted in two days. In both cases the first day's discharges were simply diarrheal.

Cholera, a sequela which is so much feared, especially in Europe, will probably never make much headway here. It does follow influenza, and has during the last two years. It can be more easily guarded against, however. than influenza, as it is more distinctly contagious. It is more liable to attack those who have suffered from the gastro-intestinal form of the disease, which often occurs and leaves the mucous membrane in a somewhat denuded condition.

Typhoid fever as a sequela has not been observed in any fatal cases in New York during the late epidemics, but the typhoid condition has been noticed frequently, and has been observed especially in some cases of dysentery, bronchitis, and bronchopneumonia.

Meningitis has occurred in a number of cases, death resulting in about two days.

Nervous prostration, which is such a pronounced symptom in the various stages of influenza, has proven a most obstinate sequela. Acute hyperæmia of the tongue has also been observed. The tongue was enlarged, reddened, hard, and tender to such a degree that the pressure of the teeth against it was quite painful. The tongue felt too large for the mouth and protruded, resting on the lower teeth. The papillæ on either side were enlarged and sensitive.

THE VARIOUS DERMATOSIS OF INFLUENZA.

The principal one of these is the erythema (influenza erythematosa). This generally occurs with influenza of the gastric type, during its acute stage, and closely resembles scarlet fever. It comes on as a pinkish blush over the face, chest, and arms, and is not punctate. The tongue has a thick, white coating, with enlarged papillæ on the sides near the tip. The skin is moist. Miliaria occasionally occurs. Erythema multiforme is also seen in this connection. Alopecia areata has been reported as a complication. Herpes zoster was observed by me in two cases during the last epidemic.

DIAGNOSIS.

The only diseases with which influenza is liable to be confounded are coryza, bronchitis, tonsilitis, dengue, scarlatina, and rheumatism.

Acute coryza and bronchitis would be excluded by the absence of severe headache, muscular pains, great prostration, and anorexia, although doubtless if these occurred during an epidemic they would be more or less due to it, and most probably mild in form. Follicular tonsilitis has many symptoms in common with influenza, but would be excluded through the absence of severe frontal headache, rheumatic pains, etc.; although I have every reason to believe that follicular tonsilitis has occurred in several cases of influenza as a complication.

Dengue resembles in a great measure the muscular neuralgic form of the disease. It would be excluded, however, on account of the different character of its onset—it generally taking from two to three days for the temperature to reach its height—the character of relapse, the eruption, the pain, swelling in joints, the enlarged glands, etc.

The rapidity with which the influenza has traveled and the territory which it has covered differ also from dengue, which occurs generally in circumscribed areas in the south of the United States, Spain, India, or Africa.

SCARLATINA.

This disease, with which the late epidemics have been most confused, is excluded on account of lack of punctate character to the eruption, strawberry tongue, and angina; also on account of speedy disappearance of the eruption, which lasts about twelve hours. The eruption, however, is quite similar in its general erythematous blush, and when it is associated with some angina and high fever the resemblance is quite strong, especially as the tongue shows some enlarged and reddened papillæ on its sides near the tip, which stand out prominently in contrast with the white coating covering it.

PROGNOSIS.

Good in most of the cases. The disease is self-limited, and if the patient is careful there is no question of speedy recovery. The only danger is when it occurs in the old and the infirm, or those suffering from chronic troubles. One thing noticeable in the last epidemics was how few phthisical patients, comparatively speaking, have died from its effects, although in many case they have succumbed from intercurrent bronchitis. In Bright's disease and valvular disease of the heart the influenza is more fatal. A few deaths were due directly to the disease, but these occurred in cases of old age, tumors, and other cachectic conditions, in which the patient died within twelve hours, probably from the shock of the sudden onset. In two other cases of feeble women, death occurred in two days, due to heart-failure.

TREATMENT.

Rest in bed during acute stage. The patients should remain at home until temperature is normal. It would be advisable for them to remain in the house until entirely well, but as they generally will not do this, it is important that they should remain at home evenings. They should be very careful in regard to their clothing, the wearing of rubbers, overshoes, etc. They should avoid all drafts of air, as in the stage of prostration and sweating they are very susceptible to pulmonary complications. They should ride in cabs, if possible; if not, in horse-cars, or the front or rear car of the elevated.

At onset move bowels, calomel two grains every two hours until they have moved, or two compound cathartic pills in one dose. At bedtime, quinine and Dover's powders, with a hot whisky punch.

For headache, fever, and muscular and neuralgic pains, give antipyrine, ten grains every two hours, with whisky, one-half ounce, until the headache is relieved. Two of these powders will generally be sufficient to relieve the most obstinate. It is not advisable to give more than three of them, but in case they do not produce the desired effect, to change to antifebrin or phenacetin, in five-grain doses, every two hours. Whisky should be given with these drugs, as it hastens their action and tends to counteract their depressing effect. In case the muscular pains are obstinate, salol, in five grains, or salicylate of soda, in fifteen-grain doses, three times a day, will generally relieve them.

Great anorexia and weakness being present, milk punches should be given every two hours, if well borne, during the acute stage.

In all stages of the disease whisky is the remedy *par excellence* to counteract the great prostration, and should be taken three times a day throughout the attack. If whisky is not well borne, give champagne, brandy, or sherry. Quinine is also a standard remedy, and is useful both as an antipyretic and a tonic. During the acute stage it should be given, if the stomach can bear it, in five-grain doses three times a day, and in the stage of prostration following it should be given, purely as a tonic, in three-grain doses, in combination with nux vomica and iron in pill or solution. In the alimentary forms, where there is considerable vomiting, good results have followed a milk diet, with a powder of bicarbonate of soda, pepsine, and bismuth, ten grains of each every four hours. If diarrhea is present add one-eighth to one-tenth of morphine to each powder and increase in frequency if necessary. All very sick cases should be put on a milk and whisky diet—two and a half quarts of milk and four ounces of whisky a day.

In catarrh of the upper respiratory tracts a pill of belladonna, camphor, morphine, and quinine every two or three hours gives speedy relief. In cases of pharyngitis and tonsilitis an astringent spray or gargle should be added.

When the laryngeal and tracheal symptoms are most pronounced inhalations of tr. benzoin comp. afford the most relief. In bronchitis of the dry and semiasthmatic form, which generally occurs, and which seems to be more of a congestion of the bronchial mucous membrane with a spasmodic cough, a mixture containing belladonna and morphine will give great relief. A preparation of codeia, gr. one-sixth; am. iodid., gr. 3, in mist. expect. Stokes, ℥ j., every three hours is also very valuable in the treatment of this bronchial condition. In case of bronchitis with abundant secretion, muriate of ammonia or the more stimulating expectorants must be given. In the genito-urinary variety simply place the patients on a milk and Vichy diet, and confine them to the house. Complications should be treated accordingly, and digitalis and strychnine should be given where the heart-action is weak, to prevent heart-failure, as influenza seems to have a depressing influence on the heart-action.

In the musculo-neuralgic variety of influenza we have a specific in the pill of phenacetin and salol, 2½ grains of each every three hours.

When severe nervous prostration follows, a tonic consisting of the phosphates, with quinine, iron, and strychnine, should be given. The phospho-muriate of quinine (Phillips's tonic) is excellent in these cases.

In conclusion, after having observed so many cases during the almost annual epidemics of the last few years, and so many sporadic ones between the epidemics, I think we have abundant ground for suggesting the possible advent of a new disease of an ephemeral nature.

PATHOLOGY AT THE INSTITUTION FOR FEEBLE-MINDED CHILDREN AT ELWYN, PA.

By HENRY W. CATTELL, A. M., M. D.,

Demonstrator of Morbid Anatomy at the University of Pennsylvania; Prosector to the American Anthropometric Society, Pathologist to the Presbyterian Hospital of Philadelphia; to the Institution for Feeble-minded Children at Elwyn, etc.

PRELIMINARY PAPER.

The Pennsylvania Institution for Feeble-minded Children, of which Dr. J. N. Kerlin is the superintendent, affords abundant opportunities for the clinical and pathological study of lesions which have to do with those deficient or weakened mental conditions not usually classified under the head of insanity.

The number of children in the institution on September 1, 1893, was 915, of which 365 were girls and 550 were boys. During the 6 years Dr. A. W. Wilmarth was assistant physician there were performed 111 autopsies. 102 of the brains and a few of the cords from these cases which were carefully studied, both macroscopically and microscopically by Wilmarth, are preserved in the museum. Since my appointment as pathologist, in the beginning of the present year, there have been performed 17 autopsies. The brains and nearly all of the cords from these cases have been hardened in Müller's fluid and are now mostly ready for microscopic study.

While this number of cases is of course entirely too few to warrant the formation of many conclusions, I have thought it wise to bring this field of investigation before you in order that written suggestions might be made in regard to the carrying on of the work in the future.

The following investigations are being carried on in the institution at the present time:

(1) An attempt at a classification of idiocy, imbecility and feeblemindedness from a clinical standpoint: from a pathological standpoint.

(2) During life: (*a*) Personal descriptive blanks. (*b*) Etiological history blanks. Of *a* and *b* about 4,000, representing some 2,000 cases have been prepared during the superintendency of Dr. Kerlin. (*c*) School progress, military drill. Trade. (*d*) Station, gait, peculiarities and deformities, reflexes, speech, health, sample of writing. Blood, corpuscles and hæmoglobin, sp. gr. Reaction, sense of feeling, taste, smell, hearing, sight, electricity, heat and cold. Epilepsy. Photograph. Parasites. Ears, Growth, musical ability, dynamometric, psychological tests; money, age, weight, size, distance and figure tests. Anthropometric measurements, casts of palate, teeth. Examination of urine. Impress of finger and toes.

(3) Post mortem record: Weight of brain, photograph of the fresh brain; cast of the hardened brain; anthropometric measurements of the interior of the skull; anatomical anomalies; macro and microscopic study of the brain, cord and cranial nerves.

The following blank forms are used as a guide:

(*a*) PERSONAL DESCRIPTIVE BLANK.

Reg. No. ——. L. B. No. ——. P. ——.

1. Name in full of candidate for admission?
2. Where now living?
3. Date of birth?
4. State, county, and town where born?
5. Was the child peculiar from birth?
6. When, and in what manner was any peculiarity first manifested?
7. Is he of the usual size and weight for age?
8. Describe the peculiarities in the shape ot the head.
9. Describe peculiarities of the features.
10. Color of the hair and eyes?
11. Are sight and hearing good?
12. Is the mouth open or well shut?
13. Are the teeth good?
14. Is the speech perfect?
15. What peculiarities of speech are there?
16. Is he right or left handed?
17. Describe any irregularity in walking.
18. At what age did he commence to walk?
19. Does he go up and down stairs properly?
20. Describe any bodily deformity.
21. Describe any paralysis.
22. Has he any odd movements of body, limbs, or face?
23. Does he laugh or weep without cause?
24. Is he nervous?
25. Has he had measles?
26. Has he had whooping-cough?
27. Has he had scarlet fever?
28. Has he had varioloid or smallpox?
29. Has he been vaccinated?
30. Describe any skin or scalp disease he may have had.
31. Has he had epilepsy or fits? When?
32. If convulsions or spasms now, or recently, state their character, and how often.
33. Has he had brain disease?
34. If yes, state particulars and when.
35. Has he had any disease of the lungs or bowels?
36. Are the hands and feet cold?
37. Are the feet easily blistered or liable to chilblains?
38. State any special preference for food.
39. State any special aversion for food.
40. Does he masticate properly?
41. What are h table habits?
42. Does he use h knife and fork?
43. Is he gluttonous?
44. Will he eat garbage?
45. Does he use tobacco, etc.?
46. Is he sensitive to pain?
47. Is he indolent or active?
48. Is he noisy?
49. Is he affectionate?
50. Will he obey a command?
51. Is he trustful and truthful?
52. Is he obstinate and passionate?
53. Is he destructive?
54. Is he stealthy?
55. Is he vulgar?
56. Does he stray from home?
57. Is he heedless of danger?
58. Is he dangerous with fire?
59. Will he destroy clothing or furniture?
60. Is he tidy or careless in dress?
61. Does he soil or wet the bed?
62. Does he soil or wet day clothing?
63. Has he any other unfortunate habits?
64. Does he understand language?

65. Does he understand a command?
66. Can he do an errand?
67. Is he fond of play? What kind?
68. How does he spend h time.
69. Is he fond of children?
70. Is he fond of music?
71. Is he fond of animals?
72. Does he look steadily?
73. Does he recognize color?
74. What colors does he know by name?
75. Does he recognize form?
76. Does he know the alphabet?
77. Does he read? How much?
78. Does he count? How many?
79. Does he sing? What songs?
80. Can he commit the words of a song or hymn?
81. Can he throw a ball?
82. Can he catch a ball?
83. Can he tie a shoestring?
84. Can he dress self? How thoroughly?
85. Can he wash self?
86. Can he write or draw?
87. Can he do housework? What kind?
88. Does he handle tools?
89. Can he make anything? What?
90. What is h power of attention?
91. What is h power of imitation?
92. What is h power of memory?
93. Is he religiously inclined?
94. Does he go to church?
95. Does he go to Sunday-school?
96. Is he easily managed?
97. What correction, if any, is used at home?
98. With what result?
99. Please state any known or supposed cause for the child's condition.
100. What do you expect from a course of training?
101. What is the name and address of the family physician who has attended the child?
102. What are the names and address of the parents?

Name of person filling up above blank, ——— ———.
Address, ——— ———.
Date: ——— ———.

(*b.*) Etiological History of ——— ———

Reg. No. ———. L. B. No. ———. P. ———.

1. Please state birthplace of father.
   Please state birthplace of mother.
   Please state birthplace of this child.
2. What has been the father's occupation?
3. Was the child born at full term?
4. Was the labor ordinary or difficult?
5. Were instruments used?
6. Was there deficient animation in the child at birth?
7. Had the child a convulsion soon after birth?
8. State the order of this child's birth—whether first born, or second born, etc.
9. Was the child nourished by its mother, or fed artificially? State any peculiarities in the early nutrition of this child.
10. Was a sickly or strong babe? If the former, how was it manifested?
11. Do you consider the cause of h condition to have been congenital, or is it the result of accident or acute sickness? In either case, please specify.
12. Was either parent subjected to any special overtax of mind or body immediately prior to the conception of this child?
13. Was the mother during this pregnancy subjected to any continuous anxiety or hardship, or exposed to any shock, accident, or specially painful emotion? If so, particularize, and the period of gestation when such disturbance occurred.
14. How many brothers of are now living? How many sisters of are now living?

HYPOPLASIA OF THE CEREBELLUM.

15. Are they of sound health in body and mind? Are there any peculiarities of constitution among them?

16. Are there deceased children? If so, please state the order of their birth, their sex, age, and the cause of their death, and whether their mental and physical powers were normal or not.

17. Have the parents had any dwarfed or malformed children?

18. Have all their children had complete coordination of all their movements?

19. What were the ages of parents when was born? Father, Mother.

20. Was either parent addicted to the use of alcoholic drinks, tobacco, or opium, prior to this child's birth?

21. Were the grandparents on either side excessively given to either of the above-named habits?

22. Had the general health of the parents been good previous to this birth, or had either of them been subject to paralysis, neuralgia, epilepsy, hysteria, chorea, eccentricity, nervousness, or constitutional taint?

23. Are both parents now living? If either is dead, of what disease, and at what age?

24. If grandparents are deceased, of what disease, and at what age?

Paternal grandfather.

Paternal grandmother.

Maternal grandfather.

Maternal grandmother.

25. Were the parents of this child related before marriage? If so, in what degree?

26. Were the grandparents on either side related before marriage? If so, in what degree?

27. Are there any instances of insanity or feeble-mindedness in the families of the father and mother, of their brothers and sisters, or in the ancestry of either side?

28. Is there any tendency to blindness or deafness in the families of either side?

29. Are there any instances of, or tendencies to, scrofula, to consumption, or to goitre, in the families on either side?

30. Are there any instances of paralysis, epilepsy, hysteria, chorea, neuralgic or sick headache, or any convulsive disorders in the families of either side?

31. State on this and the next page any other facts which in your judgment may seem to have a bearing, in this particular case, on the important subject of causation, after which please sign your name and address.

In conclusion I should like to present a brain before sections are made and the study completed.

There is almost entire absence of the cerebellum and great deficiency of the corpus callosum in a male, age 19, presenting incoordination of movements and psychic disturbances.

L. H., male, æt. 19, was the fourth child of heathy native-born parents. No instruments were used at his delivery, which was at full term. As a babe he had a weak back and did not learn to walk until he was 3 years old. When 5 years old he had an attack of scarlet fever and diphtheria, which interfered with his speech and walking and is the supposed cause of the child's trouble by his parents, though his not walking until 3 would lead one to think otherwise. He never had any convulsions, but often complained of dizziness. His gait is described as showing a slight stagger as though he was not sure of his steps, the feet being raised very high from the ground. His habits were good, and he had but little to say except when spoken to. Body longer than normal. He was able to work with his hands. His school progress was interfered with by defective eyesight, the nature of which was not determined, though he had external strabismus. Reflexes normal.

L. H. was a member of Company C, which is made up of middle and low-grade boys, varying in age from 12 to 20. Regular drills of an hour each are held daily. Capt. Weaver, the commander of the battalion, says that his gait was a very peculiar one in that his steps were short and quick, his trunk stiff and slightly bent forwards, with his head fixed and turned slightly towards one side. He had little or no idea of time, but was able to make easy movement on the march and in the drill, but never with any great degree of accuracy. He finally succumbed to an attack of tuberculosis.

At the post-mortem (Cattell, No. 555, Elwyn 126) the body was found to be very emaciated; head that of a microcephalic, with the cerebellum fossæ quite deep. Circumference of head, $18\frac{1}{2}$ inches, nasion to inion $11\frac{1}{4}$ inches. The cavity for cerebellum (a cast of which was shown) measures $2\frac{7}{16}$ inches across. From the center of the middle clinoid prcesses to the internal occipital protuberance measures $2\frac{1}{2}$ inches. Weight of brain, $32\frac{1}{4}$ ounces. In removing the brain one was at once struck with (1) the great deficiency in the corpus callosum, the brain hardly being held together: (2) the small size of the cerebellum, the two lobes being practically of the same size; (3) the atrophy of left hemisphere, especially in the occipital region, and in the neighborhood of the fissure of Rolando.

FIEBRE AMARILLA.

Por el Dr. ANTONIO JOSÉ AMADEO,
De la Universidad de Pensilvania, Miembro del Real Colegio de Cirujanos de Inglaterra, etc.

LA FIEBRE AMARILLA.

(Conocida tambien con los nombres de tifus icterodes, tifo tropical, vómito negro, etc.)

Mucho se ha escrito sobre esta dolencia desde fines del siglo diez y siete, que con mayor detenimiento se ocuparon de ella los médicos de las naciones principalmente interesadas en el porvenir de las Antillas.

Al principio los epidemologos creyeron sin razon en su origen exótico; y aun en nuestros días hay quien sostiene fué importada sino del Asia, de las regiones Africanas por los buques dedicados á la trata de negros.

Las crónicas más antiguas aseguran que los indigenas americanos sufrieron sus estragos y los Españoles desde su llegada á estas playas.

Desoló á Caparra nuestra primera población, fundada á principios del siglo diez y seis, diezmando las tropas de las escuadras que en los tiempos de Drake y de Abercromby quisieron apoderarse la isla.

Fray Iñigo, nuestro ilustre historiador en el pasado siglo, habla de calenturas pestilentes que solian estenderse por toda la provincia.

Fuertes epidemias ocurrieron algunos años despues de establecidas las primeras ciudades en las islas y en el continente, invadiendo á la vez las armadas de los distintos paises que esploraban estas tierras.

Con las grandes aglomeraciones humanas y la falta de policia sanitaria, vinieron los estragos del tifus icterodes más terribles, cuando la higiene urbana y la naval estaban en su infancia; pero tambien en nuestros días por la indiferencia con que se miran los medios de conservar la salud de las poblaciones.

Opinaba el sabío médico inglés, Lind: que la disolución de la sangre, el vómito negro y demás síntomas caracteristicos del tifus icterodes son accidentes comunes á las demás fiebres de esta zona; y transcurrieron muchos años con repetidos estudios patológicos para sacar de entre otras pirexias tropicales la singular variedad amarilla, presentada como entidad nosológica ó distinta de los procesos febriles palúdicos.

ETIOLOGÍA.

Elige las poblaciones situadas en el litoral sobre terrenos de aluvión, porosos, húmedos y en malas condiciones higiénicas, aunque en estos últimos años hemos visto invadidos pueblos de la zona del interior, segun dicen por importación de la costa y sin tener en cuenta su pésimo estado sanitario.

En todas partes notables faltas de higiene pública precedieron al desarrollo de las epidemias.

Los lugares cerrados y sin limpieza como los cuarteles, cárceles, hospicios es donde primero estalla la afección.

En los momentos que escribimos han tenido que trasladarse las tropas de guarnición en Ponce, al pueblo de Adjuntas, porque en el cuartel militar de la primera ciudad se presentaban diariamente casos de vómito.

Lo mismo pasa en la capital de San Juan, con sus vetustos edificios públicos, murallas y castillos, encerrando un estrecho y muy poblado recinto en las peores condiciones sanitarias, con brotes anuales de vómito negro que castigan la población no aclimatada.

En 1884 entre otras personas visibles (el 31 del mes de julio) falleció tras breves días de enfermedad con vómitos de sangre característicos el gobernador de la isla, Marqués de la Vega Inclán.

Además de las malas condiciones higiénicas, favorecen la invasión del mal; el miedo, la nostalgia, las fatigas corporales, los enfriamientos repentinos y los excesos de todo género.

EPIDEMIAS.

Hay años que pueden llamarse epidémicos como si además de las causas atmosféricas, terrestres é higiénicas conocidas, existiesen otras generales y más poderosas.

En 1885, fueron invadidas casi todas las poblaciones del litoral y hasta Cayey punto del interior.

Influye mucho en las manifestaciones epidémicas el aumento de población en condiciones de receptividad que son los muy jóvenes y los estrangeros recien llegados; y por eso mientras que en las ciudades populosas las epidemias se presentan cada cinco ó diez años, en las pequeñas transcurren á veces cuatro ó más quinquenios.

Y es lo que se ha observado en esta población. Los vecinos más antiguos refieren que en 1867 reinó una calentura maligna con vómitos de sangre, muriendo muchas personas y entre otras marineros de un buque norte americano surto en este puerto, propagándose la enfermedad á Yabucoa donde hizo numerosas muertes, sin que hasta 1885 volviera á verse una epidemia igual, y de la que dimos cuenta en un folleto publicado en 31 de enero del mismo año.

Las circunstancias porque atravesaba esta localidad eran en estremo anormales.

Corria el mes de mayo, con soles muy fuertes, 40°, 41°, y solo se presentaban de vez en cuando ligeros aguaceros * insuficientes para refrescar la atmósfera, echándose de menos las descargas eléctricas de otros años.

Los pozos, el rio y arroyos habian bajado á un nivel nunca visto.

El suelo aluvial, con capas siliceo-ferruginosas por desintegración granítica, calentado á su máximum por los rayos de un sol ardiente afectaba la vida en general.

Los vegetales estaban marchitos, secos y á lo que contribuían los vientos cálidos y sofocantes del sud, perturbadores eternos de todos los organismos en estos climas.

A estas condiciones meteorológicas y telúricas estraordinarias, juntábanse notorias faltas de higiene pública y miseria en las familias pobres.

Las fiebres intermitentes y remitentes no cedian como otros años á la quinina.

En los primeros dias del mes de junio, hubo dos niños afectados de fiebre continua con vómitos de sangre, estendiéndose poco á poco el mal entre los más jóvenes naturales del pais, blancos, mulatos, negros y los pocos peninsulares recien llegados terminando la epidemia á fines del mes de julio despues de recia lluvia.

INMUNIDAD.

Bastante se ha escrito respecto á la inmunidad de que gozan los individuos de raza etiópica; pero en nuestro concepto no son solo los caracteres antropológicos y otros factores contribuyen á la exención.

Los Africanos no eran estraños á la meteorología de esta isla, y siempre espuestos á las rudas tareas agrícolas y á las influencias mas dañosas, legaron á sus descendientes modificaciones orgánico-funcionales propias para luchar con ventaja contra los agentes deletereos y atmosferológicos, por lo que resisten mejor que los criollos blancos las fatigas corporales y la intemperie.

Pero no bastan los privilegios fisiológicos por herencia y el hábito para estar completamente al abrigo de los ataques de la fiebre amarilla, pues hemos visto que en el fuerte de las epidemias con los blancos y mulatos, caen algunos representantes de la raza negra pura.

Los oriundos africanos poseedores de una constitución férrea y de larga vida casi ya no existen.

La inmunidad absoluta para todas las razas se adquiere por manifestaciones febriles más ó menos intensas, ó por la prolongada residencia en las poblaciones de la costa, como si digeramos la tifización lenta de la economía.

Los que viven en el interior de la isla están muy espuestos á contraer la enfer-

* Solo cayeron aquel año 54.22 pulgadas de agua contra 112.18, 93.96, 92.73 en los tres años anteriores. Estas últimas cifras son aquí los normales.

medad si visitan los pueblos contagiados del litoral; y los niños deben considerarse lo mismo que si fueran estrangeros.

Por datos recogidos en varios puntos parece resultar que una calentura tifoidea preserva de la amarilla; pero nuevas y repetidas observaciones serían necesarias para admitir este nuevo elemento de protección.

Si los cambios intraorgánicos y la composición de los sólidos y líquidos varía con los individuos la receptividad para los agentes infecciosos no podrá ser siempre igual.

Hay personas refractarias á este morbo; y lo que puede atribuirse á la elaboración en su organismo de productos antizimóticos, ó al privilegio de eliminar con estraordinaria rapidez por todos los emuntorios los agentes piretogenos.

Por cuanto se ha dicho veremos existe una inmunidad natural conferida por la raza, la herencia y la naturaleza siendo los medios de protección de nuestra economía (segun los conocimientos modernos) el estado bactericida, el fagocitismo, insensibilidad á las toxinas y destrucción de las mismas.

Tenemos además la inmunidad resultante de una infección anterior que impide la vuelta del mal; y los ensayos de las vacunas preventivas, que aunque sin resultados hasta hoy señalan sinembargo un sendero lleno de esperanzas.

DIAGNÓSTICO.

Invasión brusca, forma continua, vómitos repetidos y de sangre, albumina en la orina, melena, fenómenos ataxo-adinámicos y uremia son síntomas que no se observan en ninguna otra fiebre de esta isla.

CONTAGIO.

Por más que se citan casos de personas contagiadas por enfermos de vómito, hemos visto (durante la epidemia de 1885) campesinos contagiados en la población que pasaron la fiebre en sus casas rodeados de varias personas sin propagarse la afección en aquellas alturas de lo que se desprende que los germenes febrígenos sea de la naturaleza que fueren necesitan para su multiplicación y para desarrollar su virulencia medios naturales y especiales de cultivo que se encuentran solo en los centros de población faltos de higiene.

NATURALEZA DE LA FIEBRE.

A pesar de las repetidas investigaciones bacteriológicas en varios puntos, no se ha podido aun encontrar el microbio patogeno; pero por algunos de estos micro-organismos presentes en el estomago se supone ser una afección local de dicha viscera, segregando en ella los microbios una toxina que pasa al torrente circulatorio, lleua la sangre disminuye la secreción renal, produce nauseas, vómitos y constipación.

Hace ya tiempo admitiamos, fundados en nuestras propias observaciones, que la temible endemia podia desarrollarse espontáneamente en esta tórrida región en medio de circunstancias meteorológicas, telúricas é higienicas estraordinarias, capaces de trastornar todos los aparatos de nuestra fábrica, con el acúmulo en la sangre de productos retrógrados y la auto-intoxicación consiguiente.

Es una hipótesis como la anterior pues en definitiva la presencia de microbios en el estómago no implica sean estos el origen del padecimiento; pero son tantos los datos en favor del parasitismo, que la opinión se inclina cada vez mas en favor de esta teoría y hasta se han formulado tratamientos de acuerdo. Sucede lo que con la fiebre tifoidea. No hay un práctico que en los meses de julio á octubre deje de haber visto algunos casos que no se esplican por el contagio, infección del agua, etc., con todo siempre creemos y buscamos por todas partes el bacilo tífico.

FORMAS DE LA FIEBRE.

Es inflamatoria en los individuos de buena constitución, sobre todo recien llegados de Europa y los Estados Unidos.

En los criollos debilitados se manifiesta la adinamia desde el principio.

Hay casos benignos que se terminan favorablemente del tercer al cuarto dia y otros ataxoadinámicos malignos, estinguiéndose la vida en pocas horas.

La buena ó mala constitución del sugeto influyen mucho en esas diferencias de forma.

La fiebre se presenta algunas veces al principio intermitente pero rebelde á la quinina y sigue su tipo continuo.

SÍNTOMAS.

Principia generalmente por escalofrio y hay marcada raquialgia, cefalalgia frontal y dolores articulares.

Dolor al epigastrio, nauseas y vómitos repetidos con estrias de sangre, constipación, albumina en la orina constante, hemorragias por las encias, intestinos, vulva y utero, gastrorragia, anuria y fenómenos urémicos de mal presagio.

La fiebre dura tres ó cuatro dias, presenta una ligera remisión y sigue su marcha presentando á veces síntomas tificos.

La temperatura unas veces alta 40°, 41° y otras 38°, 39°. Depende de la forma y de la constitución del individuo.

Es casi imposible para un médico de estos paises confundir esta con ninguna otra pirexia.

ANATOMÍA PATOLÓGICA.

En pequeñas poblaciones son difíciles aquí los examenes post-mortem; pero en algunos muertos á los 8 ó 10 dias de enfermedad hemos encontrado la mucosa gastrica inflamada particularmente cerca del orificio exofágico con puntos hemorragicos y pequeñas equimosis negruscas y lo que esplica los vómitos pertinaces y las nauseas como si se tratara de una gastritis aguda.

Con la prolongación de la fiebre se acentuan las alteraciones gástricas siendo casi seguro que en los casos de muerte rápida será tál vez una flogosis ligera la principal lesión.

En un caso con estado tífico pronunciado encontramos en el duodeno é ileum limitadas congestiones é inflamaciones de la mucosa y en los folículos intestinales diminutos gránulos con alteraciones de las placas de Peyero.

El estómago é intestinos siempre contienen sangre alterada.

Riñones congestionados, presentando como el hígado y el corazón la degeneración grasosa.

TRATAMIENTO.

Mientras no contemos con remedios expecíficos que impidan la marcha de los procesos febriles y á lo que tiende hoy la ciencia, la medicación de los síntomas es nuestro único recurso.

(1) Rebajar la hipertermia hasta límites compatibles con las vida, oponiéndonos á los descensos anormales de temperatura hasta la evolución de la fiebre.

(2) Combatir pronto las localizaciones de la pirexia y en algunos casos la atonía cardiaca desde el principio.

(3) Promover desde las primeras horas las secreciones intestinales cuanto lo permitan las fuerzas del enfermo para eliminar de la sangre y entrañas los productos escrementicios venenosos de la desintegración orgánica y los fermentos ó micro-organismos exoticos con sus toxinas.

(4) Mantener en estado fisiológico la secreción renal que separa pronto de nuestra fábrica sustancias tóxicas *leucomainas* y *ptomainas* con los principios infecciosos del esterior.

(5) Estimular la secreción del sudor promoviendo diaforesis oportunas, medio que emplea á veces la naturaleza para librarse del padecimiento y arrojar fuera los desechos orgánicos nocivos.

(6) Hacer la antisepsia del tuvo intestinal eligiendo aquellos medicamentos que menos puedan irritar la mucosa gástrica.

(7) Combatir la adinamia, el estado tífico y la discrasia.

(8) Régimen refrigerante para aliviar el gastricismo y activar la diuresis.

Con estas indicaciones debemos tener presente las modalidades de la dolencia que bajo el punto de vista terapéutico pueden dividirse.

(1) En casos benignos que se curan con simples remedios ó por las solas fuerzas de la naturaleza.

(2) Graves en los que se necesita andar pronto, con remediós apropiados á cada caso siendo á veces inútiles todos nuestros esfuerzos.

(3) Casos de intoxicación rápida que no dan tiempo para la acción de los medicamentos.

El éxito del tratamiento depende de la prontitud con que se llenen las indicaciones, pues transcurridas muchas horas ya el daño constitucional esta hecho.

En los caquécticos, sifilíticos y cuantos padecen afecciones crónicas los mejores remedios no dan resultados y el enfermo marcha á la disolución y la muerte.

La ignorancia, la intemperie y la miseria anulan con frecuencia las prescripciones facultativas. El aire puro, el aseo en la cama y el silencio más absoluto son en esta, como en todos los tifos, requisitos esenciales. Siempre que se pueda es importantisimo la traslación inmediata del enfermo fuera del lugar infestado, y lo que influye muchísimo en el caracter y terminación favorable de la calentura.

HIGIENE INDIVIDUAL.

No cometer abusos de ningun género, evitar el sereno y los enfriamientos repentinos, mantener el vientre libre con el uso de bebidas laxantes; naranjas dulces, bicarbonato de soda y aguas minerales purgantes. Si hay debilidad nerviosa tomar 6 ú 8 granos de quinina al acostarse. Los no aclimatados deben inmediatamente abandonar el lugar contagiado.

HIGIENE PÚBLICA.

Al ocuparnos de la etiología hemos visto las malas influencias atmosferológicas que preceden á las epidemias y si contra estas toda la previsión humana es inútil no así respecto á las malas condiciones sanitarias y el malestar de las clases pobres en lo que la administración de los pueblos puede intervenir eficazmente.

De pocos años á esta parte muchos centros de población aun algunos alejados de la costa han sufrido fuerte invasiones del vómito negro y en todas aquellas consta la falta de medidas preservativas siendo indispensable que los municipios establezcan un servicio sanitario permanente con disposiciones rigurosas para llevar á cabo el saneamiento urbano.

Y por eso celebramos que en este primer Congreso Médico Pan-Americano ocupe un primer puesto la higiene general, de cuyas provechosas enseñanzas resultarán medidas eficaces para borrar de nuestra carta medico-geográfica el punto azul enemigo de las relaciones sociales y mercantiles con el esterior, alejando de nuestras hospitalarias playas brazos ó inteligencias necesarias, para la prosperidad y bienestar de esta isla.

PARÁSITOS INTESTINALES OBSERVADOS EN LOS NIÑOS EN LA ISLA DE PUERTO RICO.

Por el Dr. ANTONIO JOSÉ AMADEO.
De la Universidad de Pensilvania, Miembro del real Colegio de Cirujanos de Inglaterra, etc.

El ascarida lumbricoide, el oxiuride y la tenia son los entozoarios que con más frecuencia se observan en los niños, y de los que trataremos en este artículo.

NEMATOIDEOS.

Lombrices.—Su historia ha sido hecha por varios autores quedando aun puntos obscuros sobre la vida de estos prolíferos helmíntidos, cuyos huevos se introducen en nuestra economia con el agua, las sustancias vegetales crudas y las carnes y pescados mal cocidos de que se alimentan algunos.

ETIOLOGÍA.

Encuéntranse aquí reunidas todas las condiciones favorables para el desarrollo y propagación de los ascarideos: Suelo húmedo y cálido: lluvias torrenciales frecuentes, que arrastran sus huevos á las corrientes y pozos de agua potables; pobreza, mala alimentación y el consorcio de varios animales con el hombre; predominancia de los temperamentos linfáticos.

La infancia es la edad predilecta; pero tambien sufren los adultos, siendo más comunes en las mugeres que en los hombres, y como decia J. Frank es en la época de la luna nueva cuando se revuelven y salen al esterior.

PATOLOGÍA.

Su albergue habitual son los intestinos delgados, trasladándose algunas veces al estómago é intestino grueso, donde molestan y son pronto espulsados.

La entrada de uno de estos parásitos en la laringe puede ocasionar accesos violentos de tós, sofocación y hasta la asfixia.

En autopsias médico-legales hemos encontrado lombrices en los conductos biliares y cavidad peritoneal, penetrando tal vez despues de la muerte.

De su entrada en el hígado, pleura y vias renales hay ejemplos en varios museos de anatomia patológica.

En un niño muerto con convulsiones, timpanitis y arrojando por la boca lombrices al examen post-mortem verificado seguido, encontramos perforación de los intestinos delgados y peritonitis localizada con la presencia de los parásitos causantes.

La sustancia grasa irritante contenida en las vesículas de las fibras musculares de este helmintido puede determinar una enteritis grave.

Vómitos con estrias de sangre y diarreas sanguinolentas deben atribuirse á la misma causa.

SÍNTOMAS.

Vientre tenso, flatos, cólicos intestinales, diarrea, ojeras, prurito nasal, rostro demacrado, acidez de la boca, tós seca, salivación, sudores frios, palpitaciones, vértigos, pesadilla, rechinamiento de dientes durante el sueño, enflaquecimiento y dolores en varias partes.

No todos estos signos se encuentran reunidos; pero algunos no faltan siendo el más seguro (y que rara vez se hace esperar) la espulsión de lombrices, cuyos huevecillos se reconocen con el microscopio en las materias fecales.

CONSECUENCIAS.

Los médicos antiguos exageraron la influencia patológica de las ascaridas, pero en nuestros dias (respecto á este país al menos) se ha caido en el estremo opuesto.

Convulsiones histéricas, tetánicas y epileptiformes, que alarman las familias, dispepsia, enteritis, peritonitis, paralisis, trastornos pasageros de la inteligencia, anemia, y cólicos con vómitos y diarrea, son con frecuencia padecimientos debidos á las lombrices.

Hace poco hemos visto una jóven de 18 años, con fuerte dolor, diarrea, vómitos y estado algido (simulando un ataque de cólera nostras ó una perniciosa) cuyos síntomas desaparecieron con la espulsión de centenares de lombrices, despues de la administración de un purgante de calomel seguido de otro de aceite de ricino.

Los autores modernos sobre las enfermedades de los niños no hablan de la fiebre verminosa, cuya existencia no puede aquí negarse (sobre todo durante la primavera), habiéndola considerado de origen palúdico siguiendo la doctrina etiológica esclusiva de la malaria, remora constante para la mejor clasificación nosológica de nuestras dolencias.

El número á veces considerable de estos entozoarios en el tuvo digestivo, su muerte, descomposición, y la sustancia grasa irritante contenida en sus fibras musculares, forman un detritus para la auto-infección del organismo y fiebre continua con exacerbaciones diarias, temperatura 38°, 39°, 40° centigrado, somnolencia, movimientos convulsivos, rechinamiento de dientes, ojeras pronunciadas, estrabismo, aliento acido, lengua sabural, flatos, nauseas, vómitos con estrias de sangre, vientre tenso dolorido, diarrea á veces sanguinolenta muy fétida, conteniendo fragmentos de lombrices y salida de estas por la boca y el ano; tós seca, hipo, sudores frios parciales, dolores en varias partes, pupilas dilatadas, pero no siempre.

El movimiento febril dura de siete á nueve dias, mostrándose rebelde á la quinina, y se combate ventajosamente con los antielminticos, el calomel á dosis purgantes y el aceite de ricino, que echan fuera infinidad de dichos parásitos.

Cuando en medio de la calentura se desarrolla un acceso eclámptico y muere la criatura, se piensa en una perniciosa palúdica por mas que se halla administrado la quinina desde el principio y hasta con esceso.

El paludismo ha hecho olvidar las demás causas de enfermedad.

Pero el ascaride lumbricoides no se aloja solo en los intestinos del hombre, sino que tambien elige el de los animales, sobretodo de raza bovina, pues el año pasado vimos en una estancia considerable número de becerros atacados de diarrea sanguinolenta (enteritis), muchos de los que sucumbieron y abierta por mi órden la cavidad abdominal, encontré: pelotones, millares de estos vermes en los intestinos, inyección general de la mucosa, errosiones y perforaciones multiples con la particularidad de que durante el mal, no se vió al esterior una sola lombriz.

OXIURIDE VERMICULAR.

Este otro diminuto nematoides se observa en los adultos, pero es mucho más común en la infancia.

Sus huevos entran al sistema con los alimentos y el agua lo mismo que los de las lombrices y su vida principia en el duodeno para terminarse en el ciego, donde permanece, emigrando al recto, ano, vagina y uretra con inflamación de estas mucosas y secreciones mórbidas.

Los pequeños enfermos estan siempre nerviosos, lloran, se rascan el ano y las niñas, la vulva inclinándolas al onanismo.

Se presenta un eritema en el repliegue genito crural; las criaturas no duermen se ponen pálidas, flacas y hasta sufren convulsiones y fiebres.

Es un tormento para las madres, particularmente de noche. Hay dispepsia, falta de apetito y diarrea con espulsión de centenares de estos animalillos, causa de un prurito insoportable.

Las lavativas aloéticas y terebentinadas, los supositorios de unguento mercurial, la santonina, el calomel y los purgantes son buenos remedios contra el padecimiento.

CESTOIDEOS.

Tenia.—Se ha dicho que las solitarias son muy raras en los niños, pero hemos visto aquí varios casos en particular de *tenia inerme* y lo que puede atribuirse al uso de la carne de res casi cruda, aunque algunos helmintólogos opinan que los huevos del animal pueden llegar al organismo humano, por medio del agua estancada y de los vegetales sucios y crudos.

Los niños pobres que viven en las peores condiciones higiénicas son los más espuestos, por más que hace pocos meses, he estraido una, en un niño rico de cinco años de edad, cuyo padre, aleman, había tenido tambien la tenia en su juventud en Hamburgo.

SÍNTOMAS.

Palidez del semblante, anemia, ojeras, enflaquecimiento, dilatación de la pupila, trastornos visuales, apetito voraz, otras veces anorexia, cólicos intestinales, diarrea, prurito anal y nasal; el niño está siempre irritable nervioso con sudores frios vértigos y algunas veces convulsiones epileptiformes; pero todos estos síntomas pueden presentarse sin que haya solitaria siendo el único signo seguro positivo encontrar, en las evacuaciones uno ó varios anillos del parásito, lo que siempre tiene lugar espontaneamente ó despues de un purgante.

Hay charlatanes que se titulan helmintólogos y han recorrido la isla, propalando diagnosticar la tenia con solo ver y examinar al individuo, impresionando y esplotando á los débiles é ignorantes; pero, como ya dijimos y repetiremos, el único síntoma ó signo seguro de su existencia son los fragmentos espelidos.

TRATAMIENTO.

Varios son los tenifugos recomendados y todos los hemos empleado, sin que pueda compararse ninguno al extracto etereo de helecho macho.

Dos escrúpulos ó más (segun la edad del niño) en ayunas, seguido una hora despues de un purgante de aceite de ricino bastan para espulsar la tenia entera, y rara vez hay que repetir la dosis.

La mejor profilaxis consiste en vivir rodeado de las mejores condiciones sanitarias, beber buena agua corriente filtrada y comer las carnes, legumbres y pescados bien cocidos.

Los niños que aquí abusan de las frutas; mangos, plátanos amarillos, etc., están llenos de lombrices.

CAUSAS QUE SOSTIENEN LA ENDEMICIDAD DE LA FIEBRE AMARILLA EN LA HABANA.

Por el Dr. ENRIQUE ACOSTA,

Profesor del Laboratorio Bacteriológico de la Crónica Médico-Quirúrgica.

I.

El estudio de la fiebre amarilla, enfermedad desastrosa que ha ocasionado tantas víctimas, ha preocupado siempre la atención de los hombres de ciencias de todas las naciones. La anatomía patológica, la histología, la clínica, la terapéutica y la bacteriología han sido puestas á contribución de una manera sorprendente á fin de esclarecer problema de tan trascendental importancia; inútil hasta ahora han sido los esfuerzos de todos los que tras larga série de innumerables estudios, han tratado de buscar la causa ó el agente productor de tan terrible azote. Y no por eso han desmayado en su empeño los que tal propósito concibieron, pues que á pesar de lo difícil de la empresa, aún le consagran con ferviente devoción su tiempo é inteligencia; por eso nos merecen verdadero respeto los nombres de Sternberg, Freire, Carmona, Finlay, Delgado y Tamayo.

No vamos á divagar remontándonos á épocas lejanas para señalar las causas que á nuestro juicio hacen de la isla de Cuba uno de los focos mas temibles de esta enfermedad; empresa inútil sería, porque ahora como entónces existen las mismas causas y poco se ha hecho para evitarlas.

De modo que el estado de nuestra población actual, poco mejorado en sus condiciones higiénicas nos servirá para el objeto que nos proponemos.

Mientras que la bacteriología no invadió el campo de la medicina ningún estudio de verdadera importancia se habia hecho en favor de la etiología de la fiebre amarilla, porque si es verdad que algunas ramas de las ciencias médicas han contribuido á esclarecer la marcha, síntomas, diagnóstico, pronóstico y tratamiento de esta enfermedad, la etiología siempre quedó, no postergada, pero si oscurecida ante la dificultad de su estudio.

A la bacteriología, que tanto ha ensanchado los límites de la medicina y ciencias auxiliares estaba reservada el progreso etiológico de la fiebre amarilla, por eso la humanidad agradecida tiene que admirar siempre los nombres ilustres de Pasteur, Koch, Sternberg, Roux y otros.

II.

Hasta el año 1879 ningún estudio serio se había intentado en la isla de Cuba acerca de la etiología de la fiebre amarilla, el primero corresponde al Consejo Nacional de Sanidad de los Estados Unidos, que en 25 de setiembre acordó nombrar una comisión que trasladándose á esta ciudad, fijase:

(1) La condición sanitaria de los puertos cubanos que tienen más estrechas relaciones comerciales con los Estados Unidos y especialmente los de la Habana y Matanzas;

(2) Aumentar los conocimientos adquiridos sobre la patología de la fiebre amarilla, y

(3) Estudiar la endemicidad de dicha fiebre y sus causas.

Esta ilustrada comisión á pesar de los estudios importantes y completos que realizó, no pudo determinar como hubiera deseado el factor desconocido que buscaba, no obstante inició trabajos trascendentales que aún conservan todo su valor.

Posteriormente los Dres. Carlos Finlay y C. Delgado han dedicado su atención al estudio de esta enfermedad y dado á conocer trabajos de verdadero mérito que enumeramos* porque entendemos que han prestado verdadero servicio al estudio de la fiebre amarilla y nos complacemos también en consignarlo, porque han sido los primeros que en nuestro país han hecho estudios bacteriológicos y experimentales de la afección que nos ocupa aún cuando sus resultados á favor de la etiología hayan sido negativos.

Lo mismo podemos decir de las profundas investigaciones realizadas en la Habana por los Dres. Sternberg, Tamayo, Gibier y Moreno.

El primero de estos investigadores—el Dr. Sternberg—que á nuestro juicio es el que más estudios ha hecho acerca de la fiebre amarilla y que desde 1879 se ha ocupado tenazmente de esta afección, en su última obra (Report on the Etiology and Prevention of Yellow Fever) consigna en el nono capítulo, entre otras, las dos conclusiones siguientes:

Segunda. Habiendo resultado negativas las investigaciones practicadas en la sangre y los tejidos, parece probable que el microbio se encuentre en el tubo digestivo como sucede en el cólera.

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Quinta. De los hechos expuestos parece deducirse que las deyecciones de los atacados de fiebre amarilla deben considerarse agentes infecciosos siendo indispensable por tanto su desinfección antes de arrojarlas á las letrinas.

El Dr. Tamayo, después de numerosas investigaciones realizadas en el laboratorio bacteriológico de la Crónica Médico-Quirúrgica de esta ciudad, dió á conocer el resultado de ellas demostrando que nada había encontrado en la sangre, orines, vómitos negros, piel y aire y que sus posteriores investigaciones se dirigirían al tubo digestivo porque le parecía que esta vía sería más fecunda en resultados.

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* Véase al final.

El Dr. Paul Gibier estudía la sangre, orines, tejídos, etc., y nada encuentra pero se detiene en la materia negra vomitada y dirige sus investigaciones á ella y al contenido estomacal, con resultados negativos á pesar de su entusiasmo por haber aislado del contenido intestinal un organismo microscópico melanógeno.

El Dr. Moreno, emprende una serie de investigaciones para averiguar si existe un veneno amarillo como existe uno colérico, tetánico ó diftérico y se libra á serias experiencias con resultados negativos.

Nosotros, en unión de nuestro compañero del laboratorio, el Dr. F. Grande Rossi, nos ocupamos de la fiebre amarilla y hemos iniciado dos trabajos que aún no están terminados: el análisis del aire, agua y fango de la Bahía de la Habana y inoculaciones en el cerebro debajo de la dura madre, de caldo esterilizado en el que se emulsiona vísceras de cadáveres de fiebre amarilla.

Del primero, podemos consignar los datos siguientos:

Análisis del aire.

	Bacterias por c. c.
(1) Análisis del aire* recogido frente á Casa Blanca	175,500
(2) Análisis del aire† recogido frente á Belot	501,110
(3) Análisis del aire‡ recogido frente al Rio Matadero	707,240
(4) Análisis del aire§ recogido frente al Hospital Militar	433,898

ANÁLISIS DEL AGUA.

Agua recogida por un buzo en vehículos apropiados á dos varas de profundidad en los mismos sitios en que se hizo el análisis del aire.

	Bacterias por c. c.
Agua recogida frente á Casa Blanca	2,401
Agua recogida frente á Belot	24,493
Agua recogida frente al Rio del Matadero	27,402
Agua recogida frente al Hospital Militar	25,611

Del fango recogido en el fondo de la bahía nos proponemos hacer un análisis no solo cuantitativo sino cualitativo.

El segundo estudio comprende las inoculaciones practicadas en el cerebro de varios conejos con producto de dos autopsias.

PRIMERA AUTOPSIA.

Enfermo de fiebre amarilla que muere en el Hospital Militar á las 6 de la mañana del dia 11 de setiembre de 1892, y al que practicamos dos horas después la autopsia.

Productos recogidos.—Un pedazo de hígado, otro de masa cerebral, riñón y bazo; se coloca todo en un pomo esterilizado é inmediatamente se lleva al laboratorio.

De la parte central de los productos recogidos se separan pequeños fragmentos que se trituran en una copa con caldo esterilizado según el procedimiento empleado para el vírus rábico.

Se escogen tres conejos:

Primero: De color blanco y negro de 3 libras 7½ onzas de peso, se le inocula por trepanación el líquido preparado con el cerebro; temperatura antes de la trepanación, 39.1°.

Segundo: Conejo color *rosillo* de 3 libras 11 onzas; por trepanación se le inyectan en el cerebro dos gotas de líquido preparado con hígado; temperatura, 39°.

Tercero: Conejo color blanco de 2 libras 8 onzas; se le trepana é inyecta el líquido preparado con riñón; temperatura, 38.5°.

Por la tarde la temperatura era la misma en los conejos primero y tercero; el número dos, rosillo, tenía 40° y estaba triste, la respiración anhelosa; palpitante, no comió.

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* Lugar próximo á la entrada del puerto.

† Lugar próximo á la desembocadura del Rio del Matadero.

‡ Este rio lleva á la bahia los desperdicios del Matadero.

§ Las excretas de este hospital se pierden en la bahia.

Setiembre 12 por la mañana.—El conejo número dos continúa con 40° de temperatura, triste, sin comer y nos sorprende que la jaula estaba limpia de orines. Para observar este hecho encerramos al conejo en una caja de zinc con pequeñas aberturas laterales y superiores y provista de un tubo de salida en el fondo con declive á fin de que si orinaba tuvieran que salir éstos por dicha abertura. Como la caja estaba suspendida por cuatro patas de madera, nos permitió colocar una cristalizadora debajo del tubo para recojer los orines. Por las aberturas laterales le colocabamos la comida.

A las 3 de la tarde la temperatura seguía subiendo 40.3° y aún no había orinado.

Setiembre 13 por la mañana.—Temperatura, 39.6°; respiración más tranquila, ha comido poco, no orina. Por la tarde orina 15 gramos de orina y durante la noche 20.

Setiembre 14.—Temperatura 39°, desaparece la tristeza de los dias anteriores y orina abundantemente á nuestra presencia.

El análisis de los orines no demostró la presencia de la albúmina. Su peso era de 3 libras y 8 onzas, de modo que había perdido 3 onzas de peso.

Setiembre 15.—Se encuentra perfectamente así como los otros dos que observados cuidadosamente no presentaron síntomas que llamasen la atención.

SEGUNDA AUTOPSIA.

Enfermo de fiebre amarilla; muere á las 6 de la mañana; tres horas después recogimos hígado, bazo y riñón con los que inoculamos varios conejos, aumentando la injeccion al que se inocula con hígado.

Ninguno de estos conejos tuvo novedad, pero el inoculado con hígado acusó reacción febril y disminución de la secreción urinaria.

De todo lo expuesto se deduce que ninguno de los trabajos realizados hasta el presente han dilucidado el problema etiológico de la fiebre amarilla, pero en cambio podemos asegurar, que ellos han limitado las numerosas vias de estudios que se presentan al investigador y que la bacteriología llegará en no lejano tiempo á realizar la más brillante y humanitaria de sus conquistas.

III.

CAUSAS QUE SOSTIENEN LA ENDEMICIDAD DE LA FIEBRE AMARILLA EN LA HABANA.

Las calles.—Las calles de la Habana son por lo general estrechas; en sus dos terceras partes carecen de adoquines y de acera; las adoquinadas presentan desigualdades frecuentes y las que no lo están numerosos baches, que con las aguas pluviales ó las arrojadas de las viviendas, constituyen pequeños ó grandes depósitos de agua que al sufrir la descomposición natural, se transforman en verdaderos focos de infección.

No se riegan jamás y cuando un lijero aguacero se encarga de este servicio, el fango predomina convirtiéndose después en polvo que nuestras casas, muebles, vestidos y pulmones tienen que recoger.

El barrido se hace con la recojida de las basuras empezando á las 10 de la noche; sumamente imperfecto, no es extraño contemplar por las mañanas, al frente de muchas casas, restos de las basuras depositadas la noche anterior y en muchas calles animales muertos que han escapado á la indiferente vigilancia de los barrenderos.

Los caños, desagüe de las aguas pluviales, generalmente tienen salida en las aceras, lo que obliga al transeunte en tiempo de lluvia á caminar por el centro de las calles, antes que verse acometido de trecho en trecho por un potente chorro de agua que moja sus piernas.

Las casas en su mayor parte son chicas y de planta baja, muchas de dos pisos y las menos de tres y cuatro. Su distribución interior muy defectuosa, en casi todas las chicas, pues el servicio de cocina, pozo negro y caballeriza se encuentran en un mismo departamento, carecen de habitaciones para criados. Las menos tienen acometimiento á la cloaca, las más vierten sus aguas en el pozo negro.

Letrinas.—La Habana posee 17,000 casas próximamente; en la mayor parte de ellas se emplea la fosa fija en las restantes, acometimiento á la cloaca. El sistema de limpieza de estas fosas es de lo más primitivo y detestable. Una carreta con tres grandes pipas se sitúa al frente de la casa; los excrementos, que por medio de cubos se sacan de la fosa son llevados por dos empleados hasta la puerta de la calle donde está la carreta, allí se vierten en las pipas hasta llenarlas.

Pocas veces se hace la limpieza completa, el dueño de la casa, para satisfacer el deseo de su inquilino se limita á extraer tres ó seis pipas; regularmente queda la fosa con bastante escremento.

Este servicio se hace á las 11 de la noche, hora en que casi toda la población está despierta y se vé obligada, bien á cerrar sus puertas, bien á tropezar en su camino con el asqueroso espectáculo de este servicio.

El ingeniero militar, Sr. D. Arturo Amigó, en una bien escrita memoria leida en la Sociedad de Higiene de la Habana, al hablar de las fosas, dice:

Para saber la cantidad de inmundicias que por término medio debe haber en un momento dado, en todas las letrinas de la ciudad, bastará hacer el siguiente cálculo: Teniendo la población 17,000 casas, corresponde á cada una 11.79 habitantes y supongamos, para más facilidad, iguales todas las letrinas. Limpiándose estas tres veces por año* tendremos que cada letrina ha de tener la cabida necesaria para contener las dos toneladas que depositaran cada cuatro meses los 11.79 habitantes de cada casa. Siendo estas 17,000 el número anual de las limpiezas será de 51,000, lo que dá en números redondos, 140 limpiezas diarias y no olvidemos que una letrina se limpia cada 120 dias, al cabo de las cuales contiene 2 toneladas de escrementos. Por consiguiente en un momento dado hay en la Habana:

	Toneladas.
140 letrinas vacías que contendrán	140×0
140 limpiadas el dia anterior que contendrán	$140 \times \frac{1}{120} \times 2$
140 limpiadas dos dias antes que contendrán	$140 \times \frac{2}{120} \times 2$
140 tres dias antes que contendrán	$140 \times \frac{3}{120} \times 2$
Y así hasta las 140 que se limpian 120 dias antes	$140 \times \frac{120}{120} \times 2$

La suma de todas estas cantidades nos dará la total que buscamos y será, haciendo omisión de la primera que es nula,

$$140 \times \frac{1}{120} \times 2 + 140 \times \frac{2}{120} \times 2 + 140 \times \frac{3}{120} \times 2 + 140 \times \frac{4}{120} \times 2 + \ldots\ldots\ldots$$

$$140 \times \frac{120}{120} \times 2 = \frac{140 \times 2}{120}(1 + 2 + 3 + 4 + \ldots\ldots\ldots 119 + 120 = 16{,}940 \text{ toneladas.}$$

Tal es la enorme cantidad de inmundicias que por término medio existe en todas las letrinas de la Habana en un momento dado. El trasporte de esta materia exigiría 56 trenes formado cada uno de 30 wagones cargados al máximum, es decir á 10,000 kilos por wagon, ocupando dicho material una longitud de línea de unos 12 kilómetros.

ABASTECIMIENTO DE AGUAS.

En los primeros setenta años de la fundación de la Habana, esta tomaba del rio Luyanó las aguas que necesitaba, de los pozos y algibes particulares y del Estado. En 1591 se construyó la Zanja Real y desde entonces á pesar de la construcción del acueducto de San Fernando que no acarreaba la suficiente cantidad, hasta el año próximo pasado una gran parte de la población ha tenido necesidad de utilizar dichas aguas; después de los trabajos de Vento mejoraron las condiciones higiénicas de la población, pues se sustituyó con el agua de Vento por más que la peor, la de la Zanja, tenia que seguirse aprovechando. Desde el año 1892 el abastecimiento del agua de Vento á la ciudad se hizo general y quedó como exclusiva á toda la población.

Pero aun no podemos recibir en absoluto su saludable influencia porque la construcción de dos grandes estanques de capacidad asombrosa, para depositarla, le hacen adquirir desventajosas propiedades.

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* Hay muchísimas que nunca se limpian.

Dichos estanques carecen de techo que los resguarde de la lluvia y de muros de contención para el arrastre de las basuras próximas; están hechos al nivel del suelo, de manera que al depositarse en ellos las aguas para su distribución en la ciudad pierden sus condiciones de pureza como se desprende del siguiente análisis practicado por nosotros:

Agua recogida en el manantial............	gérmenes por centímetro cúbico..	157.
Agua recogida á la entrada del tunel............	do	227.
Agua recogida á la salida del tunel............	do	809.
Agua recogida en la primer represa............	do	2.063
Agua recogida en la segunda represa............	do	2.651
Cantidad de materia orgánica..................................	por litro..	0.010
Análisis del agua después de haber pasado por los depósitos, cantidad de materia orgánica..................................	por litro..	0.040

Como se vé el agua á medida que se ha ido alejando de sus manantiales ha sufrido la acción multiplicadora de sus gérmenes y materia orgánica y perdiendo por ello las condiciones que le hacían caber en la clasificación del profesor Miguel entre las primeras.

CLIMA.

Nada mas envidiable que el clima de la isla de Cuba; su brisa constante refresca, fortalece y consuela, cuando después de un dia abrasador nos entregamos al descanso. Su sol, si bien nos hace sufrir las molestias de un calor sofocante, en cambio nos evita multitud de infecciones; su acción destructora sobre los organismos microscópicos es bien conocida, pues detiene la germinación que tan peligrosa sería; por eso creemos que á él se debe en gran parte la no extraordinaria proporción de mortalidad que arrojan nuestras estadísticas á pesar de las innumerables causas que abonan en su favor.

HOSPITAL MILITAR.

Este edificio no fué construido para hospital, sino era una factoría de tabacos hasta el año 1813. Situado al sur de la ciudad en las márgenes del puerto y en un terreno bajo, su emplazamiento ofrece las peores condiciones. Ese lugar es un foco de fiebre amarilla y son numerosos los soldados que allí la han contraido; es frecuente que un soldado que acude al hospital para asistirse de una afección venérea, á los pocos dias, tiene que ocupar cama en sala de medicina para morir de fiebre amarilla. No tiene sala especial de fiebre amarilla; posee una de cirugía con 65 camas, otra para enfermedades de la piel con 20 y otra de afecciones venéreas con 60. Además 4 de medicina y las demás de marina.

La higiene de las salas es defectuosa, los pisos son malos, no hay inodoros y se emplea el antiguo sistema de vacinillas * que se limpian dos veces al dia arrojando las exeretas al mar. El aseo se hace, en cuanto lo permite la mala construcción del edificio y es de "lamentar" que no posea una estufa de desinfección á baja presión como la que posee el Hospital Civil donada por el Laboratorio de la Crónica Médico-Quirúrgica.

CASAS DE SALUD.

Establecimientos destinados exclusivamenta á la asistencia de enfermos, debían reunir condiciones necesarias para su objeto toda vez que el progreso actual permite aprovechar lo que hace falta para ello, pero como ésto, debido quizás á la poca utilidad monetaria que reciben, resultan verdaderos focos de infección, sobre todo para la fiebre amarilla.

En algunas no hay sala para esta enfermedad y resultan mezclados los enfermos. Además muere uno del *vómito* y pocas horas después ocupa su cama un recien llegado que necesariamente tiene que sufrir la infección. Y esta apreciación no es nuestra, se vá generalizando de tal modo, que es corriente oirlo entre los mismos que frecuentan dichas casas.

* Revista de Ciencias Médicas de la Habana, número extraordinario, octubre de 1892.

Además puestos dichos establecimientos al servicio de las Sociedades Regionales, los que hacen uso de ellas son en mayor parte europeos españoles recien llegados ó que aún no han creado familiar y de aqui el mayor contingente para el desarrollo de la endemia.

No hay inodoros y se emplea, lo mismo que en el Hospital Militar, el servicio de vacinillas que se limpian dos veces al dia, siendo la más peligrosa la que se reserva para la noche, pues á esa hora enfermos y empleados duermen y el encargado de la limpieza penetra en la habitación con el depósito general donde vá acumulando los excrementos recogidos de cada cuarto para después verterlos en la fosa del establecimiento.

RASTROS.

Dentro del perímetro de la ciudad existen quince ó veinte de estos establecimientos insalubres que encierran puertas adentro en confusión desordenada, cuantos objetos puedan idear las industrias fabriles. Todos los departamentos estan repletos, pisos, paredes y techos de esos objetos, que en su mayor parte son usados y casi todos desvencijados y rotos. En ellos se compra y vende, desde el zapato roto hasta el mueble más lujoso, todo representa un valor y por inútil que parezca un objeto allí se vende facilmente.

Por estas causas se comprenderá sin gran trabajo, porque constituyen dichas casas un verdadero peligro. Si por el contrario estuviesen situadas fuera del casco de la población y provistas de aparatos de desinfección para los objetos pequeñas y departamentos adecuados para los grandes, serían entonces de utilidad indiscutible.

TRENES FUNERARIOS.

Este servicio ha sido y sigue siendo peligroso; los carros que conducen los cadáveres al cementerio vuelven á la ciudad sin haber sufrido la desinfección necesaria antes ni después. Recientemente se han dictado órdenes para que dichos carros sean fumigados en el cementerio, pero dicha medida perjudica á los intereses de los propietarios y creemos no se cumpla, porque las fumigaciones destruirían el decorado de los carros. Además, la ropa de los zacatecas y las alfombras y tapices que se llevan á las casas, no son desinfectadas como debían.

Pero hay que señalar aun otro hecho que es público y que constituye un peligro para la salud pública. En el cementerio se observa la costumbre de que cuando se dá sepultura á un cadaver de persona pobre se le quita el sarcófago á caja, la que es devuelta al tren funerario, sirviendo después para otro cadaver.

ALCANTARILLAS.

Poco diremos de ellas porque nuestras averiguaciones han sido infructuosas, este hecho constituye un dato importante porque demuestra que su distribución por la ciudad es desconocida, así como su repartimiento y construcción. El único dato seguro que podemos ofrecer es que solo existe una de buenas condiciones de sillería de bóveda. Las demás no valen nada y más son caños de desagüe que verdaderas alcantarillas. Se han ido construyendo á impulsos de la necesidad que han tenido los vecinos de desaguar sus casas.

RECIEN LLEGADOS (SU HIGIENE).

No sólo encuentra el recien llegado español al desembarcar en la Habana las malas condiciones que hemos enunciado, sino que las más graves son provocadas por descuido ó inobservancia de los preceptos higiénicos personales. Generalmente un 90 por ciento de los recien llegados son individuos pobres que se dedican al servicio doméstico, bien en casas particulares, bien en establecimientos; los menos en fincas, para labores del campo y ésto ultimamente; aquella ocupación constituye de por sí una causa predisponiente para contraer la fiebre amarilla porque se ven postergados al último rincón de la casa, sin poder aprovechar ninguno de los preceptos que aconseja la higiene privada.

Todavía sufren mas este peligro, los que se colocan en bodegas, establecimientos insalubres que por desgracia abundan. En cada esquina hay una y están destinadas á la venta al pormenor de víveres, bebidas y efectos caseros.

Por lo general ocupan pequeño espacio y este hay que aprovecharlo para depositar las innumerables mercancias que se venden; las condiciones pues del local obligan á los dependientes de la casa á tener que dormir detrás del mostrador ó en oscuras y estrechas balbacoas improvisadas.

Nada diremos de los que menos favorecidos de la suerte tienen que colocarse de caballericeros, barrenderos, etc.

Además, visitan á sus compañeros enfermos de fiebre amarilla en las casas de salud y no se les ocurre el peligro á que se exponen.

Cuando los disturbios políticos de este país tenían lugar, los soldados que venían de la Península contribuían á aumentar la mortalidad de esta enfermedad y se comprende que así fuese, porque generalmente venían en verano, desembarcaban al medio dia y se les hacía caminar desde el muelle hasta el Castillo del Príncipe recorriendo una distancia de 1½ kilómetros próximamente. Posteriormente y por real orden se prohibió el embarque de la tropa en otra época que no fuesen los meses de octubre á mayo.

Enumeradas algunas de las causas que á nuestro juicio sostienen la endemicidad de la fiebre amarilla en la Habana pensamos que ningún provecho había de reportarnos el conocimiento de su origen bacteriano y aunque esto parezca un absurdo, basta pensar que el muermo (farcino, morve) apesar de ser tan bien conocido su origen, mata anualmente 20 personas, que la viruela cuando nos visita se propaga rápidamente y que el cólera si llega á nuestro puerto, no encontrará obstáculos para su fácil diseminación y desarrollo.

Por eso entendemos que sola la higiene puede evitar la endemicidad de la fiebre amarilla, destruyendo los numerosos focos que la sostienen.

Pero como esto no es obra de un día ni nuestro tesoro puede hacerle frente, aprovechamos la idea que un día lanzara el periódico de medicina La Crónica Médico-Quirúrgica de la Habana * y que posteriormente incluyo en su informe anual al Gobierno de esa República el jefe de la sanidad marítima, cuyo nombre no tenemos el honor de recordar, para someterla á la consideración ilustrada de vosotros. Decía:

Mas no es nuestro propósito insistir acerca de este hecho que salta á la vista † y es hasta vulgar de sumo conocido; otro es nuestro punto de mira, aún cuando merezcamos el calificativo de ilusionistas ú optimistas, al estampar nuestros propósitos respecto á lo que deba hacerse para evitar esas epidemias en los Estados Unidos, empezando por extinguir la enfermedad entre nosotros, pues estamos persuadidos que esto se obtendría con las poderosas armas de la higiene moderna.

No vamos á hablar de la supresión del comercio durante la mitad del año entre esta isla y las costas Norte Americanas, como se penso después de la epidemia de 1878; tampoco nos fijaremos en las medidas de obstruccionismos á los viajeros no aclimatados, que después de todo resultan ineficaces; ni intentaremos acuerdos internacionales que siempre son poco menos que inútiles; nó, buscamos la clave de la solución del problema de la fiebre amarilla en la naturaleza de las instituciones de esa gran República, mas interesada, si cabe, que la isla de Cuba, y aún que España, en la extinción de la fiebre amarilla, porque tiene á algunas millas de su foco una población de más de 60 millones de habitantes, que en un desate asolador de esos, que han patentizado las epidemias en la historia, pueden ser amenazados como un solo hombre por la ruda segur de la muerte.

En los Estados Unidos, como hemos dicho en otra ocasión, no se espera todo de la acción tutelar del Gobierno, como sucede en otros paises; el caracter peculiar de ese pueblo es el de resolver por si sólo y sin la ayuda de los poderes del Estado, reservados para casos determinados cuantos problemas se relacionan con sus intereses individuales ó colectivos. A ese pueblo interesado en la extinción de la fiebre amarilla, lo excitamos para la creación de una sociedad que tenga por objeto escogitar los medios conducentes, no sólo á el estudio del tifus icterodes, en su natu-

* Tomo 14, pag. 488, año 1888.

† Se refiere á la epidemia de fiebre amarilla que hubo en Jacksonville en 1888 y que cree fué importada de la Habana.

raleza y medios de propagación, sino que tambien á buscar los recursos higiénicos que convenga poner en práctica mientras no se averiguase lo primero; mas como todo esto demanda grandes recursos que no podemos esperar de nuestra escasa población, ni del empobrecido país que habitamos, cumple al pueblo americano, aún más interesados que nosotros en la extinción de la fiebre amarilla, y sobrado de elementos y población, tomar la iniciativa, que á nosotros, colocados en el terreno del combate, nos tocaría apıontar nuestros servicios personales, como venimos, haciéndolo aúnque esterilmente por lo aislado, creando un laboratorio con elementos puramente particulares, y utilizando el desprendimiento de un puñado de profesores que estudian la fiebre amarilla, sin otra recompensa que la satisfacción de hacer una obra buena, de servir á la patria, y obedeciendo á la necesidad de satisfacer una noble exigencia del espíritu.

Llamada de la página quinta. Trabajos del Dr. Finlay y Dr. Delgado. Patogenia de la fiebre amarilla por el Dr. C. Finlay, 1882. Teoria patogénica de la fiebre amarilla y trasmisión por el mosquito, 1883. Apuntes sobre la historia de la fiebre amarilla, 1884. Nuevas consideraciones acerca de la historia de la fiebre amarilla, 1885. Etiologia de la fiebre amarilla en el año 1888 á 1889. Micrococo tetragenos versatiles. Estadística de las inoculaciones con mosquitos contaminados en enfermos de fiebre amarilla, 1890.

DO GERMEN ESPECIFICO DA COQUELUCHE.

Por MONCORVO FILHO,

Assistente do Laboratorio de Biologia do Estado, Chefe de Clinica do Serviço de Pediatria da Policlinica do Rio, Membro effectivo do Gremio dos Internos dos Hospitaes, Bibliothecario do mesmo Gremio, Socio fundador da Sociedade Nacional de Acclimação, etc.

Ha cerca de tres annos que estudo o germen da coqueluche sob diversos pontos de vista, tendo ja publicado sobre o assumpto alguns trabalhos e communicações.

As minhas perquisições attingiram a perto de 50 casos clinicos donde eu retirava os elementos de estude.

Como se sabe innumeros trabalhos têm sido dado a luz da publicidade acerca do microorganismo da coqueluche; entre muitos outros tembraremos os nomes de Letzerich, Burger, Tschamer, Afanasiew, e recentemente Ritter, da Allemanha, e Galtier, da França. Estes dous ultimos autores dão a origem da coqueluche a *cocci*, que lhes foi dado entratanto verificar, em numero resumido de casos. Taes estudos porem deixam muito a desejar em relação aos practicados por meu pae, o Prof. Moncorvo, desde 1882 a 1887 e depois por mim tão longa e minuciosamente execudados até a presente data.

Quanto a mim o microbio especifico da coqueluche é polymorpho; e dahi a divergencia e as contradicções dos estudos de tão notaveis investigadores como os que se têm empenhado em resolver tão seria e embaraçada questão.

Foi pois pela analyse detida de todos os factos, pelo estudo minucioso de grande numero de casos daquella affecção, que pude tirar algumas conclusões que me parecem aproximadas da verdade.

As pesquizas sobre o esputo são difficeis; e bem se o comprehende que, apezar mesmo de todas as cautelas, cuidadosa desinfecção buccal, não se póde evitar que alguns germens communs a saliva sejam acarretados.

Retirado do fundo da garganta do doente, por meio de um pincel esterilizado, um pouco de catarrho e com elle fazendo preparações simples, sem coloração verificam-se: Globulos de pus e de sangue em alguns casos mais agudos; um numero regular de cellulas epitheliaes, pavimentosas, nucleadas, infiltradas em sua maioria, de microorganismos; alem de alguns germens communs a saliva normal e mechanicamente acarretados, um elevado numero de *micrococci alongados*, raramente globulares, affectando por vezes a forma bacillar, tendo alguns um estrangulamento central, apresentando um certo brilho.

Reunem-se em cadeias, em grupos ou zoogleas sem regularidade precisa, e muitas vezes apparecem isolados, quasi invariavelmente tendo por *habitat*, as cellulas epitheliaes. Este microbio mede approximadamente um micromillimetro, e colora-se bem pelas côres basicas da anilina. A solução de Ziehl da-lhe bastante realce.

As culturas foram practicadas em diversos meios nutritivos; o melhor mostrou-se-me ser o agar-agar-peptonisado. Ahi as colonias representam-se ao cabo de 24 ou 36 horas sob a forma de gottinhas, que crescem depois para formar uma lamina na superficie do agar, simulando perfeitamento a gordura côalhada. A cultura em serie é a mais segura e de melhor exito. O exame microscopico denuncia em qualquer dessas colonias, a presença de cocci alongados, ora sob a forma de diplococcus, ora em cadeias de 3, 6 ou mesmo 8, ou sob ainda sob a forma de bacillo curto ou bastonete.

Quanto ao liquido branco secretado pelo microbio em questão, e que naturalmente é o mesmo por Griffiths encontrado nas urinas dos coqueluchentos, podemos dizer: não altera os globulos de sangue, como resultou das minhas verificações no campo do microscopio. Este facto está de accôrdo com o que se pensa actualmente a respeito da coqueluche. Porque a coqueluche ataca a infancia? Justamente porque a cellulas epitheliaes são menos resistentes na creança que no adulto, claro está que sendo ellas o habitat de preferencia do germen da coqueluche, será a creança preferida tambem pela molestia. O facto de não alterar as hematias, esse liquido branco do microbio, vem perfeitamente demonstrar, segundo a theoria mais logica, que a coqueluche é uma infecção localisada na região laryngeana e não altera directamente o sangue, acarretando pertubações febris, as quaes são sempre a consequencia de uma complicação sobrevinda no decurso da molestia. (Cadèt de Gassicourt, Moncorvo, Clemente Ferreira, etc.)

Do estudo de diversos agentes therapenticos resultou o seguinte quadro:

Substancias.	Dose.	Acção directa sobre o germen.	Acção sobre as culturas.
Permang. de pot	5 por cento	Nulla	Desenvolv. em 3 dias.
Creolina	½ por cento	do	Idem em 20 dias.
Salicyl. de sodio	5 por cento	do	Grande e rapido desenv.
Antipyrina	10 por cento	do	Grande prolifer. em 18 horas.
Acido phenico	5 por cento	do	Desenvolv. lento.
Sublim. corros.	1:10:000	Alteração rapida	Nenhuma colonia.
Acido borico	10 por cento	Nulla	Desenv. em 16 dias.
Acido citrico	10 por cento	Alteração rapida	Ausencia de colonias.
Resorcina	10 por cento	Destrucção completa	Idem mesmo 1 anno depois.
Benzonaphtol	5 por cento	do	Nenhuma colonia.

De todos os agentes ensaiados em minhas experiencias só o sublimado corrosivo, o benzonaphtol, o acido citrico e a resorcina, deram satisfactorios resultados.

Os dois primeiros não tem uso para o caso por serem toxicos. O acido citrico e a resorcina produziram sobre o microbio especifico da coqueluche o effeito desejado. A resorcina, já é hoje bem conhecida como o melhor agente therapeutico contra aquella affecção; a sob a forma de badeggionages periglotticas foi a resorcina, ensaiada pela primeira vez com magnifico successo por meu pae, o Prof. Moncorvo, e esse seu methodo de tratamento é conhecido pelo nome de methodo brazileiro. O acido citrico (vide a nota enviada tambem para o Congresso, "Do acido citrico na coqueluche"), cuyos resultados obtidos sobre o germen foram excellentes, assim se portou ainda no estudo clinico, em que parecen ser de grande valor no tratamento e prophylaxia da coqueluche.

O germen desta terrivel affecção esteriliza-se a 100°; resiste a 10° e 15°. O seu optimum medêa entre 35° e 45°.

Na inoculação do microbio da coqueluche usei de gatos, cobaias, cães, gallinhas, ratos brancos, etc.

Estes ultimos, em numero de 4, não tiveram symptoma algum da molestia parecendo possuir uma certa immunidade.

Os tres cães que foram inoculados com a erosão previa da garganta tiveram a molestia; em dois delles de mais tenra idade, os symptomas foram mais pronunciados. A mucosidade retirada do fundo da garganta destes animaes deixo a ver germen em abundancia. Um gato que tambem foi inoculado, teve raros symptomas. Restabeleceu-se.

Oito cobaias tiveram a molestia com symptomas os mais caracteristicos. Alguns succumbiram por asphyxia. A secreção catarrhal foi examinada e os germens ahi abundantes foram cultivados e inoculados novamente com resultado.

Quatro gallinhas, tiveram a coqueluche bem caracterisada, pela inoculação do microorganismo especifico na sua tracheo-arteria.

Serviram pois para a identificação do microbio da coqueluche vinte animaes, dos quaes só os ratos brancos mostraram completa immunidade para a molestia.

Estes curiosos e difficeis estudos originaes só foram practicados na America do Sul por meu pae, o Prof. Dr. Moncorvo, auxiliado pelo meu illustrado amigo, Dr. Jayme Silvado, e nestes ultimos annos por mim.

SECTION III.—THERAPEUTICS.

Honorary presidents.

Dr. I. E. Atkinson, Baltimore.
Dr. A. D. Blackader, Montreal.
Dr. Simon Baruch, New York.
Dr. Norman Bridge, Los Angeles.
Dr. W. E. Casselberry, Chicago.
Dr. M. C. Caldwell, Chicago.
Dr. Charles Cary, Buffalo.
Dr. F. D. McDaniel, Mobile.
Dr. Manuel Dominguez, City of Mexico, Mexico.
Dr. Antonio A. Ramirez F. Fontecha, Tegucigalpa, Honduras.
Dr. J. Milton Bigelow, Albany.
Dr. J. H. Kimball, Denver.
Dr. John A. Larrabee, Louisville.
Dr. Justin Steer, St. Louis.
Dr. A. B. Miles, New Orleans.
Dr. Francisco R. Martinez, Santiago, Chile.
Dr. Ramón Mazaeredo, Cienfuegos, Cuba.
Dr. George L. Peabody, New York.
Dr. J. C. Mackenzie, Cincinnati.
Dr. A. D. Rockwell, New York.
Dr. Tomás Salazar, Lima, Peru.
Dr. A. A. Smith, New York.
Dr. James Tyson, Philadelphia.
Dr. H. C. Wood, Philadelphia.
Dr. James T. Whittaker, Cincinnati.
Dr. James C. Wilson, Philadelphia.

Executive president.

Dr. Hobart Amory Hare, 222 South Fifteenth street, Philadelphia, Pa.

Secretaries.

Dr. Edward Randall (English-speaking), Galveston, Tex.
Dr. David Cerna (Spanish-speaking), Galveston, Tex.

Dr. Del Arca (Paraguay 810), Buenos Ayres, Argentine Republic.
Dr. Manuel B. Mariaca, La Paz, Bolivia.
Dr. Alvaro Alberto da Silva, Rio de Janeiro, United States of Brazil.
Dr. J. L. Davidson, Toronto, Canada.
Dr. Manuel Plata Azuero, Guaduas, Republic of Colombia.
Dr. Domingo L. Madan (Contreras 13) Matanzas, Cuba.
Dr. J. Luis Estrada, Guatemala City, Guatemala.
Dr. F. L. Miner, Honolulu, Hawaii.
Dr. Ramón Midence, Tegucigalpa, Honduras.
Dr. Fernando Altamirano (Instituto Médico), City of Mexico, Mexico.
Dr. Alvarez, Granada, Nicaragua.
Dr. Americo Ricaldoni, Montevideo, Uruguay.
Dr. Vicente G. Guánchez, Caracas, Venezuela.

MINUTES OF THE SECTION.

The section on therapeutics met in parlor 32 of the Riggs Hotel, Wednesday morning, September 6, President Hare in the chair.

The proceedings were opened by a brief address from the president.

The first paper was read by Dr. J. Mount Bleyer, of New York, upon "The chemical import of koumiss," which elicited considerable discussion. Dr. Brush, of New York, stated that he made and represented the koumiss which had been condemned by Dr. Bleyer, and he thought, in all fairness, that the koumiss side should be heard and a distinction drawn between koumiss and koumisgen, which was recommended by Dr. Bleyer. The latter, prepared from skimmed milk, dried and powdered, was deprived of its most important nutrient properties, and removed what is known as "hickory cheese." Replying to the statement that koumisgen was more digestible, he called attention to the fact that, inasmuch as it kept indefinitely without change, it was practically indigestible, and stated that it was known that the more quickly a food decomposed the more easily it was digested.

Dr. Tyson had no large experience in the use of koumiss in affections of the kidney, but one point had been alluded to by both of the speakers to which he would add a few words which were pertinent. It was the use of skimmed milk in chronic Bright's disease. He had been surprised to note how common it was to recommend the use of skimmed milk in chronic Bright's disease. Now, in doing this we remove the one constituent which was most harmless in Bright's disease, i. e., the fat, and leave that which has harmful tendencies, that is, the caseine, which is the nitrogenous constituent, where alone urea can be made and uræmia invited. On the other hand, it is known that whole milk is often illy borne, and that some dilution is required on this account, as well as to encourage diuresis. It is therefore much more sensible to give the whole milk diluted by water than to use skimmed milk from which is removed the nonnitrogenous and retaining the nitrogenous. It is much more desirable, if possible, to remove the caseine and leave behind the fat, if milk is desired as a food in chronic Bright's disease.

Dr. Baruch stated that on the question at issue he had only to say that he had never used koumiss unless the patient objected to milk or the stomach did not retain or digest well the latter. In such cases he had found koumiss a good substitute.

Dr. Blackader, of Montreal, said: "Of the value of milk as a reconstructive, there can be no difference of opinion among us. Good, fresh milk will always command the first place in our dietary, and we, when insuperable objections occur to its use, should resort to its modifications. Koumiss is milk minus its sugar, which has been partly converted into alcohol and lactic acid, and, owing to the presence of carbonic acid, has the property of effervescence. There are conditions in which these alterations are of service to us. In children I find the effervescent properties rather an objection. Therefore koumiss, I think, will probably always occupy a place, but always a subsidiary place, in the list of our dietetic measures."

Dr. Brush, replying to question from the president, stated that no alcohol was used in the preparation of koumiss. He stated further that spayed cows would continue milking indefinitely, and that he had spayed a heifer of 2 years, and, by means of soda-water bottles dipped in hot water and the mouth applied to the teats, had caused her to give milk, perhaps 2 quarts daily, for six months.

Dr. Bleyer, replying to question of chairman in reference to the administration of warm koumiss, stated that in certain conditions, administered at 60° F. it was preferable to cold koumiss. The chairman stated that unless it was handled by means of a champagne tap it could not well be given warm. If this tap were used the liquid would not only be deprived of its sparkle but of its nutrient properties, as the curd would fail to flow through the tap.

Dr. Bleyer stated that he had no interest in the preparation of koumisgen, which he had recommended, and did not know its manufacturer personally.

Dr. J. W. McLaughlin, of Austin, Tex., read a paper with the title, "Some views regarding the philosophy of drug action."

Dr. Atkinson, of Baltimore, read a paper upon "Venesection in the treatment of engorgement and dilatation of the right side of the heart."

In the discussion which followed, Dr. Tyson, of Philadelphia, said: "My experience with this treatment has been that, while temporary flattering results followed venesection, as exemplified in a case of acute croupous pneumonia where there was stretching of the right ventricle, there has been no permanent relief, and the patient has ultimately died. I am, therefore, gratified to learn that Dr. Atkinson has had satisfactory permanent results."

Dr. J. H. Musser, of Philadelphia, said: "My experience accords with that of Dr. Tyson, based upon its use in patients in the Philadelphia Hospital. It is true that the patients of that institution are not proper subjects upon which to base conclusions of treatment. Many are old, broken-down subjects, with degeneration of all organs. On the other hand, in one patient in private practice, a man aged 19, with right-sided engorgement, repeated bloodletting gave relief to repeated engorgement. Leeches over the praecordia and dry cups over the back were used. The patient died of other causes."

Dr. D. D. Stewart, of Philadelphia, thought that perhaps bleeding from the jugular or tapping the ventricle of right side of the heart might be useful. He thought also that the liver could be tapped with benefit.

Dr. Hare reported a case of enormous engorgement of the right side of the heart which was temporarily relieved by aspirating the right ventricle, soon followed, however, by death. He stated, further, that his experiments upon the lower animals (dogs) convinced him that tapping the heart was not as dangerous as generally supposed.

Dr. Edward Randall, of Galveston, had seen good results follow venesection in right sided engorgement.

Dr. Atkinson replied that permanent relief was only relative, and in the case mentioned by Dr. Hare the degree of degeneration of heart muscle was too far advanced for permanent good to result from venesection.

Dr. Rockwell read a paper upon "The treatment of exopthalmic goitrè, based on forty-five consecutive cases."

Dr. Baruch, of New York, read a paper, which was discussed by Dr. Auld, of Philadelphia, and Dr. S. Solis Cohen, of Philadelphia. The latter said:

I have only to thank Dr. Baruch for his services in personally directing the attention of medical men in America to the uses of water in the treatment of disease, and to say that my experience confirms what he has said in regard to the effect of the stimulant and trophic influence of cold water in adding to the vital tone of the patient in such conditions of asthenia as are found in hysterical and neurasthenic patients and in the reinforcement of the patient's vital energy and resisting power in fighting pulmonary tuberculosis.

"A Plea for Physiological Remedies" was the title of a most interesting and instructive paper from Simon Baruch, M. D., New York City—discussion by Dr. John Auld, Philadelphia.

Dr. D. D. Stewart, of Philadelphia, next read a paper upon "Treatment of chronic gastric catarrh" and allied conditions of lowered HCl. acidity. Dr. Blackader, of Montreal, asked the means of introducing the electrodes, and Dr. Stewart replied that by deglutition tubes. Dr. Blackader stated that he had used with benefit upon a case of neurotic dypepsia lavage and electricity (galvanic and faradic) every second day for three months and that marked relief followed.

Dr. Rockwell, of New York, said that the great merit of the Einhorn electrode is the readiness with which it can be introduced, but in certain gastric disorders, especially dilatation. he found it inefficient. In this condition the bipolar electrode, using the induced current of quantity, is of great value. We wish here to get positive contractions of the muscular tissue of the stomach and experience shows that these can be obtained far more effectually by the bipolar method with currents of quantity than by unipolar method with currents of tension.

Dr. Stewart asked Dr. Rockwell if in the use of the bipolar method the parts between the poles were not the only ones affected, and if he used this method upon the empty or full stomach? Dr. Rockwell replied that the whole stomach was affected; that he had never used the method except upon an empty stomach.

Dr. Rusby was much interested in papoid and asked about papain, stating that Dr. Jacobi had said it would dissolve diphtheritic membrane in three hours. Dr. Stewart replied that he has used papain upon the recommendation of Chittenden and as a dernier resort.

Dr. D. D. Stewart advocated in all cases of neurasthenia attention to the condition of the stomach. In all the cases that he has had anything to do with he had noticed some disturbance present usually in the direction of greatly lowered HCl. acidity. In these cases the use of an active pancreatic extract is of the greatest value, especially administered before meals. HCl., also, given after meals, must also be used. The use of these artificial digestants conserve nerve-energy and their utility is therefore evident.

Dr. McDaniel, of Alabama, asked the author of the paper whether or not he had noticed or noted the proportion between neurasthenics of a corpulent or heavy weight type and those of the opposite type, and what difference of treatment he is inclined to apply to these different classes of patients. Dr. J. Wellington Byer of New York, asked the question whether cases of neurasthenia in which organic changes such as Arterio telerosis had taken place, it was possible to effect a cure. This was important to know both for purposes of prognosis and to discriminate between organic and functional condition. The first were incurable, the latter not so.

Dr. Dercum did not agree with Dr. Stewart regarding the use of digestants; that in his experience they were unnecessary in the majority of cases. Further, that he was not as sanguine as Dr. Buzzard, inasmuch as the results of the rest cure are not by any means satisfactory in such diseases as paralysis agitans or the chorea of adults which were still to be classified as functional diseases. When arterio-sclelerosis or other "terminal" changes are present the possibilities of the "rest cure" are limited. The greater proportion by far of neurasthenic women are below weight, occasionally they are excessively fat. In these cases a special dietary is instituted. Fats and carbo hydrates are excluded, skimmed milk, lean meats, succulent vegetables, fruit, etc., are used.

Dr. Dercum's paper elicited the following discussion: Dr. Baruch, of New York, said that the paper was a good clinical demonstration of the principle advocated by himself in the morning. The chief advantage of the rest cure was the methodical application of diet, rest, exercise, etc. He insisted upon the pedometer being used to measure exercise in diabetes. If, as the author has stated, the chief characteristic of neurasthenia is a lack of resistance to fatigue, we have in hydrotherapy a most valuable remedy. Vinaj, of Italy, has shown by graphic experiments with the Ergograph that by the application of the jet douche and rain hail, i. e., water delivered under pressure, there is an enhancement of resistance to fatigue in the muscles which the Ergograph registered perfectly. It is always gratifying to find a rational explanation of hydriatic procedures, for only in this way can we establish a remedy.

There is only one criticism to make. It is the author's indefiniteness referring to the wet sheet; he has given no temperature, no directions, nor the method. If it is cold wet sheet, it may be 45° F. in December and 80° F. in August, and yet be a cold wet sheet.

The great difference in effect of hydriatic application he had personally noticed and in his prescription of hydraulic pressure he defined temperature, duration, method, and number of pounds pressure. He had devised a method for modifying the pressure with which water is delivered.

Dr. James Tyson, of Philadelphia, next read a paper upon the treatment of gout, which covered the points so thoroughly that it elicited no discussion.

Dr. David Cerna, of Galveston, presented a paper upon the therapeutic uses of phenecoll, with special reference to its employment in malaria.

Dr. L. B. Anderson, of Norfolk, Va., read a paper upon the philosophy of therapeutics.

The following were read by title:

Spanish title: Algunos datos farmacológicos acerca de catorce plantas Mexicanas. (Pharmacological data about fourteen Mexican plants.) By Dr. Fernando Altamirano, of City of Mexico.

O acido citrico na coqueluche por Moncorvo Filho, Rio Janeiro, Brazil. (Citric acid in whooping cough.)

Contribución á la therapéutica de la fiebre amarilla. (Contribution to the therapeutics of yellow fever.) By Dr. Pedro Peñuelas, Havana, Cuba.

Une plante convéniente du Brésil. (A convenient plant of Brazil.) By Dr. J. B. La Cerda, Rio Janeiro, Brazil.

Action physiologique de quelques plantes brésiliennes de la famille des menispermacées. (Physiological action of some Brazilian plants, belonging to family of menspermacea.) By Dr. J. B. de La Cerda, Rio Janeiro, Brazil.

Algunas aplicaciones de la creasota de haya. (Some applications of beech wood creasote.) By Dr. Enrique E. Lopez, Jalisco, Mexico.

Physiological action of alcohol, by David Cerna, M. D.

Printed pamphlet entitled "Formulario de la facultad médica de México." (Formulary of the medical faculty of Mexico.) By Dr. Guillermo Parra, of City of Mexico.

The use of nitroglycerin in arterio-sclerosis, by Thomas G. Ashton, M. D., demonstrator of clinical medicine in the Jefferson Medical College.

The anapyretic action of calomel, by Drs. R. J. Nunn and A. B. Simmons, Savannah, Ga.

The effect of advanced civilization on disease, by W. J. Moody, M. D., Plainfield, Iowa.

The treatment of epilepsy, by Richard H. L. Bibb, M. D., Tabillo, Mexico.

The treatment of scarlet fever by chloral hydrate, by James C. Wilson, M. D., Philadelphia.

The advantages of amorphous phosphorus over the offensive form, by E. Q. Thornton, M. D., Philadelphia, Pa.

The following resolution was received from the list of the section on pharmacy:

Resolved, That this section recommends that steps be taken toward the preparation of a Pan-American Pharmacopœia.

Resolved, That a committee of three, of whom the president of this section be one, be appointed by the chair and that the section on therapeutics be requested to appoint a similar committee, the two committees to act jointly in formulating a general plan for carrying out the above idea; this plan to be presented, with recommendations by the two sections, to the executive board of the congress.

The president appointed for this section Dr. H. H. Reesby, chairman, Dr. A. W. Miller, and the president.

President Hare appointed from the section on therapeutics Dr. Edward Randall, Dr. David Cerna, and the president.

All official business having been completed, the section adjourned.

PAPERS READ BEFORE THE SECTION.

ANESTESIA.—LA TÉCNICA DE LA CLOROFORMIZACIÓN.

Por ANGEL CONTRERAS,
Médico-Cirujano de la Facultad de México y Delegado por el Estado de Yucatán.

SEÑORES: Un voto de gratitud eterna para los inmortales genios de Soubeiran, Simpson y Flourens, á quienes se debe el uso de la anestesia por el cloroformo.

He aquí mis primeras palabras ante esta ilustre asociación, á quien pido excusas por abordar un punto de tan vital importancia, yo, el último de sus miembros, un pigmeo; pero creo que al tratar este asunto, la autorizada y competente voz de las lumbreras científicas que me rodean podrá uniformar puntos de práctica divergentes entre las diferentes escuelas y naciones, haciendo adoptar los procederes más inofensivos, expeditos y rápidos.

Tres son las poderosas palancas de los positivos progresos alcanzados por la cirugía moderna; es sin duda la primera por órden cronológico, la anestesia; á la antisepsia toca la parte más decisiva; la hemostasis es el complemento de estos perfeccionamientos en el siglo XIX.

Soubeiran descubrió el cloroformo en el año de 1831 entre los productos químicos de la série methílica.

La historia nos refiere que el 14 de octubre de 1846, Morton produjo la anestesia por medio de las inhalaciones del éter delante de gran número de médicos y alumnos de la Facultad de Boston en un paciente á quien Warren estirpó un enorme tumor del cuello, en medio de la completa insensibilidad; pero un año después Simpson y Flourens, por medio de memorias presentadas en las academias, proclamaban y sancionaban el uso del cloroformo, que desde entonces se ha generalizado, como todo lo que es realmente útil.

En la República Mexicana, de la que soy inmerecido delegado en este congreso, el Dr. Miguel Jimenez hizo uso de la anestesia por el cloroformo desde esa época, en los soldados que defendieron la independencia de su patria contra la invasión americana.

Desde su cuna han rivalizado las aplicaciones del cloroformo y del éter para producir la anestesia, sin que hasta el día haya vencido alguna á su antagonista, lo que prueba que ambas son buenas, y cada quien ensalza generalmente el agente que más ha empleado.

Los médicos mexicanos recurrimos casi siempre al cloroformo.

El éter, á la altura de 2,270 metros sobre el nivel del mar, á que se encuentra el Valle de México, es demasiado volátil y requiere más que en otros lugares el uso de aparatos especiales para su aplicación en inhalaciones.

Se admite, en general, que la cloroformización se obtiene con más rapidez que la eterización, que sus efectos son más duraderos é intensos, que la excitación que produce es menor, que los vapores del cloroformo no se inflaman ni provocan gran secreción salivar y brónquica como los del éter, que este último agente expone más al síncope cardiaco tardío y el cloroformo al del principio; pero lo que debería resolver totalmente la preferencia por uno ú otro agente anestésico sería el guarismo de su mortalidad comparativa, lo que no ha podido establecerse con perfección; porque los casos no son siempre comparables al grado de que se pueda imputar igual responsabilidad al anestésico; porque el cloroformo es más usado que el éter, de suerte que no debe compararse en lo absoluto la cifra de las defunciones de uno y otro, y porque no se publican todos los casos desgraciados.

De las investigaciones de Arloing puede deducirse para casos especiales que el éter es preferible en individuos cuyos pulmones y corazón derecho estuvieron enfermos, mientras que el cloroformo convendría mejor á aquellos que tienen afecciones del corazón izquierdo, y según Duret cuando hay simple atonía de los ventrículos. Algunos opinan que en los casos de estrangulamiento herniario debería recurrirse más bien al éter, en atención á la hipóstasis pulmonar y á la peligrosa dispena que provoca el cloroformo.

No me detendré sobre el modo de obrar del cloroformo, ni expondré los fenómenos que determina por la abolición sucesiva de las funciones del cerebro, de la médula y del bulbo, recordando únicamente que la ciencia de la cloroformisación es dar bastante anestésico para suprimir la sensibilidad y el movimiento; pero no tanto que paralice la acción del corazón y de los pulmones.

Es un hecho inconcuso que en cualquier tiempo de las inhalaciones del cloroformo suele tener lugar excepcionalmente la muerte del paciente.

En un principio creyeron algunos que el éter estaba exento de ese funesto accidente, y se refiere que Hayward recorrió la Europa buscando un caso de muerte provocado por las inhalaciones de dicho anestésico.

El tiempo ha hecho patentes, no un caso sino varios, tanto durante la eterización como en la cloroformización.

Autores de nota ha habido, como Sédillot y Gosselin, que han sostenido, por lo menos en cierta época, que el cloroformo puro y bien administrado no ocasiona la muerte.

Creo que la opinión general es hoy que á pesar de la pureza del agente anestésico y de la pericia del médico, puede sobrevenir una desgracia.

Tambien está establecido que la desgracia puede depender de varias circunstancias en la administración del anestésico, por lo que se comprende la importancia que tiene la técnica del uso del cloroformo, que es la que deseo precisar, pués es muy general que cada quien procede según sus inspiraciones ó costumbres personales, y como que la muerte durante la anestesia es excepcional, recuerdo haber leido que Billroth no ha tenido su primer revés, sino después de haber chloroformado 12,500 individuos, se comprende la necesidad de que eminentes prácticos, encanecidos en el arte, como los que me escuchan, establezcan cual es el mejor proceder.

Por mucho tiempo, creo que ha reinado el método de las inhalaciones interrumpidas y en fuertes dósis. Se vertía uno ó dos gramos de cloroformo en un pañuelo en forma de cono ó en otro utensilio semejante, que se comenzaba por llevar hácia la boca y naríz del paciente, dejando amplio acceso al aire; después se iba aproximando más, se aumentaba la dósis del cloroformo, y cada vez que se juzgaba terminada la evaporación se retiraba el pañuelo temporalmente para echar en él más líquido, quedando la graduación de la dósis y el tiempo de la interrupción á discreción del cloroformador.

Al Dr. Labbé se debe, desde el año de 1882, el método de las inhalaciones continuas, que no impresionando los centros nerviosos con distintas intensidades, tiene que ser muy favorable para evitar accidentes y economizar además tiempo y cloroformo.

En México, el Dr. Miguel Cordero, á quien la inexorable parca quitó la vida en este año, presentó á la Academia de Medicina en enero de 1890 y de 1891, memorias fundadas en casos públicos, numerosos y detallados, sancionando su procedimiento de anestesia rápida, no siderante, obtenida con las inhalaciones de cloroformo.

Su especialidad consiste en la continuidad de las inhalaciones, vertiendo frecuentemente varias gotas antes de que termine la completa evaporación en la superficie externa del lienzo, que no separa ni un momento de la boca y naríz, y á las que hay libre acceso del aire.

Transcribiré la técnica descrita por el mismo Dr. Cordero en la página 122 del tomo xxv de la Gaceta Médica de México:

El aparato empleado nada tiene de especial: unas veces, pocas, la tela de algodón extendida sobre un esqueleto de alambre, del aparato de Esmarch, otras, el mayor número, el simple alcartáz de lienzo de algodón con su abertura superior suficiente para dar acceso al aire, y no encerrando en su interior ni esponja, ni hilas, algodón o algún otro cuerpo para recibir el líquido, pués este ha sido siempre vertido por pequeñas porciones en la superficie libre del cono.
Cuando se han dejado caer las primeras gotas, se acerca éste de manera de cubrir la boca y naríz del paciente, pero conservando una pequeña distancia en su base para dejar tambien por allí libre el acceso del aire: la caída de las primeras gotas de cloroformo en el cono de lienzo produce sobre este una mancha que no desaparece, sino cuando el liquido se ha evaporado completamente; antes que tal cosa suceda (lo cual se verifica en una fracción de minuto), se vierten nuevas gotas en la superficie libre del cono, y esto se sigue repitiendo, mientras que en el enfermo no se observe alguna de los fenómenos que indiquen una marcha irregular en la anestesia, en cuyo caso se suspende la inhalación: no habiendo este motivo, se continúa el acto hasta que la desaparición del reflejo palpebral y de los movimientos demuestren que se ha llegado al grado de anestesia, suficiente para practicar sin dolor cualquiera operación. Durante ésta, se sostiene la inhalación, pero poniendo en el lienzo cantidades menores de cloroformo, y aún haciéndola con intermisiones hasta la conclusión del acto.

De las observaciones del Dr. Cordero resulta: que en ninguna de ellas ha causado la muerte el cloroformo, que el promedio del tiempo necesario para obtener la anestesia quirúrgica ha sido de 6 á 8 minutos, y que la cantidad de buen cloroformo empleada fué de 18,60 gramos, habiendo durado las maniobras operatorias en término medio de diez y ocho á sesenta minutos.

Estos resultados son muy satisfactorios relativamente á los que producen los otros métodos y procedimientos, y llaman más la atención en México, donde siempre se había notado que con el uso de las inhalaciones del cloroformo interrumpidas y en fuertes dósis se empleaba más tiempo para obtener la anestesia quirúrgica que en Europa procediendo de igual manera.

Se había discutido la causa de esta diferencia y unos la atribuían á la considerable altura sobre el nivel del mar á que se encuentra el Valle de México, pués en tal virtud, decía el Dr. Ramos ante la Academia de Medicina de México, la rarefacción del aire facilita la evaporación de los líquidos volátiles como el cloroformo, lo cual hace que en igualdad de volúmen de aire inspirado haya menos cantidad de anestésico absorbido. Otros referían la diferencia de tiempo á la clase de cloroformo empleado; pero el que se prefiere generalmente es el inglés de la casa de Duncan Flockhart y Compañía, que nos llega en fiolas de color obscuro herméticamente cerradas á la lámpara. En fin otros atribuían la diferencia mencionada al modo de administrar el cloroformo, los estudios del Dr. Cordero apoyan este último parecer.

En el Hospital General del Estado de Puebla, donde sirvo en calidad de profesor de clínica externa de la facultad de esa entidad federativa, he usado en estos últimos años el procedimiento de cloroformización del Dr. Cordero y he confirmado sus propias observaciones.

En el mismo hospital, alguno de mis compañeros ha acostumbrado últimamente cloroformar tambien por el método de las inhalaciones continuas; pero poniendo mayor cantidad de cloroformo y aplicando estrechamente el pañuelo al rededor de la boca y naríz, sin dejar abertura libre en el centro del pañuelo para el paso del aire. Este es el procedimiento que llamamos por asalto. Los dos pulgares apoyan los ángulos superiores del pañuelo contra los carrillos, y con los índices se fijan los ángulos inferiores á las ramas ascendentes del maxilar inferior y se empuja dicho maxilar hácia adelante; el cloroformo es vertido frecuentemente y en fuerte dósis sobre la parte media del pañuelo que queda entre la boca y naríz, sin retirarlo para nada.

La verdad es que los resultados obtenidos por este procedimiento son rápidos y que no hay grande excitación ni aún en los alcohólicos; pero es de temerse siempre por este procedimiento la asfixia ó el síncope, lo mismo que la susceptibilidad individual para el cloroformo, la que no puede estimarse, sino por medio de la gradución de las dósis.

El Dr. Bolognesi (del Mans) ha aplicado últimamente la cloroformizaeión en dósis cortas y continuas en la posición declive sobre el plano inclinado. Sus hechos se refieren á casos de laparotomía; pero tan ventajosos han sido los resultados de la congestión encefálica determinada por esta posición, en la marcha y excelencia de la cloroformización, que pudiera generalizarse el procedimiento del Dr. Bolognesi en la práctica de diversas operaciones.

Según dicho autor los fenómenos congestivos del encéfalo son un medio preventivo del síncope cardiaco, que es el más grave de los accidentes de la cloroformisación, y la respiración no está entorpecida más que por fenómenos mecánicos que es fácil remediar con el uso de la pinza de lengua, la propulsión del maxilar inferior y el empleo de la mesa inclinada.

Respecto á los accidentes de la cloroformisación, mencionaré únicamente la justa opinión emitida en la Sociedad Iatromática por uno de mis compatriotas, el Dr. Hurtado, quien dice "que solo los accidentes que se anuncian son los que el mayor número de veces se pueden contrariar y aún evitar, pero que los llamados justamente fulminantes, raras veces se pueden dominar, generalmente no dan lugar á prevenirlos, ni mucho menos á salvarlos."

REMARKS ON ANÆSTHESIA.

Dr. Hamilton was interested in the statement that chloroform was the favorite remedy in a city of the altitude of the city of Mexico, where the heart muscle would seem to be normally severely taxed. In Chicago it had come to be a routine practice to test the urine as preliminary to operation. In all cases where there were signs of kidney abnormality, chloroform was always preferred. In other cases ether was given.

Dr. E. Laplace, Philadelphia. I have seen six deaths from chloroform in the various clinics of Europe and have never seen a death from ether. Death seemed to begin first with a disturbance of respiration.

THE VALUE OF THE COLD BATH IN THE TREATMENT OF ASTHENIC DISEASES OTHER THAN TYPHOID FEVER.

By SIMON BARUCH, M. D., of New York.

The fact that this subject has been chosen for discussion is a happy augury for rational therapeutics. When I have hitherto referred to the cold bath as a method of treatment for an asthenic disease, I have almost invariably been met with the query, "Would not the shock be too depressing to the patient?" The question for discussion here is an evidence of an awakening to the value of the best remedy for asthenic conditions which we have. Instead of defining asthenia, let us take as an example the most typical forms we meet, one a temporary, the other a more enduring condition. Surely a woman who has fallen in syncope presents the most complete picture of asthenia. Her pulse is feeble or absent, her respiration is shallow, sensation and motion are practically abolished, the patient's vital powers lie dormant, as it were. What is the treatment which long usage has so sanctioned that even lay people constantly resort to it? The application of cold water to the periphery, the face or chest, is that remedy. You are all familiar with the result. The merest tyro in medicine can give its rationale. There is a reflex stimulus to the nerve centers, a deep inspiration ensues, the wheels of life again are set in motion, color returns to the pallid cheek, the glazed eye brightens, the pulses beat again, the asthenic condition is removed as no other agent can remove it.

Let us take a more frequent asthenic condition. A patient suffering from an infectious disease lies prostrate, with thready pulse, shallow breathing, dull eye, picking at the bed clothes, subsultus, involuntary defecation. All these remind us that here we have the very climax of asthenia. What shall we do? Will digitalis and strophanthus arouse a heart whose response depends upon these obtunded nerve centers? Strychnine gives us some aid, because it stimulates the nerve centers. But seat such patient in a shallow warm bath and pour with some force one or two basins at 75° or less over his head and shoulders, rub him gently, repeat if indicated. The result will astonish those who have not tried it. There is a gasp for breath, the dull eye resumes its luster, the facial cyanosis yields to a better hue, the pulse becomes slower and less compressible. The wheels of life are again set in motion, not as in the case of syncope to remain so, but to again be overwhelmed by the toxic blood which supplies the nerve centers. Again and again this affusion must be repeated. Fear not the so-called shock, for this is just what you want to evoke. It is, when judiciously administered, followed by reaction, and reaction is the great stimulus, greater than all medicinal agents or alcoholic stimulants. These are clinical facts, observations made at the bedside. They are, at least, as reliable as those made on medicinal agents.

In low forms of scarlatina, when the feeble, rapid, thready pulse and cyanotic appearance of the skin present every feature of asthenia, several dips of the patient into water at 60 to 75°, followed or accompanied by friction, arouses the feebly-acting heart more quickly and reliably than all other known stimulants.

What is the rationale of the action of cold water in these typical cases of asthenia? Heart failure stands like a specter at the bedside, and the physician often labors in vain to banish it. Heart failure kills. Heart failure is the culmination of asthenia. How does the application of cold to the periphery restore vigor to the drooping heart? Macey, Traube and others have shown that in these asthenic con-conditions we have a loss of tone in the smaller vessels, a paresis of the muscular coats, and of the elastic tissue which acts the part of muscular coat in the peripheral capillaries. Now it is a well-known physiological fact that the circulation of the blood depends not only upon the vigorous, healthful action of the heart, but also upon the integrity of the arteries and capillaries, by whose elastic resolvency the blood is pelled through the finest tubes. Surely the propulsion of a viscid fluid-like blood through such fine tubes would be impossible unless the latter were endowed with propulsive powers.

What results when the latter is lost or in abeyance? The heart must increase its force to overcome an obstruction at points where it formerly received aid. It is pumping against paralyzed vessels; the blood stagnates in the smaller ones, giving rise to hypostatic congestion, and then is the difficulty increased. No wonder that the heart labors harder, that the pulse rate increases, and its tension is lowered. No wonder that its ganglionic forces are exhausted and that the heart yields at last to the dread pressure upon its vital forces, which are sapped besides by the toxic blood supplying it. Apply a judicious hydrotherapeutic procedure in such a case—let it be a cold affusion, dip, spray, ablution, a bath, but let it be adapted to the case and always accompanied by friction. What is the result? There is a local stimulus to the coats of the superficial vessels; they contract again under the impact of repeated cold wave followed by friction. Their paresis is removed; they again propel the blood as was their wont. The dam is cut, as it were; the blood again flows freely through the terminal vessels; the heart responds to the relief afforded by a slower and more deliberate contraction, higher tension, and absence of dicrotism. At the same time the central nervous system is bathed by cooler blood, blood which is better oxygenated, and thus the cardiac ganglionic centers receive new life at one end while at the other the labor of propelling the blood is removed.

If any one doubts the *rationale* let him see the dead, pale skin (except the dusky face) of an advanced typhoid redden under this procedure and come out glowing with the roseate hues of health, and he will be convinced; let him see the marbled skin of a low scarlatina brighten up under the friction and bathing and resume its crab color, and he will no longer doubt. In chronic conditions phthisis offer a good illustration of the effect of hydrotherapy in removing the obvious asthenic conditions.

We have the testimony of Ziemmssen, who refers to it as "a remedy of extraordinary value." Indeed, clinical demonstration of the "value of the cold bath in asthenic conditions" is abundant. The Montefiore Home for Incurables receives its supply of patients from other hospitals which decline to retain them on account of their incurability and protracted nature. Here I have had an opportunity of testing the question in a satisfactory manner in cases of phthisis, Bright's disease, diabetes, and a variety of functional and organic nervous diseases which make this institution the Salpetriere of America. The gradual education of the reactive capacity in these desperate cases and the improvement of the nutrition in many of them offer interesting illustrations of what may be accomplished by the methodical application of water. The annual reports of this institution furnish details with which I need not burden you here. I will cite only the cases from private practice that may be of interest. A young man from Kentucky, who had been pronounced phthisical (right apex, first stage) by Dr. Janeway, and whose sputum had been found, at the Vanderbilt Clinic Laboratory, to contain bacilli, without appetite, emaciating for six months, etc., was treated at the Hydriatric Institute from August, 1892, to January, 1892, with the result of 16 pounds gain, and complete removal of bacilli (examined at the Vanderbilt Laboratory by Dr. Van Gillen seven times). He has remained well, and his brother is now under treatment for the same (more advanced) trouble and has gained 4 pounds in three weeks. A middle-aged lady who had been operated on (cervix of perineum) by Dr. Ralph Waldo, and who had been bedridden for two years, was advised by Dr. Charles Carroll Lee, called in counsel by Dr. Waldo, to place herself under hydriatic treatment. She was carried into the institute by her husband and brother, presenting every manifestation of pronounced neurasthenia of the melancholic type. Her reactive capacity was feeble, but it was gradually raised, until after six months' treatment she asked to be allowed a bicycle, so active and strong had she become. She is now in good health. With these brief histories I may conclude my commendation of the "cold bath in asthenic conditions," acute or chronic.

THE PHYSIOLOGICAL ACTIONS OF ALCOHOL.

By DAVID CERNA, M. D., PH. D.

Demonstrator of Physiology and Lecturer on the History of Medicine in the Medical Department of the University of Texas.

Almost from time immemorial alcohol, in some form or another, has been used as a beverage the world over; and for a long time as a remedial agent in the treatment of disease. Without attempting to discuss the uses of the drug in disease, a subject in itself considerably extensive, I will confine myself to carefully study the physiological actions of the drug.

Both experimental and clinical observations have shown that alcohol acts decidedly on the different systems, producing changes, either temporary or permanent, according to the amount of the drug ingested and the time employed in its administration. How such changes are brought about by the actions of alcohol, it is the purpose of this research to examine and, if possible, to determine. The evidence which I shall bring forward will be mainly experimental.

GENERAL ACTION.

The effects produced by alcohol in small amounts are those of general stimulation, followed by those of depression when given beyond what may be termed the true physiological limit. In large or toxic doses, when administered for a short or for a long time, there are produced two conditions well known and sufficiently described by various writers upon the subject: acute and chronic alcoholism.

In the first instance, the chief phenomena manifested are a weak, compressible, rapid pulse; a slightly increased at the onset, soon followed by a diminished bodily temperature. The skin becomes cool, moist, and relaxed, accompanied with pallor of the face; the breathing, although not interfered with much at first, may be somewhat accelerated, but generally towards the last assumes a slow, stertorous character; the pupils are either contracted or dilated, while the smell of the drug in the breath of the patient or animal is a common and well-known occurrence. These various symptoms gradually emerge into a mild form of the well-recognized condition known as delirum tremens, followed by stupor, coma, and death.

In the chronic form of alcoholism the chief symptoms are of a nervous character. One of the most common symptons is general loss of motor power. In these cases, at least in the majority of them, the upper extremities are affected before the lower ones. Sensation is similarly, and perhaps more profoundly than is motion, influenced. Tremors are common, these being confined to the arms and head. They are more frequent in the morning, and are improved or removed by small doses of alcohol. Often it becomes difficult to diagnose between palsy of alcoholic origin and the general paralysis occurring in the insane. Camuset* has reported instances in which tremors, general loss of muscular power, delirium of grandeur, unequal pupils, fibrillary contractions about the mouth, and all the supposed characteristic symptoms of the organic disease were present, but which resulted in cure upon the forced disuse of alcohol. Broadbent† has described a form of alcoholic paralysis of spinal origin, probably due to multiple neuritis, and said to occur more frequently in women than in men. Similar cases have been observed by Lancereaux quoted by Wood;‡ but these vary considerably in their features. It is stated that "there is at first gradually-increasing weakness of the lower extremities, when suddenly marked loss of power becomes manifest in the extensor muscles of the forearm, giving rise to double wrist-drop. The flexors of the hand may be affected very early. Usually, somewhat later, they become paralyzed, so that the hand is like a flail. Although the patient can walk and the movements of the elbow and shoulder are vigorous, the paralysis rapidly advances, until all four extremities are almost completely motionless, the arms, as a rule, being more seriously implicated than the legs. The reflexes are abolished. There is usually no pain, though the muscles may be tender on handling, and the sphincters retain their functional powers. In one of Broadbent's cases, however, sharp pains shot down the legs, and there was an incontinence of urine. In the course of a few days the muscles of the trunk become implicated, and the patient dies of paralysis of respiration, precisely as in ascending palsy. Loss of tone in the capillaries, with consequent livid congestion of dependent parts, is said to be diagnostic of this form of paralysis. Careful examination of the spinal cord failed to detect any lesions."

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* Ann. Méd. Psycholg., vol. x, p. 201, 1883.

† Medico-Chir. Transactions, vol. LXVII.

‡ Nervous Diseases and their Diagnosis, p. 60, 1887.

Attacks of insanity are of frequent occurrence, and the *mania a potu*, although it may assume any form, is usually characterized by evil visions, says Wood.*

Delirium tremens is a peculiar series of acute symptoms which are produced by excessive drinking. The affection is especially apt to develop upon the sudden cessation in the use of the stimulants, but may come on during the debauch. In their mildest form the symptoms constitute that condition known by old drunkards as the "horrors," in which the sleep is disturbed, the hand tremulous, the mind weak and confused, and the patient troubled with frightful imaginings, vague alarms, and apparently causeless depression of spirits. When the attack is more severe, hallucinations of sight, of hearing, and, more rarely, of touch, occur. These hallucinations always have in them an element of terror or of horror. Disgusting objects, such as snakes, toads, rats and mice, and similar unclean creatures, crawl over the bed or the person. Voices predicting evil, or bringing messages of remorse, or uttering threats of punishment, are heard. The patient may seem violent, and may even attack his attendants, but the violence is that of terror, and not of aggression. The attack is an attempt at defense. There is great insomnia, and usually when the patient can be made to sleep the mind is clear after the awakening. This is not, however, invariably the case. I have seen delirium tremens gradually pass through successive days of wakefulness and nights of sleeping into a chronic mania not readily to be distinguished from that arising from other causes. In the earlier attacks of delirium tremens occurring in very robust people, when all the mucous membranes are irritated, and when probably there is direct irritation of the brain and its meninges, there may be a slight febrile reaction and even a strong and excited pulse; but the disease is typically asthenic, with loss of muscular power, tremulousness, and rapid, feeble pulse, and when death occurs it is from exhaustion. Sometimes the patient suffering from delirium tremens has sufficient rationality to receive his physician with a quiet, gentle courtesy, and to answer questions without irritation. It will be noted, however, that he is evidently preoccupied, and that occasionally he turns his head or casts furtive glances from one part of the apartment to the other, and a little finesse will reveal the fact that during the whole time he is seeing visions or hearing sounds, or is at least laboring under a profound apprehension of attack.

An almost characteristic form of insanity occurring especially in married chronic drinkers is that of conjugal infidelity. This form of mental derangement is as singular, but none the less true, as that of lying in opium habitués. Thus, according to Wood,† the prolonged use of alcohol may lead to a gradual functional and finally structural alteration of the nervous system. Under the continuous influence of the narcotic the brain performs its functions slowly and imperfectly and the mental movements become sluggish and weak; the memory is greatly impaired; the power of fixing the attention steadily diminishes, but the intellectual weakness is especially shown by the lessening of the power of the will, so that not only is the judgment uncertain, but its dictates are not carried out. There is also a distinct tendency to emotional depression, and often a peculiar suspiciousness, which is the groundwork for delusions. A step further, and hallucinations haunt the victim. The route to insanity and irresponsibility from this condition is short. Out of such a state is easily developed the most characteristic and frequent form of alcoholic insanity, namely, that with depressive delusions. In some cases this variety of alcoholic insanity appears suddenly with symptoms for a time not to be distinguished from delirium tremens. Indeed, I think it perfectly correct to say that a patient may pass from delirium tremens into alcoholic insanity.

It is affirmed that headache and other symptons of sudden congestion of the brain occasionally usher in the attack of alcoholic insanity. When the symptoms are active hallucinations are very numerous, constantly changing, and almost always are such as to inspire terror or disgust. In a very short time they are accompanied by

* *Loc. cit.*, pp. 465, 466. † *Loc. cit.*, pp. 467, 468.

delusions of persecutions, voices of reproach, threatening, or remorse, mocking faces, unclean beasts, tormenting devils. These and similar visions drive the victims into profound melancholy, and finally may lead to suicide or murder. According to Spitzka, the delusions of chronic alcoholism almost always relate to the sexual relations or to poisoning. Underlying this variety of alcoholic mania is frequently an intense fear, which may lead to violence, as when a man kills his wife because he fears that she will poison him. Not uncommonly the depressive sexual delusion leads to an outburst of uncontrollable jealousy and rage, so that the wife-murder from motives of jealousy is not a rare result of alcoholic mania. There is in some of these cases a very marked relation between the presence of alcohol in the blood and the insane outburst. The drunkard may be, when not under the influence of the poison, fairly rational, but is converted by alcohol into a wild beast, although he has few or none of the ordinary symptoms of intoxication. The man may walk straight and talk rationally on general subjects but be profoundly under the influence of a depressive or persecutive delusion, which disappears when the blood is free from alcohol. The relation between depressive alcoholic insanity and *mania a potu* is, as has already been stated, very close. Insomnia, emotional excitement, especially connected with fear, hallucinations, and delusions are common to each; but the tremors are more marked in delirium tremens, and when an attack of alcoholic insanity is acute and tremors are pronounced it may be considered to be *mania a potu*. Lentz* calls attention to a form of alcoholic insanity with expansive delusions and hallucinations of sight and hearing which, very strangely, in most instances relate to God and a future state. Visions of supernatural beings, and especially of the Deity bathed in an aureola of light, perpetually haunt the patient; the ministrations of angels seem to bring relief, or, mayhap, the voice of God himself is heard in command or instruction. It would appear that two forms of alcoholic insanity must be recognized, one a lypemania, or melancholia with delusions of persecution; the other a megalomania, with a strong tendency to religious hallucinations.

A form of disease induced by the continued use of alcohol is that of epilepsy. This is apt to occur in previously healthy individuals as well as in those born of parents who have been hard drinkers.

In speaking of the subject Wood† says: "There are two distinct epileptic conditions produced by intoxicating drinks. In one of these the convulsions are symptomatic of acute poisoning, and come on during an orgy, or immediately after a single excessive draft of liquor. In the second form these convulsions are apparently not the immediate result of alcohol in the blood, but are developed at a time when the system is not profoundly under the direct influence of the poison. These epileptic convulsions may supervene during delirium tremens, when they are accompanied by hallucinations; during the mental enfeeblement of profound chronic alcoholism, when they are associated with dementia, paralysis, or stupor; or at a time when the general symptoms of chronic alcoholism are not pronounced. In the alcoholic convulsion the symptom may closely resemble those of true epilepsy, and not rarely the attack is ushered in by headache, gastric embarrassment, troubles of vision, excessive tremors, or some similar prodrome which may be looked upon as partaking of the nature of an aura. The convulsions usually occur in paroxysms, two, three, four, or more, one after the other, at intervals of a few minutes.

"Not only may major epilepsy be closely simulated by the alcoholic affection, but simple epileptic vertigo or true *petit mal* may exist, either alone or associated with the major convulsions.

"Alcoholic epilepsy is often associated with hallucinations, especially of terror, and the convulsion is not rarely followed by temporary mental derangement, which may last only for a few minutes or may continue for hours or days. The mental derangement may take the form of an acute dementia, in which the intellectual functions seem to be in abeyance, and the subject is reduced to the condition of an

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*De l'Alcoolisme, p. 491. †Nervous Diseases and Their Diagnosis, p. 117, 1887.

automaton, obeying immediately and mechanically all commands and impulses from without. This state of perverted consciousness has, in some instances, lasted for days. Suicidal impulses are very frequent."

All this has been corroborated frequently by cases reported in the various journals. Demme,* in cautioning against the common practice of allowing children the habitual use of alcoholic beverages as appetizers, reports several cases of organic and functional disease produced by such a habit. He has met two cases of cirrhosis of the liver in early life due to this cause. Five cases of infantile epilepsy were induced by the use of alcoholic beverages, and in addition to these he could trace 21 out of 71 young epileptics to parents who were drunkards. He also believes that alcohol taken in early life is a prominent factor in the production of night terrors and chorea in some cases.

Dodge † reports a case of alcoholic epilepsy in a woman 34 years of age. The convulsions were precisely of the first kind described by Wood. A similar case is referred to by Griffith and Cattell. ‡

But I will not continue to treat a subject that ought not to be considered, strictly speaking, within the limits of this essay.

The influence of alcohol in the production of epilepsy can not be denied. Thus, for instance, Drouett § attributed the disease in 45 out of 115 cases of alcoholism in men to alcohol alone. He observed the same malady in 9 cases out of 89 female alcoholics. Echeverria,‖ who analyzed 572 cases of epilepsy, found that of this number 257 cases could be directly and solely traced to alcohol as cause and effect. Again, Moeli ¶ concludes, from a careful study, that from 30 to 40 per cent of all persons affected with delirium tremens are victims of epilepsy.

The same may be said regarding the occurrence of the disease in children of alcoholic parents. Martin** has published an interesting report of this class of cases. His observations were made in La Salpêtriere. Out of 150 cases of insane epileptics in children, he found 60 in which a history of alcoholism in the parents was clearly defined.

Alcohol poisoning does occur, and whether in the acute or chronic form it often produces death *per se*. In many cases a fatal issue has been preceded by convulsions.†† How death is caused by alcohol has not been very accurately determined. It is certainly often produced by failure of the respiration. Such an observation, at least, I have myself frequently made in the course of my experimentation upon the lower animals.

But the actions of alcohol are so varied that I will endeavor to study them on the different systems separately.

ON THE NERVOUS SYSTEM.

On the peripheral nerves.—When a small amount of alcohol, say about 5 drops well diluted, is injected hypodermatically into a common frog (*Rana esculenta*), there are produced phenomena of general excitability, as is evinced by restlessness of the animal; somewhat, though not always, hurried respiration, slightly increased reflexes, and acceleration of cardiac action. These effects soon pass off and the batrachian resumes its normal condition. That alcohol, in minute quantities, does excite the peripheral nerves, appears to be demonstrated by the results of the following experiments:

Experiment I.—Took a medium-sized frog. Ablated cerebrum, and after shock had passed, reflex action, as tested with acidulated water, was manifested in twelve

* Journ. Amerc. Med. Association, 1887; also Annual of the Universal Medical Sciences, 1888.

† Medical Register, December 8, 1888.

‡ Annual of the Universal Medical Sciences, 1890.

§ Annales Méd. Psychologique, 1875.

‖ Journal of Mental Science, January, 1881.

¶ Neurolog. Centralblatt, 1885.

** Annales Méd. Psychologique, January, 1879.

†† Philadelphia Medical Times, VI, p. 463.

seconds. Injected under the skin 5 drops of alcohol well diluted with water. at 12 m.; 12:15 reflex action in ten seconds; 12:20 reflex action in ten seconds; 12:30 reflex action in eight seconds; 12:50 reflex action in ten seconds.

Experiment II.—Medium-sized batrachian. Destroyed brain; tied the blood-vessels of right leg and waited for the disappearance of shock. Reflex action was then tested as in previous experiment. It was manifested in both legs in ten seconds. Gave hypodermatically, at 10 a. m., five drops of alcohol diluted with water; 10.20 reflex action in left leg in six seconds; in right leg in ten seconds; 11.20 reflex action in both legs in thirteen seconds.

When the abdominal aorta had been tied previous to the administration of the drug, no modification in the reflex function was observed upon the lower extremities.

If the alcohol is applied to the nerves in small doses, the same slight excitability is noticed, as proven by the experiment that follows, an example of many others performed:

Experiment III.—Destroyed cerebrum of a large frog, and exposed the right sciatic nerve. After shock had passed off, a feeble current of electricity applied to the nerve trunk by means of a Dubois-Reymond apparatus, produced at 15 cc. between coils, contraction of the tributary muscles. At 9.15 a. m. gave five drops of alcohol subcutaneously. 10.15 distinct contractions are elicited in the corresponding muscles, at 20 cc. between coils; 10.25 the same result at 30, at 35 and at 40 cc. between coils.

These results are confirmatory of those previously obtained by Mommsen.* This investigator found that alcohol, when placed in contact with them, distinctly increased the excitability of the peripheral motor nerve fibers.

On the other hand, there is no doubt that large and toxic doses of the drug cause depression and paralysis of the peripheral nerves. I have frequently observed that, after death of frogs killed by alcohol, the nerves respond to electrical stimulation very slightly or not at all, these variations depending upon the quantities of the drug used. Wood † has found that the vapor of alcohol is capable of producing the stupor known as anæsthesia and further that this anæsthesia may be deepened into death accompanied by all the phenomena of fatal ether narcosis. The following experiments explain themselves:

Experiment IV.—Large frog. Injected hypodermatically 5 c. c. of a 25 per cent solution of alcohol at 1:20 p. m.; 1:30 the animal shows no disposition to move about; respiration slow; apparently in a stupid condition; 1:45, movements exceedingly sluggish, greatly diminished reflexes. Died eventually from respiratory failure. After death, nerves and muscles responded weakly to electrical irritation.

Experiment V.—Medium-sized frog. Destroyed brain, and after shock had passed away, tested reflexes by means of acidulated water. Reflex action was manifested in ten seconds. Gave at 1:50 p. m. 5 c. c. of a 25 per cent solution of alcohol; 2:00 reflex action in fifteen seconds; 2:10, reflex action in twenty-five seconds. The reflexes continued to diminish until they were finally abolished.

Similar results have been obtained by Dogiel ‡ who found the reflex susceptibility at first, somewhat, and afterwards decidedly, decreased by large amounts of alcohol; and that the same effects of depression were produced on both the motor and sensory nerves.

Again, there is scarcely any doubt that in large quantities the effects produced by alcohol on the peripheral nerves are accompanied by alterations in the nerve tissue itself, and both in the gray and the white substance. In regard to the latter, and particularly in reference to the peripheral nerve filaments, the results of experimentation shows this to be the case. It could not, indeed, be otherwise, judging

* Arch. f. Patholog. Anatom., LXXXIII. 243.

† Therapeutics: Its Principles and Practice, eighth edition, 1891.

‡ Pflüger's Archiv., Bd. VIII, p. 605, 1874.

from the very decided action of the drug. Thus Jackimoff* has made, in the laboratory of Merzefewski, an experimental study of the nervous changes following the action of alcohol. The author divided his research into three series, giving the drug to puppies and dogs in the strength of 40 per cent. The alcohol was administered in the first series, in gradually ascending doses of from 1 to 8 cubic centimeters (16 grains to 2 drachms) for each kilogram of the animal's weight, until death was produced. In the second series the author so gave the drug during the period of a month as to produce an acute intoxication which resulted in the death of the animal; while in the third series of his experiments an acute drunkenness was caused.

There was observed, resulting from the first series of experiments, a gradual paralysis of the hind legs, preceded by languor, muscular relaxation, accompanied with general hyperesthesia and tenderness of the nerve trunks. Death was caused in from five to eight months. No post-mortem lesions were observed in any of the organs, and, singularly enough, nothing abnormal was exhibited by the peripheral nerves under the microscope, while changes in other portions of the nervous system, as will be noticed presently, were distinctly seen. Why changes in the nerves were not observed, as in other parts of the nervous system, is not clearly made out, and can only be explained by some error committed in the microscopical examination. In fact, Jackimoff himself seems to admit this latter issue, since changes in the trophic cells could not occur without producing atrophy of the tributary elementary fibers. When the animals received the drug according to the second method, similar changes, although to a less marked degree, were observed.

Spaink† has studied and endeavored to determine the action of ethylic alcohol, when given for a long time, particularly upon the peripheral nerves. He used in his experiments rabbits, and injected the drug, well diluted, by means of an œsophageal sound. Immediately after death of the animal, the auricular, the tibial, and the pneumogastric nerves were taken out. These the author placed, for hardening purposes, in either Fleming's or Erlich's liquid, some of the nerves being stained by means of various reagents. The investigator was thus able to determine the degeneration of the peripheral nerve fibers, and found an especial modification of the axis cylinder, that is, a spiral twisting of this element, corresponding precisely to the direction of the degeneration of the fiber.

On the higher nerve centers.—That alcohol exerts a powerful influence upon the brain and other centers has been so thoroughly established clinically and experimentally that the subject would not need further discussion. It may be said, nevertheless, that mild doses of the drug produce a primary stimulation of the cerebrum, and thus increase the rapidity, although perhaps not the depth of thought. Upon the spinal cord, as well as upon the muscles and nerves, alcohol augments at first the reflex activity. Large amounts cause a loss of coordination, this being the result of an action upon the brain and the lower nervous system. Under such circumstances the power of touch is partly destroyed, and it has been found that this loss of coordination is mainly due to paralysis of the sensory functions. Thus Kraepelin,‡ in an especial research on the cerebral action of certain medicaments, has found that alcohol in small doses impairs the sensory functions and excites the motor ones and that, on the other hand, in large amounts the drug first aids the motor processes and finally abolishes them. The loss of coordination "makes a drunken man," as Hare§ has so tersely expressed it, "fail to recognize the surface of obstructions and the impaired mental power and disordered judgment, combined with the badly acting motor and sensory paralysis, cause him to stumble and fall."

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* Bull. de la Soc. d'Anthroplog. de Paris, v. 7, p. 72, 1890.

† Journ. de Med., de Chirurg. et de Pharmcol. de Bruxelles, October 5, 1890.

‡ Riforma Medica, July 11, 1892.—British Medical Journal, August 27, 1892.

§ Practical Therapeutics: Third Edition, 1892.

As in the case of the peripheral nerves, alcohol produces lesions of the brain, the spinal cord, and the corresponding membranes. Jackimoff[1] observed that if the constant acute intoxication of the third stage or series of his experiments be persisted in, death took place in from thirty to thirty-two days, and the post-mortem examination disclosed the lesions just mentioned. The microscope revealed great hyperæmia of the gray matter of both the brain and the spinal cord, extending into the adjacent white substance. It was noticed that in all instances the degeneration was an ascending one, decreasing in severity, however, as it proceeded. The chief lesion was found in the lumbar enlargement of the medulla spinalis.

ON THE CIRCULATION.

The influence which alcohol exercises on the circulation is extremely interesting and of the utmost importance. Without putting aside a study of the actions of alcohol on other parts of the economy, it is my purpose to make a special and thorough investigation of its influence on the circulatory apparatus, from the fact that in this there exists a great deal of contradictory evidence. I will first examine the literature of the various observations made so far, and then discuss the results of my own experiments.

Quite recently Gutnikow[2] has undertaken a series of experiments on curarized dogs. To these animals, under such conditions, he administered alcohol in ascending doses. The results obtained led the author to conclude that alcohol produces a diminution of the arterial pressure, due to depression of the vaso-motor centers; that the drug enhances the work of the heart, and that it does not influence the pneumogastric nerves. While I agree with these results, I question the action of alcohol upon the vaso-motor system. In fact, in curarized animals not very accurate results can be obtained through the action of any drug, the effects being vitiated by an influence of the curare itself. This agent is mainly given to set aside whatever influence respiration may have upon the blood-pressure, and since curare itself exercises an influence on the nervous mechanism of circulation, under such circumstances, the action of other drugs can not be entirely relied upon. In other words, the action of a drug in curarized animals can not be said to be exerted upon this or that part of the nervous mechanism which controls the circulatory system. But I will discuss the matter later.

In the sphygmographic studies made by Parkes and Wallowickz[3] on healthy men, it was found that the pulse was increased in both force and rapidity; but no distinct indications of increased blood pressure were seen. Zimmerberg[4] states that alcohol reduces both the rate and force of the pulse, and that after division of the pneumogastrics the force and rapidity remain the same, but the arterial pressure is diminished. This author, however, employed toxic doses, his experiments being made on the lower animals. Dogiel,[4] who used small quantities, has observed at first an increase of cardiac rate, followed by a decrease of the same. The pressure was also raised from the beginning, and then diminished, accompanied during this stage by a secondary increase of the pulse-rate. The investigator further noticed that under this latter condition the vaso-motor centers were paralyzed, since they did not respond to stimulation. He believes that the accelerator fibers (?) are stimulated. The author does not, unfortunately, detail his experiments, and, therefore, his studies are unsatisfactory.

Castillo[5] obtained similar results in the experiments performed on frogs and rabbits. In these latter animals he found small doses of alcohol to produce a marked

[1] *Loc. cit.*

[2] Zeits. f. Klinish. Med., B 21, p. 153, 1892.

[3] Effects of Alcohol on the Human Body.

[4] Quoted by Wood in his Therapeutics.

[5] Philadelphia Medical Times, Vol. XI, October, 1880.

increase of the arterial pressure, followed by a distinct fall, especially when the dose of the medicament was augmented. The pulse was likewise increased in both rate and force. These phenomena were not prevented by previous section of the vagi, of the accelerator nerves, or of the spinal cord. The author, therefore, concluded that the changes described were due to a direct action of alcohol upon the cardiac viscus. These statements appear to be further corroborated by the results of his experiments made upon the isolated heart of the batrachian.

Martin,[1] from the results of an extended series of experiments, arrives at conclusions almost diametrically opposed to those of the investigators above referred to. His research was carried with a view to ascertain especially the action of alcohol upon the heart of the dog. He isolated the organ by a quite complicated method, invented by himself. The experimenter used different strengths of alcohol, and found that blood containing one-eighth per cent of the drug by volume had no immediate action on the isolated heart; that blood containing one-fourth per cent diminished within one minute the work done by the heart; and that blood containing one-half per cent of alcohol always diminished the work of the heart at once. It was observed that if the pericardium be cut away, this procedure prevented the action of even one-half per cent of alcohol. The author ventures to explain this phenomenon by stating that alcohol so relaxes the cardiac muscle that there is no room in the pericardium for a full diastole, the relaxed heart being, even in its systole, about sufficiently large to fill the pericardium.

Hemmeter[2] (1), employing Martin's method of experimentation, has obtained similar results. He found that the work of the isolated heart of the mammalian is distinctly lessened by alcohol. The results obtained by these two investigators can not be satisfactorily explained. Hemmeter suggests that they may be due to alteration produced by the alcohol in the defibrinated blood, but certainly this does not suffice, and I, for the present, entirely agree with Wood, who states that "certainly the procedures are attended by so much shock as to seriously affect, and probably paralyze, the cardiac nerve-centres. Whatever the explanation may be, it is evident that the action of the alcohol upon the isolated heart is very different from what it is in the normal dog or man, since Hemmeter has shown that, during these experiments, under the influence of the alcohol, intracardiac regugitant murmurs are developed and hemorrhages occur into the cardiac tissue."

The more recent studies of Eagleton[3] do not confirm the results of Martin and Hemmeter. Eagleton, by a continuous injection of alcohol into the circulation, found that small doses, frequently repeated, increased both cardiac force and arterial pressure; that large amounts at first increased, then diminished, blood-pressure, followed by a rise to the normal height, and, finally, by a progressive fall of pressure until the occurrence of death; that at the same time, the frequency of the heart's beat is at first decreased, though there is sometimes a primary increase; that the pulse then partly returns to the normal rate, and is subsequently decreased. He also found that strong alcohol in minute quantities generally increased the cardiac force and the pulse-rate. On the other hand, large amounts of alcohol decreased at once the rate and the force of the cardiac beat, accompanied by a diminution of the blood-pressure. These phenomena were the result of a direct action of the drug upon the heart, since they were observed similarly after the organ had been previously isolated from all nervous connection. Therefore, the author concluded that alcohol, in small doses, is a cardiac stimulant; in large amounts, a cardiac depressant.

Eagleton, then, agrees with the observations of most previous experimenters, with the exception of Mrtin and Hemmeter, and his results sustain the common clinical belief that small amounts of alcohol increase the force of the circulation.

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[1] Maryland Medical Journal, p. 289, September, 1883.

[2] Johns Hopkins Univ. Stud. Biol. Labor., p. 225, Novem., 1889.

[3] University Medical Magazine, September, 1890.

Miessner,[1] who experimented on mice and rabbits with allylic alcohol, has shown that this substance produces violent irritation of the mucous membranes, accompanied with great dilatation of the blood vessels and consequent lowering of the arterial pressure. In his experiments death was caused by allylic alcohol, through respiratory failure, preceded by dyspnoea and convulsions. Narcosis, however, was not produced by this agent.

An interesting preliminary study of the actions of the alcohols belonging to the ethyl and aromatic series has been published by Gibbs and Reichert.[2] The authors examined propylic, iso-propylic, butylic, iso-butylic, heptylic, octylic, allylic, benzylic, and cuminic alcohols. The results of their experiments upon animals, show that the actions of these various substances are essentially of the same character, though differing in degree. Ethylic alcohol, which may be taken as a type of the ethyl series, was carefully studied and its actions on the circulation and the respiration are thus summarized: Small doses increase the frequency and force of the cardiac beat, increase the arterial pressure, and increase the respiratory movements; large doses generally decrease, but sometimes increase the pulse-rate, primarily increase and then lower the arterial pressure, and increase the respirations; very large doses depress pulse, pressure and respiration. The changes in the heart-beat are due to direct actions on the heart, the increase of pressure is also due to a direct action on the heart. The decrease of pressure is due to a depression of both the heart and vaso-motor apparatus. The primary increase and final decrease in the respiratory-rate are due to a stimulation and subsequent depression of the respiratory centers. The authors are led to believe that the actions of the other alcohols examined are identical with those of ethylic alcohol, the differences being essentially in degree, and increasing with the acquisition of each radicle; in other words, the higher the alcohol in the series the greater its toxic power. The actions of the benzylic and cuminic alcohols, which belong to the aromatic series are apparently the same as those of the others.

The results obtained by Gibbs and Reichert are, generally, in accord with those noted by previous investigators, and with my own, as will be observed presently.

It must be admitted that many observers have seen depressant effects caused by alcohol even when ingested in small quantities. It will be sufficient for me to mention the names of Lauder Brunton, Hammond, Hervier, and Saint Layer, Fife, Lehman, Perrin, Richardson, Smith, and Vierordt, the work of all of whom has been examined and reviewed by MacDowel Cosgrave.[3] In all these studies it is stated that alcohol produces from the first a narcotic rather than a stimulating effect.

The statements made by these latter high authorities deserve, certainly, the most serious consideration; yet I believe that the scale of experimental evidence is inclined towards a stimulation, rather than a narcosis produced by alcohol, especially when moderate amounts of the drug are carefully used.

I will now examine the results of my own experiments, studying the effects of alcohol on the pulse, both of the isolated heart of the frog and that of the dog, and upon the blood-pressure, *seriatim*. The warm-blooded animals used by me in the experiments to be presently described were exclusively dogs.

On the heart; the pulse.—I prepared different solutions of alcohol of the strength of 0.5, 1 and 2 per cent respectively. In these solutions I would place the isolated hearts of frogs and compare their activity with that of others placed in simple solutions of chloride of sodium. For example, two hearts were put first in the salt solution, and their beats counted. One of the hearts was then taken out carefully and placed in the alcoholic solution, alongside of the other and their beating carefully observed. I will detail the following experiments:

[1] Berl Klin. Wochens No. 33, and Edinburgh Med. Journal, November, 1890.

[2] American Chemical Journal, No. 6, Vol. XIII, 1891.

[3] Dublin Journal of Medical Sciences, September, 1891.

EXPERIMENT VI.

[In this experiment the hearts were beating at the rate of 48 per minute.]

Alcoholic solution, 0·5 per cent.		Chloride of sodium, normal.	
Time.	Pulse.	Time.	Pulse.
10:30	58	10:31	48
10:32	60	10:33	48
10:35	64	10:36	48
10:37	62	10:38	46
10:45	60	10:46	44
10:50	50	10:51	43
11:00	48	11:01	40
11:10	22	11:15	38
11:30	14	11:32	36
11:36	8	11:38	26
11:40	Heart stopped in diastole.	11:40	24
		11:50	8
		11:58	Heart stopped.

EXPERIMENT VII.

[The hearts were beating in the salt solution at the rate of 52 per minute.]

Alcoholic solution, 1 per cent.		Chloride of sodium, normal.	
Time.	Pulse.	Time.	Pulse.
11:15	60	11:17	52
11:20	60	11:21	52
11:25	58	11:27	50
11:35	48	11:41	40
11:45	42	11:47	36
11:50	20	11:53	38
11:55	22	11:58	36
12:00	10	12:02	32
12:05	4	12:09	30
12:08	Heart arrested in diastole.	12:11	28
		12:16	26
		12:20	12
		12:30	4
		12:35	2
		12:43	Heart ceased.

EXPERIMENT VIII.

Alcohol solution, 2 per cent.		Chloride of sodium, normal.	
Time.	Pulse.	Time.	Pulse.
12:20	56	12:22	58
12:24	58	12:26	58
12:29	50	12:32	56
12:33	48	12:38	56
12:40	40	12:42	52
12:45	30	12:47	52
12:50	15	12:52	52
12:58	4	1:00	48
1:03	Stopped.	1:10	36
		1:25	20
		1:35	8
		1:46	Arrested.

In Experiment VI the pulse was increased 10 beats above the normal, within a short time, and thus continued, with slight variations, for a period of 25 minutes; the pulse then returned to normal, and was afterwards decreased gradually until the heart was finally arrested in diastole.

The same results, although to a less marked degree, were observed when 1 and 2 per cent solutions of alcohol were used, as in Experiments VII and VIII. In these an increase of 18 and 12 beats per minute, respectively, was also noticed, lasting for about 20 minutes. The pulse, then, gradually began to decrease until its final cessation, this occurring in about 38 minutes longer. In both experiments the heart continued to act in the salt solution for a longer time (from 18 to 35 minutes), but at no time was there an action above the normal produced.

A very dilute solution of alcohol, say 0.1 per cent, has no perceptible action upon the pulse, as is shown in the following experimental record

EXPERIMENT IX.

Alcoholic solution, 0·1 per cent.		Chloride of sodium, normal.	
Time.	Pulse.	Time.	Pulse.
10:40	62	10:42	66
10:45	60	10:47	66
10:50	58	10:52	64
10:55	52	10:57	60
11:05	40	11:06	58
11:15	32	11:18	50
11:20	8	11:25	16
11:28	Stopped.	11:30	16
		11:35	12
		11:45	Stopped.

It is thus observed that, although very dilute alcohol does not apparently influence the action of the heart of the frog, small amounts of the drug do increase the rapidity of the cardiac beat, this phenomenon being eventually followed by a depressant effect if the action of the drug be continued. Large doses diminish from the first the pulse rate.

The same effects, that is, those of stimulation by small doses and of depression by large or toxic quantities, are observed in the heart of the dog. In these instances I have employed the drug in small repeated doses, given at short intervals, or in continued injection, following the method of Eagleton. The agent has been used in the strength varying from 20 to 25 per cent. In this manner coagulation of the blood was prevented to a very considerable extent.

In all these experiments the drug was injected into the general circulation, through the external jugular or femoral vein, while the carotid or femoral artery was connected with the recording kymograph.

The following normal experiments are appended:

EXPERIMENT NO. X.

[Dog; weight, 6.12 kilos.; normal.]

Time.	Dose.	Pressure.	Pulse per minute.	Respiration per minute.	Remarks.
m. s.	*c.c.*	*mm.*			
0 00	....	150	148	20	Alcohol, 25 per cent used.
30	10	150	148	20	Injection begun.
1 00	....	168	164	18	Injection ended.
45	....	168	160	18	
53	....	165	166	18	
2 00	....	162	166	18	
30	15	158	152	18	Injection begun.
50	....	160	160	15	Injection ended.
3 20	....	166	162	18	
50	....	162	158	12	Eye reflexes still good.
5 10	....	150	152	16	
40	20	....	....	....	Injection begun.
6 00	....	154	162	18	Injection ended.
8 00	....	158	170	18	
13 00	....	152	166	12	
16 00	....	142	142	14	Dog whines.
20 00	....	150	146	16	Dog struggles.
22 30	....	142	132	12	Quiet again.
25 00	....	125	114	10	Respiration shallow.
32 00	....	118	148	12	
40 00	....	98	86	8	Animal was eventually killed with chloroform.

EXPERIMENT NO. XI.

Dog; weight, 8.16 kilos; normal.

0 00	....	175	140	20	Alcohol, 25 per cent used.
1 30	20	175	142	20	Injection begun.
2 00	....	180	150	20	Injection ended.
45	....	180	152	20	
3 30	....	180	160	18	
4 30	....	182	160	18	
9 30	25	180	158	16	Injection begun.
10 00	....	182	162	18	Injection ended.
12 30	....	188	....	16	Dog whines and struggles.
13 30	....	182	154	18	Animal quiet again.
18 30	....	160	138	16	Eye reflexes gone; respiration shallow.
20 00	30	162	142	12	Injection begun.
30	....	158	132	12	Injection ended.
23 45	....	140	112	16	
28 45	....	112	98	20	Dog snores.
33 00	....	96	82	8	Hind legs rigid; snores deeply.
35 00	....	....	....	....	Clot for 8 minutes.
48 00	....	72	68	22	Respiration quite shallow.
50 00	....	65	52	26	Respiration very shallow.
58 00	....	80	112	16	Killed with chloroform.

EXPERIMENT NO. XII.

[Dog; weight, 9.9. kilos; normal.]

0 00	....	160	148	16	Pure alcohol employed.
1 45	2	160	148	16	Injection begun.
2 00	....	165	156	20	Injection ended.
3 30	....	170	162	18	
5 45	....	172	168	22	Dog whines and struggles.
8 30	....	168	152	26	Respiration shallow.
10 30	5	162	152	24	Injection begun.
11 00	....	172	166	20	Injection ended.
30	....	178	180	22	Eye reflexes weak.
15 00	....	162	148	18	
18 30	....	152	128	18	Dog whines; eye reflexes gone.
22 30	....	146	112	20	
28 30	10	142	116	18	Injection begun.
29 00	....	120	80	12	Injection ended; dog struggles.
31 00	....	130	118	18	
35 00	....	128	120	18	Breathing shallow.
40 00	....	116	82	26	Breathing very shallow; almost imperceptible.
42 00	....	82	132	26	Pulse small.
45 00	....	....	....	....	Dog died suddenly; respiration and heart ceased simultaneously.

EXPERIMENT NO. XIII.

[Dog; weight, 8.3 kilos; normal.]

Time.	Dose.	Pressure.	Pulse per minute.	Respiration per minute.	Remarks.
m. s.	*c. c*	*mm.*			
0 00	....	132	140	24	Alcohol. 20 per cent used. Continuous injection employed. Vagi prepared.
2 00	....	132	140	24	Injection begun.
5 00	....	138	152	22	
8 00	....	142	158	24	
10 00	....	138	166	18	Has had 50 c. c.
12 45	....	128	142	16	
15 00	....	122	142	18	
20 00	....	128	132	18	Has received 155 c. c.
22 30	....	....	....	....	Clot for 5 minutes.
28 45	....	130	138	26	Injection begun anew.
32 30	....	124	112	16	Eye reflexes weak; respiration labored.
37 00	....	122	128	12	Has had 235 c. c.
39 45	....	126	136	18	Applied electrical current to vagi; heart inhibited immediately.
40 00	....	52	....	....	
41 00	....	108	....	38	
52 00	....	112	124	12	Has had 320 c. c.; snores deeply.
55 00	....	82	96	8	Respiration labored; muscular rigidity of extremities; eye reflexes gone.
58 00	....	....	....	....	Died from respiratory failure.

EXPERIMENT NO. XIV.

[Dog; weight 8.9 kilos; normal.]

0 00	....	138	182	32	Alcohol 25 per cent used. Continuous injection employed. Crural and sciatic nerves prepared.
1 00	....	138	184	32	Injection begun.
3 20	....	142	192	28	
5 30	....	144	198	24	
8 45	....	128	178	24	Has had 140 c.c.
9 30	....	118	168	22	
13 30	....	122	170	16	Has received 225 c. c.
15 00	....	....	....	....	Clot for 6 minutes.
22 00	....	....	166	28	Dog snores; eye reflexes absent.
25 30	....	118	168	18	Has had 260 c. c.
28 00	....	118	162	16	Stimulated crural nerve with electrical current; blood pressure 122.
32 00	....	118	158	14	Muscular rigidity; respiration difficult; alcohol stopped. Had received 325 c. c.
38 00	....	98	112	14	Strong electrical current to sciatic nerve, blood pressure 106.
46 00	....	....	....	....	Animal died from failure of the respiration. Heart ceased in diastole.

EXPERIMENT NO. XV.

[Dog; weight, 5.12 kilos; normal.]

0 00	....	138	170	38	Pure alcohol used.
1 30	1	138	170	38	Injection begun.
2 30	....	142	178	30	Injection ended.
4 00	....	142	178	32	Struggles and whines.
7 30	....	158	182	32	
19 45	2	148	170	28	Injection begun.
11 00	....	150	172	28	Injection ended.
15 30	....	140	168	14	Eye reflexes weak.
17 00	....	140	162	16	
25 40	3	138	158	14	Injection begun.
26 00	....	130	114	....	Injection ended.
27 45	....	120	100	14	Eye reflexes gone; respiration difficult.
31 20	....	120	102	12	Produced asphyxia by closing trachea tightly.
33 30	....	140	98	....	
35 00	....	142	82	....	
38 00	....	....	....	....	Dog killed with chloroform.

EXPERIMENT NO. XV*a*.

[Dog; weight, 9.5 kilos; normal.]

Time.		Dose.	Pressure.	Pulse per minute.	Respirations per minute.	Remarks.
m.	*s.*	*cc.*	*mm.*			
0	00	....	115	162	22	Pure alcohol used.
1	30	10	145	162	22	Injection begun.
2	00	....	140	162	18	Injection ended.
2	45	....	132	150	18	
3	30	15	128	140	20	Injection begun.
4	00	....	126	138	18	Injection ended.
5	30	....	98	102	12	
7	00	....	80	....	....	Struggles.
8	30	....	68	92	6	Alcoholized; reflexes almost gone.
9	00	....	52	80	6	Clot for five minutes.
15	00	....	40	68	4	Respiration slow and shallow.
22	00	....	28	52	4	Pulse weak.
23	30	....	22	50	....	Pressure going down very fast.
24	45	....	....	....	....	Died from respiratory failure.

It is thus seen from the foregoing experiments that small doses of alcohol increase the rapidity of the pulse. This increase is usually accompanied by a corresponding rise of the arterial pressure. If during the experiment an electrical current is applied to the central or peripheral end of a cut vagus, inhibition of the heart is immediately produced (see Experiment XIII), a fact of great significant importance.

I shall now proceed to study how this rapidity of the pulse is brought about. As in the case of normal animals, in curarized dogs small doses of alcohol, ingested at short intervals, cause an increase in cardiac rate. In larger amounts, however, there is sometimes an increase, followed by a decrease, sometimes a diminution from the onset followed by an increase and then by a decrease; while in either instance the blood pressure is elevated, sometimes remains unaltered, or falls if the dose of the agent be sufficiently toxic.

I find that the same stimulating effect upon the cardiac beat is caused by small doses of alcohol, when the pneumogastric nerves have been previously divided, and similarly when the cardiac visous has been isolated from all nervous connection by previous section of both vagi and the spinal cord.

An examination of the following records sustains these statements:

EXPERIMENT NO. XVI.

[Dog; weight, 6.8 kilos; curarized.]

Time.		Dose.	Pressure.	Pulse per minute.	Respirations per minute.	Remarks.
m.	*s.*	*cc.*	*mm.*			
0	00	....	128	120	....	Pure alcohol used; artificial respiration employed.
10	00	1	126	122	....	Injection begun.
	30	....	128	120	....	Injection ended.
12	00	....	134	132	....	
18	30	....	138	136	....	
22	45	....	136	138	....	
23	00	....	132	128	....	
26	40	....	132	128	....	
29	00	1	132	128	....	Injection begun.
29	30	....	132	126	....	Injection ended.
32	00	....	134	134	....	
34	00	....	128	128	....	
42	00	....	120	126	....	
44	30	....	112	118	....	
46	00	....	112	142	....	Pulse very small.
52	00	....	....	....	....	Killed with chloroform.

EXPERIMENT NO. XVII.

[Dog; weight, 8.3 kilos.; curarized.]

Time.	Dose.	Pressure.	Pulse per minute.	Respirations per minute.	Remarks.
m. s.	*cc.*	*mm.*			
0 00	....	142	165	....	Alcohol pure employed; artificial respiration.
8 30	2	142	168	....	Injection begun.
9 00	....	142	172	....	Injection ended.
11 30	....	144	152	....	
13 45	....	142	176	....	
15 00	....	146	178	....	
16 00	3	138	158	....	Injection begun.
16 30	....	130	158	....	Injection ended.
18 30	....	138	162	....	
21 00	....	136	178	....	
24 00	....	134	170	....	
29 00	....	130	168	....	
32 00	....	130	150	....	
35 45	....	132	144	....	
40 30	....	128	146	....	

EXPERIMENT No. XVIII.

[Dog: weight, 12 kilos; vagi cut; tube in trachea. Pure alcohol used.]

0 00	....	188	192	12	
15 00	2	186	192	10	Injection begun.
15 30	....	192	194	10	Injection ended.
16 45	....	194	198	....	Struggles.
18 00	....	200	196	8	Respiration weak.
22 00	....	196	192	8	
25 00	....	192	192	6	
28 30	2	192	180	6	Injection begun.
29 00	....	180	186	....	Injection ended.
32 00	....	176	178	6	Respiration very shallow; eye reflexes weak.
36 30	....	168	178	6	
44 00	....	172	182	6	
50 00	....	168	182	6	
58 00	....	162	182	6	Killed with chloroform.

EXPERIMENT No. XIX.

[Dog; weight, 8 kilos; vagi cut; tube in trachea. Alcohol 25 per cent used. Continuous injection employed.]

0 00	....	216	182	8	
10 00	....	216	182	8	Injection started.
11 20	....	218	184	8	
13 00	....	210	180	10	Struggles.
16 00	....	200	176	8	Has had 50 c.c.
18 00	....	190	176	6	
23 30	....	182	168	6	Pulse-waves large.
29 00	....	168	138	4	Has received 120 c.c.
32 00	....	....	....	....	Clot for 5 minutes.
38 00	....	152	140	4	Started injection again.
39 45	....	140	128	....	Muscular rigidity; eye reflexes gone.
48 00	....	66	132	4	Has had 150 c.c. Stopped injection.
53 00	....	52	....	4	
55 00	....	40	118	....	Stopped breathing.
58 00	....	40	....	....	
59 00	....	....	....	....	Heart ceased in diastole.

EXPERIMENT No. XX.

[Dog; weight, 13.5 kilos; cord and vagi cut; cut cord between third and fourth cervical vertebræ; artificial respiration. Pure alcohol used.]

Time.	Dose.	Pressure.	Pulse per minute.	Respirations per minute.	Remarks.
m. *s.*	*cc.*	*mm.*			
0 00	....	88	178	....	
5 30	2	86	178	....	Injection begun.
6 00	....	88	182	....	Injection ended.
7 15	....	92	188	....	
9 30	....	102	186	....	
12 15	....	98	180	....	
15 00	2	98	180	....	Injection begun.
15 30	....	96	170	....	Injection ended.
18 00	....	82	158	....	Pulse waves large.
22 00	....	90	160	....	
25 00	2	78	148	....	Injection begun.
25 30	....	74	140	....	Injection ended.
28 00	....	48	98	....	
32 30	....	40	90	....	
35 00	....	42	98	....	
39 45	....	30	82	....	Killed with ether.

EXPERIMENT NO. XXI.

[Dog; weight, 22 kilos; vagi and cord severed; cord cut between fourth and fifth cervical vertebrae; artificial respiration. Alcohol 25 per cent employed. Continued injection.]

Time.	Dose.	Pressure.	Pulse per minute.	Respirations per minute.	Remarks.
0 00	....	102	206	....	Injection begun.
4 30	....	102	204	....	
6 45	....	112	224	....	
8 00	....	114	260	....	Has had 30 c.c.
12 30	....	98	198	....	
16 00	....	68	206	....	
28 00	....	52	206	....	
30 00	....	52	....	....	Pulse irregular; has received 250 c.c. Stopped alcohol.
40 00	....	40	172	....	Pulse-waves large.
46 00	....	30	98	....	
48 00	....	30	98	....	
50 00	....	28	80	....	
52 00	....	....	....	....	Animal died.

A careful examination of all these experiments shows that there are no marked changes in the pulse-rate in connection with the variations of the blood-pressure, except those due to a direct cardiac action. Again, granted that the blood-vessels themselves are dilated, as asserted by Miessner[1] and suggested by Mohilansky[2] there is, indeed, no positive proof or evidence that the central vasomotor nervous system is influenced by alcohol. Moreover, the results obtained in the experiments performed on the isolated hearts of frogs, point to one and the same conclusion.

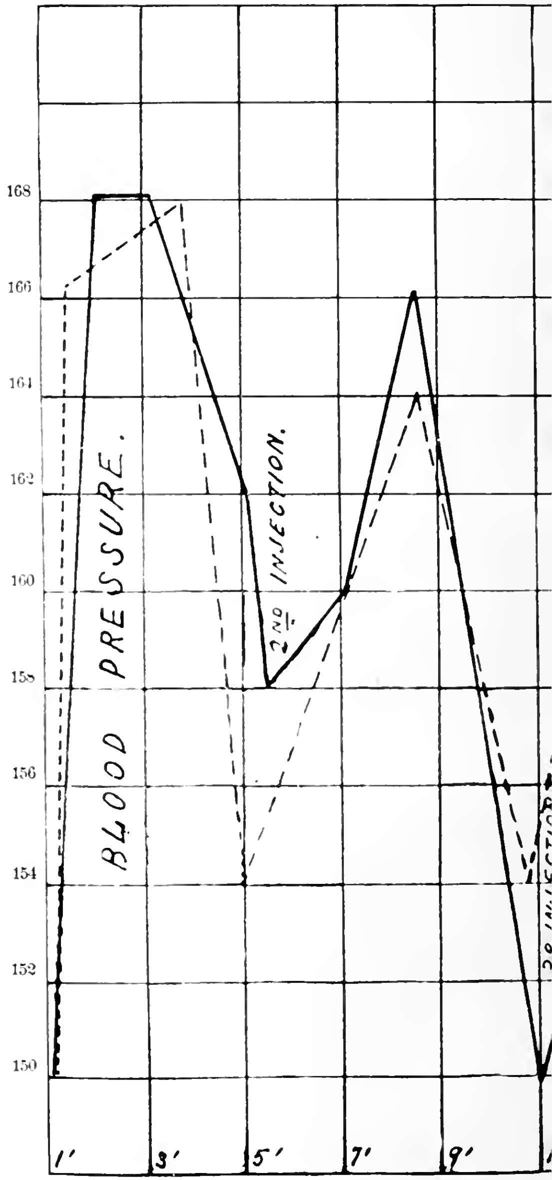
Alcohol, then, in small amounts, causes an increase in the pulserate, not by influencing the cardio-inhibitory apparatus or the vaso-motor system, but mainly by a direct action of the drug upon the heart. These results confirm those obtained especially by Castillo and Eagleton.

Large quantities of alcohol, on the other hand, exercise from the first a depressant effect on the rate of the pulse, this phenomenon continuing till the occurrence of death; and it is safe to infer that such an effect is similarly the result of a direct cardiac action. (See Experiment XV*a*.)

On the Blood-pressure.—Following the injection of a small quantity of alcohol, in the normal animal, as is observed in the preceding experiments, there occurs within a short time a sufficiently marked rise of the column of mercury in the manometer.

[1] *Loc. cit.*

[2] Medical Chronicle, November, 1889.



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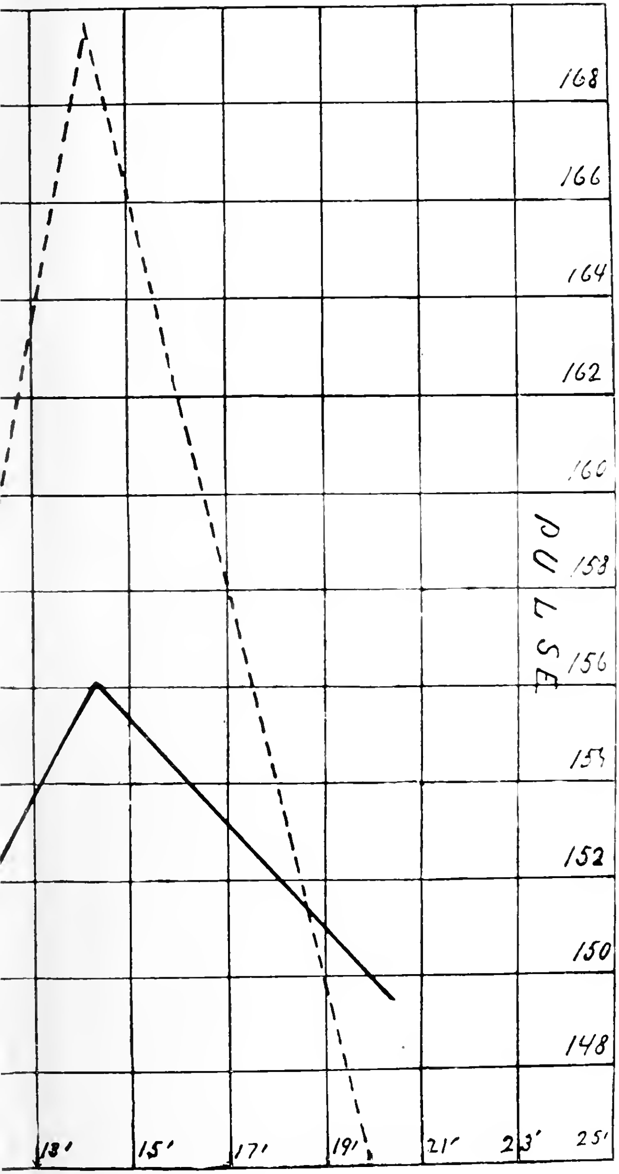
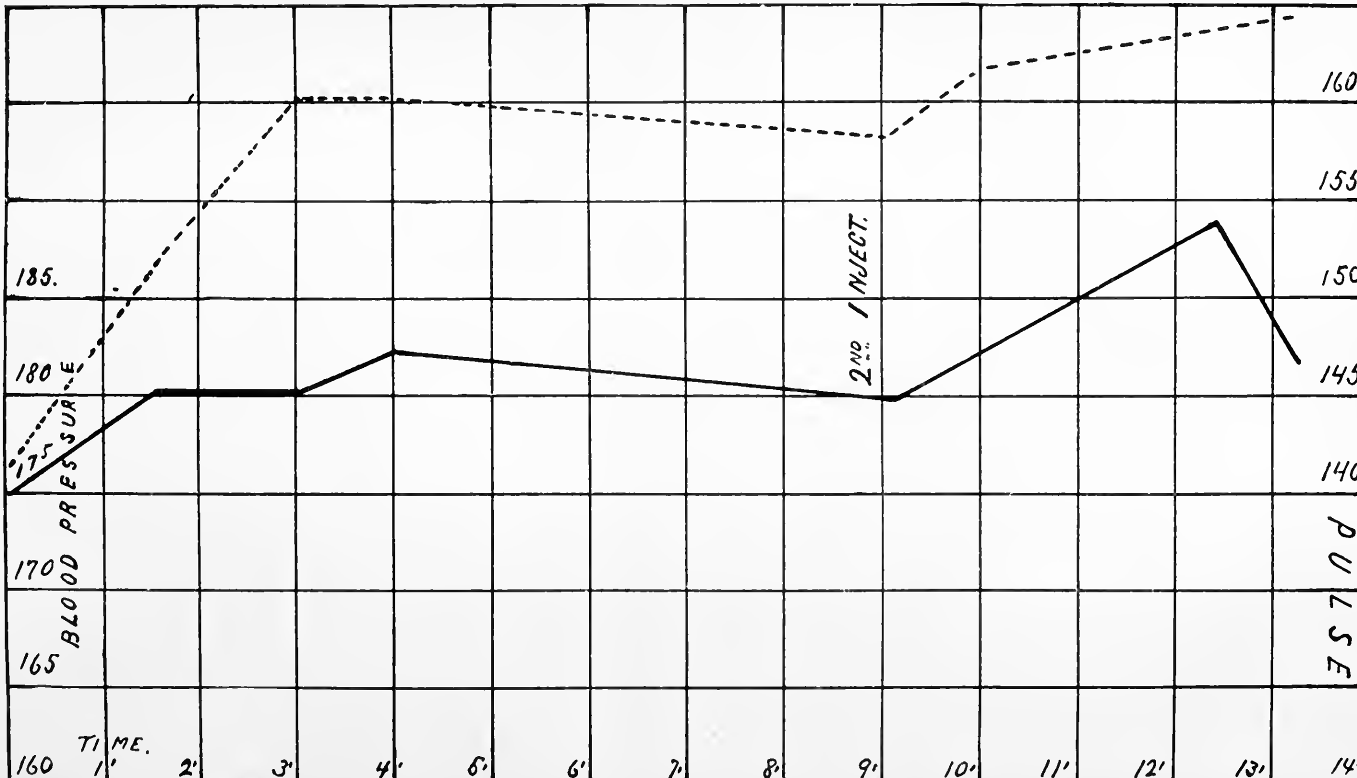
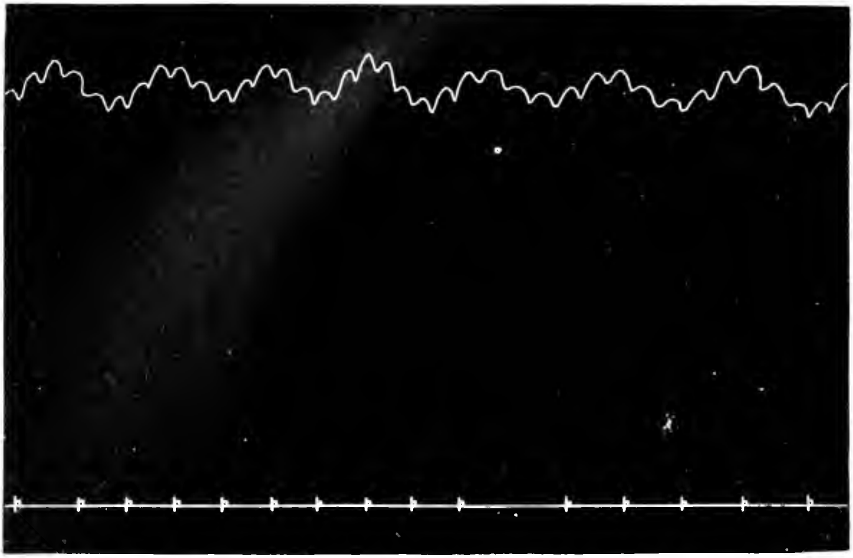


—EXPERIMENT X.
= Blood pressure.
= Pulse.



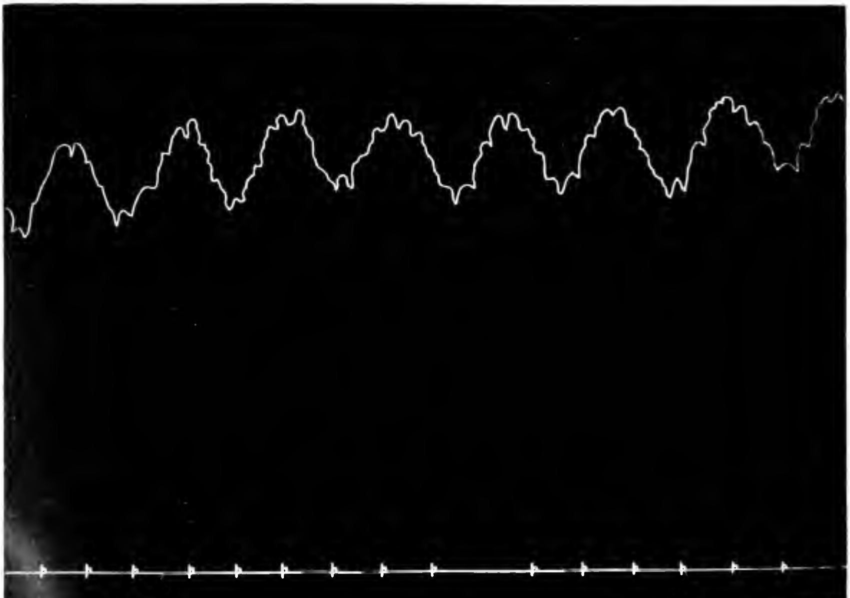
ALCOHOL—EXPERIMENT XI.

Tracing A



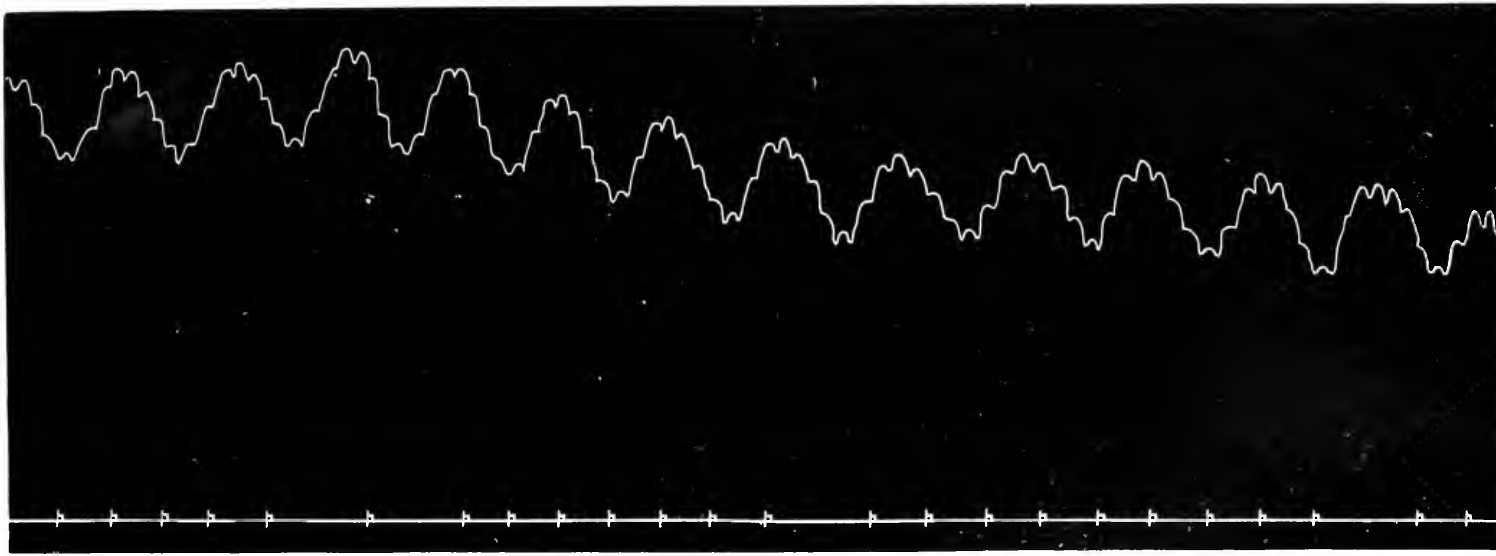
Aconite[illegible]. Tracing [illegible] a dog weighing [illegible] kilos. Injected [illegible] of the pure drug

Tracing A. [illegible]



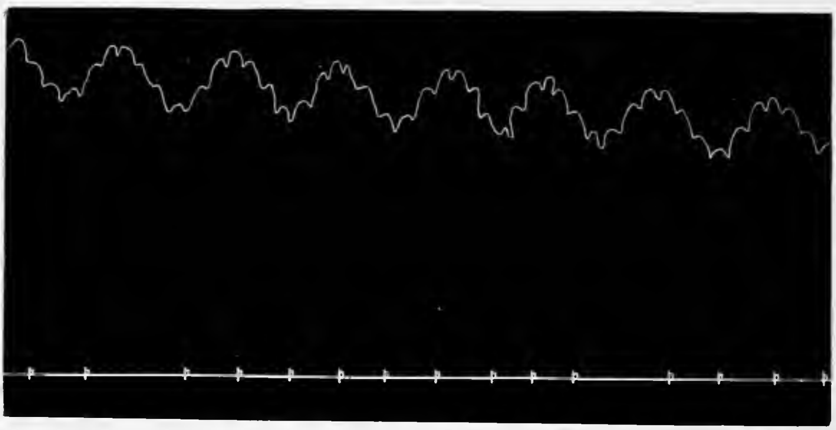
The same, ten minutes afterwards

TRACING A. C[illegible]



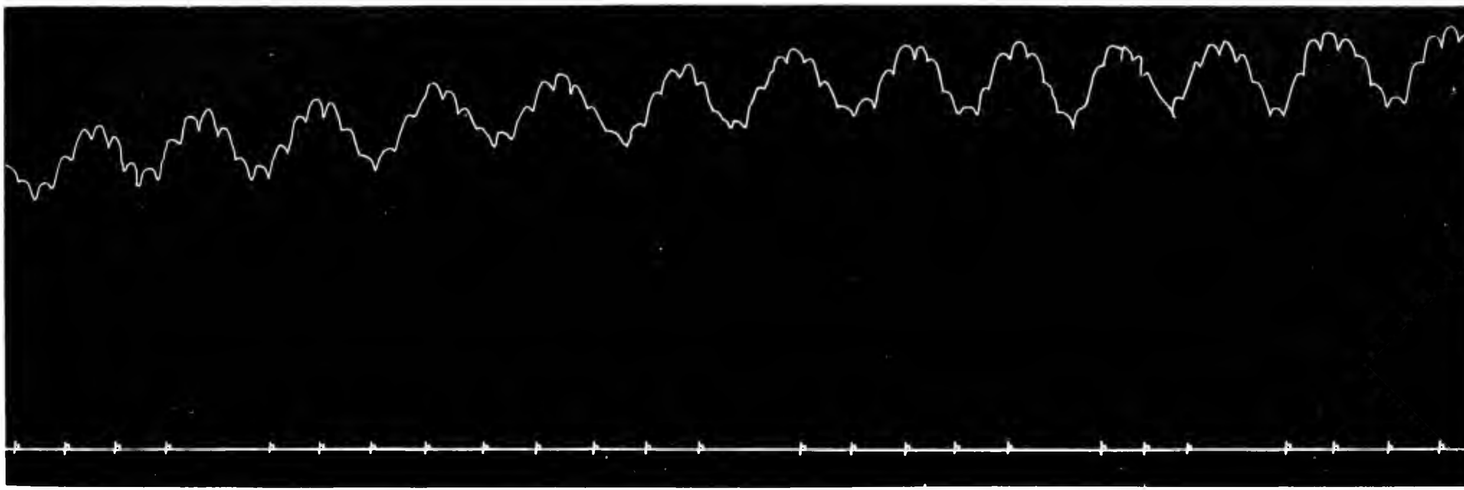
The same, fifteen minutes afterwards. Gave then 2 cc. more of pure alcohol, the injection being followed immediately by a decrease of the blood pressure; this decrease, however, was soon recovered from.

TRACING A 2



ALCOHOL.—Tracing of a young dog that had bled quite freely. Injected 1 cc. of drug.

Tracing A 2. Concluded.



The same, two and a half minutes afterwards.

After a while the pressure returns to its normal height, and again rises if a second dose is given, to be once more decreased below the normal if the amount of the drug injested is carried beyond a certain limit. Thus in Experiment X, after the administration of 10 c. c. of a 25 per cent solution, a rise of 18 mm. occurred one minute and forty-five seconds afterwards, and in two and a half minutes more the pressure fell to 158 mm. (the normal being 154 mm). A second injection of 15 c. c. was followed by an increase of 16 mm. above the normal point within half a minute. A third injection of 20 c. c. caused a very slight rise, this lasting for about eight minutes, and then there was a gradual fall below the normal. The same results are noticed in Experiments XI and XII.

In experiment XIII a continuous injection was employed of a solution of the strength of 20 per cent. Three minutes after the injection had been started, the pressure rose to 138 mm. (the normal being 132 mm.), and to 142 mm. three minutes later. By the time that the animal had received 50 c. c. of the alcoholic solution (eight minutes after the beginning of the injection), the pressure marked 138 mm., still above the normal, but it soon afterwards began to diminish and was seen at 128 mm. by the time that 155 c. c. of the solution had been ingested into the animal. The pressure, with slight variations, and accompanied with disturbances of the reflexes and the respiration then fell gradually till the occurrence of death, this latter issue taking place through failure of the respiration.

Similar results were obtained in Experiment XIV. In this animal the normal pressure was 138 mm. There was a slight rise a few minutes after the commencement of the injection. By the time the dog had received about 260 c. c. the column of mercury marked 118 mm. The crural nerve which had been previously prepared, was then stimulated with an electrical current of medium strength, and a few seconds afterwards the pressure rose to 122 mm., showing evidently that the vasomotor system was intact. When 325 c. c. of the alcoholic solution had been ingested the pressure marked 98 mm. only. At this time the sciatic nerve, which had also been previously prepared, was irritated with a strong faradic current, and the column of mercury in the manometer was seen to rise to 106 mm. Ultimately the animal died from respiratory failure, having lived forty-six minutes under the influence of alcohol.

Experiment XV shows the same effects on arterial pressure. After 6 c. c. of pure alcohol had been administered, the column of mercury was reduced to 120 mm. (from 150 mm. to which it had been elevated, that is, 12 mm. above the normal). At this time artificial asphyxia was produced by tying the trachea tightly. Here again, under such circumstances, there was a decided response by the vasomotor system, as shown in the rise of pressure to 142 millimeters.

The effects of small doses of alcohol may also be seen in tracing A and in the accompanying plot.

I found likewise that in curarized animals, in which any influence exercised by the respiration on blood-pressure, is thus avoided, alcohol in small amounts, produces the same results, as may be observed in Experiments XVI and XVII.

Large doses of the drug cause from the onset a decided lowering of the arterial pressure, this decreasing steadily, if the amount of alcohol has been sufficiently poisonous, till the occurrence of death. (See Experiment XV*a*.) If the dose is moderately large its ingestion into the torrent of the circulation is followed by a decided fall, the result, no doubt, of an overwhelming action of the drug upon the heart. In these instances the pressure is apt to recover, but does not go beyond the normal height.

Let me study how these changes of blood-pressure under the influence of alcohol are brought about.

It has been shown by the most recent physiological researches that, when in an animal under the influence of a drug, the two curves (as registered on the revolving kymograph), one representing the rate of the pulse and the other the height of the blood pressure, run parallel, such an effect is the result of an action upon the heart; but if opposite to each other, the phenomenon is dependent upon a vasomotor influence. In other words, if the arterioles are made to contract, through a vasomotor stimulation or spasm, the blood pressure rises, but, at the same time, the increased blood pressure stimulates the cardio-inhibitory centers in the medulla oblongata. As a consequence of this latter phenomenon the rate of the pulse falls, and thus the curves of the pressure and the pulse run in opposite directions. When this takes place it is assumed that the change in the arterial pressure is due to vasomotor influence exercised on the arterioles.

Now, then, a plot taken from a kymographian record of an animal under the influence of alcohol in moderate amounts would, undoubtedly, show a parallel course of the curves, this alone giving evidence of a cardiac action. There is, however, further and perhaps more conclusive evidence of this action of the drug under consideration.

Faradization of a sensitive nerve and asphyxia, as observed in Experiments XIV and XV, are able to elevate the arterial pressure depressed by toxic quantities of alcohol, this result proving that the vasomotor system is intact. But the stimulation by small doses of the drug might as well be ascribed to an influence exercised on the vasomotor system, or to a paralysis of the cardio-inhibitory apparatus, as to a direct cardiac action. Yet, that such is not the case is shown by the results obtained in the third and fourth series of the experiments performed on dogs. In these experiments the cardio-inhibitory and the vasomotor influences were eliminated by previous section of both pneumogastric nerves in the first place and by previous division of both vagi and the spinal cord in the second instance. Post-mortem examination of these latter animals showed that the cord had been completely severed.

The results obtained in Experiments XVIII and XIX, and in XX and XXI are obvious. An examination of the corresponding tables, of tracing B and C and the accompanying plots, shows that alcohol, under such circumstances, is still able, when given in small quantities, to stimulate the arterial pressure and the pulse rate. Large doses of the drug, in all cases, produce from the onset effects of depression.

It must be concluded, then, from the foregoing experimental evidence, that alcohol in small amounts causes a rise of the arterial pressure by a direct action upon the heart; and that in large or toxic quantities it lowers the blood-pressure similarly through a cardiac influence. The question of the dilatation of the blood-vessels, as pointed out by Miessner and Mohilansky, must remain, for the present, *sub judice*.

On the Blood.—If alcohol is mixed with blood outside of the body coagulation is enhanced. I have often observed this in my experiments, not only in those made solely to study this phenomenon but also in those already sufficiently described. I found that coagulation of the blood could be largely prevented by diluting the alcohol before its ingestion into the torrent of the circulation. To what these effects were due was not determined. Microscopical examination of the blood of animals killed with alcohol, showed marked alterations of the corpuscles, many of these appearing shriveled and exhibiting a yellowish matter in their interior. This latter observation has been previously made by Schultz[1] and by Jaillet and Hayem.[2] Schmiedeberg[3] has noticed that alcohol mixed with blood diminishes the ability of this fluid to yield oxygen in the presence of a reducing agent. There is no doubt that alcohol in this action causes the separation of the hæmoglobin from the corpuscles.

ON THE RESPIRATION.

Small doses of alcohol do not markedly affect the rate of the respiratory movements, although sometimes the breathing is slightly increased. In large or toxic amounts the drug generally decreases the respiratory rate, accompanied by a diminution of the depth of the movements. As a rule the amount of air going through

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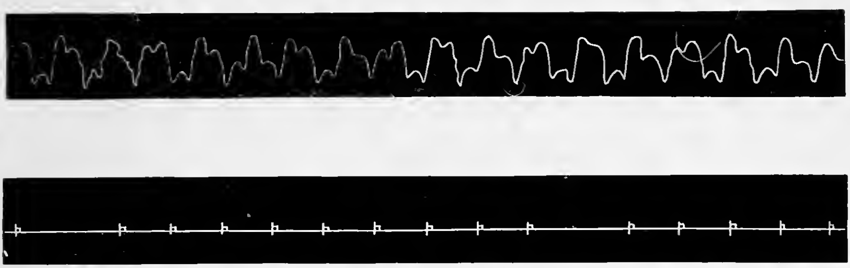
[1] Hufeland's Journ., April, 1841.

[2] Virchow and Hirsch, Jahrbucher, 1884.

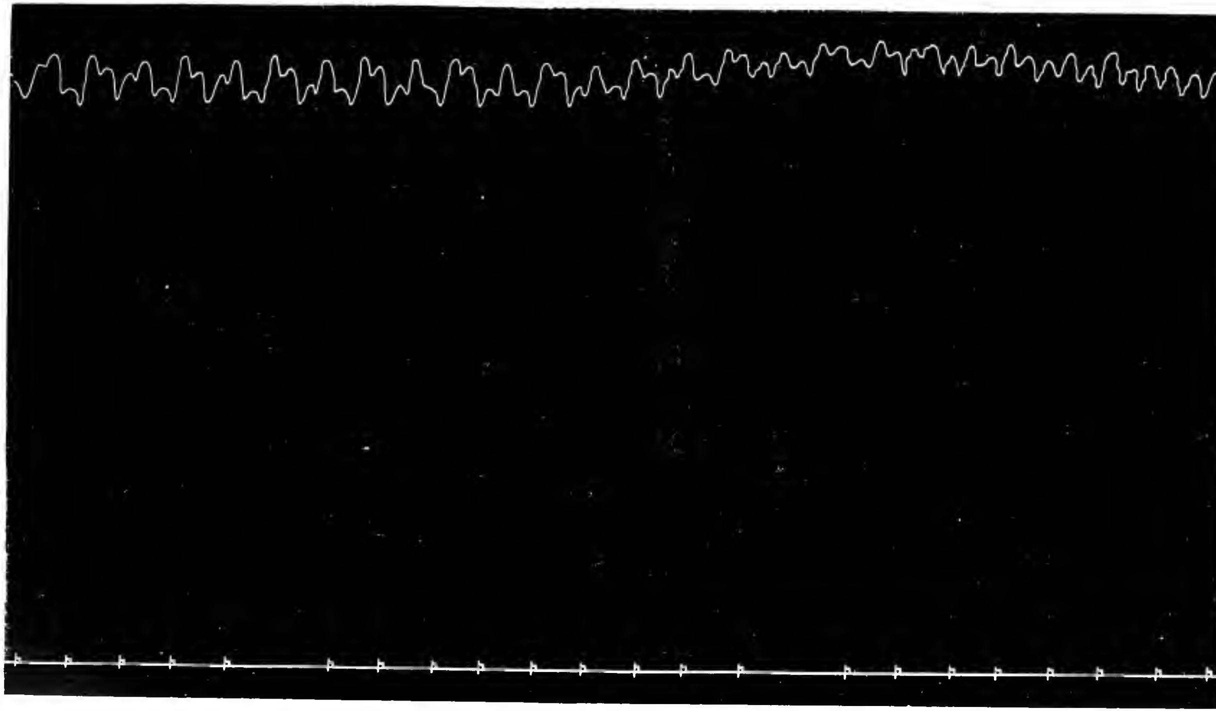
[3] Virchow's Archives, Vol. II, p. 171.

TRACING B.

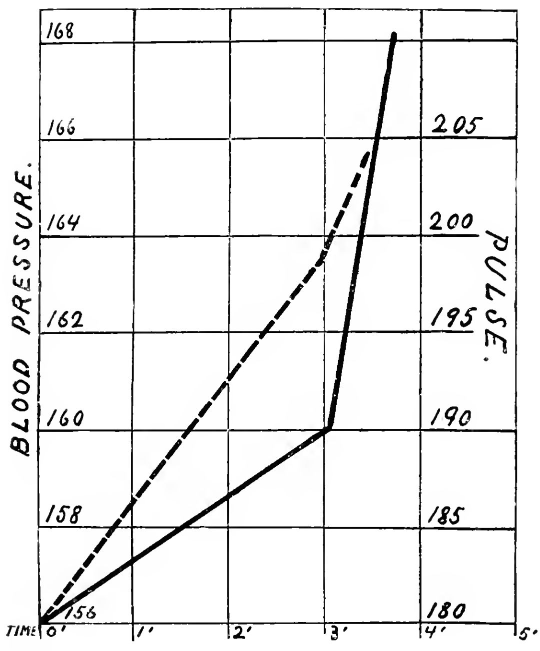


ALCOHOL.—Tracing of a dog with both vagi cut. Injected 1 cc. of drug

TRACING B.—Concluded.



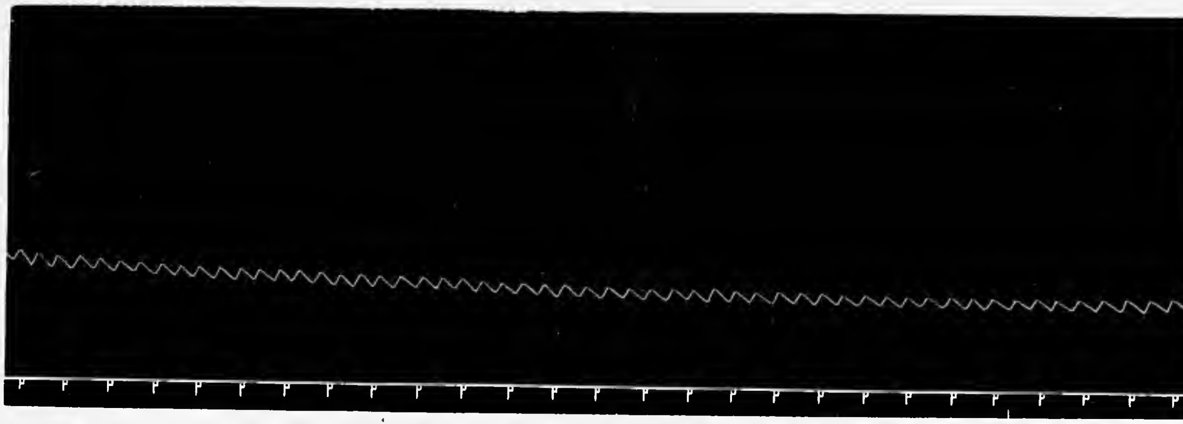
The same, three minutes afterwards.



PLOT OF TRACING B. (VAGI CUT.)

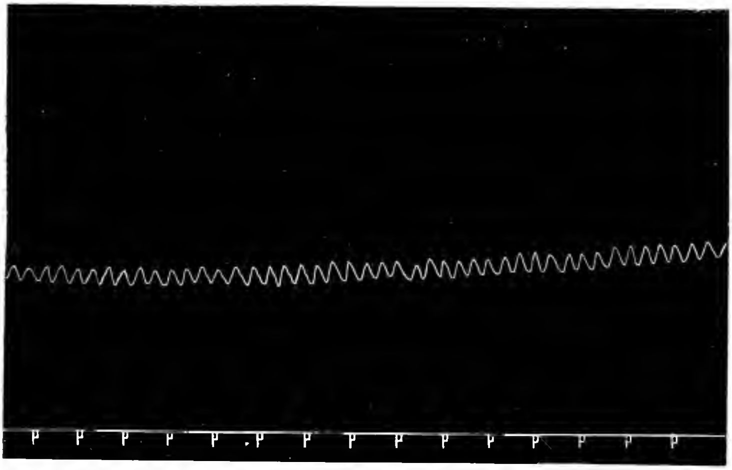
Black line = Pressure.
Broken line = Pulse

Tracing C.



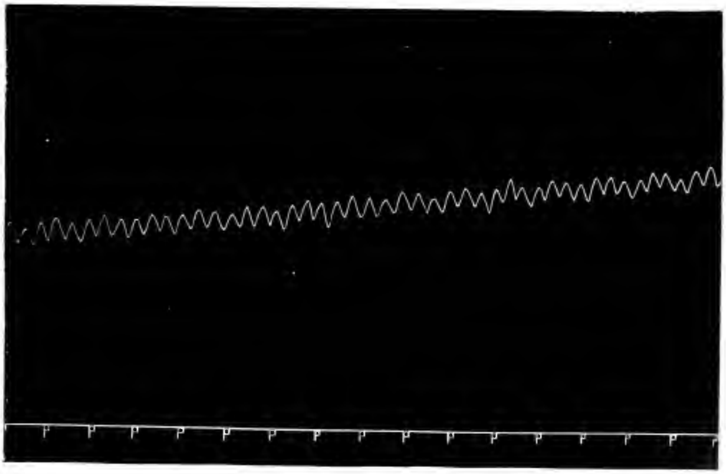
Alcohol.—Tracing of a dog with both vagi and spinal cord cut. Injected 2 cc. of drug.

TRACING C.—Continued.



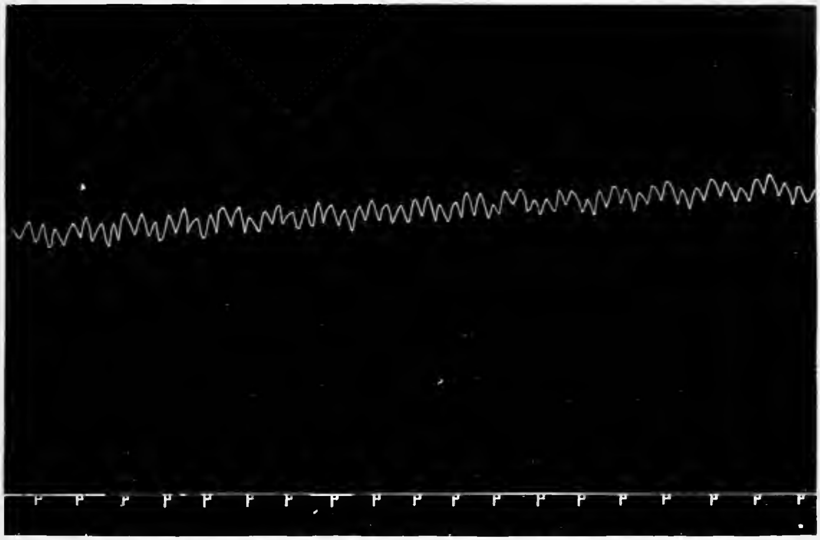
The same, two minutes afterwards.

TRACING C.—Continued.

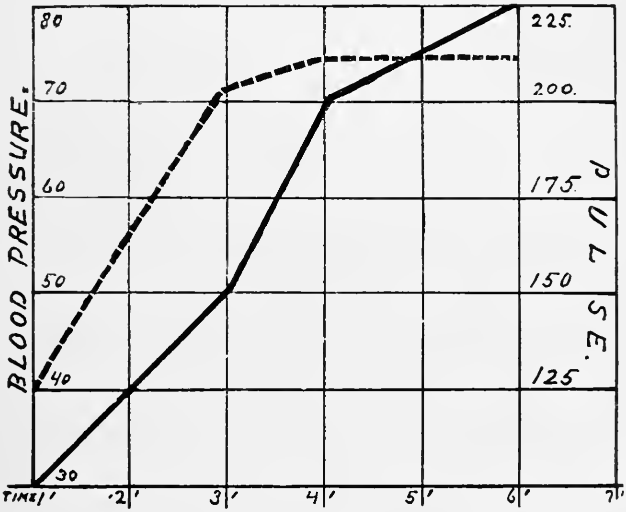


The same, five minutes afterwards.

Tracing C.—Concluded.



The same, twelve minutes afterwards.



PLOT OF TRACING C. (VAGI AND CORD CUT.)

Black line = Pressure.
Broken line = Pulse.

the lungs, whether the rate is increased (in which case the respirations are usually shallow), or whether the depth of the movements is diminished, the amount of air passing in and out of the lungs is decreased. The results of the experiments recorded already in regard to the respiratory rate are sufficiently clear. As the same effects are noticed in animals in which the vagi have been previously divided, it is evident that alcohol diminishes the respiratory movements by a direct action on the centers in the medulla.

Regarding the actions upon the function of respiration there is little or no positive evidence and, therefore, what is really meant by respiratory stimulation or depression, under the influence of drugs, has not been definitely established. Authorities are at variance upon this question of vital importance. Thus, for instance, it is generally held that opium and belladonna are physiological antagonists so far as their action on the respiration is concerned; and, indeed, it has been taught for a long time that in human opium poisoning belladonna, or its alkaloid atropine, is the antidote *par excellence*. This teaching has been followed by the routine practice of administering this latter substance in all cases of poisoning by the former, with results enveloped in contradictory and extremely unreliable evidence.

From the results obtained in a special investigation upon the subject I am inclined to the belief that atropine is not a respiratory stimulant in the true sense of the term. For the sake of illustration, permit me to devote a few words to the matter.

It has been stated by the writer[1] that "Without sufficient proof atropine has been looked upon as essentially a respiratory stimulant. But the truth of the matter is that here again we find the action of the drug to be uncertain, especially in normal animals. In those animals in which the vagi have been previously divided, the drug, it is true, almost always causes an increase in the respiratory rate, and while this shows that the agent acts directly on the centers in the medulla oblongata, it does not prove that the drug is a respiratory stimulant. If this were so we would have the same more or less constant effects in the normal animals, as is the case with cocaine, ammonia, caffeine, and strychnine, perhaps, and other drugs (and they are not many) which may be classed as true respiratory stimulants."

The writer then refers to the observations embodied in a paper by Reichert:[2] "In seven experiments performed on dogs, it was found that in five an increase in the number of respirations was effected sometime during the observation, while in two it was practically unaffected. The increase took place sometimes immediately on the injection of the drug, at others not until several minutes after, while still in others there was, instead of an increase, either no effect at all or a tendency to a gradual decline. I have observed similar phenomena, and not until repeated experiments gave me almost invariably the same results did I not make up my mind to discard atropine from the class of respiratory stimulants in the proper sense of the term. Thus, in conformity with such evidence it must be concluded that, as Reichert tersely put it, "atropine acts upon the respiratory function at the same time in two opposing ways: One (peripheral) tending to diminish, and the other (central) tending to increase, the increase or decrease of the respirations in the normal animal depending upon which one of these factors predominates."

In regard to the same subject about the effects of atropine in human opium poisoning, Wood,[3] taking issue with Reichert, says that this latter author contradicts himself when he (Reichert) affirms that "thus clinical, experimental, and toxicological data demonstrate clearly that atropine can not be considered a reliable respiratory stimulant," and on the opposite page the same author states that "the fact that the rate of the respiration is always increased after section of the pneumogastric nerves is conclusive proof that the drug stimulates the respiratory centers."

[1] Daniel's Texas Medical Journal, December, 1892.

[2] University Medical Magazine, February, 1891.

[3] University Medical Magazine, March, 1891.

But in reply, Reichert[1] contends that there is no contradiction in his previous statements; that a distinction must be made between *action* and *effect;* that a drug may stimulate the respiratory centers, and yet not be a respiratory stimulant. Atropine, it is true, stimulates the respiratory centers, and yet an increase in the rate and depth of the respiratory movements may be wanting. The writer makes a comparison in the case of a drug which may powerfully stimulate the motor centers of the cord, and yet not be a convulsant. He further contends that the effects are inconsistent, and may be in opposite directions.

Now, then, while the question of what constitutes respiratory stimulation or depression, whether, on the one hand, the phenomenon of stimulation is the result of an increased rate or increased depth of the respiratory movements, and whether, on the other hand, the depression should be ascribed to decreased rate or depth of such movements; while the question, I repeat, of what constitutes respiratory stimulation or depression remains *sub judice,* in the case of alcohol both the rate and the depth of the respirations are decreased as a general rule. Considering the matter from either point of view I believe myself justified in stating that the drug under study is a respiratory depressant.

Indeed, a drug may enormously increase respiratory rate, and yet the amount of air inspired, owing to the shallow character of the respiratory movements, be actually decreased below the normal standard. On the contrary, a substance may diminish the rate of the respiration, but at the same time the depth of the movements may be so increased as to let into the lungs a larger quantity of air than normally. This being so, in the one case an observer might consider a drug a respiratory stimulant judging from the increased rate produced; and yet the amount of oxygen inhaled would be so diminished as to be insufficient to effect the normal stimulation owing to the shallow character of the respiratory depth. And *vice versa,* the same or another investigator might state that a second remedy is a respiratory depressant judging from the slow rate caused by it, when the depth of the respiration is so augmented as to effect the introduction into the lungs of a larger amount of oxygen than normally, in which case the drug is, in fact, producing stimulation.

Returning to our study of alcohol, I have found that this substance not only produces, in sufficient amounts, a decreased rate but also a diminution in the depth of the respiratory movements, this giving rise to a lower quantity of air passing in and out of the lungs than in normal conditions.

I have in this respect conducted a special series of experiments, the results of which are recorded below.

A simple apparatus was constructed consisting of two bottles filled with mercury, in which this substance served the purpose of a valve against tubes inserted through a tight rubber stopper. Both bottles by means of rubber tubing and a Y-shaped glass-tube were connected with the trachea of the animal experimented upon; and in turn, one of the bottles was left in contact with the external atmosphere, the other with large rubber bags, these again being made to communicate with a common air meter. Thus, the air inspired by the animal was wholly transferred to the rubber bags, and the amount of air passing through the lungs in a certain period of time was more or less accurately ascertained by the meter. I first measured the air for two or three periods, of five minutes' duration each, before injecting the drug, and then proceeded to repeat the operation while the animal was under the influence of alcohol. The following normal experiments are described:

[1] University Medical Magazine, April, 1891.

Experiment XXII.

[Dog; weight, 7·71 kilograms.]

Period.	Respiration per minute.	Meter air movement.	Remarks.
First	48	7·9	Dog quiet.
Second	46	7·6	Do.
Third	46	7·6	Dog quiet; injected 1 c. c. of pure alcohol.
Fourth	36	5·4	
Fifth	30	4·9	Dog quiet; injected 2 c. c. of pure alcohol.
Sixth	24	4·8	Respiration shallow.
Seventh	24	4·1	Eye reflexes very weak.
Eighth	24	4·1	Injected 2 c. c. of pure alcohol.
Ninth	22	3·8	Eye reflexes gone; animal alcoholized.
Tenth	18	3·1	Eventually killed with ether.

Experiment XXIII.

[Dog; weight, 12·6 kilograms.]

First	72	19·6	
Second	72	19·4	
Third	78	20	Animal struggles. Injected 2 c. c. of pure alcohol.
Fourth	60	15·1	
Fifth	54	13	Injected 3 c. c. of pure alcohol.
Sixth	36	9·4	Eye reflexes gone. Injected 5 c. c. of pure alcohol.
Seventh	30	7·3	Respirations irregular and shallow.
Eighth	12	5·7	Muscular rigidity.
Ninth	8	4·6	
Tenth	6	3·8	Respirations very shallow. Killed with ether.

Experiment XXIV.

[Dog; weight, 18·1 kilograms.]

First	22	14	
Second	28	15·5	Animal struggles.
Third	20	13·8	Dog quiet, injected 3 c. c. of pure alcohol.
Fourth	18	12	Dog whines and is restless.
Fifth	12	11·8	Injected 5 c. c. of pure alcohol.
Sixth	10	11	Eye reflexes very weak.
Seventh	10	11·1	
Eighth	8	10·2	Injected 10 c. c. of pure alcohol.
Ninth	6	7·2	Eye reflexes gone; respiration shallow.
Tenth	4	4·2	
Eleventh	....	....	Animal died.

Experiment XXV.

[Dog; weight, 9.8 kilos. Alcohol, 25 per cent solution used.]

First	24	7.1	
Second	26	7.3	
Third	22	7.1	Started injection.
Fourth	28	6.8	
Fifth	40	6.2	Respirations very shallow.
Sixth	32	5.3	Respirations very shallow; eye reflexes almost gone; has received 215 c. c.; stopped alcohol.
Seventh	12	4	
Eighth	14	3.8	
Ninth	8	2.5	Animal died suddenly.

The same results were obtained in animals in which the vagi had been previously severed. In this connection I have made the observation that after section of the pneumogastric nerves, although the respiratory movements, as is well known, are generally diminished in rate, there is quite often an increase in their depth, and as a consequence a larger amount of air than in normal conditions is taken in by the animal. On the other hand, I have frequently noticed that after division of the vagi, instead of a decrease there often occurs an enormous increase in respiratory rate (a phenomenon I am unable to explain at present), but at the same time the shallow character of the movements admits of a proportionate diminished quantity of air entering the lungs.

Alcohol, after previous division of the pneumogastrics, is still able to produce a diminution in the depth of the respirations, this diminished depth causing a lessening in the amount of air inspired. This is shown in the experiments recorded below.

EXPERIMENT XXVI.

[Dog; weight, 16.7 kilos.]

Period.	Respiration per minute.	Meter air movement.	Remarks.
First	18	8	
Second	16	8.1	
Third	16	8	Cut both pneumogastric nerves; tube in trachea.
Fourth	8	12.3	Ten minutes after vagi cut.
Fifth	8	12.6	Animal struggles.
Sixth	6	12.1	Dog quiet again—injected 2 c. c. of pure alcohol.
Seventh	8	11.6	
Eighth	8	11.8	
Ninth	6	11.1	Injected 5 c. c. of pure alcohol.
Tenth	6	10.2	Respirations shallower.
Eleventh	4	8.1	Eye reflexes gone; respirations exceedingly shallow.
Twelfth	....	....	Dog died suddenly.

EXPERIMENT XXVII.

[Dog; weight, 16.8 kilos. Alcohol, 25 per cent solution used.]

First	26	9.3	
Second	21	9.5	
Third	21	10	Cut both vagi; tube in trachea.
Fourth	12	11.	Period taken ten minutes after cutting of vagi.
Fifth	16	12.	
Sixth	12	15.2	Respirations deep.
Seventh	12	16.1	Started injection.
Eighth	10	12.8	
Ninth	8	10.1	Eye reflexes weak; has received 125 c. c.
Tenth	8	7.2	
Eleventh	6	5.1	Has had 200 c. c.
Twelfth	6	3.7	Has had 240 c. c.; stopped alcohol.
Thirteenth	6	2.1	Respirations quite shallow.
Fourteenth	....	....	Animal died.

As in the case of respiratory rate, alcohol, therefore, causes a depressant effect on the depth of the respirations and the amount of air passing through the lungs, such a result being due also to a direct action of the drug on the respiratory centers in the medulla oblongata.

In concluding this portion of the subject, in which, by the methods sufficiently described, I have been able to study at the same time the behavior of alcohol on the circulation and the respiration, I may state that I did not attempt to ascertain accurately the minimum fatal dose of the drug in dogs. In fact, the action of alcohol upon the lower animals, even of the same species, varies as regards its toxicity, and any general conclusions drawn from one series of experiments may be diametrically opposed to those arrived at in a second series of experiments. However, taking in consideration the most striking of my experiments, I obtained the following records: In Experiment XII 17 c. c. of pure alcohol proved fatal to a dog weighing 9.9 kilos, in which case 1.7 c. c. of the drug per kilo of the body weight may be said to have been the lethal dose. In Experiment XIII a dog weighing 8.3 kilos died after an injection of 320 c. c. of a 20 per cent solution of alcohol, giving as an average for the fatal amount 38.5 c. c. of the solution per kilo of the body weight. In Experiment

XIV, in which a 25 per cent solution was employed, 325 c. c. of this was sufficient to destroy a dog weighing 8.9 kilos, the average being quite similar to that noticed in the second example here referred to, that is, 36.5 c. c. per kilo of the body weight. Eagleton observed that alcohol in the strength of 25 per cent produced in the proportion of from 5 to 40 c. c. per kilo of the animal's weight, results apparently similar to mine.

ON BODILY METABOLISM.

On the elimination of carbon dioxide and the absorption of oxygen.—The absorption of oxygen and the elimination of carbon dioxide have been the subject of very elaborate researches, and although there appears to be some difference of opinion in the two questions at issue, most investigators seem to have arrived at almost definite conclusions. Let me, however, bring to the notice of the reader the most important points in the controversy, which will serve as the basis for this study and for further research. The subject presents a wide field for further investigation.

In regard to the elimination of carbon dioxide Boecker,[1] Perrin,[2] Davis,[3] Hammond,[4] Boeck and Bauer,[5] and Rumpf[6] affirm that under the influence of alcohol there is a distinct decrease in the amount of carbon dioxide exhaled; and although whisky, brandy, and gin diminished the production of the gas, according to the researches of Smith,[7] quoted by Wood,[8] yet Smith states that alcohol in small quantities increases the elimination of the carbon dioxide. This same increase has been observed by Wolfers [9] in the case of the rabbit.

Closely allied to this question of elimination of carbon dioxide is that of the absorption of oxygen, similarly of the greatest interest. This has also been the subject of recent investigations. Thus, Henrique,[10] from experiments performed upon himself, found that there was an increase in the amount of oxygen consumed. Identical results were obtained by Wolfers [10] in the rabbit, and in rabbits and dogs by Bodlander.[11]

Zuntz,[12] who experimented upon man, came to opposite conclusions, asserting that the consumption of the oxygen is decreased. Forster [13] made similar observations. "No important effect," on the other hand, was noted by Geppert [14] in a similar series of experiments. The matter has been discussed at length by Warren;[15] and Wood,[8] commenting upon the contradictory nature of the evidence presented up to 1891, states that to his mind such evidence "is probably in part due to the experimental difficulties of the subject, but at the same time strongly indicates that moderate doses of alcoholic spirits have no constant very decided action upon the formation and elimination of carbonic acid. It is readily conceivable that by checking or aiding digestion, by influencing circulation, or in some other way they may exert a varying indirect action, which is superior to the slight direct influence in lessening carbonic acid production, which the weight of evidence indicates that they possess."

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[1] Quoted by Bernard in Journ. de Pharm. t. xv., third series, 1849.
[2] Archiv. General., t. IV., sixth series.
[3] Trans. of the Americ. Medic. Associat., 1855.
[4] Physiological Memoires, Philadelphia, 1863.
[5] Zeitschr. f. Biolog., x, 1874.
[6] Pflug. Archiv., XXXIII, 1884.
[7] British Medical Journal, 1859.
[8] Therapeutics: Its Principles and Practice, 1891.
[9] Pflug. Archiv., XXXII, 1883.
[10] Bul. de l'Academie Royale de Belge, II, 1883.
[11] Zeitschr. f. Klin. Med., XI, 1886.
[12] Fortschr. der Med. i, 1887.
[13] Annual of the Universal Medical Sciences, 1888.
[14] Archiv. f. Exp. Pathol. und Pharm. XXII.
[15] Boston Med. and Surg. Journal, July, 1887.

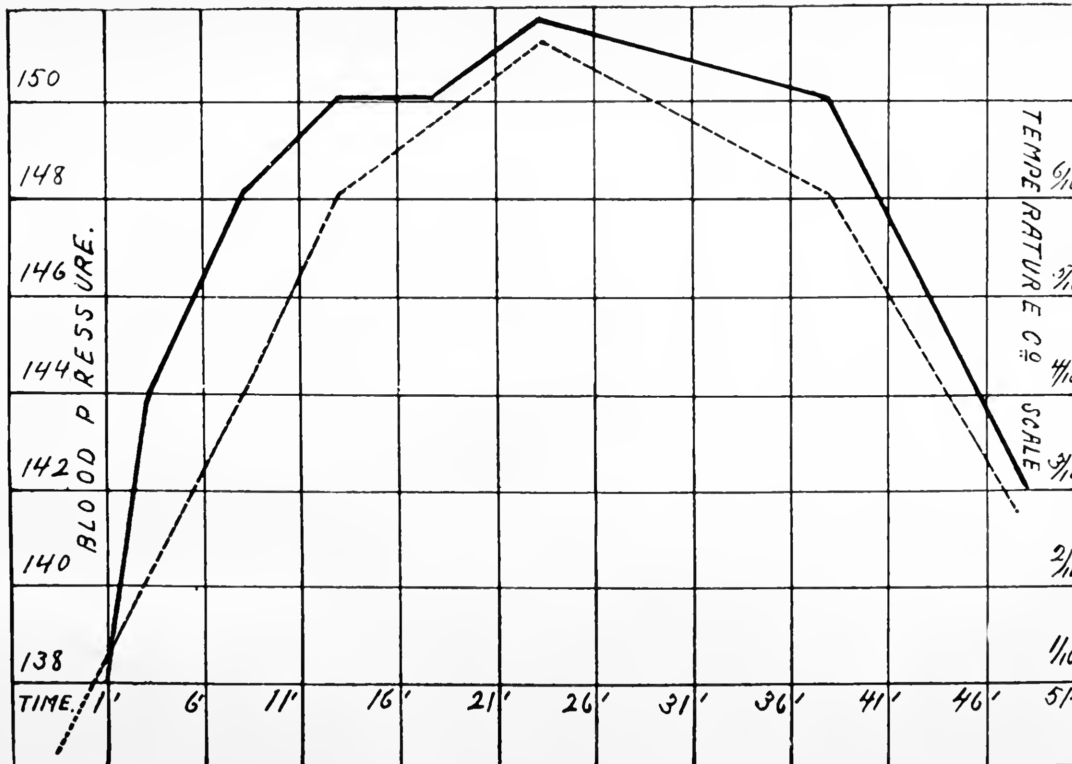
On nitrogenous excretion.—Upon the elimination of nitrogenous material alcohol has, although denied by some observers, a very decided action. Boecker[1] has apparently proven experimentally that the drug decreases the elimination of urea. This is opposed by Parkes and Wollowicz;[1] and yet it is seen in the experiments of these latter investigators that, with the exception of one day in which the man experimented upon had a chill followed by a feverish reaction, the daily excretion of urea was 31.35 grams during the alcohol period; during the time when brandy was taken the elimination of urea was 34.8 grams, while during the water period it was 35.02 grams. There was, therefore, a reduction in the excretion of urea by about 10 grains (0.65 gram) daily.

Hammond, quoted by Wood,[1] experimented upon himself, dividing his experiments into three series: First, when just sufficient food was taken to maintain the weight of the body; secondly, when more food than enough was taken for that purpose; and thirdly, when not enough food was ingested. The results noticed were in all instances similar, that is, they showed that alcohol lessened the amount of chlorides, phosphates, and urea. These results have been confirmed by the careful experiments of Rieso,[2] made on two persons placed under the strictest conditions. This author found that, under the influence of alcohol, there was a marked decrease in the urea elimination, and to a less degree also in the excretion of chlorides, phosphates, sulphates, and uric acid. There was at the same time a gain of the bodily weight.

This action of alcohol on metabolic changes is further corroborated by the excellent researches of Mohilansky,[2] house physician to the Clinic of Manassein. The investigator undertook a series of experiments on fifteen individuals, most of them healthy medical students aged from 18 to 28 years. His object was to study the action of alcohol not only on the nitrogenous metabolism, but also on the assimilation of proteids and fats. Some of the subjects experimented upon were total abstainers, some were occasional drinkers, while others were habitual alcohol drinkers. The ingestion of the drug varied according to the habit of the individual, and the daily dose administered varied from 60 to 140 cubic centimeters (2 to 5 ounces of absolute alcohol, or from four small wine glassfuls (*rumka*) to half a bottle of a 40 or 42 per cent vodka (aquavit). In other words, a sufficient amount was given to produce a slight intoxication, such as high spirits, talkativeness, etc.

The results of Mohilansky's study are so important that I will transcribe the principal ones. He found: (1) In people habituated to alcohol, when taken in moderate quantities, it distinctly improves the appetite, and gives rise to a marked increase in the assimilation of the nitrogenous constituents of food, the average surplus amounting to 2.09 per cent, the maximal to 4.22. (Thus a patient who had been assimilating 93.10 per cent nitrogen, without alcohol, when this drug was added to his dietary, proved to be assimilating 96.07 per cent of nitrogen.) (2) In habitual total abstainers, however, the assimilation is somewhat diminished, that is, from 0.28 to 0.23 per cent. (3) The increased assimilation in the former category must be attributed to a more complete absorption and intensified gastric digestion, which result from a prolonged retention of food in the stomach on the one hand, and from increased digestive power and secretion of the gastric juice (Bernard, Kretschy, Richet, Lever, Petit and Semerie, and Gluzinski) on the other. (4) The nitrogenous metabolism or disintegration of proteids almost invariably decreases (this happened in 13 out of the 15 cases observed), the average fall being 8.73 per cent, the maximal 19.42, and the minimal 0.14 per cent. (For example, in a patient in whom the metamorphosis on nonalcoholic days had amounted to 80.11 per cent, on alcoholic days it fell to 63.78.) The decrease is frequently observed, even when small doses are taken; but it is invariable in the case of moderate or medium quantities. There does not, however, exist any strict parallelism between the dose and the amount of the inhibition of the metabolism. (5) The decrease remains still

[1]Therapeutics: Its Principles and Practice, 1891. [2]Hoffman und Schwelbe's, Jahresb., 357, 1881.



PLOT X OF EXPERIMENT XXVIII.

Black line = Blood pressure.
Broken line = Temperature.

perceptible for sometime, even after the alcohol has been discontinued. (6) It is probably dependent upon the drug inhibiting the systematic oxidation processes (Manassein, Schmiedeberg, and Boecker), and further upon its changing the blood-pressure, dilating the blood-vessels, retarding the circulation, and depressing the bodily temperature. (7) Alcohol also diminishes somewhat the assimilation of fats, as it was found that there was an increase in the quantity of fatty acids excreted with the fæces.

Although perhaps not strictly within the limits of the present essay, the work of Diakonoff in this respect is worthy of mention. This author[1] undertook a series of experiments on febrile patients with the purpose of ascertaining the effects of alcohol on the assimilation and metabolism of proteids. Of the 7 patients experimented upon 6 were suffering from typhoid fever and 1 from exudative pleurisy. Of these patients 2 were total abstainers and 5 occasional alcohol drinkers. The drug was administered internally in the form of a 40 per cent vodka (aquavit) four times a day, the daily dose being invariably 50 cubic centimeters ($1\frac{3}{5}$ ounces) of absolute alcohol. The diet of the patients was limited to milk and bread, and the treatment was purely expectant. The experimenter obtained the following results: (1) In febrile patients alcohol lowered the assimilation of the nitrogenous ingredients of food. (2) In regard to this effect of alcohol, no difference was noticed between habituated and nonhabituated individuals. (3) Alcohol spoils appetite and increases both the total daily amount of fæces and the proportion of water and coagulated albumen therein. (4) The drug decreases the quantity of albumen undergoing decomposition in the system. (5) In such cases, where the assimilation of nitrogen sinks but slightly, alcohol lowers the nitrogenous metabolism; where the depression, however, of the assimilation is considerable, the metamorphosis proves to be augmented. (6) Alcohol disturbs the metabolism also qualitatively, since it raises the proportion of underoxidized products.

I have not had myself a sufficient opportunity to make an experimental research upon this part of the subject, but it seems to me, from the experimental evidence brought forward, that this points to a well-sustained conclusion in regard to the actions of alcohol on metabolism, that is, that the drug produces a decided lessening in the excretion of the products of tissue-waste both in health and disease.

ON ANIMAL HEAT-FUNCTIONS.

On normal temperature.—Alcohol affects the animal heat functions of both man and the lower animals proportionately in a similar manner. Under the action of moderate doses there is frequently produced a slight elevation of the temperature, corresponding with a stimulating effect upon the circulation. In other words, the rise of temperature is apt to occur *pari passu* with an increase of the blood-pressure. The records that follow are sufficiently clear. (*See also* Plot X.)

EXPERIMENT XXVIII.

[Dog-weight, 15.2 kilos. Pure alcohol used.]

Time.	Pressure.	Rect. temperature (C. scale).	Remarks.
m. s.	*mm.*		
0 00	138	40	
2 30	138	40	Injected 1 c.c. of drug.
3 00	140	40	Injection ended.
5 00	144	40.1	
9 00	148	40.2	
14 00	150	40.4	
19 00	150	40.6	Animal restless.
24 00	158	40.8	Dog quiet again.
39 00	150	40.6	
49 00	142	40.4	
59 00	142	40	Killed with ether.

[1] Medical Chronicle, January, 1890.

EXPERIMENT XXIX.

[Dog-weight, 12.69 kilos. Pure alcohol used.]

Time.	Pressure.	Rect. temperature (C. scale).	Remarks.
m. s.	*mm.*		
0 00	132	39.4	
1 50	132	39.4	Injected 1 c.c. of drug.
2 00	132	39.4	Injection ended.
3 30	140	39.6	
5 30	152	39.8	
10 00	160	39.9	Injected 1 c.c. of drug.
11 00	160	40.1	Dog struggles and whines.
13 00	162	40	Animal quiet.
18 00	158	40.1	
23 00	152	39.9	
33 00	142	39.8	
48 00	134	39.6	Dog killed with ether.

This rise of temperature is comparatively of short duration and apparently unimportant, since, subsequently, it is followed by a depression below normal, especially when larger amounts of alcohol are ingested. The results of these experiments are confirmatory of those observed by Richardson[1] and by Parkes and Wollowicz.[2] The latter authors found a trifling exaltation of temperature after doses sufficiently large to increase the activity of the circulation. Richardson noticed that in minute quantities alcohol increased the temperature of mammals ½° F. and of birds 1° F. above the normal.

It has been sufficiently proven that alcohol in large and lethal amounts produces in animals a fall of the bodily temperature. Even as far back as 1848, Dumeril and Demarkay, quoted by Wood, affirmed that alcohol in large doses causes a marked decrease of the temperature. The truth of this statement has been more recently upheld by the results obtained in the laboratory and in the clinical ward by a host of able observers. I will not burden the reader with an account of each one of these observations, but I believe it will be sufficient for me to refer to the authorities consulted by simply mentioning them. Almost all experimenters are in accord in regard to the action of alcohol on normal temperature, and the names of Anstie,[3] Binz,[4] Bouvier,[5] Brown-Séquard,[6] Davis,[7] Godfrin,[8] Jacobi,[9] Lewin,[10] Lombard,[11] Mainzer,[12] Manassein,[13] Obernier,[14] Rabou,[15] Raziejewski,[16] Ringer and Rickards,[17] Ruge,[18] Sulzynski,[19] and Tscheschichin,[20] may be recalled.

[1] Medical Times and Gazette, Vol. II, p. 704, 1869.

[2] Transactions of the Royal Society, 1870.

[3] Stimulants and Narcotics. London.

[4] Vircow's Archiv., Bd. II, p. 153; also Practitioner, vol. 3, 1869 and vol. 4, 1870; and Journ. of Anatomy and Physiology, vol 8, p. 232, 1874.

[5] Pfluger's Archives, p. 370, 1869; Wirkung der Alcohol auf die Korpertemperatur, Bonn, 1869; and Centralbl. f. Med. Wissens., December, 1871.

[6] Journal de la Physilogie, p. 467, 1859.

[7] Transactions Amer. Medic. Associat., p. 577, 1855.

[8] De l'Alcool, son Action physiologique, ses Applications thérapeutiques, Paris, 1869.

[9] Deutsche Klinik, 1857.

[10] Centralbl. f. Med. Wissens., No. 38, 1874.

[11] New York Medical Journal, June, 1865.

[12] Vircow's Archives, September, 1871.

[13] Centralbl. f. Med. Wissens., 1869.

[14] Pfluger's Archives, p. 499, 1869.

[15] Berlin. Klin. Wochenschr., 1871.

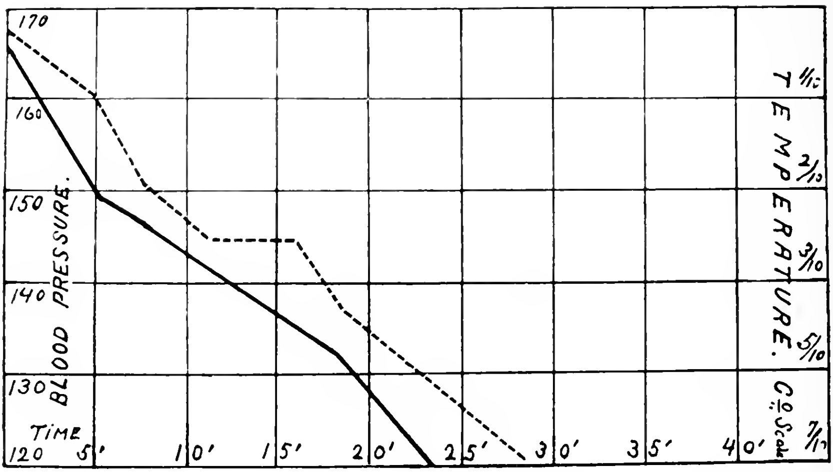
[16] Centralbl. f. d. Med. Wissens., 1871.

[17] London Lancet, p. 208, 1866.

[18] Vircow's Archives, Bd. XLIX, p. 265.

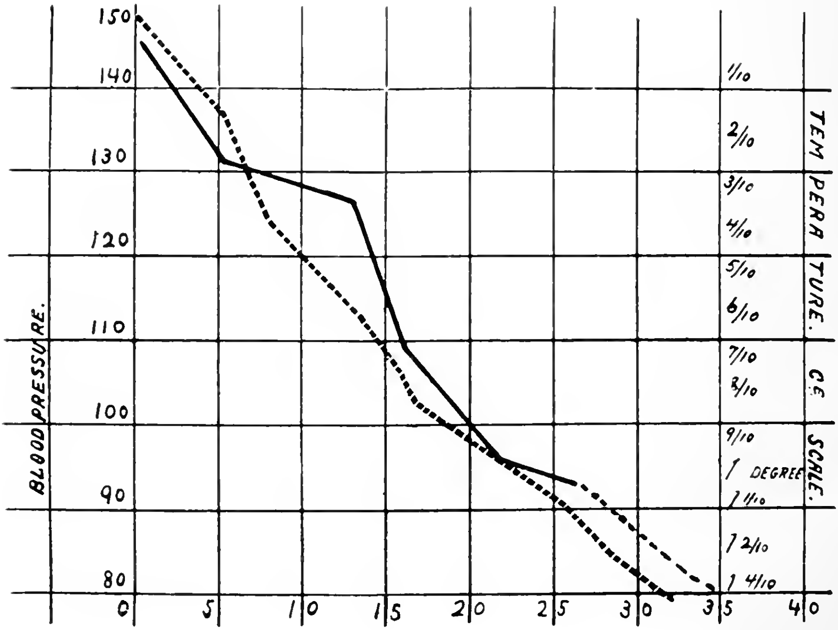
[19] Inaugural Dissertation, Dorpat, 1865.

[20] Reichert's Archives, 1866.



PLOT Y OF EXPERIMENT XXX.

Black line = Blood pressure.
Broken line = Temperature.



PLOT Z OF EXPERIMENT XXXI.

Black line — Blood pressure.
Broken line — Temperature.

in the experiments that follow, in which toxic amounts of the drug were employed, the depression of the temperature, with slight variations, was quite marked. I may here state that if the dose ingested is fatal, the fall observed is progressive till the occurence of death. (*See also* Plots Y and Z.)

EXPERIMENT XXX.

[Dog: weight, 9.97 kilos. Alcohol, pure, employed.]

Time.	Pressure.	Rect. temperature (C. scale).	Remarks.
m. s.	*mm.*		
0 00	166	39.3	
3 30	166	39.3	Injected 5 c. c. of drug.
4 00	166	39.3	Injection ended.
5 30	162	39.3	
8 30	152	39.2	Injected 10 c. c. of drug.
9 00	150	39.2	Injection ended.
12 00	148	39.1	Dog whines and struggles.
15 00	142	39	Injection of 10 c. c. of drug.
15 30	140	39	Injection ended.
16 00	135	39	Animal struggles.
21 00	132	38.8	Injection of 10 c. c. of drug.
21 30	130	38.8	Injection ended.
26 30	120	38.6	Dog quiet; eye reflexes, weak.
31 30	112	38.4	Clot for 5 minutes.
37 00	108	38.3	
42 00	98	38.2	Eventually killed with ether.

EXPERIMENT XXXI.

[Dog; weight, 7.710 kilos. Pure alcohol used.]

0 00	148	39.6	
5 00	148	39.6	Injection of 10 c. c.
5 40	146	39.6	Injection ended.
6 00	142	39.6	Dog struggles.
8 30	138	39.4	Quiet again.
9 30	138	39.4	Injected 10 c. c.
10 00	132	39.4	Injection ended.
12 00	....	39.2	Clot for 6 minutes.
18 00	128	39	Injected 15 c. c.
18 30	112	39	Injection ended.
20 00	108	38.9	
25 00	98	38.8	Eye reflexes. gone.
30 00	96	38.6	
35 00	....	38.4	Clot.
42 00	82	38.2	Respiration slow and shallow.
47 00	....	38.2	Killed with ether.

It is demonstrated beyond doubt, therefore, that alcohol in sufficiently large quantities diminishes the bodily temperature in the lower animals the same as it does upon man.

This action, however, is not the same in the case of abstainers and of habitual drinkers. In the first class of individuals the depressing influence is usually produced, but in those persons addicted to the habitual use of alcoholic stimulants, the effect is either slight or totally wanting. This is an almost every-day observation.

In this respect I may call attention to the elaborate research of Rieso,[1] who performed 86 experiments in man, with the object of studying the behavior of the drug on bodily temperature. He found that alcohol, even in moderate doses, in many cases, causes a lowering of the temperature of the body, the amount of this diminution averaging, as a rule, only some tenths of a degree; that only exceptionally is there noticed an elevation of the temperature consequent upon the administration of alcohol, and that not unfrequently, at least after minute doses, there is no noticeable change; that the diminution of temperature in convalescents is, as a rule, less

[1]Deutsches Archives f. Klin. Med., 1873.

than in healthy subjects, or it may altogether be absent; that in those who habitually drink alcoholic stimulants, the depressing influence of the drug upon temperature is almost always wanting; that frequent repetition of the doses of alcohol diminishes their lowering effect upon temperature; that the amount of diminution of temperature is directly proportional to the dose of alcohol ingested; and that, finally, the depression of temperature caused by the drug is for the most part of but short duration, and the temperature soon returns to its previous grade. These statements are in accord with the results obtained by most investigators, as well as with those of my own experiments, and they may, therefore, be said to be entirely correct.

Although the action of alcohol on thermogenesis may be said to be an indirect one, judging from the light of modern research, it would be interesting to ascertain, if possible, how these heat phenomena are brought about. Here I may say that the deductions of Binz[1] must be laid aside as of no great value on the basis of recent elaborate researches.

The first calorimetrical studies regarding the actions of alcohol were made by Lewis[2] on rabbits. The author found that the drug sometimes produced a primary decrease of heat production, especially after small doses, followed, under the influence of large quantities, by an increase in the same phenomenon. Later, Wood and Reichert,[3] who experimented on dogs, found varying results in 5 experiments, although in some of these heat-dissipation kept in advance of the heat production, and as a consequence the temperature was lowered. Sometimes, however, the heat production was above the dissipation, resulting, in such instances, in a rise of the bodily temperature.

The subject has been further investigated recently by Reichert.[4] The able and thorough research of this author is based upon 18 experiments performed on dogs, using the ordinary calorimeter described by him.[5] Reichert obtained increased heat production in 13 of the experiments. The difference did not depend upon the size of the dose employed. The range of variation in the general results was as much as 65 per cent. He determined, however, that alcohol does not affect the total quantity of heat produced; that the fall of the bodily temperature is due to the excess of the dissipation. He infers, therefore, that in all likelihood, alcohol, by undergoing oxidation, yields energy in the form of heat, thus conserving the tissues and acting as a food. The question, nevertheless, cannot be considered definitely settled, and further experimentation in this respect is still wanting in order to reconcile, if possible, all beliefs. The results of Reichert, however, carry the weight of authority, and may be said to be correct in the present state of our knowledge of this interesting part of the subject.

On febrile temperature.—That alcohol exercises a depressing influence on febrile temperatures, both in man and in the lower animals, there can be no doubt. Thus Bouvier[5] has noticed that the drug exerts a marked antipyretic action in animals laboring under pæmic fever. Alcohol in such cases diminished the temperature as much as 8.5° C.; and it was further found that the fever could be prevented if the alcohol was pushed before the appearance of the pathological condition.

The same results have been observed by Ringer and Rickards[5] in the case of man, but these authors assert that large and perhaps toxic doses of alcohol have to be ingested for the antipyretic effects to occur. As observed by Bouvier, Riegel,[5] and others, alcohol, even in large amounts, fails to effect the temperature in individuals accustomed to the use of the drug.

There can be no question that alcohol is able to reduce febrile, as it does normal temperature, both in the case of man and the lower animals. In the first instance

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[1] Deutsches Archives f. Klin. Med., 1873.
[2] Journal of Mental Science, Vol. XXVI.
[3] Wood's Therapeutics, p. 343, 1891.
[4] Therapeutic Gazette, February, 1890.
[5] University Medical Magazine, January, 1890.

the action is sustained by clinical observations and in the second by experimental evidence.

I, myself, have verified this antipyretic action of alcohol in a special series of experiments. For these observations a feverish condition was produced in dogs by the administration of putrid blood, intravenously. Two days were employed in each experiment. During the first day it was ascertained only whether the specimen of blood used was sufficiently powerful to produce fever without causing other marked disturbances. During the second day the fever-producing agent and the alcohol were given to the animal at the same time. It was found then that the alcohol not only kept the temperature from rising, but even reduced it below the normal standard, these changes depending more or less upon the amount of the alcohol ingested. It will be sufficient for me to detail the following experiment:

Experiment XXXII.

FIRST DAY.

[Dog, weight 10.21 kilos.]

	Temperature, C° scale.
In the normal state:	
First hour	39.4
Second hour	39.4
Injected 5 drops of putrid blood. In the fever state:	
End of the first hour	40.5
End of the second hour	41.5
End of the third hour	41.8

SECOND DAY.

[Dog reduced to 10 kilos.]

First hour	39.6
Injected 5 drops of putrid blood and 5 cc. of pure alcohol, repeating the latter every 10 minutes.	
End of second hour	39.6
Injected 5 drops of putrid blood and the alcohol as before.	
End of third hour	39.6
End of fourth hour	39.0
End of fifth hour	38.3
End of sixth hour	38.8

Other experiments of the same nature gave identical results. The evidence is, therefore, conclusive.

ON DIGESTION.

Every day experience and experimental research teach us that alcohol in small amounts aids digestion. It is true, on the other hand, that some observers deny to alcohol any such action, but in carefully examining the literature of this part of the subject (which is certainly, to say the least, an extensive one) it is seen that those who uphold this latter view form the minority.

Buchner,[1] from the results of a series of experiments, comes to the conclusion that 10 per cent of alcohol does not affect artificial digestion, while beer, even when used in dilute form, retards the process. His assertions, however, have not been absolutely confirmed. It is true that Gluzinski,[2] who gave the drug to fasting individuals, found that digestion, as influenced by alcohol, may be divided, in case of healthy persons, into two phases: The first, characterized by marked retardation of proteid digestion, the nitrogenous materials failing to be changed into peptones until the alcohol was removed; the second stage, beginning after the removal of the drug, when the secretion of gastric juice is so abundant that in the end the food is digested as soon or sooner than if no alcohol had been administered.

On the other hand, Mohilanshy[2] affirms that alcohol, taken in small quantities,

[1] Deutsch Archiv. f. Klin. Med., XXIX, 537.

[2] Deutsch Archiv. f. Klin. Med., XXIX, 537, and Annual of the Universal Medical Sciences, 1888.

distinctly improves the appetite, and gives rise to a marked increase in the assimilation of the nitrogenous constituents of food, this increased assimilation being due to a more complete absorption and intensified gastric digestion, resulting, as has been stated elsewhere, from a prolonged retention of food in the stomach on the one hand and from increased digestive power and secretion of the gastric juice on the other.

Blumenau[1] has arrived at similar conclusions. This investigator, with the view of studying the action of alcohol on the functions of the stomach, made a series of experiments upon 5 healthy individuals, aged from 22 to 24. The observations were made in the clinic of Koshlakoff of St. Petersburg. The drug was given in from ten to twenty minutes before dinner, in doses of 100 cubic centimeters ($3\frac{2}{3}$ ounces) and in the form of solutions of the strength of from 25 to 50 per cent. The meals allowed consisted of from 500 to 600 grams (16 ounces) of soup, a cutlet weighing 90 or 100 grams ($2\frac{1}{2}$ to 3 ounces), and 200 or 250 grams (6 to 8 ounces) of wheat bread. The author found that during the first three hours after the ingestion of the alcohol the gastric digestion is distinctly retarded, which is caused by a marked diminution of the digestive power of the gastric juice. The diminution is dependent upon the decreased proportion of hydrochloric acid and general acidity of the juice, the acidity being almost entirely produced by lactic acid. In habitual drinkers the changes are less pronounced than in alcohol abstainers. All other conditions being equal, stronger solutions of alcohol give rise to more intense changes than weaker ones.

The investigator found further that during the fourth, fifth, and sixth hours after meals the gastric digestion becomes considerably more energetic; the general acidity of the juice arises from 0.22 to 0.35 per cent; and the proportion of hydrochloric acid increases, to reach its maximum (from 0.12 to 0.14 per cent) by the end of five hours after meals, while the lactic acid amount decreases correspondingly, attaining its minimum about the same time when the acid either gives but a very faint reaction or altogether ceases to give any reaction. Corresponding to the alterations, the gastric juice during the second stage acquires a far higher digestive power. Under the influence of alcohol the secretion of the gastric juice becomes more profuse and lasts longer than without alcohol. During the first hour the action of pepsin seems to be slightly increased, because, on adding rennet to cow's milk, it coagulates more slowly than in subsequent hours. In regard to the motor power of the stomach, such was ascertained to be somewhat decreased, as tested by the internal administration of salol according to the method of Ewald. The same may be said in regard to the absorptive power of the organ, in which case the decrease was determined by the administration of iodide of potassium. It was found that the intensity of the alteration in the motor and absorbing powers of the stomach corresponds to the concentration of the alcoholic solutions used.

Of course, in large amounts alcohol hinders digestion very decidedly, and the continuous use of the drug causes pathological changes of varied nature, the principal one of which is that produced upon the liver.

That alcohol is a powerful factor in the production of hepatic cirrhosis there is scarcely any doubt. This has recently been confirmed by the results obtained by De Rechter[2] in an experimental research. The investigator made a series of experiments on dogs and rabbits. After having ascertained the amount of alcohol used by hard drinkers, he administered to the animals employed a mixture consisting of 22.5 parts of ethylic alcohol at 96 degrees, 2.5 parts of methylic alcohol and 75 parts of water. Of the 10 rabbits and 4 dogs used, 1 dog and 4 rabbits lived long enough to be of further use to the experimenter; in the rabbits he found cirrhosis in the portal spaces. In places, bands of connective tissues were found uniting the portal vein with the sublobular veins, but the parenchyma of the organ was everywhere

[1] Wratsch, No. 42, 1889, and Med. Chronicle, January, 1889.

[2] La Presse Médicale Belge, June 19, 1892.

free from change. In the dog there was cirrhosis occupying the sublobular veins, where alcoholic cirrhosis is said by Sabourin to commence in man. De Reehter attributes this difference in development to some modifying influence on the alcohol exercised by the liver of the rabbit. If experimenters have found fatty and cirrhotic change in many cases, the author attributes it to the fact that they used alcohol too short a time and in too large doses.

Be all the results of these researches as they may, certain it is that in the test tube the digestion of food is retarded or inhibited by the addition of alcohol; this I have verified over and over again. Yet, in the stomach, on the contrary, alcohol aids digestion, and here it may be said, it does so not perhaps through any inherent powers of its own, but mainly by virtue of its irritant and stimulating properties, inducing in this manner an increased amount of gastric juice.

ON THE URINARY SECRETION.

How alcohol affects the urinary secretion has not been definitely determined. Mohilansky[1] found that the drug, in healthy people, does not possess any diuretic action; and that, on the contrary, it rather tends to inhibit the elimination of water by the kidneys. Diametrically opposed to this statement is that of Diakonoff[1] who observed that alcohol, in febrile patients, considerably increased the daily quantity of urine, markedly suppressing at the same time the aqueous loss through the lungs and by the skin.

From a few experiments performed upon myself, I have noticed that small quantities of alcohol almost always caused an increase in the daily amount of urine secreted. The action under consideration, however, can not be accurately ascertained, since it must depend not only upon the amount of alcohol ingested but also upon the condition of the individual, whether this be in a healthy or a befrile state.

It is not at all improbable that if in a healthy person, the amount of alcohol administered be sufficient to stimulate the circulation, a corresponding activity of the kidneys would be observed as a consequence of the generally increased arterial pressure. On the other hand, since alcohol in large doses, as has been noticed tends to markedly decrease the arterial pressure, accompanied by a probable dilatation of the cutaneous blood vessels, according to Mohilansky, (although this has not been positively demonstrated) it would naturally be expected that such phenomenon would favor perspiration, and thus interfere with the renal secretion.

The same results might be witnessed in febrile conditions, in which, as has been observed by Diakonoff, the drug by causing a suppression of watery excretion through the lungs and skin, and undoubtedly a stimulation of the general circulation, may produce a marked increase in the daily amount of urine secreted. The question, in the present state of our knowledge of this part of the subject, remains unanswered one way or the other.

WHAT BECOMES OF ALCOHOL IN THE ANIMAL ECONOMY?

The last point which I propose to discuss in this paper is that relating to the fate (as the French would have it) of alcohol in the animal economy. This subject naturally deals with that of the elimination of the drug. Is alcohol eliminated as such, or does it undergo oxidation, as is maintained by a probable majority of writers upon this question? This is certainly of paramount importance, for here lies the basis of the value or the harmfulness or unnecessary use of alcohol in the treatment of disease. Again, not only may it be asked is alcohol a general stimulant, but also, does the drug likewise serve the purpose of a food? The question, although a long mooted one, deserves the most careful consideration.

It has for a long time been held that alcohol is completely, or nearly so, burnt up in the system. But in the celebrated work of Duroy, Lallemand, and Perrin, it is

[1] La Presse Médicale Belge, June 19, 1892.

stated by these authors that alcohol is eliminated unchanged, basing their assertion on the fact that they could not find in the blood or in the tissues the products of alcohol oxidation, such as acetic acid aldehyde; and on the fact also that they found the alcohol unchanged in the expired air, in the urine and in the sweat. These authors relied on the chromic acid test, which is said by Binz[1] to be fallacious. Binz, assisted by Stenbach and Schmidt, in a series of experiments, could not detect alcohol in the breath, affirming, therefore, that no drug was expelled by the lungs. He attributes the odor noticed in the breath of heavy drinkers, to the ethers and other volatile principles of the various liquids ingested.

Baudot[2] also questioned the correctness of the statements of Duroy and Perrin, on the ground that the chromic acid test is so delicate as to reveal the presence of 0.165 of one grain in a quart of water. He further noticed, in the twenty experiments performed, that, unless it be in enormous amounts, alcohol is practically not eliminated by the urine. These results have been confirmed later by other investigators, such as Anstie,[2] Schulinus,[3] and Lieben.[4] Schulinus showed that only very small quantities of alcohol pass through the kidneys, the largest portion of the drug taken into the blood finding its way into the tissues and organs by exosmosis, and in a number of experiments he found that one-fourth of the alcohol administered had disappeared from the body after from two to three hours and fifteen minutes. From the fact, again, that only a trifling amount of the drug was eliminated by the kidney, the author arrived at the conclusion the alcohol given must have been burnt up in the system. The same conclusions are formulated by Lieben and Anstie. This latter investigator detected a small quantity of alcohol escaping from the lungs.

Thudichum, quoted by Wood,[4] first in 1861, and later, in 1866, in colaboration with Dupré,[5] carried two elaborate researches on the same subject. In the first investigation the experiments were performed upon 33 men, to whom he administered 4,000 grammes of alcohol. The drug was recovered from the urine of all the men by repeated ditillation in order to avoid the fallacies of the chromic acid test. In this manner the experimenter obtained from the urine, within six hours after the ingestion of the drug, only 0.25 per cent of the amount of alcohol given. Identical, and perhaps more accurate, results were obtained by the same observer in his second investigation. In this instance greater care was taken to avoid loss during distillation, and he then recovered from the urine 0.82 per cent of the alcohol administered.

This experimentation was repeated by Subbotin[6] on six rabbits. The investigator claims to have demonstrated that the elimination of alcohol continues for a longer period than is generally believed, and that twice as much of the drug escapes through the skin and lungs as by the kidneys. His results, however, do not disprove those of the observers just mentioned, since he employed very large amounts of alcohol, in which case the elimination must be in direct proportion to the quantity ingested, for certainly a limit to the powers of the system to oxidize alcohol must be expected.

In a series of experiments Edes[7] observed that elimination of alcohol is greater by the lungs than by the kidneys, after small amounts; the contrary taking place under large doses of the drug. Not much weight perhaps can be attached to these statements, from the fact that the author relied chiefly on the chromic acid test. But Anstie,[8] in a second series of experiments upon dogs, using the method employed by Subbotin, confirmed the results obtained in his (Anstie's) first investigation.

[1] La Presse Médicale Belze, June 19, 1892.
[2] L'Union Médicale, 1863.
[3] Archiv. der Heilkunde, 1866.
[4] Annal. der Chim. und Pharm., II, 1870, Supl. Bd, p. 236.
[5] Tenth Report of the Medical Officer of the Privy Council, London, 1868.
[6] Zeitschr f. Biolog. VII, 1870; and Schmidt's Jahrb. Bd. CLIV, p. 261, 1872.
[7] Boston Medical and Surgical Journal, p. 347, 1870.
[8] Practitioner, July, 1874.

He found that a very trifling amount of alcohol was left in the body. Similar results have been obtained by Bodländer[1] from experiments performed upon himself and on dogs. His studies have been repeated and his observations apparently confirmed by Wöhler.[2] Bodländer found on himself that elimination occurred by the kidneys 1.2 per cent and by the lungs 1.6 per cent of the amount of alchohol ingested. In the dog he recovered from the urine 1.6 per cent and from the breath 2 per cent. No alcohol was detected by this experimenter in the intestinal excretions, nor in the milk of a goat to which nearly a quart of brandy had been administered.

It was first discovered by Lieben[2] and afterwards by Dupre[3] and Bechamp,[4] that a body closely resembling alcohol occurs in the urine of habitual abstainers. Indeed, Bechamp was able to get from the urine of persons who had not taken the drug in any form for a long time, alcohol in sufficient quantities to burn it. Lieben found the same substance also in the urine of the dog, the horse, the lion, and Rajewski[5] in that of the rabbit.

It seems to have been proven, from the results of the foregoing experimentation, that alcohol exists in the healthy organism, and, therefore, the detection of the drug in the different secretions and excretions, after its ingestion, is no proof that alcohol does not undergo oxidation in the economy. It is true that so far no products of oxidation have been found in the blood, but in this case it is reasonable to suppose that the process of oxidation goes on continuously, without interruption, until the production of water and carbon dioxide occurs as the ultimate result of such oxidation.

The elaborate and excellent research of Ford[6] tends to confirm the theory of the oxidation of alcohol in the animal economy. This investigator studied the subject on the supposition that the sugar manufactured by the liver must, before its final destruction and conversion into carbon dioxide and water, be changed into alcohol. This in mind, he carefully examined large quantities of blood of animals, seeking to obtain from that fluid alcohol by a process of repeated distillation. To prove that the substance obtained from the blood in this manner was alcohol, the author employed the chromic acid test, and relied also on the inflammability peculiar to alcohol, and similarly on the optical appearance of this substance in the conducting tube at the time the distillate began to boil. Again, to prevent possible oxidation of the alcohol during this delicate process, Ford sometimes added sulphuretted hydrogen.

The experimenter then proceeded to examine various other tissues as substances to be distilled, and here he based his calculations on the amount of carbon taken in and that exhaled, especially in regard to the quantity of alcohol to be found in the blood of the pulmonary capillaries. Thus he determined the quantity of alcohol respectively from the capillary blood of the lungs; from fresh lung tissue; from putrescent lung tissue; from fresh thoracic blood; from putrescent thoracic blood; from fresh liver tissue; and from putrescent liver tissue.

An examination of the figures given in the original tables of Ford's work reveals the interesting and important fact that the smallest quantity of alcohol was obtained from fresh liver tissue, and the greatest amount from putrescent liver tissue. This appears to show that in the latter instance the glycogen must have undergone fermentation. The same is seen in regard to the quantity of alcohol extracted from fresh and from putrescent thoracic blood.

An unbiased examination of all the preceding investigations appears to clearly demonstrate that but a very small quantity of alcohol is eliminated as such from the organism. The drug must, therefore, be oxidized in the body, thus serving the purpose of a food, and in this manner generating force. This is the case, according to

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[1] Archiv. f. Physiolog., XXIII.
[2] Journal des Progress, XI.
[3] The Doctor, February 1, 1873.
[4] London Lancet, 1873.
[5] Archiv. f. Physiolog. XI, 122, 1875.
[6] New York Medical Journal, January, 1872.

Dupré[1] who has shown that one gram of alcohol oxidized in the organism yields 7,184 heat-units, while the same weight of lean beef evolves 1,482 heat-units only. The inference is obvious. Further estimates have demonstrated that two ounces of alcohol generates a force equal to that generated by a little over nine ounces of lean beef, this latter being sufficient to maintain the circulation and respiration of an ordinary adult man per day. The results of these calculations seem to be supported by the able experiments of Reichert.[1]

It must, therefore, be concluded that alcohol, so far as our clinical and experimental knowledge goes, is mainly destroyed in the system, generating vital force, and that it ought to be considered as a food.

CONCLUSIONS.

I shall now, to close this imperfect study of the physiological actions of alcohol, give a summary of the conclusions I have been able to draw, and which will be found scattered throughout the preceding pages. They are as follows:

(1) Alcohol in small amounts excites, and in large doses depresses, both the peripheral motor and sensory nerves.

(2) Excessive quantities cause a spiral degeneration of the axis-cylinder of nerve-fibers.

(3) Reflex action is at first increased, and afterwards diminished by an influence exercised by the drug upon the spinal cord and the nerves.

(4) In small amounts alcohol stimulates the cerebral functions; it afterwards, especially in large quantities, depresses, and finally abolishes them.

(5) Alcohol causes lack of coordination by depressing both the brain and the spinal cord.

(6) In toxic doses alcohol produces hyperæmia of both brain and spinal cord, especially of the lumbar enlargement of the latter.

(7) Small doses of alcohol produce increased rapidity of the cardiac beat; large amounts, a depression of the same. In either case the effect is brought about mainly through a direct cardiac action.

(8) The drug in small quantities causes a rise of the arterial pressure by a direct action upon the heart; in large amounts it depresses the arterial pressure similarly through a cardiac influence.

(9) In large doses alcohol enhances coagulation of the blood; in toxic quantities it destroys the ozonizing power of this fluid, causing a separation of the hæmoglobin from the corpuscles.

(10) Alcohol in small amounts has little or no effect on the respiratory function. In large doses it produces a depression of both rate and depth of the respiration through a direct action on the centers of the medulla oblongata.

(11) The drug kills usually by failure of the respiration.

(12) On the elimination of carbon dioxide alcohol exercises a varying action, sometimes increasing, sometimes decreasing such elimination.

(13) The action of alcohol on the amount of oxygen absorbed also varies and may be said to be practically unknown.

(14) The drug lessens the excretion of tissue waste, both in health and disease.

(15) In small amounts alcohol increases the bodily temperature; in large doses it diminishes the same. The fall of bodily temperature is due mainly to an excess of heat dissipation caused by the drug.

(16) Alcohol, in sufficiently large amounts, has a decided antipyretic action, but for the purpose of reducing abnormal high temperature should not be used.

(17) In moderate amounts alcohol aids the digestive processes.

(18) Alcohol diminishes the absorption of fats.

(19) The drug exercises a varying action on the amount of urine secreted; but it probably increases the activity of the kidneys.

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[1] Practitioner, Vol. IX, p. 33, 1872.

(20) In large doses, or when continuously used for a long time, alcohol produces, particularly, cirrhotic changes in the liver, and paralysis of spinal origin. It also causes insanity, and epilepsy, and other maladies.

(21) Alcohol is mainly burnt up in the system when taken in moderate quantities. But when ingested in excessive amounts it is partly eliminated by the breath, the kidneys, and the intestines.

(22) Alcohol is a conservator of tissue, a generator of vital force; and may, therefore, be considered as a food.

THE TREATMENT OF EXOPHTHALMIC GOITER BASED ON FORTY-FIVE CONSECUTIVE CASES.

By A. D. ROCKWELL, A. M., M. D.,

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In considering this strange and intractable disease, I shall enter into no speculations as to its pathology for the simple reason that all explanations of the phenomena of this character that attend it are in the main conjectural. Neither shall I take time in discussing its etiology or its well-known symptoms, for these can be found in every text on neurology, with little variation of detail. The evidences of pathological anatomy have thus far been so thoroughly negative that we are left to the symptoms alone for guidance in treatment. These are, however, so positive and suggestive as to afford ground for a rational therapeutics, the end of which must be to regulate and give tone to nerve force and to equalize the circulation.

In an experience including the treatment of forty-five cases of exophthalmic goiter, dating from 1876 to the present time, a period of sixteen years, I have been enabled to study the disease clinically very thoroughly and form an opinion as to the benefits to be derived from certain methods of treatment, not altogether in accord with prevailing opinions.

In short, I hold that the prognosis in this disease is better than is generally believed, and if my results have been more satisfactory than others that have been reported it has been due to a more rational use of the remedy which has been my main reliance, and greater thoroughness and persistency in its application.

The remedy to which I refer is electricity. And while I by no means exclude the administration of drugs in the management of this disease, they are in my hands regarded as supplementary to the chief remedy and subject to changes according to the indications in each individual case. The surprising lack of unanimity of opinion in regard to the efficacy of medicinal treatment is due to the fact that not only have those drugs that have proved beneficial in some cases failed to do good in others, but sometimes a drug that has in one case proved palliative has in another seemed to do harm. Iron, for example, is a universal remedy that is perhaps in a majority of cases fully indicated, and is well borne; but I have occasionally found it to be productive of unpleasant symptoms even when anæmia existed, and have been compelled to discontinue its use. The statement of Von Graefe that iron is useless in the height of the malady, but that it does good when a certain amount of improvement has occurred, is an observation of value and founded upon an extensive experience.

My own experience has not been very favorable to the use of quinine, strychnia, or arsenic, and I now rarely administer them, and I believe the iodides often do more harm than good. Belladonna has been highly recommended and is undoubtedly of value. Carbazotate of ammonium I have used but in one case, but discontinued it after ten days on account of the gastric disturbance that it seemed to occasion. Digitalis is by some believed to be useless in this disease on the theoretical ground that it directly stimulates the muscular fibers of the cardiac muscular system. While the value of this remedy is now well recognized, there still exists much difference of opinion as to the method of its action. It has been regarded as a tonic, a stimulant, and a sedative. The latter view, as is well known, was taught by Trousseau long ago. He held that it occasioned contraction of the superficial blood vessels, thus producing diuresis—very much on the same principle as the action of fright or cold. In a recent discussion, Prof. Crocq[1] said that digitalis was not a sedative; neither a cardiac tonic, any more than alcohol is a tonic to the brain. Another view is that digitalis acts upon the pneumogastric and sympathetic nervous system, thus regulating the action of the heart. By one, the remedy is believed to act only on the left heart, by another on the right heart as well, retarding the action of both. But whatever theory is accepted, obstinate experience will not wheel into line at the command of any scientific theory, however plausible.

On the theory of the stimulant and tonic action of digitalis, I hesitated for a time to use it in this disease, but when I finally came to put it to the test of actual trial I was agreeably disappointed in the results. If the heart seems abnormally strong in exopthalmic goitre this is not by any means always the case. Very frequently there is enfeeblement of the myocardium, and digitalis is in many cases useful in slowing the rapid systole associated with it. The condition of the heart thus becomes improved by the physiological rest it obtains through prolongation of the diastole. Yet, like iron, digitalis may under certain conditions prove not only useless but harmful, although, like iron, and especially in combination with iron, it possesses undoubted value. In what may be termed sthenic cases, where the excitability of the heart is great without enfeeblement, digitalis is certainly contra-indicated, and one such case will be found in this report. In this case good results were obtained by substituting veratrum viride for the digitalis. Strophanthus has received high commendation, and on theoretical grounds it is recommended in preference to digitalis. While both tend to lengthen the interval between the contractions of the heart, strophanthus is supposed to contract the caliber of the arterioles in less degree than digitalis, and to be preferred as not increasing the work of the heart to the same degree as the latter.

In conjunction with digitalis and iron, ergot and bromide of zinc seem to me to be distinctly valuable, and I have no hesitation in saying that a combination of these four remedies will more nearly fulfill the indications in the majority of cases of exopthalmic goiter, than any other single remedy or combination of remedies. There are probably to be found few if any who will not accord to electricity an important place among the remedies indicated in exopthalmic goiter, and unlike some others mentioned, it can not, if judiciously used, do harm even in those cases where it does no good.

Gowers, who does not in general accord to electricity a very high place in therapeutics,[2] yet says that in this disease it is followed in many cases by a distinct fall in the frequency of the pulse (amounting to 10 and even 20 beats per minute) and sometimes by a slight diminution in the size of the thyroid. In one case he observed the pulse fall from 90 to 72—a lower rate than had been counted during the preceding two years. He adds, however, that such effects are usually transient—although repeated applications certainly sometimes cause a slight degree of permanent improvement. He has not seen more than this.

Even such results as Gowers describes are not to be despised, but the difficulty with his efforts and with others who have written upon this subject is the utter inadequacy of the strength of current used, and above all, so far as my observation goes, in the incomplete and haphazard way in which the applications are administered. Gowers would use a weak galvanic current, sufficient to cause merely a slight tingling of the skin, while others who have written extensively upon the subject are content with 2 or 3 milliamperes. These authorities do not seem to appreciate the fact that in the therapeutic use of electricity they are dealing with a hide-bound

[1] Academy of Medicine, Belgium, January 28, 1893.
[2] Diseases of the Nervous System, p. 1214.

body which offers such a resistance to the passage of the current that our ingenuity is taxed to its utmost in order to overcome this resistance and get into the body a sufficient quantity of electricity to appreciably affect the cerebro-spinal system and the nervous system of vegetative life—the pneumogastric—the great sympathetic including the vasomotor system of nerves. These large current strengths can not, of course, be used with small electrodes applied in the ordinary way over the region of the sympathetic and vagus in front of the neck, and from the mastoid process along the inner border of the sterno-cleido mastoid muscle to the manubrium sterni. Here, although the current strength should be much higher than is usually recommended, it is rarely possible to exceed 10 or 15 milliamperes. For the greater strength of current, large electrodes, preferably of sculptors' clay, should be applied both to the back of the neck (cilio-spinal center) and solar plexus. With electrodes in this position I have frequently used as high as 60 milliamperes, and with results the most beneficial.

I do not, however, recommend such apparently heroic treatment. Idiosyncracies vary, and there is probably no remedy to the effects of which there is a more varying degree of susceptibility than to electricity. Every case is a law unto itself, and should be studied independently, with the exercise of judgment and common sense in its management.

But if my results in the treatment of this disease has been exceptionally good I attribute it in part to the fact that I have not confined my efforts to the use of drugs and the galvanic current alone, but have, in many instances, combined with these methods the most thorough and persistent treatment by the method of general faradization. While the methods of Eulenburg and Gutman in using simple localized faradization in the vain attempt to affect directly the sympathetic, and the faradization of the precordial region by Vigouroux and Charcot, may possibly do some good they can not compare in efficiency with general faradization, a method which has been abundantly tested and which rests upon a sound physiological basis. What localized faradization is to an individual part or organ, general faradization is to the whole body. In exclusively localized faradization, the increase in the process of waste and repair and improvement in nutrition are mainly confined to the part which is traversed by the current, but in general applications these effects are appreciated by every part of the system. The improvement which each part or organ receives from the treatment reacts upon every other part, and every effect becomes in its turn a cause.

While, therefore, I consider electricity of rather more importance than any other remedy in the treatment of this disease, yet, in many cases, the most rigid and conscientious observance of certain fixed rules in regard to eating and drinking and the avoidance, not only of excess in every department of mental and physical hygiene, and even the repression of ordinary and legitimate emotions and passions, become very essential. For the majority of these forty-five cases of exopthalmic goiter I am indebted to the kindness of various members of the profession, most of whom have watched with interest the progress of the cases and have noted both the successes and failures.

I do not propose, however, to relate the failures nor to report in detail the cases (only too many in number) which experienced only partial and incomplete relief. Some absolute failures occurred, but not many. It is rare indeed that through the combined methods of hygiene diet, drugs, and electricity the disease fails to be in some degree favorably influenced, for out of these forty-five cases, there were but three that received no benefit whatever, and these were not even temporarily relieved. Twenty-seven of these cases were benefited—some of them in very great degree, others only slightly. Some of those that were much benefited relapsed, and received further treatment with good results, while others have been lost sight of and their subsequent history is unknown. In fairness, however, it must be said that while the most persistent treatment failed to do more than slightly improve many of these cases, some of them, which otherwise possibly might have been benefited, discontinued treatment after a comparatively short period.

Fourteen of these cases either fully or approximately recovered, and as the first six have been reported[1] I shall very briefly allude to them, giving in full only the eight more recent cases.

Case 1.—Mrs. G., aged about 40, was referred to me, May 3, 1876, by the late Dr. S. S. Purple, and during the treatment and for many years after until her death, was under the constant observation of Dr. J. J. Griffiths, of New York. Pulse was violent and from 115 to 110. Exopthalmos prominent, and thyroid considerably enlarged. First symptoms three years previously. Approximate recovery, the only symptoms remaining after several months of treatment being slight exopthalmus and thyroid swelling, with occasional cardiac palpitation.

Case 2.—Mrs. H., aged 42, came March, 1877. Pulse 85 to 90. Goiter quite large, but no exopthalmos. Recovery.

Case 3.—Mrs. E., aged 31. Sent by Dr. I. B. Read, of New York, October, 1878. The three cardinal symptoms present. Pulse 120 to 125, and occasionally 150. Recovery.

Case 4.—John L., aged 29, came July 6, 1879. The three cardinal symptoms present in marked degree. Pulse 125. Recovery.

Case 5.—Mrs. C. H., came September, 1879, with the three cardinal symptoms well marked. Pulse 110. Recovery. This case examined on one occasion by Dr. P. B. Porter.

Case 6.—Miss M., aged 22, referred to me by the late Dr. C. B. Belden and by Dr. J. E. Stillwell, of New York, October 18, 1879. All three symptoms present—the exophthalmos and thyroid enlargement in greater degree than the excitation of the heart, which beats only at the rate of 88 per minute. Recovery.

Case 7.—Miss B., aged about 20, was referred to me June 11, 1882, by her physician, Dr. A. R. Carman, and by Dr. Richard Van Santvoord, of New York. This case was a very aggravated form of Graves disease. The eyes were unusually prominent, the goiter large, and the pulse seldom, if ever, under 140 and frequently reaching 160. The beginning of her symptoms dated back between two and three years and had gradually reduced her until she was unfitted for all active effort. The patient received some 70 applications, resulting in a permanent recovery. Her present condition, ten years since the cessation of treatment, is this: Pulse 75 to 85, with hardly a perceptible enlargement of the thyroid or protrusion of the eyes. The patient's general health is and has been excellent for years, and she can engage, without restraint, in all the ordinary pleasures and activities of life.

Case 8.—Miss D., aged 29, was referred to me by Dr. Stephen Wickes, of Orange, N. J., March, 1885, with the three cardinal symptoms of the disease well developed—the exophthalmos, however, being much less marked than the other two. The pulse when ordinarily tranquil was 125, sometimes considerably higher and on one occasion under excitement it beat at the alarming rate of 175 per minute. The heart was slightly enlarged, and the systolic murmur which is so frequently present in these cases, was unusually loud and could be distinctly heard even when the ear did not touch the chest. The disease was not of recent origin for some four years before, when nursing a sick relative, and subject to much physical and mental strain, she first observed symptoms of disturbed heart action, and shortly after the throat and eyes both became affected.

The patient was under observation and treatment until April, 1886, a little more than a year and in that time received 85 applications of electricity with the result of a gradual but steady improvement, not only in the condition of her general nervous system but in the special symptoms characteristic to the disease. The systolic murmur entirely disappeared; the pulse sank to a permanent rate of about 80, and the eyes resumed their natural appearance. Her general health is excellent.

Case 9.—Miss R., aged 20, was brought to me on November 16, 1887, by Dr. F. Myers, of Texas.

The thyroid was only slightly enlarged, but the eyes protruded to a degree that greatly altered her expression and was the source of much annoyance. The heart pulsated at the rate of 120 per minute, but on occasions of excitement and physical fatigue I have counted it as high as 150. These symptoms had existed some three years, but all her bodily functions were normal, and, contrary to what is usually observed, her general health and strength first class. This was one of the few cases that have come under my observation where digitalis seemed to do harm. Whenever it was given in any considerable dose, either alone or in combination, the excitability of the heart was undoubtedly increased, and this effect I attribute to the fact that, associated with the over-excited cardiac contractility, there was absolutely no enfeeblement of the heart muscles. Strophanthus proved equally unpleasant

[1] New York Medical Record.

in its effects, while veratrum viride was found to exercise the most salutary influence. No other drug was given for its direct effect upon the heart, and the treatment was practically confined to electricity alone and extended over a period of fourteen months. From November 16, 1887, to March 23, 1888, she received 66 applications, with an interval of rest until October 17, 1888, when she received 47 additional treatments between that date and January, 1889. During the first two months of treatment there were but slight evidences of improvement, but during the following two months the eyes became less prominent, the goiter perceptibly decreased in size. In March, when she temporarily discontinued treatment, the pulse had not only fallen to 100 beats per minute, but was not readily susceptible to ordinary emotional or physical causes. Seven months after, when she returned, I found her in about the same condition as when she left. Resuming treatment on October 17, she perceptibly gained during the next three months, and was finally discharged as approximately cured, the pulse seldom rising above 90, with but slight evidences of exophthalmos or thyroid enlargement. Th patient has since married.

Case 10.—Mr. B., aged about 35, was referred to me by Dr. E. Hochheimer, of New York, January 5, 1888, with comparatively slight but persistent evidences of the disease. The pulse was 100, with slight swelling of the thyroid. There existed neurasthenia with extreme melancholy, and while there was hardly any exophthalmos there was present the somewhat rare symptom of obstinate œdema of the eyelids. The patient fully recovered after 40 applications of electricity extending over a period of three months.

Case 11.—Mrs. M., a widow, aged 31, consulted me January 9, 1888, with the following history. Five years before, her first child was born after a prolonged and unusually severe labor. She convalesced slowly, and in a few months, more or less, began to notice an undue activity of the heart, with shortness of breath whenever she ascended the stairs or walked more rapidly than usual. This symptom did not greatly increase until about two years ago, when the heart began to give her more trouble and she first noticed a "strange appearance about the eyes and a fullness in the neck." The eyes were now very prominent, the thyroid about as large as a small hen's egg, and the pulse beat from 128 to 135 per minute. She was markedly anæmic and extremely nervous. The patient was under treatment from January 9 to April 7 and then again from June 8 to July 29, receiving in all some 55 applications of electricity. Recovery has been approximate and permanent. The eyes are perhaps slightly more prominent than natural but not to a degree to excite comment. There are only traces of the enlarged thyroid, while the heart pulsates at a uniform frequency of between 80 and 90 per minute. Her general nervous condition also improved to such a degree that she now counts herself a well woman.

Case 12.—Mrs. E., aged 34, was seen with Dr. J. H. Gunning, of New York, April 21, 1888. Four years before she had miscarried and subsequently had worried much over domestic troubles. Three years before her heart began to trouble her, and soon after she observed a slight protrusion of the eyes and some enlargement of the thyroid. When Dr. Gunning and I first saw her the eyes were very prominent, but the gland was only slightly, though perceptibly, enlarged. The pulse, ranged in frequency from 115 to 135 and on one occasion we counted it at 165. The patient had lost much flesh; menstruation was irregular and profuse, and with a generally nervous condition was associated a very decided muscular tremor whenever she attempted to move the hands, simulating in marked degree the tremor of paralysis agitans. The patient was under treatment, with some intervals of rest, for seven months. During this time she received 73 applications of electricity and was discharged approximately cured. The pulse seldom rose above 100 and was usually at 85; the tremor had entirely disappeared, and the eyes were quite normal.

Case 13.—Miss S., aged 25, came to me August 6, 1890, through the kindness of Dr. W. P. Giddings, of Gardner, Me., well developed evidences of Graves disease. The eyes were slightly, though distinctly, protuberant. The thyroid gland was enlarged to the size, perhaps, of a very large almond, while the pulse beat at the uniform rate of 120, running up, however, on slight exertion, much higher. All exercise was exhausting, and ascending the stairs especially so. That the disease was not of recent origin was evidenced by the history given. As far back as 1885, while a pupil at Wellesley College, the act of recitation would cause her hands to tremble and perspire and her heart to beat tumultuously. When the cause of excitement was over, the heart would resume its normal action, but she noted, as time went on, that this instability of the heart-beat became more frequent and prolonged until finally it "went wrong," always, as she expressed it. It should be stated that the patient was somewhat anæmic and since the age of 14 has suffered from myopia and astigmatism. In 1887 and then again in 1889 she had slight attacks of the grippe which occasioned a decided increase in the severity of her symptoms. The symptoms, however, that were most distressing, if not the most serious, were the frequent and terrific headaches from which she suffered. These were associated with intense nausea, lasting some twenty-four hours, and recurring almost every week. The patient was first treated through a period of seven months to March, 1891, receiving some 37 applications of electricity—improving gradually in every symptom. In July treatment was again resumed and continued until she had received some 25 additional applications. To this date the patient who is under constant observation retains all the benefit that she at first received. The pulse is 80 to 90. The eyes normal and the thyroid enlargement gone. More perhaps than all else she has been so relieved of the distressing headaches and nausea that it is only at long intervals that they occur and with very much mitigated severity.

Case 14.—Mrs. J., aged 34, was referred to me by Dr. George W. Harrison, of New York. She was in an extremely nervous condition, with a very decided enlargement of the thyroid—a pulse of 120—but no exophthalmos. She first observed some disturbance of the heart's action three years before, and a few months thereafter she detected evidences of a swelling in the throat. This patient was treated every day for two weeks, when she was obliged to leave town, but in that brief period, contrary to my expectation, all the symptoms were very decidedly alleviated. After a thorough and prolonged séance of galvanization of the sympathetic, central galvanization and general faradization, the pulse invariably subsided some 15 or 20 beats, only to rise somewhat during the next few hours. It was every day noticeable, however, that the pulse beat with less violence and frequency, and when she left town it rarely rose above 100.

The method of treatment adopted by me was carried out by her family physician, Dr. J. W. McLaughton, of Austin, Tex., and according to a communication from the patient the pulse was finally reduced to 80 and 85.

PHILOSOPHY OF THERAPEUTICS.

By L. B. ANDERSON, M. D., Norfolk, Va.

DEFINITION.

Therapeutics is the grand objective point of all medical study and investigation. The philosophical and scientific application of remedial agencies to the relief of suffering humanity involves a comprehensive view of the physical and mental constitution of the patient, as well as an accurate acquaintance with the vital functions, their relationship to each other, and the indications of their aberration from a legitimate and normal condition. On this foundation must rest, and from it must spring, every indication for the use of remedial agents, whether for the restoration of impaired functions or the removal of organic derangement.

IMPORTANCE AND DIFFICULTIES.

(1) As "life," in the language of Bichat, "is the totality of those functions which resist death," so health is an expression of the harmony and unity of all the vital manifestations. Disease, therefore, is but a suspension or aberration of one or more of those functions. Therapeutics must, consequently, deal with the restoration and rectification of such suspensions and aberration. The application of a sound scientific therapia requires observation the most minute and accurate, and a judgment the most profound and discriminating. The phases of functional derangement are often so obscure as to require the most patient investigation, and even then it is difficult to determine whether the trouble is local or reflex, specific or sympathetic. Hence, when remedies are claimed as effective in a certain group of symptoms, it is often uncertain whether their action has been exerted directly on the organ ostensibly deranged, or reflectively through some other organ or organs. This constitutes one of the great difficulties in determining the therapeutic value of any remedy, the *modus operandi* of which has not been definitely determined. It is not, therefore, surprising that many agents which are vaunted as endowed with remarkable curative powers are soon discarded by the observing and discriminating as comparatively worthless.

(2) Another difficulty, which confronts the therapeutist, is the want of reliability in the agents which are prepared for his use. It is evident that every medicinal

preparation should express the exact physiological effect of the agent it purports to represent, otherwise no certain and uniform results can be secured, no matter how accurate the diagnosis or scientific the prescription. Very many medicinal agents in the vegetable kingdom are of inestimable value when used in the green state, which are either useless or injurious in a dry state. Many again are mild, efficient, and reliable when used in infusion or tincture, which become harsh, acrid, nauseous, and highly objectionable when used in powder. This is, no doubt, one cause of the great discrepancy between the statements of medical men in regard to the *modus operandi* of certain agents.

(3) Another difficulty with which the therapeutist has to contend is the contrariety of opinions and teachings among medical authors, in regard to the physiological effect upon certain organs or tissues of a given agent. Thus, no doubt, some old author, from the internal use of the powdered root of sanguinaria, which is acrid and plastic, and hence very difficult of expulsion from the villous coat of the stomach, inferred that it was "an acrid, narcotic emetic." For many years every author of works on therapeutics has repeated this declaration *verbatim et literatim,* until within the past year a new candidate for popular favor has improved upon the old authors by declaring that it "may cause hypercatharsis and act as an irritant, acronarcotic poison." For forty years the writer has been using sanguinaria in tincture and sirup in all conceivable rational doses, in the weak and strong, old and young, in catarrh, laryngitis, bronchitis, diphtheria, croup, pneumonia, etc., often pushing it in very young infants to active emesis, and he has yet to observe a case of catharsis, prostration, or narcotism, or any condition approaching either following its use. The assertions of these authors are a delusion and a snare, and are calculated to bring into disrepute one of the most valuable articles of the materia medica, when properly prepared from carefully selected and preserved root.

Again, we are told by Ringer, Stillé and Maisch, Bennet, and others that "calomel is not a cholagogue, but diminishes the secretion of bile." Nothing could demonstrate the unreliability of so-called "high authorities" better than this declaration, to the practitioner who has for forty years practiced medicine amid the prevalence of all kinds of biliary derangements, and has tested all known drugs in torpor of the liver, suspended secretion, infarction of the gall bladder with inspissated bile, and has found all unavailing until a full dose of calomel was used. From our own experience and observation in the use of calomel in torpid liver in thousands of cases, as well as often and over in our own person, we have no hesitation in affirming that it is the most certain, reliable, and efficient cholagogue in the materia medica.

Experiments on dogs and other lower animals are utterly unreliable and delusive as to the *modus operandi* of medicinal agents on the human species in a state of disease.

The contrariety of opinion in relation to the physiological action of these two important therapeutical agents, one in the vegetable and the other in the mineral kingdom, has been adduced as an illustration of some of the many difficulties which environ a student of medicine in reaching a reliable conclusion in regard to factors which constitute his armamentarium in this field of his work. It is apparent that no substantial progress can be made in therapia, until more reliable facts are secured, and more philosophical and logical processes are adopted in securing incontrovertible conclusions, in regard to the *modus operandi* of medicinal agents.

PHILOSOPHY.

One fact has been clearly demonstrated in the progress of medical science which constitutes a substantial basis for therapeutical progress, and that is, that certain agents exert a specific action on certain organs and tissues. This action must be clearly defined before any practical results can follow its application. Thus, no class of medicines exert a more pervasive and salutary effect on the animal economy in a large class of diseases, than cathartics. But in the administration of agents which act primarily and specifically on the *prima via*, not only the reflex influence of the agent on the other organs must be judiciously weighed, but the condition of the lining membrane of the bowels must be carefully investigated, that in attempting to relieve overburdened organs in other localities we may not excite by harsh cathartics a more formidable trouble in the gastroenteric channel. The same may be said of all other classes of medicines. Fortunately for medical science there are numerous agents whose specific effects on certain organs are clearly defined—thus, there are agents which act directly upon the kidneys, whose physiological effects are diametrically opposite. One is mild, soothing and cooling; another is stimulating, heating and harsh. To decide which class is indicated, the pathological condition of the organ must be clearly defined. Pathology, therefore, is the basic principle of all reliable therapeutics. Knowing the pathological condition of a given organ, and its physiological and pathological relation with other organs, will suggest the nature of the remedy required for its relief. The diversion of the mind from the true pathological condition, in quest of the cause which produced it, and the treatment of disease from that standpoint, will be to substitute empiricism for philosophy, and hypothetical factors for clearly defined scientific indications.

What matters it if we find tubercles in the cervical, pulmonary, or mesenteric glands, if we know that such medicines as will arouse healthful action in the absorbents, elaborate healthy blood, promote rapid assimilation, and energize the excretory functions, will remove them, whether they arise from Koch's bacilli or defective nutrition? What matters it if fevers arise from cryptogamia, bacteria, zymosis, functional aberration, inflammation, or so-called malaria, if we know that so soon as all the organs are restored to a proper functional activity the fever disappears? The only answer to these questions is found in a comprehension of the true pathological condition of the organ or organs affected, and the *modus operandi* of the agents requisite to overcome it.

In demonstration of the correctness of this conclusion we will state that in olden times Dr. Baynham, of Virginia, before the introduction of vaccine virus, opened a hospital for the inoculation of persons with smallpox virus. From old men who were treated by him in their youth the writer learned that he gave them one or two purges, confined them to a bread and milk diet, and carefully examined into the condition of all their organs before he operated. Nor would he then, if he found an impaired function or diseased organ. Under such treatment his patients would scarcely be sick at all—having only a slight fever and malaise for a few days. We know also that certain persons are exposed from time to time to exanthematous diseases without ever succumbing to them. They often feel badly for a few days and then it passes off without fever or eruption. Why? So elastic and vigorous are the vital functions that the virus is eliminated from the blood as fast as it incubates and before there is sufficient accumulation to subvert the vital functions or greatly contaminate the blood.

Thus we see that when a person has been exposed to any specific virus, by preserving, if possible, all the organs, tissues, and functions in a healthy condition, we may greatly modify or arrest the disease. This has been demonstrated time and again in our professional experience.

The boldness with which men proclaim themselves allopaths, homœopaths, hydropaths, etc., is a demonstration of the brazen effrontery with which they can boast of their ignorance and stupidity. To assume, as a general principle to be observed in the use of remedial agents, that a remedy should be employed to remove a given disease, which will produce a disease or condition dissimilar or opposite to that disease; or that a medicine should be employed which would produce a like or similar disease in a healthy system, in order to cure the existing disease, is as unphilosophical as it is irrational and unscientific.

In either case the principles of physiology and pathology are ignored, and the treatment based on a mere hypothetical empiricism. It measures the nature and extent of the disease, as well as the effect of the remedy, by the ostensible symptoms, and not the pathological state of the diseased organs and tissues or the *modus operandi* of the remedy on the organ or tissue. Than this, nothing can be more unsatisfactory, unreliable, or delusive, for like symptoms spring from many different causes and opposite pathological conditions.

Because a remedy in a given dose will produce a certain effect, it does not follow in reason or experience that in a smaller or larger dose it will remove a trouble similar to the one it has produced. Stimulating medicines, as a general rule, become sedatives when pushed to an extreme degree, not because their direct action in larger doses is at all different from their effect in smaller ones, but because the excessive stimulation overpowers the vital resistance and sedation follows as a necessary sequence of overaction. Thus, quinine and alcoholic beverages are used as, and denominated, *sedatives*, when their sedative action is by no means the inherent quality of the agents, but the result of the inability of the vital forces to resist their overpowering stimulation. Hence, to denominate them "sedatives" is as much a misnomer as to call bloodletting a stimulant because in some cases of congestion it frees the vaso-motor centers from oppression and liberates the oppressed circulation; hence the use of stimuli to produce sedation is unphilosophical and empirical.

While it is true that different effects are produced by similar agents when given in varying quantities, every therapeutic agent has some marked ostensible effect by which it is characterized and through which it is recognized. Thus, wholesome and nutritious food, when taken in quantities adapted to the state and condition of the digestive organs, produces a pleasant exhilaration and imparts energy and strength to the system. Let, however, the quantity be more than can be readily appropriated, a train of morbid developments arises, such as palpitation of the heart, pain in the head and sides, eructations, hiccough, heartburn, and many other troubles; yet no one would denominate any of these the legitimate effect of nutritious digestible food. Opium is properly an anodyne, but in small doses it fails to meet this requirement, and in large doses it becomes a narcotic. To effect the last object, however, it develops other effects which, however, are undesirable; such as suspending secretions, constipating the bowels, etc. If, therefore, we wish to arrive at the legitimate effect of a remedy we must adopt that dose which will produce the most decidedly sanative influence without disturbing the vital functions to any appreciable extent. This point having been gained, the remedy should be assigned to its appropriate class and used only to meet the indications designed to be filled by that class. A failure to observe this rational principle has, no doubt, brought discredit upon many valuable remedies.

An inspection of the journals of the day will disclose the fact that instead of arriving at the true physiological action of a new agent, we often are assured that it will cure many diseases whose pathological states are quite different, and for the relief of which medicines of very opposite effects are needed. Hence, it is used for the cure of diseases, for the relief of which its physiological action is not at all appropriate, some of which it may have cured by its secondary effects, owing at the time to certain accidental or adventitious influences, which now being absent, it will utterly fail to meet reasonable expectations. In the use of a new remedy we must reason from cause to effect, reaching a sound pathological basis from which arise the ostensible symptoms of morbid action, and from this standpoint read the indications for cure. Every new agent for popular favor appeals for acceptance and patronage to no higher standard than the *ipse dixit* of some so-called authority. The writer knows of no more striking illustration of this than is observed in the indiscriminate use of so-called antipyretics. Let us see.

As animal heat is the result of the operation of the vital laws whereby an equilibrium is maintained between the generating and eliminating processes, it is evident that the temperature of the human system must virtually remain the same, unless some force intervenes to destroy this equilibrium. When from any cause the vital functions are suspended or perverted, the organic laws are suspended and the laws of chemical affinity come into play, and new and strange compounds are formed by the chemical union of the dissolved tissues and discordant fluids. Fermentation, combustion, the liberation of acids and alkalies, and the formation of salts, alkaloids and other products of putrefactive decay ensue, and heat is eliminated as from a seething mass of putrescent organic matter. And, often, when life is extinct, as is the case in yellow fever, heat continues to evolve for an hour or more, reaching a temperature of 110° F. From this consummation of perverted functions in disorganization and death, if we follow nature step by step into her secret workshop we can find the key to the source of fever heat. Hence, we conclude that local inflammation, abnormal congestions, impaired functions, suspended secretion, disintegrating tissues, forming alkaloids or other new and noxious combinations under a suspension of vital laws and the operation of chemical forces, mark well the various stages of aberration from health and the true source of fever heat. So soon as the counterpoise between the heat-producing and heat-eliminating forces is lost, and organic laws cease to operate, and chemical forces with their attendant febrile developments come into play, nature demands of the therapeutist a prompt interposition, not to combat the exalted temperature, for that is only an expression of perverted function, but to restore the secretions, eliminate the retained effete products of tissue metabolism, and reestablish the lost balance.

When any of the antipyretic products of the coal-oil family which now constitute the chief armamentarium of the therapeutist in this field are given, the first ostensible effect is to allay pain if any exists, or to produce a sense of quiescence and repose. The result is the nerves of sensation, both animal and organic, lose their impressibility, and the heart and arteries, responding no longer to the impression of the irritating agents elaborated by the progressive chemical changes, sink to a state of repose. Oxygenation of the blood and tissues is thereby diminished, and the evolution of heat from the chemical changes is sensibly lessened.

In none of these experiments are the secretions restored or the morbid accumulations removed from the circulation, nervous centers or vital organs; hence antipyretics exert no sanative influence in fevers. The correctness of this declaration is demonstrated by the fact that so soon as the agent producing these impressions is eliminated or has expended its force, the reaction brings into exercise, often with increased potency, the chemical forces, and the temperature rises to as high or higher degree than before its use. The use, therefore, of antipyretics, or that class of medicines which reduce the temperature in fever, without any apparent effect on the secretions or evacuations, is irrational, unscientific, and unphilosophical.

As health is an expression of the unity and harmony of all the vital functions and manifestations, so disease is but a suspension or perversion of one or more of these functions. To preserve the one and restore the other is, *a priori*, the great end of all sound therapeutical philosophy.

THE ADVANTAGES OF AMORPHOUS PHOSPHORUS OVER THE OFFICIAL FORM.

By E. Q. THORNTON, M. D.

Demonstrator of Therapeutics, Jefferson Medical College, Philadelphia, Pa.

The investigations of Wegner, Bradley, Broadbent, Thompson, and others should leave little doubt as to the value of phosphorus as a stimulant to bone growth, and in the treatment of disorders due to exhaustion or wasting of the nervous tissues. The remedy, while undoubtedly possessing powers so potent for good, has the great disadvantage of not being entirely safe, as disorders of digestion, nephritis, and fatty degeneration are not infrequently attributed to its administration. On account of these untoward effects many authors have wisely insisted upon the utmost precaution in its use. As is well known, the form of phosphorus exclusively employed in medicine is the vitreous variety, from which both of the official preparations are made. Both of these preparations are open to the objections named above, and on account of the readiness of phosphorus to undergo change when exposed to the air, the pills are necessarily made by a complicated process, which renders their extemporaneous manufacture difficult. As to phosphorated oil, the other official preparation, its taste is extremely nauseous, as may be inferred from its combination (phosphorus, ether, and oil).

It is on account of these disadvantages of the vitreous phosphorus that I am led to suggest the employment of the amorphous or red variety. The amorphous phosphorus is made by heating the vitreous variety to 250° C. in the absence of air, and possesses the following advantages over the official variety: It does not readily undergo change at ordinary temperature; is almost entirely without taste or odor; therefore it can readily be made into pills at a moment's notice, it is free from irritant or caustic effect; consequently it is far less liable to give rise to irritation or inflammation of the gastro-intestinal and genito-urinary tract; but its greatest advantage lies in the fact that it is nontoxic, and therefore far safer.

That it has the same physiological effect as ordinary phosphorus, seems to be proven beyond doubt by Kelly, who, while experimenting upon himself to determine if it was toxic, experienced the full physiological effects of vitreous phosphorus. The following brief extracts are made from Kelly's essay, which has never been published:

Experiment No. 1.—For the first three days $\frac{1}{10}$ grain amorphous phosphorus was taken every 2 hours, 9 doses being taken each day. On the fourth day each dose was increased to $\frac{2}{10}$ grain, and from the tenth until the twenty-fifth day $\frac{3}{10}$ grain every 2 hours, 9 doses a day being taken.

Effect: Mental excitement, headache, vertigo, priapism, nocturnal emissions of semen, followed about the twentieth day by nervous exhaustion. Return to his normal healthy condition in about two weeks after discontinuing the drug.

Experiment No. 2.—About two weeks after completing experiment No. 1, he again begun taking amorphous phosphorus in doses of $\frac{1}{100}$ grain, increased on the fifth day to $\frac{2}{100}$, and on the tenth day to $\frac{4}{100}$ grain, 9 doses being taken each day. Priapism and nocturnal seminal emissions were among the most pronounced effects. The drug was discontinued on the seventeenth day, and he soon returned to his normal condition.

Experiment No. 3.—About six weeks after completing experiment No. 2, he took at a single dose 20 grains of amorphous phosphorus. The physiological effects came on promptly. Priapism, vertigo, nausea, followed by muscular tremors, cold clammy skin, great exhaustion, and seminal emissions while asleep were the most pronounced effects. For some weeks he was in a state of nervous exhaustion, from which he gradually returned to his normal condition. He is now in good health and shows no ill effect of this rather vigorous medication.

Reese publishes a case in which 30 grains of amorphous phosphorus were taken by a young woman, with suicidal intent, no toxic symptoms having been manifested.

My own experiments upon animals are in accord with those who assert that the substance in large quantities is not toxic. My investigations as to the effect of long-continued doses are as yet incomplete.

These records would seem to indicate that amorphous phosphorus, while having the same physiological action of the vitreous variety, is to be preferred as it is much easier to administer, less irritating, and above all is a far safer remedy.

SOME VIEWS REGARDING THE PHILOSOPHY OF DRUG ACTION.

By J. W. McLAUGHLIN, M. D., of Austin, Tex.

I have been impressed for some time with the belief that the progress of medica-science has been seriously handicapped by retaining certain indefinite terms; such for example, as vital force and vital action in the sense that they imply the existence of a unique and mysterious force which is not correlated to other forms of physical energy. Therapeutics has not entirely escaped this error. While our text, books and medical writers, as a rule, are silent regarding the cause of drug dynamics; there is a widespread belief that the energy of a drug is a form of force that is inherent in the drug itself and is not correlated to other forms of physical energy.

Our homeopathic neighbors are less reticent than ourselves regarding the cause of drug potency. In fact, one of the cardinal principles of the Organon is that the dynamics of a drug results from a spirit inherent in the drug itself, and that succussion and trituration of this only serves to separate the spirit from the gross matters of the drug, and thereby enables it to better act upon the spirit-like, vital force of man's body.

It seems to me, in the light of physical science, that the medical profession must accept either a physical or a spiritual explanation of drug dynamics. If we accept the spiritual we aline ourselves with the Hahnnemanians and, I believe, place our explanation outside of scientific acceptance. If, on the other hand, we ascribe this energy to physical force, are we justified in asserting that it is an unknown, mysterious form of force? I think not, nor do I believe this is necessary.

The purpose of this paper is to outline my reasons for believing that the principles of motion in matter and those of chemistry are quite sufficient to account for drug dynamics, and when these are supplemented by the principles of biology, and legitimate deductions from them, they will indicate the nature of the therapeutic action of drugs as intelligently and far more scientifically than is done by assuming the existence in drugs, and in man as well, of an unknown, mysterious force.

I do not, however, offer this scheme as an elaborated theory of drug action; this would involve an explanation of both the dynamics of the drug and of the organism upon which it acts, an impossibility in the present knowledge of molecular physics. It is my purpose rather to outline, or suggest, an hypothesis which may eventually, when a knowledge of the factors involved becomes more accurate, be worked into a demonstrable theory of therapeutic action.

A perfected theory of drug action will then involve a scientific explanation of the dynamic energy of drugs and how this energy effects the organism in the cure of morbid action. I will pursue this line of inquiry as far as accepted principles of science will allow, and will then continue the investigation on these lines as far as legitimate deductions from these principles will justify; even then many of the details of therapeusis will have to await further light before they can receive scientific treatment.

Scientists, almost universally, believe in the discontinuous or corpuscular condition of matter. The usual form of this belief is that all material substances, whether solid, liquid, or gaseous, are composed of molecules, and these molecules of atoms.

We understand a molecule to be the smallest part of a substance in which its properties inhere. An atom is understood to be the smallest conceivable part of matter which is capable of going in and out of chemical combination. Now, as atoms are thought to exist only in combination, or couples of the same kind, which are termed molecules, especially by physicists, they must not be confounded with those molecules which are composed of atoms of dissimilar nature. Molecules in the latter sense vary in size and complexity. For example, a molecule of water is quite simple, being comprised of but few atoms, while an albumin molecule contains a great many atoms, and is massive and quite complex in its structure. An atom is regarded from a chemical standpoint as a chemical unit, while from the standpoint of the physicist the molecule or atomic couple is the physical unit.

The physical units, or molecules, are believed to have figure, polarity, elasticity, and persistent and regulated motions of two kinds, interior and translatory. The interior motions, or those which take place within the molecules, occur in periods of time that are persistent, and are distinctive of the class to which the molecule in question belongs. As my hypothesis of drug action will rest upon the correctness of the theory that molecules vibrate in definite, unvarying, and distinctive periods, I will be pardoned for introducing the views of others upon this subject. Prof. J. Clark Maxwell, whose authority and distinguished ability in physical science will not be questioned, says:

Molecules exist of various kinds, having their various periods of vibration, either identical or so nearly identical that our spectroscopes can not distinguish them. The same kind of molecules, say that of hydrogen, has the same set of periods of vibration, whether we procure the hydrogen from water, from coal, or from meteoric iron.

Henry Hobart Bates, A. M., in an address to the Philosophical Society of Washington, in 1883, says, regarding molecules and their activities:

But could the molecule even be magnified to visible and tangible dimensions, with a new light to view it by, it could not by any means be rendered visible, in whole or in its parts, on account of its incessant and marvelous activity, both interior and translatory. That the molecule did not get its interior motion from the heat of dissociation is certain, for, in being allowed to recombine, it yields up its translatory activity, and with it as many degrees of temperature as disappeared in accomplishing the dissociation. No means of wholly destroying the interior motion are known. By some savants it is regarded as primordial and ultimate. It is highly probable, for reasons which Mr. Taylor has pointed out,[1] that the hydrogen-molecule contains at least four pairs of revolving elements, revolving in different periods, and in contractile orbits, but with periods as undeviating as those of the moons of Mars. It is in the revolving or vibratory constituent of this couple that we seek the final essence of matter, though perhaps not to arrive at it.

We must not endow it with gratuitous attributes, but it is surely an entity of some kind, having, in the first place, persistent and regulated motion. Secondly, it has inertia, or mass—the property of conserving *vis viva*. Thirdly, it has some bond with its fellow by which the motions of both are modified by a constant stress according to a definite law of distance, and this, following Newton, we call attraction. Fourthly, it has the complex property of interchange of momenta, accompanied by that of conserving and compounding motion by angular rebound upon an indefinitely near approach, which we name resilliance, or repulsion. Dimension it need not have, or any other property of masses; but nobody has ever yet succeeded in getting rid of the above four.

But if the world were made of atoms and molecules alone we could never know of their existence. It is necessary to have an elastic and highly attenuated medium, permeating all space, to reproduce and transmit, as wave motions, atomic and molecular vibrations.

This medium we call the universal ether, luminiferous ether, or, simply, ether. It is believed to pervade all space and to reproduce the specific motions of all atoms and molecules; for example, the vibrations of an atom or a molecule are thus reproduced in the ether as wave motions having periods equal to those of the atom or molecule which caused them. When, now, we consider that all matter is composed of molecules, and these, perhaps, of other molecules, certainly of atoms, and that specific vibrations of these various and differently vibrating elements are reproduced in the ether as specific waves, it becomes apparent that a conflict between these must occur; coincident waves will be amplified, while noncoincident waves will be destroyed by this action.

It is well known that waves of water which coincide in crest and trough will be amplified thereby, but when the crests of one set correspond to the trough of another set of waves, they will destroy each other. Likewise, waves of light and sound will

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[1] Annual address before the Philosophical Society of Washington, 1882, p. 24.

behave in like manner under like circumstances. Sir John Herschel, in speaking of the law of interference, to the operation of which the above phenomena are due, says: "This principle, regarded as a physical law, has hardly its equal for beauty, simplicity, and extent of application in the whole circle of science." When we then consider, in the light of the principles of science above referred to, the conflict between the ether waves produced by the atomic constituents of a molecule, say, of a drug, it will be seen that some of the waves will be amplified, others diminished or destroyed, and all, perhaps, changed.

The wave motions of a molecule are then quite different from those produced by its elementary constituents, they have different periods, and represent an adjustment of the wave conflict of its atomic elements. Now it is the ether waves of the molecule which have resulted from an adjustment of its atomic waves, that, I believe, give the molecule its dynamic energy, and as the molecule is the smallest conceivable part of matter, say, of a drug, in which its properties inhere, the dynamic energy of the drug must be the sum of that of its molecules; i. e., the successive impact of its ether waves, recurring millions of times in a second, give the drug its dynamic energy.

The forms of specific energy which different drugs have, will, according to this scheme, result from differences in their molecular make-up. But the dynamic energy of a drug is quite a different thing from its therapeutic energy; the first bears a certain relationship to the drug itself, and is a constant quantity in normal conditions of the drug, while the second depends upon an additional factor, the organism in which the drug acts, and is, therefore, not a constant quantity; a drug is often harmful to one kind of animal and harmless to another. As the eye, the ear, and the nerves of the body are sensitive only to certain influences; for example, the eye to waves of light, and the ear to waves of sound, it is believed that the sensitiveness of animals to drugs is likewise the result of a definite relationship between the molecular ether waves of the drug and those of certain tissue elements of the body, and when this does not exist the animal is immune from the drug in question.

A rational theory of therapeutics, that would enable one to say how and why drugs relieve morbid action, can not, of course, be constructed on ether-wave interactions between the drug and tissue elements of the body concerned until we know in what period these waves recur; yet there are physical and physiological facts and certain pertinent analogies that lend probability at least to this hypothesis of therapeutic action. The most apparent of these are as follows, viz: (1) The tissue elements of the body offer no exception to the law of discontinuous or corpuscular nature of matter, or that the molecules and atoms of these vibrate in definite and distinctive periods. (2) Organic molecules, such as compose living organisms, and especially the albuminoid molecules, which comprise the principal bulk of man's body, are exceedingly complex in molecular structure, being composed of other and simpler molecules in innumerable number. These albuminoid molecules of the body exist in many isomeric forms (that is, contain the same chemical elements and in the same proportion, but differ as to the manner these are grouped in the molecules), and have lines of weak union, like the lines of cleavage in crystals, along which they are easily broken.

Now, as the ether waves of a substance are determined more by the grouping within its molecules rather than by its chemical elements, may not the facts above related serve to explain, first, the specific action of drugs, and, second, that immunity from these which an habitué of a drug is known to acquire? The first supposition is borne out by the difference of molecular structure of the various isomeric forms of albuminoid molecules and structural differences in the molecules comprising the other tissue elements when these are considered in connection with the susceptibility of the molecules to the dynamic energy of drugs which these differences produce; the specific action of a drug upon a group of like molecules would then depend on their molecular structure and the wave periods resulting from this.

What happens to the albuminoid molecules by the wave impacts of the drug will depend on whether the waves of the two—drug and albuminoid—coincide in crest and trough. If they do, the albuminoid would most probably be disrupted, especially if its habitat is in the fluids of the body. But albuminoid molecules of the solids of the body are more firmly united to their fellows, and, therefore, might not be disrupted by the dynamic energy of the drug. More likely, the ether waves of the drug would find vulnerable points along some of the lines of weak union of the molecules, and, attacking these, would simply change the molecular structure of the albuminoids, and would, thereby, give them that immunity from the drug which follows its constant use. If, on the other hand, the waves of the drug, and those of the albuminoid molecules, do not coincide in crest and trough, then the tendency of the first would be to antagonize or destroy those of the second.

The analogies which I shall offer in support of this hypothesis of therapeutic action are derived from the principles of heat, light, electricity, and sound. There are but few principles of science, whose truth rest upon accurate demonstration, and are more firmly established in the opinions of scientific men than is the belief that these forces of nature—light, heat, electricity, and sound—are essentially wave motions. And as these forces are known to have wondrous energy, and to be capable of producing changes of a pathological and curative nature in the living organism, is it not probable, at least, that other waves, say, those of a drug, may also exert an influence, and that the potency of the drug rests in the susceptibility of tissue elements to the dynamics of the drug?

The therapeutic power of these agencies, and their various methods of application, are so well known that it is deemed unnecessary to recount them here. Sound is, perhaps, the least potent in its therapy than the others. Yet the effect of sound waves over the emotions and passions is certainly very great. For illustration, martial music inflames man's military ardor, sacred music excites his religious emotions, while the soporific effect of monotonous musical tones is well known. For illustration, the pattering of rain drops, the sound of a distant waterfall, and the nurse's lullaby.

Now, with the lights before us, we must refer the distinctive energy of the forces named to peculiarities of their wave periods, and it is therefore not unscientific, in view of the facts recounted, to also refer the distinctive energy of a drug to peculiarities of its wave periods.

SUMMARY.

The principle features of this hypothesis may be summarized as follows, viz: The dynamic energy of a drug is derived from its molecular ether waves, and these are the sum of those produced by the vibration of its atomic constituents, plus their adjustment by interference.

The specific energy of a drug is derived from the specific character of its molecular waves; and the specific character of the waves are determined by (1) the chemical elements of the drug molecule, and (2) the order in which the atoms and elementary molecules are grouped in this.

The therapeutic energy of a drug is determined by the susceptibility of organic molecules of the organism acted on, to the specific energy of the drug.

The degree of susceptibility of an organic molecule to the specific energy of a drug is in direct ratio to the coincidence of their wave periods.

The degree of immunity of an organic molecule from the specific energy of a drug is in an inverse ratio to the coincidence of their wave periods.

Coincidence in crest and trough of the molecular waves of the drug and those of susceptible organic molecules will tend to disrupt the latter. Noncoincidence of these waves will tend to inhibit or disarm those of the organic molecule by weakening or destroying its wave motions. In either case the organic molecule will have acquired immunity from the drug.

These views are either based on the following accepted principles of science, or on legitimate deductions from them. They are as follows: (1) The discontinuous or corpuscular condition of matter. (2) All matter, whether gaseous, liquid, or solid, is composed of molecules, and these molecules of atoms or elementary molecules. (3) Atoms vibrate in periods that are persistent and regular: that is, the vibrations are distinctive of each kind of atom. (4) The principles of wave motion; and (5) The isomeric forms of albuminoid molecules and their unstable and complex character.

The hypothesis is also strongly supported by the conviction that the therapeutic value of light, heat, electricity, and sound must be referred to peculiarities in their wave periods, as that of drugs is to peculiarities of their wave periods.

NOTE.—Since writing this paper, my friend, Dr. T. J. Tyner, of Austin, Tex., has related some remarkable results, obtained from hypodermic injections of pilocarpine in opacities of the vitreous humor, that seem to strongly confirm my proposition, that the dynamic energy of drugs tends to disrupt those albuminoid molecules of the fluids of the body having periods which coincide with the drug. The doctor says that he has completely cured many cases of opacity of the vitreous—some of several years' standing—by the hypodermic administration of pilocarpine; and as the vitreous humor does not contain blood vessels, nerves, nor lymphatics, except in the prenatal state, it becomes interesting to know how the drug effects the cure. In the absence of lymphatics, it can hardly be claimed that the opaque material is absorbed, and, in the absence of nerves, can the cure be brought about through nerve action. May it not be caused by the dynamic energy of the drug—its molecular waves—disrupting the opaque molecules of the vitreous? This scheme would require that the molecular waves of the drug and the opaque molecules coincide in periods and in crest and trough. Assuming this to exist, then the drug molecules when brought in contact with the opaque molecules of the vitreous, by means of the lymph spaces, would disrupt these by its wave impacts.

ACTION PHYSIOLOGIQUE DE QUELQUES PLANTES BRÉSILIENNES DE LA FAMILLE DES MÉNISPERMACÉES.

Dr. J. B. de LACERDA, Rio de Janeiro, Brésil.

La famille des Ménispermacées compte au Brésil un certain nombre de plantes médicinales, employées empiriquement par des gens du peuple.

Nous avons cherché étudier ces plantes sous le point de vue de l'action physiologique, et nous avons constaté que parmi elles il y en a quelques unes qui sont assez toxiques; tels sont l'icú (*Anomospermum grandifolium*, Eichl.), qui n'est pas autre chose que le *Cocculus Amazonum*, Mart., une des plantes actives du curare des Indiens Ticunas; l'abutua major (*Bothriopsis platiphylla*, Saint-Hil.); l'abutua minor (*Cocculus philipendulum*).

De ces trois ménispermacées la plus toxique est l'icú. Ceci est une plante des forêts vierges des Amazones, et nous l'avons fait apporter de Tabatinga, aux limites du Pérou. C'est une liane à feuilles assez larges; c'est avec l'écorce de la tige que nous avons préparé des extraits pour en expérimenter l'action sur les animaux. Quinze à vingt gouttes de l'extrait fluide de l'icú, injectées sous la peau des cobayes, les a fait mourir dans un quart d'heure.

C'est un poison vasculaire; il annulle la tension artérielle d'une façon brusque lorsqu'on fait l'injection intraveineuse; il paraît agir en paralysant les centres vasomoteurs de la moelle.

Quoique moins actives, les autres ménispermacées ci-dessus énumérées agissent de la même manière.

Il y a des rapports à établir entre l'action physiologique de ces plantes et celle de la péreirine, un principe résineux, amorphe, fourni par une apocynacée, nommé vulgairement Pau-Pereira (*Geissospermum Vellosum*).

Cette apocynacée et son principe résineux, la péreirine, sont, depuis longtemps, employés au Brésil comme fébrifuges.

UNE PLANTE CONVULSIVANTE DU BRÉSIL.

Dr. J. B. de LACERDA, Rio de Janeiro, Brésil.

Dans l'État du Pará il croît aux alentours des cabanes des Indiens une plante nommée parmi les indigènes Conamby. C'est un arbrisseau de la famille des Synanthérées, très employé par les Indiens pour pêcher les poissons dans les rivières. Ils en jettent des tiges coupées en morceaux et des feuilles dans l'eau; au bout de quelque temps les poissons étourdis montent à la surface de l'eau, où ils sont attrapés.

Ce fut le Dr. Clément Jobert le premier qui a fait des essais pour constater les effets toxiques du conamby.

Au retour de son voyage aux Amazones il m'a fait le plaisir de communiquer qu'il avait trouvé dans le conamby un poison convulsivant formidable.

Comme il avait expérimenté dans des conditions mauvaises, nous avons repris ces expériences dans le laboratoire du Musée National, et nous avons réellement constaté l'action toxique convulsivante du conamby.

Toutefois, il faut bien entendre, quoique un convulsivant, il n'est pas du tout un tétanisant tel qu'il est la strychnine, la brucine, l'igarurine.

Son action ressemble beaucoup à celle de la picrotoxine, le principe actif de la coque du Levant. L'extrait alcoolique délayé dans l'eau et injecté en quantité dans les veines d'un chien provoque une attaque de convulsions cloniques, précédée d'un cri aigu, avec augmentation de la salive, ralentissement excessif du cœur et projection des yeux hors les orbites. Ces attaques se répètent par crises, et quand elles sont finies l'animal reste anéanti, abruti.

Seulement l'extrait préparé avec des feuilles en état frais est capable de donner ces effets. Cela me fait croire que la substance toxique existant dans les feuilles est volatile.

La forme d'empoisonnement provoqué par l'extrait du conamby dit bien que cette plante mérite être classée parmi les poisons du bulbe.

CONTRIBUCIÓN A LA TERAPÉUTICA DE LA FIEBRE AMARILLA. NOTICIA DE LAS ESPERIENCIAS PRACTICADAS EN LA CÁMARA POLAR POR ORDEN DEL GOBIERNO GENERAL DE CUBA.

Por el Dr. PEDRO PEÑUELAS,
Inspector Medico, Jefe de Sanidad Militar de la Isla de Cuba.

Dada la importancia que tiene la fiebre amarilla para los paises americanos, es de suponer que este enfermedad adquiera preferente estudio por parte del Congreso Pan-Americano. En tal concepto he creido oportuno dar cuenta de la información preliminar rendida por la comisión nombrada por el gobernador general de esta isla, en el estudio que está haciendo de la cámara polar del Dr. García.

El cuerpo de sanidad militar de Cuba ha tomado parte siempre en los trabajos dedicados al estudio de la fiebre amarilla, ensayando cuantos tratamientos se han propuesto en el orden científico, y las autoridades de este país han patrocinado en todo tiempo estos ensayos. Nuestras estadísticas han ido disminuyendo en las cifras de mortalidad. (Estracto de las actas de la comisión.)

Primera sesión.—Se constituye la comisión y el Dr. García expone á la ligera el fundamento de la teoría que le sugirió la idea de emplear el aparato llamado cámara polar; siendo replicado por el Dr. Belver. El Dr. García presenta una estadística de los enfermos tratados por su procedimiento. Plano de la cámara que propone el autor.

Segunda sesión.—El vocal químico, Dr. Gaston Alonso Cuadrado, da cuenta de los aparatos de experimentación necesarios para hacer los ensayos químico-biológicos.

Tercera sesión.—Se acuerda suspender los trabajos por haberse ausentado el Dr. García de la población.

Cuarta sesión.—Se ordena por la superioridad que se dé informe de las esperiencias practicadas por la comisión, y está acorde que solo puede darse un informe preliminar.

Quinta sesión.—El vocal ponente, Dr. Felix Estrada y Catoyra, lee el informe preliminar, expone las esperiencias que confirman que el frio puede detener la vida de los microorganismos, pero no los destruye, citando á Pasteur, Tédenat y otros. Hace la historia de las aplicaciones terapéuticas del frio en la fiebre amarilla. Masnata y Fiaschieri en 1861 rodeaban de hielo las salas de los enfermos. Bavlot en 1878 propuso una especie de tienda de lona aplicando el aire frio, seco y oxigenado con electrización de la mezcla gaseosa. Despues de este año el Dr. Ronre y el Dr. Hernandez Bucho idearon unas habitaciones refrigeradoras. Gamgee, de Londres, indica las aplicaciones del frio en la desinfección de los buques epidemiados, empleándose el sistema en Nueva Orleans. Los Ingleses usaron los "*ice bags*" en su escuadra de Jamaica. Los Drs. Bango y Espala aplicaron vestidos semejantes en 1883. La cámara polar difiere algo de estos procedimientos, por más que el medio terapéutico sea el hielo para refrescar la atmósfera que rodea al enfermo.

Exposición de las historias clínicas de los nueve enfermos que fueron asistidos por la comisión.—Juicio que merece al vocal ponente el tratamiento, por ahora no se puede decir nada definitivamente, se ve modificar el estado general de los enfermos, cree que hay una acción inhibidora del bulbo raquideo, estima que el descanso de las vias digestivas favorece algo, así como la obscuridad en que permanecen los enfermos; y que puede en resumen considerarse á la cámara polar como un buen medio ó habitación higiénica para colocar á los atacados de la fiebre amarilla, pero que deben introducirse modificaciones en el aparato, presentando un plano que le fue facilitado á la comisión por un oficial de artillería.

En la última sesión el Dr. Belver combate la cámara polar, y cree no llena el objeto que el inventor se propone.

Organizado el servicio, y repartido el estudio de los trabajos, la comisión se propone este año dar un dictamen definitivo, teniendo vivos deseos que los resultados sean favorables, pues en interés de la medicina y de la humanidad está el resolver el problema de la terapéutica de la fiebre amarilla, para ver si podemos borrar el "lasciate ogni speranza" que parece se cierne sobre los paises donde esta enfermedad es endémica.

ALGUNAS APLICACIONES DE LA CREOSOTA DE HAYA.

Por el Dr. ENRIQUE E. LÓPEZ, Ocolán, México.

He usado la creosota blanca de haya con buenos resultados en el uzagre y la tiña. Para el primero, solución acuosa al medio por ciento; y en la segunda, agua 150 gramos, creosota 1 gramo.

En la mentagra al 1 por ciento. En la psoriasis difusa, glicerina 30 gramos, creosota 1 gramo. En la disentería aguda de las inmediaciones de tierra caliente la fórmula ordinaria ha sido: Agua 500 gramos, creosota 2 gramos 50 centígramos, en cinco lavativas, una cada dos horas antecedidas de una grande emoliente. Bebidas emolientes al interior y dieta lactea.

OBSERVACIONES.

N. N., de 34 años de edad, temperamento nervioso, constitución mediana. El 21 de mayo de 1890 tuvo de catorce á diez y seis deposiciones disentéricas. Dia 22, tratamiento dicho, en la noche medio gramo más de creosota en 150 gramos de agua para dos enemas con intérvalos de seis horas. Dia 23, suspención de la creosota enemas emolientes. Dia 24 alta, ni recidiva ni recaida.

N. N., 19 años, temperamento sanguineo, constitución buena. Diagnóstico: Disentería aguda, como el anterior. Tratamiento citado. Dia 6, reduc- ción á la mitad de la fórmula, y á dobles intérvalos. Dia 7 alta, ninguna consecuencia.

N. N., de 34 años de edad, temperamento nervioso, constitución mediana, costumbres morigeradas de siete años atras, y antes masturbador tenaz, por cuyo motivo aún sufria poluciones nocturnas. Lo ví por primera vez el 22 de mayo de 1890, habia tenido el dia veintiuno, de catorce á diez y seis deposiciones y las nueve ó diez últimas algo abundantes pero con sangre. El dia de la primera visita vientre doloroso, pulso pequeño á 94 por minuto, temperatura á 37.8, lengua saburrosa, sed intensa y mucha repugnancia por los alimentos sólidos. Hasta las 11 de la mañana en que lo ví, once deposiciones características, desde las cinco de la misma. En el resto del dia solo hubo cuatro deposiciones sin cólico, pero con fuerte tenesmo. Le prescribí crema de leche á la margen del ano y medio gramo más de creosota en 150 gramos de agua para dos lavativas, una cada seis horas. Dia 23 á las 7 de la mañana, angustia epigástrica, mal sabor en la boca, cesó la sed, lengua húmeda y ménos sucia, poco dolorosa la palpación ventral, pulso á 80, temperatura 37.2 y desde el amanecer una sola deposición con muy poco tenesmo. Prescripción 0.75 gramo de creosota en 300 gramos de agua para cuatro enemas, una cada cuatro horas, y además agua albuminosa á pasto al interior. Dia 24 á la 1 de la tarde, desde al amanecer ninguna deposición, sensación de calor á lo largo del recto, todo lo demás normal. Prescripción: Lavativas emolientes, sopa ligera y pan tostado. Me despedí recomendando que se fueran aumentando los alimentos con moderación y el 31 de mayo abandonó la dieta en completa salud.

N. N., mujer de 19 años, temperamento sanguineo-nervioso y de constitución muy buena. Fue visitada el 5 de abril de 1890 á las 10 de la mañana; siete deposiciones características desde la media noche del 4, según conmemorativo, dos deyecciones por la tarde abundantes, semi-sólidas, con tenesmo y cólico, pulso el dia 5 á 102, temperatura á 38, piel madorosa, sensación de abatimiento, cara lánguida, lengua blanquecina, aliento fétido, sed, anorexia, vientre doloroso y mucho desasosiego. Prescripción: La anteriormente conocida, con todos sus detalles. Dia 6 á las 8½ de la mañana, desde la hora en que me retiré el dia anterior hasta aquella en que volví, nueve deposiciones pequeñas con poca sangre y mucha mucosidad, con tenesmo y sin cólicos, pulso á 84, temperatura á 37.3, mucho sueño, todo lo demás normal. Prescripción: Creosota 1 gramo 25 centígramos, agua 250 gramos para cuatro lavativas, una cada cuatro horas. Dia 7 á las 12½, ligera cefalalgia que atribuí á la dieta, y sensación de astricción en el ano. Prescripción: Lavativas emolientes y le permití aumentar la alimentación. El dia seguiente franca convalecencia.

O ACIDO CITRICO NA COQUELUCHE.

Por MONCORVO Filho.

Chefe de clinica encarregado do serviço bacteriologico da Clinica de Pediatria da Policlinica do Rio de Janeiro; Assistente do Laboratorio de Biolojia; Membro effectivo do Gremio dos Internos dos Hospitaes; Actual bibliothecario do mesmo Gremio; Socio fundador da Sociedade Nacional de Acclimação, etc.

Estudando os agentes therapeuticos sobre o germen que me foi dado identificar como especifico da coqueluche, segundo os preceitos indicados por Bouchard, pude verificar factos bastante curiosos.

Assim organisei um quadro em que registei os diversos resultados correspondentes a cada agente ensaiado, actuando directamente sobre o germen, ou deixando com elle em contacto em culturas.

O acido borico, 10 por cento; o benzonaphtol, 5 por cento; o salicylato de sodio, 5 por cento; a creolina, ½ por cento; o permanganato de potassio, 5 por cento; o acido phenico, 5 por cento; a antipyrina, 10 por cento; e a quinina, 50 por cento; mostraram-se mais ou menos improficuos, como verifiquei, não só sobre o germen no campo da preparação, como nos tubos de cultura, onde as colonias caracteristicas se desenvolveram sem embargo, com maior ou menor pujança.

O sublimado corrosivo (1:10,000) deu bom resultado, porem não tem emprego practico por ser toxico.

A resorcina, cuja applicação topica constitue o tratamento pela primeira vez ensaiado e com o mais proficuo resultado adoptado por meu pae, o Dr. Moncorvo, desde 1882 contra a coqueluche mostrou-se-me ser, como era de esperar, poderoso agente destructivo do microbio.

Experimentando, por curiosidade, a influencia do acido citrico, substancia ainda não estudada com relação áquella affecção, e empregandolo em solução, aquosa na proporção de 10 por cento, reconheci ser elle um excellente agente destruidor do microorganismo que serviu para minhas investigações. Essa acção destruidora tanto foi por mim observado no campo da preparação, como nas culturas, onde verifiquei a completa esterilisação do germen da coqueluche.

Animado, pois, pelos satisfactorios resultados de laboratorio propuz a meu pae, o Prof. Moncorvo, que ensaiasse em seus pequenos doentes no Serviço da Policlinica do Rio, o acido citrico no tratamento daquella affecção.

Trez casos serviram logo para a experimentação clinica, havendo parecido ser de grande efficacia aquelle agente therapeutico.[1]

O primeiro caso refere-se a um menino de dous annos e meio, preto e que entrou no serviço a 15 de fevereiro de 1892, para tratarse de uma affecção syphilitica; de 8 de abril a 7 de junho do mesmo anno, symptomas de malaria aguda, que foram jugulados pela quinina. A 22 do mesmo mez tosse com os caractéres da coqueluche, que torna-se evidente em 2 de julho. A 5 deste mez começa se a medicação por meio de badigionnages periglotticas com uma solução citrica a 10 por cento. Dez dias depois o doente estava curado da coqueluche.

O segundo caso trata-se de uma creança de tres annos, parda que apresentou-se ao serviço, em 16 de julho de 1892, com uma coqueluche intensa, tanto pela frequencia como pela violencia das quintas, que acarretavam vomitos e interrompiam o somno da doente, sobrevindo em numero de mais de dez durante a noite. Em 18 de julho encetou-se o tratamento por meio das badigeonnages com a solução citrica (10 por cento) apresentando-se a doente no dia vinte e um quasi inteiramente curada. A coqueluche neste caso dactava de tres mezes.

O terceiro caso finalmente diz respeito a um menino de 4 annos, branco, que veio ao serviço em 8 de julho para ser tratado de uma coqueluche que, comquanto dactando de quinze dias, houvera ja attingido o periodo convulsivo, tornando-se ao mesmo tempo muito violenta. As quintas acompanhadas, frequentes vezes, de vomitos, repetiam-se mais de vinte vezes nas vinte e quatro horas. Phenomenos bronchiticos. Começo de placa diphtheroide. 9 de julho: Começou-se o tratamento pela applicação topica do acido citrico; a coqueluche e os demais phenomenos começaram logo a ceder rapidamente até que em 23 do mesmo mez, vestigio algum restava da coqueluche, sendo bom o estado geral da creança. Antes de encetar o tratamento pela solução citrica, e depois da cura, eu practiquei sempre em todos os casos o exame microscopico com excellente resultado.

Do que precede parece poder-se concluir:

(1) Que ainda uma vez a experimentação de laboratorio foi confirmada pela experimentação clinica.

(2) Que da acção germicida do acido citrico, pela primeira vez, por mim demonstrada sobre o germen da coqueluche, resultou o seu vantajoso emprego no tratamento dessa affecção, como se vê dos casos aqui relatados.

(3) Que se bem não seja sua acção tão poderosa como a da resorcina, offerece no entanto grande superioridade á muitos outros medicamentos preconisados no tratamento da coqueluche.

(4) Que se pode utilisal-o com proveito como meio prophylactico administrando-a limonada citrica concentrada ou o proprio limão, ás creanças que se acharem em contacto com as atacadas daquella molestia.

(5) Que nos lugares em que se não dispuzer da resorcina chimicamente pura, poderá esta ser, com vantagem, substituida pelo acido citrico em equivalente proporção.

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[1] Resumos estrahidos das observações do Archivo do Prof. Moncorvo.

THE CLINICAL IMPORT OF KOUMISS.

By J. MOUNT BLEYER, M. D., of New York City.

From the results I have obtained I am thoroughly convinced that koumiss serves its most useful purpose in the condition I am pleased to term "tissue starvation," either in that slow form due to chronic disease or in the pernicious form resulting from acute affections.

From exhaustive clinical observation, both in private and hospital practice, I am thoroughly convinced that for general tissue nutritive value there is nothing so efficacious as koumiss.

We know that koumiss is a highly effervescent, slightly acidulous beverage, made from milk by a peculiar process of fermentation. It contains casein, the most nutritious element of milk, in a form in which it can be much more readily digested and assimilated than in the unfermented state.

The principal changes which milk undergoes, when converted into koumiss, are: The lactose is partly converted into lactic acid, carbonic acid, and alcohol; the albuminoids are partially peptonized, and the remaining ingredients separated into such a finely divided state that the digestive fluids can readily act on them. As the above changes are constantly going on in koumiss, we can readily see that it is not at all stable, and that its composition is constantly changing.

While in the first stage, when still somewhat sweet and only gently effervescent, it is called "milk koumiss," similar to koumiss made from koumissgen when freshly prepared. This in the course of a few days passes into the strong koumiss, decidedly acid and highly effervescent. While in the intermediate state it is called medium koumiss. All these conditions are under perfect control by the use of koumissgen.[1]

Koumiss when taken in large doses, should not be administered too cold. Except in cases of severe and uncontrollable vomiting, it should be given with the chill off, and will then be found very easy to digest. This point I want to impress on you, particularly when used in pulmonary phthisis, where the consumption of large quantities of koumiss is required, and where the nearer the temperature of the ingested fluid approaches that of the blood, the sooner and easier will it be absorbed and digested. A temperature of about 60° F. is found to be the best.

The next question is, in what quantities shall koumiss be taken? The first precaution to be observed is that the quantity should never exceed what the invalid's stomach can easily digest, and will also depend upon the disease for which koumiss has been prescribed. As a food, any quantity can be taken by a healthy individual.

For the last thirteen years I have given much attention to the administration of koumiss in the various forms of ailments specially here described.

I found that koumiss has given me a most excellent evidence of its power in 40 cases of diptheritic stenosis in children over 3 years of age in whom the operation of intubation had been performed.

All these patients bore this preparation much better than the ordinary bottle koumiss and other foods. It was found that in all such cases koumiss produced no specific action, but was simply the most digestible food that could be employed with the view of improving the quality of the blood and the nutrition of the body.

In the many operations which we are called upon to perform about the mouth, throat, etc., I know of no better food that serves to keep the body above par during the healing process than koumiss given *ad libitum*.

In two cases of cancer of the esophagus, the nutrition of the body was extremely low when the cases came into my hands for treatment, on account of a lack of nutri-

[1] Koumissgen is a powder resembling koumiss, but superior to it in most respects. It is in a dry form and possesses the advantages over other forms of being readily transportable, readily prepared for immediate use, and keeps in all climates. It is also less expensive than the bottle form and is much more palatable and digestible.

tious food. In these cases I intubed the esophagus and through the opening thus made kept up the nourishment of these patients by koumiss and a generous diet. Large quantities of koumiss were administered in this way. Their life, beyond doubt, was prolonged for eight months, besides relieving them from the agonies of starvation, which is the usual end in such cases. I will cite one more important case from my record book showing the importance of koumiss as a reconstructive.

A child two years old was suffering from a syphilitic tumor at the base of the epiglottis; the tumor involved the vault of the larynx, which necessitated a dangerous operation at that age. The operation of intubation was performed, and by means of the stomach pump I fed the child on koumiss for three months, until the action of the remedies employed for the treatment of this tumor resulted in diminishing its size. The child recovered without much loss of weight.

In five cases of syphilitic stenosis of the larynx, due to the formation of a web, where the operative procedure of cutting through the web was necessary, and a large-size intubation tube was wedged between the cut edges and worn for six to fifteen days until these edges healed, making swallowing difficult, both on account of the pain and large size of the foreign body in the vault of the larynx, feeding on koumissgen, by the use of the esophagal tube, was carried on for a number of days. At no time were there any symptoms of tissue starvation observable.

In several forms of laryngeal ulceration due to tubercular deposits in the last stages, painful swelling is always a most distressing symptom; in these individuals the symptoms of tissue starvation are very marked. Here I employ the same procedure, feeding them upon koumissgen through the tube, with remarkable results. In order to draw a comparative test, I allowed two cases to partake of whatever food they could swallow without the aid of the tube. The result of this experiment showed that those who could only eat with difficulty, as aforesaid, were losing ground very much faster than those fed regularly upon a sufficient amount of koumissgen through the esophagal tube.

Many other cases thus treated with koumissgen I could cite, and would advise you all to give this valuable food a thorough trial. I can highly recommend its use in all branches of medicine, as well as in my special cases.

In conclusion I would say that I have substituted koumiss, made from koumissgen (the new dry form of koumiss), in all cases where I formerly employed liquid koumiss, and find it much superior in many respects, both in regard to convenience of handling and in the results obtained. It is uniform in composition, and I find most patients will take it readily, which is not the case with liquid koumiss.

THE THERAPEUTIC USES OF PHENOCOLL, WITH SPECIAL REFERENCE TO ITS EMPLOYMENT IN MALARIA.

By DAVID CERNA, M. D., PH. D.,

Demonstrator of physiology and lecturer on the history of medicine in the medical department of the University of Texas; formerly demonstrator of and lecturer on experimental therapeutics in the University of Pennsylvania, etc.

I have already, with the collaboration of Dr. William S. Carter,[1] studied the physiological actions of this new product, phenocoll. The drug is closely related to phenacetine. It is obtained by the interaction of phenetidin (para-amido-phenotol) and glycocoll (amido-acetic acid). The *hydrochloride* or *hydrochlorate* of phenocoll, the salt most generally employed in practical medicine, occurs in the form of a white crystalline powder, soluble in water at a temperature of 62° F. (about 17° C.) in the proportion of one to sixteen parts. It is readily soluble in hot water and in alcohol,

[1] Notes on New Remedies, September, 1892.

its ready solubility being due, it is claimed, to the presence of the amide (NH_2) group. The drug is barely dissolved by benzole, chloroform, or ether. The water compound melts at 203° F. (92° C.); but the anhydrous base requires a temperature of 212.9° F. (100.5° C.). The salt, according to chemical analysis, may be represented by the following formula:

$$C_6H_4 \begin{cases} OC_2H_5 \\ NH,\ COCH_2NH_2,\ HCL. \end{cases}$$

From a solution of the hydrochloride the alkalies and the alkaline carbonates precipitate the pure base.

According to Ott,[1] phenocoll causes in frogs first, a general paralysis, followed by loss of sensibility, and finally of motility, with diastolic arrest of the heart. Both sensation and motion are destroyed owing to an action of the drug upon the spinal cord. In rabbits it causes quietude, cyanosis of the ear, and weakness of the posterior extremities.

Carter and the writer[1] found from the results of their experimental work that phenocoll, in ordinary amounts, has no effect practically upon the circulation; that large doses diminish the blood pressure by influencing the heart; that it reduces the pulse primarily by stimulating the cardio-inhibitory centers, followed by an increase in rate due to paralysis of said centers; that the final diminution in cardiac beat is dependent on an action upon the heart. On the blood itself the agent exercises no influence. It was also observed that phenocoll causes, in septic fever, a very decided fall of the temperature, the fall occurring the first hour after the administration of the drug by the stomach. The reduction of the fever is the result of an enormous diminution of heat production, without any alteration of heat distribution. Finally, the power of phenocoll to reduce abnormal high temperatures is very decided, and it does this in therapeutic doses, without depressing the circulation.

Phenocoll hydrochloride has already been tried clinically with alleged success. It has been found useful as an antipyretic, and also in the treatment of neuralgia, influenza, and rheumatism. I need only refer to the favorable reports published already by various observers, among whom may be mentioned Hertel,[2] Jacob,[3] Herzog,[3] Cohnheim,[3] Albertoni,[3] Bradenburg,[3] and others. Quite recently Klick[4] has called attention to the value of phenocoll in measles, and Beck,[5] writing on the antiseptic properties of the drug, says that "it surpasses iodoform, because it dissolves easily, is odorless, does not produce eczema, is not contraindicated in kidney disease, and, on account of its nonpoisonous effects, it can be applied to very extended surfaces."

The excellency of phenocoll in malarial diseases, as first pointed out, I believe, by Albertoni, assisted by Novi, Prate, and Venturini, has been confirmed later by the observations of Crescimano,[6] Dall 'Olio,[7] Cucco,[8] and Cervello.[9]

Albertoni reported successful results with the use of phenocoll in 22 cases out of 29 of paludal disease. Cucco, according to his preliminary report, treated 84 cases of malaria with the same drug. Brilliant results were obtained in 52; in 21 the value of the medicament was uncertain, and in 4 cases it failed to do any good. The other 7 cases were not observed sufficiently long to give any accurate information.

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[1] The Modern Antipyretics, 1892.
[2] Deutsch. Med. Wochenschr., April 9, 1891.
[3] Notes on New Remedies, February, 1892.
[4] Notes on New Remedies, June, 1893.
[5] N. Y. Medical Journal, April 22, 1893.
[6] Berlin Correspon. in Notes on New Remedies, May, 1893.
[7] Gazet. degli Ospitali, January 14. 1893.
[8] Therap. Monatshefte, No. 4, 1893.
[9] Archiv. di Farmacol. e Terapeutica, 1893.

It may properly be said, perhaps, that in the whole and almost infinite range of therapeutic science, the nearest approach to specific treatment of disease is that of mercurials and iodides in the different forms of syphilis, and of quinine in the various types of malaria.

Almost from time immemorial quinine has been known to destroy marsh fevers, the drug acting in such cases evidently as a specific. The empirical knowledge of yesterday has been strengthened by the biological science of to-day. Indeed, it is now known that the alkaloid of cinchona acts, not only as an antipyretic, but that as an antiperiodic it exercises a direct influence on the plasmodia.

It will be remembered that as far back as 1765 Pringle called attention to the fact that cinchona bark, in powder or decoction, has the power to arrest or prevent putrefaction in flesh, a discovery which has been confirmed by the researches of Hallier[1] and other observers, and more especially by the studies of Binz.[2] Councilman has recently shown that quinine does act on the plasmodia of the paludal disorder; and again, Romanowsky[3] has observed the regressive changes in the malarial parasites, brought about by the administration of quinine. Laveran[4] had already stated that the efficacy of quinine in paludal fever depends upon a specific destructive action of the drug upon the hæmatozoa. But I shall not go any further into this matter, so interesting from a scientific point of view. I may be allowed to add, however, that there are typical cases of malaria which resist the action of quinine. In corroboration of this, Councilman found that neither quinine nor arsenic exercises any action whatever upon the crescentic organisms. This phenomenon has not been fully explained, although Wood[5] suggests that "it is indeed not altogether certain that these (the organisms) represent one of the life stages of the segmenting organisms and have etiological connections with malarial fever."

I fear I have digressed too much from my present theme. Returning, therefore, to the subject proper, I may state that my chief object in preparing this brief article is to record a few cases of malarial intoxication in which excellent results were obtained from the administration of the new agent under study. My short experience appears to corroborate in the main the observations of Albertoni, Crescimano, Dall 'Olio, Cucco, and Cervello.

In a recent visit to a malarial district I had opportunity to make a number of observations in the treatment of paludal fever with phenocoll. A few of these cases had already been treated with quinine and arsenic with little, if any, success; and it is worthy of note that in many of the cases that resisted the action of quinine and arsenic, the new remedy—phenocoll—gave excellent results.

With little or no time to make a minute microscopic examination of the blood of patients suffering from malarial symptoms I simply followed the method advised by Laveran.[6] The blood was obtained by puncturing a finger, thoroughly washed and cleansed properly previously, by means of a needle sterilized in the flame of a lamp. The blood appearing at the puncture was received upon a cover glass, and distributed in a thin layer by means of a second cover glass placed upon the first. The examination was made by daylight, during or soon after the malarial accesses. In this way the spherical bodies, and sometimes the flagella, could be observed. This is all that was done, which was found to be sufficient for the purpose of diagnosis and further observation. I may state, however, that I was not always successful in discovering the parasites.

All the patients under my care were advised to follow, as strictly as possible,

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[1] Das Cholera-Contagium, Leipsic, 1867.

[2] Virchow's Archiv., Bd. XLVI, p. 68, 1869.

[3] St. Petersb. Med. Wochenschr., August 24–31, 1891.

[4] La Médecine Moderne, February 19–26, 1891.

[5] Therapeutics: Its Principles and Practice, edit. of 1891.

[6] La Semaine Médicale, December, 1890.

hygienic measures; at the same time a liberal diet, such as milk, eggs, meats, farinaceous articles of food, broths, toast, etc., was, with a few exceptions, allowed. This latter concession was an agreeable surprise to the majority of my patients who, I was assured, had been starved to death almost under the care of previous physicians.

Permit, me, then, to describe the cases that follow:

Case I, quotidian type.—J. M. D., male, schoolboy, aged 15 years. On June 28, had diarrhea and vomiting, followed by intense fever. When first seen had already suffered six well marked accesses, characterized by cold extremities, chills, and elevation of the bodily temperature. No appetite; coated tongue; fetid diarrhetic stools to the number of four or five a day; tympanitis; both liver and spleen enlarged. Rectal temperature, 39.2° C. Blood showed germs.

July 4: Gave some calomel and subnitrate of bismuth to insure intestinal antisepsis, and then ordered 1 gram of the hydrochloride of phenocoll in water in 3 doses one hour apart.

July 5: Had only two stools in the day, not so fetid; all other symptoms less marked. Rectal temperature, 38.5° C. Tongue improved in appearance; no more vomiting. Ordered the same dose of phenocoll.

July 6: Passages almost normal, two in the day; no tympanitis; tongue much less coated; better appetite. Rectal temperature, 37.8° C. Still a few plasmodia in blood. Gave 1 gram more of phenocoll.

July 7: Symptoms of digestive tract much better; no vomiting; no diarrhea and no tympanitis; appetite greatly improved; tongue almost clean; no chills or cold extremities; had one passage. Rectal temperature, 37.2° C. Blood was not examined. One gram of phenocoll, as before, was ordered.

July 8: General condition very good; patient quite bright; all symptoms of digestive tract abated; size of liver and spleen much diminished; appetite very good; tongue quite clear; patient believes himself cured. No plasmodia in blood. Rectal temperature, 37.2° C. Ordered another dose of phenocoll.

July 9: Apparently no trace of the disease. Blood showed no parasites. Patient somewhat weak yet, but appetite almost voracious; liver and spleen practically of normal size; tongue perfectly clean. Rectal temperature, 37.1° C. Drug was suspended.

July 11: No return of fever accesses observed.

July 13: Patient had a slight feverish reaction, occurring at the usual hour. Thermometer marked at the rectum the figure 38.1° C. A few plasmodia observed in blood. Administered phenocoll during the fever, and in the course of an hour and a half the temperature was almost normal. Next day examined blood, but could see no parasites. Recovery was final. I saw patient July 18 and was then enjoying the best of health. He had taken in all 6 grams (90 grains) of the drug.

Case II, quotidian type.—M. V. N., female, 18 months old. Had been ill for about two weeks; liver somewhat enlarged, but spleen markedly so; frequent vomiting, but diarrhea slight; tympanitis marked; tongue quite coated; child extremely anæmic. Rectal temperature, 40.5° C. Blood was not examined. Access of fever occurred at night, preceded by cold extremities and followed by profuse sweating; loss of appetite.

July 1: Gave her subnitrate of bismuth and ordered 5 grains of phenocoll in water in divided doses.

July 2: Had five black stools, but the rectal temperature was only 38.7° C. Ordered calomel and another dose of phenocoll of 5 grains, to be administered in the same manner as the day before.

July 3: Infant somewhat better. Two stools, still diarrhetic; tongue improved; tympanitis much less marked; liver and spleen still enlarged, the latter apparently quite sensitive. Rectal temperature, 37.5° C.; sweated very little. Ordered a third dose of 3 grains of phenocoll.

July 4: Tympanitis almost gone; had one well-formed stool; tongue comparatively clean; hepatic area of dullness diminished; splenic dullness about the same; appetite better. Rectal temperature, 37.2° C.; no sweating. Suspended medicament.

July 5: Little patient continued to improve; no more fever; tympanitis and diarrhea have disappeared; tongue clean; appetite better. Child much brighter; size of liver apparently normal, that of spleen diminished.

July 6: Marked improvement; all bad symptoms have gone; spleen almost normal size now; child playful.

July 8: Fever has not returned, and the little patient appears to have completely recovered; digestive tract in good order; spleen apparently normal in size. Child had in all 13 grains of phenocoll.

Case III, tertian type.—M. F., male, farmer, 23 years of age. Had been ill a fortnight. When first seen was much emaciated; tongue coated; liver and spleen enlarged, the latter extremely painful; vomiting and diarrhea persistent; tympanitis pronounced. Rectal temperature, 39.6° C. Fever accesses occurred at about 11 o'clock a. m., followed by profuse sweating. Chills were not marked. Examined blood and found plasmodia. Ordered salol and bismuth subnitrate. In nonfever day, July 2, ordered 2 grams (30 grains) of phenocoll in the course of the day.

July 3: Digestive symptoms improved; no vomiting, and only three stools during the day. Rectal temperature at the hour of expected access, 37.8° C., and one hour afterwards, 38.2° C. Blood still contained parasites. Ordered another dose of phenocoll of 2 grams on the following day.

July 5: No digestive disturbances; tympanitis slight; the tongue almost clean; had only two well-formed passages; appetite improved; hepatic and splenic areas of dullness much diminished; could find no plasmodia in blood. Rectal temperature, 37.5° C. Suspended drug.

July 7: Fever returned, with the appearance of parasites in blood. Ordered a third dose of 2 grams during well day, but somehow or other the attendants failed to give it.

July 9: Found patient in high fever, 39.1° C., at 12 o'clock m., with active diarrhea and frequent vomiting. Remonstrated for not having given the medicament, and ordered it to be administered without fail on next day.

July 11: All symptoms abated; liver and spleen very much diminished in size; tongue perfectly clean, and appetite voracious. Rectal temperature, 37.3° C. No plasmodia in blood. Ordered, however, a fourth dose, after which the patient entered into a frank convalescence and recovery was established. Patient received 8 grams (120 grains) of phenocoll in all.

Case IV, Tertian type.—J. D., male, school-teacher, aged 25 years. Disease of three weeks' standing. Patient had been under the use of quinine until full cinchonism had been produced, but without avail. Was first seen July 3, and was yet deaf from the effects of the cinchona alkaloid; tongue coated; colicky pains, but no vomiting or diarrhea; extreme emaciation; severe headache and backache; liver of normal size, but spleen greatly enlarged; appetite very poor. There was some orchitis present. Access of fever occurred at noon, preceded by severe chills and followed by profuse sweating. Temperature under the tongue, 41.3° C. Ordered phenocoll, 1 gram at a dose. This was followed by a diminution of the acute symtoms, but microorganisms could still be detected in blood.

July 5: Gave 1 gram in the morning and 1 gram in the afternoon.

July 6: Temperature under tongue 38.5° C.; no headache and no backache; better appetite; tongue began to clear. Plasmodia still in blood.

July 7: Ordered 2 more doses of phenocoll, 1 gram each, as before. Temperature under tongue, at 10 p. m., 38° C. Improvement continued; spleen begins to diminish in size.

July 9: Tongue perfectly clear; excellent appetite; splenic dullness very much diminished. Temperature under tongue, 37.2° C. Orchitis much improved.

July 10: Patient chilly at usual hour and showed afterwards a temperature under tongue of 39.3° C.; had a little nausea and a slight headache. Blood showed a few germs. Ordered 2 more doses of phenocoll a day for two days longer.

July 14: Patient has apparently recovered. Orchitis gone. No return of other symptoms. Temperature under tongue, 37.2° C. Tongue clean; appetite very good. No more plasmodia in blood.

July 16: Continued in good health; spleen apparently of normal size. Patient considers himself cured.

Case V, pernicious malaria.—M. F. G., male, laborer, aged 42. Had been sick for five months, with short intervals of slight improvement in symptoms. Was first examined on July 12. Complained of excruciating pain over the region of the spleen, this organ being greatly enlarged; liver slightly increased in size; no appetite; coated tongue; nausea and vomiting, but no diarrhea; on the contrary, constipation; suffered terribly from headaches. Accesses of fever occurred irregularly, sometimes in the morning, sometimes in the afternoon, sometimes at night. Patient felt chilly most of the time. Night sweats abundant and very annoying; slight dry cough, and loss of flesh. Careful examination, however, revealed nothing abnormal in the lungs. Had been taking quinine and arsenic, but had received no benefit. Rectal temperature varied from 38.2° C. to 40.1° C. Stopped all medication for a week, and placed patient under a nutritious diet only.

July 19: Examined blood in the morning, but found no parasites; blood examined again in the afternoon of the same day, when a few germs could be discovered.

July 20: Put patient on phenocoll; was ordered to take 2 grams (30 grains) a day.

July 22: Marked amelioration of symptoms; better appetite; no headache; night sweats very much diminished; cough disappeared; pain over the spleen less. Germs still found in blood. Temperature at rectum, 37.9° C. Continued the phenocoll as before.

July 24: Patient quite bright. All symptoms apparently gone. No more night sweats. Rectal temperature, 37.2° C. Spleen greatly diminished in size. Plasmodia gone; suspended drug.

July 26: Patient suffered a slight relapse. Blood showed a few parasites. Ordered phenocoll for two days longer.

July 29: Patient considers himself cured. Blood free from germs. Spleen normal size, and no more pain. Rectal temperature, 37.2° C. Recovery was final, but ordered 1 gram of phenocoll daily for a week longer in order to avoid relapses.

I could cite more similar cases, but I will refrain from so doing at present. As has already been observed by previous investigators (and my experience is corroborative) phenocoll, like quinine, is not always able to combat successfully the malarial poison. In some of the cases under my care, the new drug failed to do any good by itself, but was successful when administered in combination with quinine; such cases having received no benefit from the previous use of the cinchona alkaloid alone. In other cases, which yielded perfectly to quinine and arsenic, phenocoll was powerless. Similarly, in a third class of cases, rebellious alike to arsenic and quinine, phenocoll did absolutely no good either, although it seemed to act always as an antipyretic. It is worthy of note that in most of these rebellious cases (at least in the majority of those in which the blood was examined microscopically) the plasmodia were generally found in the blood, even when the system was apparently saturated with either of three medicaments. Recovery in these rebellious cases was obtained alone by change of climate.

The following records may be of interest:

Case VI, Quotidian type.—A. G. L., female, housewife, aged 21 years. Disease of one week's standing. Accesses of fever occurred at noon, accompanied with all the characteristic acute symptoms of the disease. There was loss of appetite; coated tongue; pain over splenic region, with enlargement of the organ; liver also slightly enlarged. Patient had headache and backache; chilly sensations most of the time. Temperature under the tongue, 41.5° C. Patient first came under my observation.

July 8: Blood showed parasites. Placed her on full doses of quinine.

July 10: No improvement as yet. Complains of deafness and fullness of the head, in fact, of all the symptoms of cinchonism. Blood still showed germs. Temperature, 41° C. Discontinued quinine.

July 12: Patient about the same. Cinchonism, however, gone. Temperature, 41.2° C. Parasites still in blood. Resumed quinine.

July 14: Cinchonism reappeard, but no improvement in the condition of the patient. Temperature, 40.9° C. Plasmodia still present in blood. Discontinued quinine and waited for further developments.

July 17: Patient a little worse; quite weak; complains of headache, backache, and pain over the spleen. Temperature, 40.9° C. Did not examine the blood. Ordered phenocoll in 1-gram doses, twice a day.

July 18: Temperature, 38.5° C., but all other symptoms about the same. Plasmodia in blood. Continued phenocoll.

July 20: No improvemnt, but patient believes her fever is better. Temperature during the usual access, 38.2° C. Blood not examined. Discontinued phenocoll.

July 21: Patient worse. Temperature, 41° C. Blood showed parasites. Ordered a combination of quinine and phenocoll, 5 grains each, three times a day.

July 22: Some improvement in all symptoms; tongue not so coated; pain over spleen, very slight; no headache or backache; better appetite. Temperature, 37.6° C. Still a few plasmodia in blood. No symptoms of cinchonism. Continued combination.

July 26: Patient very bright and believes she is well. Spleen and liver reduced in size. No pain anywhere. Appetite very good. Temperature, 37.4° C. Could find no parasites in the blood. No cinchonism as yet. Ordered the continuation of the same medicine.

July 28: Patient apparently well. No fever, no pain, no parasites in blood. Liver apparently normal in size; spleen greatly diminished. Suspended the combination.

July 31: Found patient exceedingly bright. She eats with an excellent appetite. Convalescence may be said to have set in, and final recovery established.

Case VII, Quartan type.—P. N. Z., male, clerk, 24 years of age. Did not remember exactly how long he had been sick, but probably about three months, with a few intervals of improvement. Had taken quinine, then arsenic, to saturation of the system almost, without any benefit whatever. His chills and fever would come all the same. When first seen, June 29, he had not, according to his statement, taken any more medicine for about a week. He had been advised by friends to take lots of mescal (an alcoholic beverage manufactured from the century plant, agave, and almost worse than pulque so far as intoxicating properties are concerned). He had taken a few full doses, but had received no benefit. Spleen much enlarged and painful; liver of normal size. Patient was weak and had absolutely no appetite. His temperature under the tongue varied from 38° to 39.5° C. I advised him to abstain from everything except, of course, food, for a period of a week.

July 7: Examined blood, and found that it contained malarial parasites. Ordered phenocoll, in 1-gram doses twice a day.

July 10: No effect. Temperature, 38.5° C., but patient about the same. Plasmodia in blood. Continued drug in same quantities.

July 12: No improvement, although temperature had been reduced to 37.8° C. Plasmodia still in blood. Continued phenocoll, 1 gram a day only.

July 14: Patient about the same. No amelioration whatever. Microorganisms present still in blood.

I continued to see this patient almost every day until July 18, but never noticed any improvement of any kind. I then suspended the phenocoll, and advised him to change climate and go to the mountains. He followed my advice, and about a week afterwards wrote to me that he was doing very well. According to further reports from the patient, recovery was apparently completely established in about three weeks from the time he had left home. In this case medicine was useless.

The few cases here detailed are sufficiently self-explanatory. I will, however, give a brief analysis of all the cases that came under my care, and which were subjected to the action of phenocoll alone. Twenty-eight cases were thus observed, of which 21 were successfully treated by the drug. In the other 7 the failure of the new medicament to do any good, was complete, although, as stated before, it always seemed to be able to reduce the abnormal bodily temperature. This is diametrically opposed to the statement of Dall'Olio, that is, as regards the value of the drug as an antipyretic; but it agrees with the experience of Cervello, who has stated that phenocoll is not only highly serviceable in intermittent fever, but that it is also a decided antithermic.

Of the 7 failures, 3 cases yielded afterwards to quinine, and the other 4 in which even quinine had done no good, were finally cured by the administration of arsenic.

In therapeutic doses, phenocoll possesses no poisonous properties and is well borne by the stomach. Some of my adult patients took 1, 2, and even 3 grams a day for four, five, and more days consecutively without experiencing any disagreeable after-effects from the drug.

Now, it would be of scientific interest to know how phenocoll, when successful, acts in malarial fever. Does it, as is claimed for quinine, exercise a direct influence on the plasmodia, destroying them or arresting their development? It is true, the remedy sometimes fails completely, as has been shown, to combat successfully paludal intoxication, this failure appearing to correspond precisely with the non-disappearance of the peculiar parasites from the blood of the malarial patients. The same phenomenon is sometimes observed with quinine and even arsenic, the administration of these substances being followed by no effect whatever on the disease in question.

It has been apparently demonstrated, particularly by the studies of Councilman, that quinine, as well as arsenic, fails to act upon the crescentic organisms. May not phenocoll behave in a similar manner?

That phenocoll may act directly upon the hæmatozoa precisely in the same way as does quinine is highly probable. The evidence brought forward in the few reports here given, as well as that of other of my cases not detailed in this paper, strongly indicates that the new drug affects the germs of malaria directly. The observations, again of Beck, appear to lead to the support of this view. This investigator found, indeed, "that phenocoll hydrochloride is probably as valuable an antiseptic as iodoform, and stronger than dermatol, aristol, iodol, pyoctanin, europhen, etc." Why may not the drug in question be also a bactericide? The point certainly is worthy of investigation.

Before concluding this imperfect paper, I wish to record my very brief experience with phenocoll in the treatment of neuralgic disease. Three marked cases of facial neuralgia, occurring in females, yielded magically almost to the influence of the drug. One case of sciatica was very much relieved by phenocoll, but in another of similar nature the new medicament proved fruitless.

As may be observed, my experience with phenocoll in the treatment of malaria corroborates that of previous investigators. The drug can not, of course, be considered as a specific in the paludal malady, but so far as observations go these appear to show that phenocoll, though not able, perhaps, to entirely replace the good old cinchona alkaloid, may claim the serious consideration of the practitioner in the treatment of malarial affections. For the present, at least, the good results obtained warrant the further trial of the new medicament in paludal disease.

VENESECTION IN THE TREATMENT OF ENGORGEMENT AND DILATATIONS OF THE RIGHT SIDE OF HEART.

By I. E. ATKINSON, M. D., Baltimore.

Upon no point in therapeutics was there more settled conviction in the minds of medical men in the first half of the present century than in the matter of bloodletting. Open works of almost any of the great medical lights of that period and one finds the testimony in its favor never uncertain, never equivocal. In one form or another it was easily the sheet anchor of the remedial art. Yet a single generation, nay, even a decenary, saw it fall into disrepute, almost with complete desuetude. It is not my intention here to consider the influences that brought about this astonishing change, this unhesitating rejection of the experience of centuries, this discredit of the opinions and conclusions of those who in many respects still claim our reverence and admiration. It is an old story (and has its analogies in many phases of the history of our race) of a good thing abused, perverted, and misapplied until turned into an instrument of such malignant power that the evil springing from it, for a time at least, quite hid its true merit. So completely has general bloodletting fallen into disrepute that it may be said safely that a majority of the medical men of the present generation have never seen, much less done, the operation of venesection. Yet, throughout these years of its humiliation, there have never ceased to be those who have held up the standard of venesection, though, for the most part, in so half-hearted, timorous fashion, that they have rather weakened their cause by the feebleness of their defense. There has been some sign, of recent years, of a disposition to reconsider the therapeutic claims of venesection in a judicial spirit and from a clinical, not a theoretical, standpoint. Surely at this date partisanship and prejudice need form no factors in such a research and, although we can hardly expect a justification of the statement made so recently as 1860 by no less an authority than the late Pro. George B. Wood (Therapeutics and Pharmacology, etc., 1860, Philadelphia, Vol. II, p. 37), that there is no more important remedy than bleeding, perhaps none which so frequently saves life, it seems likely that we will find that our therapeutic predecessors were not so hopelessly in the wrong after all.

It is not my purpose to consider in this paper the general question of bloodletting. I intend to refer briefly to but one of its aspects, one, however, in which the indications for its employment are so clear, its beneficial effects so prompt, remarkable, even life-saving, that there remain hardly any grounds for discussion. I refer to the mechanical relief to be afforded an overtaxed, distended, and dilated right heart by the abstraction of blood. This procedure receives such abundant justification both in theory and practice that an apology might almost be expected for recommending it before such an assembly as this, especially since it has been advocated repeatedly with far more convincing argument than I shall be able to offer in this short paper, and more recently by Lafleur (Bull. Johns Hopkins Hospital, August, 1891) and Pye-Smith (Med. Chir. Transact., Lond., Vol. LXXIV). The revolt against venesection, however, has been so widespread and complete that it is only by persistent advocacy that we may hope to see it rehabilitated, even in its most important applications.

Overfilling and incomplete emptying of the right ventricle may be brought about by any persistent obstacle to the free passage of blood from this chamber to the arterial circulation. Nearest the right ventricle the obstruction may be in the pulmonary circulation, as from bronchitis associated with the diminished vascular supply consequent upon the atrophic changes of emphysema, etc., or it may depend upon defects of the mitral orifice and valve; finally, but only after secondary and relative incompetence of the mitral valve, alterations at the aortic orifice and valve may form the exciting cause. Of these influences the mitral changes have most potency, mitral stenosis more notably, for reasons that are obvious and not necessary to be designated here; but in consequence of the more frequent occurrence of mitral insufficiency the latter lesion will be found to be the exciting influence in the majority of cases. Disturbances of the right side of the heart are not very prone to occur so long as hypertrophy of the ventricle is able to supply an increased energy sufficient to afford compensation to the obstructed circulation in front of it. It is only after failure of this muscular hypertrophy has begun and weakening of its power with dilatation and increased capacity of the ventricular chamber have set in that the condition we are considering is apt to arise. This usually occurs by a gradual development after long standing and slowly augmenting valvular defect; but it not unfrequently is precipitated by sudden intervention of obstruction in excess of that already present.

The most important of these intercurrent processes may be located in the lungs, as from a pneumonia, a bronchitis, especially in the presence of old emphysema. However occurring, whenever this condition is encountered venesection affords a remedial measure of remarkable power, but when the engorgement is the consequence of a rapidly developing obstruction to an already laboring right ventricle its good effects appear, at times, to be almost magical. The clinical indications for venesection under the circumstances we are considering may be quoted from an excellent paper on the therapeutical value of venesection by Dr. Pye-Smith as "general venous congestion with arterial anæmia indicated by cyanosis with dyspnœa, turgid veins, swollen liver, albuminuria, pulsation in the jugular veins, and at the epigastrium, functional incompetence of the tricuspid valve (sometimes indicated by a systolic murmur and a weak, small, and fluttering radial pulse.") The pathological chain of which these symptoms are the expression usually begins with an arterial anæmia, having its origin in an unfilled or an imperfectly emptied left ventricle, unfilled in consequence of an obstructed mitral orifice or an obstructed pulmonary circulation, imperfectly emptied. in consequence of an insufficient mitral valve. The blood obstructed in its onward passage in one or the other or all of these ways backs up into the system of the right heart, the pulmonary artery, the right ventricle, the right auricle, and into the general venous system.

The brunt of the struggle is with the right ventricle, which, unable to overcome the obstacle in front by its systole, distended during diastole by the increasing pressure of blood from behind, becomes overfull, stretched, incapable of orderly and vigorous contraction and in immediate peril of succumbing to the burden thrown upon it. As the distention of this muscle increases, so does its power steadily diminish.

Many therapeutic measures are resorted to for the relief of this condition of passive engorgement with greater or less success, but no measure will so safely, so pleasantly, so speedily, so frequently afford relief, even avert impending death as the judicious practice of venesection. By it the torrent of blood is checked and diverted, the ventricle relieved of the pressure, contracts, gathers force and rhythm, and relief, often but temporary, rarely permanent, is secured. Naturally, in many cases, all remedies fail and the patient dies; in many again the relief is only transitory, but in a fair number where the circulatory obstruction is acute, as in the sudden bronchitis that at times surprises an old emphysema with its resulting weak heart, the relief will be permanent. Taken altogether, I desire to claim openly that in the conditions above described, where the danger to the life of the patient is rapidly developed and imminent, the letting of blood offers greater chances of relief than any other remedy.

From a number of cases of successful venesection for the condition under discussion, I have selected the following:

Mr. W., unmarried; 40 years old; a builder and contractor; of medium height and robust frame. Mr. W. had had a healthy youth and early manhood. He now had scarlatina or diphtheria; some rheumatic pains in the ankle joint three years ago, but not severe enough to disable him. For years has been addicted to rather free alcoholic indulgence. He is of an active, energetic temperament. Was not thought to have heart disorder until the preceding winter. He never fainted nor complained of palpitation. Early last spring had occasion to consult a physician on account of dyspnœa. He became orthopnœic and mildly cyanotic, and had very feeble and irregular heart action. This condition lasted a number of weeks, and he slowly improved and finally resumed work. There was said to have been no albuminuria and no dropsy. He did fairly well until attacked by the prevailing influenza. This followed an ordinary course and left him with some bronchial catarrh. On January 8, 1890, he went out-of-doors, and on the 9th was seized with severe cough and dyspnœa. Symptoms of active pulmonary engorgement rapidly developed, and on the 11th, at 10 o'clock p. m., I was called to see him in consultation with Dr. L. McLane Tiffany. He was then sitting up in bed, livid; temperature, 103° F.; respiration, 55 to 60; pulse unaccountable at the wrist, being extremely feeble, irregular, unequal, and frequent.

His cough was almost incessant and brought up a very copious amount of currant-jelly-like sputum, lacking, however, the tenacious appearance of ordinary pneumonic sputum. It runs very free and liquid. He was breathing noisily and with great difficulty. Coarse and fine moist râles were heard all over the chest, quite masking the heart sounds. There was no tubal breathing. Percussion was dull, but not flat, over both lower lobes posteriorly. There was no albuminuria. A hypodermic injection of $\frac{1}{4}$ grain of morphia, with $\frac{1}{150}$ grain of atropine sulphate, was given at once, and 12 drops of tincture of digitalis given every third hour. A milk diet. 12th—easier. Sputa still copious and deeply stained; orthopnœa; respiration 48, temperature 101; cardiac pulsation 120 to 140, very irregular, intermittent, and unequal. Many pulsations not perceptible at the wrist. Apex beat felt in fifth intercostal space $2\frac{1}{2}$ inches to the left of left nipple. Very little heaving impulse. Cardiac dullness (relative) extends at level of the fourth rib, from the right border of the sternum, 11 cm.; in fourth intercostal space, from 1 cm. to right of right sternal border, toward the left, 16 cm. Heart sounds heard with difficulty, but a systolic murmur, not loud, but of a rasping character, was detected. There was no albuminuria or anasarca.

During the 13th, 14th, and 15th there was no decided change. Cough, dyspnœa, cyanosis very pronounced and surface bathed in cold sweat. No nausea, continued digitalis. Complained of intense pain in right infra-mammary region and hypochondrium. Border of liver dullness two finger-breadths below costal margin. This region was quite tender to pressure. 16th—chest clear, sputa losing color, but general condition very bad. Some delirium, cyanosis increased, extremities cold. Surface bathed in sweat, slight albuminuria. Some œdema of ankles. Expression very bad. Eight ounces of blood were drawn by cups from the right hypochondrium. This was followed by immediate relief of pain and much easier respiration (42). Pulse slightly stronger, but systolic still most incomplete. During this day took 8 drops of tincture of strophanthus every fourth hour, but his condition grew so rapidly worse that it was abandoned. When the cupping was done death seemed imminent. Pulse almost imperceptible at the wrist, deep cyanosis, urgent dyspnœa, cold sweats, slight albuminuria. 17th—some general improvement in the morning, but symptoms all became aggravated during the day, and at 10 o'clock p. m. was in extreme distress. Pulse at the wrist 96, while at the præcordium 120, very unequal pulsations could be heard. Eight ounces of blood were rapidly drawn from the right arm. While the blood was flowing the patient expressed decided feelings of relief and the radial pulse became at once stronger and more regular. He presently fell into a sweet sleep in a semirecumbent position. His complexion cleared, his surface became warm and dry, and the most comfortable night he had had followed. On the 21st the cyanosis had disappeared, as had also the albuminuria. He took nourishment well and gave every evidence of improvement. Respiration 36, temperature 100° F. Improvement was steady and in two months he resumed business. The mitral murmur and cardiac irregularity persist, but there has been no return of the grave symptoms; at the moment of venesection the symptoms gave both Prof. Tiffany and myself the impression of impending dissolution, but from that moment amelioration was as apparent to the patient, and his attendants as it was to us.

THE USE OF NITROGLYCERIN IN ARTERIOSCLEROSIS.

By THOMAS G. ASHTON, M. D.,

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But a little more than twenty years have elapsed since arteriosclerosis was first demonstrated to be a distinct and definite disease, and, as is well known, it is to Gull and Sutton to whom we are indebted for this addition to our medical knowledge.

It is necessary for us to fully understand the nature of arteriosclerosis in order that we may clearly appreciate the reasons advanced for the employment of nitroglycerin in its treatment. Equally important, also, is it for us to have a clear idea of the drug's physiological actions.

The most commonly accepted theory explaining the manner of the development of arteriosclerosis is that advanced by Thoma in a number of articles published in Virchow's Archives. Thoma finds the development of the disease to depend upon a series of conditions which conform to the following law, viz:

A slowing of the blood current in an artery that is not at once and completely counteracted by a proportionate contraction of the media leads to new growth of connective tissue in the intima, which lessens the lumen of the affected vessel, and thus restores the normal swiftness of the blood current more or less completely.

According to this law, therefore, the lesion has its origin in the media which, in some way not known, has lost its tone. As a result of this impairment of the elasticity of the media the artery dilates and, as a consequence, the normal swiftness of the blood stream is lessened. The slowing of the blood current produces, in turn, a hyperæmia of the vasa vasorum and a new growth of connective tissue in the intima, with which there is subsequently associated a similar formation in the media and adventitia. So soon as the growth of new tissue reaches such dimensions in any situation that the normal swiftness of the blood current is thereby reestablished, the sensitive nerves are restored to their normal condition, the hyperæmia of the vasa vasorum disappears, and no new tissue forms in the intima until the blood current again undergoes changes of speed and again makes operative the various factors originally involved in the production of the disease.

Now, let us see how the changes in the arterial walls will affect the various tissues and organs the nutrition of which it is the function of the blood vessels to provide for. As this degeneration is characterized by a more or less distinct swelling, the compensatory thickening of the intima projects to some extent into the lumen of the vessel, and thus interferes with the blood current. In the same manner is the orifice of the blood vessel narrowed at its point of branching off from the parent vessel.

Various and grave disturbances of nutrition may, of course, result in the organs to which these branches go, and it is conceivable that often thus a vicious circle is established. Thus, the diseased arteries supply less blood to a given organ than its proper nutrition requires and local degenerations ensue in the organ. These changed conditions call for still less blood, and there results a further disturbance in the rapidity of the current in the affected artery. This causes further changes in the vessel's intima. (Peabody.)

Thus we will find that the same vicious circle that becomes established in the various organs of the body involves with them the arteries themselves. The vasa vasorum, sharing in the general sclerotic change, supply less blood to the arteries than is required for their proper nutrition; further degeneration of the arterial walls follows, calling for less blood for nutritive purposes, which produces in turn a slowing of the blood current in the vessels supplying the arteries; consequently the intima of these vessels become the seat of further degenerative changes.

We have found, therefore, that we are dealing with a disease one marked feature of which is a mechanical interference with the blood current due to progressive narrowing of the lumen of the blood vessels, and that a necessary result of this obstruction is a lessening of the supply of blood essential to the nutrition of the tissues, resulting in various tissue degenerations.

Let us see, now, what are the properties of the drug with which we propose, if not to permanently arrest the progress of the disease, at least to ameliorate its striking and annoying symptoms.

When a dose of nitroglycerin, large enough to produce the physiological effects is taken there follow more or less flushing of the face and a feeling of fullness of the head which, in some individuals, is accompanied by dizziness. These manifestations are the result of dilitation of the superficial vessels which, according to Brunton, is due to weakening or paralysis either of the muscular walls of the arterioles themselves, or of the vasomotor ganglia in or near them. That the effects of the drug are not due to its action upon the sympathetic acting upon the muscular structure of the arteries through the vasomotor center he demonstrates by showing that the nitrites lower the blood pressure in animals even after the cord has been divided just below the medulla.

Nitroglycerin, therefore, lowers blood pressure by producing a dilatation of the arterioles, and it is upon this dilatation of the arterioles that the value of the drug in the treatment of arterio-sclerosis depends. We found that in arterio-sclerosis, because the tissues receive too little blood for their proper nutrition. local degenerations occur, and that these local degenerations, disturbing again the equilibrium of the circulation, cause still further sclerotic changes to occur in the arterial walls. By causing a dilatation of the blood vessels, and thereby supplying the tissues with a larger amount of blood for their nutrition, not only will the progress of degenerations in the various organs and tissues be retarded, but the course of the disease will also be arrested in the arteries themselves by supplying them, in the same manner, with a large quantity of blood.

The most important clinical manifestations of arterio-sclerosis are directly due to the condition of the blood vessels, which interferes with the blood supply to various organs.

The following cases, briefly cited, will give a clear idea of the chief of these symptoms and to what extent nitroglycerin may be relied upon for their relief:

Case 1.—J. McL., aged 28; a lumber salesman; family history negative; patient for past ten years, in following his occupation has had a very exposed life, and, in addition, has been subjected to arduous railroad traveling, which in the course of a year covered many thousands of miles. The symptoms mostly complained of were vertigo, headache, and palpitation of the heart. The examination of the heart showed no enlargement of that organ; the first sound, however, was louder and longer than normal and the second sound was markedly accentuated. The radial at the wrist showed decidedly thickened walls. Arterial tension was increased. Urinalysis showed albumen to be present in small quantities. The average amount of urine passed in twenty-four hours was 70 ounces. The microscope revealed hyaline casts. Nitroglycerin was administered and pushed until physiological effects were produced. Its effect upon the headache, vertigo, and palpitation was almost immediate, and in three months the albumen and casts had entirely disappeared from the urine. The drug was then suspended. In two months, however, the patient returned with the original symptoms present and albumen and casts again in the urine. Nitroglycerin was again administered with the same results as upon its previous exhibition. With occasional intermissions the patient was kept upon nitroglycerin for the period of one year. It is now over a year since treatment was suspended and there has been no reappearance of the albuminuria or other symptoms.

Case 2.—P. C., aged 45; a tailor. Family history not obtainable. Patient in appearance a man of fully 65 years of age. For many years had habitually used alcohol to excess. Complained of headache, intense vertigo, causing him at times to fall in the street, and impairment of memory. An eye examination showed some recent, and many old, retinal hemorrhages. Urinalysis revealed albumen; quantity of urine voided in twenty-four hours increased; microscopically were found hyaline and some granular epithelial casts. The superficial vessels showed a marked degree of sclerotic change, and arterial tension was greatly increased. The heart was considerably hypertrophied; first sound prolonged and booming in character, and second sound markedly accentuated. The patient was first put upon treatment over three years ago, nitroglycerin being the remedy selected. While no curative result has been obtained, yet the drug accomplished an undoubted retardation in the progress of the disease, in addition to the almost completed disappearance of the cerebral symptoms, including a marked improvement in the memory.

The above cases, selected from a number that have been under observation, will suffice to illustrate the uses of nitroglycerin in arterio-sclerosis.

As previously stated, the chief symptoms of arterio-sclerosis are due to the malnutrition of various organs, resulting from a lessened blood supply; nitroglycerin relieves these symptoms by increasing the blood supply of any given tissue. The cardiac hypertrophy, however, so common an attendant upon this disease, is caused by increased peripheral resistance. By lowering the blood pressure and, according to Bartholow, by removing the inhibition exercised by the pneumogastric nerve, thereby lessening the work of the heart, nitroglycerin results in relief of this condition. The advantages from the use of the drug in attacks of angina pectoris are too well known to require discussion.

Because nitroglycerin lessens arterial tension and thereby diminishes the amount of urine voided and lessens the output of albumen; and because it increases the blood supply to the kidneys, and therefore improves their nutrition, and prevents further degenerative processes, is its exhibition advantageous in the renal changes accompanying arterio-sclerosis.

Nitroglycerin is best administered in the form of a centessimal solution or as tablet triturates, each containing $\frac{1}{100}$ of a grain of the pure drug.

Inasmuch as the susceptibility to the action of the drug varies very greatly the dose can not be stated in advance. It is therefore advisable to begin with a dose of $\frac{1}{100}$ of a grain, watching its effects, and increase it until the physiological actions of the drug become manifest. In some individuals small doses will continue to maintain the physiological effects of the drug, while in others, as in a case sometime since reported by Dr. D. D. Stewart, of Philadelphia, a remarkable tolerance, even to massive doses, becomes established. According to my own experience those cases respond best to the use of the drug in which small doses continue to maintain its physiological manifestations.

The effects produced by nitroglycerin upon the pulse vary somewhat, though not materially, in duration in different individuals. In one of my cases the effects of a dose just sufficient to produce the physiological actions did not disappear from the sphygmographic tracing for nearly three-quarters of an hour.

According to Murrell, however, whose observations upon the subject have been made with great accuracy and have become to be regarded as authoritative, the tracing resumes the normal in less than half an hour. As the effect of the drug is but transient, therefore, the interval between the doses should not exceed two or three hours.

Nitroglycerin tends to arrest the oxygen-carrying function of the red blood corpuscle, and it is therefore important not to give it in doses larger than necessary to produce the desired effects, and during long-continued courses of the drug to interpose frequent periods of abstinence from its use.

Arterio-sclerosis is a progressive disease and it is not claimed, therefore, that nitroglycerin will effect a permanent cure. It is claimed for the drug, however, that it will retard the progress of the affection and alleviate many of its most distressing and serious manifestations.

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THE ANTIPYRETIC ACTION OF CALOMEL.

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The manifold uses of calomel and its prominence in our armamentarium for centuries would naturally cause one to hesitate before claiming for this old remedy any new application in therapeutics. That it has been used in all diseases is beyond question, but its contemplated action has not always been very clear.

Those physicians who can draw upon an experience of thirty or forty years will readily recall the fact that it was at that time conceded by the profession that antiperiodics did not act well unless preceded by a good large dose of calomel. This was the result of clinical observation, but there never was an explanation offered except by referring to the cathartic action of the medicine. In those early days the thermometer as a clinical aid was unknown, and shortly after calomel became an unfashionable remedy, except among a few old fogies, and hence it probably is that its antipyretic action has not been investigated. Now, however, circumstances have changed somewhat, and the thermometer has enabled us to scientifically confirm the accurate observations of the past generation and give special prominence to one more of the many valuable properties possessed by this almost indispensable drug.

In the treatment of continued fever with a typhoid tendency, the chief desideratum is a remedy that will produce intestinal antisepsis and a reduction of high temperature at the same time, without the depressing constitutional effects usually seen with these agents. During the past months, in a series of severe fevers, some of a typhoid character and others of a simple continued type, and in which the usual remedies, such as the synthetic compounds, salol, phenacetin, acetanilid, and allied preparations failed to reduce the temperature, calomel has seemed to meet every indication, not only producing a rapid fall in temperature, lasting from twenty-four to forty-eight hours, but giving a marked amelioration in all symptoms.

We gave it in 10-grain doses, and usually in combination with soda, bismuth, and pepsin. The dose was repeated as soon as temperature increased. This, and this alone, has been our indication for its repetition. That it has aborted some cases we are convinced; that it has modified all we know. So far we have found no contraindications, neither in diarrhea, tympanites, albuminuria, nor hemorrhage, but in each have had only the best possible results.

There has not been a single case of ptyalism, nor any ill effect of any kind, although very large quantities have been given, one patient taking during a sixteen-day attack as much as 1 to 3 drams. This is one of the most peculiar results connected with our cases. In none has there been the least symptom of mercurial poisoning, no tenderness of the gums, no increase of salivary secretion, no swelling of glands, no mercurial odor of breath. This tolerance of calomel is truly remarkable. The reduction of temperature commenced as soon as given, in some instances giving in an hour's time a reduction of 2 or even 3 degrees, and remaining down from twenty-four to forty-eight hours.

The carthartic action has been mild, not producing more than 2 or 3 stools, without pain and straining.

After the first few days (while the calomel had but little effect on the duration of the disease) its antipyretic action was as much marked. It is peculiarly applicable in those cases in which there is high temperature with cold, clammy skin, in which other agents used in controlling high temperature would not be available. In such the reduction was just as apparent, seeming to change the condition to such a degree, that an external heat would be substituted for an internal one with external cold, and hence more readily and easily managed.

The happiest results have appeared in those cases with constipated bowels. Here the abortive action was greatest, in some instances converting a fever with high temperature to one of lower grade after a few doses, and with the judicious use of agent temperature would not again reach a dangerous point.

A few times the administration of the calomel was followed by hypercatharsis, but, as we have said, this did not contraindicate its use when there was another exacerbation of fever, and upon its repetition would act mildly, and at other times would produce no stool at all, but even then the antipyresis was produced. In what manner the agent acts we will not attempt to say; we are only recording some clinical facts seen in a busy practice. By trial we find that when given in powder (not in capsules) the reduction of temperature is more rapid, reaching a lower point, and remaining down for a longer period.

This would argue that possibly there was some lesion in the upper bowels, on which the agent acted directly. We believe that there was seen also a special action on kidneys, the urine being more copious and of higher color.

No one agent in our hand has had the same controlling influence over high temperature in the condition peculiar to these fevers. Nor has any agent so modified the general symptoms and given control over an otherwise unmanageable case.

In some instances it has been necessary to repeat the remedy within the same day, the fever not being influenced by the first dose; the second was, however, followed by the reduction of temperature expected, and even in those cases there was not excessive catharsis. The reduction of temperature is not followed by copious sweating, an objection to some remedies when used often.

The fall of temperature usually reaches its minimum point in six hours, remains stationary for several hours, and then gradually rises again, sometimes taking twenty-four hours or more to attain its former height. During convalescence, when there was recurrence of fever owing to some indiscretion in diet, or other cause, the same marked effect was noticed after a large dose of calomel.

All cases have gone on to a rapid recovery after this treatment. There has been but one relapse in 25 cases in which this treatment was used. We do not know how it would be in a larger series of cases, the number being too small to form any opinion in this respect.

We recognize that the remedy is a powerful agent for evil, as well as good, and that harm might occur after such heroic treatment, but such evil result we have not observed. This agent, we think, will prove a potent factor for good upon further trial in these diseases.

Only after much experiment can we name its exact position as an antipyretic, and it is only after much painstaking care and trial that we have arrived at this conclusion. We have tried smaller doses, but they did not reduce temperature, nor did they ameliorate the other symptoms. The combination with pepsin and bismuth has shown its superiority over any other that we have made, and we have tried many.

No claim is made that calomel is a specific in these diseases, or that it would have antipyretic action in other conditions of high temperature, but in these continued fevers of typhoid types, it is certainly a valuable adjuvant in their management, particularly in the reduction of a high temperature to a less dangerous degree. We know that many physicians claim that high temperature is conservative and shorten s an attack, but such is not our experience, but the reverse.

From the use of calomel in these 25 cases we have drawn the following conclusions: First. Calomel is a sure and safe antipyretic, reducing the temperature from 2 to 3° in a few hours. Second. Small doses will prove of no avail. Third. The ingestion of large doses was followed by no untoward event, no ptyalism, no hypercatharsis. This is contrary to the usual opinion. Fourth. Diarrhea, hemorrhage, albuminuria, tympanites have not been contraindications to the use of the remedy. Fifth. The reduction of temperature occurs without cathartic action on the bowels. Sixth. The calomel acts best in combination with soda, bismuth, and pepsin. Seventh. That in some instances the remedy appeared to cut short an attack, and in others, while having no influence on its duration, it modified all symptoms, and by keeping temperature in check aided materially in the management of the case.

Appended are reports of two cases, one of the simple continued type, the other of a typhoid character:

Case I.—October 9, 1892: Had fever for several days; pain in stomach, back, and head; skin dark; eyes yellow; tongue coated heavily with white coat and dry; complained of soreness all over body; temperature, 102½; pulse, 88; bowels, constipated; prescribed 10 grains of calomel at once, with small dose of quinine. For several days he had been taking large doses of quinine.

October 10: Bowels had acted freely; pains had diminished; temperature, 101; pulse, 90; complained so much of chinchonism that quinine was discontinued.

October 11: M. Temperature, 101½; pulse, 100; pains in bowels, but no tympanites; repeated calomel, and also gave carbolic acid, 1 drop, and tincture iodine, 2 drops, every four hours. Evening: Temperature, 100; pulse, 92; had several vomiting attacks during the day.

October 12: M. Temperature, 102; tongue, moist; bowels had acted several times; much nausea; calomel repeated.

October 13: M. Temperature, 100; no pain or nausea; bowels had acted several times from calomel.

October 14: M. Temperature, 99½; pain in head; calomel repeated.

October 15: Temperature, 99; gradually decreased, and patient was discharged on the 18th.

Case II.—October 26: Mary W., aged 15 years; had fever for one week, with an occasional chill; bowels running off; pain in head and limbs; tympanites marked; pain in right iliac region; tongue coated with brownish coat and very dry; temperature, 103; pulse, 112. Gave 10 grains of calomel, soda, and bismuth, with small dose of quinine and phenacetine; milk diet.

November 2: Temperature, 99½; pulse, 100; bowels still moving rapidly. Gave carbolic acid and iodine mixture 3 times daily.

November 3: Temperature, 101; pulse, 94; chill during the night; bowels checked. Quinine, 5 grains, 3 times daily; calomel and bismuth repeated.

November 4: Temperature, 100; pulse, 95; bowels moved frequently after purgative.

November 5: Temperature, 101½; pulse, 94; bowels free; tympanites not so great. Calomel and bismuth repeated.

November 6: Temperature, 101½; pulse, 92; bowels in check; tympanites increased.

November 7: Temperature, 101¾; pulse, 100. Calomel and bismuth repeated.

November 8: Temperature, 100¾; pulse, 100; bowels under control; tongue clean.

November 9: Temperature, 100¼; pulse, 96.

November 10: Temperature, 100; pulse, 100; bowels loose.

November 11: Temperature, 103; pulse, 106; tympanites pronounced; chills during the night. Calomel and bismuth repeated.

November 12: Temperature, 101½; pulse, 106.

November 14: Temperature, 103½; bowels frequent. Calomel and bismuth repeated.

November 15: Temperature, 100½; pulse, 106; tympanitic bowels.

November 16: Temperature, 103½; pulse, 106. Calomel and bismuth repeated.

November 17: Temperature, 99¾; pulse, 96; bowels lax.

From this the temperature gradually declined until the twentieth day, when the temperature became normal, and convalescence rapidly followed.

THE TREATMENT OF NEURASTHENIA, WITH SPECIAL REFERENCE TO THE REST CURE.

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Notwithstanding the many advances made by modern therapeutics, nervous exhaustion in its various forms still remains one of the most trying and difficult conditions with which physicians have to contend. It presents such varied symptoms and is often so generalized in character that some writers even deny it the position accorded to other affections. However, even if it be not as sharply outlined as other diseases, one must admit that there is a genuine morbid state of the nervous system present in the condition known as neurasthenia. Because many of the symptoms are subjective, and because patients frequently find it difficult to give us an accurate conception of the various morbid sensations which they experience, the outlines of a given case are often vague. However, the fact that certain symptoms or groups of symptoms constantly recur, and the fact that we have such definite etiological factors as prolonged nervous strain, exhausting illnesses, and great physical or mental shock, proves that we have a well-established clinical entity before us.

Neurasthenia has always been regarded as an affection without a pathology. However, C. F. Hodge[1] has shown that in nerve cells certain changes take place, due to functional activity. These changes affect all of the cell contents, and there can be no doubt that they are characteristic of fatigue. These facts render it extremely probable that there not only is a pathology to neurasthenia, but that this pathology is to be sought for largely in intracellular changes.

Hodge, it will be remembered, proved that as a result of electrical stimulation the nuclei of nerve cells decrease markedly in size, and that their outlines, instead of remaining smooth, become jagged and irregular, and that they also react differently to staining reagents; and further, that the cell protoplasm undergoes slight shrinkage in size, becomes vacuolated, and also reacts differently to staining reagents; and finally, that even the cell capsule itself, if present, shows changes in the size of its nuclei. He further rendered it extremely probable, as is well known, by his researches upon birds and bees, that these processes take place equally in normal fatigue. Among the most interesting results achieved by Hodge is also the demonstration that exhausted nerve cells recover their normal appearance if allowed to rest for a sufficient time, and, further, noted the fact that the process of recovery is slow, requiring many hours of rest.

Certainly we have in these facts a hint as to what is present in the condition which is known as nervous exhaustion. It is probable that the nerve cells in a typical case undergo changes similar to those which have been described by Hodge in his experiments. However, it is probably characteristic of neurasthenia that repair either does not take place at all or always imperfectly. It seems to me that this hypothesis enables us to understand many of the symptoms presented.

The underlying feature of nervous exhaustion is a diminution in the capacity for the sustained expenditure of energy. If it be true that the nerve cells have undergone changes similar to those described by Hodge, and if it further be true that for some reason complete repair has not taken place, we have all the conditions necessary to explain this symptom. Not only do the results of Hodge furnish us with an explanation of the condition presented by the efferent or motor side of the nervous apparatus, but they also render comprehensible many of the sensory and subjective symptoms.

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[1] Journal of Morphology, Vol. II, p. 95.

For instance, the backache and the headache present in neurasthenia are, if we pause to analyze them, peculiar in that they resemble the sensations often produced by normal fatigue. They seem to be grossly exaggerated fatigue sensations. Certainly the backache of neurasthenia differs from the backache of lumbago, or the backache due to actual disease of the spine or spinal contents. Certainly, too, the neurasthenic headache differs markedly from headaches due to other causes. Not only are symptoms present in the sensory and motor spheres which would suggest exhausting change in the nerve cells, but also, as is well known, in the vaso-motor apparatus and in the behavior of the various glands and viscera. In the tendency to irregular flushing, in anomalies of sweating, in the anomalies of the secretion of urine, in the general atony of the digestive tract we have instances of this condition. Certainly our position relative to neurasthenia has been materially improved by the researches of Hodge, inasmuch as they enable us to formulate a rational and conceivable pathology of this curious affection. From what will be said further on it will be seen, however, that the researches of Hodge, even in their fullest application, do not yet enable us to explain all that is found. Certainly such curious symptoms as the tinnitus aurium, the persistent throbbing in the limbs, and the various chill-like creeping, and other strange anomalies of sensation which we meet with, still lack an explanation.

Further, another element makes its appearance when we reflect that when morbid processes continue for a length of time they are apt to be followed by more or less permanent changes, changes that we are in the habit of referring to as "terminal changes" in discussing other diseases. We see at once that the pathology of neurasthenia may be a very complicated one. Some of these changes can occasionally be traced. Such, for instance, are the changes which are sometimes noted in the blood vessels of chronic neurasthenics. In persons who have been the victims of nervous exhaustion for years, and in whom repair has never had an opportunity of fully asserting itself, we find occasionally that the blood vessels have become more or less thickened, that is, they show changes of age at a relatively early period and the heart also gives evidence of the same thing. In neurasthenics in whom the trouble has been profound and who have suffered for very many years atheroma of the blood vessels can frequently be detected with very great ease. Certainly when the blood vessels and heart give us the signs of premature age, we have every reason to believe that all of the other tissues share more or less in this process, that is, in a general tendency to premature senescence. These changes, I say, can occasionally be traced in the blood vessels. I believe that they also take place in the muscles and even in the bones, but of this direct proof is as yet wanting. It is extremely probable that the nervous system itself will in the future studies made under more exact and favorable conditions show changes on a par in their significance with those which are occasionally found in the blood vessels.

Recognizing, then, the fact that in neurasthenia the nerve cells undergo a change which is in all probability similar to that which they undergo in normal fatigue, and that added to this we have due to the persistence of fatigue in all probability secondary or terminal changes taking place, we can readily understand how it is that some of our neurasthenic cases are so inveterate, why it is that some of them yield so little to even the most radical treatment.

A third element which largely influences the results of treatment lies in the fact that some of our patients are what might be called hereditarily neurasthenic, i. e., persons who make their start in life with a nervous system in which cell wear and tear takes place readily and in whom recuperative power is unusually feeble. We have met these cases, they are peculiar in the fact that their neurasthenia is manifested relatively early in life, they are apt to be feeble as children, often, but not always, of small physical development, and are persons in whom fatigue is brought about by very slight exertions, either mental or physical. I know of no more unsatisfactory class of cases to treat than these cases of hereditary neurasthenia.

The factors, then, which influence the results of treatment in neurasthenia primarily are, first, whether we have a hereditary case to deal with; secondly, if not hereditary, the time for which the neurasthenia has lasted; thirdly, in nonhereditary cases, the result is influenced, according to my individual experience, as to whether a given case be the outcome of prolonged nervous strain, or whether it has been suddenly produced by a physical or mental shock. The last group, or the traumatic neurasthenics, so called, are, in my experience, more difficult to treat than those in whom the neurasthenia is acquired in other ways.

With these preliminary observations, let us now turn our attention to the means that we have at hand for the treatment of a case of neurasthenia. From what has been said it is evident that rest is an imperative factor, certainly if the waste be rapid and repair be slow, the diminution of function—the securing of as complete a rest as possible—is the object to be aimed at. We all know that absolute rest, physiologically speaking, is an impossibility, but at the same time that the degree of relative rest which is practicable to obtain is very great. The question in any given case naturally turns at once, how much rest does this case require? Every practical physician knows that it is most frequently impossible for persons actively engaged in pursuits of life to take absolute rest, nor in fact is absolute rest always a necessity. Very frequently the most astounding changes can be brought about by relative rest.

In the high pressure of modern civilization, especially as is represented on this continent, the temptation to overwork is extreme, and, in very many cases of neurasthenia, if the unphysiological excess of work be stopped, recovery will result. You are doubtless, all of you, familiar with the scheme of "partial" rest, so called, instituted by Dr. Mitchell, in which the patient, often an active business man, is directed to prolong the hours of rest in bed, to rise not earlier than 9 or 10 in the morning and to retire with the onset of evening. A man following this direction must necessarily curtail the hours devoted to work, and very often this simple expedient is sufficient to bring about a most favorable result. However, cases are brought to us of greater and greater severity, cases which vary from those in which a few hours rest in bed during the day is requisite, to those in whom absolute rest for weeks and months is imperative.

How much are we to expect from rest? As I have already said, it is exceedingly probable that permanent or terminal changes are often present in neurasthenia. This factor, of itself, necessitates that the results to be attained by rest will, in given cases, be limited. In others again it will be followed by the most gratifying results.

Finally, regarding the rest, let us remember that if our case of neurasthenia be a profound one and of long duration, that this rest must be as nearly absolute as it is possible for us to make it. Dr. Weir Mitchell has already pointed out how this is to be accomplished, how in very bad cases the patient is not even allowed to feed herself, is not even allowed to turn in bed without the assistance of the nurse, is not even allowed to leave the bed to void the bowels or urine. Now, while rest is undoubtedly a factor of prime importance, rest of itself, as Dr. Mitchell has shown, is not without its attendant evils. (*See* Seguin Lecture, and Fat and Blood.) It is well known that a joint, if not moved, will stiffen, and finally become anchylosed; it is well known that a muscle which is not exercised will waste away, and it is probable that analagous changes take place in other tissues. How to combat these evils is a problem which now presents itself. If we exercise our patient we expend his strength. Evidently the solution of the problem is to obtain the effects of exercise without this expenditure. That it is our ordinary custom to obtain these effects by massage and by electricity I need hardly point out, nor is it my intention to go over the ground already so well covered by Dr. Mitchell and by Dr. Playfair. I have only the following suggestions to make based upon my own experience. It is that these agents be used at first very sparingly and only later in the treatment to their full extent. To this point I shall return in greater detail.

The diet in cases of neurasthenia is of course of prime importance, and upon its proper management will depend as much as upon anything else the result achieved in a given case. You are familiar with the methods ordinarily pursued; with the fact that milk constitutes a large portion of the diet; that the patient is placed habitually upon milk at first and that later on other food is added. The neurasthenic is almost of necessity a dyspeptic he lacks both the desire to eat and the ability to digest food properly. He presents that train of symptoms with which we are all familiar under the name "nervous dyspepsia." Very frequently the patient objects strenuously to the milk, asserting over and over again that he can not digest it, that the milk will be vomited, that it gives rise to pain and so on. The custom under these circumstances is to in some way modify the milk, either by the addition of some diluent, as weak tea or one of the carbonated waters, or peptonized milk, or koumys is administered. Most often, however, you will find that the inability to take milk is very much exaggerated, and my own habit is never to ask a patient the question, "Does milk agree with you?" I simply order it. I am careful, however, to order it in small quantities, beginning with about 4 ounces every two hours and excluding absolutely all other food. This amount is of course insufficient for the needs of the body. I now find, that even if a disgust for milk is present the patient being placed upon a very small amount of food and becoming in a day or two very hungry becomes extremely grateful for the milk and takes it eagerly.

My habit is next to increase the milk very slowly, being careful at first to keep my patient a little hungry all of the time. Finally in the course of a week or ten days, I increase the amount to 8, 10, or even 12 ounces every two hours, as the case may be. If I find that the patient is quite hungry by the fourth or fifth day I add a small slice of stale bread with butter once or twice a day. This I finally permit the patient to have three times daily. The diet is then further increased by a soft-boiled egg, or perhaps by a mere fraction thereof at breakfast. Finally a small chop or steak is given at noon, and a small quantity of thoroughly boiled rice may be given for supper. Upon these beginnings a substantial diet is finally built up, until the patient eats three large meals a day, such for instance as a breakfast of fruit, cracked wheat, one or two soft-boiled eggs, or a good sized steak or several chops, bread and butter, and milk; a dinner of a good slice of roast beef with vegetables and boiled rice (in place of potatoes) for dinner. The supper I prefer leaving as a light meal of bread, butter, fruits, light pudding, and milk. It will be noticed that in this dietary coffee, chocolate, tea, cocoa, are absolutely omitted. Further, that malt extract, cod-liver oil, and beef-tea (all recommended by others) are not used.

My own studies of these cases have convinced me that soups, beef-tea, and broths possess relatively little value, that they simply occupy space which can otherwise be given to milk which certainly has a far higher nutritive power. The same I think holds true of tea, chocolate, and cocoa, while coffee is exceedingly objectionable, inasmuch as the neurasthenic is an individual who has in the vast majority of cases already exhausted stimulants, not only coffee, tea and alcohol, but also the various narcotics, in the vain hope to find relief. I believe that coffee and alcohol even in moderate use should be avoided. Wine, beer, and milk-punch find, therefore, no place in my dietary.

Another element of importance in the treatment is, as Dr. Mitchell and Dr. Playfair have both pointed out, the isolation of the patient. Not only is our patient the victim of a neurasthenia, but in very many instances she is also hysterical, inasmuch as neurasthenia and hysteria are often inextricably intertwined. Under these circumstances isolation, the withdrawal of the patient from the influences of relatives and friends, is of the utmost importance. How deleterious home surroundings are under these circumstances I need not dwell upon, as they have been sufficiently discussed by others. I need only to say that in cases of nervous prostration, which are sufficiently pronounced to require rest in bed. *isolation is imperative*, and that it should be absolute, no exceptions should be made in favor of any relative, mother, sister, or daughter. nor should any communication ever reach the sick room except through the mouth of the doctor, and then even should be most guarded and most general in character. My experience accords with that of Drs. Mitchell and Playfair, that even slight infringements upon this rule are sometimes followed by the most disastrous results.

We find then that our resources for combating profound neurasthenia comprise rest, artificial exercise (namely massage and electricity), a special diet, and isolation.

The success which attends our efforts in any given case depends largely upon the way with which the various means at our disposal are utilized. No doubt every-one who has essayed the rest cure has developed certain methods of his own which he finds gives him the best results. My own experience has led me to adopt the following: The patient is placed in bed. As a rule she is extremely nervous and perhaps hysterical. Frequently she is a stranger amid strange surroundings. She is left by her friends in the care of a physician whom she knows only by reputation, and of a nurse of whom she knows less. It is my custom, therefore, to begin treatment in the most gradual manner, in order that the patient may become in the first place accustomed to her bed; for lying in bed is in the beginning quite a task to even neurasthenic people, and in the second place, that she may become acquainted with and acquire confidence in her nurse. I, therefore, at the first visit am in the habit of examining my patient thoroughly if I find that the examination is well borne and causes no excitement, but only in part if she be very nervous.

Frequently I do not finish my examination until the next or even the third visit. I simply order a small quantity of milk as already explained and instruct the nurse that she shall give the patient that evening a light and rapid sponge bath, because, in the first place, the patient will have a chance to become a little acquainted with her nurse, and because the bath in most instances favors sleep. Generally I do not direct that massage shall begin until the second or third day, and then I direct the nurse to continue it only for a short time and to make it very gentle and superficial in character. My reasons for beginning the massage in so gradual a manner are, first, that the patient may become accustomed to the touch of the hands of the nurse. Secondly, I direct when I once begin with the massage, that it shall be given in the evening, as the gentle, superficial stroking which I direct to be given at first, soothes the patient. Just as the diet is very gradually increased so should the massage be very gradually increased both in depth and vigor; finally the administration of the massage should be increased to at least an hour. Dr. Playfair recommends that the patient be massed for even three hours. This I do not consider necessary and am indeed doubtful whether anything is gained, if indeed something be not lost by this prolonged rubbing.

Another point which I have come to regard as important is that the massage be performed by the nurse: this, of course, necessitates that our nurse be also an expert *masseuse*. My experience has been that if the patient be treated by a regular *masseuse* at certain intervals in the day, the visit of this third person with whom the patient has also to become acquainted acts as a disturbing factor; to use an every-day expression, the patients are apt to be "upset" by it. In one instance I am satisfied it was the only factor which prevented my achieving a successful result.

Regarding the details of the massage, I do not believe that they are of as much importance as is sometimes believed. The special method or school which the *masseuse* follows has no influence on the general result. In this I am entirely in accord with Dr. Playfair. One practical point, however, suggests itself. As a rule, you are aware a slight elevation in temperature takes place. Occasionally the reverse is the case. A limb that has been rubbed grows cold. In the last instance the nurse should be specially cautioned not to expose the patient's person any more than is absolutely necessary.

Electricity I do not regard as of the same value or importance as massage. In this I am in accord with the writers already quoted. However, it is a remedy which I almost invariably utilize, but generally as follows: In the first place, I believe that almost all that can be gained by artificial exercise can be gained by massage, and we must remember that most patients are excessively afraid of the battery. The average neurasthenic is hysterical, and the mere mention of a battery or the sound of the vibrations of the interrupter will make them very nervous. Sometimes, indeed, marked depression follows its use. However, as in massage, its application must be begun in a very gradual manner. A scarcely perceptible current is at first used, and the nurse, who has been previously instructed in the points of Ziemsen, is made to use the slowly interrupted current in such a way that each group of muscles contract a given number of times. Until the patient becomes accustomed to this often unpleasant sensation, the application may be limited to the forearms and legs. Later it may be applied to the thighs, arms, and trunk. Electricity is, doubtless, a useful adjunct to the rest cure, but it is only an adjunct. At the same time its utility can not be questioned. I never use it early or in the beginning of a case. I am fearful, and in fact such has frequently been my experience, that the excitement and the irritation consequent upon its use act deleteriously upon the patient. Further, the exercise that it gives the muscles I am confident frequently tires and exhausts, and I have observed it several times to retard the increase in weight which otherwise takes place. My habit is to begin with it only several weeks after the treatment has been well under way, and sometimes only in the latter part of a case, preparatory to getting the patient out of bed.

Supposing that our treatment is now well under way, how shall we determine whether we are making satisfactory progress? In the first place, if our patient is taking a large amount of food, and massage is having its proper effect, the color of the patient should improve. The patient should, as the *masseuse* expresses it, "pink" readily under her touch. The limbs, too, should gradually become firmer to pressure. However, another and more important guide than this is the change in weight shown by the patient. Starting with the patient much below normal weight, as many of our neurasthenic subjects are, the changes which the weight undergoes should be our guide. Occasionally it is noticed that in the first few days there is a progressive loss of weight, but soon the patient begins to gain, and in the average case gains rapidly. Patients gain in the course of from eight to twelve weeks as much as 25 or even 35 pounds. I can confirm, from personal observation and personal experience, all that has been said upon this subject by Drs. Mitchell and Playfair. One of my patients actually gained 42 pounds in the course of three months. I have learned to regard the progressive increase in weight as the most valuable index attainable regarding the progress of a case. I consider it of far more value than the persistence or nonpersistence of such symptoms as backache or headache or general nervous feeling. My experience with the various subjective symptoms is that some of them disappear relatively early, others persist, but even the latter, in the majority of cases, grow fainter and fainter until at last they no longer impress themselves upon the consciousness of the patient. In those instances in which obscure subjective sensations seem to be permanent it is not improbable that more or less definite changes "the terminal changes," have taken place and that these persistent symptoms are due to the latter.

It will be noticed that in the above plan of treatment drugs find no place. However, it is occasionally judicious to use a few remedies. Not infrequently, for instance, the indigestion of our patients is complicated by a veritable gastric catarrh. Indeed, I may say that this is, in my experience, more frequently the case than not. I am, therefore, in the habit of prescribing nitrate of silver, say one-fourth of a grain, combined with a fourth of a grain of hyosciamus, to be taken half an hour before meals. Sometimes, also, at the beginning of the treatment we find that the patient's tongue is coated and that the bowels are loaded. In such case I usually prescribe small doses of calomel and bicarbonate of soda until the desired effect is obtained. In other words, general principles must guide us in the use of medicines in these cases, though, as far as possible, medicines are to be avoided. In a number of cases a laxative of some sort becomes necessary. The choice of this is largely a matter of personal judgment; the simpler the remedy, the better. I myself am in the habit of using the fluid extract of cascara, given at night and, if possible, in gradually diminishing doses.

Occasionally special symptoms require special interference. It may be that the headache is so intense as to demand active interference. In this case I am in the habit of relying upon phenacetene, and sometimes administer moderate doses of bromide of ammonium at the same time. Frequently, too, the insomnia is so profound that it does not yield to the general treatment. We find, however, as a rule that patients who are taking a large amount of milk sleep a great deal. The excess of food seems to have a soporific or sedative influence, and therefore narcotics are rarely indicated. The massage, too, if given in the latter part of the day, favors sleep. Sometimes, though not always, a wet sheet followed by a gentle rubbing, or a hot sponge bath rapidly given, act as sedatives. Occasionally, however, insomnia is so profound that we are driven to the use, for a time at least, of drugs. The milder drugs, say small doses of sulphonal, possibly of bromide, should be given. The stronger narcotics should practically never be used. Fortunately in the average case we can get along without them.

It will be noticed that strychnia and arsenic, so much vaunted in neurasthenia, are drugs rarely used by myself. They are distinctly stimulants and should, therefore, on general principles, I believe, be avoided. In a large number, perhaps the majority of cases, the treatment can be conducted successfully from beginning to end without the use of any other drug than an occasional laxative.

Let us suppose now that our patient is progressing favorably; she is gaining steadily in weight; the tissues are becoming firmer; the annoying subjective symptoms are disappearing; when are we to get her out of bed? How are we to know when the maximum amount of good has been obtained by the method pursued? In neurasthenic cases of long standing it is probable that our best guide is the change shown by the body weight. If a decided increase has taken place and it then ceases, it is probable that the maximum increase has been reached, i. e. the maximum increase possible under the treatment. If at the same time our patient's symptoms have become progressively less and less, we have probably reached a period when the patient should be gotten out of bed. In young neurasthenics, however, and in others in whom neurasthenia has not lasted for so long a time, it is probable that the increase in weight is not of itself a sufficient guide, inasmuch as they will sometimes continue increasing in weight until they become needlessly fat. In such cases we are to consider whether the body weight is about normal to the height of the individual, and whether a normal body weight has therefore been reached. If at the same time the neurasthenic symptoms are disappearing, we may consider that it is about time for our patient to be gotten out of bed. In getting her out of bed, we must remember that, though well nourished, she is weak. We must remember that though the muscles have been thoroughly rubbed, and though they have been toned up by the battery, the patient has not exercised for weeks and months. She is in the condition of having accumulated an enormous amount of latent energy.

This energy must now be mobilized, made potent by gradual exercise. The patient is allowed, for instance, to sit up for five or ten minutes in a day. While in bed passive movements of the legs and arms are made. Gradually the length of time for sitting up is increased, so that the patient sits up twenty minutes to forty-five minutes or an hour a day. Little by little the time is increased, until at the end of ten days the patient is up from four to six hours. Passive movements, which until now have been made by the nurse, are now dispensed with. For them light calisthenics are substituted. The patient is also made to walk about her room a little. Finally a short walk out of the house or a carriage ride follows. Next comes a trip to the seashore for some ten days or three weeks. During this time the patient is made to exercise in the open air. As a rule she walks a little at first, but gradually increases the amount until 2 or 3 miles at a brisk gait is attained. The massage is little by little discontinued, and during the stay at the seashore occasional immersion in a hot salt-water bath, say twice weekly, is ordered. I say immersion because a prolonged bath in some patients will be followed by a sense of fatigue rather than exhilaration.

During this time, also, the patient is guarded against any sudden excitement. However, she is gradually permitted to renew her relations with her relatives and friends. Finally she is returned home, and in order to insure against a relapse, which under proper precautions rarely occurs, she is told to spend some ten hours in bed out of the twenty-four, to still take her breakfast in bed, and to still keep up a moderate quantity of milk in addition to her regular diet. Daily exercise is also insisted upon. These precautions are not absolutely necessary. At the same time they insure care on the part of the patient and also impress the relatives and friends of the patient that the latter is not yet to be subjected to the strains of social and domestic life. Little by little the patients break in upon the rules laid down by the physician at parting, and in the course of a number of weeks adopt the lives of the people about them. I have had the opportunity of tracing some of these patients for a number of years after a prolonged course of rest-cure and have never met with a relapse in a case in which the patient had devoted a sufficient length of time to the treatment. My experience is that although some patients make excellent progress in six weeks and even seem able to return to their friends at the end of that time, that these cases are prone to relapse, that the recovery is not a durable one. Time is therefore a necessary element in achieving a more or less permanent result. I always prefer to give the patient the benefit of from ten to twelve weeks, and in some cases even longer. Exercise, also, is a necessary element in maintaining the increased level of health. A return to the previous habits of life, often habits of indolence and dissipation. are of course dangerous to the continued welfare of the case. One of the marked benefits accruing from the rest-cure is the fact that the patient is placed, and perhaps for the first time, under a rigid discipline, a discipline, too, which leaves its impress upon the whole after life and absolutely modifies for the better the previous way of living.

As already stated in the body of this paper, the rest-cure permits of several modifications, and as a rule some modifications must be made when the patient is a man. Men take less kindly to their beds, and frequently, too, the patient is the breadwinner of the family, and to withdraw himself absolutely from his business is an impossibility. In these cases an application of the general principles of rest and diet as laid down above will be found of great service. However, if the case be one of profound neurasthenia little can be accomplished unless the rest-cure be carried out rigidly in all its details. I will not allude to the part which exercise plays in the treatment of the milder cases of neurasthenia, as it is somewhat foreign to the topic of this paper. My experience, however, has been that in cases in which the neurasthenia is well marked the exercise had better be of a limited character and carried on under the eye of the physician, or of a professional physical instructor. Violent or severe exercise, it is hardly necessary to say, invariably does harm. It is surprising, however, to what an extent the exercise can be increased if it be begun gradually, and this I need hardly say applies not only to the treatment of the milder cases of neurasthenia, but also to the "after-bed" treatment of the more severe cases.

Much might be added to the above remarks regarding the qualities which it is necessary that a nurse should possess in order that the rest-cure may be successfully carried out. Much time might also be spent upon the discussion of the use of such adjuvants to treatment as hydrotherapy. I prefer, however, to close my paper at this point, preserving the above topics for some future occasion.

ALGUNOS DATOS FARMACOLÓGICOS ACERCA DE CATORCE PLANTAS MEXICANAS.

Por el Dr. FERNANDO ALTAMIRANO.

He querido contribuir con mi humilde contingente dando á conocer á esta honorable asamblea los resultados á que varios profesores mexicanos han llegado en el estudio de algunas plantas. Acerca de todas ellas he reunido lo que se ha hecho en el Instituto Médico Nacional de su clasificación botánica, composición química y acción fisiológica, dando además de la mayor parte de dichas plantas, los usos terapéuticos que parecen más fundados. He cuidado de citar á cada autor al calce de cada resultado inscrito por mí. Ojalá que la lectura de este trabajo pueda tener algún interés para el ilustrado personal del Congreso Panamericano.

BOCONIA ARBÓREA, WATSON. PAPAVERÁCEAS.

En Michoacán se le conoce con el nombre de Inguande, en Morelos con el de Llora-sangre y en Córdoba con el de Gordolobo. Abunda particularmento en Michoacán cerca de Uruápam y de Tingambato. Se usa la corteza. Encierra un jugo amarillo que contieno los principios activos.

Composición química de la corteza.

[Profesor M. Lozano, 1893.]

Agua	10.060	Dextrina	5.775
Sales	9.500	Ácido oxálico y tártrico	2.430
Grasa	1.320	Ácido	
Resina ácida	9.361	Materias colorantes	
Alcaloide (boconina)	5.116	Celulosa y leñosa	44.990
Goma	1.875	Pérdida	9.620

Al alcaloide se le llamó Boconina por el Sr. Lazo de la Vega, quien hizo un análisis de la corteza. Lo que se ha llamado Boconina es una reunión de varios alcaloides. Se han indicado cuatro por el mismo Profesor Lozano. Uno lleva el nombre de Boconirabina, otro el de Boconixantina, el tercero Boconiclorina, y el cuarto Boconiiodina, nombres debidos á la coloración que desarrollan los alcaloides por la acción del ácido sulfúrico concentrado, que es roja para el primero, amarilla para el segundo, verde para el tercero y violada para el cuarto. Además, las sales del primero son rojas, las del segundo amarillas, las del tercero y cuarto blancas; todas esas sales son cristalizables.

Acción fisiológica.—La experimentación se ha llevado á efecto con la boconina, esto es, la mezcla de tres alcaloides. Los efectos principales, encontrados hasta hoy, son que produce anestesia de las placas terminales nerviosas del lugar en que se inyecta, y después la de los centros nerviosos, que provoca la dilatación vascular favoreciendo así la producción de hemorragias, y que determina perturbaciones cerebrales ligeras sin privar de la inteligencia. Cuando se administra el polvo de la corteza por la vía gástrica provoca efectos vomipurgantes, que deben atribuirse á principios resinosos. Se ha aplicado con buen éxito para producir la anestesia local en varias operaciones quirúrgicas.

CACALIA CERVARIÆFOLIA, D. C. COMPUESTAS.

Vegeta en Chihuahua. Se le llama Matarique, que significa mata-dolor. Se usa la raíz. Es muy olorosa, de sabor amargo, y en su quebradura presenta de especial una zona de puntos resinosos amarillos.

Composición química.—Resina, esencia, glicosida, tanino, glucosa, alcaloide.

En la rana, la dosis de 0.10 de extracto hidro-alcohólico produce la parálisis de los músculos voluntarios, disminuye la sensibilidad y paraliza el corazón. En el perro, 0.50 del mismo extracto por inyección intravenosa produce analgesia en general, abatimiento de la energía cardiaca, y trastornos respiratorios, todo lo cual desaparece á las dos horas. En el hombre 30 gramos de tintura producen vómitos, dolores intestinales, evacuaciones, calambres y aún accidentes lipotímicos. Al exterior en fomentos ó fricciones, calma las neuralgías, mitiga los sufrimientos que causan las escoriaciones y quemaduras, y favorece la cicatrización de las heridas por sus cualidades antisépticas. Se ha aplicado para combatir las dispepsias pútridas, la constipación y meteorismo intestinal. Su principal aplicación es como vulnerario y para calmar los dolores reumáticos musculares ó articulares, segun observaciones del Dr. Ceballos, médico del Asilo de Ancianos. Dosis: de 15 á 30 gramos de tintura al interior. Hay que vigilar sus efectos sobre el corazón. Al exterior en las heridas se usa una mezcla de 20 gramos por 100 de agua para lavatorios antisépticos.

CALEA ZACATECHICHI, SCHL. COMPUESTAS.

Zacatechichi, su nombre vulgar, indica yerba amarga. Es en efecto muy amarga y se usa para combatir algunas afecciones del estómago. Vegeta en Córdoba y Orizaba, del Estado de Veracruz.

Su composición química es la siguiente: Clorófila, materia colorante, aceite esencial, resina ácida, un ácido volátil, principio amargo (parte activa), tanino, sales. (Dr. Armendáriz.)

Terapéutica.—Se ha ensayado en los hospitales, en las dispepsias, catarros gástricos, anorexia, diarreas atónicas, etc., con buenos resultados. Aumenta el apetito, facilita la digestión y combate la constipación. Dosis: El cocimiento en la proporción de 5 por ciento, el extracto 1 gramo en veinticuatro horas y la tintura hasta 4 gramos.

CALLIANDRA GRANDIFLORA, BENTH. LEGUMINOSAS.

Pambotano, Xoloxochitl, Cabellitos. Vegeta en Veracruz, Morelos, Michoacán, valle de México. Se usan las raices, que son rizomas vivaces, fasciculadas, torcidas, fibrosas, leñosas, de sabor acre especial, que persiste en la faringe masticando, aún que sea una partícula de la parte leñosa.

Composición química.—Materias grasas: Cera, esencia, tanino, resina, materia colorante roja, glucosida.

El cocimiento y el extracto no producen ningún fenómeno notable en las ranas ni en el perro, sea que se administre por la vía gástrica ó por inyección subcutánea, por una sola vez, ó por varios dias consecutivos. En el hombre se ha ensayado en numerosos casos de impaludismo sin haberse llegado á comprobar que quitara los accesos. Jamás se llegó tampoco á producir la desaparición de los microzoarios de Laveran. En vista de lo anterior no se debe tener confianza en esta droga para combatir las intermitentes graves, aún cuando goza de gran reputación de antiperiódica en el público. Podría servir en un impaludismo crónico, combatiende las diarreas y perturbaciones gástricas, por sus calidades antisépticas. Se usa el cocimiento: 60 gramos por 500 de agua. Se hierve hasta reducción de la tercera parte. Una larga ebullición es necesaria para conseguir la disolución de los principios extractivos.

CORIARIA ATROPURPÚREA, D. C. CORIARIEAS.

Tlalocopetate. Se encuentra en abundancia en Amecameca del Estado de México. Es venenosa y sus frutos ocasionan todos los años accidentes tóxicos graves en los niños del campo.

Composición química de la planta.—Agua, grasa, resina, tanino, ácido gálico, materia colorante amarilla, coriamirtina (principio activo), sales. (Río de la Loza.)

La coriamirtina es sólida, blanca, cristalizada en prismas exagonales alargados. Poco soluble en el agua fría y muy soluble en el alcohol, éter y cloroformo. El ácido sulfúrico la colora primero en amarillo descomponiéndola y dejando depositar una materia blanca pulverulenta; el ácido iodídrico es descompuesto colorándose en amarillo claro. Los álcalis fijos y volátiles coloran las soluciones en rosa, que pasa al amarillo.

HECHTIA GLOMERATA, ZUCE, Y H. ARGENTEA, BAKER. BROMELIÁCEAS.

Nombre vulgar: Guapilla. Abunda en San Luis Potosí, Querétaro, la Mixteca, etc. Cubre grandes extensiones de terrenos, sobretodo rocallosos. Se usa por los campesinos como emoliente, como alimento y para curar la pulmonía y bronquitis crónicas. En la base de las hojas sobre ambas caras hay una substancia amarilla extendida como un barniz. Frotando ó plegando la hoja se levanta ese barniz en laminitas delgadas, adhesivas constituidas por un bálsamo cuya composición es la siguiente:

Composición química del producto llamado guapilla ó cera vegetal.—Aceite esencial, 2.600; ácido benzoico, 5.733; resina ácida, 79.267; resina neutra, 2.100; goma, 0.040; sales minerales solubles en el agua, 1.360; sales minerales insolubles y pérdida, 8.800. (Armendáriz.)

Este producto natural, según su composición química, se clasificó como un bálsamo análogo al de benjuí, pero formando una nueva especie, que por ahora llamaremos benuí de bromelias. Toca al Dr. Armendáriz haber señalado el primero la composición y naturaleza de este producto notable.

Sus propiedades son: Color amarillo verdoso, aromático, algo dulzón, blanco, susceptible de amoldarse con los dedos; punto de fusión, 72°, centígrado; inflamable, produciendo llama rojiza humeante y desprendiendo olor de benjuí. Densidad, á 18°, centígrado, 1183. Soluble en el éter sulfúrico, alcohol absoluto, en una mezcla de cloroformo y alcohol; casi insoluble en el agua, en el éter de petróleo, en la benzina, en el sulfuro de carbono y en el alcohol á 50°. (Dr. Armendáriz.)

El ácido nítrico lo colora en verde obscuro, el sulfúrico en verde que pasa al azul violado; los alcalinos lo disuelven con coloración rojiza. El ácido benzoico se llegó á extraer solamente sublimado el producto resinoso en presencia de álcalis y agua. Por vía seca no se obtiene dicha substancia. Sus aplicaciones se desprenden de su composición. Podría substituir á los bálsamos de benjuí, etc. Se llegará á obtenerlo á bajo precio, por la abundancia que hay de la planta productora.

ERYTHRINA CORALLOIDES, D. C. LEGUMINOSAS.

Al árbol se le llama Tzompantle y á las semillas colorines ó patoles. Vegeta en el valle de México y en otros muchos lugares. Se le cultiva como planta de ornato en casi todos los pueblos. Se usa la madera en la fabricación de tapones para botellas. Las flores en la alimentación. Las semillas, de color rojo, son venenosas.

Su composición es la siguiente: Agua, 7.15; grasa, 13.35; resina soluble en el éter, 0.32; resina soluble en el alcohol, 18.47; alcaloide, 1.61; albumina, 5.60; goma, 0.83; ácido orgánico, 0.42; fécula, 15.87; sales minerales, 89.15; pérdida, 0.68. (Professor Río de la Loza.)

Composición química del extracto llamado eritrina.—Nombre de los componentes y su clasificación fisiológica: Coraloidina, convulsivante; coralina, inerte ó poco activa; eritroidina, paralizomotor enérgico; ácido erítrico, inactivo; eritro-resina, emética; principio, inactivo; grasa, inactiva; glucosa; materia colorante; sales minerales; resina. (Dr. F. Altamirano, trabajo leído en la Academia de Medicina en julio 27 de 1887.)

La acción fisiológica se reasume al enumerarse los componentes. Se puede agregar que tres son las calidades principales del extracto: (1) Paralizar las placas terminales de los nervios motores; (2) provocar convulsiones; (3) provocar vómitos.

***Aplicaciones.*—Por sus principios paralizantes se recomienda en el tétanos, mal**

epiléptico, la corea, etc., y como medio contentivo fisiológico.- Por sus propiedades excitantes no tiene aplicación alguna. Por sus propiedades eméticas como vomitivo seguro en los animales y con especialidad en las aves.

GAULTHERIA OVATA, D. C. ERICACÉAS.

Nombre vulgar: Axocopaque. Vegeta abundantemente cerca de Huauchinango, Orizaba, y Jalapa. Toda la planta es muy aromática por lo que se usa actualmente para perfumar los templos y las habitaciones. Los antiguos mexicanos usaban las hojas para perfumar la ropa y preservarla de la polilla. Les servía también para curar varias enfermedades, dándola á los enfermos en bebida teiforme. Contiene 20 por ciento de aceite esencial, que se puede considerar como el principio activo, análogo á la esencia de *wintergreen*, que se extrae de la *Gaultheria procumbens*, planta de los Estados Unidos del Norte. Sus propiedades antisépticas, diuréticas, vulnerarias y antireumatismales la recomiendan á los prácticos. Se aplica especialmente á los niños atacados de reumatismo con el fin de evitarles los inconvenientes del salicilato de sosa. Como antiséptico el principio esencial es tan eficaz como el ácido salicílico y el fénico sin ser tóxico. Es de preferirse para la antisepsia de las mucosas, heridas extensas y anfractuosas, etc. La infusión teiforme es la preparación más usual. Se prepara en la proporción de 10 por ciento; es agradable, y el estómago la tolera por largo tiempo.

MONTANOA TOMENTOSA, LLAV. ET LEX. COMPUESTAS.

Zihuapatli, nombre azteca, que significa medicina de mujer. Es muy común en toda la República. En el valle de México abunda. Se usa el cocimiento de las hojas para provocar las contracciones del útero.

Composición química.—El Dr. E. Armendáriz ha demostrado recientemente los componentes que siguen, de los cuales el Profesor Federico Altamirano había encontrado el principio activo, que es el ácido montanoico: Resina ácida, 2.140; resina neutra, 3.026; clorófila, 27.500; ácido orgánico (montanoico), 1.560; cera vegetal, huellas; goma y principios, 2.015; tanino, que colora en verde las sales de fierro; agua, 11.500; sales minerales, 12.560; celulosa y leñosa, 22.824; materia extractiva, 10.110; aceite esencial y pérdida, 4.705.

Al ácido montanoico se considera hasta ahora como el principio activo de esta planta que produce la contracción uterina.

Acción fisiológica.—Se absorbe por el estómago el cocimiente de las hojas, y produce fuertes contracciones uterinas. El ácido montanoico en inyección subcutánea provoca dolores intensos en el lugar inyectado y la contracción de los vasos capilares. La dosis para este efecto es de 0.10 y no produce accidentes tóxicos. Su acción vaso constrictiva es análoga á la del cuernecillo de centeno. Se diferencía en que el zoapatli produce con especialidad más bien las contracciones del útero que las de los capilares para detener las hemorragias. Podría decirse que el zoapatli hace contraer al útero y no á los vasos, el cuernecillo al útero y á los vasos y el hidrastis á los vasos y no al útero. La comelina obra como el hidrastis.

Indicaciones.—Para aumentar la energía de las contracciones del útero grávido y violentar el término de la involución uterina.

PSORALEA PENTAPHILLA, LINN. LEGUMINOSAS.

Contrayerba de Querétaro. Contrayerba blanca ó aromática. Vegeta en Querétaro, Guadalajara, Guanajuato, etc. Se usa la raíz. Esta es tuberosa, leñosa, rugosa, flexuosa, de 4 á 8 centímetros de ancho y de largo, de color café al exterior, blanca al interior, muy feculenta, de olor especial. Goza de gran reputación entre el vulgo, como antiperiódica (y para calmar los dolores de dientes).

Composición química.—Agua, 10.000; sales, 3.750; grasa fusible á 60° centígrado, 1.880; ácido cristalizable, 0.400; alcaloide (psoralina y glucosa), 0.250; goma, 6.86;

glucosa, 1.440; almidón, 26.500; albumina, 0.100; celulosa y leñosa, 28.750; pérdida 6.154. (M. Lozano.)

Psoralina: Alcaloide descubierto por Lozano, blanco, cristalizado, soluble en el agua y en el alcohol, insoluble en el éter sulfúrico, en el cloroformo y en la benzina; de olor aromático parecido al de la raíz y de sabor amargo. Precipita con los reactivos de los alcaloides. El ácido sulfúrico le hace tomar un color violado que pasa al verde y luego al azul de Prusia; el ácido nítrico produce coloración verde-claro que pasa al rojo bajo la acción del cloro y del amoniaco.

Fisiología.—En las palomas la psoralina provoca por inyección hipodérmica en la dosis de 0.25 á 0.50 vómitos, abatimientos de la energía muscular y descenso de la temperatura, por lo que puede considerarse como emética y antitérmica (Dr. Altamirano, 1889). Tesis inaugural del Professor Lozano. Según los experimentos del Dr. Toussaint en el Instituto Médico Nacional, resulta que es realmente antitérmica, la psoralina, por acción directa sobre los centros nerviosos.

Terapéutica.—Aunque muy recomendado por el vulgo como excelente antiperiódico, el Dr. Terres en su servicio del Hospital de San Andrés no ha llegado á comprobar esos efectos. Se ha demostrado que abate la temperatura febril 1° á 2° en una hora, persistiendo el abatimiento como dos horas. La dosis empleada ha sido de 0.016. Es pues la psoralina un buen antitérmico preferible por no tener acción tóxica.

ROUREA OBLONGIFOLIA, HOOK. ET ARN. CONARACÉAS.

Se le llama chilillo de la Huasteca. Vegeta en la Huasteca Potosina, en Motzorongo (Estado de Veracruz), etc. Es una liana que trepa sobre los árboles á grandes alturas. Los cojolites (*Penelope purpurascens*, Wagl.) se alimentan con sus frutos, y según se dice los huesos de estas aves se vuelven venenosos para los perros. Aún no comprobamos esta particularidad. Se usa la raíz para envenenar á los perros y también como curtiente por la gran cantidad de tanino que encierra la corteza.

Composición química.—Según un ensaye del Dr. Codoy, contiene: Grasa, materia colorante amarilla, resina soluble en el alcohol, resina insoluble en el alcohol, tanino en abundancia, principio amargo, glucosa, goma, principios diversos.

Acción fisiológica.—La dosis de 4 gramos de polvo de la corteza administrada á un perro por la vía gástrica provoca convulsiones clónicas generales (temblores), paralisis de los cuatro miembros, respiración difícil, dilatación pupilar. Estos síntomas aparecen lentamente en tres ó cuatro dias y persisten mucho tiempo, particularmente la paresia motriz. En la rana produce también la parálisis del movimiento y trastornos cardiacos. (Altamirano.) Nuevos estudios nos harán conocer su modo de obrar en diversas enfermedades. Actualmente se usa: 1° Como veneno para los perros; se les da el polvo de la corteza mezclado con carne. 2° Como curtiente.

SENECIO EHREMBERGIANUS, T. W. KLATT. COMPUESTAS.

Yerba de la Puebla, Izcuimpatli. Vegeta en Puebla, Zacatecas, Guanajuato, etc. Se usa toda la planta. Es venenosa y se utilizan sus propiedades para matar á los perros. Se les da el polvo oculto en un fragmento de carne y mueren como á las dos horas de haberlo comido.

Composición química.—Agua, grasa, resina, goma, ácido senécico (principio activo), sales. (Río de la Loza.)

Propiedades del ácido senécico: Líquido, incoloro, inodoro, insípido, muy soluble en el agua, el alcohol y éter sulfúrico. Reduce en caliente las sales de plata, oro, licor de Fehling, etc. No precipita por el percloruro de fierro, ni cloruro de bario, de calcio, agua de cal, sulfato de magnesia, etc. Reduce al bicloruro de mercurio precipitando calomel. No da ninguna coloración en los ácidos concentrados. Forma fácilmente senecatos por saturación ó por descomposición de los carbonatos. Los senecatos alcalinos son delicuescentes. Con el ácido acético y una base forma aceto-senecatos muy facilmente cristalizables. Esta combinación será la más appropósito para las formas farmacéuticas.

Fisiología.—El aceto-seneeato de barita produce la muerte á un perro en la dosis de 0.40 por inyección subcutánea, después de tres horas.

THALAUMA MACROCARPA, ZUC. MAGNOLIÁCEAS.

Yoloxochitl, flor del corazón, como se le llama también. Vegeta en el Estado de Morelos, pero principalmente cerca de Motzorongo, en el Estado de Veracruz.

Composición química de las semillas.—Grasa, resina ácida, resina indiferente, aceite esencial, materia colorante, extractivo amargo, talaumina, un glucosido resinoso, sales. (Dr. Armandáriz.)

Fisiología.—Lo que por ahora se puede inferir de las experiencias practicadas es que el extracto de las semillas altera los glóbulos rojos poniéndolos negruzcos, provoca fenómenos asfíxicos, modifica las pulsaciones cardiacas y la tensión de la sangre y da orígen á diversos fenómenos dependientes del sistema nervioso. La muerte es producida por parálisis cardiaca. (Altamirano.)

Terapéutica.—Es muy usada la tintura preparada con las flores, contra las palpitaciones nerviosas. Actualmente se ensaya en los hospitales.

THEBETIA YCCOTLI, D. C. APOCINÁCEAS.

Esta apocinea se conoce vulgarmente con el nombre de Codo de fraile ó Yoyote. Vegeta en Morelos cerca de Jojutla, Michoacán, etc. La parte usada es la semilla, que contiene las principios siguientes como más importanes: Grasa, tebetosa (glucosida).

La tebetosa es el principio activo glucosida muy venenosa, cristalizado en láminas incoloros, brillantes, de sabor acre. Adormece la lengua é irrita enérgicamente la mucosa nasal. Soluble en el agua. Muy soluble en el alcohol y poco en el éter sulfúrico. La tebetosa se transforma en teberesina bajo la influencia de los ácidos. La teberesina reduce al licor de Fehling.

Acción fisiológica.—Se absorbe fácilmente por las vías gástrica y subcutánea. Su acción principal la ejerce sobre el corazón. En el perro, la dósis de 3 milígramos provoca á los quince minutos de ingerida, irregularidades en los latidos, aumento exagerado de la tensión sanguínea, vómitos, salivación, contracción traqueal y tal vez brónquica, movimientos respiratorios frecuentes, superficiales y fenómenos asfixicos. En fin como á los cuarenta minutos parálisis del corazon, abatimiento de la presión sanguínea. No provoca diuresis. El corazón se detiene en sístole. En el corazón de la rana se observa que antes de detenerse pasa por un período de parálisis ó relajamientos parciales de las paredes ventriculares.

La terapéutica clínica está por hacerse. Puede clasificarse como emeto-catártico y paralizomotor cardiaco. Parece contraindicado en las afecciones cardiacas mitrales particularmente.

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ADDRESS BY THE EXECUTIVE PRESIDENT, JOHN B. HAMILTON, M. D., LL. D.

COLLEAGUES: For the first time in the history of the American continent the medical men of the Americas meet in convention for the purposes of scientific advancement and the cultivation of closer professional relationship.

The country of Washington, the land of Bolivar, and the sunny islands of the Southern seas have sent their representatives to this capital of their oldest Republic to exchange courtesies and set forth a fair statement of their degree of enlightenment in the various branches of medical knowledge.

Our statesmen have long desired this close union between the American Republics, and the medical profession now, as ever, stand ready as citizens to carry out their share of this patriotic duty. After our own civil war, the medical profession, through the American Medical Association, met in annual reunion at Atlanta; and it should always be a matter of professional pride that our own led the van in this march of professional and social reunion. Here again we are inaugurating the first of what we hope may be the beginning of a series of Pan-American professional congresses, each more interesting than its predecessor, and all serving to unite our glorious lands in common aims and mutual regards.

As the United States has had the honor of proposing the congress, the burden of organization has fallen largely upon its representatives, and the overflowing programme is to-day evidence of the faithfulness with which our president, our secretary-general and their coadjutors have performed their task.

We welcome you, dear colleagues, to a rare treat in the republic of letters; our foremost medical men will address you, and the topics they bring for your consideration have living interest, for they are topics of to-day.

A glance at our programme shows that our own section, notwithstanding the subdivisions by which many branches of surgery have been organized into separate sections, is ample to fully occupy the time set apart for our deliberations.

The rapid evolution of surgical knowledge is one of the wonders of this remarkable age, and surgeons may fairly claim that their own branch of medicine has kept equal pace with the stupendous advances made by the collateral sciences. A review of the surgical progress of the last decade alone constitutes one of the most brilliant pages of the history of medicine. And yet one must remember that all scientific progress is based on antecedent fundamental facts discovered by slow, laborious, and painful steps.

The labors of Darwin, Huxley, Herbert Spencer, Pasteur, and Lister in the last decade have made possible the practical successes in the present decade.

There is at this time no diseased organ or tissue of the body that escapes the remedial scalpel, and an examination of the discussions of this time shows that the questions presented are rather those of method than those of original discovery. We no longer question the propriety of surgical interference in hitherto dark portions of human anatomy, but we are concerned in the technique of that interference; and to the improvement of surgical technique the ablest minds of the present decade have been directed.

The subject of surgical bacteriology, which includes the chemical study of microbic products, has still much to disclose, but we already base our practice on the immortal discovery of Pasteur. The success of modern surgical treatment, even with the imperfect knowledge of the bacteria that we now possess, is such that no surgeon thinks for a moment of comparing the results of any given operation with those obtained in the pre-microbic epoch. This comparison, however, only relates to the age of gunpowder, for history tells us with abundant detail that the ancient treatment of wounds corresponded very closely with our own. The vulnerary compounds of the ancients were largely composed of what we know as antiseptics; the terebinthinate and metallic dressings of the Alexandrian Period we can accept to-day as true antibacillary agents; and even the boiling oil and the red-hot iron we could now admit as forming an eschar or impermeable wall against the entrance of microbes. It was aseptic surgery of which the ancients knew nothing. The empirical results of the boiling oil, of the actual cautery, were enough for the ancient masters; like the heroes of Balaklava,

"Theirs not to reason why."

They only knew results were satisfactory; wounds healed quickly and without sepsis; what matter if the theory on which their treatment was based--that of arrest of hemorrhage—was faulty, the result satisfied them. Like the blind man of the New Testament, the logic was simple: "Whereas I was blind, now I see;" therefore the touch was adequate. All medical science seems to have run in cycles, and there was less medical superstition in the Alexandrian Period than in mediæval medicine --less in the Hindoo charaka than in the pages of Guy de Chauliac or Ambroise Paré. Bacteriology has added much to our knowledge of tuberculosis, and given more precision to its treatment, but that knowledge is still imperfect, and its treatment far from satisfactory. Much less has bacteriology added to our knowledge of the carcinomata, which still remain one of the mysteries of medicine. We have for years studied the varying departures of tissues from the normal to the abnormal type, and bacteriologists have in vain sought to connect the atypical structure of carcinoma with some bacterial development, but no Pasteur or Harvey has yet dawned upon our horizon to pick the lock of a mystery to which Heaven seems to have allowed our generation no key. Looking to the future we can not doubt that the solution of the formation of the carcinomata will yet be discovered, but it will necessarily be through the influence of some now totally unknown factor. The study of embryology and atavism seems at present the most probable avenue to the truth.

What may we hope for the future of surgery?

It seems likely at this day that improvements in technique will continue to occupy the surgical mind until some epoch making discovery in physiology shall have been made. It is not likely that the present generation of surgeons will witness another discovery as far reaching as that of Pasteur. We must digest and fully assimilate the discoveries of the bacteriological epoch; that process will probably fully occupy our time and that of our immediate successors. It is true that we may have some help from advances in the collateral sciences; transillumination of the body, for example, may be yet fully developed in our time, instruments of precision as aids to hearing and vision may greatly assist us in making our present knowledge useful, but the great outlets to human life, such as carcinoma, in all probability will have their genesis understood only by the surgeons yet unborn. When that time shall come carcinoma and tuberculosis will be classed among the preventable diseases. These two affections have cost more human lives annually than cholera or yellow fever, and yet no government has ever set on foot any systematic and regular inquiry into their causation or propagation. It is true that the study of cattle tuberculosis has been the subject of much study by the Bureau of Animal Industry, but so far as the human race is concerned little has been done in the direction indicated.

Colleagues, I feel that I have too long detained you with these speculations, when we have before us a programme so rich and so varied, but I can not refrain from expressing my heartfelt congratulations on the success of this meeting, my thanks for your generous response to the call for papers, and as an American surgeon to bid you welcome. Welcome, thrice welcome, foreign colleagues, to our hearts and homes. We pray you to kindly join us in warmest fraternal greetings to our European guests, and let us remember the saying of Livy that true friendships are immortal.

PAPERS READ BEFORE THE SECTION.

TWO CASES ILLUSTRATING THE VALUE OF GASTROSTOMY FOR THE EXPLORATION OF THE CARDIAC EXTREMITY OF THE STOMACH.

By ERNEST LAPLACE, M. D.,

Professor of surgery, Medico-Chirurgical College, Philadelphia, Pa.

The following case illustrates the benefits to be derived by immediate operation for the relief of symptoms in spite of the desperate nature of the present condition. Gastrostomy for the relief of an œsophageal stricture has gotten the reputation of a forlon hope, or a last resort, and though this may properly be the case when the stricture is of a cancerous nature, still, owing to the impossibility of a positive diagnosis, it may happen, as in the following case, that other causes may produce the stricture, which, if the patient could successfully be tided over a crisis (the causes) might subside and the patient be restored to health.

Case 1.—J. H., aged 54, had been healthy all his life until he gradually noticed a difficulty of swallowing, which was soon followed by vomiting whenever an attempt at swallowing was made; finally was unable even to swallow water. No stomach tube of any size could be introduced past the stricture, which was diagnosed at the cardiac extremity of the stomach. No cancerous history, no possible clew as to the nature of the obstruction. On entering the hospital the patient was in a starved condition, having been fed by enema for three months. Although very weak—almost exhausted—we determined to perform a gastrostomy.

Incision was made on the right side 3 inches in length parallel to the costal arch, starting about half an inch from the ensiform cartilage. Opening the peritoneum we fell upon a hard, glistening mass which we recognized as the stomach only by the attachment of the omentum. Having had considerable difficulty in assuring ourselves that it was the stomach, we sutured this substance to the abdominal wall by 12 silk stitches, leaving an exposed surface of the stomach about three-fourths of an inch in diameter. On the third day this was punctured with the thermo cautery, and a sound was introduced into the stomach, which was found quite thick and strongly contracted. The patient was fed through this opening with peptonized milk, custards, etc. In a few days the stomach had dilated to a considerable extent, and then the patient, craving for food, was allowed to chew his food, and the mass was then introduced into the stomach through the opening.

No difficulty was found in withholding the contents of the stomach, for a plug, consisting simply of an India-rubber nipple, such as is used in ordinary feeding bottles, was introduced into the opening and remained in position at the hour-glass portion of it. The patient rapidly increased in weight and regained perfect comfort, when, to our surprise, he became able to swallow liquids, and gradually to swallow food, through the œsophagus.

Having apparently regained perfect health we determined to close the fistula in the stomach. The patient was anæsthetized, and, being very anxious to know what could possibly have produced the original stricture, we introduced two fingers into the stomach toward the cardiac extremity and found a pediculated mass hanging in the stomach

This was rather high up and out of our reach. The obstruction to the œsophagus must evidently have existed at the time that the growth started. This growth is evidently a polypus which started about the cardiac extremity of the stomach as a sessile growth large enough to completely obstruct the orifice, but on further development becoming pediculated, gravitated into the stomach, leaving the œsophageal tract open. The patient at the present writing is feeling perfectly well, and still retains this growth within the stomach which at present seems to afford him no annoyance.

We should not wonder but that it will eventually be digested by the stomach, should its pedicle become long enough to allow it to hang on the floor of the stomach. Should it, however, offer him any discomfort he has promised to return for its extraction, which operation will offer no difficulty, as it will only require a cut over the original cicatrix, and ligating the pedicle the tumor will be easily removed.

Case 2.—A. H., aged 52 years, a miner by occupation, and a sufferer from tertiary syphilis, gradually lost the power of deglutition. He was otherwise in a fairly good condition. On examination the æsophageal sound of smallest caliber could not pass through the cardiac portion of the æsophagus. There was great emaciation, and for the relief of the progressive starvation gastrostomy was resorted to. The operation was performed at two separate sittings. At the first the stomach was attached to the abdominal wall as in the previous operation; at the second the stomach was opened with the thermo-cautery knife. The patient chewed his food and it was then inserted into the opening of the stomach. The opening was at first plugged with iodoform gauge, and subsequently the India-rubber nipple was used for that purpose. After two weeks the emaciation had considerably disappeared, and the opening in the stomach had enlarged to the size of a 5-cent piece. No apparent change had taken place in the patient's power of deglutition, although he was given the mixed specific treatment by the stomach. It then occurred to me that I might introduce the sound through the opening into the stomach up the cardiac extremity. This was tried and with success. The smallest size was introduced first, then the next size. On the third day the dilatation was continued, and the patient was then enabled to swallow liquids with ease. When alimentation was found completely carried on by the mouth, that is, about one week after the first dilatation, the patient submitted to an operation for closing the gastric fistula. This consisted in carefully denuding the edges and suturing them with silk-worm gut. The patient has to-day gained 25 pounds, and is in comparatively good health.

These two cases illustrate not only the value of gastrostomy as means of supplying nutrition to the body but also of exploring the stomach in its whole dimension. This latter idea, as applied to the pathology of the cardiac extremity, has hitherto not been given sufficient notice, and I will have been amply repaid if others find likewise the solution of some pathological problem of this region by the opportunity of exploration offered by gastrostomy.

SOME POINTS IN THE SURGICAL TREATMENT OF APPENDICITIS.

By AUGUSTUS P. CLARKE, A.M., M.D., of Cambridge, Mass.

Recent experiences of the surgeon, as well as of the general practitioner, have most materially changed the teachings of the earlier writers respecting the treatment of appendicitis. In those cases in which the inflammation of the appendix is of a minor degree it may be overcome by an expectant method. Undoubtedly the larger proportion of the cases involving the additamentum coli is of this lesser grade. Such cases often arise from the presence of bacteria or bacilli which have gained admission into the tissues in immediate connection with the intestinal tract. The symptoms occurring may be characterized by pain or tenderness, by moderate distension, marked constipation, and by disturbances of the constitution generally.

Under favorable circumstances, or by rest and by the application of heat and by the administration of gentle laxatives, the symptoms may subside without exciting any grave apprehensions on the part of the patient, or on the part of those who are in attendance. After intervals more or less remote there is liable to occur, from various causes, a recrudescence of the inflammation. Not unfrequently, after the lapse of some few days, the disease may take on retrograde processes: in other instance it may become so intensified as to demand prompt surgical interference for the patient's recovery. From a careful study of the histories of cases coming under my observation during a number of years past, and also from learning in many instances the final results, I feel that it is not unsafe to say that in every case in which there is reason to believe that the vermiform appendix is involved, however mild or transient the symptoms may at first appear, the surgeon or medical attendant should be on careful watch for sudden surprises or for untoward results.

There is great probability in almost any event that the appendix during an attack of inflammation will become adherent to other parts in the immediate vicinity. In a case of laparotomy to which I was called for the removal of diseased uterine appendages I found that the vermiform appendix had become adherent to the tube and to the ovary of the right side. The appendix cæci was thickened and also indurated as the result of inflammatory processes of considerable duration. In some instances the first intimation the surgeon may have of the case will be the formation of a localized abscess; this may occur in or near the McBurney point between the umbilicus and the anterior superior spinous process of the ilium or about 5 centimeters from that point on the ilium. The temperature in such a case is not usually very high; it is often not more than 100° to 102½°. The pulse may become soft and compressible, and occasionally much more frequent than the temperature would indicate.

The vomitus is of a dark or grumous substance; at times it is of a light greenish color. When the symptoms become urgent surgical measures should immediately be instituted for relief. In many cases, if not in the most, the incision should be made over the point of greatest tenderness; this point, as before intimated, is midway between the umbilicus and the superior spinous process of the ilium, and is usually in the right linea semilunaris. Such an incision will afford an opportunity for free drainage and for flushing the parts with warm carbolized water or with water of the temperature of 115° to 120° containing boracic acid or other agents that can safely be introduced into the abscess cavity. A liberal incision, when timely made over the tender part, has always yielded in the cases occurring in my practice an immediate and permanent result. In all cases after the incision has been made the parts should be thoroughly explored; if the appendix is within easy reach it should be brought forward and then sewed off by means of sutures of aseptic kangaroo tendon. If, however, the appendix is bound down by firm adhesions, or if it can not be found without much difficulty or without doing excessive violence to the cæcum or to other structures, it is far better to let it remain, for its presence, when left, will not seriously interfere with the patient's recovery.

In a case to which I was called some months since the patient, who was aged 20 years, had been suffering nine days. I made a free incision over the tenderest point; the operation was followed with a profuse discharge of purulent exudation. Careful search at the time was made, but the appendix could not be found. The patient, however, died next day. Extensive dissection at the autopsy revealed the fact that the appendix was drawn upward behind the cæcum and was firmly adherent to the intestine. It required much patience to isolate and to identify it as the part for which we were in search. No portion of the intestine, nor other part, was found gangrenous. It is highly probable that had the patient consented in the early stage of the attack to the operative measures he could have been saved. In another case to which I was called, the patient, a girl aged 14 years, had been ill with local symptoms for four days; there had been much distention of the abdomen. The point of greatest tenderness was lower down than usual, but the symptoms so strongly pointed to the existence of appendicitis that a resort to operative measures was advised.

An incision was made 8 centimeters in length over the point of greatest tenderness; there was considerable discharge of purulent and bloody exudation. The appendix was unusually long and was bifurcated, and at its junction with the cæcum it was larger than normal. The excision of the appendix was affected without much trouble; it was sewed off, as in the other cases, by means of the cordwainer's stitch, in which kangaroo tendon was employed. The patient made a speedy and an uninterrupted recovery. In another case to which I was called, that of Miss G., aged 13 years, the symptoms had been in progress upward of four weeks. The attending physician had early diagnosticated the case as one of appendicitis and after consultation with another practitioner had advised a resort to surgical measures. The symptoms, however, soon became so much easier that the operation was deferred; after the lapse of some days there was a sudden return of the graver symptoms; at this time I was called to see the case. The parents now declined the proposition for any operative interference unless they could be positively assured of ultimate success. Nothing then remained to be done but the adoption of an expectant method.

For some days the patient was nourished solely by enemas of beef juice, brandy, and beef peptonoids. After that the patient was able to take by the mouth small quantities of malted milk and beef essence. Morphia and other sedatives in small quantities, frequently repeated, were employed. Under this régime the pain was kept under control, the vomiting almost entirely ceased, the abdominal distention markedly lessened, though there was probably suppuration going on at the McBurney point. The father still refused a resort to operative interference. Though the patient was so much relieved the temperature was at times somewhat above the normal. On the thirteenth day from the adoption of the expectant method the patient experienced an unfavorable return of the symptoms. She died from sudden collapse on the following day, which was the forty-second from the apparent onset of the disease. In the treatment of this case the patient had the opportunity to try the benefit of the expectant method, carried out from the first in the most approved manner. Had an operation been undertaken in the early stage of the inflammation the patient would undoubtedly have recovered.

At no time after I was called did it seem that an operation could have afforded much chance for relief, owing to the excessive emaciation and to the other unfavorable phases which the disease had assumed. If consent had been obtained I should nevertheless have given the patient the benefit of an exploratory incision. When an operation in the early stage of the inflammation is undertaken there will be but little difficulty experienced in the removal of the appendix; of course, after adhesions are formed the danger is increased. In all cases the wound should be kept in an aseptic condition; if an abscess has formed the cavity should be irrigated or flushed with a warm medicated solution. When the appendix is not easily reached, or is bound down behind the cæcum, the safer method will be to let it remain and not to make any extended search or dissection, especially after suppuration has taken place. When the mesentery or other structures have been sufficiently detached the appendix should not be tied, but should be clamped, and then should be sewed off by means of carbolized animal sutures; as soon as all bleeding points have been controlled the appendix should be incised about 2 centimeters from the cæcal tissue.

In order to prevent adhesions of the stump or base of the pedicle to other parts, the peritoneal tissue in immediate vicinity of the margin of the incision should be closely approximated by a subperitoneal or by a Lembert suture. The smaller-sized kangaroo tendon, rendered aseptic, should preferably be the material for such use. A thorough closure of the peritoneal surface of the wound thus affected will not only obviate the occurrence of agglutination of the parts, but will also help to prevent the escape into the peritoneum of septic matter that may gravitate toward this point and thus preclude the occurrence of a fistulous tract. The entire wound should as far as possible be kept in an aseptic condition. Aristol and iodoform will be found to be excellent adjuvants in accomplishing this result. The danger of the subsequent occurrence of hernia may be overcome by paying careful attention to the closure of the several parts that have been divided in the operation; the peritoneum, the muscular tissue, the fascia, and the external integument should each be brought together separately. Carbolized animal sutures should be used for this purpose.

Entire closure of the wound by the first intension can be affected only in those cases in which the operation has been undertaken in the early stage of the attack. After the formation of an abscess complete union at first can not be expected to result, because some method for maintaining drainage for awhile will have to be employed. Some operators recommend that after the appendix has been incised the stump should be disinfected with a small-pointed cautery; in cases in which the appendix has become gangrenous, or in which there has been sloughing or marked septic processes going on, such a method of procedure may do no harm, but in those cases in which it is desirable to achieve immediate union of the tissues cauterization may cause further sloughing, and exudation that will delay cicatrization; in most cases disinfection with 1 to 1,000, or to 2,000 mercuric bichloride solution, and the liberal use of aristol and iodoform will be more conducive to this end, and be a far safer practice to adopt. The different steps of the operation are much complicated when there is present an unusual abdominal distention; so also it will be in cases in which there is excessive or marked obesity.

In one case to which I was called, though the distension was not uncommon, expulsion of the intestine began as soon as a moderate incision was made; the employment of the Trendelenburg posture, however, overcame the complication and enabled me to complete the operation without further inconvenience. The advantage of Trendelenburg's position in all cases of abdominal section for intestinal affections can not be over estimated. In those cases in which some means for drainage become necessary every detail in the treatment should receive the utmost attention, for if there should occur any hindrance to a free discharge of the exudation a risk of a dangerous sepsis to the organism will be incurred. In every such case of abdominal section when a drainage tube has been employed the possibility of the occurrence of hernia should not be overlooked. In all cases, whether the drainage tube has been required or not, a firm binder, or a thorough bandaging should be employed, the patient for some weeks should be kept for the most part in the horizontal position.

As already intimated, an abdominal section with the removal of the appendix, in the early stages of the inflammation, is most likely to be followed with favorable results. In the initial stage of many of the milder cases the medical attendant often hesitates, or shrinks from assuming the responsibility of undertaking operative measures; he rather indulges in the hope that the case will ultimately take on a more favorable aspect. It is true that in some cases there will be for a while considerable improvement which will lead to the thought that the patient may finally recover. In other cases there is an evident fear on the part of the medical attendant that the diagnosis may be incorrect or that the symptoms are dependent on the presence of uncertain factors. Such a conclusion, however, at the present day should not obtain when it is considered that our increasing experience will enable us to decide most accurately, in reference to the elimination of the existence of other possible causes. Assuming that our diagnosis is occasionally incorrect, the dangers of an exploratory incision are infinitely less than would result from allowing the symptoms to progress without availing ourselves of the advantages of an abdominal section, which in most cases is, in any event, when properly carried out, a comparatively harmless procedure.

The question often arises should the surgeon when called upon in the later stages of a case advise operative interference? In answer to this it may be remarked that our experience is favorable to the adoption of an exploratory incision. When an operation is undertaken in the later stages the patient must, of course, assume more risks, for the chances of recovery are much less than when an operation is attempted much earlier, though surgical measures at such late day may prevent the rupturing of an abscess into the peritoneal cavity. When there has been such a rupture, removal of the pus, and cleansing the parts may afford an opportunity for a retrograde process of the disease to take place. Nothing, therefore, but the occurrence of extreme collapse should weigh against the employment of operative measures. Some surgeons have advised that when the existence of peritonitis has become somewhat diffused it should be regarded as a bar to the adoption of surgical treatment. It should, however, be remembered that the implication of the peritoneum may be dependent in any case on the presence of lesions that may have their origin at a distant point and that the removal of the cause of such morbid processes may effect a speedy subsidence of the peritoneal inflammation; a peritoneal inflammation should always, according to the light afforded by recent pathological investigations, be considered only as a secondary affection to other processes that have had a more or less continuance.

Before closing this paper I deem it important to say that in those cases of appendicitis which have gone on to suppuration before operative measures have been undertaken there may occur secondary abscesses in other parts of the abdominal cavity. An operation to insure relief must, therefore, embrace a course of procedure that will afford a free discharge to all accumulations of purulent exudation; it will sometimes be necessary to make an extensive dissection at different parts and also to overcome adhesions of an unusual extent. Great care will also have to be exercised lest an opening be made into an adherent intestinal mass. In some instances portions of the epiploon may become gangrenous; there may occur in the veins of the abdomen an inflammation that may extend outward to the femoral and to other veins. In carrying out for these complications the necessary surgical treatment much judgment will have to be exercised and much precaution taken that the dissection or search be not prolonged beyond what may afterward prove to be a beneficial or safe proceeding.

APPENDICITIS, WITH ORIGINAL REPORT, HISTORIES, AND ANALYSIS OF ONE HUNDRED AND FORTY-ONE LAPAROTOMIES FOR THAT DISEASE, UNDER PERSONAL OBSERVATION.

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Mr. President, Members of the Congress: It might seem necessary to offer an apology for presenting a subject that has been so thoroughly discussed at medical associations and so voluminously considered in medical literature in the past four years. But I will offer none for presenting this subject as many of its important relations to the physician and patient are still mooted questions. There is probably no subject in abdominal surgery on which the profession is so divided and on which such opposite views are entertained. Gynecologists are fairly well agreed on what the procedure should be in cases of pyosalpinx, ovarian cysts, and even now on fibroid tumors, but at every medical meeting in which the subject of appendicitis is discussed we find the physicians almost equally divided for and against operative procedure. The question presents itself, Why are they thus divided? The answer is, They are divided because they have different views, or better, because they are not informed on (1) the pathological conditions that exist; (2) on the probable course or clinical history of the patients suffering from these pathological conditions unaided by the surgeon; (3) on the comparative results to the patient by the aided and unaided methods.

I shall not consider the anatomy of the appendix, nor treat of the various positions in which it may be found. The excellent paper of Dr. Joseph D. Bryant fully elucidates that subject.

Pathological conditions.—Let us first consider the pathological conditions that exist. The inflammatory or infective lesions of the appendix, for a scientific discussion of their relations to the comfort and life of the patient, should be divided into the following classes, because each class has advantages and disadvantages peculiar to itself, and in considering the effects of these lesions upon the patient a fair idea of the percentages can not be obtained unless the classification is carefully carried out, so that the degree of jeopardy may be uniform. The lesions of the appendix and their effect on the surrounding organs and peritoneum should be divided into (1) simple catarrhal appendicitis; (2) ulceration of the mucous membrane without perforation, (*a*) pressure atrophy with infection, (*b*) simple ulceration with purulent accumulation, (*c*) typhoid ulcer, and (*d*) tubercular ulcer; (3) ulceration of the mucous membrane or ulceration of the appendix with perforation; (4) gangrene of mucous membrane of appendix, (*a*) local, (*b*) general; (5) gangrene of appendix complete, (*a*) with perforation, (*b*) without perforation; (6) infection of peritoneal cavity, (*a*) without perforation, local and general, (*b*) with perforation, local and general; (7) peritonitis, (*a*) local peritonitis without limiting adhesions, (*b*) circumscribed abscess, (*c*) diffuse general.

The scope of this paper does not include the neoplasms, traumatisms, nor herniæ of the appendix.

I include in this paper the cases occurring in the practice of my partners, Drs. E. W. Lee, F. S. Hartmann, and H. R. Wittwer, as the cases were all treated on the same basis, and had equal chances of recovery. Though the actual operations were performed by Dr. E. W. Lee, 20 cases with 5 deaths; Dr. F. S. Hartmann, 9 cases with 1 death; H. R. Wittwer, 4 cases with no deaths; Dr. J. B. Murphy, 108 cases with 10 deaths; total, 141 cases with 16 deaths. Mortality with my own cases 9.2 per cent.

Etiology.—The pathological lesions above mentioned are produced by certain causes which we will classify as (1) simple pus-infection, producing the catarrhal variety; (2) extensive infection of wall by the amœba coli, or pyogenic microphytes, producing gangrene of a greater or lesser portion of the appendix; (3) pressure atrophy with infection of appendix, (*a*) fecal concrement, (*b*) foreign body; (4) specific infections, as typhoid, tubercular, etc.; (5) retention accumulations, (*a*) from cicatricial contraction, (*b*) from occlusion with enterolith or foreign body.

Perforations of the appendix from various causes. I have found in the report of 465 autopsies of this disease occurred 324 times; of the appendices removed by us there were perforations 39 times, and 58 removed during attack.

The simple catarrhal variety of appendicitis without retention is seldom brought to the surgeon's attention; more frequently, and still not often, to that of a physician, as it usually accompanies a catarrhal enteritis, and has no symptom peculiar to itself except a slight excessive tenderness in the right iliac region. We have not operated on, nor seen a single case of this class. Catarrhal inflammation with retention is a very different condition; it presents a very serious train of symptoms, producing a pulse as high as 130, temperature of 105°, as can be seen by cases 65 and 118.

This form is frequently brought to the surgeon's attention. It is accompanied by a train of severe symptoms, both local and general, and endangers the life of the patient much more than the preceding one. There were 3 cases of this variety operated on; all recovered. Of the 141 cases operated on the appendix was found completely gangrenous and not perforated in 4 cases, with 4 recoveries. In this form of appendicitis the appendix is usually serrounded by bowel or omentum without a pus infection of the peritoneum.

Pressure atrophy of the appendix with perforation was considered in former times to be due in the majority of cases to foreign bodies that had passed into it from the alimentary canal. This was erroneous. Later observations show that only a very small percentage is due to foreign bodies, such as seeds, cherry stones, etc., passing into the appendix in that manner, but the great majority of pressure atrophy perforation is produced by fecal concretions (enteroliths). Number of foreign bodies in our cases, 5; 3.5 per cent; number of fecal stones, 43; percentage of fecal stones, about 30 per cent. This does not represent all, as many of the appendices allowed to remain undoubtedly contained them.

The specific infections seldom produce obstruction of the appendix or special symptoms. Of our cases we had one of the typhoid variety. Mrs. B., case 46; operated; recovered. Of the tubercular variety we had one case, and the patient recovered from the immediate effects of the operation and died of a general tuberculosis eighteen months later.

Retention accumulations in the appendix from cicatricial contraction occur where an ulcer has previously existed in the appendix, and the contraction so occludes the caliber of the base of the appendix that the secretions in the cavity of the appendix accumulate, produce distension, bring on attacks of pain, fever, local tenderness, and finally rupture. The only cases of this kind were cases 101 (12 attacks in two and one-half years) and 126 (5 attacks in eight months). The effects of the obstruction of a foreign body or concrement at the base of the appendix is the production of a gangrene of the appendix: (1) By infection and gangrene (not by restriction of circulation, as the appendix receives its blood supply from the side, not from the end); (2) by retention of contents; (3) by strangulation from swelling of mucosa. The cases of this kind will be considered under the head of gangrene of the appendix.

Pathological lesions.—Simple recurrent catarrhal appendicitis is considered by some physicians to be a frequent disease. The course of this disease is supposed to be an inflammation of the appendix and an accumulation within the appendix of the products of inflammation with the subsequent escape through the opening of the appendix into the caecum. That recurrent appendicitis is not of this variety I am convinced. Recurrent appendicitis in the cases that we have operated upon is due most frequently to a foreign body in the appendix, and next in frequency is due to the cicatricial contraction, *and these recover not by the passage of the products of inflammation through the neck of the appendix into the caecum, but by an ulceration from without inwards in wall of caecum,* from a circumscribed suppuration about the appendix at the seat of the foreign body. These cases are misnamed by some authors cecitis or pericecitis. Matterstock, in 146 autopsies for perityphlitic abscess, found the caecum perforated from within outwards twice. Number of cases of this class diagnosticated recurrent catarrhal appendicitis, and operated on by us, 3; of these all showed rupture of wall and opening into caecum, and all recovered.

A simple ulcer of the appendix produces symptoms in two ways: (1) By occlusion of the appendix from a swelling of the mucous membrane and the tension produced on the serous coat; (2) by an infection of the peritoneum through the wall of the appendix or along its mesentry. In the literature on this subject we are led to believe that a pus infection of the peritoneum only occurs with perforation. This is erroneous, as in a number of our cases with simple ulcers of the appendix we had (*a*) an infection of the mesentery and peritoneum, and yellow flakes of purulent material (*see* case 67); (*b*) accumulations of a quantity of pus in the peritoneal cavity without perforation (*see* case 113). This is very important, for in ulcerations of other portions of the alimentary canal such pathological conditions are reported as occurring; and why should the mesentry of the appendix not be injected, or why should the peritoneum not be infected without perforation of the appendix, that is, by simple ulceration, as in other portions of the alimentary canal? There is no reason; and while it has not been previously noted I have found it, nevertheless, a common pathological condition.

That simple ulceration of the appendix with perforation should produce a serious, if not fatal, peritonitis is to be expected the same as perforating ulcers of other portions of the alimentary canal. When a perforation first takes place, to which there are many exceptions, the rule is that adhesions are formed about the appendix, but as the accumulation outside of the appendix increases these adhesions are ruptured and the contents of the abscess cavity escapes into the peritoneum with the results to be considered under general septic peritonitis.

Partial gangrene of the appendix is produced in three ways: (1) Mechanical compression by foreign bodies: (2) by accumulated fluid; (3) and most frequently by infection of wall—*a*, biotic; *b*, toxic. The latter was the most frequent condition.

Complete gangrene of the appendix, (*a*) with perforation; (*b*) without perforation. In complete gangrene of the appendix, either from compression at its base by a foreign body or by infection of its wall, destroying the vitality of the tissue, or by contortion, shutting off its circulation, if an early operation is performed the appendix will be found black, nonadherent, surrounded by omentum which is adherent to the wall of the bowel, and with pus infection of the peritoneum. It looks as though it were a miniature gall bladder with extremely thin walls. The dangers of this variety with early operation, before it has perforated, one can readily see, would be small, as the cæcum can be lifted into the wound, the appendix ligated, excised in the absence of pus in the peritoneal cavity, and with very little danger of subsequent infection.

When the appendix has perforated, as in subdivision *a*, the contrary is the case. We have a greater or lesser accummulation of the products of infection, gangrene of the appendix, and the microphytes in the peritoneum, with or without adhesions. In this variety perforation can take place directly into the peritoneal cavity and a general peritonitis be produced, in which there is no effort at limiting adhesions, the same as you find following gangrenous destruction of other portions of the body from infection in which there is an absence of the effort of limitation and a nonrestricted advancement of infection.

Peritoneal infections.—The first variety of infections without perforation I have mentioned under the head of ulceration of the mucous membrane. The second variety is of the most common occurrence in disease of the appendix, a small circumscribed abscess as a result of perforation. The effect of this abscess in its subsequent course depends (1) on whether there follows necrosis of the wall of the adherent intestine which protects the peritoneal cavity, allowing the entrance of the contents of the abscess into the intestine; (2) whether the abscess is retained within the constantly dilating sac, producing a large accummulation always separated from the general peritoneum, and which can be treated surgically by a lateral incision without opening the unaffected portion of the peritoneal cavity; (3) whether the abscess suddenly ruptures into the peritoneal cavity, or (4) whether the abscess opens into other of the neighboring viscera or cavities, as kidney, bladder (case 82), pleura.

The local, circumscribed peritoneal abscess is a source of danger (1) from absorption; (2) from necrosis of the tissues forming its walls, that is, wall of the bowel, followed by hemorrhage and death (case 54); (3) danger of rupture into the general peritoneal cavity; (4) thrombo-phlebitis, secondary abcess. (Cases 10 and 26.)

General suppurative peritonitis, as a result of diseases of the appendix, is produced (*a*) by a direct perforation and emptying of the contents of the appendix into the peritoneal cavity (many cases); (*b*) by a rupture of a small circumscribed abscess that had previously formed around the appendix (case 108); (*c*) by infection through wall of appendix (many cases), and also abscess (case 86); (*d*) by rupture of gangrenous appendix into peritoneal cavity (numerous).

The result of the infections of the peritoneum, or general suppurative peritonitis, depends upon the pathological changes produced by the infection on the surface of the peritoneum.

(1) We have a dry septic variety of peritonitis, more or less, with complete exfoliation of the endothelium of the peritoneum, which terminates fatally in a very short period of time, as in cases 25 and 43.

(2) We have, where the quantity of pus is considerable, a ptomaine poisoning from the immediate absorption of the quantity of pus poured into the peritoneal cavity, where the patient at the end of four to twelve hours after the rupture will die with the most profound symptoms of collapse from toxæmia. (*See* cases 102 and 101.)

(3) We have an escape of a quantity of pus into the peritoneal cavity, generating a general suppurative peritonitis. Of this variety there were 36 cases, with 12 deaths. In all of these the patient had no immediate manifestations of collapse. In many the pulse was not above 90, temperature not above 100°, even in cases at the time of operation in which the surface of the bowel in one-half or three-quarters of the entire abdomen was covered with pus. This condition can exist four, five, six, or even seven days without producing the symptoms of collapse, which are recorded in our text-books as occuring *immediately* from *infections* or *ruptures* into the peritoneal cavity. The symptoms of collapse come on in these cases *only after an absorption of the products of inflammation,* never primarily, and when they do come on the patients die within a very few hours after their onset. The symptoms of collapse in these cases always surprise the attending physician, as his patient before their onset is considered to be very far advanced in convalescence—indeed, if not cured, and this explosion surprises him like a thunderclap from a clear sky.

I will not go into the details of the clinical history of the many varieties of lesions and their sequences which I have now related, as you can readily understand how the course in the various pathological conditions would differ. There is probably no disease in the abdominal cavity that produces such a multiplicity of manifestations, pathological conditions, and variety of dangers as that of lesions of the appendix. In comparing the operative with the nonoperative treatment all these pathological conditions must be considered separately, otherwise we can draw no reliable conclusions as to the merits of various procedures. In order to do this the symptoms of each lesion must be so distinctly and separately outlined that the lesion can be recognized by the medical man without operating as well as by the surgeon with operating. We will, therefore, now consider the symptomatology of appendicitis.

SYMPTOMATOLOGY.

Can we recognize the various pathological conditions by the symptoms? Can we say from the symptoms, this is catarrhal appendicitis; this is peritonitis? Emphatically, no. What are the symptoms of acute catarrhal nonobstructive appendicitis? They are the symptoms of enteritis, with a slight increase in the local tenderness over the appendix. What are the symptoms of suppurative appendicitis with obstruction, that is, with retention of products of infection within the appendix? Sudden attacks of pain in the abdomen, either localized to the right iliac region, or general, shortly followed by nausea and very frequent vomiting. Tenderness, most frequently local, occasionally general; extreme tympanites; a pulse of from 120 to 130; temperature of from 104° to 105½°; in fact, the classical symptoms of peritonitis, and still no peritonitis present. (*See* cases 83 and 116.) The symptoms of ulceration of the mucous membrane without perforation are just the opposite to the preceding ones in intensity, being, as a rule, the same symptoms, but very mild; and with specific ulceration, as typhoid and tubercular, they are also practically the same as the latter. (*See* cases 46 and 30.)

In ulceration with perforation we have (1) a sudden attack of pain, (2) followed always by nausea and frequently vomiting, (3) increased local tenderness in right iliac region, (4) a temperature of 102–3°. These symptoms continue for three days. They may be accompanied by extensive tympanites and general tenderness. If the abscess remains circumscribed, they will gradually subside, and at the end of a week the temperature will be 99½° to 100°, pulse 90°, absence of general tenderness, absence of tympanites, and only local tenderness present. But still there may be an abscess in the peritoneal cavity.

Gangrene of the mucous membrane has no special symptoms different from those just mentioned with ulcerative perforation, and can not be determined until the abdomen is opened and the appendix examined. There are following a perforation of the appendix, no special symptoms except a possible exacerbation of pain and an increased area of tenderness.

We have now considered the leading symptoms of the varieties of appendicitis *per se*, without its complications, and we recognize four cardinal symptoms within the first forty-eight hours in every case: (1) Sudden pain; (2) nausea and vomiting; (3) increased local tenderness over the appendix; (4) elevation of temperature.

These symptoms occurring in a healthy individual are pathognomonic of this disease, and all that is necessary for its recognition. They are most marked and characteristic within the first forty-eight hours; therefore the diagnosis is most readily and positively made at that time.

Special care should be exercised in excluding females with a history of genito-urinary infections.

The infections of the peritoneal cavity without perforation have no immediate symptoms to those of appendicitis without infection of peritoneum. *Infection of the peritoneum with perforation has, immediately following the perforation, no special symptoms above a circumscribed peritonitis or a simple lesion of the appendix without perforation.*

The constitutional symptoms of a circumscribed abscess in the neighborhood of the appendix, immediately on its formation, are usually pain and vomiting, an elevation of temperature approximating 103°. This continues for four or five days; subsides to 99½°, or even 99°, as long as the abscess remains circumscribed and does not open into the peritoneal cavity or into the retroperitoneal cellular tissue. Induration; increased local tenderness.

Diffuse general peritonitis.—What are the symptoms of diffuse general peritonitis? If the members of this congress were to answer that question from our text-books or cases reported in our journals, they would say immediately—that is, within a few hours after the infection—symptoms of tympanites, intense pain, collapse, particularly the latter, would be present. I desire to call your attention to the symptom of collapse as a manifestation of peritonitis, because it is misleading. We are taught in our text-books that the patient has, immediately following a rupture into the peritoneal cavity of one of the viscera, or an abscess, particularly the latter, the manifestation of collapse. I will state now that that symptom does not occur, except under special conditions, and I would warn the doctor who relies on the symptom of collapse as an immediate manifestation of perforation that he is in error, except in cases of sapræmia, as before mentioned, and that his erroneous idea on this subject will cost him the lives of many of his patients. The manifestations of ruptures into the peritoneal cavity depend upon: (1) The character of the material entering the peritoneal cavity; (2) the quantity of material; (3) the pathological changes produced within the peritoneum by various substances, and (4) resistance offered by peritoneum.

Examples of the first, where the substance admitted into the peritoneum is chemically irritating or poisonous, as gastric juice, fluid from hydatid cysts, cysts of the kidney, etc. As a result of these admissions into the peritoneal cavity we have immediate manifestations, such as pain, tenderness, and collapse.

Examples of the second, where the quantity of material cuts an important figure. If the quantity of material be small, as of the substances mentioned in No. 1, as well as the admission of pus or the rupture of small abscesses into the peritoneal cavity, which we see in every day practice, the immediate manifestations of their presence may be very limited and transitory. While if a large quantity be admitted, the rapid absorption by the peritoneum of their toxines, or ptomaines, produces rapid collapse and death without waiting for inflammatory reaction, the same as if a poisonous alkaloid were injected into the peritoneal cavity, as in case 102.

Examples of the third, where substances small in quantity but particularly septic in their nature cause a peritonitis of greater or less severity, of which peritonitis may assume the fulminating, dry form so dreaded by all laparotomists, fortunately a form of rare occurrence and not amenable to treatment. Or the slow variety in which there is an accumulation of sero-purulent material which gradually increases in quantity and spreads over the surface of the bowel, producing but slight disturbance for a number of days until such time as the rapid absorption of the products of inflammation takes place and the patient suddenly collapses and dies. The pus is guided in its advancement on the surface of the intestine by the positions of the coil as shown by the formation of secondary abscesses on the opposite side.

Errors in diagnosis occurred three times: (1) A perforating round ulcer of the stomach caused the peritonitis; (2) an extra nephritic renal calculus on right side; (3) rupture of a psoas abscess; (4) gangrene of entire mucous membrane of colon (diphtheritic colitis). All cases except the last demanded immediate operation. It will be further noted that in every one of these four cases there was an absence of some of the cardinal symptoms.

In order to determine the advisability of operative interference, we must ascertain as near as possible: (1) What percentage of the cases terminate fatally that are not interfered with surgically? (2) What percentage of the same class of cases terminate fatally that are operated upon? (3) What are the additional dangers of the operation *per se?* It is estimated on good authority (Crafts) that from 27 per cent to 30 per cent of all cases treated medicinally terminate fatally sooner or later if not operated. On that point I can not furnish statistics of my own, as I operate on all cases. The percentage of deaths in our cases was 11 per cent, or 16 deaths in 141 cases. In the first 100 cases we had a mortality of only 7 per cent. Since that I lost three consecutive cases in as many days. The causes of death in our cases were: (1) Pyæmia: 1, septic pneumonia; 2, septic phlebitis, multiple infarcts. (2) Ptomaine poisoning. Rupture of large abscess into peritoneal cavity at time of operation. (3) Septic peritonitis. In thirteen the peritonitis existed before operation out of 36 cases of general septic peritonitis operated.

I consider the dangers of the operation comparatively *nil* in competent hands.

What operation should be performed? In early cases the lateral incision over the most common seat of the appendix in the right iliac fossa should be given the preference. In late cases the incision should always be over the most prominent portion of the induration. In this class of cases the appendix is removed only when it presents itself palpably in the wall of the abscess and can be removed without rupturing the adhesions which separate the abscess from the uninfected portion of the abdomen. In early cases always remove the appendix, as it is the only certain means of preventing recurrence. I had 11 cases of recurrence in which the appendix was not removed at the primary operation; 6 of these were reoperated upon early in their first recurrence; appendices removed; all recovered.

We never use fluid of any kind in the peritoneal cavity, pus or no pus.

When should we operate? On every case of appendicitis, or better on every case where we have present the four cardinal symptoms: (1) Sudden attack of pain over appendix; (2) always nausea, frequently vomiting; (3) elevation of temperature; (4) exaggerated local tenderness in various positions occupied by the appendix.

In every case in which the above symptoms were present, including every case on which we operated, except those mentioned as errors, I found pus, gangrene, or proof that it had previously existed within or about the appendix. In one case, in which elevation of temperature was absent, the mucous membrane of the appendix was ecchymotic. The operation should be performed at the earliest possible moment after the onset of the symptoms. (1) Because at that time the inflammation is limited; (2) the appendix is easily located and removed; (3) the time for rupture into the general peritoneal cavity has not occurred; (4) the gangrene of the bowel in the neighborhood has not taken place; (5) Matterstock states that upwards of 50 per cent of the mortality from disease of the appendix occurs before the sixth day.

It is therefore evident that the operator who waits to operate as late as the sixth day will lose 50 per cent of all the cases that would terminate fatally without operation.

I desire to urge upon you that you operate on all cases; (*a*) because pus or gangrene is present in 99 per cent of the cases; (*b*) that you operate early so as to prevent the disastrous effects of a rapidly spreading disease in the peritoneal cavity and save yourself the humiliation of an ante-mortem operation.

Case 1.—Date of operation. November 9,1885. Operator, Dr. Murphy. L. E. age, 24; male. Cook County Hospital.

History: Two weeks before operation patient began to feel pain in right iliac region and in lower part of abdomen; nausea; vomiting and elevation of temperature. He noticed a swelling in right iliac region which gradually increased in size up to the time of operation.

Operation: Incision over highest point of induration. drainage of abscess cavity; general peritoneal cavity not opened. Appendix was not removed. About 12 ounces of pus escaped. Patient made a rapid recovery.

Case 2.—Date of operation. March 2. 1889. Operator, Dr. J. B. Murphy. L. Z. age, 19; male. Cook County Hospital.

History: Patient had been sick for three weeks with the usual symptoms of appendicitis at the time of entrance into hospital. Some induration present. Temperature 99°.

Diagnosis: Appendicitis with perityphlitic abscess.

Operation: Lateral incision directly into the abscess. General peritoneal cavity not opened. A fecal stone the size of a bean escaped in the pus. The appendix firmly imbedded in a mass of induration was not removed. Recovery.

Case 3.—Date of operation, March 22, 1889. Operator, Dr. Murphy. Mrs. O'D., age 35.

History: Typical attack began March 1. Severe symptoms of peritonitis were manifested on the 7th. Patient had fever, sweats, and evening elevation of temperature until time of operation. Abdomen greatly distended; induration extended from right side beyond the median line to the left. Abdomen tympanitic over induration, which was explained by presence of gas in the abscess cavity.

Operation: March 22, three weeks after onset of attack. Lateral incision; about 2 quarts of very offensive pus escaped. The bowels were covered with a thick layer of fibrin. Drainage (rubber tube). Recovery.

Case 4.—Date of operation, March 25, 1889. Operator. Dr. Murphy. L. G., age 14. female.

History: On the 18th patient complained of pain in right iliac region, followed by vomiting. Temperature, 102°. March 19th, temperature, $99\frac{1}{2}°$; pulse, 90. Tenderness increased in right iliac region vesical tenesmus. These symptoms continued without an elevation of temperature, about $99\frac{1}{2}°$, until time of operation. The induration was about the size of a hen's egg.

Operation: Lateral incision into abscess. General peritoneal cavity not opened. Appendix not removed. Drainage. Recovery.

Case 5.—Date of operation April 10, 1889. Operator, Dr. Murphy. Mr. X., age 55.

Case occurred in practice of Dr. Hicks, of Burlington, Wis. Patient had a typical attack of appendicitis six weeks ago. Since then has been confined to bed with fever, sweats, pain, and tenderness in right iliac region. Dr. Hicks pronounced the case one of perityphlitic abscess, and, on the following day, Dr. Murphy, assisted by Dr. Hicks, performed the operation.

Operation: Lateral incision; general peritoneal cavity not opened; large quantity of very offensive pus escaped. The abscess extended down into the pelvis. No foreign body, no fecal stone. Drainage. Recovery.

Case 6.—Date of operation May 3, 1889. Operator, Dr. Murphy. T. B., age 13, male.

History: April 25, 1889. patient came to my office complaining of pain in right iliac region.

Examination: On examination no swelling could be detected, no elevation of temperature. He presented himself again May 3, with pinched, anxious expression of countenance; pain, swelling, and tenderness in right iliac region. No fluctuation, no symptoms of phlegmon in the abdominal wall. Temperature, $102\frac{5}{10}°$; pulse, 128.

Diagnosis: Perforated perityphlitic abscess.

Operation: Lateral incision; the induration has lost its resistance under the anæsthetic; peritoneal cavity opened; an abscess found in the retro-cæcal region. Fecal stone size of a lima bean. The appendix had been amputated at its base by an ulcer; the body of the appendix retained its vitality by adhesions to the cæcum; removed; drained. May 4, temperature, 99°; pulse, 120. Vomiting constantly. May

5, temperature, 101.4°; pulse, 136. Still vomiting, countenance pinched and anxious; delirious; very tympanitic over entire abdomen. Died same day. General septic peritonitis.

Case 7.—Date of operation, May 16, 1889. Operator Dr. Lee. D. L., aged 19, male.

Patient's attack began May 10, with severe pain in right iliac region accompanied by nausea and vomiting; these symptoms continued and constantly increased until May 13, when the pain extented all over the abdomen, but the greatest sensitiveness was in the right iliac fossa. Induration could be felt there without the signs of fluctuation or phlegmon. May 16, General amelioration of symptoms; pulse 84, temperature 99°.

Operation: Lateral incision, no infiltration of subperitoneal tissue. Intra-peritoneal abscess opened, drained; appendix adherent its entire length along the wall of cæcum. Drainage. Recovery.

Case 8.—Date of operation June 23, 1889. Operator, Dr. Murphy. H. R., age 26, male.

On June 18 patient was seized with pain in right iliac region, nausea, vomiting, and constipation. At the end of twenty-four hours the symptoms became those of general peritonitis.

Examination: On the third day distinct induration could be felt in right iliac region extending half way to umbilicus. No induration from rectum. Operation consented to on fifth day.

Operation: Lateral incision. When the peritoneal cavity was opened to my great suprise it appeared perfectly healthy. No adhesions to anterior abdominal wall. The large induration which before operation seemed to extend to umbilicus had disappeared. A careful examination revealed an indurated mass close to the spinal column to the left just below the level of the umbilicus. The adhesions were gently separated, and an abscess opened; inserted drainage tube, packed about with iodoform gauze. Recovery. This case illustrates how deceptive the sign of induration may be in the acute stage. It appeared to be in the case close to the abdominal wall in front, and when the peritoneal cavity was opened it was found located at the posterior wall. The induration always appears larger than it actually is. This difference being most marked in the first few days of the attack.

Case 9.—Date of operation August 9, 1889. Operator Dr. Murphy. Mrs. N., age 56, female.

History: Patient had complained of pain and discomfort in right iliac region two weeks previous to August 4, 1889. At this time the pain became very intense, and a doctor was called at midnight to relieve her. Nausea, vomiting, great abdominal pain and tenderness, and depression. These symptoms continued for four days. A consultation was called and an operation decided upon. The patient was extremely obese, no induration could be detected either from without or from the rectum.

Operation: Laterial incision, directly into abscess; about an ounce of pus (very offensive) escaped and with it a small fragment of bone. General peritoneal cavity not opened. Rapid recovery.

Case 10.—Date of operation August 16, 1889. Operator, Dr. Murphy, F. F., age 56, male.

History: On August 16 patient was seen in consultation with Dr. Volini who had made a diagnosis of perityphlitis and gave the following history. Three weeks ago patient was attacked with severe pain in abdomen followed by nausea, vomiting, and high fever. Pain rapidly extended over the entire abdomen and the patient became very tympanitic. The tympanites and general abdominal pain subsided in four or five days, but the sensitiveness and induration remained in the right iliac region up to time of operation. The patient was very much emaciated and presented all the appearances of a typhoid in the the third week. Diagnosis: Peri-appendicitis (circumscribed abscess).

Operation: Lateral incision; general peritoneal cavity opened; circumscribed abscess evacuated. Drainage. August 17, temperature $99\frac{1}{2}°$; August 20, temperature $100\frac{1}{2}°$; August 20, temperature 102°; August 21, temperature $100\frac{1}{2}°$; August 22, $99\frac{1}{2}°$; August 26, temperature $100\frac{1}{2}°$; August 27, temperature 101°; August 28, temperature 102°; August 29, temperature $100\frac{8}{10}°$, evening; August 30, temperature $99\frac{8}{01}°$, morning; August 30, temperature $101\frac{8}{10}$, evening; August 31, temperature 102°, morning; August 31, temperature $103\frac{1}{2}°$, abscess burst through; September 1, temperature normal a. m.; September 1, temperature $103\frac{1}{2}°$, p.m.; September 1, midnight chill; September 2, temperature $102\frac{1}{2}°$; September 2, temperature 102°; September 3, temperature $102\frac{1}{2}$, a. m.; September 3, 3 p. m., died.

A second abscess was opened posteriorly on the 29th of August. Patient had a chill September 1, with pulmonary symptoms, from that time he continued to sink, and died September 3. Autopsy revealed embolic pneumonia of lower lobe of right lung. Sero-purulent fluid in right pleura cavity. Lungs otherwise normal, heart and liver normal. Remains of primary abscess in neighborhood of vermiform appendix which was opened in the first operation. Down in the retro-peritoneal cellular tissue a second abscess cavity was found which had been opened in the second operation; from this abscess he received his fatal pyæmia. No peritonitis, no infarcts in any of the other organs. Head not examined.

Case 11.—Date of operation October 1, 1889. Operator, Dr. Hartman. S. W., age 10 years, male.

History: Patient was taken sick with a typical attack many months before; the abscess was aspirated and finally an external fistula formed. The patient improved, was up and about, but a mucous discharge continued from the sinus.

Operation: A laparotomy was performed; peritoneal cavity opened: fecal stone at the base of the sinus was removed from the appendix, which was adherent to the abdominal wall and cæcum. The appendix was not removed, but its mucous membrane was curetted. Uneventful recovery.

Case 12.—Date of operation December 17, 1889. Operator, Dr. Lee. I. D., age 22, male.

History: About December 3, 1889, patient was taken suddenly ill with pain in right iliac region, accompanied by faintness and vomiting. These symptoms continued for two weeks together with fever and sweats.

Examination: On examination was found a large circumscribed induration in right iliac region. Temperature 102°, pulse 120.

Operation: December 17, fourteen days after onset. Lateral incision; peritoneal cavity opened; contained a serous fluid and was very much congested. Large mass of adherent intestines could be seen; on separating these a pus cavity was opened and drained. Pulse and temperature rapidly fell to normal and patient made a speedy recovery.

Case 13.—Date of operation January 16, 1890. Operator, Dr. Murphy. D. L., age 20, male.

History: Had an operation in May, 1889, for drainage of a perityphlitis abscess. Present attack typical; local pain, vomiting, fever, tenderness, and induration.

Operation: Fourth day after onset. Drainage of a circumscribed abscess. Appendicisectomy. Recovery. (*See* history of Case No. 7, May 16, 1889.)

Case 14.—Date of operation, January 26, 1890. Operator, Dr. Murphy. R. W., male, age 26. Occurred in practice of Dr. Devlin.

History: Patient's sickness commenced with a typical attack January 19. January 20, temperature 101°, symptoms continued; January 21, temperature 102°, induration detected in right iliac region. Operation advised. From January 22 to 24 temperature ranged from 101° to 102½°; pain and tenderness increased, and induration extended to above the crest of the ilium; January 25, temperature 103½°; January 26, operation.

Operation: Lateral incision into pus cavity; general peritoneal cavity not opened. Appendix not removed. Half a pint of pus evacuated. Drained. January 27, temperature normal and remained there. Recovery.

Case 15.—Date of operation, February 28, 1890. Operator, Dr. Murphy. T. McC., aged 29, male. Patient had had 20 attacks previous to this one.

History: One week prior to operation patient had a typical attack of appendicitis. Symptoms continued, accompanied by a temperature of 103° up to the time of operation. Pulse, 120°.

Operation: Lateral incision; a large pus cavity opened without opening the general peritoneal cavity. About 20 ounces of pus escaped. Appendix not removed. Second day after operation fever had permanently disappeared. This case recurred, but was not operated.

Case 16.—Date of operation, March 27, 1890. Operator, Dr. Murphy. N. Le B., male, age 26. Cook County hospital.

When patient was admitted to hospital a slight induration could be felt in right inguinal region. There was great tenderness in the region of the induration. Patient says he had a similiar attack about three years ago. Temperature at time of operation 100°.

Operation five days after beginning of attack; usual incision; appendix found encircled and adherent to omentum; appendix loosened from adhesions and amputated; it was large and swollen, the size of a man's little finger; the stump was cauterized and top-sewed; no pus in peritoneum; iodoform gauze packing; pus was found in appendix. Recovery.

Case 17.—Date of operation June 11, 1890. Operator Dr. Murphy. Wm. H., age 20 years, male. Cook County hospital. Patient was transferred from medical side of Cook County hospital to surgical side for operation.

Operation: Typical incision; the appendix was located, ligated and amputated; the stump top-sewed with silk; the abdominal cavity was closed without drainage; the appendix contained enterolith and pus. Patient made a rapid recovery.

Case 18.—Date of operation, June 25, 1890. Operator, Dr. Murphy. Miss W. Richmond; age, 27 years. Presbyterian Hospital.

History: For the past four years patient has had recurrent attacks of severe pain in abdomen, which came on suddenly, continued for several days, and was followed by a soreness of some days' duration. Present illness. Patient was taken sick on May 12, 1890, with an attack far more persistent.

Case 19.—Date of operation, June 26, 1890. Operator, Dr. J. B. Murphy. Rev. G.; age 40; male. One June 23; patient was seized with griping pains in right iliac region which gradually increased, accompanied by vomiting. Pulse that evening 120; temperature, 102°. Localized tenderness; induration; general tympanites.

Operation: Appendicisectomy: Appendix nonadherent, gangrenous, not perforated. The serous coat of the appendix was stretched over the gangrenous *debris* of mucous membrane and pus; it was not protected at base and rupture was imminent. There was no infection of peritoneum. How different the condition would have been twenty-four hours later. The appendix would have ruptured, a septic peritonitis developed as there were no protecting adhesions, and the patient's life would have been greatly jeopardized, if not sacrificed. Rapid recovery.

Case 20.—Date of operation, July 15, 1890. Operator, Dr. F. S. Hartman. Mrs. B. Typical attack; pain, vomiting, temperature and slight induration over crest of ileum, posteriorly.

Operation: Two weeks after onset of attack. Incision over crest of ileum, posteriorly, drainage of a circumscribed abscess. Appendix not removed. General peritoneal cavity not opened. Recovery rapid.

Case 21.—Date of operation July 21, 1890. Operator, Dr. Lee. N. C.; age, 34 years; female.

Present sickness commenced July 16, complained of chills, fever, vomiting, and abdominal pain, latter more pronounced in ileo-cæcal region. July 18, pulse 120, temperature 103°. Slight tenderness in ileo-cæcal region. July 21, pulse 124; temperature 102.5°. Great pain over whole abdomen. Tenderness over ileo-cæcal region marked and induration present.

Operation: Appendicisectomy. Appendix large, swollen, and tortuous; no perforation. Appendix contained enterolith in which was imbedded a small spicula of bone. There were no adhesions around the appendix. Peritoneal cavity opened. No abscess. Pus in appendix around enterolith. Gauze drainage. Temperature fell to normal immediately after operation. Recovery.

Case 22.—Date of operation, August 2, 1890. Operator, Dr. Lee. H. McQ.; age, 10 years; female.

Present illness of patient began July 27, with pain in ileo cæcal region and diarrhea. August 1, pulse 130; temperature 103°. Tenderness in right iliac region. Induration.

Operation: Drainage of circumscribed abscess; general peritoneal cavity not opened. Appendix not removed. No foreign body found. Temperature fell to normal within twenty-four hours after operation. Recovery.

Case 23.—Date of operation, August 22, 1890. Operator, Dr. Lee. Present, Dr. Bridge, Cook County Hospital. C. P. A.; age, 21; male.

Patient had a similar attack five years ago. Three days previous to operation patient was seized with sudden pain in right iliac region. Temperature 102.2°; temperature August 20, 103.3°; temperature August 21, 100.8°.

Examination: Abdomen moderately distended, tympanitic. Dullness in right iliac region and marked tenderness over appendix. Tongue slightly coated.

Operation: Incision over induration, escape of pus and two enteroliths. Drainage. Recovery.

Case 24.—Date of operation September 6, 1890. Operator, Dr. Lee. J. R.; age, 16; male. Case occurred in the practice of Dr. McCarthy. Patient's present sickness began August 29, with acute pain in lower part of abdomen; diarrhea. Temperature 101.8°, pulse 112; on August 30, temperature 101.3°, pulse 106; on September 1, temperature 101., pulse 100; on September 2, temperature 101°, pulse 98. Tenderness on pressure over lower portion of abdomen, which gradually became localized in right iliac region and induration developed.

Operation: Incision and drainage of intra-peritoneal abscess. General peritoneal cavity opened. Appendix not removed. Temperature fell to normal inside of forty-eight hours. Recovery.

Case 25.—Date of operation September 18, 1890. Operator Dr. Lee. F. W. H.; age 25; male. Case occurred in the practice of Dr. McCarthy. Present illness commenced suddenly September 14, with intense pain in right iliac region, persistent vomiting and diarrhea. General abdominal tenderness more marked over the right iliac region. Tympanites. Patient lies with knees drawn up and bears a distressed look. Temperature 102.2°, pulse 116. September 15, temperature 102.6°, pulse 122; nausea; singultus. Tenderness and tympanites general. Slight induration in right iliac region. September 16, temperature 102.2°, pulse 126; induration more marked and extensive; tenderness increased. Dr. Lee called in consultation. Diagnosis, rupture of appendix with intra-peritoneal abscess.

Operation: Typical incision. No induration to be felt after incision; dry septic peritonitis; appendix perforated; small abscess around base; drainage. *Exitus letalis* on third day.

Post-mortem: General dry septic peritonitis; perfect adhesions around gauze packing.

Case 26.—Date of operation, November 9, 1890. Operator, Dr. Lee, Cook County Hospital. Mrs. M. P.; age, 32.

Patient has had several attacks of same nature as present one in last three years. One week before admission to hospital present attack began with fever, chills, sweats, and pain in right iliac region. Patient presents appearance of a grave typhoid; tongue and teeth heavily coated, lips covered with a herpetic eruption. At time of admission patient had a temperature of 104.6°, and had severe septic symptoms. In right inguinal region, 3½ inches from anterior superior spine of ileum, is an induration.

Operation: Incision over tumor into abscess; pus and feces escaped; packed with iodoform gauze.

Death from pyæmia, which was present at time of operation, in three days. Temperature reached 106° several times. Frequent chills. No septic peritonitis.

Case 27.—Date of operation, November 15, 1890. Operator, Dr. Lee. O. P. P.; age, 31 years; male. Patient had sudden attack; severe pain in right iliac region; chills, fever (temperature 103°), vomiting, general abdominal tenderness. More marked in right iliac region, where induration could be felt, which was dull on percussion.

Operation: Incision, drainage of an abscess without opening intra-peritoneal cavity. Appendix not removed. Fecal fistula. Recovery. Patient subsequently had recurrent attacks and was again operated. (*See* history No. 30.)

Case 28.—Date of operation February 11, 1891. Operator, Dr. Lee. R. S.; male; age, 28.

History: For the past two years patient has been subject to frequent attacks, beginning with pain in right iliac region, generally accompanied with nausea and vomiting. Attacks usually lasted from a week to ten days. During past six months patient had an attack about every three weeks.

Examination: Induration in right iliac region.

Operation: Appendiciseetomy. General peritoneal cavity opened. The vermiform appendix was found perforated near the base, which communicated with an abscess cavity that had opened into the cæcum. A probe could be passed through the opening into the cæcum. Drainage. Recovery.

Case 29.—Date of operation, March 9, 1891. Operator, Dr. Murphy. Miss McC.; age, 23.

History: First attack of pain, 1889. Sudden pain in right loin, followed by fever, tenderness, vomiting. The swelling gradually increased in loin, and case was seen by several physicians in the next year, all agreeing that it was a sarcoma of the kidney. It finally was opened in the back and a small quantity of pus escaped. Two fecal stones escaped from the opening after some months' time; this was followed by the discharge of berry seeds for several months, no other material escaping. At the end of about a month I operated to close the fistula in the cæcum. This was by suture and was successful. The history of this case extended over a period of about three years. Recovery.

Case 30.—Date of operation, May 19, 1891. Operator, Dr. Lee. O. P. P.; age, 31; male. Cook County Hospital.

Patient had a primary operation for appendicitis in November, 1890. An intra-peritoneal abscess was drained, but the appendix was not removed. An April, 1891, a laparotomy was performed for removal of the appendix, but on account of the extensive adhesions it was impossible. Patient was seen three days after onset of present attack, and by an operation the appendix was amputated; two enteroliths were found in it; a rubber drain was inserted and the abdominal incision partially closed. Patient made rapid recovery. There remained a small sinus leading down to the iliac fossa for several weeks.

Case 31.—Date of operation, June 4, 1891. Operator, Dr. Murphy, Cook County Hospital. J. C.; age, 27; male.

Patient was seen five weeks after onset of attack. His illness commenced with pain in the right iliac region.

Examination: Hard tumor in right iliac region, not movable, seemingly attached to ileum. Percussion dull over tumor; other side percussion normal. Temperature, 101.2°.

Operation: Incision into pus cavity. The appendix, which was difficult to locate, was drawn into abdominal incision, ligated near its base, and amputated. Drainage. Recovery in three weeks. The appendix was perforated near its base.

Case 32.—Date of operation, June 6, 1891. Operator, Dr. Murphy, Alexian Brothers' Hospital. F. F.; age, 18; male.

Patient had a typical attack and entered the hospital five days after onset, when he showed symptoms of a circumscribed suppurative peritonitis. Operation was at once performed and a large abscess drained. The appendix was not removed. Recovery.

Case 33.—Date of operation, June 25, 1891. Operator, Dr. Murphy. L. M.; male; age, 18. Alexian Brothers' Hospital.

This case was operated on four days after onset of a typical attack. A circumscribed abscess was opened; a fecal stone escaped. The appendix was perforated and was removed after simple ligature. Recovery.

Case 34.—Date of operation, July 28, 1891. Operator, Dr. Murphy. J. A.; male; age, 56; Alexian Brothers' Hospital.

History: Patient entered hospital fourteen days after onset of a typical attack. A large induration in right iliac fossa to be felt.

Operation: Incision into large pus cavity. Appendix not removed; drain. General peritoneal cavity not opened. Circumscribed abscess. Recovery.

Case 35.—Date of operation, August 5, 1891. Operator, Dr. Murphy, Cook County Hospital. A. H.; age, 30; male.

Had an attack six months previous similar to the present. Typical attack July 27. Induration in right iliac region.

Operation: Lateral incision. General peritoneal cavity opened. Peritoneum very much congested. Appendix situated along the lower border of the ileum. Appendix perforated, one side surrounded by a mass of granulations, where it was adherent to the cæcum. The probe could be passed through a small opening into the cæcum, showing where the abscess had emptied. The appendix was ligated and removed. There had been a local gangrene now in the process of cicatrization. Recovery. This is one of the cases that is classed by some authors as cecitis, but the opening in the cæcum was made from without inwards by an accumulation of pus around the gangrenous appendix.

Case 36.—Date of operation, August 10, 1891. Operator, Dr. Murphy, Cook County Hospital. F. D.; age, 32.

Patient was always healthy up to present illness. He was taken ill with severe pain in umbilical region, fever, and vomiting. The pain increased rapidly, and at time of operation was diffuse and uniformly severe.

Examination: Pulse rapid and small; legs drawn up; percussion shows abdomen full of fluid, nearly up to umbilicus; abdominal wall tense; tenderness diffuse.

Operation: Median incision; escape of a large quantity of sero-purulent fluid with fecal odor. Drainage after irrigation of abdominal cavity. Appendix adherent. Patient died on following day.

Post-mortem: Appendix adherent to under surface of cæcum, excepting about one-half inch of tip which was free. At base of appendix was an ulcerated perforation At side of perforation enterolith size of cherry stone. No evidence of a previous abscess cavity. General suppurative peritonitis which had developed before adhesions could take place. The peritoneum of the abdominal and intestinal walls was eroded of endothelium.

Case 37.—Date of operation, September 11, 1891. Operator, Dr. Murphy. Male, G. A.

History: Typical attack.

Operation: A circumscribed intra peritoneal abscess was opened and drained with iodoform gauze. A fecal stone escaped with the pus. Abscess extended deep into back. Recovery.

Case 38.—Date of operation, November 13, 1891. Operator, Dr. Lee. Miss B, age 16.

Sickness commenced with sudden pain in right iliac region, vomiting; sudden rise in temperature to 103°. Induration in right iliac region and tenderness more marked in this locality.

Operation: Drainage of a large circumscribed abscess. Fecal calculus. Appendix not removed. Recovery.

Case 39.—Date of operation, December 14, 1891. Operator, Dr. Murphy. Miss F., age 17.

History: Typical attack.

Operation performed on fifth day after onset. Intraperitoneal pus cavity opened. Fecal stone removed. The appendix was gangrenous and perforated; amputated. Abscess cavity packed with iodoform gauze. Recovery.

Case 40.—Date of operation, December, 1891. Operator, Dr. Murphy. H. F., age 24.

History: For the past three years had had repeated attacks of pain in right iliac region. With the attacks he occasionally had vomiting; always great tenderness in right side.

Status præsens: Patient is emaciated; has evening elevations of temperature and night sweats. For the last three days has suffered from great pain in right iliac region.

Examination: Heart and lungs normal. An area of dullness in right side extending from Poupart's ligament to within 2 inches of the margin of the ribs and as far forward as the *linea similunaris*. The induration extended behind from the crest of the ileum to the margin of the ribs. It was most sensitive and approximated the surface more closely an inch to the right and a little below the anterior superior spinous process. No induration could be felt from the rectum. Urine normal.

Diagnosis: Recurrent appendicitis with extensive infiltration of cellular tissue.

Operation: Lateral incision an inch to the inner side of the spinous process. The cellular tissue was found infiltrated and indurated from a quarter of an inch from the skin. This induration was lacerated with the handle of the scalpel until an abscess was reached 1½ inches below. A small quantity of thin odorless pus escaped. It was found on exploration with the finger that only a sinus had been opened. This sinus was followed upwards and backwards and at the lower end of the right kidney was found a renal calculus, the shape of a maltese cross, the bars being 1 inch in length and three-eighths inch in diameter. It was broken with a heavy forceps and extracted. It had escaped frequently from the kidney and the opening closed, as no urine escaped at time of operation or subsequently. The closure of the opening accounts for the absence of pus in the urine at the time of examination. Patient made an uneventful recovery.

Case 41.—Date of operation, January 10, 1892. Operator, Dr. Hartman. F., male, age 9.

Patient was seen one week after a typical attack, had quite a high temperature with a distinct induration over appendix.

Operation: At time of operation temperature 105°. An intraperitoneal abscess was drained; the appendix was not removed. Recovery.

Case 42.—Date of operation January 26, 1892. Operator, Dr. Murphy. Alexian Brothers' Hospital. J. J. G., age 26, male.

During past two years patient has had about a dozen attacks of appendicitis.

Operation (in intermediate stage): Appendicisectomy. Appendix was adherent to cæcum and showed many cicatrices from previous perforations. Small enterolith. Recovery.

Case 43.—Date of operation, February 20, 1892. Operator, Dr. Lee. Miss D., age 25 years.

Sudden attack of pain in right iliac region. Vomiting. Diffuse abdominal tenderness. Temperature 105°, pulse 130 at time of operation.

Operation third day after attack: Usual incision. Drainage of an intraperitoneal abscess which had previously ruptured and caused a general dry septic peritonitis. Enterolith removed. Symptoms of peritonitis continued and patient died in forty-eight hours. Autopsy not allowed.

Case 44.—Date of operation February 26, 1892. Operator, Dr. Lee, Cook County Hospital. L. J., age 19, female.

Patient was admitted to the gynecological ward of the Cook County Hospital, probably on account of an induration in the roof of the pelvis.

Diagnosis of appendicitis was finally made. She was not operated upon until three weeks after beginning of her attack.

Operation consisted of incision of abscess. General peritoneal cavity not opened, irrigating and packing (with iodoform gauze). Complete recovery in four weeks.

Case 45.—Date of operation March 11, 1892. Operator, Dr. Lee. Male, 18 years. F.

Patient felt perfectly well up to February 28, when, while riding on a bicycle, the pedals of which were too low for his foot, he felt a sudden pain in right lumbar region. Fever soon developed and vomiting occurred several times; bowels constipated. He suffered from great pain above and behind the right anterior superior spinous process of ileum. Excessive tenderness over right side of abdomen, especially in the region of the right anterior superior spinous process. Abdomen very tympanitic. Under anesthetic induration to be felt, which was not apparent before. Temperature 103°.

Operation: Drainage of circumscribed abscess; removal of enteroliths. Appendix not removed. Later fecal fistula developed. Closed itself. Recovery.

Case 46.—Date of operation April 3, 1892. Operator, Dr. Murphy. Female, B., age 52.

Typical attack, nausea, vomiting, local tenderness; no induration.

Operation: Third day after attack; temperature, 102°. Appendicisectomy. Base of appendix very much distended. No adhesions of appendix. A large ulcer in appendix. Drainage forty-eight hours. Recovery.

Case 47.—Date of operation, April 5, 1892. Operator, Dr. Murphy. A. K., age, 26, male. Case occurred in practice of Dr. Davey. Patient was seen seventh day after attack.

Operation: A large abscess was drained without opening general peritoneal cavity. The appendix was not removed. A foreign body was found in abscess cavity. Recovery.

Case 48.—Date of operation, April 5, 1892. Operator, Dr. Lee. Cook County Hospital. Female, M. N., age, 52.

Patient's trouble commenced with chills, fever, vomiting, and general pain in abdomen, which gradually became localized in right iliac fossa. The diagnosis of appendicitis was made and a circumscribed abscess drained. The appendix was not removed. No foreign body present. Patient had a parotid abscess, otherwise an uneventful recovery.

Case 49.—Date of operation April 21, 1892. Operator, Dr. Lee, Cook County Hospital. D. M., age 28.

History: Patient's present illness commenced with a sudden attack of severe pain, vomiting and great tenderness over the epigastrium: had previous good health and no symptoms of pain and distress after taking food. The pain became very intense after a few hours and tympanites set in. The abdomen was uniformly sensitive. No induration could be felt on account of the distention. Temperature 100°; pulse 96. Anxious expression.

Diagnosis: General peritonitis from appendicitis.

Operation: Lateral incision, a general suppurative peritonitis. The appendix was found inflamed in common with the other tissues, not removed. Cause of peritonitis not ascertained. Death twenty-four hours after.

Autopsy: General suppurative peritonitis produced by small round perforating ulcer of stomach. It will be noted in this case that there was absence of increased local tenderness in right iliac region and the pain was located in the epigastrium; also absence of history of ulcer of stomach.

Case 50.—Date of operation, May 10, 1892. Operator, Dr. Murphy. C., age 23, male. Occurred in practice of Dr. Oswald.

History: Sickness commenced with sudden pain in right iliac region, vomiting and nausea.

Examination: Large induration over appendix.

Operation five days after attack; incision of abscess; escape of a large quantity of pus with enterolith; appendix not removed; abscess cavity packed with iodoform gauze; recovery; had one recurrence since, very light; not operated.

Case 51.—Date of operation May 11, 1892. Operator, Dr. Murphy. T. H., age 46, male.

History: Case occurred in the practice of Dr. T. J. Conley; typical attack, induration.

Operation: Drainage of a large circumscribed abscess containing 4 ounces of pus; no foreign body, appendix not removed, general peritoneal cavity not opened; recovery; three recurrences since operation (not operated).

Case 52.—Date of operation May 11, 1892. Operator, Dr. Murphy. Alexian Brothers' Hospital, J. B., age 28, male. Typical attack.

Operation: An extraperitoneal abscess was opened, the appendix removed, also enterolith and the abscess cavity drained with iodoform gauze; recovery.

Case 53.—Date of operation May 18, 1892. Operator, Dr. Murphy. Miss B., age 24. Present attack commenced May 13, 1892, with general abdominal pain, nausea, and vomiting; induration.

Operation five days after attack; drainage of intraperitoneal abscess containing about 2 ounces of pus; recovery; recurrence July 12, 1893; operated. (See history No. 97.)

Case 54.—Date of operation June 20, 1892. Operator Dr. E. W. Lee. E. B., age 50 years, male.

Seven days before operation patient was suddenly attacked with pain in the abdomen after having partaken of a heavy dinner. A few hours afterwards he vomited, the fever set in (temperature 103°). Abdomen became rapidly distended and tender over the entire surface, more pronounced over the right iliac region. Patient seen on third day by Dr. Lee. Operation advised. Consultation the following morning resulted in postponement of operation. Symptoms continued the same except temperature which fell to 101° and remained so. Further consultation on the seventh day. Operation agreed. Pulse 90, temperature 101° at time of operation.

Operation: Usual incision. General suppurative peritonitis present, result of rupture of a circumscribed abscess around appendix. No limiting adhesions. Bowel at seat of circumscribed abscess black and gangrenous. Appendix not removed. Second day after operation feces discharged freely through the wound. Pulse and temperature good. Third day: Escape of intestinal slough. Patient in good condition. Fourth day: Condition improved. Fifth day: Profuse hemorrhage both from wound and rectum. Patient pulseless. Remained in bad condition and died on seventh day. Autopsy not permitted.

Case 55.—Date of operation, June 25, 1892. Operator, Dr. Murphy. Wiezgoski, Roman, age, 17. Alexian Brothers' Hospital.

History: Typical attack four weeks before operation. Continuation of fever and sweats, with rapid emaciation and tenderness in right iliac region.

Status Præsens: Induration extending half way to the umbilicus; tense and tender; dull on percussion.

Operation: Lateral incision; opened a large circumscribed abscess; general peritoneal cavity not opened; appendix not removed; drainage with iodoform gauze; recovery. This case was re-operated on a second relapse. (*See* Case No. 113.)

Case 56.—Date of operation, July 9. 1892. Operator, Dr. Murphy. Mr. S., age 36 years. Case occurred in practice of Dr. Hoelscher.

History: Typical attack; examination reveals induration and dullness on percussion far beyond median line to the left; operation 28 days after attack; lateral incision; about a quart of pus escaped; no fecal stone; appendix not removed; general septic peritonitis; recovery.

Case 57.—Date of operation, July 16, 1892. Operator, Dr. Murphy, Cook County Hospital. H. W., male, 22 years. Typical attack.

Operation four days after onset: Drainage of a large accumulation of pus (intra-peritoneal); general suppurative peritonitis; appendicisectomy; local gangrene of appendix; no foreign body; drainage; recovery.

Case 58.—Date of operation, July 28, 1892. Operator, Dr. Murphy. Miss R., age 10. Case occurred in practice of Dr. Cotton.

History: Typical attack; nausea, vomiting.

Operation, eighth day after onset: Lateral incision; escape of about 6 ounces of pus from an intra-peritoneal abscess; no foreign body; appendix not removed; recovery.

Case 59.—Date of operation, August 27, 1892. Operator, Dr. Murphy. A. M.; age 22; male; Alexian Brothers' Hospital. Typical attack of appendicitis.

Operation: Lateral incision; circumscribed abscess opened; general peritoneal cavity not opened; appendix not removed; drainage; recovery. This case was operated upon twenty-four hours after admission to hospital.

Case 60.—Date of operation, September 16, 1892. Operator, Dr. Murphy. J. McC.; age, 11; male. Case occurred in the practice of Dr. P. H. Conley.

History: Typical attack.

Operation fifth day after attack: Incision; general peritoneal cavity opened; pus found extending over bowels beyond median line; escape of fecal stone with pus; appendix not removed; temperature at time of operation $99\frac{1}{2}°$; pulse $98°$; expression good; recovery in three weeks; *fecal fistula* closed without operation in ten days.

Case 61.—Date of operation, October 11, 1892. Operator, Dr. Murphy. H. S.; male; age, 34.

Admitted to hospital five days previous to operation. Patient gave a typical history of appendicitis; small induration; temperature, $101°$.

Operation: Lateral incision; drainage of circumscribed abscess without entering peritoneal cavity; drainage; recovery.

Case 62.—Date of operation, October 15, 1892. Operator, Dr. Murphy. Case occurred in practice of Dr. Hoelscher. Miss F.; age, 16.

History: typical attack.

Operation, three days after onset: Drainage of circumscribed abscess; appendicisectomy; general peritoneal cavity was opened; appendix was perforated, gangrenous, and contained enterolith; recovery.

Case 63.—Date of operation, October 27, 1892. Operator, Dr. Murphy; S.; age, 37; male. Case occurred in practice of Dr. McCarthy.

History: Typical attack; nausea; vomiting.

Operation on sixth day: Large abscess containing about a pint of pus; general peritoneal cavity not opened; appendix enlarged and gangrenous; ligated; amputated; a fecal stone removed; abscess cavity packed with iodoform gauze; recovery.

Case 64.—Date of operation, October 28, 1892. Operator, Dr. Murphy. Alexian Brothers' Hospital. F. R.; age 18.

History: Attack typical.

Operation several days after onset: Lateral incision; general suppurative peritonitis; the appendix and a fecal stone removed; a large quantity of pus escaped; drainage with iodoform gauze. Recovery.

Case 65.—Date of operation, October 28, 1892. Operator, Dr. Murphy; occurred in practice of Dr. Hoelscher. C. F. B.; age 18.

Patient was seen eight days after onset (a typical attack) by Dr. Hoelscher. The temperature was $105°$, the pulse 130. Extreme tympanites and general tenderness present. Patient in a profoundly collapsed condition at time of operation.

Operation: Drainage of abdominal cavity; a very large amount of pus escaped (about 1 quart). Death twelve hours after operation. General suppurative peritonitis at time of operation; patient also had pneumonia.

Case 66.—Date of operation, October 28, 1892. Operator, Dr. Murphy, Alexian Brothers' Hospital. H. G.; age, 26; male. Typical attack.

Operation: Lateral incision; general suppurative peritonitis; appendix perforated, gangrenous, non-adherent; appendix removed; drainage; recovery.

Case 67.—Date of operation November 2, 1892. Operator Dr. Murphy. Miss G., age 14.

History: Sudden attack on October 30, 1892, two days before operation, nausea, vomiting and sudden rise of temperature.

Examination: Temperature 102°, pulse 80, local tenderness, tympanites.

Operation: Lateral incision over region of appendix: appendix adherent to side of cæcum and covered with flakes of pus; mesentery also infiltrated with pus; appendix ligated and amputated; appendix found enlarged, adherent, no perforation but ulceration of mucous membrane present; recovery.

Remarks: This case is very interesting as it shows a purulent infection of the peritoneum, and mesentery from an ulcer of the mucous membrane of the appendix without gangrene and without perforation. This peritoneal infection has been reported from ulcers in other portions of the intestinal tract without perforation, but this is the first case on record where such a condition is reported occuring from the appendix without perforation or gangrene.

Case 68.—Date of operation November 3, 1892. Operator Dr. Murphy. Male W., age 36. Case occurred in practice of Dr. O'Malley.

History: Attack typical. Examination revealed a large area of superficial dullness.

Operation eighth day: Incision and removal of appendix; general peritoneal cavity not opened; about a pint of pus escaped, also fecal stone; packing of abscess cavity with iodoform gauze; recovery.

Pathological conditions: Appendix completely gangrenous and free in abscess cavity; nothing being left of it but its peritoneal covering.

Case 69.—Date of operation November 11, 1892. Operator Dr. Murphy. Miss F., age 26.

History: Two days ago patient became very sensitive in right iliac region and noticed there a hard swelling; there had been no perceptible swelling previous to that time: this increased rapidly in size and when admitted to hospital extended up to the margin of the ribs and could be felt distinctly behind; there was no deformity in back, nor was there a history of trouble in the spine; urine normal.

Diagnosis: Appendicitis.

Operation: Laparotomy. Lateral incision; abscess opened without entering the peritoneal cavity; cellular tissues of abdominal wall very much infiltrated; this was due to a rupture of the abscess into retro-peritoneal cellular tissues by an exertion the day before onset of pain; pus was odorless, which immediately caused doubt as to the etiology of the suppuration; exploration of the abscess cavity revealed a sinus leading up to the third and fourth lumbar vertebræ which were tubercular. Rupture of the psoas abscess into the cellular tissue accounts for the sudden onset of symptoms, and the location of and limited disease of the vertebræ accounts for the absence of scoliosis or lordosis; recovery.

Case 70.—Date of operation November 14, 1892. Operator, Dr. Murphy. Case occurred in the practice of Dr. T. J. Conley. Mrs. S., age 24.

History: Typical attack; induration resonant.

Operation fourth day after attack revealed intraperitoneal abscess and perforation of appendix with enterolith; the appendix was amputated; the abscess cavity drained with iodoform gauze; recovery.

Case 71.—Date of operation November 26, 1892. Operator, Dr. Murphy. K., age, 11, male. Case occurred in practice of Dr. O'Shea.

History: Typical attack.

Operation seventh day after onset; a large abscess was opened which contained quite a quantity of blood; after pus escaped, a profuse hemorrhage took place which resembled that of an aneurism; was suppressed by packing with iodoform gauze. A fecal stone was removed; appendix not removed; recovery.

Case 72.—Date of operation November 30. 1892. Operator, Dr. Murphy. Mrs. E., age, 22. Case occurred in practice of Dr. T. J. Conley.

History: Typical attack; operation on the fourth day.

Operation Appendicisectomy: A large circumscribed abscess was present; the appendix was gangrenous and had perforated fecal stone; recovery.

Case 73.—Date of operation December 7, 1892. Operator, Dr. Murphy. Female, S., age, 12 years. Case occurred in practice of Dr. Graves.

History: Typical attack; after four days' operation.

Operation: Intraperitoneal abscess containing 2 ounces of very offensive pus opened; the appendix was found to be partially gangrenous and perforated; was removed; the cavity was packed with iodoform gauze; recovery.

Case 74.—Date of operation December 9, 1892. Operator, Dr. Murphy. J. F., age 25, female. Hospital.

History: Patient had frequently complained of pain in right iliac region and occasionally had pains in back; present attack began two weeks ago with classical symptoms of appendicitis; on examination a considerable induration was found in the right iliac region which appears to be near the surface; no induration could be felt from rectum; superficial dullness on percussion.

Operation: Lateral incision; circumscribed abscess; appendix not removed; general peritoneal cavity opened; drainage; recovery.

Case 75.—Date of operation, December 16, 1892. Operator, Dr. Murphy. St. Joseph Hospital. M. age 28, male.

In year previous to operation the patient had three attacks of local peritonitis; during the last attack Dr. F. S. Hartmann saw the case and advised operation. The last attack simulated intestinal obstruction very much, so that there was doubt as to the actual diagnosis.

Operation: General peritoneal cavity opened; appendicisectomy; there was present a perforation of the appendix with a circumscribed abscess in region of umbilicus; the cæcum coiled forwards around appendix; drainage; patient made a good recovery.

Case 76.—Date of operation December 16, 1892. Operator, Dr. Murphy. A., age 26, male. Occurred in practice of Dr. Wittwer, Alexian Brothers' Hospital. Patient was seen several days after onset of attack and showed severe symptoms of general suppurative peritonitis.

Operation: The usual incision was made and a large quantity of pus escaped which covered the bowels for an area of several inches; slow recovery.

Case 77.—Date of operation December 25, 1892. Operator Dr. Murphy.

Case occurred in practice of Dr. Mott. Two weeks previous to first operation patient had a typical attack accompanied with pain, nausea, vomiting and tympanites; on examination a dullness on light percussion over entire abdomen below the umbilical line; deep percussion resonant.

Operation: Lateral incision, large quantity of pus all over the bowels; appendix not removed; temperature dropped for three days and then again rose to 103°; January 2, consultation with Dr. Mott; it was found that left side of abdomen was not drained properly; accumulation of pus in that region; the abcess was drained; it was found that this abcess extended into the pelvis; patient made a rapid recovery.

Case 78.—Date of operation January 28, 1893. Operator Dr. Murphy. K., age 22, female.

Sickness commenced with sudden pain and tenderness in right iliac region; at operation, which was performed four days after onset of attack, a large extra-peritoneal abscess was found which was packed with iodoform gauze; the appendix was not removed; two weeks after the operation a lobar pneumonia set in which was followed by a hydrothorax; aspiration; recovery.

Case 79.—Date of operation, February 17, 1893. Operator, Dr. Murphy. R., age 32, male.

Case occurred in practice of Dr. Turk. Ten days previous to operation sudden attack of pain and tenderness in right iliac region. Difficult urination. No induration.

Operation: Lateral incision and removal of appendix. General peritoneal cavity opened. The appendix was adherent to its surroundings, a fecal stone was removed and a perforation of the appendix had taken place. Local gangrene of appendix. Gauze drainage. Recovery.

Case 80.—Date of operation, February 17, 1893. Operator, Dr. Murphy. Cook County Hospital, W. C., age 16, male.

Recurrent appendicitis. Three attacks previously. Typical attack, no induration.

Operation: Lateral incision. No temperature at time of operation. General peritoneal cavity opened. Appendix situated in the retro-cæcal fossa, adherent, very much enlarged and œdematous, ligated and amputated. No pus in peritoneal cavity. Drainage. Recovery.

Pathological conditions: Mucous membrane ulcerated, very much swollen around the ulcer. Tension on serous covering great.

Case 81.—Date of operation, March 9, 1893. Operator, Dr. Hartman. Male, B., age 9.

Patient's illness began one week previous to operation. Sudden abdominal pain, nausea, vomiting, diarrhea, fever. Abdominal tenderness more pronounced locally. Induration.

Operation: Drainage of an intraperitoneal abscess. Recovery.

Case 82.—Date of operation, March 12, 1893. Operator, Dr. Wittwer. W., age 8, male.

Case occurred in practice of Dr. Hicks, of Burlington, Wis. About two weeks before operation patient commenced ailing with an irregular temperature, sweats, occasional vomiting, and later on pain in lower part of abdomen, with a tendency to localization in right inguinal region Examination of urine revealed pus Induration.

Diagnosis: Large circumscribed perityphlitic abscess with rupture into bladder.

Operation: Median incision 2 inches above pubic symphysis; a large quantity of pus escaped which had involved the whole right iliac region. Two large rubber drains inserted. Complete recovery in four weeks. Appendix was not removed.

Case 83.—Date of operation, March 20, 1893. Operator, Dr. Lee. R., age 13, male. Case occurred in the practice of Dr. P. B. Hayes. Onset sudden, vomiting, pain in right iliac region, extreme tympanites, no induration. At time of opertion, temperature 105° F., pulse 134; had been so for three days. Typical typhoid condition.

Operation: Appendicisectomy: Drainage, no peritonitis. Appendix unusually long and swollen, contained some blood and pus; not perforated; mucous membrane ecchymotic and ulcerated. Temperature fell promptly after operation to 102° F.; on the third day patient became deeply jaundiced. Rapid recovery.

This is a particularly interesting case, the temperature keeping above 105 and the pulse 134 from the beginning of the attack up to the time of operation. Abdomen enormously tympanitic and tender. He presented all the so-called classical symptoms of general septic peritonitis. Note the pathological conditions, no peritonitis, simple infection with retention in appendix. How could a diagnosis of the pathological conditions be made by these symptoms?

Case 84.—Date of operation, March 30, 1893. Operator, Dr. Murphy. Male, M. L., age 22, Cook County Hospital.

History: Patient was transferred from medical division of hospital after having been sick for five days. Five days previous to operation patient was taken with severe pain in right iliac region. Large doses of morphine were necessary to control the pain. Bowels moved as usual. Patient had noticed no swelling.

Examination: On examination abdomen tympanitic, severe pain on slight pressure over the appendix; no tumor visible nor palpable; no difference in percussion resonance. The pain increased constantly from the beginning. March 29, 1893, pulse 120, temperature 103.4°, respiration 42. March 30, 1893, morning pulse 132, temperature 102.2°, respiration 36.

Operation: Lateral incision: peritoneum opened, packed around seat of operation. Retro-cæcal abscess; 1 ounce of pus. Appendix amputated, no foreign body or calculus. Sutures inserted but not tied. Drained with iodoform gauze. In twenty-four hours pulse had subsided to 96, temperature 97°., respiration 28. Subsequently convalescence uneventful.

Case 85.—Date of operation, April 6, 1893. Operator, Dr. Murphy. Mrs. S., age 30 years.

Onset of typical attack April 2, 1893. A temperature of 103°, and a pulse of 92 was present at time of operation. Increased local pain and general tympanites.

Operation: Lateral incision. Appendix invaginated in a fold of the cæcum. A couple of drams of very offensive pus around it. Appendix was ligated near its base, amputated. Drainage. Recovery. Appendix had no perforation. An ulceration was the cause of the infection. The mesentery was infiltrated with pus and there were flakes of pus on the surface of bowel in the region of infection. This is another illustration of local suppurative peritonitis from ulcer of the appendix without perforation.

Patient had a temperature of 103° every day after operation for three weeks without any other symptom of sepsis or local trouble; as she expressed it "one of her regular bilious attacks." It annoyed me very much, but no other explanation for temperature could be given. Recovery.

Case 86.—Date of operation, April 6, 1893. Operator, Dr. Wittwer. B. L., age 10 years, school girl.

History (as given by Dr. Wittwer): Patient was brought to my office two days before operation. Mother gives the following history: For the last two weeks child has been ailing; complained of pain all over body, principally in abdomen around umbilicus. Child gradually lost flesh, her appetite failed, she had some diarrhea, occasional vomiting, so that finally a physician was called who treated her several days for rheumatism. When I saw her she had some temperature, cheeks flushed; walked into office like a case of hip joint disease. Right leg drawn up in recumbent position.

Examination revealed a narrow induration about 3 inches long in the right iliac region. An operation was made two days later (April 6, 1893), and the following conditions were found.

Operation: Typical incision, appendix easily located and found adherent to surrounding tissues; some flakes of pus could be seen on outside of appendix, but no distinct accumulation of pus had formed. Appendix was ligated and removed, suture left in wound and latter packed with iodoform gauze.

Pathological conditions: Fecal stone. On opening appendix it was found that one-half of mucous membrane toward the cæcum was thickened and infiltrated but not gangrenous, while the distal portion of mucous membrane had become gangrenous and presented the appearance of a diphtheritic patch, ulcerated with a dirty, thick, grayish, yellow base. There were present in appendix a few drops of pus. Recovery.

Case 87.—Date of operation, April 9, 1893. Operator, Dr. Murphy. Miss W., age 12 years. Case occurred in practice of Dr. T. J. Conley. Typical attack.

Examination: Induration with resonance on percussion, tenderness general. Temperature at time of operation 99°, pulse 96.

Operation: Lateral incision into general peritoneal cavity, escape of about 1 quart of pus. No foreign body to be felt. Appendix was not removed. General suppurative peritonitis. The coils of intestines were covered with a thick layer of fibrin which I believe accounts for the absence of absorption and toxic symptoms. Recovery.

Case 88.—Date of operation, April 21, 1893. Operator, Dr. Murphy. Mrs. I, age 24.

Case occurred in practice of Dr. Heartler. Present illness commenced with sudden general abdominal pain and vomiting; fever. Examination, tenderness over appendix. Induration.

Operation on fourth day after attack: Lateral incision into peritoneal cavity; circumscribed intraperitoneal abscess; appendix removed; drainage. Recovery. An extensive gangrene of the appendix was present but no perforation.

Case 89.—Date of operation, May 6, 1893. Operator, Dr. Murphy. R. C., age 13, male.

Case occurred in practice of Dr. McKee. Patient was sick one month before seen by operator. Onset typical; examination, large induration extending over lower half of abdomen. Tympanites; tender. Patient very much emaciated and cachectic. Temperature normal.

Operation: Abdomen opened at most prominent point of induration, which was to the left of the median line. Appendix not removed; drainage. Recovery. A general suppurative peritonitis was present. The intestines were covered with a layer of fibrin.

Case 90.—Date of operation, May 13, 1893. Operator, Dr. Murphy. Alexian Brothers' Hospital. H. S., iron worker, age 26.

Patient had first attack about two and one-half years ago which came on suddenly while riding in a street car; the sudden pain commenced in the right iliac fossa and soon spread over the entire abdomen. Patient had always had more or less tenderness over the appendix since this time and had had quite a number (24) of similiar attacks at intervals of five to six weeks. The attacks consisted of pain in right iliac region, vomiting, nausea, slight chills and fever. Bowels have always been kept regular by use of cathartics. During the attacks there has always been a desire to micturate, which persisted until attack subsided. This attack has been more severe than any other. Herpes zoster in right iliac region.

Operation: Appendicisectomy and drainage. Time four and one-half minutes. Temperature after operation always below 100°. Recovery.

Case 91.—Date of operation, June 3, 1893. Operator, Dr. Murphy. Mr. K., age 22. (Was operated upon five months previous. *See* case 78.)

Recurrent attack; patient sick five days.

Operation: Lateral incision. Intraperitoneal abscess; appendicisectomy. Enteroliths. Drainage. Recovery. Appendix was perforated and showed local gangrene.

Case 92.—Date of operation, June 4, 1893. Operator, J. B. Murphy. C. H., male, age 28.

Patient was taken sick May 31, 1893, with moderate pain in abdomen, which gradually became worse and localized in lower half. Nausea, vomiting on the second day, pain became localized in the right iliac region and gradually increased. In the evening of the third day he experienced a sudden severe pain accompanied by a sensation as if something had ruptured within the abdominal cavity.

Examination: Tenderness, induration, and dullness in right inguinal region.

Operation: Appendicisectomy. Intra-peritoneal abscess incised; fecal stone escaped with pus. Fecal fistula followed operation, which lasted for ten days. Temperature ranged up to 101.5° after operation. Recovery. Subsequent examination showed protrusion of abdominal wall, a small hernia.

Case 93.—Date of operation, June 5, 1893. Operator, Dr. Murphy. Alexian Brothers' Hospital. P. H., male, age 30.

History: About six years previous to operation patient was attacked with severe pain in the abdomen, followed by nausea and vomiting. The pain was very intense for five hours; then the fever set in. Had had a dozen similar attacks since then. Was drowsy and sleepy the day before each time.

Examination, sixth day after onset: Lateral incision. General peritoneal cavity opened. Appendix adherent; removed. Fecal stone. Drainage. Recovery. For twelve days after operation temperature remained below 100°. On sixteenth day rose to 103°, but fell to normal shortly.

Case 94.—Date of operation, June 16, 1893. Operator, Dr. Murphy. F., male, age 18. Woodstock, Ill.

Case occurred in the practice of Dr. L. C. Waters. Sickness began five days ago with a typical attack.

Examination: Induration, local tenderness, temperature 99.5° at the time of operation.

Operation: Lateral incision, intra-peritoneal abscess, appendix adherent, removed. Drainage. Recovery.

Pathological conditions: Fecal stone, local gangrene of appendix, perforation.

Case 95.—Date of operation, June 16, 1893. Operator, Dr. Murphy. M. M. G., male, age 13.

Case occurred in practice of Dr. P. H. Conley. Illness began June 9 with sudden pain and tenderness in abdomen; this was soon followed by vomiting and fever. This condition lasted until time of operation. General tympanites. Circumscribed induration in right iliac region; local tenderness. Temperature before operation, 102° F.; pulse, 110.

Operation: Lateral incision. Large intra-peritoneal abscess. Appendicisectomy. No foreign body. Drainage. Appendix ulcerated, not perforated.

Case 96.—Date of operation, July 8, 1893. Operator, Dr. Murphy. W. F., male, age 16.

Case occurred in the practice of Dr. W. H. Bonton. Commenced with sudden attack in right iliac region, extending all over abdomen. Fever. Slight induration, which was more pronounced under anæsthesia, and under the influence of the latter appendix could be outlined.

Operation: In attempting appendicisectomy, the ligature, which was tied around the base of the appendix, was cut through. No further attempt at ligation was made; intra-peritoneal abscess at seat of operation drained; appendix slightly adherent, adhesion easily separated owing to a complete gangrenous condition of appendix, which also accounted for ease with which silk tore through in attempting ligation. Appendix not perforated. Fecal fistula on third day, which closed in thirteen days. Temperature subsided immediately after operation. Recovery.

Case 97.—Date of operation, July 12, 1893. Operator, Dr. Murphy. Female, age 26. Miss B.

Patient had a typical attack on the 9th of July, 1893, three days before operation; had pain, vomiting, tenderness, temperature, and slight induration.

Operation: Incision and removal of appendix. About an ounce of pus escaped, which was of very offensive nature. Drainage. Recovery. The appendix showed perforation on its side near the base. No foreign body. Cicatrix showed seat of previous perforation. This case was operated upon May 12, 1892. Simple drainage of abscess.

Case 98.—Date of operation, July 18, 1893. Operator, Dr. Murphy. Mrs. N. Age 24.

Case occurred in practice of Dr. Hoelscher. Present illness began five days before operation, with severe vomiting and slight pain in right iliac region. The vomiting persisted up to time of operation, regardless of treatment. No induration, no local tenderness, no temperature. Pulse 120, anxious expression.

Operation: Lateral incision. General peritoneal cavity opened. No peritonitis. Cæcum drawn over toward uterus and firmly held there by the appendix, which was adherent to uterus, and produced intestinal obstruction. Appendix removed. Twenty-four hour drainage. Rapid recovery. Appendix very much elongated, contained no pus, ecchymotic at the end where it was adherent to uterus. This case is very instructive, as the symptoms correspond exactly with the pathological conditions and did not suggest acute appendicitis but intestinal obstruction, and is the only case in which there was an absence of pus or cicatrices showing the previous existence of pathological conditions.

Case 99.—Date of operation, July 18, 1893. Operator, Dr. Murphy. I. D., male, age 56. Alexian Brothers' Hospital.

Four weeks ago patient experienced a sudden attack of severe pain in right half of abdomen. Progress of disease characterized by a dull heavy aching pain in right groin and hip. Patient jaundiced since commencement of attack. Stools normal. Difficulty in micturition. Great tenderness on palpation in right iliac region. Induration. Patient is unable to completely extend right thigh.

Operation: Drainage of a large circumscribed abscess containing about three pints of pus. Appendix situated behind the cæcum, not removed. Drainage. Recovery.

Case 100.—Date of operation, July 23, 1893. Operator, Dr. Murphy. Mrs. C., age 25.

Patient was attacked on July 19 with severe pain all over abdomen; the pain was more severe over right side. Pain was accompanied with nausea and vomiting, which continued up to time of operation. Temperature July 19, 103°, pulse 96; 20th to 23d temperature 102°, pulse 90. Abdomen enormously distended, dull on the lower half.

Operation: Lateral incision; a quart of pus of sero-purulent nature escaped from the general peritoneal cavity which covered the bowels to a great extent. Drainage. Recovery.

Case 101.—Date of operation, July 24, 1893. Operator, Dr. Murphy. T. S., male, age 25. Alexian Brothers' Hospital.

Recurrent, twelve attacks during the past five years, lasting from three to ten days.

Operation: Appendicisectomy in immediate stage. Drainage. Recovery. Appendix extensively adherent: mucous membrane ecchymotic. Marked stricture in middle of appendix, resulting from cicatricial contractions of former ulcerations.

Case 102.—Date of operation, July 25, 1893. Operator, Dr. Murphy. J. H., age 14, male.

Case occurred in practice of Dr. Quine. Patient had a typical attack of appendicitis two weeks previous to the operation, accompanied by fever, local tenderness, induration. The temperature subsided on the tenth day to normal and remained so for three days, when it gradually began to increase, and by the thirteenth day reached 102°. The area of induration increased rapidly and was somewhat tender. On the fourteenth day there was a large induration of the right iliac region. Pulse and temperature both good.

Operation: Lateral incision into an abscess. General peritoneal cavity not opened. There was no pus when the abscess was opened, as is usually the case, showing an absence of tension in the abscess. There was considerable fresh blood in the abscess cavity. Two fecal stones. No effort made to locate or remove the appendix. Drained. After recovering from the anæsthetic the patient collapsed and died fourteen hours after operation. The course of this case after the operation indicated that the abscess ruptured between the coils of the intestine and the pus emptied into the peritoneal cavity before the incision was made, explaining the reason why pus did not escape when abscess wall was opened as well as the hemorrhage into the abscess. This opening was not detected at the time of operation, nor could it be seen that the pus escaped into the peritoneal cavity, as that was not opened beyond the line of adhesion. This also accounts for the collapse of the patient, as the symptoms were those of fatal sapræmia.

Case 103.—Date of operation, July 26, 1893. Operator, Dr. Murphy. Case occurred in practice of Dr. Rohr. F. O., age, 43; male.

A week before operation patient was suddenly attacked with pain in right iliac region, followed by vomiting, nausea, and tympanites: pain and tenderness all over abdomen, especially in lower half; temperature, 99½° at time of operation; pulse, 100.

Operation: Lateral incision; general peritoneal cavity opened; a general dry septic peritonitis present; appendix situated behind cæcum; very difficult to locate; the adhesions around the same were loosened and the appendix removed. The appendix was large, gangrenous, and showed perforation, through which a fecal stone projected. Iodoform gauze drainage. I desire to call your attention especially to the fact that this patient was not collapsed at the time of the operation; that his temperature was 99½° and his pulse 90, notwithstanding that he had a general septic peritonitis involving all of the abdominal viscera, and had it for some time previous to operation. Death twenty-four hours after operation.

Case 104.—Date of operation, July 27, 1893. Operator, Dr. Murphy. M. O'C., age, 22, male.

Patient suddenly attacked with pain in region of right kidney; extreme tenderness over appendix, extending high up above crest of ilium and up to margin of ribs behind, but not in front; no tympanites until morning of attack. At 4 a. m. on the day of operation felt the abscess rupture; a sudden bursting in his abdomen, followed by great pain and depression.

Operation four days after attack: Incision; appendix difficult to locate; an abscess cavity was found and the appendix formed a part of its wall. It was gangrenous; had ruptured and located behind cæcum. Two fecal stones were removed. There was present a dry septic peritonitis, the result of the rupture of the abscess the morning before the operation. The intestines were denuded of their endothelium, and flakes of pus and some sero-purulent fluid rested between the coils. The operation was refused for 48 hours preceding the rupture of the abscess, and the delay cost the patient his life. Death, thirty-six hours after operation, of sapræmia.

Case 105.—Date of operation, July 28, 1893. Operator, Dr. Murphy. T., age, 18, male.

Case occurred in practice of Dr. Berry. Patient complained of abdominal pain and vomiting on the night of the 24th; called the doctor on the evening of the 25th; temperature at this time 103°, pulse 120; 26th, a. m., temperature 102°; tympanites increased, pain diminished; 27th, p. m., temperature 101°, pulse 100.

Operation: Lateral incision; circumscribed abscess; general peritoneal cavity not opened; fecal stone escaped with pus; appendix removed; drainage; recovery.

Case 106.—Date of operation, July 28, 1893. Operators, Drs. Murphy and Dr. Le Count, house surgeon. J. M.; age, 32; male.

Patient's trouble began twelve days before entrance to hospital with severe pains in abdomen, accompanied by vomiting. Later on a dull aching pain developed in the right iliac fossa which was persistent; vomiting continued a little every day until day of operation; could keep nothing on stomach. Bowels moved daily. No chills, no fever. Later on an induration became visible in right iliac region.

Operation: Usual incision; general peritoneal cavity not opened; escape of 8 to 10 ounces of purulent, fecal-smelling pus. Digital examination of pus cavity detected sacculated condition, which was broken down and made into single cavity. Packed with gauze. Upper part of wound sutured with silk. Patient made rapid recovery.

Case 107.—Date of operation, July 31, 1893. Operator, Dr. Murphy. A. J.; age, 22; female.

Case occurred in practice of Dr. P. H. Conley. Patient had a previous attack about a year before operation, but not as severe as present one. Sudden attack July 21, 1893. Pain in right iliac region; nausea; vomiting; tympanites; induration; dullness on percussion.

Operation: Lateral incision; extensive suppurative peritonitis extending into Douglas's pouch and up behind the cæcum and colon to the kidney; drainage; recovery.

Case 108.—Date of operation, August 5, 1893. Operator, Dr. Murphy. R. W.; age, 18; male. Alexian Brothers' Hospital.

History: Patient had a previous attack June 25, 1892, for which he was operated; simple drainage (see case 55). Had a second attack in August, 1892, which only lasted a few days. This present attack (third) began with sudden pain in the abdomen, caused by straining himself while working at his lathe. The pain and vomiting were so severe that he was compelled to go to bed. At first pain was located in right iliac region, but in a few hours it extended over the entire abdomen.

Examination: The temperature reached 102° fifteen hours after the onset, and he presented himself for operation thirty-one hours after onset. Temperature, 99.7°; pulse, 80; tympanites; general abdominal tenderness; dullness on superficial percussion on lower half of abdomen.

Operation: Lateral incision; general peritoneal cavity opened; found full of a thin purulent fluid. The wall of an old circumscribed abscess was seen, in which was detected a small opening. On opening the wall extensively half of the appendix was found to protrude into it. The appendix was very much enlarged, thickened, and at its tip an enterolith protruded. This condition had existed for a long time, as could be seen from the pathological condition of the opening. Although the peritoneum of the intestine and omentum was congested, it still retained its gloss and was not eroded of its endothelium. Appendix ligated, amputated; recovery.

Remarks: The cause of the peritonitis in this case was the rupture of a circumscribed abscess that had existed since the previous August, or the time of the second attack. The wall of the abscess was very firm. It will be noted that while the general suppurative peritonitis was present at the time of the operation and had existed for thirty-one hours, the patient was not collapsed; his temperature was only 99.7° and his pulse 80.

Case 109.—Date of operation, August 8, 1893. Operator, Dr. Murphy. J. J. D.; age, 23; male.

Present attack began July 28 with sudden pain in the region of the umbilicus which rapidly localized itself in the right iliac region. Marked induration over appendix. Temperature 102° day before operation. Has vomited several times since the onset of attack. Temperature on morning of operation 100°.

Operation: Lateral incision; general peritoneal cavity opened; circumscribed abscess found which contained half a pint of pus; appendix amputated; drainage; recovery.

Pathological conditions: Appendix enlarged; local gangrene with perforation; no foreign body.

Case 110.—Date of operation, August 17, 1893. Operator, Dr. Murphy. Patient occurred in practice of Dr. Pigall. R. S. B.; age, 33; male. Post-Graduate Hospital.

Patient was kicked, on July 31 by a man, in the right side. The same night at 2 o'clock he was attacked with sudden pain in the right iliac region, followed by fever, tenderness, and tympanites. These symptoms continued up to time of operation.

Examination: Large tumor in right iliac region, extending almost to umbilicus; no fluctuation could be determined; no œdema or redness of the wall; dull on percussion, both superficial and deep. A differential diagnosis was made between rupture of kidney, rupture of cæcum and appendicitis in favor of the latter.

Operation: Lateral incision; abscess wall adherent to anterior wall of abdomen; general peritoneal cavity not opened; abscess circumscribed, drained; appendix not removed; recovery.

Case 111.—Date of operation, August 22, 1893. Operator, Dr. F. S. Hartman. A. K.; age, 18; female.

Primary attack: Sickness began with colicky pain in region of stomach, followed by nausea and vomiting. Later pains extended to lower part of abdomen. The following day fever appeared and the pain increased. Two days later patient felt about recovered from her attack and went about as usual. During the afternoon of this day a second severe attack developed with pain, nausea, vomiting, etc. The following day she felt perfectly well, but a third similar attack occurred later in the day. She was first seen on this day. Pulse. 114; temperature, 104. Large induration in right iliac region.

Operation on third day: Drainage intraperitoneal abscess, containing about 3 ounces of pus; 3 fecal stones removed; appendix not located; gauze drain; fecal fistula; recovery.

Case 112.—Date of operation, August 25, 1894. Operator, Dr. Murphy. Male; F. H. C., of Buffalo; age, 28.

Case occurred in practice of Dr. J. C. Cook. Appendicitis began on morning of 24th, at 7 a. m., with sudden attack of pain in right iliac region, followed by nausea and vomiting; tenderness all over abdomen: very sensitive on deep pressure in right iliac region; abdomen tympanitic, induration. Nine a. m., August 25, pulse 96, temperature 98.3; 8 p. m., August 25, pulse 100, temperature 102°; 11 p. m., August 25, pulse 120, temperature 103°.

Operation: 11:30 p. m., Lateral incision; peritoneal cavity opened; no adhesions to anterior wall; appendix situated in front of cæcum surrounded by omentum; appendix gangrenous, showed no perforation; two drams of pus outside of the appendix, which was amputated; enterolith in appendix; drainage; recovery.

Remarks: Instructive in showing purulent infection of peritoneum; (two drams of pus) without perforation.

Case 113.—Date of operation, August 28, 1893. Operator, Dr. Murphy; Alexian Brothers' Hospital. P. McG.; age, 27; male.

Patient was taken with typical attack three days before operation. In spite of the very severe pain he worked the whole of the first day. The pain at first was general, but gradually was localized in right iliac region. There was marked muscular resistance, but no perceptible induration over appendix.

Operation: Temperature at time of operation, 100.8°. Lateral incision; appendix situated 2¼ inches below the umbilicus and near the median line; circumscribed abscess, small, no adhesions to anterior wall; adhesions to omentum; appendix perforated; fecal concretion; appendix excised; simple ligature of base; drained; recovery. Temperature no time after operation exceeded 100.4°.

Case 114.—Date of operation, August 28, 1893. Operator, Dr. Murphy. Mrs. C.; age, 52. Occurred in practice of Dr. Cauley.

Attack began six days before operation with typical symptoms. A general suppurative peritonitis existed before operation. The operation showed that a circumscribed abscess existed and had ruptured.

Operation: Temperature at time of operation, 104°; pulse, 120. An incision was made and the abdominal cavity drained: appendix removed; gall bladder elongated and adherent to abscess wall. Patient died three days after operation of sapræmia; no autopsy.

Case 115.—Date of operation, August 31, 1893. Operator, Dr. Murphy. Male; R. H.; age, 16.

Case occurred in practice of Dr. J. C. Cook. Patient was suddenly taken sick at Waukegan (August 29) with nausea and vomiting, severe pain in right iliac region. Patient had been eating grapes the day before (August 29). Temperature August 31, 101°.

Operation, thirty-nine hours after onset of symptoms: Lateral incision; appendix completely surrounded by omentum at least half an inch thick except at tip, where only the thin gangrenous peritoneal wall of appendix separated the pus in the appendix from the peritoneal cavity.

This whole mass was ligated, amputated; a drain of iodoform gauze inserted. Silkworm gut was used to ligate the appendix; this had to be removed, as it did not slough off or was not absorbed.

Case 116.—Date of operation, September 19, 1893. Chas. B.; age, 11. Operator, Dr. Hartmann; Post-Graduate Hospital.

History: Patient was taken sick in the morning of September 16, 1893, with dizziness and headache. Went to bed at noon; slept; on awaking at 3 p. m. dizziness and headache had increased and he had developed a fever and backache; diarrhea and griping present. The following day, September 16, vomited freely; high fever. September 17, 6 p. m., pulse 150, temperature 105°; typhoid condition; abdomen somewhat tympanitic, general tenderness. September 18, a. m., pulse 135, temperature 105°; general conditions same; abdominal tenderness more marked in right iliac region; no induration, but slight nodules could be felt in this region, which at time of operation proved to be swollen mesenteric glands.

Operation: Appendicisectomy, small iodoform gauze drain; sutured. Appendix was nonadherent; external appearance normal except the end, which was somewhat swollen; was of rather unusual length. Upon being opened was found to contain a grape seed and was ulcerated.

Recovery; ventral hernia; latter resulted from wound opening during a severe attack of typhoid fever which immediately followed the operation.

Case 117.—Date of operation, September 24, 1893. Operator, Dr. Murphy. K. S.; age, 50; male.

Case occurred in practice of Dr. Venn. Patient has had a number of attacks. Present attack began about seven days ago, with severe local pain at umbilicus, nausea, vomiting, fever, tympanites.

Status Praesens: Large induration in right iliac region, dull on superficial percussion, resonant on deep percussion. No oedema of wall. Temperature 101°, pulse 90 at time of operation.

Operation: Lateral incision, abscess opened without opening the unaffected portion of peritoneum. Abscess circumscribed. Appendix not removed; drain, recovery.

Case 118.—Date of operation, September 21, 1893. Operator, Dr. Murphy. H. C.; age, 22; male.

Case occurred in practice of Dr. O'Malley. Date of attack September 13, beginning with pain in umbilical region, followed a few hours afterwards by vomiting. On September 15 temperature 105°. On September 16 temperature normal, and remained so up to day of operation. September 24, 1893, 8 a. m., pulse 104, temperature 99°. The induration extended to the median line as high as umbilicus and within three inches of ninth costal cartilage. Resonant on deep percussion and flat on light percussion over that area.

Operation: Later incision; abscess circumscribed, i. e., the abscess was opened directly through the abdomen without disturbing the uninfected portion of the peritoneum. Appendix not removed: drained, recovery.

Case 119.—Date of operation, September 27, 1893. Operators, Drs. Oswald and Oswald, Alexian Brothers' hospital. W. McK.; age, 15; male.

Six months previous the patient had been operated upon for general suppurative peritonitis following appendicitis. The abdomen had been drained, appendix not located. The wound healed nicely, but has opened and discharged pus three times since the operation. The present operation was performed for the purpose of removing the sinus and determining the cause of the same.

Operation: Incision 2 inches to the inner side of the opening. Peritoneal cavity opened; caecum found adherent to the lateral perietal wall; the end was considerably distended. The cavity of the appendix shut off from the cavity of the caecum by a large cicatrix. There were three openings into the appendix. The cicatricial occlusion of the base of the appendix accounts for the recurrence of the attacks. Appendix removed. The opening in the side of the appendix was connected with the opening in the abdominal wall. Drain. Recovery.

Case 120.—Date of operation, September 28, 1893. Operator, Dr. Murphy. Male; F. B.; age, 35. Occurred in practice of Drs. McKee and Pigall.

History: In the night of September 21 patient was attacked with severe abdominal pain. This was shortly followed by nausea and vomiting. The following morning patient's temperature was 102°. Vomiting and pain continued during the following seven days. The patient became very tympanitic and rapidly lost strength.

Examination: Septemper 28, patient's facial expression bad; skin cold, gulping every few minutes. Abdomen extremely distended. Dull on light percussion over lower half. Temperature, 101°; pulse, 135.

Operation: Lateral incision, abdomen full of sero-purulent fluid; endothelium of the intestines eroded. The appendix was easily located and removed; adherent, gangrenous, and perforated; drained. Death thirty-six hours after operation of sapraemia.

Case 121.—Date of operation, October 2, 1893. Operator, Dr. Hartmann. E. S.; male; age, 32.

History: Evening of September 30 patient experienced abdominal pain, which was relieved by an anodyne. The following morning pain returned, but patient went around as usual. In the evening pain became very severe, and during the night was so intense that hypodermic injections were given. October 2, a. m., pulse 95 and strong; at noon pain became somewhat localized in the right iliac region; at 4:30 had a very severe chill.

Examination, 6:30 p. m.: Tympanites; general abdominal tenderness, more marked in lower portion of abdomen and right iliac region; induration in the latter location.

Operation: Appendicisectomy; drainage of local septic peritonitis; appendix gangrenous, perforated, containing enterolith; adhesions of bowel to peritoneum; limited septic process above and to the inner side of incision; toward the pelvis no adhesions were to be felt. Patient died on October 4.

Post-mortem revealed presence of general septic peritonitis; folds of intestines were agglutinated and presented many pockets of suppuration.

Case 122.—Date of operation, October 12, 1893. Operator, Dr. Murphy, Alexian Brothers' Hospital. Ed. B.; age, 21; male.

Onset October 7, 1893, with intense abdominal pain, more severe in right iliac region. Treated "expectantly" for one week. Was up and about after the first few days. Vomiting continued at intervals from beginning of the attack. Patient collapsed two days prior to admission to hospital, and when admitted in very bad condition; respiration irregular, almost entirely thoracic; pulse feeble and rapid; temperature 102°; general pain and tenderness, with tympanites all over abdomen; induration not palpable. most sensitive in right iliac region.

Diagnosis: Appendicitis; perforation; general suppurative peritonitis.

Operation: Lateral incision; about a pint of pus escaped. Appendix perforated, firmly adherent, not removed. No limiting adhesions; pus distributed throughout the entire peritoneal cavity. Strands of gauze placed in all directions. No irrigation. Hypodermic injections of strychnine sulphate, grain $\frac{1}{16}$ every hour. Patient rallied completely in forty-eight hours. Temperature dropped to 99° and remained so; he improved rapidly until October 22, when he was attacked with a double pneumonia, and died October 24, 1893. All of his abdominal symptoms had subsided before the attack of pneumonia began; the drainage, however, had not been removed. I have placed this in the list of recoveries, as I believe the cause of death was independent of his peritonitis. This is one of the very few cases that rallied from the collapse of general supurative peritonitis.

Case 123.—Date of operation, October 14, 1893. Mary S., 11 years. Operator, Dr. Hartmann.

History: On October 8, immediately after dinner, patient vomited very freely; the rest of the day felt as well as usual. During the night she again vomited. Felt quite well on awaking following morning, October 9. During the afternoon developed pain in region of navel, which was relieved by hot applications. October 11, in awaking, felt quite sick, intense pain in abdomen, almost constant; remained in bed; during the night developed a fever which continued until the time of operation.

Operation: Appendicisectomy; small iodoform drain; suture; appendix swollen and mucous membrane gangrenous.

Case 124.—Date of operation, October 23, 1893. Operator, Dr. Hartmann. Mrs. M. O. B., age 27, at Post-Graduate Hospital.

Since May, 1882, had ten attacks; always suffered with intense colicky pains in epigastrium, accompanied by vomiting of bile. The attacks occurred mostly during the night, and came and disappeared suddenly. October 21, 6 p. m., patient experienced persistent colicky pain in epigastrium, accompanied by persistent vomiting, lasting until 4 o'clock the following day, when, after having ceased for a couple of hours, returned again. First complained of pain in right iliac region during afternoon of 22d; chills in afternoon of same day.

Examination: No tympanites, slight induration, tenderness confined to the right iliac region.

Operation: Drainage of local septic peritonitis, appendicisectomy. Appendix gangrenous, perforated, adherent. Recovery.

Case 125.—Date of operation, October 23, 1893. W. E.; age, 24; Alexian Brothers Hospital. Operator, Dr. Murphy.

History: Patient admitted to medical ward of hospital October 11. History of having been sick for ten weeks. Bloody stools for five days previous to operation. Severe pain and tenderness over abdomen, general diarrhea during entire ten weeks, passage once every hour since entrance to hospital, some pain during micturition. Temperature 101°, pulse 104, respiration 25. October 13, 25 stools in twenty-four hours. October 16, lumbar myositis most painful in right side. October 20, great tenderness with tumefaction and tympanites. October 23, Dr. Murphy saw patient and decided to make an exploratory laparotomy. Usual incision, about half a pint of very offensive fæcal pus as well as fragments of necrotic tissue (3 inches long) escaped. The cavity had the appearance of a large diphtheritic abscess. Iodoform gauze used as drainage. Condition gradually grew worse, and patient died at 2 p. m.

Post-mortem: Total destruction of mucous membrane of colon, in parts resembling, microscopically, the appearance of honeycombed tissue. Mucous membrane loosened as a tube from submucous tissue and gangrenous. The incision was made directly into cæcum, which had lost all resemblance of a mucous membrane. Appendix not affected in any way.

Case 126.—Date of operation, November 1, 1893. Operator, Dr. Murphy. Mrs. J.; age, 44.

Case occurred in the practice of Dr. William E. Quine. Patient suffered from five attacks in the seven months preceding the operation, the last one, three weeks before the operation. It was more severe than the former attacks; began with sudden pain in right iliac region, and gradually extended all over abdomen. It was shortly followed by nausea and vomiting. Temperature reached 103°. There was increased sensitiveness as well as induration in right iliac region, general tympanites shortly followed. After five days the symptoms began to subside and disappeared entirely. The operation was performed after all the inflammatory symptoms had subsided.

Operation: Lateral incision. Appendix found firmly adherent to side of cæcum, distal end distended and somewhat œdematous. Proximal end close to cæcum very much contracted. Ligature applied at seat of contraction. Packed with iodoform gauze. Time of operation, six minutes. Gauze removed in forty-eight hours and sutures tied. Convalescence uneventful. Examination of appendix showed complete occlusion at the neck. Cicatrices at side showing where it had ruptured into the caecum. Repeated accumulation in the appendix without an outlet was evidently the cause of the recurrences.

Case 127.—Date of operation, November 2, 1892. Operator, Dr. Murphy. A. B.; male; age, 26. Alexian Brothers' Hospital. Case occurred in practice of Dr. Hoelscher.

History: Patient felt slightly indisposed Tuesday, October 30. November 1, severe pain in abdomen; exaggerated in right iliac region. Patient seen on that evening by Dr. Hoelscher; transferred to Alexian Brothers' Hospital at once. Temperature 101°. November 2, 9 a. m. Patient had considerable pain during the night; is very sensitive over the appendix. No induration. Temperature, 100°.

Operation: November 2, 1893, 10 a. m. Lateral incision. Appendix reached without difficulty, very much distended, gangrenous on one side, had not ruptured, no infection of the peritoneum. Appendix drawn out, the wound packed with iodoform gauze, ligated, amputated, top-sewed, sutures inserted, iodoform gauze drain. Removed in twenty-four hours, sutures tied. Time for operation, ten minutes. Patient made a rapid recovery. Highest temperature after operation, 100.4°.

Case 128.—Date of operation, November 4, 1893. Operator, Dr. Murphy. D. T.; age, 44; male.

Attack began evening of October 26, with intense pain in the abdomen, which continued for several hours; it was accompanied by nausea and vomiting. October 27, pain less severe, tympanitic, sensitive all over abdomen, most marked in right iliac region, very slight induration, pulse 90. Temperature 103°. Patient had a severe purulent bronchitis accompanying the attack. The symptoms continued until November 3, when he had a chill, followed by a temperature of 104°. Following morning, laparotomy.

Operation: Lateral incision, circumscribed abscess retro-cæcal. Packed around with iodoform gauze before opening. Appendix not removed. Following morning pulmonary symptoms more severe, bowels moved, temperature subsided to 101°. Pulmonary symptoms continued increasing. He died on the 5th day. Post-mortem not allowed.

Case 129.—Date of operation, November 5, 1893. Operator, Dr. Murphy. Miss N. R.; age, 17 years.

Case occurred in practice of Dr. Rose.

History: October 22, 6 a. m., patient's illness commenced with a gnawing in the stomach. Dressed with difficulty on account of soreness; not localized, as far as she noticed. October 23 and 24, pain was accompanied with nausea and vomiting. Enema of hot water was given, which relieved the symptoms. Induration felt. Patient did not manifest any serious symptoms for following two weeks. Very slight elevation of temperature with slight digestive disturbances. Induration remained. Mother gives history of diarrhœa, with slight hemorrhage. November 5, case was seen by Dr. Murphy. Operation advised.

Operation: Lateral incision. General peritoneal cavity not opened. Appendix not removed. circumscribed abscess. A large quantity of pus. Drainage. Recovery.

Case 130.—Date of operation, November 10, 1893. Operator, Dr. Murphy. W. M.; age, 12 years; male.

Case occurred in practice of Dr. Hayes. On November 3 patient was suddenly attacked with pain in the right side. On November 4, nausea, vomiting, increase of pain which patient described as cramps. As the symptoms had not subsided on the 5th of November (next day), a physician was called in.

Examination on November 5. Temperature 105°; pulse 120. Tympanites; abdominal tenderness general, but most marked in right iliac region. An opiate was administered, which relieved pain. November 6, pain more marked, but less intense; discontinuation of opiates resulted in return of pain. An operation was advised, but was not consented to. The symptoms continued up to November 10, when an operation was now agreed upon. Temperature at time of operation, 99°; pulse 90.

Operation: Lateral incision, general peritoneal cavity opened; a general suppurative peritonitis present. The bowels were covered with flakes of pus. Appendix not removed. Drainage. Recovery.

Case 131.—Date of operation, November 23, 1893. La Pla.; 16 years; male. Operator, Dr. Witter.

Case occurred in practice of Dr. Bergeron. Family history good. Ten days before operation patient complained of pains around umbilicus; later, localized in right iliac region. No vomiting. Tympanites appeared after a few days. Pain was more severe last two days before operation, when limbs were constantly flexed. Last three days frequent urination; complete loss of appetite.

Status presens; pinched features, limbs flexed; a very tympanitic abdomen, very sensitive to pressure. Induration in right iliac region, not well defined on account of tympanites. Not much pain at time of operation unless abdomen was touched.

Operation: Usual incision in right iliac region. Upon entering the peritoneal cavity the intestines were found agglutinated to the anterior abdominal wall. Upon severing the recent adhesions a large quantity of thin purulent, very offensive, pus escaped. Intestines found covered with large flakes of lymph. Two fingers were used in separating all the adhesions that could be reached, and finally a large abscess was reached which was in contact with the bladder, which had not been perforated. A glass drain was introduced into abscess cavity near bladder. Four days later a smaller one took its place. Gauze drain also used. Appendix not removed. No enterolith found.

Ten or twelve days after operation boy commenced to vomit, and complained of pain in left iliac region. His bowels had not moved for four or five days, and all symptoms of a second abscess to the left of the urinary bladder were present. With the intention of making a secondary operation, patient was again visited, but found by pressure from the outside and insertion of another glass drain the abscess could be drained without another incision. Boy had no further trouble. January 24, 1889, boy is up and around and is feeling perfectly well.

Case 132.—Date of operation, November 25, 1893. Operator, Dr. Murphy. Chas. B.; age, 40; male.

Case occurred in practice of Dr. Rohr. Patient gives a history, which leads to suspicion that he had previous attacks of appendicitis. Present attack began forty-eight hours before operation, with sudden pain in abdomen, nausea, vomiting, and moderate rise in temperature (about 101°). On second day extreme tympanites developed; the pain had increased. No induration to be felt.

Operation: Appendicisectomy. The general peritoneal cavity was opened and a general suppurative peritonitis found to be present, without adhesions. Pus covered the bowels to a great extent. The appendix was located, brought into the abdominal incision, ligated and amputated. The abdominal cavity drained with iodoform gauze. The temperature at no time was over 101°; the pulse was very rapid (140) at time of operation.

The appendix was gangrenous, not perforated, contained no foreign body. Patient had persistent vomiting for three days after operation, which then subsided. He then made an uneventful recovery. This is another illustration of extensive purulent infection of the peritoneal cavity forty-eight hours after the onset of symptoms, in which there was no perforation, but a gangrene of the wall. The bowels were eroded somewhat of their endothelium, but not sufficiently to admit of the fatal sapræmia.

Case 133.—Date of operation, November 28, 1893. T. S.; age, 32. Alexian Brothers' Hospital. Operator, Dr. Murphy. Occurred in practice of Dr. Rohr. Patient says he has had two similar attacks previous.

History: Present illness began November 26, with colicky pains, after a dose of oleum ricini to move bowels. November 27, 10 p. m., pains had continued accompanied by nausea and vomiting, and did not cease until November 28, 3 a. m. Pain localized in right iliac fossa.

Examination: Tenderness and induration in right iliac fossa, on pressure. Temperature 104° before operation.

Operation November 28, 2 p. m. Usual incision; no circumscribed abscess. Appendix almost entirely covered with omental adhesions. Had not perforated, however. Pus oozed out through punctures made by forceps used for holding it up for ligation. Appendicisectomy. Appendix found to contain about one-half dram of pus. Its tissue was gangrenous. Appendix three inches long, size and thickness of little finger. Flakes of pus visible in opening peritoneal cavity. Time for entire operation seven minutes. Temperature fell to normal after operation and patient made an uneventful recovery.

Case 134.—Date of operation December 19, 1893. M. W.; age, 28; male. Operator Dr. Murphy. Case occurred in practice of Dr. Berry.

History: December 16, complained of being tired and feverish. December 17, slight soreness in right iliac region. December 18, tenderness over entire abdomen. Temperature 100°, pulse 80. December 19, temperature 101°; pulse 85 before operation.

Operation: Lateral incision, intra-peritoneal. Retro-cæcal. Abscess around appendix. Flakes of pus on bowels outside of abscess. Peritoneum protected with iodoform gauze. Abscess opened, sponged. Appendix adherent to posterior parietal wall; easily elevated and amputated. Drainage with iodoform gauze. Recovery.

Pathological conditions: Circumscribed abscess. Appendix perforated. Flakes of pus on bowel outside of abscess.

Case 135.—Date of operation, December 20, 1893. Operator, Dr. Murphy. E.; age, 26; female. History: December 7, typical attack. Pain at first general, later local. No tympanites. Temperature 100 to 103 in first forty-eight hours. First constipated, then had an attack of diarrhœa. Marked induration over appendix.

Operation: Lateral incision; protection of peritoneal cavity with iodoform gauze, and drainage of an intra-peritoneal abscess. Glass drain and iodoform gauze used.

Temperature remained at 100.5° for ten days after operation, then ran up to 103°, and remained so for forty-eight hours. Temperature again normal on twentieth day. Recovery.

Pathological conditions: Intra-peritoneal abscess extending down into the pelvis. About six ounces of very thick, creamy pus escaped; in it was the appendix, which was entirely gangrenous and perforated at its base.

Case 136.—Date of operation, December 22, 1893. Operator, Dr. Murphy. Case occurred in practice of Dr. Hoelscher. O. T.; age, 20; male.

On November 22 patient was attacked with sudden, severe, colicky pains in abdomen; it caused an indisposition for a couple of days. He was then able to be out again. These attacks occurred occasionally for the following twenty-six days. At no time was he well, though able to be about. On December 18 the pain became extremely severe; was located in the right iliac region, and was shortly followed by nausea and vomiting. It increased in intensity; the temperature rose to 101. This condition continued up to the time of operation, four days later.

Examination: Abdomen tympanitic, uniformly distended, no induration, excessively tender in right iliac region.

Operation: Lateral incision; general peritoneal cavity opened. An abscess of considerable size was seen situated around the head of the colon and in the retro-cæcal fossa. General peritoneal cavity protected with iodoform gauze packing; abscess opened. About 8 ounces of pus escaped, and in it the gangrenous appendix. Glass drain. Recovery.

Pathological conditions: Appendix completely gangrenous and separated from its attachment at the base. All of its coats were macerated except the peritoneal, which could be filled with water and resembled the rubber of a toy balloon. Two fecal stones.

Case 137.—Date of operation, December 29, 1893; Operator, Dr. Murphy. Mrs. G.; age, 21.

When performing laparotomy for tubal disease, the appendix was found very much elongated, congested, swollen, and adherent to side of uterus and proximal end of right tube, causing traction upon cæcum, and undoubtedly accounted for some of the symptoms from which she was complaining. Result, recovery.

Case 138.—L. J.; age, 21; male. Date of operation, December 31, 1893. Case occurred in the practice of Dr. Weatherly. Operator, Dr. Murphy.

History: Patient was seized with a chill December 29: severe pain when walking; this pain lasted through the night and was accompanied by vomiting and fever. Dr. Weatherly saw the case December 30 at 8 p. m. Patient was sent to hospital. December 31 at p. m. temperature 101°, pulse, 83.

Operation: Appendix found partially adherent to liver, two inches necrotic, but not perforated; not covered by omentum; no foreign body. When appendix was elevated pus oozed through the pores in its wall, showing that perforation was about to take place. The mucous membrane has entirely disappeared, and was commingled with the fluid débris. No pus outside of appendix. Twenty-four hours drainage; recovery.

Case 139.—Date of operation, January 4, 1894. Operator, Dr. Murphy. C. H. M.; age, 25; male. Case occurred in the practice of Dr. George Barnett, Ishpeming, Mich. Recurrent appendicitis. First attack May 30, 1891; sick for five days; second attack September 23, 1892; sick for ten da s; third attack December 24, 1893, began with sudden severe pain in the abdomen, followed by vomiting, great tenderness; temperature 103°. After two days, temperature dropped to 99.5° and remained so till December 31, when it suddenly rose to 104.2°, with pulse 120. Marked tumor was present in right inguinal region at that time. Operation was urged by the doctor and consented to.

Examination: No tympanites; no general abdominal tenderness; a distinct tumor in right iliac region which appeared to come close to the skin. Temperature 100°.

Operation: Lateral incision into an abscess which had already penetrated the walls of the abdomen and invaded the subcutaneous cellular tissue. This opening was enlarged with the finger and the abscess cavity within the abdomen examined; no fecal stone; appendix could not be located; drainage; recovery.

Case 140.—Date of operation, January 6, 1894. Operator, Dr. Murphy. Case occurred in the practice of Dr. Riese. L. B. C.; age, 35 years; male; Detroit, Mich.

Patient was attacked with severe pain in the right side of abdomen, followed by nausea and severe vomiting. Temperature on morning of operation 101°; no induration; no tympanites. A very sensitive point could be felt in the right iliac region; the appendix could be outlined.

Operation: Lateral incision; appendicisectomy; gauze drainage; sutures inserted but not tied. The appendix was not adherent; appeared normal on its peritoneal surface, although very hard to touch. Mucous membrane inflamed, swollen, gangrenous in spots; contained a number of seeds. Gauze drain removed in twenty-four hours; sutures tied; recovery.

Case 141.—Date of operation, January 15, 1893. Operator, Dr. Murphy. C. G.; age, 30; male; Alexian Brothers' Hospital.

Present illness began fifteen days before operation with pain in abdomen, accompanied by fever and sweats. The pain gradually centralized in the right iliac region. Was able to be up and about and came to office day of operation.

Examination: No tympanites; induration and tenderness in ileo-cæcal region extending down to pubis. Nothing to be felt from the rectum.

Operation: Lateral incision; general peritoneal cavity opened. Tip of appendix firmly adherent over iliac vessels; liberated with difficulty; body free; removed; sutures inserted but not tied; iodoform gauze drain. The distal half inch of a very elongated appendix (4 inches) was swollen to three times the size of the remaining portion. Minute gangrenous spots on mucous surface; no perforation Gauze drain removed in twenty-four hours and sutures tied; recovery.

Case 142.—Date of operation, January 30, 1894. Operator, Dr. Wittwer. Male; L.; age, 30.

History: Three days previous to operation patient was suddenly attacked with pain in right iliac region; this was followed within an hour by vomiting; temperature 102°. The following day the abdomen was tympanitic and very tender on right side. On morning of the third day patient had a severe chill. Temperature at time of operation 100.5°.

Operation: Lateral incision over induration, which was now more marked under thea næsthetic. General peritoneal cavity opened; flakes of pus over cæcum and omentum; appendix adherent, necrotic; small circumscribed abcess at base; thin sero-purulent fluid; adhesions liberated; appendix ligated; iodoform gauze drain; recovery.

Pathological conditions: Appendix perforated in one spot, and showed two other gangrenous places ready to perforate.

Case 143.—Date of operation, February 6, 1894. Operator, Dr. Murphy. Female; Juliet M.; age, 19. Case occurred in practice of Dr. Berry.

History: Primary attack. Present illness commenced three and a half days prior to operation with intense pain in right iliac region, which rapidly spread over entire abdomen. Nausea and vomiting followed within an hour. All these symptoms and tympanites were present on second day. Vesical tenesmus severe.

Examination: Time of operation temperature 102°, pulse 120. Very anxious expression, mental exhilaration, great thirst, gulping, extreme tympanites; a complete absence of peristalsis; not a sound could be heard in any portion of the abdomen for fully ten minutes. No dullness either on light or dull percussion.

Operation: Lateral incision; general peritoneal cavity opened; at once a small quantity of sero-purulent fluid escaped which was very offensive. There were no limiting adhesions. Every separation of the coils of intestine was followed by an additional discharge. Douglas's pouch full of pus. Appendix adherent to fundus of bladder; liberated and removed without rupturing. Iodoform gauze and glass drainage. Intestines denuded of their endothelium, resembling a blistered surface. Symtoms of sapræmia continued, and patient died twenty-two hours after operation. General suppurative peritonitis.

Pathological conditions: Appendix enlarged size of thumb; gangrenous, full of pus; enterolith size of grape seed; no perforation, still general suppurative peritonitis.

Case 144.—Date of operation, February 9, 1894. Operator, Dr. Murphy.

Occurred in practice of Dr. J. M. Auld, who made a diagnosis and ordered operation three hours after the onset of attack, for which he deserves the congratulations of the profession and the patient. A. W.; age, 19; male.

Patient first attacked a year ago and had a similiar attack three and one-half months before present one. He was operated upon at the time of the second attack; a circumscribed abscess was drained; the appendix was not removed. The present attack began the day before the operation with sudden pain, followed by nausea and vomiting. The patient was brought to the Cook County Hospital on the first day of sickness and early the next morning he was operated upon, eighteen hours after onset. Temperature at time of operation 99°, pulse 100. Slight tympanites; no induration to be felt.

Operation: Lateral incision an inch towards the median line from the old scar. General peritoneal cavity opened; sero-purulent fluid situated around the head of the colon; peritoneum congested but not abraided. The appendix was situated across the iliac vessels, adherent behind; half of it hung over the brim of the pelvis. The appendix and cæcum were elevated out of the wound. About three drams of sero-purulent fluid was sponged out. There were no limiting adhesions around the pus. The seat of penetration of infection could be easily recognized on the peritoneal surface of the appendix. Appendix ligated; amputated; gauze drain; recovery.

Pathological conditions: The proximal two-thirds of the mucous membrane of appendix greatly swollen. A small ulcer existed where the infection penetrated the wall, but there was no perforation. What would have been the result in this case under expectant treatment?

Case 145.—Date of operation, February 12, 1894. Operators, Drs. Murphy and Verity. Mrs. E. P.; age, 42.

Patient had first attack in July, 1893; had a second attack January 14, 1894, which commenced with severe pain just below the margin of the last rib. This was accompanied by nausea, but no vomiting. For the first few days there was no fever; temperature not taken. This subsided, but the pain and tenderness continued until the time of operation. Patient had never been jaundiced.

Examination: With anæsthetic. An induration, extending from the margin of the ninth costal cartilage downward 3 inches, could be felt distinctly. It was stationary during the respiratory act. It could not be separated from the abdominal wall, nor could it be displaced to the left. It could not be separated from the kidney, nor could the kidney be outlined.

Operation: Temperature at time of operation normal. Incision over induration. Peritoneal cavity opened; colon was found adherent to lateral wall of the abdomen just below the margin of the ribs; the adhesions were separated and the remains of an abscess detected; no pus; the cæcum was found adherent and folded upon the posterior surface of the ascending colon. The appendix was found perforated at its tip communicating with the abscess. It could be seen where the abscess had emptied into the posterior wall of the colon at its hepatic flexure. Appendix ligated; amputated; recovery.

Remarks: This is the first time I have found the cæcum folded on to the posterior surface of the colon. The abscess was situated just below the edge of the liver.

TRATAMIENTO DE LOS ESTRECHAMIENTOS MÚLTIPLES BLENORRÁJICOS DE LA URETRA POR LA URETROTOMÍA DOBLE CON CANALIZACIÓN VÉSICO-URETRAL.

Por el Dr. JUAN MARTINEZ DEL CAMPO, de México.

SEÑORES: Asunto de la mayor importancia es el enunciado, como se comprende muy facilmente, por ser una de las cuestiones que diariamente se presentan en la práctica quirúrjica y que á pesar de esa frecuencia, ha sido de las más difíciles de llevar á buen resultado. En efecto, todos los procedimientos para tratar los estrechamientos uretrales han adolecido siempre del defecto capital de exponer tarde ó temprano á la reproducción del accidente, y no puede ser de otro modo, pues si se reflexiona sobre el modo de obrar de los instrumentos inventados para seccionar la coartación uretral y el papel importantísimo y constante que desempeña el órgano encargado de expulsar á todas horas el liquido de exereción más esencial de la economía, se comprende que estas solas circunstancias bastan para hacer difícil, y sobre todo permanente, su vuelta al estado normal.

La uretra es un canal virtual que tiene aplicadas sus paredes cuando está en reposo, separándose estas solamente en el momento de dar paso á la orina. Si un instrumento, por muy perfeccionado que se le suponga, divide solamente los tejidos que constituyen la estrechez sin destruirlos, estos al aplicarse de nuevo se ponen en condiciones de cicatrizar, y si por otra parte la función esencial de todo el aparato génito-urinario, la emisión de la orina, sigue haciéndose por ese canal alterado en el que la barrera opuesta al curso de la orina no permite que esta salga completamente hacia afuera sino que una parte por pequeña que sea se quede en la dilatación que hay siempre detras de todo punto estrecho y en el bajo fondo de la vejiga irritando más y más la delicada mucosa que la forra interiormente, y alterando constantemente su estructura, salta á la vista la dificultad que hay para devolver á ese canal su calibre normal.

Hemos supuesto hasta aquí el caso de una sola estrechez y tratada solamente por la uretrotomía interna. Piénsese en el más frecuente, de varias, y fácilmente se comprenderá la mayor dificultad para su curación.

Pero aún suponiendo que no se siga este procedimiento sino el más racional, es decir, la uretrotomía externa, que divide directamente las estrecheces en todo su espesor y deja separados los bordes de la herida hecha con el bisturí, á diferencia del de Maisonneuve, por ejemplo, que como hemos dicho permite la aproximación de esos mismos bordes; si no se procura que los tejidos de nueva formación que constituyen la estrechez, se destruyan de algun modo, esta se reproducirá necesariamente por cuanto á que aquellos permanecen formados de sus mismos elementos y sin cambio ninguno en su estructura.

Esto es tocante á la uretrotomía interna ó externa: en cuanto á la dilatación gradual, es más difícil comprender que sea el procedimiento para curar la afección de que se trata. Separándose tan solo las paredes del canal y los puntos coartados durante un tiempo más o menos largo, los tejidos por su misma elasticidad vuelven sobre sí, dejando intactos los que constituyen la coartación.

Hace más de diez años que he visto seguir á mi maestro, el Profesor Lavista, un procedimiento más racional para curar esta clase de estrechamientos. Ha dado siempre tan buenos resultados, que no solo los innumerables casos del mencionado profesor, sino los que me pertenecen tratados del mismo modo, me animan á presentar esta pequeña memoria, en la que no haré más que describir el procedimiento operatorio y los buenos resultados que él ha dado, apoyado en multitud de observaciones que hemos tenido la buena fortuna de comprobar despues de mucho tiempo de la intervención.

Hay en dichas observaciones algunas tan importantes, que me permitiré detallar brevemente aunque sea una, pues sirve de fundamento al modo de obrar que voy á señalar.

Antes tengo que repetir qué no se trata de estrechamiento único, flojo y reciente de la uretra, en el que el procedimiento de dilatación gradual y progresiva, ó la sección y divulsión por el de Otis, pueden dar y dan á veces buen resultado, nó, yo me ocupo de las estrecheces anulares, múltiples, con cambio completo en la estructura del canal y muy frecuentemente acompañadas de blenorrea; que á veces son tan estrechas que se hacen casi infranqueables, en otras se ha alterado de tal modo la uretra, que se hace verdaderamente fungosa, sangrando al menor contacto; algunas en que siendo casi imposible la desocupación de la vejiga por el obstáculo mecánico que se le opone, se hace infiltración de la orina en distintos puntos, dando lugar á fístulas que hacen del perineo y de la región escrotal una regadera que atormenta al enfermo y le hace buscar un alivio pronto á sufrimientos tan grandes; otras veces, por fin, en que debido tal vez á resistencia especial de los tejidos, que no permite su perforación, al acumularse más y más la orina en su receptáculo, hay verdadera retención de ella con los gravísimos desórdenes que provoca y que es urgente remediar en el acto, porque de lo contrario se compromete de un modo inmediato la vida del enfermo.

Muchos muchísimos de estos casos, que presentan un cuadro tan alarmante, he tenido ocasión de observar, operados con la habilidad que caracteriza al Profesor Lavista, y que han sido salvados de una muerte segura y han recobrado la integridad de su aparato génito-urinario.

Voy pues, á describir el manual operatorio á que he hecho referencia.

Prévia la anestesia clorofórmica, y despues de haber rasurado y desinfectado el perineo, se procede á la desinfección de la uretra por medio del tubo de Lavaux, y si es posible, á la de la vejiga por medio de una sonda y solución de ácido bórico caliente al 4 por ciento. En seguida se practica la uretrotomía interna siguiendo el procedimiento de Otis, y una vez terminada esta, se coloca un cateter en la vejiga y se procede á hacer el ojal perineal, siguiendo en todo las reglas especiales para estas operaciones; se lava perfectamente la herida, la vejiga y la uretra, se hace la hemostasia correspondiente y se coloca una sonda de Nélaton, ordinariamente del número veintiocho que entra por el ojal hasta la vejiga.

A dicha sonda se le han practicado préviamente dos ó tres agujeros á más del natural, con objeto de que no se tape con los coagulos á que dá lugar la necesaria exhalación sanguinea. Se coloca otra sonda del mismo autor número veintidos ó veintitres, en la parte anterior de la uretra, la que entrando por el meato se hace salir por la parte anterior del ojal perineal. Dicha sonda se fija, poniendo un alfiler de seguridad en la parte anterior, á dos ó tres centímetros adelante del meato y otro á igual distancia de la herida perineal. La sonda que vá á la vejiga, se asegura por medio de otro alfiler perpendicular á la herida y en los extremos del cual se hacen pasar unas cintas que cruzándose, se ván á fijar en el vientre del enfermo, acolchonando con algodón ó lienzos ad hoc, los lugares en donde alguna saliente huesosa pudiera molestar al paciente.

Se coloca entre la herida y el alfiler que sujeta el tubo que vá á la vejiga un apósito consistente de ordinario en algodon ó gaza yodoformada, que mantiene desinfectada la herida y evita que moleste el asegurador; y se completa este aparato añadiendo al sifón vesical un tubo largo y lleno que vá á terminar en un orinal que está colocado abajo de la cama y al que se ha puesto una solución desinfectante en donde sumerje la extremidad libre de dicho tubo.

La marcha consecutiva, en lo general, es enteramente feliz: el enfermo entra en descanso, pues con excepción de las primeras veinticuatro ó cuarenta y ocha horas, en que la presencia del tubo vesical le provoca la sensación de un tenesmo incómodo, que desaparece en el mayor número de casos, trascurrido ese tiempo, siente como hemos dicho, un bienestar muy grande.

La orina escurre gota á gota constantemente por ese tubo y por consiguiente tanto la vejiga como el canal uretral entran en reposo. Se puede lavar y desinfectar constantemente el receptáculo urinario y la uretra anterior y profunda, quitando las sondas para colocarlas de nuevo despues de haberlas desinfectado.

En el caso muy frecuente de alteración de la mucosa vesical, se cura directamente esta con las sustancias á propósito y sin dificultad alguna.

La permanencia de la sonda provoca una uretritis aguda que termina por supuración desde el tercero ó cuarto dia y esto, que á primera vista pudiera parecer un inconveniente serio, es precisamente la ventaja del procedimiento puesto que el trabajo supurativo funde los tejidos que constituyen la estrechez.

Una vez que aparece este accidente, se retira la sonda que está colocada en la uretra anterior y se tiene perfectamente aseado todo el canal lavándolo cuantas veces sea necesario con solución bórica al cuatro por ciento ó anilina violada á uno por cuatro mil. Se cuida de pasar diariamente la sonda para conservar la integridad del canal pero sin dejarla yá á permanencia.

Cuando ha terminado el trabajo de supuración que comunmente dura quince dias y que la vejiga ha recobrado sus condiciones normales, se quita la sonda vesical primitiva que, como hemos dicho, es del número veintiocho sustituyéndola por una más delgada, número veintiseis, la que se conversa dos dias para dar tiempo á que avance un poco la cicatrización; despues esta, se cambia por otra del número veinticuatro, conservándola otros dos dias y así sucesivamente hasta llegar al número diez y ocho ó diez y seis, en cuyo momento se quita yá definitivamente, dejando que la orina salga sin sonda. En el mayor número de los casos sucede lo siguiente: La primera emisión de orina que se verifica sin sonda se hace totalmente por el ojal; en las siguientes se divide este liquido, una parte, la más considerable, sale aún por la herida y la otra, la más pequeña, por el meato y así lenta y gradualmente vá aumentando la que escurre por este último punto y disminuyendo la que sale por el primero, hasta que trascurridos tres ó cuatro dias, sale esta completamente por el canal natural, lo que indica que la cicatrización de la uretra ha terminado yá. La de los tejidos blandos del perineo se verifica en seis ú ocho dias más, tardando en total unos veinticinco ó treinta dias desde el momento de verificada la operación.

La descripción anterior se refiere al mayor número de los casos, ofreciendo en muchos una multitud de variantes tanto en la marcha como en la duración.

Algunas veces se presentan accidentes que reclaman indicaciones especiales y que obligan á alterar el programa general: el tenesmo que provoca la presencia del cuerpo extraño colocado dentro de la vejiga es en ciertos casos tan fuerte, que obliga á quitar aquel antes del tiempo necesario para la curación de la vejiga y la fusión de las estrecheces; la hemorragia, rara por cierto en mis observaciones, se ha presentado sinembargo, obligando á quitar todo el aparato, á poner la sonda de camisa de Dupuytren y á hacer el taponamiento consiguiente, para volver á colocar aquel una vez correjido el accidente; la orco-epididimitis consecutiva á la uretritis aguda supurada, complica á veces la operación, ocasionando como es natural grandes molestias al enfermo y obligando á llenar las indicaciones que ella reclama; puede presentarse tambien la fiebre de absorción urinosa con su alarmante cortejo de síntomas; pero en el mayor número de casos se combate facilmente con los medios apropiados.

Repito que no hágo más que relatar el producto de las observaciones seguidas de diez años á la fecha, con los resultados inmediatos y lejanos de la intervención señalada. Los primeros no pueden ser más satisfactorios: el enfermo tratado de este modo siente desde luego un bienestar inmenso, atormentado antes por las grandes molestias que ocasiona esa afección y expuesto al peligro inminente de perder la vida con horribles sufrimientos, siente desde luego el beneficio de la evacuación completa de su vejiga y la reintegración de su importantísimo aparato génito-urinario, asegurando la existencia comprometida antes de un modo tan serio.

Los resultados lejanos de este modo de obrar son tambien muy halagadores, y esto es verdaderamente lo que me ha decidido á escribir estas mal forjadas líneas. Con efecto, hemos tenido la buena fortuna de ver á muchos de los enfermos tratados en el trascurso de estos diez años, y el cuidado de rectificar las condiciones de su canal, el cual se ha conservado en un estado muy satisfactorio. De otros, aún cuando no los hemos visto, sabemos que se conservan en buenas condiciones sin haber tenido necesidad de nueva operación.

Asciende á ochocientos el número de enfermos tratados de este modo en el trascurso de tiempo señalado, pues tanto en el Hospital de San Andrés, como en la casa de salud particular del Dr. Lavista y en su clientela civil es un asunto muy frecuente. Pues bien, de este número de observaciones, lo menos una cuarta parte corresponde á los enfermos examinados despues de cuatro, seis, ocho ó diez años de operados, sin que, como hemos dicho, hayan tenido necesidad de nueva intervención. Ultimamente hemos visto uno de estos, operado el año de 1886, cuya historia paso á relatar en compendio, porque ofreció condiciones muy especiales:

A. V., de 58 años, casado, comerciante, refiere haber sufrido hace más de treinta años varias blenorrágias, comenzando á padecer de estrechamientos de su canal algun tiempo despues. Estos fueron aumentando lenta y gradualmente hasta hacerle casi imposible la emisión de la orina: tuvo retenciones agudas que obligaron á sondearlo y á puncionar su vejiga Se le practicó también la uretrotomía interna consiguiendo alivio algunos meses, pasados los cuales, valvió á su anterior situación. Al solicitar los cuidados del Profesor Lavista tenía este enfermo varias fístulas por donde salía la orina totalmente.

La operación fué muy laboriosa por cuanto á que la uretra formaba un cordon duro inaccesible enteramente al paso de cualquier instrumento. Hubo necesidad de practicarle la uretrotomía externa sin conductor y canalizar la vejiga. Despues con paciencia se fué colocando el conductor del uretrotomo de Maisoneuve dividiendo la porción del canal que se conseguía franquear y avanzando muy poco á poco con él hasta que se logró, despues de muchos dias, llegar á la parte anterior del ojal, es decir, hasta que pareció haberse franqueado toda la uretra anterior.

Una vez hecho esto, se canalizó con sonda de Nélaton número veintidos: todos los dias se quitaban los tubos para desinfectarlos, así como el nuevo canal, y un dia al hacerle la curación no se pudo colocar la sonda anterior, lo que obligo á introducir el dedo meñique en la herida perineal y esta exploración enseñó que una porción de la uretra, como de dos y medio centímetros de extensión, no habia sido seccionada, sino que la continuidad de aquel canal se habia restablecido á expensas de los demas tejidos blandos. Entonces se prolongó hacia adelante el ojal, haciendo una disección cuidadosa hasta alcanzar la parte de la uretra que habia sido respetada antes. Dividida esta, se hizo pasar la sonda desde el meato por este lugar y se fijó como de costumbre, restableciéndose así la continuidad del canal.

Aquella sonda permaneció colocada cuarenta y cinco dias sin dar lugar más que á la supuración abundante del canal, el cual se desinfectaba constantemente sin quitar el tubo sino cada cuatro ó cinco dias, para lo cual se perforó este de bastantes agujeros colocados á dos ó tres centímetros de distancia uno del otro y correspondiendo á sus paredes anterior, posterior y laterales. Dicho agujeros se habian hecho previamente con el termo-cauterio de Paquelin para que quedaran perfectamente regulares. Todos los dias se movia la sonda mencionada al hacer el lavado, para que todos los puntos de aquella uretra tan alterada, se pusieran en contacto con el agua del lavado.

De este modo se consiguió que aquel canal que estaba totalmente obturado, y que aquellos tejidos que habian adquirido una consistencia casi calcarea, se hiciera permeable al paso de la orina fundiéndose los tejidos que constituian aquella multitud de estrecheces, que ya no formaban sino una sola, en una extensión de canal muy considerable.

Este enfermo obedeciendo á la indicación que se le hizo, se sondea de cuando en cuando, conservando hasta la actualidad un canal bastante para desempeñar sin molestia sus funciones naturales.

Dos ó tres casos más, análogos al anterior se registran en nuestras observaciones con el mismo buen resultado inmediato y tardío, y otros muchísimos que sin haber llegado á ese grado tan avanzado de estrechamiento de su canal, hasta hacerlo como se ha visto, casi impermeable al paso de la orina, presentaban sinembargo alteraciones de la uretra y consecutivamente de la vejiga.

La inmensa mayoría han obtenido el beneficio de la curación de su blenorrea que, como es bien sabido, es rebelde á todos los tratamientos hasta hoy aconsejados para curarla. Una de las sustancias que en nuestras observaciones parece haber contribuido á este buen resultado, es la anilina violada, que se ha usado amplísimamente en solución á uno por cuatro mil para hacer el lavado de la uretra y de la vejiga. Con ella hemos visto modificarse la secreción muco-purulenta y agotarse muchas veces los escurrimientos crónicos de la uretra.

Termino ya pidiéndoos vuestra indulgencia para esta incorrecta memoria, dándoos las gracias por vuestra benévola atención y deduciendo de las anteriores reflexiones las conclusiones siguientes:

Primera. Los estrechamientos múltiples blenorrágicos de la uretra constituyen una afección muy frecuente y de una duración muy larga.

Segunda. Comprometen sériamente la integridad del aparato génito-urinario y consecutivamente la vida del enfermo.

Tercera. Los diversos medios aconsejados para su curación son paliativos pues exponen á la reproducción del accidente.

Cuarta. El procedimiento que parece dar mejores resultados es la uretrotomía doble con canalización vésico-uretral.

¿CUAL ES EL MEJOR TRATAMIENTO DE LOS ABSCESOS DEL HÍGADO?

Por el Dr. SALVADOR GARCÍA LUGO, México.

Chassaignac inventando sus trócares y el eminente clínico, Jimenez, sirviéndose de ellos para la punción y canalización de estos abscesos nos enseñaron un método verdaderamente quirúrgico para su tratamiento.

Los resultados prácticos no se hicieron esperar largo tiempo, y la observación clínica y los datos estadísticos demostraron palmariamente la superioridad de este método curativo respecto del preconizado por Récamier.

El Dr. Jimenez, de México, con la perspicacia de su talento clínico, se cercioró y pudo asegurarnos que la canalización ordinaria no permitía la introducción del aire á la cavidad del foco, en virtud de las disposiciones anatómicas que relacionan íntimamente al hígado con la cara inferior del diafragma y la interna del hipocondrio derecho.

Una vez probada, la excelencia del método y los felices resultados de su aplicación aparecieron procedimientos que lo mejoraron progresivamente.

El Dr. Clément propuso la canalización doble del absceso por medio de dos tubos colocados en distintos puntos de un espacio intercostal ó en diferentes espacios. Teóricamente era aceptable su indicación y solo faltaba la sanción de la práctica. Si podia objetarse que el sufrimiento sería mayor, siempre que no se usara la anéstesia, la gran facilidad con que se practicaría el lavado del foco, y se daría curso al pus disponiendo de dos vias, contestaban la objeción.

Guérin recomendaba la curación serrada y la punción subcutanea para impedir la entrada del aire á las cavidades purulentas, cuando Dieulafoy proporcionó á la cirugía el recurso de la aspiración. Morton en Londres y Clément en Guadalajara cauterizaban las superficies sangrientas y las cavidades supurantes con soluciones concentradas de cloruro de zinc, para sustraerlas del contacto del aire, secundando las miras de Guérin, aunque con diverso procedimiento y á la vez utilizando los buenos efectos de la detersión. Potain mejoró la aspiración con la invención de su aparato y Lister dió á conocer los sorprendentos resultados de su curación.

En nuestro país so hacian esfuerzos en igual sentido: El Dr. Benitez comenzó en Guadalajara á cauterizar los focos hepáticos después de evacuada su colección con soluciones concentradas de iodo y ácido fénico obteniendo la cicatrización de las paredes del absceso con punciones hechas con el aspirador de Potain antes de canalizarlo; y cuando no alcanzaba tan felíz éxito la canalizaba; mas cerrando la extremidad libre del tubo de desagüe, y lavando las cavidades con dichas soluciones, procurando dejar en ellas una cantidad que sin extender demasiado sus paredes las modificaran ventajosamente. Después imaginó un aparato de aspiración neumática continua que puesto en comunicación con el foco por medio de un tubo elástico largo, ajustado al de canalización, aspira el pus á medida que se forma.

Es inútil ponderar las notorias ventajas de estos procedimientos porque son palpables y la experiencia ha fallado ya en pro de ellas.

La Escuela de Guadalajara se sentia satisfecha con estos adelantos, creyendo salvar á la mayor parte de las víctimas de mal tan grave y frecuente entre nosotros; mas se han presentado algunos casos en que á pesar de un tratamiento tan seguro como científico y de la mayor escrupulosidad en su aplicación, el término ha sido desgraciado.

En los casos de este género la observación clínica y las lecciones de las autopsias nos enseñan que siempre que existen focos múltiples en el hígado, colocados á distintas alturas y comunicando entre sí por trayectos largos y sinuosos fracazaran estos tratamientos, porque el pus contenido en los focos más distantes del sitio en que se encuentra el canalizado no puede ser aspirado, porque al hacerse el vacio en los trayectos oblicuos que establecen la comunicación entre ellos, la presión combinada del paquete intestinal y del aire que existe en los pulmones la cierra adosando sus paredes irregulares y anfractuosas, por carecer el tejido glandular de estroma resistente y además estar dilacerado al nivel de dichos trayectos y convertido en una masa pulposa, blanda y que cede facilmente á la presión. Mientras más fuerte sea la aspiración, la tendencia al vacio lejos de protejer la salida del pus, favorece la yustaposición de las paredes del trayecto; siendo estériles el empeño y habilidad del cirujano para obtener un lavado completo de todas las cavidades existentes en la viscera; y aconteciendo á menudo, que después de haber extraido cierta cantidad de pus, de haber inyectado soluciones antisépticas y haberlas aspirado sin mezcla de supuración ni de detritus, continuando el lavado y variando la posición del enfermo ó sin hacerlo, sustrae la jeringa aspiradora una nueva porción de pus hepático ó flegmonoso.

Por regla general los enfermos que presentan esta clase de abscesos terminan agotados ó por septicemia, siendo impotente el tratamiento descrito para salvarlos.

La doble canalización proporciona la inmensa ventaja de hacer circular las inyecciones en el interior de los focos con mayor facilidad, supuesto que son empujadas y que la fuerza empleada para verificarlo hace caminar los líquidos por los trayectos penetrando en ellos y separando necesariamente sus paredes, que son obligadas á entreabrirse permitiendo el acceso de las soluciones antisépticas hasta las cavidades más distantes, y por lo mismo, haciendo posible su aseo más completo. Además, puede variarse la dirección de la corriente inyectando alternativamente por uno ú otro tubo, sobre todo, cuando alguno de ellos es obturado por los grumos y detritus que existen en los focos para arrastrarlos hacia fuera en lugar de aspirarlos, que no siempre es posible; echar mano de la aspiración permanente ó interrumpida cerrando el orificio libre de alguno de los tubos con un taponcito ó con una llave; servirse de la irrigación continua ó periódica, lavando los focos como se acostumbra hacer con las pleuras con líquidos antisépticos y variando la altura del recipiente para graduar la fuerza de impulso, etc., ventajas que en un concepto legitiman la superioridad de este método para el tratamiento de los abscesos hepáticos, y principalmente si estos son múltiples y ofrecen las condiciones anatómicas indicadas.

Cuando son abundantes los grumos y detritus en los abscesos y se aplica la aspiración permanente, suele obstruirse el tubo de desagüe con alguno de ellos, y hay necesidad de limpiarlos y desobstruirlos varias veces al dia si se quieren utilizar los buenos efectos de este método; lo cual obliga á maniobras repetidas que deben ser hechas siempre por manos hábiles.

La práctica recomendada en Paris de abrir ampliamente los abscesos del hígado, incindiendo un espacio intercostal y si fuere necesario resecando una porción de costilla para evacuar la colección purulenta, lavar la cavidad y curarla como absceso expuesto con la curación de Lister, debe impedir indudablemente el extancamiento del pus y evitar su descomposición; mas siendo un traumatismo mayor y careciendo yo de experiencia personal acerca de este método, y por otra parte, juzcando indispensable y de gran utilidad para la cirugía americana, que los sabios y distinguidos médicos, reunidos en esta Asamblea, emitan su opinión autorizada y competente supuesta la frecuencia de la hepatitis supurada en nuestro país, me permitiré someter á su deliberación la importante resolución de cual sea el mejor tratamiento de los abscesos hepáticos, sirviéndose señalar las reglas generales de su aplicación; y cual debe emplearse siempre que exista seguridad de que son sépticos y producidos por la migración del pus de las ulceraciones intestinales efectuada por el sistema porta.

Espero de la ilustración de los miembros de este Congreso la resolución de asunto tan vital y que entraña el renombre de nuestros eminentes cirujanos la gloria de nuestras escuelas, y sobre todo, la salvación de las víctimas de esta terrible y común enfermedad.

SONDAS Y BUJÍAS GUÍAS.

Por el Dr. ALBERTO CASTAÑO, Buenos Aires, Argentina.

Entre los instrumentos con que cuenta el médico para el tratamiento de las estrecheces uretrales, se nota en la mayor parte de ellos defectos y deficiencias que son en la práctica fundamentales; me refiero solamente al método de la dilatación gradual que es, puede decirse el tratamiento clásico.

Tratándose de las estrecheces en las cuales la luz de la uretra no dá paso sino á pequeñas gotas de orina, es donde se encuentran las más serias dificultades.

Entre los instrumentos de que podemos disponer, tenemos las bujías Béniqué Guyon que se encuentran tan generalizadas y son de las que voy á hablar con más detención por ser su uso tan comun en todas partes del mundo.

Un simple análisis bastará para hacer resaltar los inconvenientes que tienen.

Tenemos en primer lugar una bujía metálica articulada á una fina guia de goma por unas vueltas de tornillo.

La parte metálica de la bujía no guarda proporción con la guia; hay una diferencia tan notable, que á la simple vista resalta, de manera que colocada la guia en una estrechez filiforme, que la clasificaremos con el número 1, articulamos la bujía cuyo número menor corresponde al número 12 de la escala Charrier, y forzando el instrumento pasamos la estrechez.

Tendremos pues una verdadera dirección, un desgarramiento de la mucosa uretral en el punto estrechado, y por consiguiente una dilatación brusca que no será sino el método antiguo, modificado por instrumentos más perfeccionados.

La guia que se articula á la bujía es, á mi modo de ver, el defecto principal y que por si solo basta para desechar de la práctica esta clase de instrumentos.

Cuatro son las vueltas de tornillo que hay quedar para su articulación, y que al menor descuido tanto del médico como del fabricante, hace que este t rnillo ceda y se desprenda la guia quedándose en la vejiga.

En tercer lugar, la parte metálica de la bujía es otro de sus defectos. El maestro Thomson, de reputación universal, al hacer la descripción de estos instrumentos, les llama la escuela mecánica y en su juicio crítico dice: Que el instrumento en la uretra, aún cuando no exista ninguna afección, es una causa de irritación más ó ménos considerable, proporcionada á la rigidez y al volumen del cuerpo extraño así como á la manera de proceder. En el estudio comparativo entre las sondas rígidas y flexibles establece una diferencia notable entre unas y otras y con esa esperiencia y persuación que solo es permitida á los hombres de ciencia que se han encanecido, en la lucha diaria y el trabajo constante con el enfermo, desecha de un modo absoluto el instrumento rígido y le dá gran superioridad al flexible y termina diciendo: "Adoptad el instrumento flexible, que los sucesos en la práctica serán bien compensados."

No me detengo en el análisis de las otras clases de bujías y sondas, porque no son como para dominar una estrechez al principio del tratamiento, pudiendo simplemente emplearse para continuar la curación una vez que la luz de la uretra lo permita.

He usado durante muchos años las bujías Béniqué Guyon, tanto en mi clínica del hospital como en la práctica civil, reconociéndoles todos los inconvenientes que dejo señaladas. Habia leido tanto en libros como en revistas varios casos en que las guias se habian que dado en la vejiga á médicos distinguidos, habiendo yo mismo observado varios casos de sucesos semejantes y he podido reunir quince historias de casos desgraciados.

Apesar de todo continuaba en mi práctica diaria empleándolas por no poder disponer de otras clases de instrumentos hasta que un dia se me quedó una guia operando á un distinguido jóven al que no fué posible extraérsela por todos los medios conocidos apesar de los distinguidos cirujanos que intervinieron; fué necesario practicar la talla.

Entonces me propuse hacer los instrumentos que presento á la consideración de ese honorable Congreso, que si no llenan por completo un vacio en el arsenal quirúrgico, están por lo ménos exentos de los graves inconvenientes que dejo señalados en todos los de su clase.

CONCLUSIÓN.

Las bujías, como las sondas, son flexibles; los primeros números son filiformes en sus tres cuartas partes, aumentando su diámetro insensiblemente á medida que se aleja de su punta; tienen cada una cuatro diámetros más ó ménos, de manera que al pasar la fina guia por una estrechez vá dilatando insensiblemente, obteniéndose por lo tanto con una sola bujía una dilatación que corresponde á cuatro números de Charnier.

La longitud es de 54 centímetros, igual á las de Béniqué Guyon articuladas.

La curación es rápida, no existiendo ningun peligro en su empleo.

La colección la componen 12 números. Adjunto á esta pequeña memoria dos colecciones de instrumentos, bujías y sondas, para que esa honorable corporación con su sano criterio dé el fallo que le corresponda.

REPORT OF FOUR CASES OF BRAIN SURGERY.

By ANDREW J. McCOSH, of New York,
Visiting Surgeon to Presbyterian Hospital, Professor of Surgery in the Polyclinic.

The localization of cerebral functions has, in recent years, become so accurate that it was naturally thought much progress would be at once made in the surgical treatment of epilepsy. This anticipation has, however, not been realized; indeed the treatment of this disease by operative measures is attended by results, as far as cure is concerned, but little better than those which were obtained a score or more of years ago. It must be confessed that the great advances made in cerebral localization have thrown but little light upon the nature and treatment of epilepsy. While it is true that certain cases of Jacksonian epilepsy have been permanently cured by operation, yet we must acknowledge that operations for the cure of true idiopathic epilepsy have been discouraging.

Experimentation on animals has thrown but little light upon this subject, and it is probable that most of our accurate knowledge must be derived from the observations of the pathologist and the surgeon. On this account it is important that all cases which are related directly or indirectly with this subject should be reported. At the time of their report, individual cases, which, while interesting, may not afford suggestions for the formation of general rules for diagnosis and treatment, will eventually, by comparison with similar cases, lead to inductions which will be of the greatest value.

Each one of the following cases contain some point of special interest:

Case 1. Extra dural hemorrhage; convulsions; operation; recovery.—Male, age 18. On July 29, 1889, patient was found lying on the bottom of a trench in a semicomatose condition. He had been in good health up to the previous night when, it was supposed that while under the influence of liquor, he had fallen into the trench, which was 6 feet deep. The accident must have occurred after midnight, and he was brought to the Presbyterian Hospital at 8 a. m. On his admission he was very stupid, but could be aroused so that he gave his name but not his address. Temperature, 100; pulse, 76. The scalp was contused in the occipital region, but there was no sign of fracture or hæmatoma. The pupils were symmetrical, and there was no paralysis. For twenty-four hours the patient showed the general symptoms of cerebral irritation (laceration), lying on his side, with his thighs drawn up, in a half stupid state; he could be aroused by an effort, and would utter a peevish, irritable cry, jerk his arms, roll over on the opposite side, and lapse again into slumber. He refused all nourishment. His urine was drawn by catheter. At the end of twenty-four hours he became brighter, began to look about him, and drank his milk. By the fourth day there was marked improvement; he talked intelligently and asked questions, but his memory was deficient. By the eighth day (August 5) he seemed almost natural, except for slight restlessness and occasional lapse of memory. His eyes were normal, and there was no paralysis. On the evening of this day slight twitching of the right foot and leg was noticed. On the ninth day this twitching was more noticeable, and in the evening it had extended to the right hand. There appeared to be no paralysis. During the night he had an epileptic convulsion, beginning in the right foot and becoming general, followed by stupidity lasting half an hour. On the morning of the tenth day (August 7) another very short convulsion occurred. I decided in the afternoon to operate, and to expose the lower and posterior part of the motor area of the left side, as the symptoms indicated pressure at this point.

The diagnosis was pressure by a blood clot. On shaving the head no contusion or laceration of the scalp was found. By dissecting up a semicircular scalpflap the bone was exposed over the fissure of Rolando. There was no evidence of fracture or injury of the skull. With a three-quarter inch trephine a button of bone was removed from over the center of the fissure of Rolando. Immediately underneath, a blood clot was found extending downwards and backwards. The opening in the skull was enlarged in this direction, following the clot until an opening 2 by 2½ inches was made. The clot was then removed in two or three pieces. It was oval in shape, three-quarters of an inch thick at the center and thinning out towards the edges.

The surface of the dura mater under the clot was roughened, but was not lacerated or apparently injured in any way. It was not opened. A director was swept around between the skull and dura, but no additional clot or sign of fracture could be discovered. The bone was not replaced. The scalp-flap was replaced and sutured.

The patient was returned to his bed at 4 p. m., and rapidly recovered from the anæsthesia. At 7 p. m. there was a slight convulsion, limited to the right leg and hand. No farther manifestation of cerebral irritation showed itself, and the patient made a rapid and uneventful convalescence. He has been perfectly well ever since, earns his living as a bricklayer, and does not hesitate to go on an occasional spree.

Case 2. Extra-dural hemorrhage; convulsions and paralysis; trephining; recovery.— Boy, age 6. On August 11, 1890, the patient fell down stairs and was supposed to have struck his head. He was unconscious when picked up, and remained partially unconscious until admitted to the Presbyterian Hospital, twenty hours later. For forty-eight hours after admission he lay quietly on his right side, with thighs and arms flexed, and was apparently unconscious, unless when disturbed, when he became irritable and restless, uttering sharp peevish cries and pushing away his nourishment. Temperature ranged between 100° and 102°, pulse 110 to 120. Pupils were equal and reacted. There was no sign of paralysis. The scalp was contused over the right temporal region. On the fourth day he became brighter, was less irritable, answered questions in a semirational manner, and drank his milk when ordered to do so.

On August 17, the sixth day from the date of the injury, his general mental condition was very much improved; he talked intelligently, asked for food, and seemed quite happy. It was noticed, however, that sensation in the left arm and leg did not seem so acute as on the other side; there was no impairment of motion. On the next day (seventh), in the morning, he had a distinct convulsion, limited to the left upper extremity, lasting one minute and followed by an apathetic state for half an hour. In the afternoon there was another convulsion, beginning in the left side of face and forearm and then involving the entire left upper extremity. Sensation markedly diminished in the left arm and leg. The left upper and lower extremities towards evening were completely paralysed. There was left-sided facial paralysis. During the night two similar convulsions occurred. On August 19 (eighth day) two convulsions, beginning in the left hand and foot and involving the left upper and lower extremity and left side of face. The boy's mental condition remained bright. No disturbance of sight, taste, or smell could be discovered. The eyes were normal. Complete paralysis of left upper and lower extremity persisted. Temperature 100°, pulse 90.

The diagnosis was made of blood-clot pressure on the motor area for left arm, leg, and face, and after consultation with Dr. W. G. Thompson immediate operation was decided on. The contused scalp had recovered, and there was no external sign of injury. After anæsthetization a semilunar scalp flap was dissected free and the skull exposed over the fissure of Rolando. The bone was bared over a space $2\frac{1}{2}$ by 3 inches, but no sign of injury found. With a three-quarter inch trephine a button of bone was removed at a point over the fissure of Rolando $2\frac{1}{2}$ inches from the median line. On removal of the button, in the anterior half of the circle the dura appeared normal, but in the posterior inferior quadrant it was concealed by a blood clot. The clot extended downwards and backwards, and the opening in the skull was enlarged by Rongeur forceps in this direction until it measured $2\frac{1}{2}$ inches in the antero-posterior direction, and 2 inches from above downwards. It was then seen that a fissure of the skull ran into the posterior part of the opening. On enlarging the scalp flap it was seen that this fissure ran from above downwards and slightly forwards, and at its upper extremity was joined by another fissure running from above downwards and backwards. The portion of bone between the two fissures was triangular in shape, the apex $1\frac{1}{2}$ inches from the median line. This triangle of bone attached at the base was $1\frac{1}{2}$ inches long and was cut away. Under it was brain tissue deprived of the dura and somewhat lacerated. The rent in the dura was $1\frac{1}{2}$ inches long, and the edges having receded, left bare an area of brain corresponding with the triangle of bone removed.

The clot, which in the meantime had been removed, was oval in shape, $2\frac{1}{2}$ by 3 inches, and about one-half inch thick at its center. The cavity was irrigated with boro-salicylic solution, the scalp flap returned and sutured except at the lower posterior angle, where a rubber drain was inserted. No attempt was made to suture the rent in the dura, as it was found impossible to approximate the edges, and the brain tissue at this point appeared to be superficially disintegrated.

The patient recovered quickly from the anæsthetic, and in his struggles he moved decidedly, though feebly, the left hand and forearm which had been absolutely paralyzed before the operation, and which had lain limp and motionless when he was fighting vigorously with his right hand and arm while inhaling the ether. This ability to move the left arm remained only for a short time, and then for the next twelve hours the paralysis appeared as complete as before the operation. He remained, however, bright mentally, and there were no convulsions; indeed after the operation not a single convulsive movement occurred.

At the end of twenty-four hours he could move his left arm with distinct force, and very feebly his left foot. Sensation remained sluggish. On the fourth day after operation there was a marked improvement in his muscular power. There was a discharge of broken down brain tissue through the tube, and apparently a tendency to hernia cerebri. On August 26th (seventh day) this had ceased, and the paralysis of sensation and motion had almost disappeared. At the end of two weeks the boy was out of bed, without sign of paralysis. He has been in good health ever since, has attended school, is bright at his lessons and entirely free from pain, convulsive movements, or paralysis of either sensation or motion.

Case 3. Trephining; drainage of lateral ventricle; recovery.—Male, age 29, florist, gives a history of occasional attacks of unconsciousness ever since he was 12 years of age. He describes them as beginning with a sudden pain in the cardial region, followed by tumultuous beating of his heart, and ending in syncope or unconsciousness, which lasted for a few seconds and left him weak and exhausted. Convulsive movements had never been noticed. These attacks were very infrequent, sometimes two or three years intervening between them. The patient had always been of a nervous and excitable temperament, and, from the history, it was doubtful if the attacks were true epilepsy. His general health had been fairly good up to the time of an accident, which occurred on October 29, 1892. On that day while carrying a stove down stairs he was pushed from behind and precipitated to the foot of the stairs. He was stunned for a minute or so, but did not lose consciousness. A short time afterwards, on account of the hemorrhage from a scalp wound, he was brought to the Presbyterian Hospital.

On admission (October 29, 1892) two scalp wounds were found in the occipital region, each about 2 inches long. There was an extravasation of blood in the left eye and hemorrhage from the left ear. He was unable to raise his left arm. For the next few days he was very stupid. He would answer questions, but, unless aroused, he took no notice of his surroundings. His temperature ranged between 99½° and 100½°. The paralysis of the left arm gradually disappeared, and mentally he became brighter, though complaining of severe headache.

By November 10 the paralysis had entirely disappeared, and, though somewhat stupid and dazed, he was allowed to sit up. While sitting at the side of the bed in a chair he had a general convulsion, lasting ten minutes, followed by an apathetic condition for a couple of hours afterwards, and by slight anæsthesia of the left arm. For the following two weeks he complained of headache and dizziness, but his mental state gradually improved. He had no further convulsive movements until December 3, when a general convulsion occurred, lasting two minutes. It was followed by complete anæsthesia of his left arm and leg, and hyperæsthesia of the right side, and marked tenderness of the cicatrix in the occipital region. The reflexes on the left side were absent and on the right side exaggerated, where there was also marked ankle clonus. On the following day these symptoms still persisted, and, in addition, partial loss of power of his left hand was noticed, and extreme sensitiveness of his right eye to light. Gradual improvement took place, and in forty-eight hours more these signs had entirely disappeared. He was still, however, stupid and at times excitable, but on December 7 he felt well enough to leave the hospital, though strongly urged not to do so. He remained at home for nearly a month, during which time he had two convulsions. Immediately after his second convulsion (January 4, 1893) he was brought into the medical side of the hospital in an extremely excitable and yet somewhat dazed condition. Temperature 101°, pulse 100.

On January 5, a general convulsion lasting six minutes; January 11, a general convulsion; January 17, a general convulsion; January 18, two general convulsions. From the 17th to the 25th a general convulsion occurred every morning, and often a second one at night. The convulsions lasted three to ten minutes and were very violent. There was no regularity in the muscles which were first affected. His mental state continued to grow worse. His memory was entirely lost; at times he lay in a stupid, almost semicomatose state, and at times was excited and delirious. He complained of pain in the back of his head, and the slightest pressure on the occipital cicatrix caused him to cry out with pain. His temperature ranged between 99° and 100½°, pulse between 85 and 100. After January 25 he became steadily worse; the convulsions became more frequent, averaging five in the twenty-four hours; his stupor increased and he became quite irrational, sometimes for an hour or so remaining in a state of semicoma, and then again becoming very restless and noisy.

On January 28 Dr. A. H. Smith, the attending physician, felt that unless relief could be derived from operation he could not live more than a week or two, and on the next day he was transferred to my service on the surgical side. In the meantime he had been examined by a number of neurologists and surgeons, and most of their diagnoses inclined toward syphilitic gumma or general paresis. Operative interference was, in the opinion of all of them, contraindicated. Dr. Smith, however, sent him to me, in the hope that he might be benefited. He remained under observation for three days more, during which time his symptoms remained very much the same, with the exception that his temperature ranged between 100° and 101° and his pulse increased in frequency (110). He was at no time rational, lying for part of the time in a semicomatose state, and then again he became excited and delirious, imagining himself persecuted, and making violent efforts to get out of bed. He was very hyperæsthetic over his whole body, but especially so on the back of his head, and most markedly at the seat of the cicatrix in the right occipital region. His eyes were normal. His tendon reflexes were greatly exaggerated.

As he was daily losing ground both physically and mentally, I decided, on January 31, to do an exploratory trephining. He was anæsthetized with chloroform, and a semicircular scalp flap was raised, the cicatrix being in the center. This cicatrix, which was situated just above the middle of the superior curved line of the right side, was found adherent to the bone. On exposing the bone, a roughening and what seemed to be a stellate cicatrix was found. At this point, which was just above the lateral sinus, with a 1-inch trephine a button of bone was removed. The inner surface of the button was roughened, but the elevations were not more than one-tenth of an inch, and certainly could have produced no depression of either the dura mater or brain. The dura was found thickened and roughened over an area three-quarters of an inch square, being perhaps twice its normal thickness. By rougeur forceps the opening was enlarged mainly upwards and inwards. A flap of dura was raised. No evidences of clot were found and the pia mater looked normal. There was evidently, however, a great amount of intracranial pressure. The brain bulged out through the opening in the skull as if there was not room for it inside the cranium. The cerebral tissue covered by pia mater projected through the opening in the skull half an inch beyond the external surface of the bone. Even after sitting the patient bolt upright this bulging was still very noticeable.

This extreme intracranial pressure was naturally supposed to be due to pressure of fluid, as no tumor or hardness could be felt on palpation of the brain substance, which, though congested, did not appear unnatural. A hypodermic needle was thrust into the brain in three directions, but no pus or other fluid was obtained. It was then decided to tap the lateral ventricle, and for this purpose a long hypodermic needle was passed into the right lateral ventricle, and about an ounce of thin, straw-colored fluid removed. The needle of the aspirating syringe was then withdrawn and a trochar and canula, made of aluminum, thrust into the ventricle, and the canula left for permanent drainage. About thirty minutes more were consumed before the final dressings were applied, and during this time the fluid continued to issue from the canula at the rate of a drop every four or five seconds. It was estimated that nearly an ounce escaped in this manner. The canula was carried out through an opening in the middle of the flaps of dura and scalp, which were each returned and sutured. The patient recovered slowly from the operation, and for the following twenty-four hours was stupid and somewhat restless. In the second twenty-four hours he was brighter, though still restless and irritable. At the end of forty-eight hours the canula, which had been so arranged by fixation to pads of gauze that it could not slip farther out or farther in, was removed. From the amount of moisture on the pad, which absorbed all the ventricle fluid, it was estimated that between 1 and 2 ounces had escaped. This estimate, however, is unreliable, and a much greater amount may have escaped.

After the third day (February 3) the patient improved rapidly. There had been no signs of convulsive movements since the operation, and he remained entirely free from even twitching of the muscles during his convalescence. At the end of a week he was quite bright and cheerful, talked intelligently, asked for food, was entirely free from delirium or delusions, and had perfect control of himself. The reflexes seemed to have returned to their normal state, the hyperæsthesia had disappeared, there was no sign of paralysis, and he was able to read his bedside notes. His eyes were examined and found normal. His memory was still defective, and he complained of occasional headache. At the end of two weeks the patient was out of bed, bright and cheerful. At the end of a month (March 1) he was apparently perfectly well, and made himself very useful in the work of the ward. His memory of events during the past year was defective, but otherwise he seemed well. On one or two occasions after excitement he complained of headache, but otherwise had no pain. On March 24, after an exciting interview with some of his friends, he had some twitching of the muscles of the face and hands, but no distinct convulsion. On March 28 he went out on a pass and was brought back by ambulance in a very stupid state, evidently caused by alcohol. On April 3 he left the hospital, commenced drinking, and in the evening was carried to another hospital in a condition of semicoma.

Alcoholic intoxication was, however, evidently the cause of his mental state, as, a day later, he resumed work. He has reported to me within a week, seven months after operation. He has been at work for the past five months, and has not missed a single day. His health is perfect, he looks bright and happy, and his employers report that he is intelligent and trustworthy, and that his memory is good. He has no headache and no tenderness of the cicatrix. He has been intoxicated more than once without bad consequences. Indeed, up to the present time he is perfectly cured, and there seems to be every prospect that the cure will be permanent.

There can be no doubt but that the operation saved this patient. It is difficult to name the disease or lesions which caused his grave symptoms. It is probable, I think, that the cicatrix in the dura was the cause of the accumulation of intracranial fluid. In many ways his symptoms resemble those of the disease which has been described under the name of meningitis serosa.

Case 4. Subdural (organized) clot: epilepsy; trephining.—Female, age 6½ years, was kindly referred to me by Dr. M. A. Starr. The family history is good, with the exception of the maternal grandmother, who was an epileptic. The mother reports that the child's health has been good, with the exception of the fits. She states that at the age of 1½ years the child had a series of convulsions, coming on suddenly without apparent cause and lasting several hours. As a result there was a partial paralysis of the right arm and leg which persisted for several weeks and then disappeared. The next convulsion occurred at the age of 4 years, and one fit followed another for two or three hours, and resulted in a weakness of the right hand which lasted for a few days only. During the next six months she was perfectly well. At 4½ there was another convulsion without resulting paralysis, and at 5 years another severe convulsion, since which time she has remained partially paralyzed in her right arm and leg. For nearly a year no further convulsions occurred, though the paresis remained.

For six months previous to her entrance into the hospital (since September, 1892) she has had what the mother calls "spasms," in which the head turned always to the right, and convulsive twitching of the right hand and occasionally of the right foot followed. For the first four months when she was without treatment these averaged ten in the twenty-four hours; since treatment has been carried out the average number has been four or five.

On examination there was marked atrophy of the muscles of the right arm and forearm. She had very little use of the right upper extremity, especially of the hand. At times there was marked rigidity of the muscles of the hand and forearm, the fingers and thumb being flexed and tightly clinched in the palm. The circulation of the hand was impaired. Occasionally she could hold a large object in her right hand, but as a rule she was unable to take hold of any article. At times athetoid movements were present. There was slight atrophy of the muscles of the right leg and foot, and a distinct dropping of the toes (hemiplegiac gait). Mentally the child is bright, though very bashful; her eyes normal and general nourishment good.

Dr. Starr had made the diagnosis of pressure on the motor area for the right arm and leg, and sent her to me for operation. He advised an opening to be made over the arm center, and accordingly, after reflection of a scalp flap with a 1-inch trephine, a button of bone was removed over the fissure of Rolando about 1½ to 2 inches to the left of the median line. On removal of the bone the dura was found to have been adherent to its under surface. By rongeur forceps the opening in the skull was enlarged downwards and forwards to double its original size. The dura seemed to pulsate less vigorously than usual. It was incised along the upper border of the opening and a flap turned downwards. As the dura was reflected its under surface was seen to be rougher than normal, and lying on top of the pia mater was seen a translucent reddish membrane. This membrane, which was about the thickness of a sheet of note paper, covered the area of brain exposed, and extended beyond. It was lifted up and removed, but there remained a border which extended beyond the opening in the skull for about three-quarters of an inch, except at its lower part. This was afterwards removed by a small spoon from under the dura, the patient's head being elevated. So-called oedema of the pia was marked, this membrane being lifted off the brain by a layer of fluid nearly one-half inch deep. The pia was incised between the veins in two or three places, and several drachms of fluid oozed out. As the fluid poured out it was seen that this part of the brain was depressed, as if the convolutions at this point were atrophied. The brain, on palpation, appeared normal, and there was no justification for further exploration. The flap of dura was replaced and sutured, as was also the scalp flap. The bone was not returned.

The child recovered quickly from the operation and showed very little shock. For three weeks following there was no special change for the worse or the better. The convulsions continued as before, as did the paralysis. It is now five months since the operation. The child has gained considerably in weight and appears brighter, but the convulsions have not been modified by the operation; they occur as frequently and their character is the same. An improvement, however, has taken place in the paralyzed muscles; the child walks without a limp, and she can now easily grasp objects with her paralyzed hand. The muscles are still weak and lack proper coordination, but there is undoubtedly an improvement. I should consider the prognosis bad as far as the convulsions are concerned, but I should expect a farther improvement of the paralysis. The membrane removed was undoubtedly an organized blood clot and the most probable cause of the hemorrhage was a pachymeningitis hemorrhagica.

Within the last three months I have trephined three other patients for epilepsy. All have recovered from the operation, but it is as yet too soon to report on the results. The mere removal of a button of bone from the skull seems to improve nearly all epileptics for a few months, and it is rather misleading to report on the condition of these patients before sufficient time has elapsed for the disappearance of the amelioration which may be attributed to the operation *per se*.

CARBUNCLE: ITS ETIOLOGY, PATHOLOGY, AND TREATMENT.

By D. W. Graham, M. D., Chicago, Ill.

Carbuncle was formerly looked upon as a peculiar mysterious disease, having a pathological process of its own with little or no relationship to any other disease either in its etiology, its pathology, or its indications for treatment.

The teaching and the practice of the present day indicate that we are still in bondage to the traditions of the older pathology to some extent in this respect, this being one of the more common diseases which have received scant attention on account of the allurements of visceral surgery and the rewards of work and study in the newer fields.

A conviction that there are established facts and available knowledge respecting this disease which are not fully reflected in the views and the practice of to-day is sufficient justification for an effort to ascertain and correlate what is known of the cause, nature, and treatment of carbuncle.

The observation has often been made, and should be reiterated, that the names anthrax and malignant pustule should no longer be used interchangeably with carbuncle. To avoid confusion the latter term should be reserved exclusively to designate the disease under consideration, while the former should be applied only to that disease of the lower animals which is contagious, sometimes communicated to man, and is caused by the anthrax bacillus.

Etiology.—Carbuncle is a disease of microbic origin, like all of its class. This has been demonstrated by the researches of Gawé, Bockhart, Baum, and others.

The micro-organism most frequently found is the staphylococcus aureus. In the minority of cases there are present also the staphylococcus albus or the streptococcus pyogenes or the two together with the former, but always outnumbered by it. The coccus may enter the skin through the hair follicles, the sebaceous gland ducts, the sweat glands, or an abrasion of the epidermis. It is easy to argue on the grounds of analogy that the organism may enter also through the alimentary canal or the respiratory tract. We are nowhere more in bondage to the traditions of the elders than in the belief that this disease is of constitutional origin. The notion that it is a disease of the cachectic, the alcoholic, the tubercular, and the diabetic was easily believed and necessarily prominent before local causes were demonstrated. The most that can be rightly claimed for the constitutional factor is that it increases the vulnerability of the tissues and predisposes to acute suppurations in general rather than to carbuncle in particular. Even the diabetic, so prominently associated with carbuncle, does not often have the disease.

The writer believes, with others, that the systemic vices are greatly overrated as etiological factors, and, though no statistics are at hand to prove it, it is even believed that the disease is not found more often, relatively, in the cachectic classes than in those of good health. The association of these constitutional conditions with carbuncle in a causative relation is probably partly accounted for by the fact that statistics used by writers and teachers have been collected more from the older large public hospitals and almshouses rather than from private practice and the smaller modern private hospitals. Whatever may be the exact facts in relation to this question, it is certain that whoever ignores the local origin and local nature of the disease is handicapped and disarmed for the proper treatment of his patient.

Carbuncle is a disease of middle life, while its near relative, furuncle, is preeminently a disease of the adolescent.

Anatomy and pathology.—Nosologically carbuncle is one of the acute suppurative inflammatives of connective tissue, and hence is generically related to osteomyelites, parenchymatous abscess, acute abscess, furuncle, and other suppurative diseases of the skin. The essential unity of the group is shown when we consider that all have a local origin, all involve the same histological structure, and all are due to the invasion of the same pus coccus, or at least one of the pyogenic cocci. The differences in clinical history, the divergence in pathological process, and the various modes of termination which are found when we compare the several diseases of this generic group with each other are determined by differences in the anatomical structure or region concerned. These differences are quite as marked in the skin of different regions of the body when they are compared with each other as are those found in one organ when compared with other organs. These variations in histological anatomy relate to thickness, density, toughness, elasticity, vascularity, the surrounding attachments, and the amount and mode of disposition of the adipose tissue.

It is these variations in histological structures of the skin in different regions of the body or the structural differences in the various strata of the skin in a given region that determine whether in a given case of invasion by the pyogenic coccus we shall have a superficial pustulation, as impetigo; or a deeper and more extensive suppuration process, as furuncle; or a still more deeply seated and extensive one, as acute subcutaneous abscess or carbuncle, as the case may be.

When the coccus invades the mouth of the hair follicle, sebaceous gland, or sweat gland, and is arrested there, we have impetigo, or one of its congeners. There is little tension, no stasis, no obstruction to the outflow of fluids or pus, and no slough.

When the deepest part of the epithelial structures of the follicle or the sebaceous or sweat gland is invaded a true furuncle is the result. Here there is obstruction to the outflow of fluids and pus on account of the depth and partial closure of the passage way. Hence we have tension, stasis, liquefaction (pus), a limiting wall, and in the center a conelike slough, which consists of the remnants of the gland or follicle surrounded by as yet undigested connective tissue, especially fibers of the yellow elastic tissue.

But when the pus coccus passes beyond the epithelial layer of the skin into the cutis vera, the result is either an acute abscess, with its circumscribed cavity filled with digested connective tissue and inflammatory product, or, on the other hand, a carbuncle, with its dense infiltrated mass of undigested connective tissue without any circumscribed cavity. Whether it be an abscess or a carbuncle will depend on the histological structure of the skin of the particular region involved. The region of predilection of carbuncle, is "the dense and fibrous integuments over the posterior median line of the body." The skin of this region is characterized by (1) its extreme thickness, especially the relative thickness of the cutis vera; (2) the aponeurotic-like density of the papillary layer, and its having few and small openings; (3) the more direct connection of the subcutaneous tissue with the reticular part of the true skin as one continuous structure; (4) the number and size of the polygonal spaces found in the subcutaneous and reticular strata, caused by the diverging and interlacing bundles of dense fibrous tissue which make up the framework of these strata. These polygonal spaces are chiefly occupied by adipose tissue constituting the *fasciculus adiposus,* and a delicate network of fine connective tissue; (5) the presence of Warren's fat column, extending from the adipose tissue below to the base of the follicles of the lanugo hairs above, with their horizontal branches; (6) the dense, tendon-like, cone-shaped, fibrous bundles which extend from the base of the adipose column obliquely, to be inserted into the muscular fascia beneath.

The pus coccus having passed down and invaded these tissues, a focus of inflammation is begun, and we have all the factors and conditions necessary for the production of a typical carbuncle. The delicate network of areolar adipose tissue succumbs readily and liquefies, and as tension increases pus is forced to the surface through the slender adipose columns into the hair follicles as the only means of escape. Thus we have the numerous pus points and eventually the cribriform condition of the surface of the skin, so characteristic of carbuncle. As tension increases the inflammation is forced to extend laterally farther and farther from the original focus through the polygonal spaces and channels occupied by the rapidly diminishing delicate connective tissues and fat. Thus we have the characteristic peripheral extension and the broad flat indurated mass passed between the still resisting dense papillary layer above and the muscular fascia beneath, to which it is still firmly bound by the tendon-like cones of fibrous tissue.

If now an incision be made into this mass, there would be seen the numerous small pus points and channels but no proper pus cavity, both of which conditions are well recognized features of carbuncle. The process continues until the skin over the original focus becomes necrotic and sloughs away, thus relieving the tension and peripheral pressure, and we have the first step towards the natural limitation of the disease. But if the infiltration and induration have already extended so far as not to be influenced by this diminution of tension, it will continue to spread indefinitely, or until the sloughing process following in its wake has gained on it sufficiently to entirely arrest the peripheral tension. After all the long-resisting dense fibrous parts described above which began to die with the skin have yielded and sloughed piecemeal, we have the crater-like cavity coextensive with the indurated mass.

It is said carbuncle may occur on any part of the body, but this is not correct of true typical carbuncle conforming to a fixed definition.

We cannot have a typical carbuncle without continued tension in inflamed tissues, one part of which resists the digestive or liquefying process of suppuration longer than other parts.

Many subcutaneous inflammations are loosely called carbuncles when they are simply abscesses.

But as the characteristic features of the carbuncle skin are only typical in certain regions of the body, and are found more or less perfectly or imperfectly in other regions, it will often happen that a suppurative inflammation of the skin and subcutaneous tissue cannot be definitely classed either as a carbuncle, an abscess, or a furuncle; or that the characteristics of one may predominate, while those of the other are present in some degree.

The general indication for treatment is the same as in any other disease, viz, to limit its extent and duration.

The special indications are to arrest suppuration and to prevent septicæmia. The history of means and methods of treating carbuncle would fill a volume. Palliative means are useful and to be recommended if nothing better can be done. Many good surgeons advocate a purely expectant course and discard all active means, relying on internal medication, and treating it as a self-limited disease, not to be interfered with. Most surgeons, however, recognize the necessity of doing something to hasten sloughing in order to relieve tension, and thus limit the extent of the disease and prevent absorption of disease products. Caustics, incisions, single, multiple subcutaneous, and the time-honored crucial incision, are relied on. These are to be recommended also if nothing more efficient can be done. But they are all inadequate to fulfill the indication, although they accomplish something.

Scraping, as advocated by Page and Owens (British Med. Journal, March 24, 1888), and Mr. Teale, of Leeds (Medico-Chirurgical Journal, January, 1887), and even the "excision and scraping" as advocated by Reuhten Parker (British Med. Journal, March 31, 1888), are valuable resources in certain stages after sloughing has begun; but they are applicable only to those cases where the disease has ceased to extend.

The injection of various antiseptics as advocated by some would hardly be relied on by any one who had an adequate conception of the anatomy and nature of the disease. But it is not my purpose to review and compare discarded or prevalent methods. As a substitute for all of these I would advocate total extirpation of the indurated mass, as we would remove a benign tumor.

If this is done early the entire skin can be saved. If it is done later there will be some loss of skin over the original focus, but the patient will be saved from all the dangers of septicæmia, the cause of death in carbuncle, usually miscalled exhaustion.

If the patient already have septicæmia, and there remains a ring of indurated tissue beyond the sloughing center, extirpation is still the best means of saving the patient's life. It should be resorted to in all cases, whatever the stage of progress, except those in which the disease has clearly run its course, where the excision and scraping of ruptured parts would be sufficient.

It is a rational, life-saving, and time-saving method, and will commend itself to all who try it. All the reasons that call for amputation of a gangrenous limb can be urged in favor of total extirpation of carbuncle.

The technique of the operation needs but few words. Anæsthesia is required which should be as brief as possible, and not profound, if the patient already suffers from septicemia.

A crucial incision should extend to just beyond the borders of the induration. The four flaps are to be dissected up to the limits of the disease, which can usually be made out easily, contrary to what is usually taught. Then with volsella forceps and a knife the mass is readily dissected from its attachments to the deep fascia and removed entire, or in sections, according to its size and condition. The four flaps are then stitched together toward the center, more or less closely, according to the amount of necrosis and sloughing. When the extirpation is done early there will often be no loss of skin and but little subsequent discharge. There are no blood vessels in or under the skin in the carbuncular regions that should terrorize anyone.

A CONTRIBUTION TO RECTAL SURGERY AND BLOODLESS OPERATIONS OF MEMBRANEOUS AND LAX TISSUES BY MEANS OF AN ELASTIC QUILLED, OR WELTED SUTURE.

By H. M. BISHOP, M. D., Los Angeles, Cal.

For the removal of the larger hemorrhodial tumors, and of the complete or partial prolapse of the rectum, all past methods have failed in obtaining one or both of the desiderata of surgery, prevention of hemorrhage and primary union; the ligature, the ecraseur, the clamp and cautery, and Whitehead's operation, are either liable to a waste of blood primarily, or secondarily, or leave a granulating wound with the risk of infection or other unpleasant complications.

After seeking for many years to obviate these disadvantages, and to devise some means of harmlessly controlling hemorrhage while excising the tumors and redundant folds of the rectum, and likewise to hold in perfect and undisturbed coaptation the edges of the incisions, my endeavors have finally been satisfactorily rewarded.

It is now my custom after dilating the sphincter, to raise the hemorrhoidal projection or prolapsed membrane with vulsella, to gently clamp its base so as to parallel the approximated tissues and free them from plications; then, having left room between the clamp and adjacent healthy tissues, I apply on either side a sufficient length of rubber tubing 5 millimeters in diameter, having a central orifice of 1 millimeter; these are secured with catgut after the usual manner of the quilled suture, the clamp removed and the tissues divided close to the tubing. This makes a bloodless operation, plastic exudation soon unites the edges, the catgut softens in due time and permits the tubing to pass away, while the flexibility of the latter has adapted itself to its environment with the minimum of annoyance to the patient.

In cases of complete prolapsus or where any considerable section of the rectum is removed, after properly bringing down the folds, the same plan can be followed, by uniting internal and external circles of the tubing, applied just above and below the section to be excised, the elastic pressure sufficiently occluding the divided vessels without interfering with reparative processes, and leaving a smooth line of union. This, although resembling somewhat the modern enterorraphy, differs from it in the less rigidity and more suppleness of the supporting rings of union.

Other and more extended uses of this combined ligature and suture have suggested themselves. The coeleotomist might find it more eligible than the sectional tieings of the broad ligament now in vogue, with its puckerings of folds, and crowding into condensed distorted masses structures that are normally expanded, and whose severed edges would manifest less disposition to necrosis if kept unfolded and smoothly approximated while at the same time freed from the rigidity of the clamp. After a few days when the tubes had accomplished their object they could be slipped away from the softened catgut loops by a thread of silk left attached for that purpose, and drawn out through the vault of the vagina or other convenient locality.

Should it be necessary in any emergency to make use of more firmness than the simple tubing supplies, it can be furnished by passing a wire along the small aperture of the rubber tube.

For the closing of the abdominal incision and other long and deep wounds it may prove to be more advantageous than the usual interrupted suture, for it provides a more uniform and steady joining of the severed parts, deep as well as superficial, which accommodates itself to the various necessary bodily movements without permitting any variation of the relation between the parts engaged in the process of reuniting, and which must consequently result in a firmer line of union

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TAPPING OF THE LATERAL VENTRICLES OF THE BRAIN.

By DR. J. FRANK, Chicago, Ill.

Surgeon to the Cook County and St. Elizabeth Hospital.

The interesting train of symptoms, long known and recognized, of which the principal are: nystagmus, general convulsions, disturbance of the respiration, slowness of the pulse, vomiting, coma and death, find a solution in the acceptance of the theory of compromise of brain function by so-called intracranial compression. Whether an actual elevation of intracranial pressure be present, or whether the symptoms have their foundation in irritation of brain elements, by increased transudation, concerns us less than the possibility of restoring brain function, in part or in whole, by removing collections of cerebro-spinal fluid, blood, pus, or foreign matter. That this can be done practically upon the operating table with the same gratifying results as in the experimental laboratory has become a well-known fact. It is therefore not strange that operators should have adopted means of reaching compressing agents in the lateral ventricles, there known to exist.

Tapping for hydrocephalus through the fontanelle is so old a procedure that it can not be determined who first devised or practiced it. The publishing of the method for tapping the ventricles, by means of trephining, is of more recent date, and the plans for the same have been technically perfected and shown to be thoroughly feasible and easy of accomplishment.

Dr. C. Wernicke in Lehrbuck der Gehirn Krankheiten, vol. 3, 1881, writes of meningitis, that—

The disease can get well by spontaneous retrogression. It is, therefore, often necessary to lengthen life in every possible manner, in order to gain sufficient time, that the chance of spontaneous retrogression may obtain. It seems in many cases the cause of death is an effusion into the ventricles, which has the tendency to increase even when the disease is in the stage of retrogression. This can be clinically determined, where the fontanelles are still open. Where this condition of things is present, operative interference is fully justifiable, the more so, as without it a fatal ending can, with the greatest certainty, be predicted. In such cases one will trephine and puncture the lateral ventricles. The returning powerful pulsation of the brain will indicate if the desired result has been obtained. If it becomes necessary, there should be no timidity about repeating the operation, or eventually performing it on both sides.

D. Lowson, M. D., of Hull, on April 10, 1885, before a branch of the British Medical Association, read a paper in which he recounts a case of hydrocephalus in a boy 7 years of age, paralyzed, blind, in constant pain, affected with occasional epilepsy, but intellect unimpaired. The skull was drilled, fluid aspirated, and constant drain established by means of silver cannula, to the end of which rubber tubing was attached leading under carbolic-acid fluid in a bottle placed lower than the head. Rapid improvement, with some movement of the limbs and some vision, was noted. In his sleep patient pulled out the cannula twice; the last time it could not be found. Died comatose the day after, the eighth after operation. Silver cannula found in the ventricle.

Dr. Phillip Zenner, of Cincinnati, in a paper on tumors of the brain, read before the Academy of Medicine, February 1, 1886, referred to tapping the ventricles, as a palliative measure in some cases of tumors of the cerebellum, and reports a case in which the operation was prevented by the sudden death of the patient; the autopsy made clear the certain benefit to be derived from such interference.

Ernst von Bergmann, in Die Chirurgische Behandlung von Gehirn Krankheiten, writing of the operative treatment of acute hydrocephalus from tubercular meningitis, states:

It is not the deposit of miliary nodules along the course of the vessels which causes the danger, but rather the inflammation of the plexus and its products—the acute effusion of fluid into the brain cavities. The intracranial pressure, through increase of ventricular cerebro-spinal fluid, becomes so great that it offers a hindrance, and at last an actual obstruction, to the entrance and progress of the blood. Naturally comes the thought to drain off the water, and thereby unburden and free the circulation.

Von Bergmann then describes the similarity of the deposit of miliary tubercle on the pia and peritoneum, both followed by great transudation. The well-known and remarkably good results following emptying the peritoneal cavity, with retrogression of the tubercular process, led him to think that the same benefit might accrue in puncturing and draining the ventricles. It was this reasoning that led him to operate, July 15, 1888, upon a case of tubercular meningitis in the stage of brain paralysis.

The patient lay in a deep stupor, with periods of restlessness and groaning; pulse 72 and intermittent; respiration of the Chayne-Stokes character, with very long intervals; in the contracted left arm convulsions; eyes closed, pupils dilated and without reaction. Immediately after the operation, pulse 104, regular; respiration 40 and regular. Evening of same day, patient takes nourishment, the eyes are opened, pupils less dilated and react against light. The patient died; yet the benefit to be derived from the operation was illustrated in a most striking manner.

Dr. W. W. Keen, of Philadelphia, has done more than any other in bringing the operation into prominence. His work is not based upon the results obtained by his predecessors. As he states, in the paper published in the Medical Record of September 20, 1890, he was led, November 7,1888, to propose the trephining, puncturing, and drainage of the lateral ventricles by the results shown at the autopsy of a case of tubercular meningitis which had been trephined for supposed abscess. A drainage tube had been introduced and found, post mortem, to reach within one-fourth inch of the distended ventricle, the same having produced no inflammation or irritation.

Dr. Keen reports three cases of his own upon which he did the proposed operation. The first was for threatened blindness from acute hydrocephalus, due to tumor of the cerebellum. The left side was first trephined and drained, and some twenty days after the right side. Irrigation of the ventricles, from side to side, without ill results, was demonstrated in this case. This patient died, the post mortem revealing a sarcoma of the left lobe of the cerebellum. The second case was one of hydrocephalus of about three years standing, the mental condition being poor. The left ventricle was tapped, improving paresis of the right arm. Convulsions set in the next day, thought to be due to too rapid emptying of ventricle. It was decided to replace the fluid, which being done had the result of stopping convulsions. This was repeated eight times, each time stopping the convulsions. The autopsy revealed extensive hydrocephalic distention. The third case was one of unilateral acute internal hydrocephalus of left ventricle. The patient, being in extremis, died four hours after operation.

Dr. Samuel Ayres, on December 4, 1888, operated upon an imbecile child 5 years old; disease beginning during third month of life with convulsions. Enlarged head with closed fontanelles and sutures, aphasia, total blindness, idiotic smiling, rotary movement of head, grinding of teeth, bowel and bladder incontinence. Had never walked nor stood alone. Trephining over coronal suture one and a half inch to right of median line; distinct pulsation; fine trocar introduced through dura downward, backward, and inward to a depth of two and a half inches. One ounce of fluid removed from ventricles and smaller quantity from space between dura and brain. Oozing of fluid for several days from puncture in dura. Pulse before operation 120 to 140, after operation 140; temperature 101.8°. Child could stand alone two or three days after. Partial restoration of sight; would wink on finger being passed before eyes. In three weeks was gradually able to walk alone across room; less irritable and could sleep well; no development of speech; no control of sphincters. Three months after operation, continued improvement.

Dr. Keen reports 2 cases by Mr. Mayo Robson, of Leeds. The first of these was a boy of 10 years, with high temperature, right hemiplegia and aphasia; twitching of limbs of right side; double optic neuritis. Operation October 7, 1889. One and one-half inch trephine used over motor centers of right side; no pus being found, a needle was pushed into the lateral ventricle and ten drams of clear liquid evacuated. Patient showed continual improvement; six months later was in good health. The second case was that of an infant with acute hydrocephalus; the drainage gave relief, but the child died in convulsions on the third day.

A. Broca, of Paris, published two cases in the Revue de Chirug. under the head of "Drainage of the ventricles for hydrocephalus," one of his own, the other by Thiriar, of Brussels. His own case was one of hydrocephalus with contracture of the left arm; drainage of right ventricle. Contracture of arm disappeared; object of operation was consequently reached.

Thiriar's was a case of hydrocephalus of three years' standing. Tapping was followed by diminution in circumference of head and a depression of fontanelles. Patient died; autopsy showed great distention of ventricles.

To these I will add two cases within my own experience.

Case 1.—Charles K., a hod-carrier, March 8, 1891, at about 3 p. m., was struck upon the head by several brick falling from the second story of a building. He is said to have been completely unconscious immediately after the hurt, but gradually regained partial consciousness; could make effort at answering questions and move his limbs. The disability being deemed of a passing nature, he was placed on some boards in the engine-room of the building upon which he had been at work. At 5 o'clock p. m., two hours after injury, there was so little improvement shown that he was taken to his home, where a physician advised removal to a hospital. He arrived at St. Elizabeth Hospital at 9 p. m., and was placed in my service.

House surgeon, Dr. Palmer, made the following notes: Still dressed in working clothes, a well-developed muscular man lay without motion on the table. Pulse 30 to 40, full and irregular; respiration 8 to 10 per minute, irregular and somewhat sterterous. Upon questioning him loudly he mutters unintelligibly. Pupils dilated; respond feebly to light, and on holding light closely the lids are shut tightly; seems to have good motion on right; diminution in motive power of left side. Owing to great amount of effusion into scalp, no definite diagnosis of fracture could be made. Several contusions, with great swelling above and in front of right ear.

Upon reaching the patient, paresis of left side was so marked that it was decided to trephine over right motor centers. After the head was prepared in the usual way a U-shaped incision was made, beginning at the frontal eminence, running backward to median line 4 inches, and returning anterior to ear, the flap being about 2½ inches wide. Previous to this a row of interlocked alternate white and black sutures, about one-fourth inch outside line of incision, were tied to control the hemorrhage. The flap, separated from the skull, was wrapped in gauze and laid upon forehead, exposing a linear fracture commencing one-half inch to right of sagittal and the same distance posterior to the coronal suture, involving the latter suture as far as the incision permitted observation. A 1½ inch trephine was so placed that the anterior margin reached the coronal suture and superior within one-half inch of sagittal suture, and a button of bone removed. No epidural clot or hemorrhage, but great bulging of dura, of exceedingly tense feel and without pulsation. A meningeal artery crossing the trephine opening was tied, and it made the base of a flap in the dura. The brain substance protruded beyond the skull opening about one-fourth inch and was with difficulty replaced. At the moment of bulging, pulse and respiration became more rapid; when pressed back pulse and respiration were slower. No subdural clot or hemorrhage as far as the finger could explore; a normal amount of cerebral fluid escaped. On account of the above conditions, a hydrops ventriculi was diagnosed and tapping of the ventricles decided upon.

No trocar being at hand, an aspirating needle corresponding to No. 3 American catheter scale was used with syringe attached. The direction of introduction was slightly backward and toward the median line. At a depth of 2½ inches fluid was reached, the syringe was detached from needle, and about 3 ounces of clear ventricular fluid gradually drained off. No anæsthetic was given the patient after the incision through the scalp. After the drainage of the ventricles, the respiration increased to 16 and the pulse to 120 per minute. There was a general reaction, the pupils became smaller, paresis was improved, and the patient was much more sensitive to pain, chloroform being necessary in the later stages of the operation. No further drainage was employed than a few strands of wicking, which was passed from the point of the brain puncture to the most dependent part of dural and skin flaps. The button of bone, which had been kept in sterilized water at a temperature of 100° F., was replaced and the scalp brought together with deep interrupted and superficial continued sutures and an aseptic dressing applied. The operation lasted one and three-quarter hours.

The following morning respirations were 18 and pulse 120 per minute; temperature 102° F. Patient was comatose, defecated and urinated unconsciously. At 5 o'clock p. m., twenty-six hours after injury and nineteen hours after operation, temperature rose to 105° and patient died suddenly, with no marked change in pulse and respiration up to that time.

At post mortem the dressings were found dry, save slight oozing; edges of scalp united; the pericranium adherent to button of bone, button adherent to dura, and edges of dura united. Upon removal of skull cap, a linear fracture was revealed, beginning as above indicated and extending along the coronal suture to the sphenoid bone, where it divided into several smaller fractures in the sphenoid and temporal bones. On removal of brain from cranial cavity an epidural clot was found under the squamous portion of temporal bone; there was also a similar-sized clot beneath right cerebellar lobe, which lobe was softened to a noticeable degree. The brain and meninges were much congested. The ventricles were empty and no trace of puncture was found. That the tapping was justifiable was shown by the improvement immediately afterwards. There was sufficient traumatism to cause death. The rise in temperature was ascribed to the extent of fracture, disorganization of cerebellar tissue, and resorption from blood clot.

Case 2.—Freddie McC., aged 13, was referred to me by Dr. Brower, to whom I am greatly indebted. The following history was gleaned: Parents respectively 42 and 43 years old, in good health; tubercular, specific, or malignant family taint denied. Mother has had but two children, the patient and a girl aged 10, who is bright, active, and well developed.

Until the age of 6 years the patient was apparently well, though precocious, attended school, learned quickly and easily, and was apt at acquiring vices and the use of profane language. In disposition he was combative, and was admired by all that knew him for being clever beyond his years. The history of present troubles began when in sixth year. At the time he fell from a wagon, striking upon the back of his head. Nothing was thought of the fall since the patient was at play soon after. He did not become unconscious, nor was there a sign of external injury nor any complaint of resulting pains. Two weeks after he became sick with a fever which lasted two weeks; was delirious; head was thrown back and at times he lay in an opisthotonos position. Intense jaundice developed, the duration of which is unknown. During entire illness there was no incontinence. Convalescence was slow, and during its period of three months patient was fretful and peevish; would, grasping the head with both hands, cry out in pain. He had delusions of varied character and spoke disconnectedly. In the third month after beginning of disease patient began to stammer in his speech, and had disordered and involuntary muscular movements and twitchings of face, trunk, and limbs. These increased to the extent that the child was unable to walk or stand. The case was diagnosed by the attending physician as one of chorea.

In about one year the patient gained sufficient strength to walk fairly well; but became subject to epileptoid seizures. When walking or standing the patient would fall and be unconcious for a moment, without convulsive movements; would however immediately get up and pursue the subject of occupation. These continued about one year and were followed by spells, during which patient seemed unconscious, the countenance staring, face flushed, followed by pallor. Patient had an ataxic walk, descended stairs with great difficulty, and was sleepless. The application of faradic current brought about some improvement. The power of speech was lost gradually to the extent that only single words could be articulated: Mamma, papa, the name of his little sister, and a few profane words. He was irritable and would laugh and cry without apparent cause. He was sent to school for a short time, but made no progress. There was, at this time, incontinence of urine and feces, but this symptom has disappeared.

The boy is well developed and muscular, 32 inches in height, without pubic or axillary hair. The reflexes are found to be normal, except exaggerated knee jerk; the walk is spastic, can walk alone but a few steps. Unilateral symptoms are present, the right side affected more than the left. Has habit of chewing right thumb, upon which callus has formed. Pupils are widely dilated and do not react to the light; a critical examination of them can not be made on account of the restlessness of the subject. Patient has occasional rise of temperature and vomiting. Pulse irregular, from 60 to 70; respiration 14 to 18, irregular and sighing.

Diagnosis.—Idiocy following hydrops of the ventricles, in turn due to chronic inflammation of the ventricular lining, as a result of cerebro-spinal meningitis. It was proposed to tap the ventricles. After due consideration it was accepted by the parents, to whom the dangerous and uncertain results had been explained. The operation was done May 4 at 11 o'clock a. m., Drs. Beck, Holland, and McKay being present, besides the house staff. Keene's posterior route for reaching the ventricles was selected, and it was decided to do it upon the left side.

The alternate white and black interlocked hæmostatic sutures were used. A U-shaped flap was made and separated from skull, wrapped in gauze and laid to one side. With a 1½-inch trephine there was removed a button of bone, the anterior margin 1½ inch posterior to coronal suture, the upper margin 1½ inches from saggital suture. The button was kept in sterilized water at a temperature of 100° F. The dura opened, a trocar, size No. 3 American catheter scale, was introduced almost directly downward and slightly forward to base of skull. The ventricle was reached at a depth of 1¼ to 1½ inches, as was shown by the outpour of clear ventricular fluid, of which 6 to 7 ounces escaped. A grating feel upon the trocar gave the impression that there might be present a ventricular calculus. In order to explore the cavity the handle of a scalpel was passed alongside of the trocar, a pair of closed forceps were introduced through the opening thus made, without being able to detect anything unusual. The index finger was next inserted into the ventricle, with no better result. It is, however, noteworthy that this can be done with safety, also that while the finger was in the brain there was great depression, weak and slow pulse and respiration, which improved upon withdrawal. A drainage tube one-fourth inch in diameter was passed into ventricle, and through the posterior part of wound. The ventricular fluid flowed freely and with distinct pulsation.

The dura was sutured with catgut and button of bone replaced, the scalp incision was closed, and a sterilized dressing applied. Time of operation was two hours. Before removal from the table there was noted a paralysis of right side, which persisted until death. The pupil of right eye smaller than left. Patient placed in bed, lay very quietly, passed urine involuntarily, but indicated to his mother when his bowels were to move. He recognized both his father and mother.

On day of operation, at 5 p. m., pulse 110, respiration variable and irregular between 40 and 50, temperature 102° in axilla; 8 p. m., pulse 120, respiration variable and irregular between 44 and 45, temperature 102° in axilla; May 5, 8 a. m., pulse 100, respiration variable and irregular 40, temperature 101.5° in axilla; 3:30 p. m., pulse weak, could not be counted, respiration 56, temperature 100° in axilla. At 8 p. m. patient was brought to dressing room to have a new dressing applied, the old being saturated with ventricular fluid. Upon exposure the wound was found in good condition. The edges of scalp united. The drainage tube was freely movable and discharged clear fluid with distinct pulsation. The external wound was cleansed and dressing applied; patient seemed more comfortable. At 11:30 p. m. died quietly without convulsions.

Post mortem was held the morning of the 6th of May. The body was rigid and the toes of the right foot were extended; the cornea of both eyes were opaque.

The dressing was removed, and no signs of sepsis were visible here or in any part of the wound. The sutures in the scalp were cut, and slight union was found throughout. There was also slight union between pericranium and cranium, also between pericranium and button. Button was adherent to the dura. One catgut suture in the dura had untied itself. The edges of the dura were united, and there were no signs of hernia of the brain. During the entire examination there was a free flow of ventricular fluid. The cranium was very thick, the button of bone being five-eighths inch in depth. The cranial sutures were raised above the surrounding bone.

The following pathological and anatomical description of brain and meninges was kindly furnished me by Dr. Beck, of this city:

The dura mater is much thickened: the inner side is smooth. The inner membranes are nowhere adherent, and are easily removed. On the left side of the skull, about 4 centimeters from the median line and in front of the coronal suture, in fact entering it, is an oblique opening in the skull about 2 centimeters in diameter; this was traversed by a band of solid connective tissue, which is united to the pericranium on the outside and the dura internally. The convolutions of the brain are narrow, especially in the parietal and occipital lobes, some of them being only 3 and 4 mm. broad, but the sulci deep. The convolutions are more ramified than usual, so that the normal configuration of the gyri and sulci is disordered. The island of Reil on both sides is softened and does not show any distinct gyri. The convolutions along the fissure of Rolando on the left side are very much lacking. The brain case is normal as regards the array of vessels and nerves.

The gray substance of the brain is very narrow. Both lateral ventricles, as well as the third, are enlarged to double their normal space. The ependyma shows the most remarkable change, the surface has the appearance of so-called chagrin. The cerebellum is disproportionately large to the cerebrum.

The microscopical examination of a part of tissue taken from the lateral ventricle where the chagrin tissue is most developed, shows the following from within out. The ependyma is thickened and undulating. Under this is a dense layer of connected tissue, and beneath this a zone of infiltrated leucocytes, both of which are characteristic of a chronic inflammation. The brain tissue is normal.

The pathological diagnosis is as follows: A partially defective cranium; micro gyri and a chronic internal hydrocephalus.

To follow up the literature of the operation of trephing and tapping the ventricles, I will cite the following case:

Dr. W. C. Dugan, before the Louisville Surgical Society, on December 12, 1892, reports the interesting case of a lady, 50 years old, suffering intense headache for eight to ten months. Gradual loss of hearing. Impairment of intellect; slowness of comprehension and in giving answers. Partial paralysis of right leg, incomplete loss of sensation in right arm, twitching of right side of face. Had two convulsions. Ocular examination reveals double choked disks. Diagnosis of tumor was made, probable seat, upper part of fissure of Rolando.

Exploratory operation over left parietal region, button of bone removed allowing dura to bulge greatly, of singularly hard and inelastic feel. The dura opened, brain tissue welled up as thick as the finger and impossible to return. Hypodermic needle found no fluid, but a grooved director being passed into ventricle 3 or more ounces of fluid escaped. As the fluid drained off, the brain tissue receded, and the finger could be passed easily between the dura and cortex; no tumor was discovered. The grooved director was passed through septum into opposite ventricle without finding fluid; without drainage the wound was dressed and the patient put to bed. Reacted well without shock; paralysis and loss of sensation relieved immediately.

Hearing has not returned. As the exact pathology of the accumulation of fluid was not understood, it was thought that tapping or aspiration may have to be repeated, on that account the button of bone was not replaced.

Dr. Theodore Diller reports a case operated upon by Dr. R. W. Stewart, for supposed tumor at base of brain, after an injury two years previous. Diffuse headache, drowsiness, left hemi-paresis, cerebellar titubation, disphagia, aphonia, and advanced optic neuritis. Operation to relieve intra cranial pressure, and find and remove tumor if possible. No tumor or depression of bone found, but great bulging and formidable protrusion of brain indicated intra cranial pressure. The ventricle was tapped and 2 ounces of clear fluid removed; drainage. Left paresis more marked after operation, and four or five convulsive seizures. Patient died thirty-six hours afterwards. Tumor, a sarcoma about the size of a walnut on left side of pons found at post mortem.

Verified by the results of dissections and trials upon the cadaver, the method of reaching the ventricles has been described in so lucid a manner by W. W. Keen that little can be added to his article published in the Medical News, of December 1, 1888. Three routes, anterior, lateral, and posterior, are given with the minutest details. To this paper I would refer those interested.

In a general way, where there is a point of election for reaching the ventricles, either of Keen's routes will make the attainment of the object easy. However, they should not be considered to be the only manner of finding them, nor is it necessary to have recourse to them, when the skull has been opened in a different place for injury or disease. From any point on the cerebral cortex it is not very difficult to penetrate to the normal ventricle, familiarity with its location and conformation being the principal requirement; it is extremely easy where the cavity has been enlarged as in chronic hydrocephalus.

At the post-mortem of Zenner's case, a trial puncture with a trocar three-fourths of an inch to the side of the median line and about 1 inch anterior to the line connecting the auditory orifices succeeded in reaching fluid at a depth of 1½ inches beyond the dura, but the operator succeeded equally well at several points posterior to this.

Broca made a cross incision through the pericranium and trephined three cm. above and three cm. behind the right ear meatus and introduced the trocar in the direction of the opposite ear meatus. He felt the brain consistence yield at a distance of four cm., a discharge of clear fluid following. Thiriar, by experiments on the cadavar, establishes the rule: To trephine 7½ cm. above the meatus auditorius externus and 1 cm. anterior to this line. These varied rules prove the truth of my previous assertion, that from different points on the cerebral cortex it is not difficult to reach the ventricles.

After the usual aseptic or antiseptic details of preparing the head, a straight, crucial or curved incision, involving a flap, may be made to expose the cranium. A chisel, drill, or trephine, large or small, may be used; if the opening be too small it can be enlarged with proper instruments. The dura may be simply punctured with the trocar or a dural flap may be made to expose the cerebral surface. This latter has the advantage of allowing of closer observation of the cortex and of finger exploration between cortex and dura.

The instrument to be used for the puncture is optional with the operator, and the depth to which it will be necessary to penetrate will depend on the amount of fluid in the ventricle.

Zenner used a trocar and found fluid at a depth of 1½ inches. Von Bergmann used a long exploring needle, and introduced it slowly until cerebro-spinal fluid escaped. Keen at first used a grooved director, but later a canula, No. 13, French, and thinks it less liable than any other instrument to do damage, which is principally the puncturing of larger vessels. Mayo Robson used a needle, and pushed it onward until fluid began to flow. Broca employed the trocar of a Potain aspirator, and came upon fluid at the depth of 4 cm. Thiriar made use of a fine rubber canula, closed by a button, and penetrated to a depth of 5½ to 6 cm. I have in the one case used an aspirating needle; in the other, a fine trocar canula, No. 3, American. I have devised a canula with blunt stylet, which will be a useful instrument. In the one case I have penetrated to a depth of 2½ inches; in the other, 1½ inches, depending on the amount of distension of the ventricles.

Now, the very important question of drainage arises. Shall it be rapid and free, or slow and in drops, and shall there be irrigation? This question must be decided for the individual case, as the requirements for each must necessarily differ, depending on the conditions to be met.

If the effusion into the ventricle is the result of acute and still active inflammation, decompression by rapid removal of fluid and subsequent continuous drainage until the acute stage subsides, or repeated tappings, without drainage, would be the rational procedure. If the inflammation be in the stage of retrogression, the artificial removal of fluid by simply tapping, without drainage, will be all that is required.

In cerebellar, or tumors of other situations, blood clot from trauma, etc., compromising the circulation to the extent of bringing about hydrops ventriculi; if the condition be recent, rapid and continuous; if it be of longer duration, with great amount of fluid, where the brain tissue is or may be atrophied, tapping and slow continuous drainage, or repeated tapping would seem to be indicated. In chronic hydrocephalus, with great distention of the ventricles, the brain tissue being atrophied and greatly altered in physical relationship, in order to allow of gradual return to something approaching normal condition, it is best to both tap and drain slowly. That rapid emptying of the ventricles, under these circumstances, is dangerous and may be fatal is well illustrated by Keen's interesting and highly instructive Case No 2.

Finally, in abscess of brain breaking into the lateral ventricles the most rapid and free drainage and cleansing irrigations is the only procedure promising relief in that most dangerous condition. In these cases it would be best to trephine and drain both sides and irrigate from side to side. That this can be done is demonstrated by Keen's Case No. 1.

Repeated tappings or aspirations in some cases may advantageously take the place of drainage. The means to secure drainage will be found in the rubber tubes of different calibers, gauze, wicking, or horsehair.

In special cases operative procedure could go farther than puncture or drainage; the ventricles may be incised and opened with forceps so that a consistent mass (blood clot or foreign body) might be removed. In my second case a finger was introduced into the ventricle, without any apparent lasting detriment to the patient. Thus opening up the ventricle freely, probing and digital examination may be of diagnostic and therapeutic value in special instances.

Although it does not strictly come under the heading of this paper, mention is made of a number of cases of secondary spontaneous opening of the ventricle, from trauma or abscess, with drainage off of cerebro-spinal fluid, for a longer or a shorter time. Many of these have recovered; the condition did not add to the gravity of the disease or injury.

Indications.—What is generally understood as brain compression is the indication for trephining and tapping the ventricles of the brain. That compression can be a sole factor, without other important lesions, in producing death, is amply proven by the careful and interesting experiments upon animals, and remarkable results obtained by Dr. P. Deucher, published in the Deutsche Zeitschrift fur Chirurgie, Leipsig, 1892–'93, to which I would refer those interested.

It is true there is no certain method of differentiating compressing agents in the general cavity, the ventricles, or in both together. One such instance has come under my observation, the compressing fluid being drained from the general cavity. Opening of the dura would determine that; perhaps laminectomy, under the circumstances, would be of equal value with trephining.

The compression symptoms have so often been alluded to in the history of the operation that it will not be necessary to repeat them.

In the cases, so well described by Wernicke, of brain compression from simple or tubercular meningitis, decompression by tapping the ventricle offers reasonable hope of restoring brain function and maintaining its integrity. The symptomatology points to the fact that compression is often the sole element inducing a fatal termination. It is in these acute cases that the operation is of greatest value and urgently demanded.

When the skull has been opened for compression symptoms, which are confirmed by bulging of dura and protrusion of brain, no tumor, clot or depressed bone being found, it is indicated to tap the ventricles. This was shown in my Case No. 1, in that of Dr. Dugan, and that of Dr. Diller. These, although an unrelievable condition was found to be present, showed some amelioration of symptoms, as was well illustrated in Dr. Dugan's case.

Abscess of brain, which has invaded the ventricle, it is quite clear, demands immediate tapping and, if possible, irrigation from side to side. This needs no further elucidation or argument. Possible benefit may be received by tapping chronic hydrocephalus, where there is but little enlargement of head, and symptoms denoting a compression, moderate in extent and severity. This was well illustrated in Ayer's case, in which the compressing agent had been at play for over four years.

In tumors of the brain, involving the circulation to the extent of bringing about hydrops ventriculi, it is advisable to trephine and tap the ventricles, where the compressing agent adds to the suffering or disability of the patient or is a proximate cause of danger to life.

But in chronic hydrocephalus, with enlargement of head, with great distention of the ventricles and corresponding atrophy of brain tissue, it is contra-indicated to tap and drain. All cases of this class have died from the operation. One can easily comprehend that under these circumstances no benefit can accrue.

The following summary is offered in conclusion:

Trephining and tapping of the lateral ventricles of the brain:

(1) For distention of the ventricles, from acute simple or tubercular meningitis, is a therapeutic measure clearly indicated.

(2) For effusion of blood into the ventricles, from trauma or disease, makes recovery a possibility.

(3) For abscess, involving the ventricle, is immediately and imperatively demanded.

(4) For effusion into the ventricles from brain tumors, may afford relief to symptoms.

(5) For chronic hydrocephalus, moderate distention of the ventricles, without enlargement of head, may afford relief.

(6) For chronic hydrocephalus, great distention of ventricles, enlargement of head, will lead to a fatal result.

ESTUDIO CLÍNICO SOBRE LAS HERIDAS PENETRANTES DEL ABDOMEN.

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Entre los traumatismos que afectan de continuo la región abdominal tienen puesto preeminente las heridas, que, á cada paso, ocupan la atención del práctico, por la diversidad de hechos que entrañan y por la variedad de complicaciones con que se presentan, desde la herida que podemos llamar simple, hasta aquella que reviste una insólita gravedad, siendo necesariamente mortal. Soluciones de continuidad amplias y que sólo comprometerían la vida por un proceso intercurrente ó mediato, como la infección *post lesionem*, ya por punible descuido del cirujano ó de sus ayudantes, ya por el enfermo mismo; soluciones de continuidad pequeñísimas y sinembargo de pronóstico funesto, por la lesión visceral que hayan producido.

En presencia de fenómenos tan complexos, de una sintomatología tan varia y diversamente apreciable, toca al clínico buscar una base sólida á su procedimiento y establecer un criterio quirúrgico que ordene é informe la conducta que ha de seguirse en todo caso, para llenar de cumplida manera su misión, y hermanar en un resultado satisfactorio las imposiciones del momento con los principios incontrovertibles de la ciencia.

Encargados durante algunos años de servicios quirúrgicos, ya en el hospital civil de hombres, y luego del servicio de "La Piedad" en el Hospital Vargas, y últimamente en el Hospital Militar del Distrito Federal, hemos tenido ocasión de recoger numerosas observaciones que dan luz á la materia de que nos ocupamos. También, después de la batalla reñida crúdamente entre los ejércitos de la usurpación y los de la revolución nacional, en el sitio de Boquerón, el 4 de octubre de 1892, fuimos enviados por el Ministerio de Guerra á prestar nuestros servicios á los heridos, fundando en el pueblo de los Teques un hospital de sangre, y allí acopiamos datos preciosos é importantes. Debemos, además, á la bondad de algunos de nuestros ilustrados colegas, y, en especial, del amigo y compañero Dr. F. A. Rísquez, varios casos personales de sus clínicas. Reciban, pues, aquí, la expresión sincera de nuestra gratitud.

Dejando á un lado la enojosa cuanto inútil división de las heridas del abdomen en punzantes, cortantes, contusas, etc., que no hacen sino trastornar la concepción clara y precisa de la lesión, sólo aceptaremos, clínicamente hablando, la división en:

Heridas no penetrantes, es decir: las que solo interesan la pared abdominal sin tocar al peritoneo.

Heridas penetrantes, las que alcanzan hasta la cavidad peritoneal.

Estas últimas son el objeto de nuestro estudio, que deseamos hubiera sido lo más completo posible, como un testimonio de alta estima y homenage de respecto á las celebridades médicas que toman asiento en este Congreso y una muestra de afección por la gran Nación Americana.

Entran en el plan de nuestro trabajo las subdivisiones que necesariamente hay que hacer de estas heridas en: (I) Con respecto á su causa, en: (*a*) Heridas por arma de fuego; (*b*) Heridas por arma blanca. (II) Con respecto á su efecto, en: (A) Heridas con lesiones viscerales; (B) Heridas sin lesión visceral.

Importante es esta subdivisión desde el punto de vista del diagnóstico, del pronóstico y del tratamiento, pues ella es la que regla la conducta del práctico en cada caso particular.

I.

(*a*) Heridas por Arma de Fuego. (*b*) Heridas por Arma Blanca.

(A) HERIDAS CON LESIONES VISCERALES.

Generalmente son estas las heridas que á cada momento encontramos, ya en los hospitales, ya en la práctica privada, y las que exigen más minucioso y atento examen.

Dada una herida del abdomen por arma de fuego ó por arma blanca, fuerza es plantar el problema siguiente: ¿Es una herida simple, es decir, sin lesión de una víscera, ó hay lesión visceral; cuál víscera ó cuáles ha interesado el proyectil ó el arma? La anatomía topográfica puede darnos razón, pero, si acaso, aproximada, no siempre verdadera, y no debemos por tanto atenernos á las deducciones que hayamos hecho; son sólo presunciones que en casos semejantes no tienen valor alguno, pues, con los movimientos del cuerpo en la lucha, por ejemplo, hay desalojamiento de los órganos abdominales; y el cuerpo vulnerante puede deslizarse sin herirlos.

Hay, pues, que tomar como base del diagnóstico los síntomas que suministra cada órgano en particular; es decir: en la herida de los intestinos la salida del gas que encierran y la distensión producida por él en la cavidad peritoneal, trayendo timpanismo, y la peritonitis subaguda, por el derrame de las materias intestinales en la misma cavidad peritoneal; una enterorragia abundante en la herida del intestino grueso; en la lesión de la vejiga ó del riñón la orina mezclada con sangre en proporción crecida. Por lo que toca á las heridas del hígado, del bazo, de un tronco ó rama arterial importantes son bastante oscuras pues no dan un síntoma inequívoco, etc.

De la compulsación de las estadísticas consultadas por mí y según las observaciones de Otis, Hoyne, MacCormac, Coley, Reclus, Packard, resulta que la generalidad de las heridas penetrantes del abdomen están complicadas con lesiones de las vísceras y entre estas, ocupan primer lugar los intestinos, por el hecho de llenar ellos la totalidad del vientre.

II.

(a) Heridas por Arma de Fuego. (b) Heridas por Arma Blanca.

(B) heridas sin lesión visceral.

Las heridas de este género, producidas por arma de fuego, ó por arma blanca, se caracterizan por la herida abdominal simple, sin lesión de vísceras é interesando solo el peritoneo; pueden sí, acompañarse de hernia de vísceras intactas, intestinos, hígado, epiploon, etc. Nuevas í funestas complicaciones, pues si la solución que da paso á un asa intestinal, es muy pequeña, es inevitable la estrangulacion del intestino, por la irreductibilidad de la hernia.

Casi todos los autores convienen en la rareza de esta clase de heridas, correspondiendo su mayor número á las producidas por arma blanca. Sinembargo en 375 casos observados en el espacio de ocho años, hemos encontrado 56 sin lesión alguna de las vísceras.

La cuestión del diagnóstico en estas heridas es algo oscuro en las primeras horas, por la carencia de síntomas especiales.

El peritoneo es el solo interesado, ora permaneciendo en el interior de la cavidad abdominal, ó formando hernia al travez de la solución de continuidad.

La característica, pues, de las heridas penetrantes sin lesión de las vísceras, es la lesión del peritoneo, y sus caractéres son casi siempre idénticos, observándose diferencias, solo en ciertos signos dependientes de la causa productora de la lesión, bala ó arma blanca, que se distingue por la forma de los bordes, por la amplitud de la sección, por la diversa dirección de la trayectoria.

Conocida sobre manera, es hoy la sintomatología de las heridas penetrantes del abdomen, para que nos detengamos á exponerla; y en igual caso está lo que se relaciona con el valor de algunos síntomas, como el dolor, el vómito, las cámaras sanguinolentas, tenidos antes como patognomónicos, pero que nuevas y serias apreciaciones hacen reconocerlos, como infieles, inconstantes y equívocos. El dolor en multitud de casos de heridas simples es agudo, y se exacerba con la presión, y en heridas con lesión visceral no existe y si lo hay, es mínimo, y vice versa. El vómito bien puede presentarse como un simple fenómeno reflejo, en la vuelta del colapso producido por el temor, ó por una hemorragia abundante; y las cámaras sanguinolentas se presentan en la herida del intestino grueso, ó faltan, como faltan generalmente cuando los intestinos delgados han sido lesionados.

Esbozadas estas ideas generales, pasemos ahora á la parte esencial de nuestro trabajo, la que es móvil de que hayamos acojido la ocasión honrosa que nos brindó este augusto cuerpo; es decir, exponer nuestras ideas sobre el tratamiento de las heridas penetrantes del abdómen; ideas nacidas al calor de ese sentimiento de amor á la humanidad, que se anida en el corazón del médico, y que unido á la experiencia, y al culto del saber, forma esa aureola de gloria que atrae la admiración, arranca aplausos, y levanta á los apóstoles de las ciencias médicas á las alturas de veneración y de la inmortalidad.

En las heridas simples, sin complicación ni de hernias de epiplón ó de vísceras, ni de peritonitis, ¿que tratamiento es el más apropiado y de resultados más satisfactorios? ¿En las heridas con lesión de las vísceras, manifestada esta por síntomas especiales, ó por una peritonitis subagnda, la intervencion quirúrgica debe ser precoz ó tardia? Antes de asentar de modo definitivo, cual debe ser la conducta del cirujano, recordemos ligeramente un punto de alta importancia, y es la diversidad de opiniones, cuando se trata, no de una herida, en que los síntomas revelan una lesión visceral de trascendencia, no de una amplia herida simple que permite comprobar á la sola inspección ocular, su profundidad í carencia de complicación visceral, sino de una herida cuyo único carácter evidente es la penetración. Dividense, pues, las opiniones en este punto, pronunciándose unos por la abstención completa de toda intervención, y otros se deciden por la intervención inmediata. Luego expondremos nuestra manera de pensar en este punto.

Heridas sin lesión de vísceras.—Si el proyectil ha atravezado de parte á parte la cavidad abdominal, y el exámen minucioso y atento del enfermo nos revela un estado general relativamente satisfactorio, nuestra conducta es la oclusion completa de los orificios de entrada í salida de la bala y la inmovilidad absoluta del paciente. Si la bala se ha alojado en la cavidad abdominal, procedemos de idéntica manera sin preocuparnos por la permanencia del proyectil en el interior. Las razónes en que nos apoyamos son, primero: que la herida en todo su trayecto está completamente aséptica, merced á la alta temperatura del proyectil, y luego, la casi certeza de que no vendrá la peritonitis aguda, á complicar la lesión y á darle una gravedad insólita porque hay en la serosa peritoneal una especie de indiferentismo por las reacciones inflamatorias, cuando no son solicitadas por agentes sépticos exteriores ó interiores, y así hemos visto quedar en su cavidad, sangre que se ha reabsorvido sin producir fenómenos patológicos; el líquido de la ascitis, restos de soluciones con las que se han hecho lavados intraperitoneales. (Observaciones I, II, III, IV i V.)

Si la herida de que se trata es de arma blanca, amplia hasta permitir ver los órganos en toda su integridad, es de necesidad urgente practicar un lavado cuidadoso de la herida, hacer hasta donde sea posible el aseo riguroso del peritoneo, suturar profundamente para traer la reunión primitiva de los músculos seccionados í luego superficialmente, ocluyendo despues, con la cura de Lister toda la extensión lesionada. Estos cuidados son de urgencia, pues las heridas por arma blanca son generalmente sépticas. Agréguese á esto, la inmovilización del enfermo, las aplicaciones de hielo sobre el vientre y el uso al interior del opio unido á sustancias antisépticas.

Por lo que respecta al punto, en que hemos dicho hay opiniones opuestas: Cuando se trata de una herida cuya una característica es la penetración, resueltamente nos decidimos por la intervención inmediata, pues ¿no se estaria en presencia de una lesión visceral de trascendencia, que abandonada á si sola acarrearía la muerte? ¿No hemos visto una víscera herida, sin dar notaciones de la lesión que ha destruido su integridad anatómica ó funcional, y que solo revela más tarde la esplosión brusca de un proceso patológico que termina rápidamente con la muerte, ó que la autopsia pone de manifiesto? La única objeción que puede hacerse á la laparotomía exploradora es la de que no habiendo lesión alguna de importancia, se haya practicado una operación inútil, y aún en este caso, ¿es humanitario, es moral que el cirujano, niegue al pobre herido los recursos de la ciencia, y ahogue en una duda inconsciente el noble esfuerzo de su augusta misión? ¿A qué recursos habrá de ocurrir, cuando hecho impotente por el temor, una complicación mortal, le revele con toda la brutalidad de lo imprevisto, la verdad del proceso? La laparotomía entonces sería insuficiente para detener los estragos del mal, y la muerte aparecería entonces, ya que no á los ojos del hombre de ciencia, más sí, ante los del público como una consecuencia forzosa de la operación, y la propia honra, y la dignidad profesional, son vallas insalvables. Así, pues, cada vez que nos encontramos en presencia de una herida penetrante del abdómen, no vacilamos y practicamos sin pérdida de tiempo la laparotomía.

Heridas con lesión de las vísceras.—En estas lesiones, ya sean producidas por arma de fuego ó por arma blanca, la laparotomía se impone con lógica inflexible. Afirmación es esta que no admite discusión ni vasilaciones.

El solo punto cuestionable es, si debe practicarse la laparotomía inmediatamente, ó esperar á que se acentuen los síntomas que marcan la gravedad insólita de la lesión.

Por nuestra parte, haremos nuestra profesión de fé quirúrgica, si se nos permite la expresión, y daremos las razones en que nos apoyamos.

En toda herida penetrante del abdómen, con lesión visceral, aceptamos í reconocemos, como único tratamiento racional y positivo, la intervención inmediata: la laparotomía franca, atrevida, sin vacilaciones ni pérdida de tiempo.

Veamos ahora las razones, para una afirmación tan rotunda, para una decisión tan absoluta.

¿Cual es el objeto primordial de una laparotomía? Ver, palpar la lesión producida en la víscera ó vísceras por el agente vulnerante, en primer lugar; y luego corregir los desperfectos ocasionados al órgano; impedir por medio de una *toilette* directa í rigurosa, que los microorganismos ya entrados con el instrumento productor de la lesión, libren batalla para proclamarse vencedores sobre las ruinas de la célula í sostener con el uso de antisépticos poderosos la vitalidad de esa misma célula para que reaccione favorablemente contra la infección. Un intestino ha sido abierto, ¿debemos esperar que todo su contenido se derrame en la cavidad peritoneal para intervenir?

Hay quienes proponen, esperar á que se presenten los signos precursores de la peritonitis, y ¿cuales serían esos signos precisos, claros, que nos marcasen la proximidad de una peritonitis? El dolor, los vómitos, los sudores, el meteorismo, el abultamiento y dureza del vientre, la macicez parcial ó general, ¿son signos precursores, ó signos que revelan la existencia del gran proceso inflamatorio, de la peritonitis misma? Esta proposición es ilusoria, y no pasa de ser una *charmante causerie.*

Otros opinan porque debe esperarse tambien para intervenir, que la peritonitis se establezca y llegue á su máximum de gravedad, basados en la esperanza de que el proceso inflamatorio se detenga y todo entre en su funcionamiento normal. Basta una rápida ojeada á la diversidad de lesiones puestas de manifiesto por la abertura del vientre, la série de manipulaciones necesarias para un trabajo de recomposición y reorganización completos, ó el tiempo necesario para todo esto, para desechar esta espectativa enojosa, para el cirujano y cruel para el enfermo. No hay en suma, laparotomía más difícil y de éxito más dudoso, que aquella que se practica en pleno proceso inflamatorio, que ha invadido por completo toda la cavidad abdominal. Intestinos distendidos, ligados entre sí por adherencias más ó menos fuertes, más ó menos extensas, que los retienen y dificultan su movilización, y hasta colecciones purulentas, que ocultan las perforaciones, colecciones generadoras de una infección general, que ha tenido ya como precursor, el escalofrio intenso y que testifica y da fé de su presencia la fiebre de alta temperatura y la postración del paciente, que se debate entre el dolor que le desgarra las entrañas y el delirio que le atormenta el cerebro y le arrebata la razón. Tal es el cuadro lúgubre que se presenta en esa hora suprema de la peritonitis sobre aguda y con que nos brindan los partidarios de la intervención tardía.

Como una razón más, en apoyo de nuestra decisión por la intervención inmediata, tenemos la bondad de nuestro clima, de una temperatura casi uniforme, sin oscilaciones bruscas de alza ó de descenso; el aire de nuestras ciudades, casi igual al de nuestros campos, con su oxígeno bienhechor, esparciendo vida á torrentes, proporcionado por nuestra lujuriante y fecunda vegetación, sin los elementos de viciación del aire europeo, por la carencia de hacinamiento de población. Esto es gran parte, para que la generalidad de los trabajos quirúrgicos de nuestro país y particularmente las laparotomías sean coronadas frecuentemente por el éxito más completo, debiéndose las pérdidas, casi esclusivamente á las condiciones generales, ó mejor dicho, al estado orgánico y constitucional del individuo.

CONCLUSIONES.

(1) En toda herida penetrante simple del abdómen, perfectamente comprobada por un diagnóstico inequívoco, la regla es la abstención absoluta de toda exploración, y ocluir, con una cura antiséptica rigurosa el orificio, ó los orificios existentes.

(2) En toda herida simple penetrante del abdómen de amplia abertura (por arma blanca): lavado minucioso de todo el trayecto de la herida, suturas profundas y superficiales, según la profundidad de la herida y oclusión completa con cura antiséptica.

(3) En toda herida penetrante simple, con hernia visceral (hígado, intestino, epiploon): reducción de la hernia, hecha préviamente aséptica, y si la herida es muy péqueña y ha estrangulado la hernia, haciéndola irreducible, y provocando así daño para la víscera: laparotomía.

(4) En una herida abdominal, cuya única característica es la penetración, intervencion inmediata: laparotomía explorada.

(5) En toda herida penetrante del abdómen con lesión visceral: intervención inmediata, laparotomía franca, sin vacilaciones.

OBSERVACIONES.

Personal.

Caso 1.—N. N., natural de Caráca*s*, constitución robusta, de 23 años de edad, entró á mi servicio del Hospital Civil para hombres.

Al exámen, encontramos dos heridas penetrantes simples del abdómen, por arma de fuego (revolver, proyectil, 9 milímetros), los dos proyectiles estaban alojados en la cavidad peritoneal. Ausencia de todo síntoma que revelase la lesión de alguna víscera. Dolor circunscrito á los orificios de entrada situados: el uno á cinco centímetros por debajo del ombligo y tres centímetros á la izquierda de la línea media; el otro, á cinco y medio centímetros por delante y arriba de la espina ilíaca superior anterior.

Antisepsia de toda la pared exterior del vientre, oclusión de los orificios con colodión iodoformado, cura húmeda de Lister.

2º dia: Persistencia del dolor al nivel de los orificios. No hay reacción febril. Estado general, bien.

3er dia: Ligero meteorismo. Temperatura, 37.3°; pulso, 80. Dolor de igual intensidad.

4º dia: El meteorismo ha desaparecido. Dolor mucho menor. Temperatura, 37°; pulso, 76.

Desde este dia todo se normaliza i marcha bien, hasta el dia 12, que deja el hospital en completo estado de salud.

Caso 2.—N. N., italiano, de 40 años de edad, buhonero de profesión, alcohólico, entró á mi servicio del Hospital de Hombres, por una herida penetrante del abdómen por arma de fuego.

Al exámen, encontramos que la herida habia penetrado á cinco centímetros por encima de la sínfisis pubiana y un centímetro á la derecha de la línea media, saliendo el proyectil á medio centímetro de la apófisis trasversa de la 3a vértebra lumbar, hacia la izquierda.

Ausencia de signos especiales á las lesiones viscerales.

Antisepsia de toda la región. Oclusión completa de los orificios de entrada í salida del proyectil. Cura húmeda de Lister.

Al dia siguiente el estado del herido es satisfactorio.

En los dias subsiguientes nada de anormal se presenta.

Al 8º dia se levanta el apósito, y se encuentran los orificios de salida, rasados, llenos de mamelones carnosos de rico aspecto. Se hace una nueva cura, seca.

Al 17º dia se levanta el apósito, y la cicatrización de los orificios es completa.

A los 20 dias, abandona el enfermo el hospital completamente bueno.

Por Dr. F. A. Rizquez.

Caso 3.—N. N., de 30 años de edad, natural de Carácas, fué herido por arma de fuego (revolver, calibre 9 milímetros).

La bala penetró en toda la región hipogástrica, quedándose alojada en la cavidad peritoneal.

Ausencia de síntomas que revelase la herida de algún órgano.

Cura oclusiva antiséptica rigurosa; espectación.

Cura sin complicaciones de ningún género á los 23 dias.

Hace hoy tres años del accidente y el estado de su salud es perfecto. De la bala, aún se ignora el sitio en que haya permanecido alojada, pues ningún síntoma, ni malestar lo determinan.

Caso 4.—Señor N. N., natural de Carácas, de 25 años de edad, fué herido con arma blanca.

El puñal penetró por debajo del reborde costal izquierdo.

Al exámen se comprobó: Una herida penetrante del abdómen con hérnia del epiplón.

Ausencia absoluta de síntomas que indicasen una herida del estómago.

Antisepsia del epiplón, reducción de este. Cura oclusiva.

Treinta horas despues, ligera inflamación peritoneal, circunscrita á los alrededores de la herida.

Al 4º dia, desaparición del ligero proceso inflamatorio.

Curación rápida, y completo restablecimiento de la salud á los diez y seis dias.

Personal.

Caso 5.—N. N., Canario, de 35 años de edad, jornalero, en una riña recibe una herida de arma blanca (cuchillo de zapatero).

Al exámen sé encontró una herida penetrante del abdómen, de siete centímetros de longitud, situada en la región epigástrica, como á cuatro centímetros distante, por encima, del ombligo, complicada con hernia del colon traverso. Fué visto por nosotros dos horas y media despues del accidente.

Asepsia del intestino y epiplón; gran lavado de toda la región y de la herida, reducción del colon; sutura profunda con catgut; sutura superficial. Cura oclusiva. Opio al interior y aplicaciones de hielo al exterior.

Peritonitis localizada al rededor de la herida, sin tomar proporciones agudas.

Al 5º dia aún quedan vestigios de la inflamacion peritoneal.

Al 10º dia las funciones intestinales se normalizan. El orden fisiológico, comienza á recobrar su imperio, y la curación es completa sin otra complicación á los 28 dias.

PRACTICAL POINTS IN THE TREATMENT OF HIP DISEASE.

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Hip disease may be called a semimalignant affection because of its duration and its destructive quality. But it is almost never fatal. In every large community there are many healthy and active adults, who bear traces of this disease in scars and deformity, many of them never having had adequate treatment. In all stages of the disease it may be predicted, excepting in patients who are exceptionally unfortunate in their surroundings, that the time will come when the forces of nature will rally and repair take the place of disintegration.

In approaching the subject of treatment it is necessary to bear in mind that the destructiveness and inveteracy of this disease are largely the result of mechanical environment. Its full counterpart in the upper extremity is not found, evidently because in the upper extremity the focus ignited in the cancellous tissue is, as a rule, resolved at an early stage by reason of the exemption of the upper extremities from the labors and hardships attending locomotion. We can not do better, therefore, than to nullify pernicious mechanical environment. By so doing we directly banish trauma from the part affected and indirectly fortify the general health and in both ways invite the advent of the "natural cure."

The three cases which are to be cited illustrated the good effect of mechanical treatment in the most unpromising cases.

Case 1.—A boy, 6 years of age, presented an enormous abscess and all the usual symptoms of the last stage of the disease, which had continued in the right hip for nineteen months. Exsection of the joint had been urged by a surgical attendant. The abscess opened spontaneously on the first day the patient was seen and before treatment could be begun. The child's general condition was bad. The limb was greatly adducted and flexed, and the slightest disturbance of the joint elicited screams of pain. Mechanical treatment was begun the sixth day after the patient was first examined. Pain was relieved at once. He was enabled to be out of bed without delay and out of the house nearly every day throughout the entire course of treatment which lasted two and a half years. The affected joint received the benefit of fixation, or a reasonable degree of immobilization, and was thoroughly protected from the traumatic incidents of locomotion. The adduction of the limb gradually and painlessly disappeared as the boy made use of the limb protected by the splint in walking and flexion was reduced till the limb was in a position favorable for locomotion. Wearing the splint, the patient pursued the ordinary occupations of a boy of his age, while the reparative process supplanted the ravages of disease.

The abscess, already referred to, was followed at irregular intervals by other purulent collections which were incised or allowed to open spontaneously. At one time there were nine sinuses about the joint, all derived from diseased bone. Five of these extended in a line down the outer side of the thigh from the trochanter to near the middle of the shaft of the femur, as seen in fig. 1. The position of these sinuses, from one of which a sequestrum was extruded, and the attachment of the resulting cicatrices to the bone showed the shaft of the femur was to a great extent involved in the destructive process. The patient's condition six months after the cessation of treatment is shown in figs. 1 and 2. The limb is in good position, neither abducted nor adducted, and flexed at a slight angle, enough to allow him to sit comfortably and yet not enough to interfere with graceful locomotion. He walks with firmness, runs fast, and never uses a cane. There is practically no apparent shortening; that is, the shortening due to adduction and flexion. The "real" shortening is 1 inch, due partly to changes in the femoral head and neck, but more to the fact that the skeleton of the affected limb is smaller than that of the well limb. This difference is seen in the difference between the outlines of the feet, as shown in fig. 3, and is also due partly to the fact that the growth of the affected limb has been retarded by disease while the development of the well limb has been forced by over-exertion for so long a period. The position of the sinuses is shown in the figures. The scars are depressed and attached to the deep fasciæ and bone. They are numbered in the order in which the sinuses appeared. Figs. 1, 2, 4, 5, 7, and 8 are copied from photographs.

Case 2.—A girl, 3 years of age, had a family history in which the mother, the maternal grandmother, and three paternal uncles and aunts had died of pulmonary tuberculosis. (The family histories in cases 1 and 3 were remarkably free from similar incidents.) The disease had been present in the right hip a year or more. Treatment had been by the immovable plaster of paris dressing, the wheel-crutch, and by portative apparatus in which there was provision for motion at the knee but not for traction. When first seen the child presented the marked adduction and flexion characteristic of an advanced stage. She had suffered for several weeks the severe pain which forbodes an abscess, and is due probably to the retention of pus in the cancellous tissue of the bone. Soon after the application of mechanical treatment the position of the limb improved, adduction giving place to abduction, and flexion being materially reduced. The pain ceased as the result perhaps of the escape of pus from the hard shell inclosing the cancellous tissue. Five months after treatment began the pus was released from the soft parts by incision, and in the following eighteen months five other sinuses were established spontaneously or by incision. Their location and order are indicated in figs. 4 and 5 which show the child's condition eight months after the cessation of treatment. The scars are attached to periosteum and deep fasciae. Her health is perfect and she walks and runs without assistance of any kind. The position of the femur is favorable both for walking and sitting, there being no abduction or adduction, and but a moderate degree of flexion. The real shortening is only one-fourth of an inch. The outlines of her feet is shown in fig. 6. When she walks with care it is difficult to perceive any defect although the motion in the joint itself is so slight as to be of very little use in locomotion, advantage being unconsciously taken of the flexibility of the lumbar region of the spine and of the unimpaired mobility of the sound hip-joint. Fast walking and running develop a limp but not enough to exclude her from the ordinary pastimes of youth.

Case 3.—A boy of 7 years had suffered from disease of the right hip for four years. His father was a dealer in surgical instruments, and the boy had worn elaborate appliances, the chief defect of which had been in the slight construction of the frame of the portative splints which had failed to make sufficient traction or to relieve the affected joint from the weight of the body in standing and walking. The usual signs of an advanced stage were present, and an abscess was pointing when treatment commenced. Improvement in the position of the limb was soon seen. In course of time four sinuses were established either spontaneously or by incision as seemed to be necessary. The case progressed favorably and the duration of treatment was four and a half years, lo-ger than was necessary through excess of caution and anxiety on the part of the father. Figs. 7 and 8 show the boy's condition eighteen months after all treatment was discontinued. Scars 2 and 4 are attached to the underlying bone. He takes long walks to and from school, is a good skater, and walks and runs with greal speed although motion in the joint is practically wanting. He never uses a cane. When walking carefully, there is no defect in his gait. There is one-half inch of real shortening. The outlines of his feet are shown in fig. 9. The position of the limb is good, there being a moderate degree of flexion, enough to facilitate sitting, but not enough to interfere with graceful locomotion. There is neither abduction nor adduction.

Since these cases were reported the patients have retained their health and activity, but two of them have lost some of the symmetry above noted. The femur became flexed and adducted, not enough to compromise ability in locomotion, but yet enough to give a defect to the gait. This is evidently the result of a failure to retain the prescribed natural rhythm of walking. The third patient, becoming a medical student, understood and appreciated the importance of rhythmical locomotion, and retains the symmetry recorded.

These cases are not presented to illustrate the achievements of mechanical treatment in early and promising cases, but to show what should be the result in cases of the worst kind taken in advanced stages, provided the assistance of intelligent and thrifty parents is assured. In favorable circumstances and with treatment begun at the earliest sign of a focus, the result should be, and sometimes is, such as to make it difficult by careful examination and measurement to discover any asymmetry or trace of disability.

The same general rules or principles of treatment hold good in the earliest stage and in the most desperate and advanced stages. Treatment should make sure of four things: (1) Preservation of the general health throughout the treatment; (2) the arrest of motion in the joint in the acute stage; (3) the removal of the weight of the body from the joint in all stages; and (4) provision for final symmetry and locomotor ability.

The first consideration is the general health of the patient. On this we rely, in the absence of specific medication and established operative procedures, for the natural return of the affected part from progressive destruction to progressive repair. Can a patient thus beset be better off than when equipped so that he can rise from his bed after a painless sleep and pass the day up and dressed, and with his schoolmates and playfellows, his appetite and respiration stimulated by happy hours passed in the fresh air and sunshine? With suitable mechanical equipment the patient should not, and will not if left to himself, pass an hour of his waking time in the invalid's bed.

Second, the arrest of motion in the joint may be amply secured by the traction exerted by the hip splint in those stages in which it is required by the painful condition of the joint and the apprehension which the very thought of articular disturbance excites in the mind of the patient. Absolute immobilization is out of the question from the mechanism of the hip-joint, but fixation, or a reasonable degree of immobilization, is easily produced and conveniently maintained.

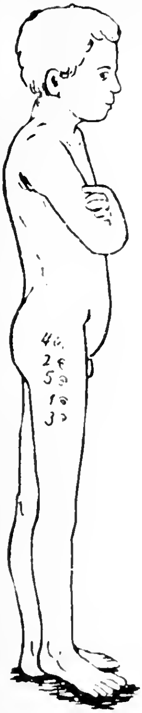
Third, the patient equipped with the hip splint when standing and walking is prevented from putting his weight on the joint. The heel can not reach the ground. The patient sits on the perineal strap of the apparatus, which is essentially a crutch head applied to the ischiatic instead of the axillary region. With this arrangement he wears a high sole on the well foot to make up for the factitious length which is given by the splint to the affected side. It is not entirely fanciful to say that the patient is sitting while walking, because he alternately stands on the well foot and sits on the perineal strap. An adult patient tells me that when tired he rests while still erect, by leaning against some support and sitting on the hip splint. It was thought at one time that it was impossible for a patient to go for any time touching the ground with only one foot. With the hip splint, however, children run about for years, putting their weight on the well limb alone, the affected leg being thus converted into a pendent member, like the arm. The result is immediate relief from urgent symptoms and the promotion of recovery.

Fourth, the patient while wearing the hip splint may be induced by instruction and drill to give up the "false time" of his footsteps, which is the chief cause of the deformity and limp of hip disease, and to return to the natural rhythm of human locomotion, in which equal time is given to the two feet. The result of walking habitually in this way is at once the abolition of a great deal of the appearance of lameness and in time the correction of deformity, because the adducted limb will pass, without conscious effort on the part of the patient, from adduction to abduction (with, at the same time, and for the same reason, a decrease in flexion), in order to place itself in that position in which it can best do its half of the work of progression, thrown upon it by the adoption, or rather the resumption, of natural rhythm or "correct time" in walking.

A few words are in place describing the apparatus and its application. Its frame is made of steel. In use it does not require to be bent, as so many pieces of orthopedic apparatus do: therefore it may be well, but not too sharply, tempered. It consists of upright and pelvic band, as shown in fig. 10. The upright, shown in fig. 11, extends from the ground to a point about midway between the iliac crest and the trochanter. It is flat, with its width laterally disposed, and its thickness anteroposteriorly, an arrangement by which the strength of the metal is in the direction of the strain when the patient's weight is borne by the instrument. It is composed of a bar and a box, the former being propelled in the latter by a rack and pinion, and held at the point of election by suitable mechanism. The box is attached above to the pelvic band and the bar ends below in the footpiece, which is shod with leather and carries two leather straps. A high sole for the well side is conveniently carved from a block of light wood and fastened to the sole of the shoe in the manner shown in fig. 12. Properly shaped and stained it is quite as presentable as the more expensive cork sole. A kneepiece is adjustable on the upright, and, being of soft steel, is easily adapted to the size of the lower part of the thigh.

If the patient is tall and requires a longer upright, this piece is carried on the bar, instead of, as in figs. 10 and 11, on the box, thus doing away with the necessity of increasing the length of the latter with the increased length of the upright. A piece of webbing is buckled around the upright and the limb at the lower part of the thigh, and a leather strap around the upright and the lower part of the leg. The pelvic band, shown in figs. 10 and 13, is a nearly semicircular piece of bar steel, covered with leather, or better with hard rubber, the angle of its attachment to the upright being adjustable and firmly fixed by a bolt and nut. It carries the perineal strap of webbing padded with blanketing and covered with Canton flannel. A strip of adhesive plaster from 1¼ to 3 inches wide and ending below in a buckle extends on each side of the limb from the middle of the thigh to the lower part of the leg. The plaster is protected by a legging made of twilled muslin provided with eyelets for lacing.

To apply traction to the limb, the leather straps attached to the foot piece are buckled to the adhesive-plaster strips attached to the limb, the perineal strap is buttoned over the ends of the pelvic band, and the rack is propelled in the direction of the foot by the pinion or key. In practice, if the patient is more than a mere child, he uses the key at will, and may be depended on, if the joint is in a painful or tender condition, to keep up steady traction as long as there is any indication for its use. It was thought at first that traction thus applied relieved pressure on painful articular surfaces, but there is excellent reason to believe that its good effect is due to the fact that it assists the patient in his conscious and unconscious (voluntary and reflex) efforts to keep the joint from motion; in other words, that it produces fixation, or a reasonable degree of immobilization. The knee piece is useful in the same way. Worn at the lower part of the shaft of the femur it hinders motion at the knee and, *pari passu*, at the hip. There is probably no more distressing sight



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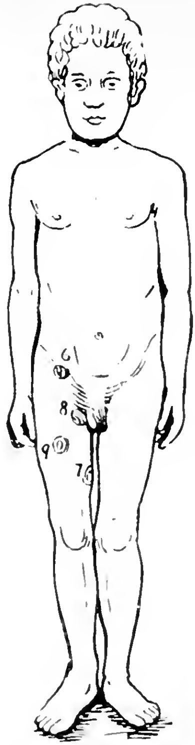

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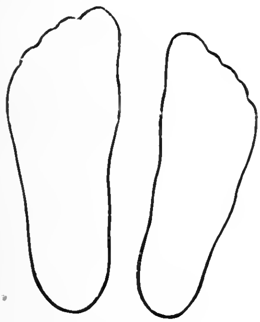

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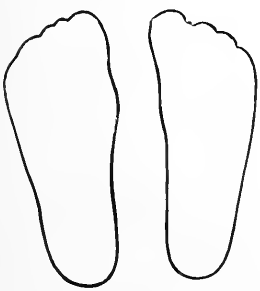

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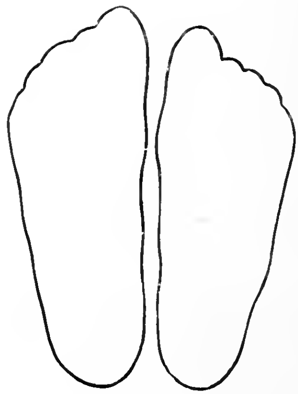

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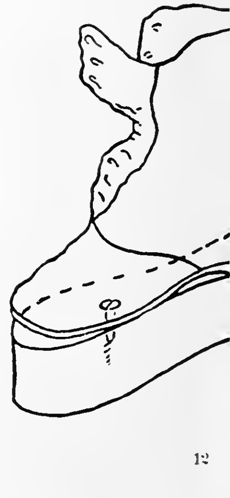

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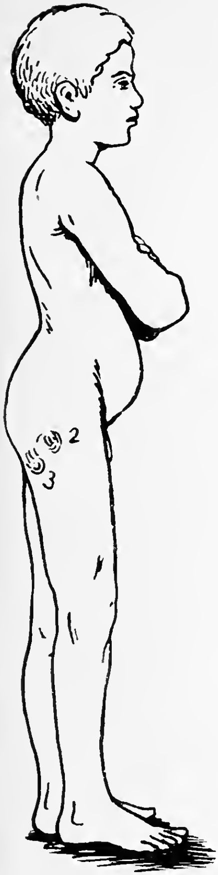

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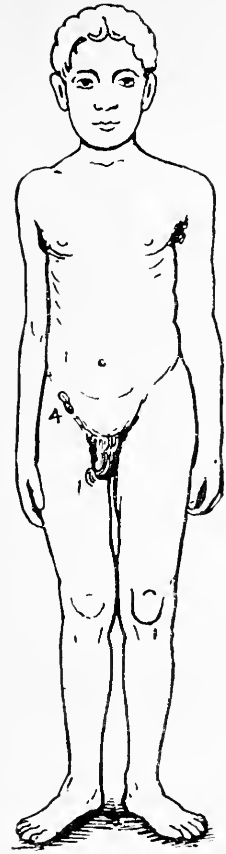

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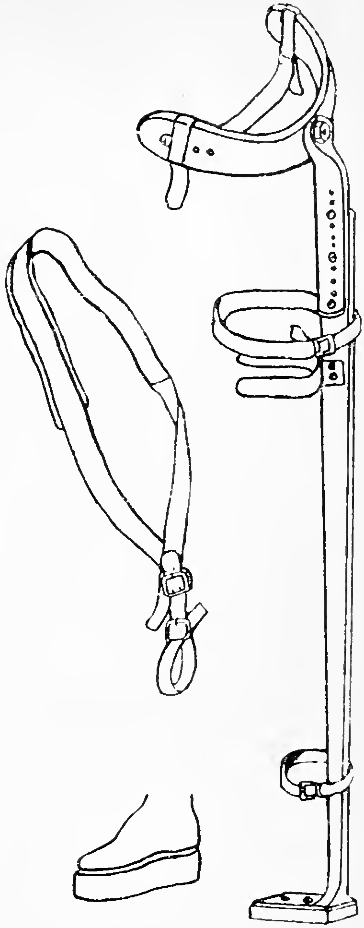

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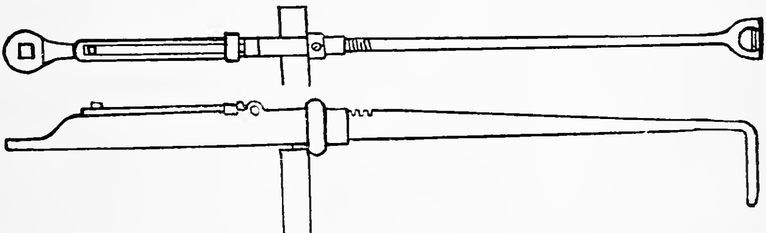

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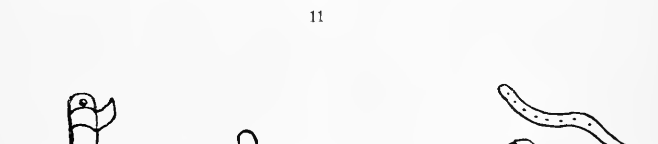

10

OF HIP DISEASE.

than that of a patient in the acute stage of hip disease, and no resort of surgery is more simple in *modus operandi* and more certain to give relief than the application of traction in this way. It is not to be overlooked that traction thus applied secures whatever benefit may accrue from the counteraction of the circumarticular muscles.

In this stage the apparatus should be applied, although abscesses and great deformity are present, as in the exceptionally difficult cases related above. The end of the pelvic band may extend obliquely over the chest on account of the adduction of the limb. It may even be necessary at the beginning to attach the perineal strap by buckles instead of loops, to gain for it a suitable length, and in some cases to apply it to the perineum on the sound side. But with care and gentleness the apparatus can be arranged in some way so that a slight and increasing amount of traction is effected. Immediate relief from pain is followed soon by reduction of the deformity, so that in a few days the restored symmetry of the patient's figure will enable him to wear the splint properly adjusted and comfortably. The pelvic band may then be brought down to its proper place on a level midway between the anterior superior spine of the ilium and the pubic bone. It may thereafter be kept at that level if the perineal strap is of the right length and suspended by loops instead of buckles. A bedridden patient treated in this way soon recovers strength from the return of sound sleep and before long seeks to leave his bed and try walking without crutch support except that afforded by the perineal strap. A high sole is attached to the shoe of the well foot, and a shoulder strap, shown in fig. 13, transfers the weight of the splint to the opposite shoulder, and he is instructed in the necessity of acquiring, as soon as it can be done by daily effort, the habit of moving his feet in correct time. He then ceases to be seen at his home or in the hospital ward, and becomes an "office patient" or "out patient."

The splint as thus far described is to be worn day and night. It makes traction on the limb and protects the joint from the traumatisms of walking. The latter is necessary in all stages of the disease, but there are long periods when traction is not necessary, when all that the patient requires is a perineal or ischiatic support to keep the affected limb from reaching the ground. The adhesive plasters and the rack and pinion and other machinery for maintaining traction may therefore be dispensed with during a large part of the treatment. The simple upright shown in fig. 13 may then be used instead of the upright shown in figs. 10 and 11. Alteration in the length of this upright and adjustment of the knee piece are provided for in a simple manner. The adhesive plasters are removed from the limb and the leather straps from the foot piece, but in all other respects the apparatus is applied and worn as if it were a traction splint. Thus simplified, however, it is essentially an ischiatic crutch, and, like any other crutch, it is to be laid aside at night.

In closing, it may be said that the apparatus thus arranged as a crutch may be useful in many other affections besides hip disease. If its simplicity and convenience were generally recognized, it might facilitate the treatment of any disease or injury of the lower extremity in which it is desirable to let the patient take exercise without using the affected limb.

EPITHELIOMA OF THE TONGUE AND ITS TREATMENT.

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If the literature of the lingual neoplasm be studied, it is found that the chapter consecrated to malignant genus has been gradually undergoing change. Formerly, writers recognized here the existence of four species—viz, scirrhous, encephaloid, melanotic, and cancroid or epithelioma; to-day, by most writers the generic tree is stripped of three of its branches and there remains only epithelioma as the sole type of malignant growth appearing in the tongue; although a few authorities contend that both epithelioma and carcinoma may appear in the tongue, yet Paget, Hutchinson, Thiersch, Billroth, and Otto Weber find epithelioma to be the only form of malignant tumor that attacks the tongue; and these authorities claim that the only cases they have seen where carcinoma was present, were those in which the disease had reached the tongue secondarily after having commenced primarily in contiguous structures.

Pathologists teach that the constituent element of the epithelioma is the epithelial element disposed in horizontal or concentric layers superposed on each other; and such cells, even in stratified arrangement, are sometimes found deep beneath the surface, so deep, indeed, that Weber claims they have arisen from connective tissue elements; Thiersch admits the same, although unwillingly, his theory allowing of the origin of epitheliomatous cells only from preexistent epithelial cells.

Epithelial cancer, according to its site or to its situation in respect to the surface of the tongue, may be divided into two classes, viz, the excrescent and the internal or interstitial, and each of these may arise from a papilla, wart, naevus, or from a limited abrasion, which may be a crack, a fissure, or a plane erosion; and these initial points of commencement, if examined early, have no characteristics of epithelioma.

If the unaffected lingual papilla be examined histologically, it is found that the cells which invest it have an arrangement similar to that possessed by all other normal papillæ, but when the epitheliomatous change occurs then the papillæ become radically altered in their form, in fact, they become crowded out of existence by the invading strata or lines of multiplying epithelial cells.

In the excrescent or papillary species the growth is outwards rather than inwards; tuberculated, crested or wart-like prominences isolated or forced into an uplifted plateau, stand on a hardened base.

In the internal form there is, besides growth outwards, especially a development inwards of epithelioid calls which penetrate between the muscular fibers and along the tissue which incloses the vessel and nerves. The invading new-formed elements crowd on and destroy the muscular tissue, the walls of the lymphatics, and of the blood vessels. The cells in this deeper situation are more permanent than those which develop at the surface; the latter, by their remoteness from vascular supply, and especially by their exposed situation, are being constantly detached and thus the uplifted structure presents a raw surface. This eccentric or superficial growth may be sessile or pedunculated, and often rises into crests resembling the cock's comb. It is situated usually on the dorsal or anterior face of the tongue, and less often near the epiglottis. The tumor may also be mulberry-like in form, with reddish tint and bleeding when touched. The lingual epithelioma of surperficial site occasionally attains proportions too immense to be retained in the buccal cavity.

The penetrating species commences, according to the author's observation, most usually on the side of the base of the tongue near one of the ends of the **V**, which the calyciform glands there form, or, more definitely located, it begins in the sulcus between the base of the tongue and the palato-glossus muscle, and thence extends upward on the base of the tongue, as well as laterally on the wall of the pharynx. This small ulcer ever rests on a hard base, and it is bounded by irregularly notched or jagged edges, which, from being undermined, sink and become infolded. If this ulcerated structure be compressed between the fingers, thereby whitish or grayish vermiform bodies are forced out, and these, examined microscopically, are seen to be a conglomerate of epithelial cells.

The ulcerating process is unilateral and it rarely crosses the fibrous median septum of the tongue; when situated posteriorly, it finally, in its lateral extension, attacks the alveolar process of the lower jaw.

Instead of this posterior site, it may appear on the free border of the tongue anteriorly and at or near the tip of the organ. In two cases the writer saw the epithelioma on the free border midway between the base and the tip of the tongue, while in a third case the disease occupied the anterior border of the tongue and extended backwards along the border equally on each side for a distance of a half inch from the median line.

Both in the deep and in the excrescent form the ulcerative process finally reaches and opens blood vessels, and thus hemorrhage, slight or profuse, occurs and weakens the patient. The taking of food into the mouth and its mastication is the source of so much pain that the patient voluntarily abstains from food, and from this cause he emaciates and loses strength. The decaying, ichorous, feted materials, which are generated and detached from the ulcerating surface, are partly swallowed, or they pass through the windpipe to the lungs. In the former case the material, being absorbed, vitiates the blood; in the lungs such material is not only absorbed into the circulation, but it also acts locally on the pulmonary structure causing an adynamic pneumonia.

The morbid agencies just enumerated are reinforced after some months by the appearance of the disease in the lymphatic glands, and this metastatic development corresponds, as a rule, to the affected side of the tongue; it is only exceptional that the metastasis appears on the opposite side. The infected gland or glands, though swollen, are for some time very movable; later they become adherent to the adjacent tissues, and finally to the overlying skin, so that the whole is a conglomerated mass of heterogeneous structures, in which glands, muscles, vessels, nerves, are almost indistinguishably fused together. The glands initially infected are those which lie internal to the angle of the lower jaw, and just behind or below the submaxillary salivary gland. Later this fused conglomerated structure becomes very closely adherent to the skin, which is thickened and often presents one or more folds with intervening depressions.

There is but little pain in this morbid mass of secondary infection. The swollen glands are painless, and this painlessness is a cause that the attention of neither physician nor patient is drawn to these glands until their presence is plainly disclosed by visible swelling. But as the treatment and prognosis of lingual epithelioma are intimately connected with the condition of these glands they should be carefully examined; this examination should be one of skilled tact and care, and should be made at an early stage of the disease; by placing one finger on the outside of the lower jaw and another on the inside the structures of the floor of the mouth are included and may be exp'ored; the region around the submaxillary gland should especially be examined; thus an indurated gland, if present, can be discovered, and, if there be doubt, the normal condition of the opposite side will serve for corrective decision.

The mass of agglutinated tissues continuing to enlarge, the central portion afterwards commences to soften, and finally the skin opens and an ichorous fluid containing cheesy fragments is discharged. At first this opening is a small orifice, but it continues to enlarge until it becomes a free, crater-like outlet, which ever enlarges without any sign of healing. Should this mass be removed before it opens, there will be found in it a central cavity containing softening material; the outlines of the cavity are irregularly notched, jagged, and of a dark, livid color. When such cavity is, however, allowed to open, although it freely discharges the breaking-down material, yet this has no limiting effect on the progress of the disease; the conglomerated mass continually incorporates into itself other tissues which are adjacent to it; it passes from the side originally invaded to the other, and finally the front upper portion of the neck is involved; in this enlarged field other openings may form.

Another form of metastatic invasion of the structures of the floor of the mouth and of the upper part of the neck, has been seen; in this there is little or no disposition to suppuration; there is swelling and rapid infiltration of the parts mentioned; the skin remains white, and the affection has no definite bounds. It is accompanied by an oedema of the base of tongue and entrance of the larynx; the oedematous swelling may quickly cause death by occluding the glottis. The case here is allied to the purulent oedema described by Pirogoff, since, if after death, these affected tissues be opened with the knife, there escapes a sero-purulent fluid with which the swollen structures are saturated.

The course and duration of lingual cancer, when allowed to run its natural course, will, according to Demarguay, complete its fatal work within fourteen months; and this short period, he says, may yet be abbreviated if the disease be unwisely attacked. The history of operative interference, as usually found in surgical works, does not offer an encouraging prospect for the patient, as nearly all authorities report recurrence after operation. One writer, however, Otto Yust, presents figures much more favorable; he states that recurrence takes place in only twenty-five per cent of the cases. The writer of this article fully shares the opinion of Yust, and further believes that even more than 75 per cent of patients could be saved if the disease were seen in its primary stage and treated then by intelligent surgery.

Meddlesome ignorance too often monopolizes the precious weeks, when proper treatment might rescue the patient from death. Intelligent management can prolong life although the disease be not cured, for after operation the average duration of life has been two years. The absence of glandular metastatic infection adds much to the prospect of nonrecurrence; in fact, it may be regarded as almost a guaranty against return.

In case of relapse the epithelioma commonly reappears at or near its primary site; or, it may appear in the subjacent glands. It has been observed that when the disease recurs, it grows at a far more rapid rate than it did prior to the operation.

The causation of epithelial cancer of the tongue is unknown; it is evident, however, that certain agencies do promote its evolution; as such may be cited, calcereous incrustations on the inner face of the teeth, sharp points or edges of the teeth which may continually wound the borders of the tongue, the habit of thrusting the tongue into an interstice between teeth, or into the hollow of a decayed tooth. The use of tobacco is, probably, a casual agency, and this explains the far greater frequency of the disease in men than in women, who seldom use tobacco. That the man is often less attentive to the cleanliness of his mouth than the woman, predisposes the former to epitheliomatous affection, not alone of the tongue, but of the entire walls of the buccal cavity.

Age has an important bearing in the development of the tongue; epithelioma here seldom appears under 40 years of age; it oftenest occurs between 40 and 70 years of age; yet there may be exceptions to this, since Billroth saw the disease in a youth 18 years of age.

DIAGNOSIS.

The diagnosis of lingual epithelioma is of the utmost importance. One unfortunate error which has sometimes been made is that of confounding syphilitic affection with cancerous disease of the tongue; to avoid such misapprehension the surgeon should have in his mind a definite picture of the manner in which syphillis affects the tongue.

Syphilis may appear as the primary chancre on the tongue, and then the appearances are similar to those of the disease when seated on the mucous membrane of the lips, and, to test the matter, if the chancrous lingual ulcer be cauterized and touched with a mild astringent, the ulcer will heal; but if it be cancerous such mild local treatment will fail to heal the lesion. A primary syphilitic sore may heal spontaneously, the epithelial ulcer grows larger instead of less.

The secondary manifestations of syphilis, according to one of the most competent authorities, Fournier, may present themselves in one of the following forms: (1) Ulcerating syphilide or eruption; (2) nonulcerating gummy eruption, and gummy growth within the tongue.

(1) The ulcerating eruptions are small lenticular ulcers which are round when seated on the dorsal surface, but when on the sides they are more angular in shape. They appear in solitary or in crecentic groups, are indurated and chronic in duration, and when touched, or if the tongue be moved, they are painful.

(2) Nonulcerating syphilitic eruption of the tongue, named, also, lingual sclerosis, or plastic glossitis, presents itself in the form of round and irregularly shapen nodules, which are situated in the surface of the tongue and rise somewhat above it; the overlying mucous membrane is redder and smoother than normal, and it appears thickened and as if the papillæ had been removed from it. The entire surface of the tongue may be the site of such syphilides, and then the teeth make impressions on the side of the tongue.

(3) Gumma (better gummi) may develop in the mucous membrane of the tongue or in the muscular tissue of the organ. Gumma lies in or near the dorsum of the tongue, and should it commence deeper it then grows toward the dorsal surface. There are usually from one to four gummatous tumors in the tongue, and they may be small, or so large as to protrude the tongue from the mouth. When in the mucous membrane it is diminutive, but when in the muscular tissue it may attain the dimensions of a walnut. Such gummatous growth may ulcerate and present a hollow cavity filled with gangrenous structure, and for years this may remain open. Unless it opens, the lingual gumma is painless, but when it opens, speaking, chewing, swallowing, and other acts in which the tongue is concerned, are interfered with and there is consequent pain. The saliva is increased in quantity and the breath becomes fetid; taste is unimpaired and the glands rarely swell.

This is Fournier's description of the syphilitic eruptions of the tongue, which he says may be confounded with lingual cancer; the latter, however, appears in the old, while syphilitic eruptions appear oftener in the young and robust subject. Cancer may be inherited, which is rarely the case with lingual syphilitic manifestations. Cancer remains a tumor, although it be ulcerated in its surface, and its base has a better defined induration than is the case with the ulcerated gummy tumor. Cancer appears on one side, while syphilis is bilateral in its development. Lingual cancer is more spongy than the syphilitic growth, the former is inclined to bleed, while the gummy growth is not. Cancer has less steep edges than a gummy ulcer; the former granulates less, is not so covered with gangrenous tissue, and it has a more fetid odor than the gummy ulcer. In the advanced period of lingual cancer the adjacent glands become implicated; this is rarely the case in gummy ulcer. The writer will add that it is rare that secondary syphilis has so isolated a location as the tongue; if found there, it should also manifest itself elsewhere.

Langenbeck, in 1881, gave the following differentiating mark between syphilitic gumma and lingual cancer. Gumma presents one or more rounded, flattened tumors, on which the mucous membrane appears smooth and shining, and the remaining mucous membrane presents a warty, fissured aspect. Gumma appears in the muscular structure of the tongue, and never in the submucous tissue of the floor of the mouth. Multiple tumors indicate syphilitic disease. Cancerous disease is more painful and it bleeds easily. It soon passes to the floor of the mouth, where gumma does not appear. Langenbeck observed cases in which neglected syphilitic disease of the tongue became cancerous.

Demarguay observes that gummy tumor of the tongue is at first round and hard, and later this softens in the center; conditions not found in cancerous disease.

Boyer states that cancer attacks by preference the sides and point of the tongue, while syphilis appears oftenest in the median part and on the base of the tongue.

TREATMENT.

Epithelial cancer in its commencement is a purely local disease, and at this stage it is curable by appropriate treatment; but if the disease be allowed to progress and attack the greater portion of the organ, and, especially, if the glands beneath the floor of the mouth have become infected, then treatment will aim rather at palliation than at eradication of the disease. Where the disease already occupies all of the tongue, or its greater part, noninterference should be the guiding rule; in such state the surgeon's hand by attempting to remove the disease would only stir the fire and widen the area of the flames. But in all cases in which the disease is circumscribed to a portion of the tongue that can be so operated on that the track of extirpation will be wholly within the sound tissues, then an operation may be resorted to, with strong probability of curing the patient.

Three different routes have been recommended for operative procedures upon the tongue, namely: through the floor of the mouth, through the mouth itself, and thirdly, through the lower part of the cheek. Numerous methods in the work of extirpation have been proposed and followed. Though multifarious, these may be placed in the following classes: Cauterization, potential and actual; ligation, immediate or gradual; excision, by knife, scissors, écraseur, or by thermal cautery. One or more of these methods finds illustration in the work that has been done by eminent surgeons whose procedures in somewhat chronological order here follow:

In 1842, Regnoli, to remove the tongue, made an incision from the os hyoides to the symphysis of the chin, and then made a second incision along the inner border of the inferior maxillary arch; then through the two flapped openings thus made, the tongue was drawn down and excised. In this way he removed the tongue of a girl who recovered so well from the operation that she spoke clearly and distinctly.

In 1850, Nélaton found that division of the lower jaw through the symphysis was an important aid in the operation of excising the tongue; the jaw was divided by means of a chain saw, and after the removal of the tongue he reunited the halves of the jaw by means of a ligature which included the front teeth on each side; the incisors and canine teeth were tied. Sedilot, in a comparison of Nélaton's plan with that of Regnoli, prefers the former since it renders more of the tongue accessible to the operator; he thinks, however, that mere fixation of the sides by dental ligation is an imperfect plan; and, to more securely fix the parts, he would so saw the sides that one end would have a solid angle which might be received in a hollow angle in the other end.

. Near the same period Syme operated in somewhat the same manner as Nélaton; viz, he divided the lower jaw through the symphysis, and English writers name this method as that of Syme.

In 1858, Demarquay operated in the following manner: A vertical incision was made through the lower lip when the lower jaw was divided in the median line with the chain saw; the tongue was excised with the écraseur, and the divided bones reunited by means of a gutta-percha appliance; a complete recovery was thus obtained.

Thiersch, in 1865, wrote on lingual epithelioma, and finds that it commences oftener on the edges of the tongue than elsewhere.

Since the disease advances insidiously, undermining parts that are sound, he prefers to do the work of removal with the knife rather than with the thermal cautery or the écraseur. As a preliminary to the removal, he ties the lingual artery, which he ligates near the os hyoides, of which the corner should be fixed with a tenaculum. In one case Thiersch tied the right and left lingual arteries, and in another case, not finding the lingual, he ligated the common carotid artery.

Nunneley, an English writer, in 1866, from his experience in five cases of cancer of the tongue, pronounces the operation of removing the organ to be void of peril. In three of his cases the disease did not return. He removed with the écraseur. To do this Nunneley first thrust a curved needle between the hyoid bone and the lower jaw, letting it emerge under the tongue near the frænum. By this means the écraseur was drawn into the mouth and over and behind the root of the tongue. To aid in applying the écraseur the tongue must be drawn well out of the mouth. The division of the parts must be done slowly, so as to insure the closure of the vessels.

Paget, to remove the tongue, first divides the genio-hyoid muscles near their insertion in the inferior maxilla. Through the opening made the tongue is drawn down, and then, an incision being made around the tongue through the mucous membrane, the loop of the écraseur is placed in this cut, and the division of the organ may now be made.

Buchanan, as preparatory step, first divided the lower jaw in the symphysis, according to the plan of Nélaton and Syme, and then through this opening he removed the tongue.

Gamgee, in 1868, removed the tongue by Regnoli's method, in which he separated the muscles from the lower jaw on both sides as far back as the facial arteries; he is undecided whether this plan is better than that of Syme, in which, as preliminary step, the jaw is severed at the symphysis. He favors the previous ligation of the lingual arteries.

In 1868, Podrazky, of Vienna, reported the extirpation of the tongue for epithelioma, in which as preparatory step he tied both the lingual arteries; and he claims that this was the first time that simultaneous ligation of these vessels has been done.

In 1871, Harrison, an English surgeon, to excise the tongue affected with cancer, first divides the frænum and the mucous membrane around the tongue so that the organ can be drawn well forward. Through the sublingual opening made the loop of the écraseur is to be passed, and the tongue being included, the latter is excised.

Billroth, in 1874, wrote on the removal of the tongue affected with cancer. He directs special attention to the cleansing of the mouth, and urges that more care be given to this than is commonly done. Through an incision, corresponding to the boundaries of the floor of the mouth, the tongue is drawn and cut off with scissors, and the vessels are tied as they are opened. The crescentic cut is next to be closed, excepting the lateral cuts which are left open for drainage.

Menzel operated in a similar way, yet, as preliminary, he tied the lingual arteries as advised by Czerny.

Axel Iversen, in 1874, wrote on the operation of removal of the tongue, both partially and in its totality. He opposes any method which mutilates much by extensive cutting, viz, division of the inferior maxilla. Although such mutilating operation be done when the growth is far advanced, it does not eradicate the disease, which soon recurs. Iverson advises to not operate in cases where the disease has extended beyond the papillæ circumvallatæ.

In cases where the affection has extended well backwards he prefers the method of Heyfelder and Yäger to reach it, viz, by an incision made through the cheek. Iversen operated in Copenhagen on several cases, in which he somewhat modified the cut of these operators, viz: Instead of a horizontal incision outwards from the angle of the mouth, he made an incision on a level with the teeth of the lower jaws This cut curved downwards, so that a flap was formed with convex margin looking downwards. Iversen claims as advantages for this incision that it shuns branche. of the facial nerve, avoids the duct of Stenson, and does not injure that part of the cheek in which the tendinous portion of the facial muscles lie. The wound heals by first intention, having been closed by twisted suture. Iversen condemns the use of the écraseur for the excision as an instrument both uncertain and painful, but recommends the knife and the galvano-cautery. He likewise claims that the ligation of the lingual artery does not guarantee against hemorrhage. He removes the affected glands, which is easily done when these are not adherent to the surrounding structures.

In 1881, Guillier, following the method of Verneuil, advises thorough removal of the cancerous tongue, and this at an early period; where the glands are affected he counsels their removal, and also the removal of the structures lying between the tongue and the glands. Recurrence in the lingual stump is rare, occurring oftener in the sublingual tissues of the floor of the mouth. To do this work radically, let an incision be made through the floor of the mouth from one angle of the lower jaw to the other, and this cut demands the ligation of the two facial arteries. A double ligation should be placed on each vessel and then the vessel may be divided between the ligations; the tongue is then to be drawn down through the crescentic cut and divided with the thermal cautery. If the disease is unilateral, remove only the affected half of the tongue, dividing antero-posteriorly with the écraseur. In case the palate and tonsil are affected, divide the lower jaw in the symphysis.

Whitehead, in 1881, published his method of operating: he dissects the tongue from the floor of the mouth, and then divides the organ near the epiglottis, tying vessels as they are divided.

Berg, a Scandinavian, finds that the lingual cancer has a special tendency to travel antero-posteriorly; exceptionally it passes through the raphe.

In 1881 Wöltler describes the method of operating then pursued by Billroth, who within thirty months had operated forty-five times. He does not divide the lower jaw nor make the submental flap as he once did, but now operates through the mouth, thus warding off septic pneumonia. He ties one or both of the lingual arteries; and the cut for the ligation of the artery may be enlarged and the diseased glands removed through it. He divides the frænum and the mucous membrane around the tongue so that the latter can be drawn well out of the mouth. Drainage is made through the floor of the mouth. Wöltler states that the secondary pulmonary affection which follows these operations on the tongue may be of a mild catarrhal character, which subsides in a few days; or there may follow a severe pneumonia from which the patient may recover, yet sometimes death is thus caused, the cause in all the forms being the swallowing of septic material, a part of which passes to the lungs.

Langenbeck's plan is to divide the lower jaw and then to excise the tongue with the thermal cautery.

The method of operating by Baker, of St. Bartholomew's Hospital, is as follows: To hold and fix the tongue a thread is passed through each side, a half inch from the median line; and, to loosen it so as to allow of extension, the attachments of the tongue are divided with scissors, the division being done close to the lower jaw. Next, the mucous membrane is to be divided along the median line and the two halves separated with the finger. This done, remove the diseased half of the tongue, and also any glands that may be affected. The removal of the glands is most easily done through the floor of the mouth by external excision.

Kocher operates by first performing tracheotomy and plugging the fauces. Then an incision is to be made along the anterior border of the sternacleidomastoid, and from the middle of the muscle carry a second cut to the hyoid bone, and thence along the digastric muscle to the symphysis of the jaw. The flap described is reflected aside, and the facial artery and vein and the lingual artery are then tied. Next, the attachments of the tongue are to be severed and the organ drawn through the opening and divided with scissors or the galvano-cautery. When the entire tongue is excised, tie the remaining lingual artery. The canula must remain in the trachea for some days, and the aseptic dressing should be removed twice daily from the fauces and new dressing placed there; and at these dressings the patient must be fed.

In Volkmann's plan, if the tongue can be drawn out the diseased portion is excised and the mucous membrane brought over the wound, which is closed by suture. Also, if a portion of healthy tongue remain, this is turned around so as to form a rounded end of the lingual stump. But when the tongue is more extensively affected, let a thread be passed through it by which traction can be made; then an incision is made downward from the angle of the mouth, a canine tooth is extracted, and the jaw is divided at this point. Through the breach thus made the tongue can be drawn out and excised. The cut surfaces are then faced with mucous membrane and sutured. The jaw is to be sutured with wire. A drainage tube must be placed in the tonsillas fossa and carried out through the lateral wound.

Near this period Hueter and Lesser report extirpation of the tongue affected with epithelioma. Seven operations are reported, in all of which the lingual artery was tied. All recovered.

The operation of tying the lingual artery is now generally practiced as a preliminary to extirpation of the tongue. A description of how this may be done is here given:

From his experience in this ligation the writer would state that it may be either easy or difficult according to the conformation of the subject's neck. In one whose neck is long and with scanty adipose tissue the artery is easily found; but when the neck is short, thick, and laden with a thick couch of fat, the operation becomes exceedingly difficult; and it is no wonder that one surgeon was compelled to ligate the carotid artery.

Demarquay, in 1867, reported the ligation of the lingual artery in eight cases, and in 1868 he published a memoir on the subject. He claimed that the operation was not difficult to one well versed in the anatomy of the parts. He says the operation was first suggested by Béclard and was first done by Mirault. Besides, as a preliminary to excision of the tongue, this ligation may be done to control bleeding in wounds of the organ; and in such cases the hemorrhage has not returned after the ligation.

Demarquay counsels this ligation to retard the growth in cases in which the cancer has advanced so far that it can not be removed. At the time he wrote his article the ligation had also been done by Mirault, Roux, and Deguise. To reach the artery Demarquay, finds Blandin's plan to be the best. This is done by an incision made above the great cornu of the hyoid, and extending from the anterior edge of the sternocleidomastoid muscle to the median line of the neck. When the neck is short, as soon as the submaxillary gland is reached, open its capsule and let the gland be pulled upward. The digastric muscle and the ninth nerve are now brought into view. The artery lies in this field in a triangle formed by the hyoid cornu below, the hypoglossal nerve above, and the carotid artery behind. The artery lies just above the hyoid bone, and is displayed by a horizontal cut through the fibers of the hyoglossus muscle, behind which the vessel is hidden.

Near the same time the lingual artery was tied by Hueter in the operation of lingual excision. To find the artery Hueter incises horizontally above the hyoid bone, and uplifting the skin there is displayed what he names the lingual triangle. This triangle is bounded below by the two legs of the digastric muscle and above by the hypoglossal nerve. The digastric portions are the sections of the digastric muscle which lie before and behind the hyoid bone. The space included in the triangle does not exceed a square centimeter in surface. (A centimeter equals two-fifths of an inch in length.) Hueter does not deem the operation a dangerous one; on the contrary, Weichselbaum, who has written on the subject, pronounces the operation dangerous. When the disease occupies the middle portion of the tongue, Weichselbaum advises to tie both lingual arteries, since, according to Hyrtl, the dorsal portions of the lingual arteries sometimes unite and form a single vessel in the median line.

Anatomists have found that the situation of the lingual artery is not uniform in the first part of its course; exceptionally, instead of lying above the hyoid bone, it may lie behind it or below it. If the artery is not discoverable, the ligation of the external carotid should be done. The vessel should be tied as far backward as possible, since thus there remain no branches through which the blood can enter the tongue. However, should the vessel not be discoverable in this part of its course, or if from inflammatory or cicatricial agglutination of the structures the vessel is not accessible, then it may be sought for more anteriorly. In its anterior portion the vessel may be found by making a horizontal incision midway between the inferior margin of the lower jaw and the hyoid bone. The exposed submaxillary gland must now be drawn upward by a transfixing tenaculum; and when this is done there is offered to view the anterior leg of the digastric muscle, and above this the hypoglossal nerve. In the space between these and lying behind the hyoglossus muscle lies the lingual artery. To find the vessel, divide the hyoglossus horizontally and cause this cut to gape, and the artery will be found.

This search for the vessel will be facilitated if the surgeon has recently dissected this region; for, no matter how accurate his anatomical knowledge may once have been, it is within the experience of the writer that sketches long ago copied in the mind wander in time from the true picture in nature; accurate correctness is only maintained by repeated rehearsals on the cadaver. As the linguist who would retain intact a language that he has learned must from time to time rehearse the rudiments of its grammar, so the operative surgeon, to do the best work, must ever and anon renew his early association with the cadaver. As a mnemonic guide which represents the site of parts that have a close relation to the lingual artery, the one subjoined has been constructed by the writer. In its posterior site C A D represents the initial letters of cornu, artery, and digastric, in the order in which the structures stand from below upward; anteriorly, after the artery has passed beneath the posterior leg of the digastric, the symbol D A N, represents the order in which appear, from below upward, digastric muscle, artery, and ninth nerve; and the two syllables conjoined form the word CADDAN. Such devices as amuse the memory; they become pebbles which, dropped into the tub of the Danaids, close some of the openings through which are wont to lapse so many of the facts which we store there.

The following cases of epithelioma of the tongue have been treated by the writer with results not unfavorable to operative interference:

Case 1.—Patient from Wallawalla, State of Washington, in which the anterior fourth of the tongue was the site of epithelioma which had advanced to ulceration: No glands affected. As there was a suspicion of specific disease, this was negatived by a course of iodine and mercury. The anterior third of the tongue was excised with the thermal cautery, but as the lingual arteries bled they were controlled by a circumscriptive suture. The patient has remained well ten years.

(2) Patient from Sacramento, with epithelioma involving the middle third of the tongue on the left side: Lingual artery was tied and a wedge shaped section removed from the side of the tongue. Recovery, without return ten years later.

Case 3.—Woman from San Diego, Cal., operated on similarly to preceding for epithelioma on the side of the tongue. Patient, when heard from a few months afterwards, was well; since then has not been heard from.

Case 4.—Case in which the epithelioma involved the right side of the base of the tongue and the side of the pharynx. The excision involved the internal carotid, so that it was necessary to ligate the right carotid artery, and, profuse bleeding continuing from the distal end of the internal carotid, the left carotid also was tied. Patient has remained well over five years. The case is fully reported in the Transactions of the American Surgical Association.

Case 5.—Patient from Chico, Cal., with epithelioma seated in the middle third of the side of the tongue. The lingual artery was tied and wedge-shaped excision done. The patient, operated on three years ago, remains well.

Case 6.—Patient from Eureka, Nev., with lingual epithelioma similar to preceding, and operation done similarly. Tongue remained well, but the disease recurred in the cervical glands some months afterward, and, although they were removed, the patient survived but a few weeks.

Case 7.—Patient from Nevada, the subject of lingual epithelioma, involving the body of the tongue. Ligation of both external carotids. Patient died of cerebral disease one month after the operation.

Case 8.—Epithelioma on the left side of the base of the tongue and implicating the lower part of the adjacent palato-glossus muscle. Glands near the angle of the jaw were implicated. The diseased structure was excised, the remaining wound thermally cauterized, and the affected glands removed. The disease returned six months afterward at the original side in the buccal cavity. Treatment by thermal cautery repeated, and patient has now been well eighteen months.

Case 9.—Epithelioma, involving the anterior two-thirds of the left side of the tongue, the inner surface of the inferior maxilla corresponding to the right and left incisor and bicuspid teeth; also the left submaxillary gland and contiguous lymphatic glands were implicated. After ligation of the lingual the diseased portions of the tongue and affected glands were excised, and the affected part of the lower jaw was thermally cauterized. Though the patient was 75 years old, he recovered in four weeks and has remained well for a year.

Case 10.—Epithelioma, involving the front portion of the inferior surface of the tongue, the sublingual gland, surface of the maxilla adjacent to this gland, the two ducts of Wharton, and glands near the submaxillary glands. After ligation of both lingual arteries, the anterior two-thirds of the tongue, the sublingual gland, the two submaxillary glands, and the adjoining lymphatic glands, which were swollen, were removed. The inner surface of the inferior maxillary arch was thermally cauterized. This operation was done four months ago, and as yet there is no recurrence. The after treatment consisted in frequent ablutions with alcoholized mint water. Nutrition was maintained by use of liquid food.

All of these cases, except case 9, were at ages between 40 and 55 years. The 9 men used tobacco. There was but little disturbance of speech except in case 10; yet he has so improved that his language can be understood. That limited or extensive glossectomy did not greatly interfere with articulation is not to be wondered at when it is remembered that in speech the tongue is only needed to pronounce the sounds of t, d, th, l, and r, in the last two the tongue being only partially an instrumental factor.

A summarized statement of the operative procedure pursued in the foregoing cases is here appended.

Except in cases 1, 4, and 7, the operation commenced with ligation of the lingual artery; in 4 the common carotids were ligated, and in 7 the external carotids were tied. The ligation of the lingual was done posteriorly, where the disease was situated far back on the tongue. The mouth being well opened by an interdental wedge inserted between the molar teeth on one side, the tongue, seized with forceps, was drawn out, and its protrusion aided by division of the palato-glossi muscles, as well as the lateral sublingual connections of the tongue with the floor of the mouth. With strong scissors the affected part was excised, the circumscribing cut lying in the sound strictures, as verified by sight and touch. After ligation of the lingual artery this cutting is done in bloodless structure. In some of the cases the submaxillary gland and contiguous lymphatic glands were affected; in such cases both were removed. If the inferior maxilla was implicated, this was cauterized with the thermal cautery.

The buccal cavity was diligently cleansed every two hours by irrigating it with alcoholized mint water, and such irrigation was always done after taking food. Four weeks sufficed for the recovery.

The operation was done through the mouth, and, thus performed, no visible scars were left to remind the patient or his friends of the interview of the former with the surgeon's knife.

SIMPLICITY IN SURGERY.

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The titles of successful books which have wrought a revolution in treatment encourages one, abashed at his trite subject, to believe that axioms repeated do not always fall to the ground unheeded.

Hilton's Rest and Pain, Mitchell's Fat and Blood crystalize into laconic brevity whole methods of treatment that were loosely known and sporadically practiced before the books appeared, but under the master hands of their authors assumed definite and recognized importance, as well as formulated out loud what common sense had been whispering all along. It is with a moiety of this feeling that the writer ventures to bring before your consideration the generally admitted desirability of simplicity in surgery, conscious that there is no one present who would contend a moment against its advantages theoretically, but suspecting that some distinguished surgeon may be tempted to neglect it in improving some operation or making an additional attachment to a speculum, another trust to a suture, whereby to hang his name.

The generous desire to contribute to science, coupled with a more selfish, but equally ardent, desire to promote one's own reputation, makes us over and over again underestimate the value of simplicity in our endeavor to produce novelty, no matter how complicated; yet, when we consider sober facts, and take a bird's-eye view above the arena of competition, we find good reasons for the faith that is in us.

Simplicity marks the termini of science; it is characteristic of the beginning and of the end. Not the end in the sense of annihilation, but of perfection. The simplicity of the beginning is that of ignorance, of lack of knowledge; then comes a tentative period, in which a host of adjuvants are tried in the balance and often a host found wanting; by evolution the fittest survive, and when perfection is attained we see the course strewn with futile impedimenta, sometimes with arms and legs and lives that have perished in attaining that ideal, having some of the original, with an impress here and there of the accidental, but complications have been cast aside and the simple shines out.

The immortality of a discovery is often proportionate to its simplicity; the more it is handicapped the less likely it is to make a place in the race.

There is one complex factor in surgical science, however, that can not be simplified, and that is Nature herself. With centuries of study, her ways are still past finding out, and in dealing, as surgeons do, with her processes, we may take it for granted that we are still far from sounding the recesses of her depths for good or ill. The blood is a fair example of her complexities. This most common and easily analyzed tissue of the body constantly presents new features or substances that biologists a decade ago never dreamed of. What with Ehrlich's lymphocytes, mononuclear leucocytes, transitional forms, polynuclear leucocytes, eosinophiles, and the pros and cons of phagocytosis, the mysteries of chemotaxis, the antiseptic qualities of the serum, one would think enough complexities were added to hemorrhage to fill the maw of the pseudo-scientist, who, like Helen's Babies, desires nothing so much as to see the 'wheels go round.'

But Nature can afford perplexities because she is the product of an Almighty Hand whose omniscience knows her whole detail, but the finite surgeon must know how he adds strings to his bow with his limited powers of observation and less power of control. * * *

Taking Nature with her complexities as one factor in surgery, then the assistance rendered by man should aim at simplicity, for such practical reasons as the following:

Simple methods are more applicable in place and time. The surgeon who perfects an operation that can be done in a hovel as well as in a hospital is a benefactor indeed. More so if it can be done in a half instead of an hour. The pocket-case operation is a greater boon than its conjener requiring highly specialized surroundings; there are more wood floors than tiled pavements in the world, and the more we render the labor unessential the better. Do not misunderstand me as undervaluing the vast benefits and comforts of a carefully appointed operating room or the superb results of careful technique. I would not sacrifice an ounce of security for a pound of simplicity, but even in the wards of hospitals, or the costly rooms of specialists I would reiterate, be as simple as possible, endeavor to rid your technique of complexities, and above all, down the personal equation of frills and fads. Teachers of surgery must know that medical students are mostly men of mediocre minds, fresh from the farm or the loom, whose intellectual horizons are checkered by counties rather than continents, with limited absorbing power. To teach these men complicated methods is to open avenues of disaster in humble homes throughout the land. What they need is a firm foundation on simple principles, homemade appliances rather than store apparatus. Electric lighting is all very well if you have the plant, but teach your students to rub sticks rather than freeze.

Personal experience tells me, from my own feelings toward a distinguished master now past the goal, that I loved him for the gentle simplicity of his character as much as I admired him for his unostentatious learning.

It is beyond the scope of this paper to attempt to take up, seriatim, operations and contrast the simple and complex methods of attaining the same end. Suffice it to look in passing at a few of the more involved procedures, and judge for ourselves whether or not they can profitably have some of the chaff beaten out of them. In the first place there is nothing more variable than the antiseptic method of wound treatment nor multiple than the so-called essentials of technique. The mist that hung around the operation has at last been raised by Mr. Lister himself, but the numerous adjuncts which many consider *sine qua non* still litter the operating room. From the old surgeon, whose mind is trammeled by the cobwebs of laudable pus, to the novitiate, who has a list as long as his arm to prepare before opening a boil, there is every gradation; yet when you bear in mind three cardinal points: (1) that surgical cleanliness is essential; (2) that the less interference with clean wounds the better; (3) that boiling is practically a perfect germicide—your armamentaria need not be extensive.

The first can be attained by soap, brush, and a few bichloride tablets for a mild bichloride solution, to apply, not to wound surface, but adjacent parts; the second speaks for itself.

The third, boiling, covers the ground of instruments, ligatures, sutures (if you confine yourself to silk, and well you may after the disasters lately reported from catgut), and as far as rendering your dressings aseptic. Should you wish to make them antiseptic, and thus prevent the backward infection of your wound from decomposing drainage, gauze wrung out of the bichloride solution prevents that until it has dried and become impermeable. My own custom when I know I am going to operate is to put instruments, needles, silk, gauze (drainage tube, if necessary, though I prefer a gauze strip usually, and substituting perforated mica films, found in any store, for unboilable rubber protection).—I say I place all these in the ordinary agateware trays in a tin boiler full of water, put them on the kitchen range, boil for an hour or less, and when ready to start put the boiler in the back of my wagon. After cleansing the patient and my hands with soap and bichloride solution, I have everything else aseptic at hand in my trays arranged conveniently for the operation without fear of infecting ligatures, etc., by touching their sides, as the boiling has made the trays clean, too. By ringing the boiled gauze out in a mild bichlor solution I have an antiseptic as well as aseptic dressing, while my ligatures, sutures drain and instruments have not been exposed to the destructive influence of corrosive sublimate. Over all a linen bandage, wrung out as above, forms the proper compression of dead spaces and gives a splint like firmness to support the part when dry. The nonirritating boiled gauze drain is removed in forty-eight hours if used, and the wound pursues a typically satisfactory course under two dressings for two or three weeks, when the sutures may be removed after the wound has healed sufficiently to offer resistance to any possible infection from the drawn out sutures. That is simplicity itself. One drug, bichloride tablets, the rest the ordinary *vade mecum* of a surgeon plus the usual chattel of a farmhouse, i. e., clothes boiler and stove.

If called in an emergency I have all I require for a great many operations in my pocket case, and again and again I have operated in strangulated herniæ, compound fractures, crushed skulls, with success, with no greater outlay; nor would I hesitate to do laparatomy if in addition to the above I had provided three feet of rubber tubing for irrigation.

I can not insist too strongly on the value of noninterference with wound surfaces. The fewer the ligatures, the less strangulation of tissue, and the least constant suture that with judicious pressure will avoid dead spaces or interfere with the blood-clot organization, the better. Can anyone estimate the cost in lives due to neglect of the above precautions in gun-shot wounds alone? What simpler treatment than to leave the ball alone, provided it has not taken with it foreign matter in the shape of clothes, and provided no large vessels are wounded or cavities opened in its course. Is it not better to have the reporter's opprobium, "the doctor failed to remove the ball," than to infect the punctured wound with pick and finger and convert this natural test tube into a pus pocket? My experienc teaches me it is, and I seldom rummage for a ball unless there is evidence of complications other than the presence of the ball alone. Knots and sutures have offered to worthier surgeons a field to strew with complexities. Do you think your hands could hold the knots that would embarrass a sailor to tie, and yet the ordinary reef-knot so minutely described as a tangle in most operative surgeries holds about as fast as any of its substitutes.

Sutures bob up and sink in surgical literature all the while. The intestinal suture alone from Raindohr, in 1789, to God knows who the latest is, has been twisted and turned with a surgeon's tag at each twist for more than a century, on an average of ten a decade, and the simpler ones survive. Treves, in his excellent work on Operative Surgery, enumerates Dupuytren's, Gely's (three stages), Cushing's, Lembert's, Czerney's, Halsted's, Jobert's, etc., and, after weighing their value, says:

> Lembut's suture has stood the test of time, and it may be safely said of it that it is, on the whole, the best form of suture with which we are acquainted. Why? Its extreme simplicity, the rapidity with which each stitch can be inserted, and its undoubted efficiency are points in its favor which all operators have recognized. (Manual Operative Surgery, Vol. II, p. 313.)

In treating hemorrhage Esmarch's bandage has come to stay, because it is simple and can be improvised at once. We see Weir applying it, modified, to his hip-joint and shoulder amputations, while the more complicated and less certain rectal or abdominal pressure pass down. Does anyone hear nowadays of Simpson's acupressure, with its three methods of torsoclusion, retroclusion, etc.? They exist in text books probably as a test of the enthusiasm of the student who, having pluck enough to wade through these descriptions, may be counted worthy to enter the ranks of the profession. I was asking an old general practitioner the other day who had not kept up his surgery, if he recalled any of the operations for the permanent cure of hernia. He said: "I recall a misty remembrance of labyrinthian sutures and trusses that a fair Rosamond could not unravel." That must be the experience of all who have not looked into that domain of surgery for the last score of years. Even in modern books there is a sort of fetich worship in repeating, only to damn, those intricate and ineffective inventions; but the end is not yet—the modern methods are too involved. Some need a particular needle, or pair of them, as in McEwen's: others alter the relation of the cord and put the vas deferens at a more than normally acute angle, possibly reducing its caliber and tending to invalidate the testicle, and as a general evidence that none has reached the desired simplicity each inventor gets better results from his own operation than from his colleague's or from those who attempt to follow in his footsteps, no matter how lucid the descriptions and graphic the plates.

"No one method can be rigidly adhered to or be considered all-sufficient," is a a criticism of a modern judge. Why? Because they lack the staying power of simplicity. The title of surgeon from its derivation indicates that handicraft is one of his endowments, but he must be careful not to let the mechanic run away with the man, or substitute pulleys for common sense.

In a recent article on simplicity in the treatment of fractures, Roberts' Philadelphia Medical News, July 8, 1893, says:

> A truly wonderful illustration of this perversion of mind is found in Bandenhener's Guide to the Treatment of Fractures. I show a single illustration taken

from his book in proof of my statement. Could anything be more preposterous than the method by which a patient with an ordinary fracture of the lower end of the radius is here treated? He is shown confined to bed with weights and pulleys attached to his arm and hand, so as to make traction in five different directions. Such a method of dealing with an injury which ordinarily needs scarcely any splint is a travesty of modern surgery.

And then to show how surgeons are prone to multiply good things, he speaks of a case of fracture of the thigh, in which the man had on a Physick's long splint, a Buck's extension, and plaster apparatus applied for his single fracture sufficient for three patients with a like injury.

I can not go into this part of the subject without plagiarizing from the article jus-quoted, which covers the ground, but I would reiterate the cheapness, adaptability, comfort, ability to inspect parts associated with the ordinary plaster or starch splint well lined with cotton batting and split down the middle when swelling is expected, with fenestra over compound fractures or wounds, rather than the machines sold at instrument-makers'.

Again, the use of neighboring parts, not only as standards of measurement, but as means of treatment, is hardly sufficiently appreciated. The upper jaw is an excellent splint for the lower, the side for fracture of the humerus, while the serrated edges of Colles's fracture hold themselves together almost unaided, provided the displacement is properly reduced, better than Bond's and Nélaton's and the host of splints that figure in text-books in this connection.

In the treatment of dislocations the same history repeats itself. It is not the man who has invaded the junk shop and produced pulleys and ropes and torture who is immortal, but such as Bigelow, who found a ready-made pulley in the Y ligament and turns its mechanism to the patient's profit; and so one might go on through general surgery to special and see the simple principles endure, the complicated perish.

A good judge of human nature and one who made millions thereby once said, "The public love to humbugged." Probably if wealth were the only reward of the surgeon that dictum would hold good with us. People generally prefer to think themselves at death's door with a Latin disease rather than be ailing with an ordinary English monosyllable; but, in the long run, the man who does not yield to such temptations and tells people no worse than they are earns the respect of his fellow practitioners and the confidence of his patients. The lying pessamist soon exhausts his Pandora's box of desperate situations, and people will employ the man who does not steal their sleep by false anxieties.

Nowhere is simplicity of more value than before a jury. The expert who can bring himself down to everyday expressions and call a spade a spade has the goodwill of the boxfull of men, just as dear old Sellers gained it by inquiring how folks were at home. You can't fool all the people all the time, and as one can never know exactly when they are ripe for fooling it is better not to attempt to fool any of the people at all.

Now, one word more in regard to simplicity of nomenclature. Names should mean something and carry an explanation in themselves. How much more satisfactory and easy to recall in its relations is the sterno cleido mastoid muscle than the valve of Vieusens, because the former means something; the latter is a monument without a description, and such monuments are apt to get mixed, maybe, damned for inaccuracy, as Bright's disease is associated with parts unmentionable. The circle of Willis has an enviable position, but the glandulæ Tysoni are not so desirable name sakes. In conclusion, let me again emphasize the appreciation of the unavoidable and immense complexities in investigating natural processes in the laboratory and how essential such complexities are, because results are the fruits of elimination and one-by-one casting away of useless appendages which no *a priori* method could simplify, and while recognizing these essential complexities of the laboratory, let me again emphasize the great benefits of simplicity in the application of results at the bedside as in the amphitheater. In other words, the brushing away of branches, the crushing, if need be, of blossoms, the stripping of leaves when we wish to grasp the fruit, and the fruit only, of the tree of knowledge, and to press its luscious juices to the parched lips of our patients.

On Dr. Johnson's paper, Dr. Quimby remarked as follows:

I fully agree with Dr. Johnson in the conclusions of his very able paper. His criticism against undue complications in surgical dressings is very timely. Harm often follows this error. The great men in medicine seek the simplest and plainest methods to accomplish this end. Lister's spray method was most complicated, and great difficulty followed the effort to get the patient ready for an operation. I have known poisoning to follow the use of Lister's spray when used in large exposures of wounds in abdominal operations. To-day this method by Lister is abandoned, and the author has given up its use. The drainage tubes have had the same experience of being popular for a time, then dying away. Surgeons failed to recognize that drainage tubes were foreign bodies, which did injury rather than good, by their too long retention in the wounds. Drainage tubes are of limited value, and should only be used for a short time. Shortness of time, simplicity of operations and dressings, should be the motto of the prudent surgeon.

THE TREATMENT OF BONE CAVITIES BY FILLING WITH COPPER AMALGAM.

By Dr. OSCAR J. MAYER, San Francisco, Cal.,
Late Assistant on the Surgical Staff, Moabit Hospital, Berlin.

The short time allotted to me prevents me from reviewing all the work that has been done in regard to healing bone cavities. I shall only call your attention to some experiments I have made in the Moabit Hospital, in Berlin, during my time of service on the surgical staff, with a view of obliterating bone cavities by means of plugging the cavity with inorganic material, following in the main the manner in which dentists fill carious teeth.

After attending a lecture of Prof. W. D. Miller, delivered before the Association of American Physicians in Berlin, where the pathological conditions of carious teeth were demonstrated and the properties and antiseptic actions of some fillings explained, it occurred to me that some of these metals could be used in bone-filling in place of other materials I had experimentally tried.

That foreign bodies can become encapsulated within soft tissues, as well as bones and even vital organs, is an established fact which we often witness in gunshot wounds where the bullet is allowed to remain. Although the conditions upon which the permanent encapsulation of fillings into bone depend are by no means so simple as in the case of carious teeth, the investigations and experience of the dental profession must of course form the basis of our experiments.

Above all, it was clear that the material used for fillings must be not only aseptic, but actively antiseptic, since it is certainly out of the question so to disinfect at one sitting the cavities which remain in the bones after chronic osteomyelitis or tuberculosis that all the bacteria in them are destroyed. If the filling is to become encapsulated it must, by virtue of its antiseptic properties, act upon the colonies of micro-organisms which may still be present, and thus destroy the exciting causes of the inflammation. Furthermore, such fillings must consist of a material which is light, nonpoisonous, and which hardens rapidly.

I am encouraged to make the present demonstration because of the interest a former presentation aroused at the Twenty-second Congress of German Surgeons, and because I am desirous that the investigations so far made may be tested by others and perhaps brought near to completion. For, although the question whether such fillings can heal into bones will soon be definitely answered, it will require years of observation to ascertain whether this method of bone-filling is to be regarded as an enrichment of surgical procedures.

Experiments were made with various metallic mixtures of as low a melting point as possible; among others, with the alloy of Wickersheimer, which melts at 55° R. (156° F.), and the alloy of Lipp, which melts at 63° R. (174° F.). But it soon became evident that these mixtures could not be of service, as they solidified in the funnel and, even if no funnel is used, the mixture does not flow properly if poured into a cavity which is below the above-mentioned temperature. Attempts were made to transform aluminium into a soft mass, but as yet without success. With mercury, aluminium forms a spongy, porous mass, such as has been noticed when instruments of that metal have been put into a solution of bichloride.

Copper amalgam was made into a dough-like mass, in the manner customary in dental practice, by heating it in a spoon over an alcohol flame, and rubbing it to a pillular consistency in a mortar, the cavity was either completely filled with the mass, or only coated with it, and a lighter filling material, as cement, gutta-percha, etc., used to fill out the defect. Plaster of Paris * (after TRENDLEBURG), was not at first used, because it is more porous and heavier than the above-mentioned substances, and not so easy to manage, and also hardens more slowly, and is more liable to soil the surface of the wound. On account of the well-known instability of carbolic acid it is not to be supposed that plaster of Paris fillings made up with a 5 per cent solution of carbolic acid instead of water will have any lasting antiseptic effect on the surrounding tissue. In one experiment, as we shall see further on, I used plaster of Paris after the cavity was coated with copper amalgam, but, as will be observed, a great deal of shrinking took place.

Of cements, the Harvard cement of Dr. Richter is particularly worthy of mention. I had made for my use a quantity of the lighter white sort of this cement which shows the fewest pores. It also requires a much shorter time for hardening than any other cement, and shows no shrinking after hardening. On account of the expense of the latter, I have set to work and experimented with a number of different cements and putties and found that one of the most reliable, and at the same time very inexpensive, cements that could be obtained is the oxychloride of zinc. I used this in my latter experiments in connection with the copper amalgam; its preparation is as follows: Zinc. chlor. 4 parts, aqu. dest. 5 parts, glycerine, 3 parts. Of this solution 10 c. c. is intimately mixed on a slab by means of a spatula with 10 grains of oxide of zinc. It will remain in a putty condition for about four or five minutes and then set and show upon being split with a hammer and chisel, none, or very fine pores. Use was also made of Abbey's noncohesive gold foil, the antiseptic effect of which had already been shown by Miller.

On account of the troublesome technique required to properly apply copper amalgam, the substance which shows the most marked antiseptic effect on plate cultures of bacteria, I made use in some experiments on animals, of coarse fillings instead of the dough-like mass. The cavities were coated with this and then filled out with cement, gutta-percha, etc. We shall see, after describing the post-mortem condition of the bones that have undergone filling, which is to be preferred.

The property of copper amalgam to check the development of various sorts of pathogenic and nonpathogenic bacteria has already been shown by Miller,† even in the case of fillings of this metal which had been carried for years in the teeth. This has since been confirmed by Behring ‡ in his article on the means and method of dis-

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* Dreesmann, Knochenplombirung, Beitr. z. klm. chir. IX. Heft. 3.

† Mikroorganismen der Mundhöhle, 2. Auflage, 1893, p. 277.

‡ Desinfection, Desinfectionsmithel, and Desinfectionsmethoden, Zeitschr. f. Hygiene, Bd. IX.

infection, and I have been able to show a direct antiseptic effect by the death of bacteria in plate cultures. I prepared in the usual way plate cultures on agar-agar of bacteria (Staphylococcus aureus, Staphyl. albus, Streptococcus, etc.), and after the colonies were fully grown placed a copper-amalgam filling on the plate. Before putting in the fillings inoculations were made from the plates on agar tubes, and after twenty-four hours other inoculations were made from colonies within a space of 1 to 2 cm. from the edges of the fillings. In spite of many attempts, nothing ever grew except in the tubes inoculated before the fillings were put on the plate.*

It is worthy of note that the greenish discoloration appears much sooner and more markedly, and spreads over a larger space, if the metal is put on a plate on which the cultures are already grown, than if it is put on immediately after the preparation of the plate; in the latter, only a narrow green ring is formed around the filling; perhaps the more extensive discoloration is due to the chemical changes produced by the bacteria. Copper amalgam of various manufactures were used, and at one time it seemed that some possessed more marked antiseptic properties than others, but this was a result obtained during the time my incubator was out of order and shows that if the plates are exposed to ordinary room temperature the free space surrounding the copper amalgam will be much larger than if the plate cultures are at once transferred to the incubator that registers 37° C.

The animal tests were made on dogs, some of which were operated at one, others at two sittings. In order to get the filling closely into the bone defect, it is desirable to have the cavity as dry as possible. In this case we are confronted with considerable difficulties with which the dentist does not have to combat, for we have to deal with a tissue richly supplied with blood, while the dentist has only to excavate the tooth, dry it with the hot-air blast, and separate it from the mouth with rubber sheeting, in order to obtain a perfectly dry surface, such as we can not obtain even with the tampon and the Esmarch's constrictor. I have made use of the hot-air blast, and after considerable modifications I had constructed a hot-air blast by which a strong stream of hot air of 70–80° C. is obtained. It consists of a spiral platinum loop 20 cm. long which is lighted by an accumulator supplied with 40 cells. It works very much on the style of a Paquelin thermo cautery, a continuous supply of air being driven through the platinum loop by a double blast. Before drying out the cavity with this, I swab with alcohol and ether in order to facilitate the drying up. Pressing in the filling will cause a slight capillary hemorrhage, not enough however to cause any disturbance.

Experiment 1.—Bitch, six months old. In morphine narcosis the upper epiphisis of the left tibia was chiseled open, the periosteum being also taken away and the medullary portion gouged out with a sharp spoon. The hemorrhage was checked by tampons, swabbing with alcohol and ether, and use of the hot-air blast, and the cavity was coated with prepared copper amalgam. During the filling a little blood had to be occasionally wiped out—the hollow of the filling itself was not filled out—edges of wound closed with catgut sutures and a plaster of Paris bandage applied. The next day the bandage was found gnawed off and the stitches torn open; another bandage was applied, but as this also was torn off and the wound began to secrete, no further attempt at bandaging was made. By the third day after operation the animal used the operated leg for standing and walking and jumped into her stall without difficulty. The wound closed completely in eighteen days. On the twelfth day the depression in the filling was still visible through a little opening. Forty-four days after the operation the animal was killed, wound of incision completely cicatrized, of a reddish appearance, plainly recognizable. Inner side of tibia, where it was chiseled open, shows marked thickening; no fistula present. On sawing the bone through longitudinally, it appears that the filling has been made smaller by the formation of new bone tissue, the newly formed bone tissue having pressed upon it until the hollow which was in the filling had entirely disappeared. Only a slight crescent-shaped form shows that the filling originally filled a round bone defect, or rather covered it as a thin coating, leaving the middle of the cavity entirely empty. The surface of the section of bone in the neighborhood of the filling is

*Since the above was in print I have learned from Prof. Miller that he has also confirmed the above results by experiments on the pulp of living teeth.

somewhat darkened and discolored by the sawdust produced by sawing through the copper amalgam.

Experiment 2.—Bitch, 6 months old. In morphine narcosis the same operation was performed as in the former experiment, except that a filling of the Harvard cement of Dr. Richter was used instead of copper amalgam. Progress of the healing about the same; after fifteen days the outer wound is entirely closed; animal killed in forty-four days; the tibia shows marked thickening over the site of the filling. The filling is seen to be completely healed in without formation of fistula. In this case also the sawed surface in the neighborhood of the filling shows some yellowish discoloration, due to the sawdust from the cement.

Experiment 3.—Dog, 8 months old, operated in two sittings. In the first sitting the bone was chiseled open in morphine narcosis, the medullary portion removed with a sharp spoon, and a tampon of sterilized gauze inserted. Operation the following day without narcosis, tampon removed, the cavity lined with a coating of softened copper amalgam and then filled with Richter's Harvard cement, soft parts sutured with catgut and bandaged; bandage several times renewed, but always gnawed off; progress of the healing slower than in the preceding cases. In this case there existed a deep fistula, through which the filling can be felt with a sound. The filling, however, seemed to be firmly healed in, the fistula closed twenty-eight days after the operation, and the wound healed in the course of the next week; the animal was killed forty-three days after the insertion of the filling. In the soft parts the cicatrized fistula may be easily distinguished from the rest of the scar tissue by its more reddish color; the tibia being free from the soft parts, a not yet calcified spot may be recognized as the former bone fistula. It is, however, completely covered with thick granulations, which are connected on the inside with the bone tissue. It is much more difficult to saw through the bone in the region of the filling than in the preceding cases. After the bone is sawed through it is seen that a small portion of the gauze had been left in the cavity; the filling is considerably broken up, which I explain as the effect of the pulling of the saw teeth, which were clogged with shreds of gauze, upon the filling, which was not firm enough to stand such violent treatment. In this case also the neighborhood of the filling is discolored by the amalgam.

The next experiments were carried on to determine how older animals would stand the operation of bone filling, and whether the filling would become perfectly encapsulated, as also to find out which was the better technique, filling with softened copper amalgam, or that with coarse filings of the metal.

Experiment 4.—Dog, 8 years old, 16 pounds; morphine narcosis; the tibia is chiseled open as in the previous experiments. Instead of softened copper amalgam the coarse filings are used with Harvard cement. After sixty days the animal is killed; the defect in the bone over the site of the filling is partly closed with new bony tissue, partly with granulations. A fine sound can not be passed through anywhere. After sawing the bone open longitudinally, it is seen that the filling is somewhat torn; this seems to show that the filling does not fit as tight when the filings are used instead of the softened metal, as we witness this tearing of the filling in every case where the former was used.

Five more experiments were made with older animals, and, while all the fillings remained in and the wound became smaller, not enough time elapsed between the date of operation and the day the animal was killed to admit of a definite statement as to the time required in old dogs for the filling to become perfectly encapsulated.

So much in regard to the experiments thus far made. In addition to the successful experiments just reported, Prof. S. Sonnenburg has made use of the method of bone filling proposed by me on two patients suffering with chronic osteomyelitis, and, while they were unsuccessful, they still offer a great deal of interest and show that if properly made a filling can become encapsulated. The operations were made at a time when the technique was anything but well tried. Again it shows that no one should attempt bone filling in the above manner with copper amalgam until after he has practiced it either on the dead or lower animals and acquainted himself thoroughly with the different manipulations. There is a decided difference between simply filling a hole in a bone and the proper adjustment of a filling to a bone cavity.

One filling came out after about two months. It had been tightly held for about fourteen days when it became loosened and gradually expelled. Right behind the filling was found a sequestrum about one-fourth inch broad and 1 inch long, which evidently had been overlooked at the time of operation. The filling itself, as will be observed, is rather irregular, instead of being evenly covered with copper amalgam; the latter has been crowded on to one position. It will be seen that on one side newly-formed bone tissue is closely attached to the metal and cement. As these cases will be reported by Prof. Sonnenburg, I shall not lose time in dwelling upon them here. One case of bone filling for chronic osteomyelitis of ten years' standing, in which I have inserted a filling weighing approximately 120 grains (4 ounces), has been left to me by Dr. Riegner, director of the surgical department of the All Saints Hospital in Breslau. The results of this case will be published by the surgeon in charge as soon as definitely known.

No one is more conscious of the incompleteness of this work than myself, and in giving it I entertain hopes that those of you gentlemen who have material at their disposal will take up this subject and reveal whatever merits it may possess and give the results whatever publicity they deserve.

In addition I have tried copper amalgam in the treatment of chronic gonorrhœa by application of sounds covered with that metal. Experiments are also in progress to see whether O'Dwyer's intubation tubes covered with copper amalgam have any direct action upon the primay herd in diphtheria and are capable of preventing the downward spread into the trachea in this disease.

SUTURA DE LA VENA BRAQUIO-CEFÁLICA.

Por el Dr. FRANCISCO MARÍN, Puebla, Méjico.

El primero de mayo de 1889 entró al Hospital General del Estado de Puebla M. R., herido por arma de fuego. Pistola.41 de calibre. Tenia cuatro heridas. La primera estaba colocada inmediatamente encima de la articulación esterno-clavicular izquierda. La segunda, que era la abertura de salida de la anterior, estaba sobre la clavícula derecha, en la unión de su tercio interno con el medio. Volvió á penetrar en el hombro del mismo lado á tres centímetros adentro y abajo del acromion y por última salida, la hizo sobre la cara externa del hombro, á un centímetro debajo del acromion.

Interesó la articulación externo-clavicular izquierda, caminó en seguida en el tejido celular del cuello, despues detras del sterno-cleido-mastoideo derecho cerca de sus inserciones á la clavícula, haciendo salida arriba de este hueso inmediatamente afuera de su haz clavicular. Las heridas del hombro fueron subcutaneas. Hacia dos horas que habia sido herido. Este hombre estaba pálido, exangüe, tenia síncopes, sudores frios y el pulso pequeño y débil. La hemorragia habia sido bastante abundante: sangre venosa negra salia por la abertura supraclavicular. El escurrimiento sanguineo tenia esto de particular: no salia durante la inspiración y si el enfermo estaba quieto y tranquilo la sangre que se perdia era poca cosa. Al menor esfuerzo que hacia el herido, la cantidad de sangre aumentaba de tal manera que poco antes de mi llegada á la sala de operaciones, habia sentido la necesidad de evacuar. Se habia sentado y en el esfuerzo que hacia para defecar habia perdido una cantidad considerable de sangre que determinó un síncope. El líquido sanguineo habia corrido hasta debajo de la mesa.

Acompañado del Dr. H. Gonzales y C. Lopez, procedimos al exámen de las heridase y sobre todo á la de aquella por donde salia sangre. Nos cercioramos de que el sitio de la hemorragia estaba profundo y decidimos hacer un debridamiento que comprendió el haz clavicular del músculo sterno-cleido-mastoideo. Esplorando la región descubierta veimos salir el líquido de la parte más baja y profunda correspondiendo á la confluencia de las venas del cuello. Levantamos el haz dividido del músculo, y esponjeando y observando con atención vimos el sitio de donde manaba la sangre. Aplicamos pinzas hemostáticas, tratando de pasar una ligadura lateral; pero no obtuvimos ningun resultado. Entónces volvimos á ver con sumo cuidado y descubrimos una fisura ó hendidura mayor que un centímetro, verticalmente colocada sobre el punto en que se forma el tronco braquio-cefálico derecho, por el anastomosis de la yugular interna y de la vena subclavia del mismo lado, y por este sitio vimos salir la sangre durante la expiración. Las paredes de la abertura se aplicaban una contra otra en la inspiración, circunstancia feliz que habia impedído la entrada del aire en las venas.

Comprimimos con una esponja y discutimos lo que debiamos hacer. La ligadura lateral la habiamos intentado sin resultado; la ligadura de las venas afluentes era casi imposible. Dejar un tapon de gaza, era un medio incierto y peligroso. Entónces pensé en hacer la sutura de la hendidura de ese grueso tronco venoso, y una vez decidido, con una aguja delgada, ligeramente curva, ensartada con catgut fino, pasamos tres puntos de sutura entrecortada, despues de haber bien limpiado la herida y descubierto las paredes venosas. Los puntos fueron apretados suavemente. La hemorragia se detuvo completamente y aun cuando el herido hiciera esfuerzos ya no salia sangre. Las suturas habian interesado todo el grueso de la pared venosa. Hicimos la curación, y algunos dias despues hice la sutura del músculo que habiamos dividido.

Ningun accidente se presentó durante la curación. El herido salia del hospital un mes despues, sin que durante todo este tiempo se hubiesen presentado signos de oclusion ó trombosis venosa.

Otro caso es el siguiente: A fines de julio de este año de 1893, operamos á un ingeniero alemán, F. K., de 50 años de edad. Le habia yo amputado hacia dos años la pierna derecha por una úlcera extensa y rebelde, probablemente una degeneracioń epiteliomatosa de los botones carnosos, que le habia confinado en la cama por mucho tiempo. Habia tenido muy buena salud desde que fué amputado; pero últimamente aparecieron en el triángulo de Scarpa varios ganglios degenerados, entre ellos uno tan grande como una manzanita. Lo asistia mi hermano, José Maria Marín, y fuí llamado por él, para proceder á su extirpación, por que el exámen histológico habia revelado una degeneración carcinomatosa. La operación fué un poco difícil. La vena safena estaba envuelta por el grueso ganglio, y sus paredes se habian hipertrofiado invadidas por la degeneración. La extirpación de estos tumores cancerosos nos dejó una gran pérdida de substancia, en cuya profundidad estaban descubiertos una porción de los músculos pectineo y del aductor medio. La extracción de los ganglios fué acompañada de fuerte pérdida de sangre. Las venas que atravesaban el tumor fueron ligadas.

Al terminar tuvimos una fuerte hemorragia venosa; venía de la crural: en un momento se nos llenó de sangre todo el hueco dejado por la operación. Comprimiendo y esponjeando, pudimos ver que la sangre venía de la vena femoral. Mi hermano aplicó, abrazando los bordes de la herida venosa, los ramos largos y delgados de una pinza hemostática, paralelos á la dirección de la vena, de tal manera que cerrara la abertura por donde salia la sangre. Entonces con catgut fino, en agujas ligeramente curvas, pasamos una sutura del colchonero inmediatamente abajo de las pinzas, teniendo especial cuidado de no picar la artería crural inmediata á la vena. Pasados tres puntos, tiramos ligeramente de las extremidades del hilo y quitamos las pinzas. La hemorragia se habia suprimido y aun cuando el enfermo hiciera algun esfuerzo, ya la sangre no salia. Pudimos estar ciertos de que no habíamos obliterado el vaso, porque la sutura habia sido casi á la superficie de la vena, y esta es bastante gruesa. Hicimos con las extremidades del hilo un doble nudo, teniendo cuidado de no estirar para no fruncir las paredes venosas, ó que se encorvaran y el calibre de la vena se obliterase. El enfermo estaba en via de curación, cuando salí de mi país.

Lister ha cosido con catgut fino los labios de la axilar por herida. Schede lo hizo con la femoral, y Czerny suturó la yugular interna, haciendo una esofagotomia. Yo no tenia conocimiento de estos hechos cuando suturé el tronco braquio-cefálico. Algunos autores al hablar de estas suturas dicen que los procedimientos son poco conocidos, mal arreglados y que es más fácil y de mejor resultado el aplicar una pinza sobre la abertura de la vena ligando la pared, ó sea la ligadura laterál. Esta es la práctica más común siempre que se pueda ejecutar, es pronta y expedita: pero se pueden encontrar hechos como el que he referido y en el que la sutura dió un resultado completo, siendo su ejecución no difícil y bastante segura para cerrar la abertura relativamente grande que tenía ese grueso tronco venoso.

En los casos urgentes, el cirujano hace uso de los procedimientos generales, aplicándolos á medida de las necesidades que se le presentan y creo que la sutura en las paredes venosas es una de tantos medios útiles para contener las hemorragias. En el herido del cuello se encontraron circunstancias realmente excepcionales, que dieron tiempo para ejecutar la pequeña operación que cerrara el vaso herido. Pocas semanas antes veia yo morir de hemorragia á un hombre herido en la raiz del cuello y perdía la vida cuando le comprimía el lugar por donde salia la sangre, sin darme tiempo ni para pensar lo que debia hacer. Esto prueba que las indicaciones y nuestra conducta activa cambian segun cada caso particular, y que no pueden existir reglas absolutas para dirigir nuestra conducta. Me parece preferible hacer la sutura siempre que las circunstancias la hagan relativamente fácil á la de dejar en una herida pinzas hemostáticas por más ó menos tiempo: por supuesto, despues de haber intentado la aplicación de la ligadura lateral de las paredes y que se trate gruesas venas. Esta ligadura es utilísima en las operaciones. La ensayamos sin éxito, en el hecho de que me ocupo.

Duplay y Reclus citan en su última obra el caso observado por Maisonneuve. El tronco braquio-cefálico venoso habia sido abierto con un puñal. La herida cutánea tenía un centímetro y medio, y estaba colocada encima de la horquilla external y fué reunida por sutura entortillada. La curacion se efectuó. Dichos autores aseguran que es el único caso conocido de curación de una herida del tronco braquio-cefálico venoso. Este hecho es muy parecido al mio con esta enorme diferencia, de que Maisonneuve no descubrió el tronco y aplicó una sutura compresiva sobre los bordes de la herida cutanea. Produjo la hemostasis indirecta por compresion, mientras que en mi caso la aplicacion de la sutura fué inmediata sobre el tronco venoso.

CONCLUSIÓN.

En ciertos casos la sutura sobre los troncos venosos puede ser eficaz, siempre que se presente una indicación para hacerla.

La experimentación sobre los animales producirá tal vez resultados dignos de consideración.

UNUNITED FRACTURE.

By LLEWELLYN ELIOT, A. M., M. D.,

President of the Medical Association of the District of Columbia Surgeon to the Eastern Dispensary, Consultant to St. Ann's Infant Asylum, etc., Washington, D. C.

It is with much hesitation I appear before such an august and critical assemblage of surgeons as are gathered here, for I feel that nothing I may say will appear new to the majority of you. The subject—ununited fracture, delayed union, pseudarthrosis—has received attention at the hands of writers on surgery from the earliest time, and has engaged the attention of the best and ablest surgeons. To follow its literature would be an almost endless task, and to review in detail the various methods of treatment would occupy much more time than I desire to consume.

According to writers on surgery, firm union between the fractured ends of a bone may sometimes be delayed beyond five or six weeks, the period of time usually required for their repair. This condition constitutes what is termed nonunion, ununited fracture, or pseudarthrosis. This delayed union may be temporary or permanent; it may correct itself or it may require the intervention of the surgeon. The character of the union in these cases is of a fibrous or ligamentous nature, or is a proliferation of brittle callus.

The causes of this nonunion are divided into two classes, those of a constitutional character and those of a local character. Among the constitutional are hemorrhage, scorbutus, diarrhœal diseases, excessive lactation, pregnancy, shocks, any state of the system attended by a diminution of the vitality of the patient. The reparative process itself may be at fault, since the callus thrown out about the fractured ends may be so proliferative that it softens and dissolves before it has performed its part in the repair, or it may become so brittle as to be useless. Old age, cancer, paralysis, rheumatism, and syphilis are passive, and not active, constitutional causes, although the contrary is strongly asserted. As local causes we enumerate the interposition of a foreign body between the ends, such as a piece of muscle, tendon, or clothing; the destruction of the blood supply of the bone; improper adjustment of fragments; defectively applied fixation apparatus, where the fragments are not held in a proper position, but are movable. More cases occur in hospital practice than formerly, as the hospital internes are allowed greater liberty in the treatment of fractures to-day than they were accorded some years ago.

There should be no difficulty in the diagnosis of cases of nonunion after fractures. The condition, as a rule, is apparent. The treatment of cases of ununited fracture must be in accord with the cause of the delay. Iron for the anæmic, iodide of potash and the salicylates for the rheumatic, mercury for the syphilitic constitute our remedies for those cases which depend upon some fault of the system. But even with this course many patients become tired and discouraged at the delay and demand more active measures be adopted. It is then that rubbing the ends together, injections of irritants, introduction of setons, caustics, and pins, resection of the ends of the bone, bone grafting, wiring, and finally amputation of the member must be considered. One or more of these methods may be adopted. Of course, it is to be understood any faulty position must be corrected.

The history of these various procedures is entirely out of place in a practical paper, and then again you are all familiar with them. The best method, so far as my limited experience goes to show, is that of resection, resection with wiring of the freshened ends of the bone. After the operation I encourage free suppuration, believing the bony union which results will be firmer and more permanent, since, as Wyeth has written:

If the broken ends do not come in contact with the air, that is, if the fracture is not compound, the process of repair in bone after an injury is similar to the physiological process of development of this tissue, namely, the embryonic tissue is developed into cartilage cells, and these, undergoing proliferation, develop into a secondary embryonic tissue, which is formed directly into bone. If, however, air is admitted to a wound in bone, the process of ossification in the embryonic tissue is more rapid and direct, since the intermediate stage of cartilage cell formation does not occur.

Repair begins in the adult subjects generally about the tenth day. The callus is solid from the fifteenth to the thirtieth days and is absorbed by the sixtieth day.

I have seen four cases of ununited fracture during the last twenty years. In two success followed resecting the ends and wiring; one died from shock following amputation of the thigh, and the fourth would not consent to any operative treatment and has a perfect pseudarthrosis of the lower third of the thigh, without disability, but a shortening of about 2 inches.

Case 1.—B. S. P. White, adult. Was first seen and treated for secondary syphilis. Further examination revealed the presence of a pseudarthrosis of the right humerus at the upper third, of several years' duration. The arm was perfectly useless to him, hanging flail-like by his side, so when an operation looking to its improvement was proposed to him, it was gladly accepted. Under a mixed anæsthesia of chloroform and ether an incision 3 inches long was made along the outer aspect of the arm, the bone exposed, and the ends found to be bound together with strong, fibrous bands. The fracture had been oblique. The lower end was resting high up on the upper and on the inner side. Dividing the ligamentous bands, the periosteum was pushed out of the way and the ends of the bone freshened, about half an inch being taken from each end. The freshened ends were pierced with strong silver wire and tied tightly, the ends of the bone having been brought into exact apposition and the periosteum drawn down. The wound was allowed to heal by granulation. In four weeks the bone was united, and in six months he was dismissed from treatment. At the expiration of two years the wires had worked their way to the surface and were removed, the arm at that time being strong and of equal size as the other.

Case 2.—W. H. R. White, adult. Sustained a double fracture (simple) of the right femur. After months of treatment he came under the care of one of the most distinguished surgeons in the District of Columbia in a frightfully debilitated condition. A fracture just about the junction of the middle and lower thirds and another nearly midway of the lower third allowed the intervening fragment to remain looser. After consultation wiring was considered, but the lower end of the bone was so unhealthy that amputation was done at the upper third.

Case 3.—P. M. White, aged 25 years; blacksmith, of good muscular development. History of syphilis contracted about two years previously, at which time he was circumcised under cocaine anæsthesia. Was treated at irregular intervals with the protiodide of mercury, stopping treatment when the eruption had become dried. Has been a very hard drinker of whisky for the past twelve years. On May 28, 1892, while under the influence of alcohol, he boarded the engine of an express train. After riding a few blocks, about a quarter of a mile, he jumped off, thereby sustaining a comminuted fracture of the right tibia and fibula. He was carried to hospital in the police patrol. After being made comfortable for the night, the next morning an extension apparatus with weights was applied and retained on the leg for twelve days, when a plaster of Paris bandage was substituted, the weight extension being continued. This bandage was allowed to remain on the limb for one month, when it was removed and another applied. At the end of six weeks he was allowed to get out of bed and walk about the ward on crutches. On July 26 the plaster bandage was removed, and he was discharged cured.

During his stay in hospital he was treated for syphilis with iodide of potassium. He now came under my care; he was impatient and wanted something done for him. After attempting to set up an inflammation by rubbing the fragments together, I determined upon resection and wiring. Having been given a soap bath and his leg shaved, this was done on August 5 (1892), at half past 6 o'clock in the morning, Drs. T. N. Vincent, J. V. Carrahar, and R. A. Neale assisting. The anæsthesia was begun with chloroform, but as he took it so badly ether was substituted. An incision extending downwards from the promontory of the tibia to very near the end of the bone was made. This was supplemented by a T incision over the seat of nonunion, the bones separated from their muscular attachments, and the following condition found: A fracture at the middle of the tibia, united; a fracture half an inch below this, united; a long fracture starting from the internal angle of this last fracture and extending down at an angle of 75°, united by fiber. In the lower fragments the bone had been split for an inch. The fibula had been shattered, but had united in all its fragments, with much shortening.

Each fragment of the ununited portions of the tibia was resected obliquely, $1\frac{1}{2}$ inches of bone being removed; with a jeweler's drill each freshened end was perforated in two places and wire passed through the perforations, drawing the ends together; the wires were twisted, the ends pressed well down upon the bone, and the periostrum drawn over them. Eleven sutures were required to close the wound, a drainage tube introduced at the angle of the wound, and an iodoform dressing applied. The leg was then placed in a fracture box, with bran supports. Given morphia sulph. gr. $\frac{1}{4}$; reaction from the anæsthetic good; 7 p.m., temperature, $101\frac{1}{5}$°; pulse, 120. Has vomited several times; has not eaten anything; given whiskey at intervals; pain along tibial nerve severe; morphia sulph. gr. $\frac{1}{4}$ every two hours if necessary.

August 6, 10:15 a.m. Temperature, $100\frac{1}{5}$°; pulse, 96. Slept very little during the night, as muscular contractions were very painful and annoying; morphia sulphate gr. $\frac{1}{4}$ as necessary.

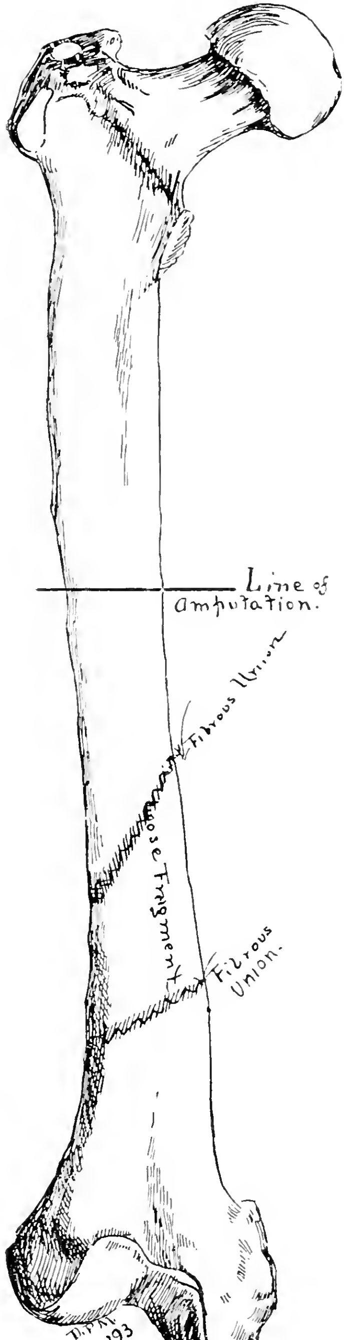
August 7, 11 a.m. Temperature, $100\frac{4}{5}$°; pulse, 96. Slept during the night; feels comfortable; wound is discharging at angle over the wires; other parts look well; washed with a solution of carbolic acid and dressed with iodoform.

August 8, 7:30 p.m. Temperature, $102\frac{4}{5}$°; pulse, 120. Wound at angle is discharging very freely around and through drainage tube; tube taken out; wound washed with carbolized water and dressed with iodoform; given bromide of potassium and chloral hydrate; muscular contractions not so severe; has eaten nothing since the operation; milk punch continued.

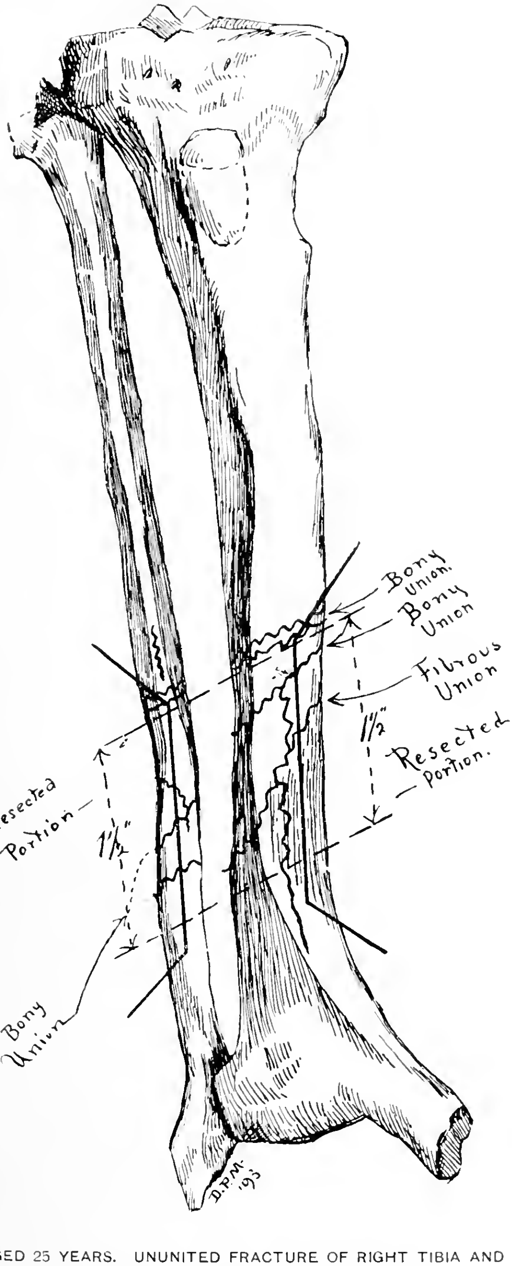
August 9, 12 m. Temperature, $100\frac{1}{5}$°; pulse, 112. Feels comfortable; has eaten chicken broth and toasted bread; wound discharging freely.

B. S. P., ADULT. UNUNITED FRACTURE OF RIGHT HUMERUS.

Heavy black lines show wire sutures.
Broken line shows line of fracture.



W. H. R., AGED 27 YEARS. UNUNITED FRACTURE OF RIGHT FEMUR.



P. M., AGED 25 YEARS. UNUNITED FRACTURE OF RIGHT TIBIA AND FIBULA.

Irregular black lines show lines of fracture.
Heavy black lines show wire sutures.

August 10, 11 a. m. Temperature, 100°; pulse, 100. Suppuration free; has pain and jerking in leg; dressed with carbolized water and iodoform.

August 11, 12 m. Temperature, $99\frac{2}{5}$°; pulse, 96. Suture at angle taken out to allow freer drainage; iodoform dressing; batting changed; morphia sulphate and chloral hydrate as necessary.

August 12, 11 a. m. Temperature, $100\frac{1}{5}$°; pulse, 112. Delirious during the night; attempted to get out of bed; suppuration free; took out sutures; wound at upper portion healing, leaving the T incision open; felt bones of leg jump; sulphate of magnesia.

August 13, 12 m. Temperature, $100\frac{1}{5}$°; pulse, 112. Slight pains in leg.

August 14, 11:15 a. m. Temperature, $99\frac{3}{5}$°; pulse, 96. Feels comfortable; felt bones jump during the night; pads changed; suppuration free.

August 16, 10 a. m. Temperature, $99\frac{4}{5}$°; pulse, 90. Feels well, except little sickness at stomach; bones give him the sensation he had when they were uniting; dressed with carbolized water and iodoform; laxative.

August 18. Temperature, $98\frac{4}{5}$°; pulse, 88. Had malarial symptoms; ℞. quininæ sulph. gr. 11, every three hours.

August 22. Temperature, $98\frac{2}{5}$°; pulse, 88. Bones uniting.

August 24. Temperature, $99\frac{3}{5}$°; pulse, 90. Doing well; bedding changed.

September 12. Abscess at upper extremity of incision incised and a large amount of clean, healthy pus evacuated.

September 18. Doing well; no discharge; wound healed; wires can not be felt.

September 26. Put on posterior tin splint with foot piece; allowed to get out of bed and go about his room on crutches.

October 9. Dressing removed; tin splint reapplied with silicate of potash bandage; allowed to go about at will on crutches.

October 20. New silicate of potash bandage applied; can lift leg without pain or strain when no bandage is on it.

In January went to work at horseshoeing; wound up with a heavy spree and a hard fight; was thrown down and dragged about the room; felt no bad effects in the leg; union perfect.

February 16. Leg still doing well; wears the last bandage; has secondary syphilitic symptoms; given hydrarg. protiodite gr. $\frac{1}{4}$ every four hours.

February 26. Bubo incised; continue pills.

July 4. Bandage taken off; wires still in the bones; leg perfectly strong; can do as good a day's work at horseshoeing as before injury. He wears a shoe that prevents any limping.

Cases 1 and 2 prove to me syphilis is not a cause of non union, and that the bony union following free suppuration is stronger and more permanent than that following the closed method of treating these cases.

A CONTRIBUTION TO THE STUDY OF CLUBHAND.

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Congenital clubhand is a deformity of very much less frequent occurrence than clubfoot, and its cause is involved in equal obscurity.

There are clubhands of the acquired variety, caused by vicious cicatrices as a result of burns, by paralysis of certain muscles, or contraction of others from central nervous irritation, or in other cases resulting from injuries to the bones of the hand or forearm, but these do not properly come under the head of clubhand, such as I wish to mention. As examples of these acquired forms, I might mention the following cases:

In the Philadelphia Medical News, May 12, 1888, J. E. Young reports a case of clubhand, due to irritation of the brain, which disappeared on the removal of the disturbing influence. The infant was delivered by forceps after a protracted labor, and the left side of the head much crushed. A large hæmatoma formed here, and subsequently the right hand was markedly adducted, and the fingers and thumb flexed, and the hand was flexed at the wrist, forming almost a right angle with the forearm in the radio-palmar position. The muscles on the radial side of the forearm were firm. The hæmatoma was incised, and profuse bleeding followed, and subsequently the deformity gradually subsided, disappearing twenty-four hours before death, which occurred some days later. At the autopsy a fracture of the left parietal bone was found over the position occupied by the ascending frontal and parietal convolutions, which had been subjected to great pressure from the effused blood.

Bilhaut in the Annales d'Orthopédie May, 1893, relates a case of clubhand which was supposed to be congenital, but which was really the result of a fracture of the ulna at birth, or soon after, with subsequent loss of bone from suppuration, giving rise to inequality in the length of the bones of the forearm, causing sharp deflection of the hand towards the ulnar side. For the relief of this condition the author proposes to remove a portion of the radius and so make it of equal length with the ulna.

The congenital cases of which I wish to speak are of a different kind and may be divided into three varieties. (1) Those where the skeleton is complete and well formed. (2) Where the skeleton is complete but ill formed. (3) Where the skeleton is incomplete and distorted. It is said by various writers that the majority of cases come under the the third head, but in the author's personal experience this has not been so, only two of the five cases that have fallen under his observation showing absence of portions of the skeleton; but, of course, this number is far too small to be used in drawing conclusions of any sort.

In four of these patients there was clubfoot of some variety, and in one case an hypertrophy of one great toe, and the large majority of reported cases are associated with abnormalities of development of some part of the body.

The direction of the deformity may be either in flexion or extension abduction or a combination of two, the most frequent seeming to be the radio-palmar variety.

In those cases where the bones of the hand and forearm are present the prospects of a good result are more favorable than where there is absence of one or more bones. In these milder cases, when seen early, it is sometimes possible to restore the hand to proper shape and function by constant manipulation and retention of the parts in an improved position by some fixed dressing, as for instance, the plaster-of-Paris bandage, changing the dressing from time to time as the deformity is reduced. Section of the tendons or ligaments or fascia may become necessary, especially if the case is not seen in the early stages.

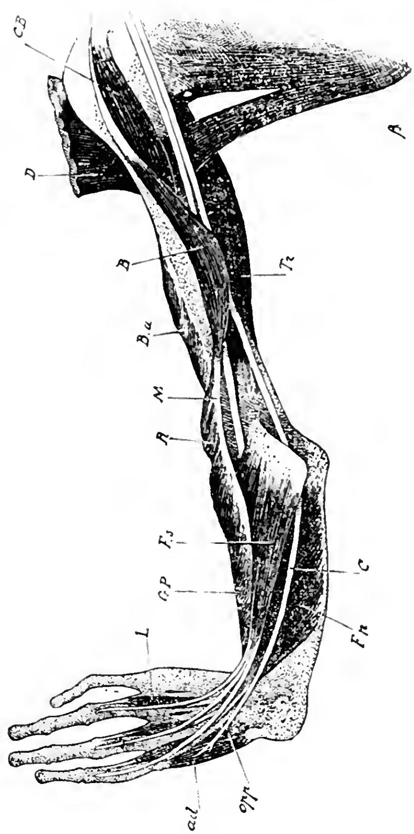
Many of these structures are so situated as to make open section much more preferable than the subcutaneous method, and if the flexor tendons have to be divided it would seem better to operate on the forearm instead of the hand, and to split the tendons longitudinally, and, after having gained such additional length as was needed by sliding the ends past each other, to suture them together again once more. I have seen two cases where the deformity was due to shortened flexors of the fingers, one of which had been operated on in Baltimore by the section of the flexor Carpi radialis and flexor Carpi ulnaris with great improvement as to function according to the statement of the parents, but the hand was much distorted, and the fingers could be extended only when the wrist was flexed sharply on the forearm. In this case the parents were obliged to leave town before any operation was practicable; and in a second of similar, though less aggravated, character the presence of inflammation of the cervical vertebræ made it inexpedient to give an anaesthetic, and the operation was therefore postponed.

In a double congenital clubhand at present under treatment the position has been very markedly improved by manipulation and plaster-of-Paris bandages, as seen by the accompanying photographs.

Another case of the more aggravated kind has also come under my observation, and these are sufficiently rare to warrant me in describing it at length:

R. B., æt. 9, was seen by me in December, 1892, having a congenital clubhand and clubfoot of the right side, and also a lateral curvature of the spine, the concavity being on the right side. The lateral curvature was apparently due to the imperfect development of the whole right half of the body, the right upper and lower extremities both being markedly smaller than their fellows. This might possibly be

POSITION OF HAND BEFORE AND AFTER OPERATION FOR CLUBHAND.



CLUBHAND DESCRIBED BY KIRMISSON AND LONGUET. REVUE D'ORTHOPEDIE, JANUARY, 1893.

accounted for by disuse, as, on account of the very severe form of clubhand and clubfoot, the boy had depended almost altogether on the left half of his body for assistance. The clubfoot was an extreme varo-equinus, and was treated by deep subcutaneous incision in the sole of the foot and tenotomy of the tendo achillis, the foot then being immediately replaced in the normal position by means of Bradford's clubfoot twister, it being necessary to employ a very considerable amount of force to effect reduction. The foot was then kept in position by plaster-of-Paris boots, renewed about every three weeks until at the present time his foot is practically in a normal shape.

The clubhand was almost the counterpart of one described by Kirmisson and Longuet in the Revue d'Orthopedie, January, 1893, and which they had an opportunity to dissect. The radius and thumb were absent as well as the first metacarpal bone and a certain number of the carpal bones. Exactly which of the latter were absent, I am unable to state. The ulna was curved in its middle at an angle of about 30° toward the side where the radius should have been. The hand was almost at right angles with the forearm, but toward the radial side and flexed on the forearm. The carpus did not articulate with the ulna, but was attached to it by means of firm, ligamentous bands.

I first did an osteotomy of the ulna to correct the curve, and, after the bone had firmly united in a straight line, endeavored to stretch the contracted tissues on the side of the arm, where the radius should have existed, by means of adhesive plaster, attached above and below the wrist, and passing around the ends of a wooden splint, which was fastened to the forearm.

After several weeks of traction the hand could not be drawn down far enough to permit the ulna to slide above the carpus, although a considerable elongation of the contracted tissues had been effected. It had been my intention to endeavor to form an artificial joint between the lower end of the ulna and the carpus, but on cutting down upon the bones I found that after freeing the end of the ulna from all ligamentous attachments, it was impossible to draw the carpus clear of it, and I therefore removed what I took to be the os magnum and unciform.

The scaphoid and semilunar apparently did not exist, as in the case which Kirmisson and Longuet describe. The tip of the styloid process of the ulna was then cut off, and the end of the bone inserted into the gap in the carpus formed by the removal of the carpal bones. I had originally intended to wire the bones fast in this position, but on second thought determined to leave the ulna free, thinking that a more serviceable hand would result from this method, and that the bones could be wired together later on, if necessary. This operation, of course, shortened the upper extremity still more than nature had already done, but it seemed to me wiser than the very extensive division of tendons and muscles which would have been required in order to permit the carpus to be pulled down to the extremity of the ulna. The hand was dressed in a straight position, and, after about three weeks, movements of the wrist were made, with the object of creating, if possible, a serviceable joint, which should be under the control of the patient.

The position of his hand before and after the operation is shown in the accompanying photographs, and the boy's control of his motions and his ability to grasp objects is greater now than it was before the operation, while his appearance is vastly improved. He is still wearing an apparatus with a joint at the wrist, allowing flexion and extension, while retaining the bones in a better position than they assume when left to themselves.

In the case described by Kirmisson and Longuet the shape, general appearance, and situation of the defective bones correspond so closely with the case I have just narrated, that I think it worth while to quote quite largely from their description of the autopsy:

Muscles—Arm.—At the upper end there was a complete absence of the long portion of the biceps; the short portion seemed to be normal. At the lower end the tendon which is inserted into the bicipital tuberosity was absent, and the biceps was gradually merged into a rectangular muscular fasiculus in front of the elbow joint. The brachialis anticus was remarkably small. The other muscles of the arm were normal, but were very slightly developed. On the anterior surface of the forearm the muscular anomalies were so marked as to render it difficult to recognize what muscles were present. There was no pronator radii teres. On the inner border there was a muscular fasiculus continuous with the rectangular muscular mass spoken of above, which below spread itself out at the edge of the carpus, and seemed to correspond to the palmaris longus. The flexor carpi ulnaris was absent. The superficial and deep flexors were in a confused group at their upper extremities, and it was impossible to separate the one from the other at their lower insertions in each of the three last fingers, counting from the ulnar side of the hand. There was no flexor tendon going to the atrophied finger which corresponded to the index; there was no flexor proprius pollicis nor pronator quadratus. On the posterior surface of the forearm the supinator longus and brevis were absent. An undetermined little muscle which was confused with the other muscles of the posterior surface of the forearm was inserted toward the external part of the carpus, and represented the radial group. A little muscle fiber ran from the epitrochlear fossa to the internal edge of the carpus. There was no anconeus, and no extensor minimi digiti. A single muscle fiber went to the ulnar side of the second finger, representing the extensor communis digitorum.

Hand.—On the outer border of the hand there were no muscles to form the thenar eminence; three lumbricals were present; there were no interossei.

Nerves.—The median nerve was normal. The ulnar passed the elbow in the usual position, and was lost on the inner side of the hand. The radial sprang from a common trunk with the musculo-spiral and was lost on the forearm.

Skeleton.—The scapula and clavicle were well formed. The humerus had no bicipital groove. The musculo-spiral groove was normal. The elbow joint was very much relaxed, only the trochlear surface of the humerus was covered with cartilage. The sigmoid cavity of the ulna was well shaped, but allowed only slight movement of flexion and extension of the elbow joint. There was a very sharp anterior curve in the ulna which made the styloid process very prominent. The radius was absent. The carpus consisted of five bones, two of the first row, the cuneiform and pisiform, and three of the second row, the trapezoid, os magnum, and unciform. The scaphoid, semilunar, and trapezius were absent. The two internal metacarpals were also absent; the other respective phalanges were normal, but the index and the second metacarpal which it supported were very short. There was no thumb.

The most extensive article on the subject is that of Bouvier in the Dictionnaire Encyclopédique, in which are arranged in tables all the cases reported up to 1871. Of the dissections of several cases he gives minute details and also illustrations of the anomalies which correspond very closely to the defects in development found in the present case. In regard to treatment, but little is said except that stretching and tenotomy are useful in certain cases, and may be supplemented by apparatus. LeDentu in the Dictionaire de Jacoud also enters largely into the description of this affection, but says little as to treatment. Bradford and Lovett, after mentioning the different positions in which the hand may be found, say in regard to treatment, that in the worst cases where there is much bony deficiency the choice lies between amputation and doing nothing. In the milder cases of resistant muscles, stretching by manipulation and apparatus may be efficacious. In general, the treatment must be varied according to the severity of the case.

St. Germain divides clubhand into three groups similar to those I have mentioned above. Three such cases are in the Dupuytren Museum, and are mentioned by Malgaigne in his "Lessons on Orthopedic Surgery." He suggests manipulation and the employment of apparatus to remedy the deformity. Redard recommends manipulation and massage in young children where there is but slight fibrous or tendonous resistance; tenotomy is to be done only on the flexor carpi radialis, ulnaris, and palmaris. He does not think very highly of the various orthopedic appliances, and believes that resection and arthodesis are very rarely indicated.

Hoffa goes quite extensively into the various varieties of faulty development of the upper extremity which may give rise to clubhand. That due to absence of the ulnar is very rare, Burckhart and Birnbacher having been able to find only seven reported cases. In regard to treatment, Hoffa mentions massage and retention by means of apparatus but gives almost no details, while Holmes and Owen are equally brief in their remarks on this point.

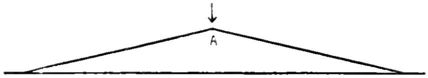


Fig. 1.

Fig. 4.

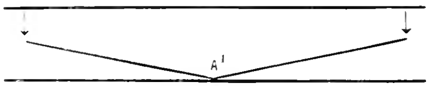


Fig. 2.

Fig. 3.

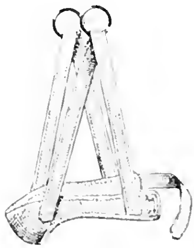


Fig. 5.

Fig. 6.

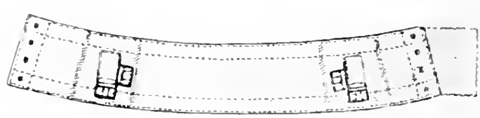


Fig. 7.

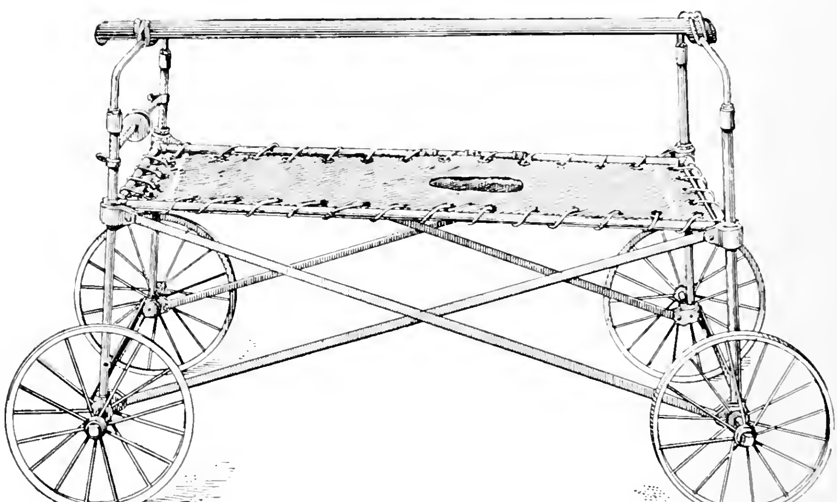


Fig. 10.

TREATMENT OF POTT'S DISEASE.

The operation which I practiced on the case just mentioned is, as far as I have been able to review the literature of the subject, the first of the kind yet described.

The ulna does not stay in its place as well as I should wish, and if I were to operate on a second similar case I should endeavor to remove the carpal bones without severing the posterior ligaments and so leave a pocket into which the end of the ulna might be placed, and I may still perform some such operation on this boy if his hand does not seem sufficiently useful.

In a case described by Bouvier, which is in the Dupuytren Museum, such of the carpus as is present articulates with the ulna on the side where the radius should have been, the radius being absent. In such a case the proper operation would seem to be the division of the ulna just above the articulation with the carpus and to turn it at right angles, letting the outer surface reunite with the cut end of the ulna, and thus bring the hand into a straight line with the arm, at the same time preserving the wrist joint.

The anatomical peculiarities of these cases are such that each must be judged by itself, and this brief sketch of the subject is simply offered as contributing to the scant literature of a subject on which much may still be said.

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RECUMBENCY IN THE TREATMENT OF POTT'S DISEASE.

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The collapse of a cavity resulting from disintegration of bone and fibro-cartilage is not the only local element of the spinal deformity of Pott's disease. During the process of destruction, the bone for some distance around that which breaks down becomes greatly softened. This change is not to be regarded as merely a part of the destructive process, but, as a great degree of protection against mechanical violence is thus afforded, it has a positive conservative value. The protection thus gained, however, is liable to be at the expense of change in shape of the softened bone itself, and it is this also and not the bone destruction alone which produces the deformity. In those cases which have no very acute symptoms, such as pain, night cries, marked spasm, fever, or impairment of general condition, but with a prolonged tendency to progressive deformity, it is probably the predominating factor. It has been shown that after removal of a tuberculous focus from the bones entering into the knee joint the surrounding cancellous tissue remains for some months in a pliable state, so that without renewal of the ostitis it may bend and permit flexion of the limb; that this is corrigible by mechanical means and that the bone ultimately becomes permanently hard.*

* Deformity following excision of the knee; Trans. Am. Orth. Ass., Vol. v, Brooklyn Med. Journal, February, 1892.

The same conditions obtain in disease of the cancellous tissue of the spine, and after the destructive process has expended its energy the deformity may still be easily increased, but is also to a great extent controllable. Given a soft segment in the vertebral column, the kyphos is the mechanical result of weight and muscular action exerted in one or more of the following ways: First, as longitudinal pressure by which the part is squeezed out; second, as anterior leverage by which it is bent out; third, as direct backward pressure, such as intra-abdominal or intra-thoracic tension, or in case of a patient supine upon a yielding surface, visceral weight, pushing out a weak portion of the parieties. It is of importance that these deforming forces be kept clearly in mind in order that counteracting force may be intelligently applied. Sudden, intermittent pressure, such as is produced by jars or twists, favor more particularly the destructive process; while long-continued pressure produces more effect in changing the shape of the surrounding bone. The same force may be actively destructive or passively deforming according as the active or passive condition of the parts predominates. Cicatrical contraction also plays an important rôle. Although conspicuous as a distorting factor in disease of joints other than spinal, its existence in this connection seems to have been generally ignored. An amount of cicatrization sufficient for the firm binding together of the parts adjacent to the bony defect is conservative, and it is fortunately improbable that any force which we can bring to bear can overcome it. But here, as elsewhere, inadequate protection in the acute stage may permit such a degree of disease intensity as will result in the formation of an unnecessarily large amount of scar tissue. This in contracting increases the deformity.

It is evident that inhibition of the destructive process is the most efficient preventive of the deformity, but as the latter is not necessarily proportionate to the former, and as the displacement of parts is itself traumatic in its effect, the deformity is treated not only for itself, but because it has a marked influence upon the causative destruction and upon the general health of the patient. In any stage of the disease the mechanical treatment consists in protection from traumatism, intrinsic and extrinsic, and antagonism of the deforming forces enumerated. But while no sharp distinction in kind is to be made between therapeutics of the disease and those of the deformity, there is a very great difference between the degree of protection and of mechanical prophylaxis that is necessary for a spine in which progressive caries is in operation or very great softening exists, and that degree which will meet all the needs of one where that process having ceased to operate, only a moderately weak place remains. Clinically accurate determination is impossible, and the treatment must be made thorough enough for any possible state. If the conditions of the spondylitic spine, when upright, and the active, unavoidable performance of its functions as a support and a base for muscular action, and subject to a constant succession of traumatisms—accidental, those involved in the use of the limbs and those consequent upon misplaced muscular origins and insertions—are considered, the magnitude of the demand made upon any form of portative apparatus is apparent. Such instruments have demonstrated a great degree of utility. Let us consider their limitations.

Their action consists in support (principally antero-posterior) by leverage, and in longitudinal traction. Unlike splints applied to a broken long bone or to a joint of a limb, where they act on long, stiff levers, they have no direct grasp upon the seat of disease nor upon the parts immediately adjacent thereto, but their power is diminished by the distance and the heterogenous character and mobility of the parts which intervene between their points of application and the spine; and in the acute stage the force thus applied is expended not altogether upon the bony defect or the seat of actual disintegration, but to a great extent upon the soft mass surrounding it. This can not be pried straight while it is under the influence of pressure transmitted longitudinally through the spine. Their antero-posterior support is also limited, in mid-dorsal disease, for instance, where the length of the spine above and below furnishes the best opportunity for leverage, by the amount of pressure which the skin over the kyphos will bear. In acute cases it frequently happens that this tolerance is not sufficient to permit a successful resistance to destructive and deforming force. As the back becomes sore the apparatus must be removed or modified to diminish the pressure. This is but following up an increasing deformity, not successfully antagonizing it. In disease of the upper spine, where traction is the more essential element, similar limits are encountered. The immature pelvis of a child affords a poor base for traction. The skin covering the chin, back of the head, etc., will permit far less pressure than is involved in the weight of the head alone.

Another indication of inefficiency of portative apparatus is furnished by the convalescent spine. In the acute stage the area of reflex muscular spasm extends much beyond that of the disease. The extent of this rigidity is a pretty fair criterion of the intensity of the process. Frequently the whole spine is rigid or may become so when the patient stands. In a case of dorsal disease a posterior brace fitted to a prone patient will either continue to fit when the patient stands or will cease to fit because he straightens his lumbar spine. But when the acuteness diminishes the area of previous collateral rigidity becomes more flexible and a brace now fitted to a prone patient does not follow the contour of the upright spine. The tendency of the healthy spine when vertical is to sag into curves, and the patient now lordoses away from the brace. Although some support had been afforded, it had not been sufficient to supplant reflex muscular spasm. It was the patient's muscles, to some extent at least, and not the brace that had held him up. In many cases the patient has supported the brace more than the brace has supported the patient. These criticisms are applicable to any form of portative apparatus of whatever material constructed. Their use belongs properly to the subacute or convalescent stage only.

Recumbency as a therapeutic measure means mechanically more than simply putting a patient to bed. It implies protection from traumatism and retention of the whole spine in the best possible position, so that the relations of the separate parts remain unchanged or subject to those changes only which by the use of pressure and traction the surgeon may make. The prone position is preferred by some surgeons, notably by Noble Smith,* of London, for the following reasons: (1) It removes the weight of the body from resting on the spine; (2) it restrains the action of the abdominal and other muscles in front of the spine, so that the part of the body above the deformity is not bent forward; (3) it allows free use of the arms for feeding, play, etc., without causing the body to bend forward and press the diseased bones together. I have had no experience with this position, but, as compared with the supine, it would seem to be open from a purely mechanical standpoint to these objections: (1) It fails to afford the splintage which, in the supine position, the contact of the spine with the fixed surface of the couch affords. On the contrary, the anterior chest and abdominal walls being stationary all the traumatisms of respiration and other thoracic or abdominal movements are effective on the vertebræ; (2) deglutition, especially of liquids, and attention to the other needs of the body must be much more difficult in the prone than in supine position; (3) in cases where it is necessary to keep the head fixed in line with the trunk, the patient could not see what is going on, and confinement in this position would soon become very irksome; (4) suppose the apex of the kyphos to be designated by a and a' in the accompanying diagrams, the direction of gravity being indicated by the arrows.

In the prone position (fig. 1) such of the parts as underlie the kyphos are supported by the bed, and are themselves supporting the spine in its deformed position; there is nothing to prevent the soft bone from being thrust out. In the supine position (fig. 2) the trunk rests, in part at least, upon a, and the weight of the spine above and below the kyphos, together with that of the superincumbent parts, is reforming in its tendency.

That this last consideration is not a mere matter of theory the accompanying

* The Surgery of Deformities. E. Noble Smith, London, 1882, p. 213.

tracings (fig. 3), taken from a case of dorsal disease, will very strikingly show. The first (*a*) was made by means of the lead strip applied to the spine while the patient was prone. The patient could by no means have tolerated in the upright position a brace that would have produced such a change. When cut out of cardboard the edge fitted the spine accurately. The second (*b*) was thus obtained: Several thicknesses of plaster-of-Paris bandage were applied to the mid-line of the back and closely secured by a muslin bandage. The patient was placed in the supine position upon a firmly-padded table and kept quiet until the plaster had become hard. The muslin bandage was cut away, and the patient lifted carefully out of the cast. By means of the lead applied to the impression the contour of the cast was obtained, cut out of cardboard, and tested. These tracings have been placed together for comparison. While the general straightening of the spine is in part due to compensatory lordoses above and below the kyphos, even this change is a very desirable one. For, as emphasized by Whitman,* the spinal deformity derives its importance chiefly from the resulting misplacement of the head, shoulders, chest, etc. The lordoses must moreover exert a considerable straightening force upon the kyphos. (*f*) In a similar case were determined in both positions the transverse outlines of the projection. Fig. 4 shows the comparison. The upper is the profile in the supine, the lower that in the prone, position. The greater forward inclination of the ribs in the prone position is serious, because it effects a projection forward of their sternal ends, and thus causes the characteristic pigeon breast.

The thorough support of the spine is not possible if the patient lies upon a soft or yielding material, or upon a canvas-covered frame placed upon a bed from which it is raised several times daily. For the contour of the spine is not the same when the frame is suspended as when it is on the bed. Although no pain may be caused by thus changing the relations of the inflamed or softened vertebræ, such change tends to produce reflex spasm and is not surgical. The supporting surface should be quite firm, and the whole spine should be comfortably fitted. When the posterior projections of the occiput and the buttocks are greater than that of the kyphos, a pad, tightly stuffed with curled hair, cork shavings, hair felt, or similar firm elastic material, should be placed under the latter. The hollows of the cervical and lumbar regions should also be filled in when they exist. On the other hand, care should be taken that the kyphos does not bury itself in the bed so that the pressure above and below, or upon the ribs at either side, is greater than at the apex. The backward projection of the diseased area should be at all times directly antagonized by as much force as is practicable. It is essential that this force be subject to accurate adjustment without exciting reflex muscular spasm by interrupting the general condition of rest. This adjustment is not possible when the patient lies upon a board or other surface where no access is had to the spine. It is then due to slight deformity, and good fortune if he does not have to be repeatedly taken up and the padding modified to meet the changing contour or to relieve some part of too concentrated pressure. Comfort is an essential criterion, and the same rule that applies to almost any kind of orthopedic instrument holds good here. When it is a source of pain or discomfort, it is not only not doing good, but is probably doing harm. Bathing, not rubbing, the skin with alcohol and water, equal parts, and the application of talcum, fuller's earth, or a similar drying powder, is very necessary when sores form or are imminent. A very little turning of the patient will suffice for this purpose, but even this should by a careful adjustment of the pressure be avoided as much as possible, and should always be done by two persons, one at the head and shoulders, the other at the pelvis, working together so as to keep the relations of the parts unchanged. This is particularly necessary in cervical disease. In these cases, the patient will not, usually, try to turn his head or lift it up.

Traction is particularly efficacious in cervical or high dorsal disease and usually may be applied by means of a head sling similar to that employed in the Sayre suspen-

* Trans. Am. Orth. Ass., Vol. v., 1892.

sion apparatus, fig. 5. To the rings of this are attached a stout cord, which passes over a pulley and is fastened to a weight. It is well to have several of these slings, made of drilling and lined with Canton flannel, or made altogether of the latter, and with straps of webbing instead of leather. They can be washed when soiled and are more comfortable. Fig. 6 shows a form of headpiece, which is easily made, and answers very well in cases when a light weight is to be used and the occipital projection is well developed, and it has the merit of not interfering with the lower jaw. It consists simply of a piece of webbing 1 inch wide, a buckle, and two 1¼-inch iron harness rings. So long as the weight is pulling the web has a good hold. After the ring has adjusted itself the two layers of webbing are to be stitched together when they cross. I sometimes add a strap to pass from ring to ring under the chin. It can be removed so that the patient may eat, without entirely intermitting the traction. As compared with the other headpiece this one has the disadvantage that the patient can slip it off when the nurse is not looking. When the case is acute, however, he is not likely to do so. The feet are placed from 1½ to 4 inches lower than the head, so that the greater mass of the trunk and lower extremities affords a good base for counter traction. The amount of weight is to be regulated by the patient's feelings. From one-half to 4 pounds in case of a young child is sufficient to counteract muscular spasm and render the patient comfortable. In mid and lower dorsal disease traction is not so efficient. The patient should be nearly or quite horizontal, because the amount of pressure involved in drawing the upper segment of the trunk up hill is greater than the chin and scalp will long stand.

In these cases, if attempt at much traction is made, the pelvis should be secured by adhesive plaster applied to both lower extremities, as for hip disease, or by the belt shown in fig. 7, laced on, with straps passing to the foot of the bed. But, as stated, the undeveloped pelvis of a child offers very poor opportunities for traction. The belt is of more service in securing the pelvis so that the patient can not turn over. While the amount of weight should be all that can be tolerated, it is evident that the leverage illustrated in fig. 2 is a more powerful agent than traction in these most formidable cases. In lumbar disease the head should be placed a little lower than the feet. The pelvis is to be fixed as before, and the extending force consists of the head and thorax, with as much additional weight as is comfortable. When psoas contraction exists, an adjustable inclined plane is used, with traction on the flexed limb.

At the annual meeting of the American Orthopedic Association, held in New York September, 1892, I presented an orthopedic couch, which seemed to be all that was necessary for its purpose. Further experience has demonstrated its inadequacy, and impelled me to make experiments in devising a bed which will more fully meet the requirements already outlined. The surgical cot apparatus which I now present comprises a modification of the familiar canvas-covered frame, with provision for supporting it and maintaining uninterruptedly rest, fixation, and accurately adjusted pressure and traction. It consists of a rectangular frame of iron, a canvas bottom, and an iron support, upon which the frame is adjustable at any convenient height or incline. The rectangular frame is stiff enough to stand, without bending, the patient's weight and the strain involved in stretching tightly a heavy canvas.

It should be from 4 to 6 inches longer than the patient—48 by 15 inches inside will be found a convenient size for children under 5 years old—and it should be made of three-eighth inch pipe. Larger sizes should be made heavier. The canvas should be No. 2 for sizes under 48 inches, thicker for larger sizes. It is to be hemmed and made a little shorter and narrower than the frame to allow for stretching, and provided with eyelets through which pass stout cords by which it is laced to the frame. The lacing is to be done secundum artem. The corners are first drawn as tightly as possible and the sides and ends laced by separate cords. The object of this is to provide for the independent adjustment of each part and so to diminish the sagging. Warming the canvas will assist in getting it tight. A hole, preferably a narrow oval, is provided for the purposes of micturition and defecation. It should measure for a child under 5 years of age 6 by $3\frac{1}{2}$ inches. Its long diameter coincides with the longitudinal median line of the canvas, and the center should, when the spine has not been shortened, be about three-fifths distant from the top. When the spine has been much shortened special canvas will have to be made. The edges of the opening must be strongly and neatly bound and hammered flat. The vessel is placed underneath, supported at the proper height by a stool, box, pile of books, or in some such way. It is brought to the patient and not the patient to the vessel. The opening is closed by an underflap a little broader than the hole is long. One end of it is sewed to the edge of the canvas and the other secured by three or more stout straps arranged to buckle around the side of the frame.

The patient is laid upon the couch in the position he is to occupy, so that the anus is placed at the upper end of the opening. The locations of the neck and axillæ are marked upon the canvas, and marks are also made by means of which the situation of the kyphos can be determined. He is then removed. Padded straps of webbing arranged to pass around the shoulders and through the axillæ, and provided with buckles, are sewn to the canvas. The buckles should be placed close to the sides of the neck, where they will be least accessible to the patient, and the straps diverge. The sewing can best be done with a sailor's palm and needle. A strap to lie loosely across the chest, and having in each end a loop, through which the shoulder strap passes, will prevent the slipping off of the latter. If the case be one of cervical or high dorsal disease, loose pads of kersey, hair felt, or some similar elastic material, covered with linen, can be easily placed under the neck. But for lower spondylitis the pads should be sewn to the canvas. They should be about 6 inches wide and one-half to three-fourths of an inch thick, except at the ends, where they are flattened, long enough to extend an inch or two above and below the projection. They are placed longitudinally, each side of the middle, so that a groove about one-half to three fourths of an inch wide exists between them. The object is to press upon each side of the prominent spines, and to protect the bony projection. The patient is replaced upon the canvas and the shoulders secured by the straps. To exert a pressure upon the kyphos in such a way that it may be accurately regulated, there is the following arrangement. Two, three, or more straps of webbing are placed side by side, transversely under the canvas and across the kyphos, so as to buckle, at each end, around the iron frame.

By the use of these straps, which constitute a most important feature of the apparatus, the reforming pressure is always under control, while the weights of the parts anatomically above and below are brought into play to secure a backward leverage. The cervical and lumbar hollows should be filled by small pads without groove, sewn on. The sagging of the canvas results in the formation of a shallow trough which interferes with lateral motion, and, as the material yields to the warmth and pressure of the prominent parts, after a few days the back is generally accurately fitted. By feeling the underside of the canvas it may be ascertained whether such is the case. The weight of the body serves to maintain a close contact with the couch. The most perfect fixation of the spine is secured by the application to the back of some rigid material, but this involves the danger of pressure sores, or, to prevent them, a frequent removal and reapplication of the apparatus. Thus the patient must be frequently turned over. In most if not all cases, sufficient fixation is attained by fastening the patient to the couch by means of the shoulder straps, by webbing passed around the side bar and buckled to the pelvic belt, and by the use of traction. A pillow should be put under the lower extremities to prevent pressure on the heels and also to relax the flexors. A towel fastened around the rectangular frame and the thighs prevents the patient kicking. The covering is also wrapped around the patient and frame and so keeps the back warm.

For the purpose of applying traction, there is a broad-flanged wooden pulley, which turns on a steel bar placed across either end of the apparatus at any convenient height. The cord connecting the head sling and the weight is passed two or three times around this drum and so can not be thrown off. Should the patient move his head laterally, as may be allowed in convalescent cases, the pulley and weight follow the movement. I have sometimes secured the headpiece to the top of the frame and allowed the weight of the parts below the disease to act as the tracting force. Steel, of St. Louis,* fastens the side rings of the headpiece to uprights placed at a considerable distance apart in the head of the frame which he employs, and thus secures some lateral fixation of the head. By the use of the cot I have been able to keep up an absolutely uninterrupted rest with traction, and render the patient perfectly comfortable for months at a time. The addition of rubber-tired wheels and a parasol, has contributed to the comfort of the patient and the convenience of the friends (fig. 9).

The apparatus may be folded into a comparatively small compass. It is made by W. F. Ford, of New York, in sizes up to 4½ feet (large cot).

When the patient is recumbent, all the indications may be more perfectly met than in any other position. The force of gravity which by leverage and by longitudinal pressure acts upon the upright spine as a powerful destructive and deforming agent can now be converted into a reforming force. Direct backward pressure can be accurately antagonized. Muscular action and interosseous pressure, now greatly reduced by the general condition of inactivity, can be counteracted by fixation and by far less traction than would be required to raise the weight of what were superincumbent parts. The spine, relieved of the performance of all its active functions and saved from all traumatisms except that of respiration, is thus placed in the best possible condition for repair. And, what is of great importance, fever and the drain of muscular spasm, pain, and perverted nutrition are met by a state of systemic rest. It is true that while a gain in weight is the rule, the muscles soon become soft, and a loss of muscular strength may occur. This loss is a gain, for, to the spondylitic spine, muscular strength is a menace. So long as the nerve connections are preserved the muscle remains capable of restoration and no permanent damage by rest is possible. Nature never makes the mistake of demanding as a condition of recovery the use of any parts (as in this case bones and muscles) which are unable to perform their functions.

A feature about this measure in chronic bone disease which is surprising to all to whom it is not familiar, is the way patients thrive under it. When the fixation and traction are efficient, they are relieved of pain, sleep well, and soon loose the drawn, old, tired expression so familiar upon the faces of those suffering from the great drain of prolonged muscular spasm. I believe that the amount of caries is thus limited; that much deformity is prevented, and that the duration of the disease is materially shortened. Another merit of this therapeutic measure is that its employment does not demand the exercise of the mechanical skill and experience which is necessary to the successful employment of a portative apparatus. In places where a spinal support can not be readily obtained, recumbency with adjustable pressure and traction may be adopted until other arrangements can be made. Patients may, if necessary, be moved long distances, and with safety and comfort upon a frame.

Recumbency is indicated as a routine treatment as soon as a diagnosis of spondylitis has been made or even when it is probable. For the intrinsic tendency of the disease to progress is in each new case such an unknown quantity that no time should be expended during the developmental stage in experimenting with less thorough methods of treatment. In the case of a patient wearing a support, progressive deformity or the persistence of pressure sores should be regarded as demanding recumbency. It is of course presumed that the brace has been skillfully designed and applied, that pressure has been diffused over as much surface as the case will permit, and that by cleanliness and dryness every care has been taken to protect the skin.

* The Medical Fortnightly, St. Louis, February 1, 1891.

While no method can claim to prevent in all cases an increase of deformity, such increase should, in no case, be regarded as inevitable until it is ascertained what can be done by the careful use of mechanical force applied to the passive horizontal spine. Marked psoas rigidity denotes a considerable activity of the disease and probable abscess. When the patient walks or stands with the thighs flexed, the forward inclination of the trunk causes the weight of the mass above to act at a great mechanical advantage in the production of deformity. Support is thus made very difficult and uncertain, and femoral movement exerts through the shortened muscle a direct traumatism upon the diseased spine. These cases should be treated in the horizontal position, and the limb elevated upon an incline plane sufficiently to relax the psoas muscle. By means of adhesive plaster a weight is attached to the limb and traction made as in hip disease. As the muscle relaxes the plane is to be lowered. Pott's paralysis, even a slight dragging with exaggerated reflex, should be regarded as unequivocal indications for recumbency with all possible traction. Very brilliant results, even when there were present incontinence of urine and fæces and large bedsores, have thus been obtained. Patients with abscess should generally be treated in the horizontal position; always, if the abscess is new or increasing. Night cries, a grunting respiration, peripheral pain, referable to the spinal nerves coming from the seat of the disease, an inclination of the patient to lean on chairs, etc., indicate an insufficient support, and suggests the need of recumbency.

It is evident, however, that confinement to a cot can not be continued during the whole course of a spondylitis, nor is this necessary. When, by the absence of pain, fever, and progressive deformity, we are led to conclude that the acute or actively destructive stage of the disease has passed, the patient may gradually be allowed more freedom under the protection of a portative apparatus carefully adapted to the needs of the case. This is always done tentatively with watchful supervision, and the slightest increase of deformity or occurrence of pain, irritability, or the evidence by face, attitude, or gait that the patient is not getting the proper support should be the indication for a return to the horizontal position. This holds good for any time in the course of the disease, and any intercurrent change which makes it doubtful whether the case is doing as well as it should may be regarded as an indication for recumbency.

I trust that this cot, aside from its employment in Pott's disease, may be found of service in other cases, surgical or medical, when prolonged rest is necessary. It is adapted to the treatment of rhachitic curvature. For hip disease with flexion the inclined plane may be used as in psoas contraction from spondilytis. In fracture of the femur the railroad splint may be employed. It should extend well up to the buttock and is a very perfect means of preventing eversion. The tops of the uprights at what might be termed the head and foot of the couch may be joined by movable steel rods adjustable to any height. Across these may be placed longitudinally, like a ridgepole, a bar. This is placed over the middle, or at either side, and is intended to support by slinging an arm or leg. The ridgepole may be used to support mosquito net. It is not recommended in spinal diseases, as the patient may try to raise himself by it. A tray is easily added, or a light sewing table may be placed over the patient. I think by the use of this couch, which does not occupy much more floor space than the patient, a helpless child or young person may be quite easily handled, and by the addition of rubber-covered wheels may be readily moved about the room, placed by a window, or taken out into the sunlight and fresh air. The invalid's world would be thus greatly enlarged. When the opening in the canvas is not to be used, the water or air bed or any kind of mattress may be employed, or the canvas may be replaced by iron springs. When the crosspieces and ridgepole are taken off and the uprights folded down the couch may be converted into a stretcher with or without wheels, or the rectangular iron frame alone may be so used. The whole apparatus folds into quite a compact package, and is as light as is consistent with safety.

A BRIEF SPLINT-TECHNOLOGY FOR SURGEONS.

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The objects of this paper are to treat in detail of a new material and method devised for surgical splint-making, to aid the surgeon to become the maker of suitable splints for cases occurring in practice, and to indicate lines of procedure in apparatus-making which promise rich results in general and orthopœdic surgery.

THE MATERIAL.

The basis of the material employed is wood-pulp, made preferably from the crushed fiber of the poplar tree, and rolled in such fashion that the broken fibers intertwine in every direction and loosely, so that an increase of ductility is thus given to the product. These sheets are further strengthened by having a fabric introduced between the layers of the pulp, or by interweaving with the short crushed wood fiber a long jute or other tough fiber.

The sheets are rolled of different thicknesses, for adaptability to all splint conditions. For convenience sake I shall designate the thickness by number, each unit representing a thickness of 1 millimeter. Thus sheet 1 represents the material with a thickness of 1 millimeter, sheet 2 with a thickness of 2 millimeters, and so on.

The material, its characteristics.—The chief characteristics of this material are stiffness or rigidity when dry, and plasticity when moist. Its rigidity can be ncreased *ad libitum* by the use of a silicate solution as a moistener.

Its plasticity has a limit. The limit is rarely felt and only when molding the material over complex curved surfaces. To exemplify: A splint can not be directly molded over the ankle joint anteriorly, for there are two large curves in opposite directions to be followed simultaneously, the convex curve from maleolus to maleolus, and the concave from above downward over the leg and instep. This difficulty, when met, can be obviated in various ways. I shall mention three of them. Take the case of the ankle joint. An anterior splint is required for it. The proper shaped blank should be cut from sheet No. 2 and moistened with one of the solutions described later. It should be then applied to the limb, care being taken to keep its outer border in contact with the skin, while the superfluous material over the anterior of the joint should be pinched between the thumb and forefinger, and all of it laid or pressed over to one side; a bandage should be snugly applied to perfect the molding of the splint. This method of "pinching and folding over" has an important application in the making of spinal jackets.

A second way consists in cutting away the superfluous material, in this case an elliptical figure, and bringing the edges of the cut portion together, to retain them so by means of a strip of the material pasted over the cut edges.

A third method is to cut a blank for each important curve and after molding to properly unite them.

The material possesses, besides the above characteristics, that desideratum of a splint material, extreme lightness. Its cheapness also deserves a passing mention.

MOISTENERS.

Water or a stiffening solution can be used to moisten the material.

Water.—The advantage of water is its omnipresence. A serviceable splint can be made with its help. Such a splint should be protected from perspiration or other moisture, lest it be softened and its usefulness destroyed. It can be so protected by a covering of oiled paper or silk, mackintosh, or best, by a coat of varnish.

Silicate solution.—A stiffening solution with several qualities to recommend its use, is that of silicate of potash. (Silicate of soda is almost as serviceable.) Any desired degree of rigidity can be imparted to a splint by using this solution, the amount of rigidity depending on the strength of the solution. A splint rendered rigid in this manner is not affected by perspiration nor, indeed, by momentary contact with fluids, as in washing. Another advantage, especially in cases of compound fracture, is that this solution renders the splint antiseptic.

In practice, the solution of silicate of potash generally sold for surgeons' use, and further diluted with water, can be employed. The commercial solution is regarded as a 100 per cent solution, and the percentage solutions spoken of in this paper are to be made by diluting the commercial solution with the proportion of water called for by the percentage; thus, a 70 per cent solution is made by mixing 70 parts of the commercial solution of silicate of potash with 30 parts of water. The commercial solution should have a sp. gr. of 1.3 to 1.4.

Dextrin solution.—Another useful stiffening solution is that of dextrin, in the proportion of about ℥viii to Oj of water. This solution adds some tenacity besides stiffness to the material treated with it. A splint made with its aid can be remoistened with water and remolded, quite an advantage in cases where from disappearance of swelling or other cause a closer approximation of splint and limb is desired. In practice, dextrin (to be had of paint wholesalers) can be carried about in powder form, and a solution in water extemporized when needed. (An addition of 8 gr. of corrosive sublimate to Oj of the dextrin solution will render it antiseptic.)

MOISTENING PROCESS.

A few words descriptive of the proper manner of moistening the material. The aim should be to get barely sufficient moisture into the material to render it semiplastic. If more moisture be absorbed, it becomes more difficult to maintain the molded splint in the desired shape while drying, and also unnecessarily lengthens the time required to dry the splint. I find the best way of moistening the splint blank is to apply the fluid used on each side of it, alternately, by means of a flat paste brush. A little practice will enable us to judge the precise amount of moistening best suited for our purpose.

DRYING.

The time required for drying the molded blank varies, for the different sheets employed, from ten to forty minutes; the thicker sheets, holding the more moisture, require the longer exposure to heat to drive it out. Any source of sufficient heat can be employed; a good kitchen fire is very efficient and generally convenient.

While the splint is drying it is serviceable to have yarn or string wound around the moistened form after its removal from the body, to aid it to maintain the desired form, until drying permanently fixes it.

Having treated of the materials used in splinting, I shall briefly consider their application to the human body, under the headings of (1) head splints; (2) trunk splints; (3) upper-limb splints; (4) lower-limb splints. This simplicity of classification necessarily will be violated in specific cases where compound splints, embracing parts of different systems, are constructed.

HEAD SPLINTS.

I shall describe two head splints—a nasal and an inferior maxillary splint.

1. A nasal splint.—The blank is cut from sheet No. 1 after a pattern, the general shape of which is shown in fig. 1, but which varies for the individual case. A 75 per cent solution of the silicate of potash is used to moisten the blank, for a rigid splint is required. The most of the difficulty in molding this splint is met with over the junction of the nasal and frontal bones. After the splint is molded

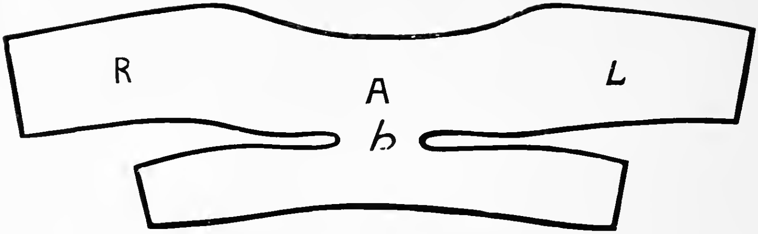

FIG. 3.—Pattern of lower-jaw splint. (Reduced one-third.)


FIG. 7.—Spinal jacket.

it should be looked after while drying, so that, if need be, rectification of its shape can be made before it has hardened too much in drying. This splint, completed, is pictured in fig. 2.

2. An inferior maxillary splint.—The general shape of the blank for this splint is shown in fig. 3, it being the pattern, reduced one-third, of a splint molded on a boy of 14 years.

The blank should be cut from sheet No. 1 and moistened with a 75 per cent solution of silicate of potash. To apply the blank: That portion of it corresponding to A on the pattern should lie under the chin, close to the jaw bones; the large arms on its sides should embrace the cheeks—R the right, and L the left cheek; the point corresponding to *b* should lie directly over the point of the chin. That part of the blank which will be found to lie in front of the point of the chin should now be bent upwards and molded over the anterior portion of the jawbones; the small flaps at each side will be found to lie over the cheek portions of the splint, to which they should be fastened.

The blank should now be carefully molded with the fingers over the bones, and, to complete the molding, a roller bandage should be snugly applied over it. After a moment's retention the splint should be removed and dried. The completed splint is pictured in fig. 4.

TRUNK SPLINTS.

The splints designed for the trunk of the body can be subdivided into three classes—(*a*) those that are intended to control the spinal column; (*b*) those that act on the shoulder system; (*c*) those that act on the pelvic system. The two latter are analogous, inasmuch as their action is not confined to the trunk but is carried over in a degree to the extremities.

(*a*) *Splints for the spinal column.*

(1) *A cervical splint.*—This splint is devised for fixation of the cervical vertebræ. The blank is cut from sheet No. 2 or from sheet No. 3, according as the case is that of a child or an adult. The general shape of the blank is shown in fig. 5, drawn from a pattern of a splint on a lad. The head of the patient should be supported in the desired position while the moistened blank is being molded over the back, shoulders, neck, and occiput; the molding is facilitated by the use of a gauze bandage applied snugly over the blank. After a short retention the molded blank should be removed and dried.

If preferred, the blank can be cut from sheet No. 1, and the neck piece in this case can be rendered strong enough by doubling over a flap cut for the purpose in the original blank, as pictured in fig. 6.

(2) *A spinal jacket.*—To treat this subject justly will require a special article. I shall here briefly suggest a technique for a simple, cheap, and serviceable jacket.

The blank is to be cut from sheet No. 1 and moistened with a 75 per cent solution of silicate of potash. This blank is of the simplest pattern, having length sufficient to envelop the patient's body once and a quarter around, and its width governed by the amount of spine we desire to control. The patient should be placed in the same position as for the application of a plaster jacket; he should have on him a tight-fitting woolen undershirt. The blank is to be applied to the body by commencing on the back about 2 inches beyond the vertebral spine and keeping that portion in place, guiding the rest of it around the body so as to overlap considerably on the back. A vertical line should be drawn on the overlapping piece from the armpit. The object of this line is to give position to the hinge joint which we require in the jacket to facilitate removal and reapplication. (The joint is made by bending the moistened blank backwards and forwards along this line until the pulp is sufficiently broken—the fabric embedded in the sheet forming the hinge. After drying the jacket this hinge should be strengthened by gluing strips of chamois skin 1 inch wide over the hinge, inside and outside.)

The blank, having been applied to the body as above described, we proceed to make it conform to the body's surface as accurately as possible. We place over the spine a large pad (two large rolled bandages, each 4 inches in diameter and 6 inches long, placed end to end, do well), which serves to press the blank well into the hollow of the back. Further conformation to the body is obtained by the "pinching and folding over" method heretofore described. Here this method is particularly advantageous, for it adds threefold to the vertical strength of the jacket without a material increase of its weight. A gauze roller bandage should be so applied over the whole blank as to hold it in snug apposition to the body. After a few minutes' retention the bandage should be taken off and the jacket carefully removed; in doing so the hinge described above should be made use of, so as to disturb as little as possible the form imparted to the jacket. If the blank has been properly moistened, but slight aid to hold its form need be given to the jacket, till drying permanently fixes it. Thus, the foundation of a good spinal jacket, as pictured in fig. 7, is completed. It can be reenforced as desired. Straps can be fastened to it for its adjustment, or lacing bands can be applied to it for the same purpose; if preferred, it can be fastened on directly by cementing the overlapping flap to that portion of the jacket which it overlaps.

(*b*) *Splints for the shoulder system.*

(1) *Claviculo-scapular splint.*—This splint (fig. 8), made from sheet No. 2, is part of an apparatus devised for the treatment of dislocation (upwards) of the acromial end of the clavicle. The apparatus is described in the Boston Medical and Surgical Journal, Vol. CXXVIII, p. 186.

Other shoulder and pelvic splints I am constrained to here omit, for want of time for their proper elaboration.

UPPER-LIMB SPLINTS.

I shall describe but five of the simpler forms.

1. Arm splint—long (after Hamilton).—For this splint the position of the arm is to be that assumed as it hangs limp beside the erect body, the palm against the thigh. A pattern should be cut to approximate the limb for which the splint is intended. Its general shape is that shown (reduced one-fifth in fig. 9). A blank, with the pattern for a guide, should be cut from sheet No. 2, and moisted with a silicate or dextrin solution. The blank can then be applied to the arm, which is to be held at an angle from the body to permit of easier manipulation. The part of the blank corresponding to A, in fig. 9, should be placed against the inner side of the upper arm; the part equivalent to BB, against the ulnar side of the hand, over which it should be molded, as the curve thus formed gives additional support and strength to the lower portion of the splint. After careful molding of the blank over the arm and retention of it for a short while by a bandage it should be removed and dried. Fig. 10 pictures the finished splint.

2. External angular splint.—(Other angular splints, designed to meet the indications called for in the treatment of the various injuries of and near the elbow joint, are reserved for a special article.) This splint is easy of construction. The arm is to be flexed into the position we desire to retain it, and the forearm placed in the desired degree of rotation (in the splint pictured in fig. 12 the forearm is semi-prone). A pattern should be cut to approximate the flexed limb. The general shape of the pattern is that of fig. 11. The line AA, in the original pattern, measures the distance from the point on the upper arm from which the splint commences to the

FIG. 8.—Claviclo-scapular splint. E. A. Tracy, 1892.

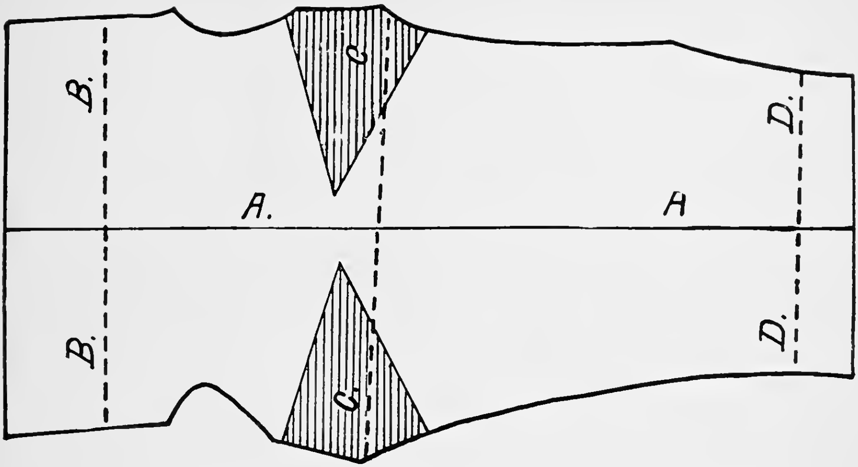

FIG. 11.—External angular arm splint. Pattern for left arm. (Reduced one-fourth.)

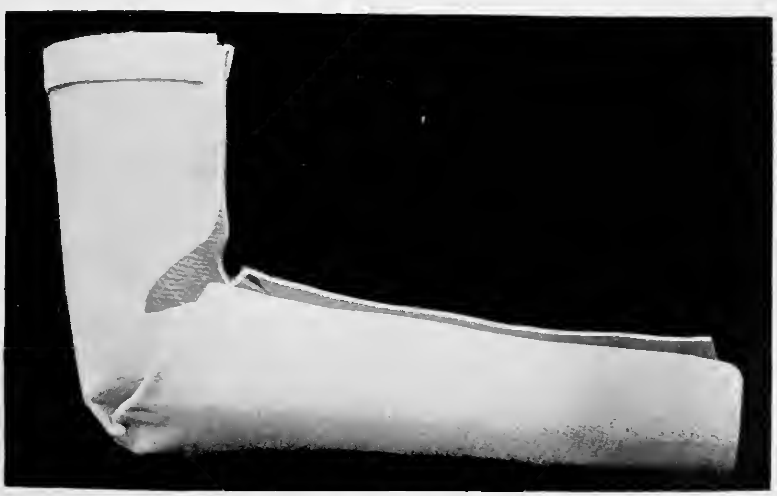

FIG. 12.—Right forearm semiprone. Outer aspect.

SPLINT TECHNOLOGY FOR SURGEONS.

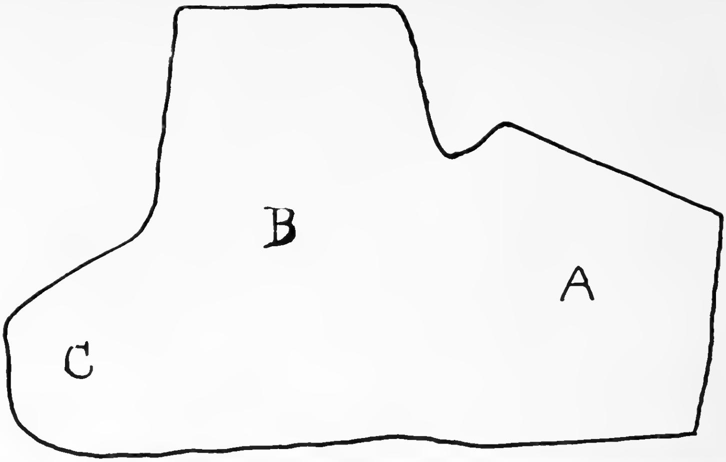

Fig. 15.—Thumb splint. Pattern of left thumb. (Reduced one-half.)

Fig. 16.—Thumb splint.

wrist, and this length should be taken over the olecranon with the arm flexed; the line BB measures a half inch less than the circumference of the upper arm; the line CC is somewhat less than the circumference of the forearm near the elbow, and the line DD equals its circumference at the wrist. The blank, following the prepared pattern should be cut from sheet No. 1 and moistened with a solution of silicate of potash.

The arm having been placed in the position for which the pattern was cut, the blank should be applied, commencing at the upper arm. The blank is to be applied and molded over the upper arm so that its opening coincides with a vertical line on the forearm bisecting the (crease) fold of the elbow. The upper arm and blank should now be grasped, while the lower portion of the blank, drawn taut over the olecranon, should be molded over the forearm; that part of the blank which will be found to bulge out at each side of the elbow, and which corresponds to the shaded part of the pattern in fig. 11, must be folded inwards towards the skin of the forearm. The molding of the blank is to be completed by the application and retention for a short while of a gauze bandage, after which the splint should be carefully removed and dried. The fixation of the joint can be rendered more certain by letting some glue flow between the folds about the angle.

The blank of the angular splint here pictured (fig. 12) had a half-inch margin at its upper end which was folded over, thus adding somewhat to the strength and comfort of the splint.

3. Palmar forearm splint.—A very simple but important splint. It is designed to meet the indications which Cheever emphasizes in the treatment of a Colles' fracture. This accurate surgeon says:

> The important point would seem to be, * * * not to press the back of the wrist down in such a way, by splints, that we shall lose sight of this arch, which is so marked, under the radius. * * * This arch must be well supported. * * * The splint should terminate at the head of the metacarpal bones, and the thumb and fingers should be left free. (Lectures on Surgery, by David W. Cheever, M. D. *See* Lecture X, Boston Medical and Surgical Journal, Col. CXXIX, p. 2.)

The general shape of the blank for this splint is shown in fig. 13. (The position of the forearm for the splint pictured in fig. 14 was that of semipronation, that of the hand semiflexion—its natural position of rest.) The pattern should slightly overlap the ulnar side of the forearm, so that there will be sufficient material in the blank to be molded over that side of the forearm. The blank should be cut from sheet No. 1 and moistened carefully with a 75 per cent solution of silicate of potash. The blank should be applied to the palmar surface of the forearm, so that the ulnar side is overlapped by the blank. The blank should then be carefully molded over the forearm in the position described above.

After snugly applying a roller bandage over the splint, commencing at the wrist, then enrolling the hand, and finally the arm, pressure should be applied by squeezing the forearm and splint between the thumb and fingers at a point 1¼ inches above the styloid process of the radius, where the arch of the radius is most pronounced. The direction of the pressure, it need hardly be mentioned, is from the palmar to the dorsal side of the forearm; its object, to give the splint an arch approximately nature's. After squeezing in the manner described for a moment, the splint should be removed and dried. The completed splint is pictured in fig. 14.

The curve of the splint caused by the arch of the radius is there clearly illustrated. The curve of the splint made by molding over the ulnar side of the forearm the overlapping portion of the blank on that side is important, because it is the main source of the strength of this splint.

4. Thumb splint.—This splint is intended for fixation of the thumb. The general shape of the pattern is shown in fig. 15. The blank should be cut from sheet No. 1 and moistened with a 66 per cent solution of silicate of potash. The blank is applied to the parts as follows: That portion of it corresponding with the part marked A in the pattern should be applied to the dorsum of the hand; the part corresponding to B should be made to surround the thumb; the part equivalent to C to lay over the palm. The blank should now be molded with half of a bandage snugly applied over the thumb and hand; after a moment the splint should be removed and dried. This splint is pictured in position in fig. 16.

5. A finger splint.—The splint here described and figured is for the index finger. For other finger splints, a modification of the pattern, which will suggest itself to the surgeon, will be necessary.

The general shape of the blank is shown in fig. 17. The blank should be cut from sheet No. 1 and moistened with a silicate solution. The part of the blank corresponding to A of the pattern should be applied to the dorsum of the hand, and the part equivalent to BB should be applied over the dorsum and sides of the forefinger. The blank should be molded by aid of a bandage rolled around the hand and forefinger. After a moment's retention the splint should be removed and dried. The complete splint is shown in fig. 18.

LOWER-LIMB SPLINTS.

I shall describe but two:

(1) An anterior knee splint.—This is for fixation of the kneejoint. The general shape of the blank is shown in fig. 19. The part of the blank corresponding to A in the pattern, which would lay over the knee cap, should be cut out, as this permits of a better molding of the splint over the limb. The blank should be cut from sheet No. 2 and moistened with a silicate or dextrin solution. The blank should be applied so that the hole in it embraces the kneepan and its long axis coincides with the long axis of the limb. The molding of the blank can be perfected by aid of a snugly applied roller. After a moment's retention the splint should be removed and dried. The completed splint is pictured in fig. 20.

(2) A latero-posterior knee splint.—This splint is also for fixation of the knee joint. It is a modification of the so-called ham splint. It differs from the ham splint in having a surface which is applied to the side of the limb (preferably the inside) as well as to the posterior; this addition greatly strengthens the splint and aids its fixation. The general shape of the blank is shown in fig. 21. The blank should be cut from sheet No. 2 (sheet No. 3 for a very powerful limb) and moistened with a silicate solution. The blank should be applied to the limb so that the portion corresponding to the shaded part of the pattern lies over the internal aspect of the limb. The molding of the splint is perfected by applying a roller bandage snugly about it; after a moment's retention to the limb the splint should be removed and dried. A completed splint for the right knee is pictured in fig. 22.

(3) Lateral leg splints (internal and external).—These splints are so simple as to require no description. No pattern is necessary, the blank being cut from the sheet direct (No. 2)—the limb's outline having been previously drawn on it. Fig. 23 shows such an outline from the internal side of a boy's leg; fig. 24, an outline from the external side of the same leg.

AN APOLOGY.

I owe this Congress an explanation by way of an apology for the incompleteness of this paper. In June last I had the honor of reading a short paper on my material before the American Medical Association at Milwaukee. It then occurred to me to prepare a paper for the Pan-American Medical Congress, demonstrating the adaptability of the material for general surgical splinting. The shortness of the intervening time has prevented the performance of my purpose as completely as contemplated.

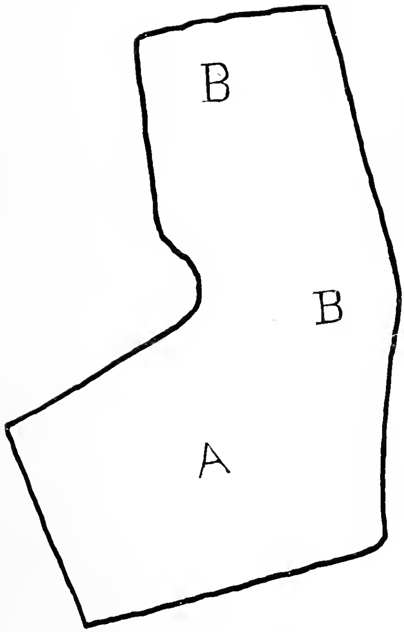

FIG. 17.—Forefinger splint. Pattern for left forefinger. (Reduced one-half.)

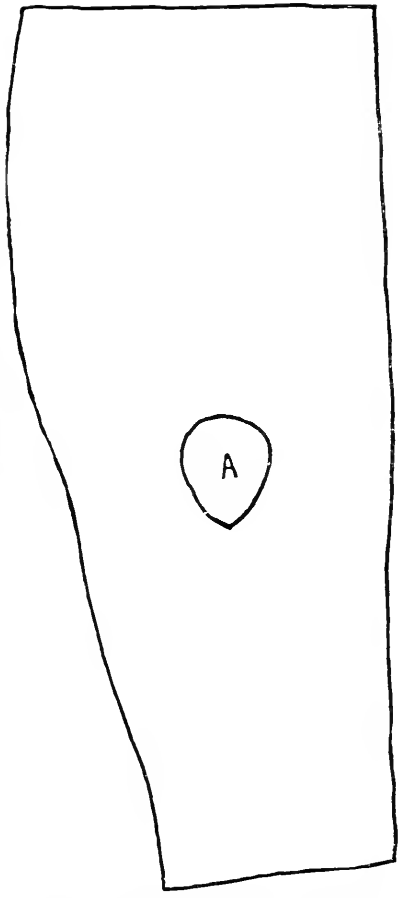

FIG. 19.—Anterior knee splint. Pattern for right knee. (Reduced one-fourth.)

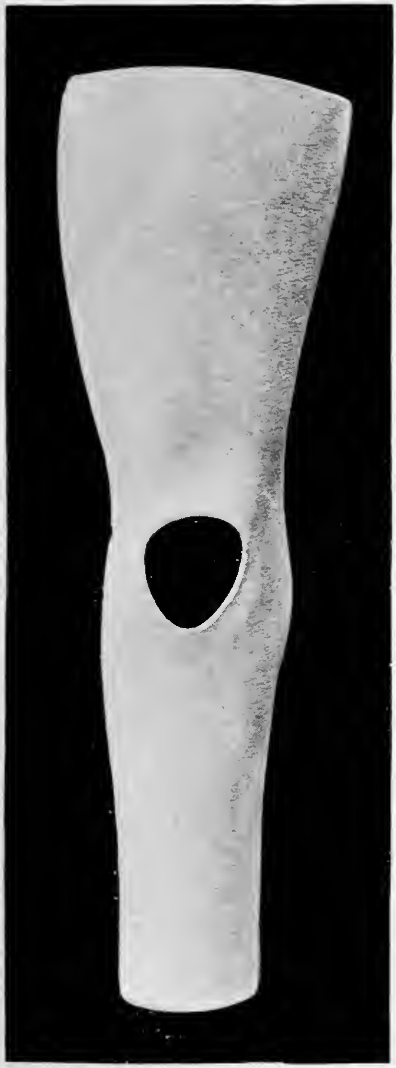

Fig. 20.—Interior knee splint.

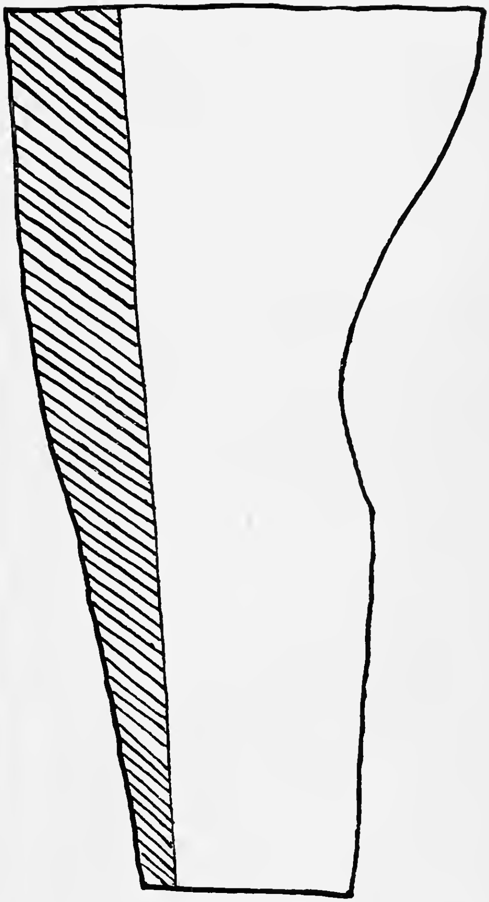

Fig. 21.—Latero-posterior knee splint. Pattern for right knee. (Reduced one-fourth.)

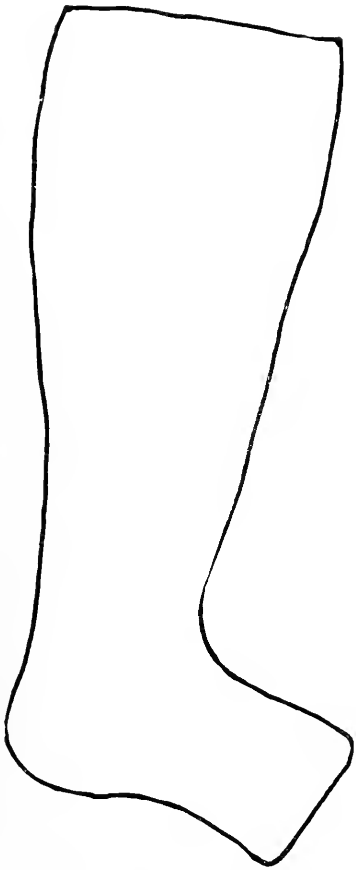

Fig. 23.—Internal lateral leg splint. Right leg.

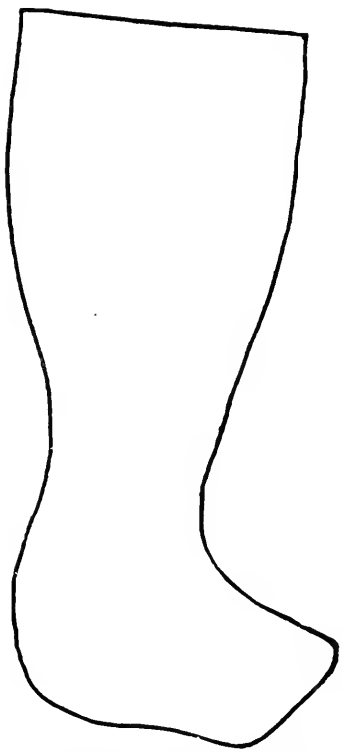

Fig. 24.—External lateral leg splint

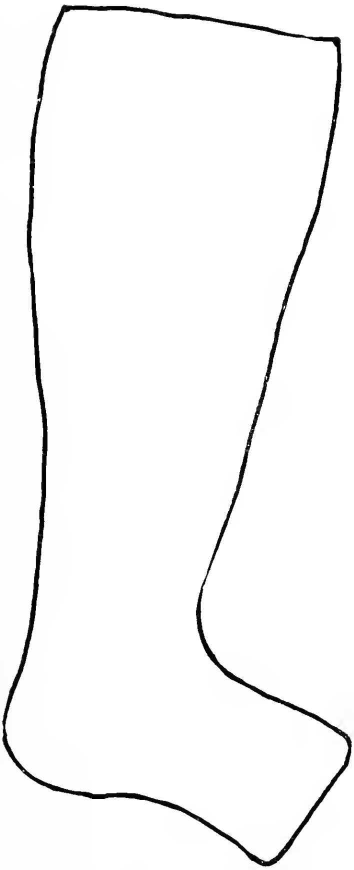

Fig. 23.—Internal lateral leg splint. Right leg.

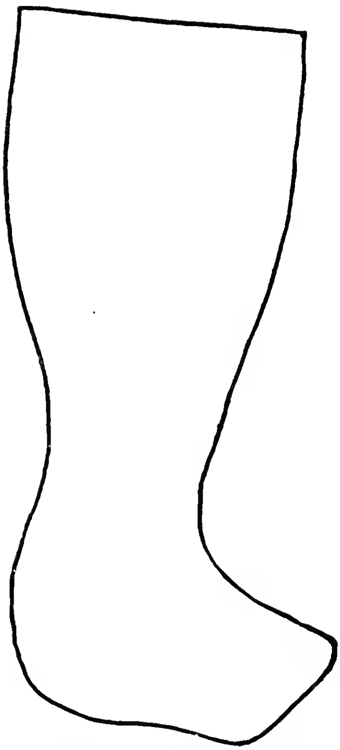

Fig. 24.—External lateral leg splint

A CASE OF ACUTE ARTHRITIS OF THE HIP, WITH SOME REMARKS ON THE ETIOLOGY OF THE AFFECTION.

By AUGUSTUS THORNDIKE, M. D., of Boston.

The term acute arthritis of infants may be still considered to mean an acute destruction of the joint; it is a clinical definition of the condition of the joint, and is not intended to convey any information about the origin of the process. Acute joint destruction may be the result of (1) a syphilitic osteo-chondritis, or (2) a catarrhal synovitis becoming purulent and passing on to a destructive ostitis, or (3) a tuberculous ostitis running a very acute course, or (4) a septic osteomyelitis starting in or close to the upper epiphysis of the femur. (Lovett, Diseases of the Hip. Boston, 1891.

According to Mr. Thomas Smith (St. Bartholomew's Hospital Reports, 187, Vol. 4 x), who gave us the first clear description of the affection in English, the vast majority of cases are due to an acute infectious osteomyelitis of the upper end of the femur. Later investigators have gone further, and attributed all cases to an acute infectious osteomyelitis (Townsend, Arthritis of Infants, American Journal of Medical Science, January, 1890), but it does not seem possible, as yet, to differentiate between the cases due to syphilis, to rapid tuberculosis, to synovitis, and to osteomyelitis, and it therefore seems wiser to retain the name as a clinical definition, not a pathological one, although I firmly believe that the vast majority of cases are due to an infectious osteomyelitis. There are still too few published clinical reports, accounts of autopsies, and of bacteriological investigations to enable one to formulate the methods by which a differential diagnosis may be successfully reached, and the following case is reported solely for the purpose of inducing others to relate their own observations and to elicit a free discussion:

James C., aged 14 months, born and living in East Boston, was one of a family of four children, one of whom had died of "convulsions" at the tender age of 3 months. The parents, both of whom are alive and well, were descended from a healthy stock, and I failed to obtain any family history of phthisis, rheumatism, joint disease, or nervous disease. James was still nursing and had been well, with the exception of a light attack of measles when he was 9 months old, until four weeks ago. At that time he was treated for pain in the stomach and cold and improved for two weeks, when the pain became more severe, was worse at night, and was localized in the left iliac region and hip.

Three days ago another physician had been summoned, who "found a deep abscess," and advised taking the child at once to the Childrens' Hospital. This had been delayed because there had been no vomiting or diarrhea and the baby had nursed better, although the swelling and pain had steadily increased and spread to the entire thigh, and the baby had cried all the night through. Dr Lovett very kindly asked me to see the case with him and later to operate on it at the West End Infants' Hospital, whither it was immediately transferred. This was on May 9, 1893.

It was a strikingly pale baby, with a pinched expression of countenance, and both the body and extremities were much emaciated and cool. The left thigh was flexed, and appeared to be uniformly swollen to twice its natural size from the knee to the iliac crest, and all the lower half of the abdomen was tender and prominent. Previous to the operation the pulse was 136. He was given 10 drops of brandy and 2 minims of tincture of digitalis, after which he took a warm corrosive bath, 1–3,000, was wrapped in hot sterilized towels and lightly etherized on the Lovett operating table, which consists of an aseptic metal top warmed by hot-water cans underneath.

The incision, 3½ inches long, was made as if for an excision of the hip and immediately voided about a quart of pus. The cavity was found to extend from just above the knee to the iliac crest behind, and the thigh muscles were all dissected out by it, while in front the finger easily passed alongside of the femur to the anterior ramus of the pubes and over it into the pelvis, where the size of the cavity could not be determined, although a considerable amount of pus (about f ℥ iv) was pressed out by the hand outside on the abdomen. The cavity was once irrigated with corrosive-sublimate solution, 1–5,000, then rinsed out with warm boiled water and two drainage tubes inserted, one following the course my finger had taken into the pelvis, the other lying along the outer side of the thigh.

The pulse had risen to 160, and two subcutaneous injections of brandy were given, while a large sterilized gauze dressing and a Cabot wire frame were applied. The operation was done as rapidly as possible to avoid shock. The drainage tubes were removed thirty-six hours later and a short gauze wick substituted. Brandy, 10 drops, and tr. digitalis ♏ j., were given on alternate hours, and the feeding was increased, as he soon became ravenously hungry. Mother and child went home six days after the operation. The temperature never exceeded 99.5. In six weeks the sinus was entirely healed, and the child was a fat healthy baby.

He came again to see me at my request on August 30, and had been perfectly well ever since. His mother had some difficulty in preventing his walking, which he did with a well-marked limp to the left side and with the left toes turning out. There was three-eighhts of an inch real shortening and half an inch less in the measurement of the circumference of the left thigh. The scar was firm, not sensitive, and had contracted considerably.

I have purposely omitted saying that the hip was dislocated. It was not only out of joint, but the femur at the time of operation was lying in a sea of pus and gave the impression of being almost free from attachments at the upper end. The neck was bare and was lying on the dorsum ilii, while a shallow cavity full of soft granulations occupied the site of the acetabulum, in the center of which I fancied I could feel a hole. I tried to replace the head in the acetabulum before applying the Cabot frame, and thought I had succeeded; but at the second dressing thirty-six hours after operation it was out of place.

On the third day Dr. Lovett and I made another futile attempt under ether to reduce the deformity. It was reduced and it would immediately get out again, so after two or three attempts the idea of reducing the dislocation was abandoned.

I do not know how frequently the attempt has been made to reduce dislocation occurring from acute arthritis of the hip; but I believe the common result in all cases which are well drained and which receive good supportive treatment afterwards is just this—that they generally get well and usually with a dislocated hip. Of the 19 new cases reported in some detail by Townsend in 1890, in the January number of the American Journal of Medical Sciences, 11 involved the hip; of these 5 were incised and all recovered and 1 recovered without operation; of the 4 fatal cases, in 3 no mention is made of operation, and in the fourth it is expressly stated that the abscess was not incised. In one other case (not operated) the child could not be traced, but was probably dead.

My own experience is small, but I have yet to see a case which has recovered without an incision. I have also scrutinized Dr. Townsend's report of these same cases in regard to the ultimate condition of the joint. In 3 cases nothing is said about it. In 1 case, the only unoperated case which got well, there was some motion in the hip and knee, and nothing in the report would imply the existence of a dislocation. Of the remaining, 5 were shown (by the position of the trochanter and the amount of shortening) to be dislocated, and 1 more was shown at autopsy to have a separation of the upper epiphysis from the shaft, while in still another the joint is stated to be in such a condition that at the post mortem examination it could be thrown out and replaced with perfect ease. In brief, in 7 out of 8 cases there was either a dislocation, or else after death the joint was found to be so far disintegrated that it was all ready to become displaced.

In the case of James C., just reported, Dr. C. A. Porter, who assisted at the operation, stained and examined 2 cover-glasses smeared with the pus and found among numerous other cocci a number of colonies of streptococci; 2 of these colonies I have roughly sketched, as seen under a $\frac{1}{12}$-inch oil immersion lens. Dr. A. K. Stone, who also kindly examined the same slides at the Harvard Medical School, was of the opinion that the appearance of the cocci growing in pairs was probably due to the rapid proliferation they were at the time undergoing. The sample of pus from which cultures should have been made was unfortunately too long delayed on its way to the medical school, so that Dr. Stone was unable to obtain any staphylococci pyogenes aureus from it.

To sum up in a few words what I have been able to find regarding the etiology of acute arthritis of infants: It attacks most commonly children in the first year of life, and traumatisms are not infrequently the alleged cause. Townsend has strongly emphasized the fact that pyæmia, or the absorption of pus from some other part of the body, in many instances acts as the exciting cause, and cites instances where it followed an umbilical ulcer, an umbilical abscess, and empyema. The affection has also been noted in connection with varicella (T. Holmes: The Surgical Treatment of Diseases of Infancy), variola, measles, scarlatina, empyema, and pertussis. (Townsend *loc. cit.*)

According to Lovett, the rôle played by syphilis and tuberculosis in the causation of this affection are not as yet understood on account of insufficient pathological findings, and in older children the affection closely resembles and is likely to be confused with typical but rapid cases of bone tuberculosis. Furthermore, as Townsend justly remarks:

The causes of acute arthritis in infants are not always easy to ascertain. In a number of cases the most careful investigation fails to discover any.

The indications for the treatment of acute arthritis are self-evident. The general septic infection of the system must be met by increased alimentation and the free use of alcoholic stimulants. Brandy, beef juice, and eggs should be added to the infant's natural diet. The hip must be kept quiet, and this is best accomplished by the posterior wire or Cabot's frame, which has been already so frequently described. Traction may relieve pain, but it is very unsatisfactory and hard to apply to such young babies. But the one cardinal endeavor of the surgeon should be to find the pus as early as possible and immediately drain by free, deep incisions frequently into the hip joint.

Babies appear to stand disinfection with corrosive-sublimate solution (1–5,000) remarkably well, and the shock from the immediate discharge of so large a quantity of pus will be minimized by the careful observance of the following details: (1) light etherization; (2) keeping the baby warm; (3) preventing loss of blood by the immediate application of pressure forceps; (4) by doing as rapid an aseptic operation as is consistent with securing good drainage and disinfecting the cavity. The surgeon must remember how young a baby he has to deal with and save as much blood and strength as possible.

After operation the hip should again be immobilized on the wire frame, which may be applied in a much straighter position than before, and may be worn underneath the dressings. The same supportive general treatment should be continued after the operation, and the stimulants should gradually be left off, if indicated. Quinine, digitalis, and sirups of the iodide of iron may be useful adjuvants to the treatment. If the general condition is poor just before operating, it is well to stimulate, and stimulants may be given per rectum or subcutaneously during operation, as in older children.

OBSCURE INJURIES OF THE SPINE FOLLOWED BY PARALYSIS OF LONG STANDING—RELIEVED BY SUSPENSION AND PLASTER-OF-PARIS JACKET.

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Having seen a number of cases of serious injury of the spine followed by paralysis, more or less complete, involving the bladder and rectum, which were relieved by suspension and a plaster-of-Paris jacket, and eventually entirely recovered; and two of these cases having recently called upon me in perfect health after the lapse of many years, it occurred to me that it would be desirable to look over my notebooks, and publish the records of the cases for the benefit of the profession.

***Case 1.*—C. W. H.; about 36 years of age. On October 15, 1877, in switching**

from a main track to a branch, the train going around a curve at a rapid rate, while he was standing in the rear of the car, he was violently thrown upon the corner of a stove and instantly paralyzed below the waist, probably by a fracture of one of the lumbar vertebræ, presumably the third. While paralysis of motion was complete at the time, there was some sensation and pain in the outside of the left thigh for a few hours. There was loss of control of the bladder and rectum, with a feeling of constriction, as of a tight band, about the lower part of the abdomen, the line of demarkation between the active and paralyzed parts being clearly defined. Pain at the point of injury was incessant, and severe beyond description. The bowels were evacuated by cathartics and clysters, and the bladder by the catheter. After ten weeks there was some return of sensation, with ability to evacuate the bladder voluntarily as a general thing, and in a little more than five months from the time of the injury there commenced a slight muscular action in the legs, which increased irregularly so that in a year after the hurt the limbs could be drawn up and pushed down in the bed, and even be made to move as in walking, with the body supported on crutches and by an attendant, but only a trifling amount of weight could be sustained by them.

During all this time there were frequent periods of almost total paralysis of both motion and sensation, greatly influenced evidently by the formation of numerous abscesses, which began about six months after the injury, discharging through the rectum, the outside of the right thigh, and the inside of the left—the latter giving exit to two fragments of bone, half an inch to an inch or more in length, and from one to two lines in thickness; one piece from two or three lines in width at the base, tapering to a point, and partly necrosed; the other, from one to two lines wide, somewhat pointed, and slightly curved or twisted in shape, but perfectly bright and clean, and showing its fracture very plainly. The patient, who was a physician, stated that he was confident that another fragment of bone had previously escaped per rectum, while still another was distinctly felt in the abscess that formed in the outside of the right thigh, but afterward disappeared. During the winter of 1878–'79 abscesses formed with great frequency, causing much loss of strength through the large quantities of pus formed and the severe pain they created. The partial recovery of the action of the muscles was in a great measure lost, so that they responded to the test of electricity no more than would those of a man recently deceased, and he was unable to distinguish the difference between heat and cold when applied to the surface of the extremities; indeed, so imperfect was sensation that both legs were badly burned on different occasions by too hot soapstones, it being necessary to use artificial heat to maintain the proper warmth in the extremities.

The abscesses finally stopped forming under the use of iodide of potassium, so that after May, 1879, only two appeared, the last about the 1st of August. With the cessation of the abscesses, improvement took place in the general health and in the action of the legs, apparently aided by the daily use of electricity and frictions, and the persistent exercise of the muscles by volition, so that by the autumn of 1879 he was able, at times, to get a part of his weight on his feet by supporting himself on crutches or over the back of the chair. But he was still unable to be off the bed except for a short time during the day, and often he did not even make the pretense of sitting up for more than a week at a time. He was compelled to evacuate the bowels by injections, except at times when suffering from painful diarrhea. He also suffered such intense pain in his spine and limbs all the time that he was forced to take from one to three grains of morphia daily to keep even bearably comfortable.

On November 30, 1879, the actual cautery having previously been applied with but trifling benefit, if any, with the assistance of my son, Dr. L. H. Sayre, I suspended the patient, and encased him in a plaster-of-Paris jacket. The relief from pain, and the improvement in the sensation and motion of the limbs thus produced, indicated the probable benefit which would follow from this mode of treatment.

The jacket was applied exactly as described in my work on Spinal Disease and Spinal Curvature, etc., the closest attention being given to the minutest details. The result was a remarkably accurately fitting case, which gave perfect and even support to the whole trunk, and complete and absolute rest to the injured and diseased parts. Three days later the patient could walk about the room without mechanical support, and two days after this he went on the street for his first walk in more than two years. Sensation, which had been very imperfect, became nearly normal; control of the muscles became constant and much more perfect; the frequent attacks of spasmodic contractions of groups of muscles entirely ceased, as did also the occurrences of almost total paralysis of the legs, during which he would often be unable to draw them up in bed for days at a time. Complete control of the bladder was obtained, and the bowels became much more natural in their action, enabling him to wholly discard injections. He was also enabled to discontinue the use of heat to the limbs, as they had become as warm as the other parts of his body. Though still suffering severe pain at the point of injury, he succeeded within a period of six weeks in reducing the quantity of morphia to less than one-half of that taken before the jacket was applied. At this time the muscles were still too weak to sustain the weight of the body with the legs flexed, or to raise it on the ball of the foot and propel it forward as in natural locomotion. This gave him a necessarily slow and somewhat awkward movement, but there was apparently no paralysis of any muscle at that time, and he was able to walk a fourth of a mile without artificial aid of any kind, except the *moral* support of a light bamboo cane.

On removing the jacket, January 13, 1880, he found himself unable to walk across the room without support of some kind, while there was a marked increase of pain. There was also a preceptible change in the form of the trunk, it being two inches smaller around the waist, probably by absorption from lateral pressure of the jacket above the ilia, where it had been crowded in to get a point of support to maintain extension. Upon the application of a new plaster case there was immediate relief of the increased pain, and a return of the use of the legs as before, with considerable improvement in their action, the new jacket being, if possible, a better fit than the first. This showed most clearly the need of, and the great benefit derived from the extension and support of, the plaster jacket.

On February 1 he reported that he could then raise himself on his toes by voluntary contraction of the extensor muscles of the feet.

On March 11, 1880, he called at my office in perfect health. He would walk without cane or other support nearly as well as before the accident. He wore the jacket eighteen months, when he was perfectly consolidated. Since then he engaged in the active practice of his profession, until July, 1887, when he died.

Case 2.—W. F. C.; 29 years of age; was brought to me by the preceding patient, both of them having been injured by an accident on the same railroad. On August 10, 1877, while acting as mail agent, he was in a train which ran off the track and for some distance on the ties, during which time Mr. C. was thrown violently about the car in various directions. This caused partial loss of consciousness for a short time. He was soon, however, in the possession of his faculties and continued at his duties as mail agent until August 13. During these three days he suffered severe pain in the lumbar region, where there was noticed a slight swelling and contusion. Four days after the accident he gave up work and took to his bed, on account of severe pain in his loins. His bowels had been constipated for three days following the accident, and he had also experienced considerable pain in his head during this time. On the third day the patient, for the first time, was unable to voluntarily empty his bladder except while supporting himself by his hands on the arms of a chair, or by supporting himself on crutches. This continued up to the time he was first seen by me—January 17, 1880. He was confined to bed for twenty-two months, continuously so for thirteen months, with occasional intermissions of a few moments at a time. Three weeks after receiving the injury he noticed loss of sensibility in both feet, which gradually increased and extended upwards until it reached the knees, which was at the end of ten months. The anæsthasia now gradually subsided from the right leg, while it extended upwards in the left, involving the whole thigh.

During these ten months he was actively treated—local bleeding by means of leeches, blistering, iodide, and bromide of potassium, in full doses, being used. The loss of sensation in the left limb remained unchanged until July, 1879, when he felt sharp pain from the back pass down the inside of the thigh and leg, and while, before July, 1879, pricking with needles or the application of a strong current of electricity failed to cause any sensation whatever, he now began to feel a tingling from such operations. Voluntary motion in the left limb became impaired from the first, and at the end of seven months was completely abolished. Voluntary motion in the right leg was never impaired. There had been a total loss of sexual power from the first, though sensation of the genitals had been normal. The pain in the lumbar region was continuous and severe for thirteen months from the time of the injury, but it then began to diminish, and had gradually grown less severe. During these thirteen months the patient was actively treated as before described, and a brace was employed, but, owing to the continuous and severe pressure which it caused on the crests of the ilia and under the arms, it had to be discontinued. During this time he had been seen by a large number of distinguished physicians in different parts of the country, all of whom considered his case incurable, but thought he might receive some relief.

At the time when he first came under my observation, January 17, 1880, the patient weighed about 200 pounds, very nearly what he weighed before his injury. His appetite and digestion were good, and the bowels were regular. He slept tolerably well. The right limb was normal; the left incapable of any voluntary motion. There was some sensation in the limb, so that when a needle was plunged into the patient he experienced a sensation as though his leg had "gone to sleep." The limb was well nourished, having diminished but little in size. There was constant pain in the back, though not very severe. Pressure over the first and second lumbar vertebræ caused an increase in the pain; crowding the vertebræ together by pressing on the head or shoulders increased the pain in the lumbar region, while when the superimposed weight was taken off by suspending the body by the shoulders, the patient felt perfectly easy. He was unable to sit erect longer than fifteen or twenty minutes without its causing violent pain and great exhaustion. When he supported himself on his crutches he felt very comfortable, and could remain so for one hour or more. The urine could not be voided except when the patient suspended his body from his shoulders by means of his arms or hung upon his crutches.

He was to-day cupped over the lumbar region, and about four ounces of blood obtained, deep punctures by means of a sharp tenotome being employed instead of scarification.

January 23: Sensibility of the left limb has increased since the cupping, and the pain on pressure in the lumbar region has diminished. The actual cautery was applied on each side of the lumbar spine over the transverse processes for about 3 inches.

February 3: Suspended the patient and applied a plaster of Paris jacket. When it had set he could stand without other support, which he had not been able to do since the accident. Sensation has returned to the left leg since the application of the cautery, and he can now slightly move the toes voluntarily.

March 16: A letter was received, in which the patient said: "Sensibility and motion are returning rapidly; the former is now nearly perfect. All the muscles now respond to the battery."

May 26: Patient returned. Sensation and motion greatly improved. He can now walk with the assistance of a cane. The jacket was removed and made into a corset. There was no tenderness on concussion or pressure along the spine. He could stand erect without any support.

September 20: He has been in perfect condition since last note; he can now stand without pain or support.

March 23, 1881: Mr. C. returned to-day in apparently perfect health, but he states that he can not yet do without the corset for any length of time. In December, 1880, he first attempted to do without it, and he became much exhausted after a few moments. He has, however, gradually increased in strength, so that he can now leave it off for a whole day, provided he does not walk or exert himself. The genital organs still remain powerless—no sexual desire or erection. He can pass his water easily when the jacket is off.

November 9, 1881: He returned in perfect health except as regards his sexual organs. He has not worn the jacket since last July.

June 26, 1886: Patient looks perfectly well; weighs 205 pounds; says he can not lift any weight without feeling it in the back. The numbness in the feet has entirely disappeared; sexual power has returned, but there is no desire.

August 2, 1893: The patient called to see me as he was passing through town with his wife and 3-years old boy. He was in perfect health, sexually as well as otherwise. He frequently rides 60 miles a day on horseback without suffering any pain or fatigue.

Case 3.—Mr. O. E. B.: 53 years of age; in June, 1879, was standing up in the rear car of a train when it jumped the track and ran on the ties for some distance, and then turned over. When he was removed from the wreck he had severe pain in the lower part of his back and no sensation in his lower extremities. The lower extremities were entirely motionless and cold. The right external malleolus was torn off, and he received various other bruises about the body. The bladder failed in its functions after the accident and the urine had to be withdrawn by catheter. The bowels became costive and required to be moved by cathartics. Digestion remained good and appetite fair. It was supposed by his medical attendants at that time that there had been a dislocation of the eighth or ninth dorsal vertebra, which was pressing on the cord.

He suffered great pain and loss of sleep. On the fourth day sensation began to reappear in the lower extremities, and this soon developed into a hyperæsthesia. This hyperæsthesia also affected the upper part of the body. He did not suffer from severe pain in the spine at this time. After the tenth day the bladder resumed its function. On the third or fourth day, after many trials, he succeeded in moving the second toe of his left foot slightly, and from this time motion gradually but very slowly developed in other parts of his lower extremities, and in the course of a few weeks he could extend the leg a little upon the thigh. A slight slough occurred on the left heel. The lower extremities remained very cold and had to be kept warm by hot bottles and the use of friction, etc.

In September he first rode out in a carriage, but while riding, could not be comfortable except when supporting himself on his arms, and each time when he came home he felt so very tired and exhausted he was finally obliged to give up this exercise.

On October 30 a felt corset was applied to him. This made him feel much better and gave support to his back. With this on he again rode out, and with more comfort. The right foot and leg remained somewhat painful. The right thigh was atrophied, measuring $1\frac{1}{2}$ inches less than its fellow.

In the latter part of December he began to bear some weight upon his legs, and could, when first seen by me in March, 1880, bear his whole weight on his limbs after he had been helped to the upright position. While sitting up he had a frequent desire to raise himself upon his arms. He could flex the thighs moderately, and the legs upon the thighs. The left leg had more power than the right.

The tenth and eleventh dorsal vertebræ were more prominent than the others. The spinous and transverse processes were more prominent and much thickened, and on firm pressure considerable pain was produced. Below this point there was more than the ordinary lumbar lordosis. Sensation was still a trifle exaggerated below the tenth and eleventh dorsal vertebræ, except in the left foot, where there was partial anæsthesia. On touching the sole of the right foot, an immediate reflex muscular movement followed, while in the left, reflex movement was considerably delayed, and the foot then moved very slowly. When sitting up for any length of time, he supported himself by leaning on his arms, which he said "rested him." He had to be assisted to his feet, after which he could stand by supporting himself somewhat on his crutches. By being raised so as to take most of his weight from his feet, he felt better than when standing. After being supported in this way for some moments, he felt, when let down again, tender and uncomfortable along the lower part of his back.

About 5 or 6 ounces of blood were drawn from the lower dorsal region by means of deep incisions and cupping glasses.* The next day the patient voluntarily remarked that his thighs felt different, and that he could move these muscles voluntarily, which he had not been able to do since the accident. The actual cautery was applied on the right side, opposite the tenth dorsal vertebra, and on the left side opposite the fourth lumbar vertebra. When the burns of the cautery had healed, a plaster of Paris jacket was applied, from which he experienced some relief from the constant aching in his back, but not complete freedom from pain. He was able to move his extremities more freely, but the jacket did not give him the expected and desired relief to his pain and improvement in muscular strength, and it was evident that too much "dinner pad" had been used, and sufficient "waist" had not been made to the jacket. This jacket had been applied while he was sitting on a stool and partially suspended from his head and axillæ. A second jacket was applied while the patient was suspended from his head and arms while standing upright, the extension being carried to the point of making the patient comfortable. Great care was used in "waisting in" the jacket, and in this better-fitting jacket he had very little pain in his back, and was able to walk very much better. He said it gave him very great support.

Six months later, he wrote that he was improving surely, but as he thought, very slowly. The right leg continued to be $1\frac{1}{2}$ inches smaller than the left, and had much less power, although it could bear the whole weight of his body. The left leg was strong but sluggish. The circulation continued to be slow in both lower extremities. He used his crutches in going out-doors, but in the house he could get ahead with two canes, and could take a few steps without support. He also thought he had improved more in the last four weeks than in the preceding few months.

In December, 1881, he called on his way to Europe; walked upstairs without assistance except his cane, and his hand on the baluster. He could walk on the level ground without jacket or support, and could concuss himself on his heels without pain, but preferred to wear the plaster jacket for protection. He could cross each leg over the other, but did this better with the left than with the right: he had voluntary control over the muscles of his lower extremities. The left leg is more tardy in its movements, although it is the largest. A plaster of Paris jacket was applied and made into a corset, and with this he sailed for Europe.

In 1887 he reported that he had steadily improved although his legs were still slow in responding to his will. He was still using massage and Swedish movements.

In February, 1892, he called, and stated that he had been able for some years to walk up and down stairs without assistance, and was in perfect health, and attending to active business, but was unable while lying down to rise from the floor without assistance. The patient was seen in June, 1893, and his back continued well.

Case 4.—L. V. T.: About 28 years of age; while in charge of an express car the train was derailed and fell down an embankment, the car turning over several times, and the iron safe striking the patient violently a number of times. He was rendered partly unconscious by the fall, and when he came to himself was unable to move his lower extremities. He has had very defective control of his

*In all of these cases, the blood was withdrawn from punctures made very deeply along the spine, and not from superficial scarification, a point which I think is of much importance in cases of congestion of the spinal cord.

bladder and bowels since the time of the injury. When first seen in 1886, some months after the injury, he was still paralyzed as to motion and sensation in the lower extremities, bladder, and rectum, but not completely so, as he was able to drag himself about on crutches, but was unable to rise without assistance. He had severe pain in the lumbar region, and the sensation as of a girdle around the waist. While partly suspended by the head and shoulders, he could move his legs with greater ease, and the girdle sensation disappeared; and with a plaster jacket could sit upright for several hours without discomfort. When unsupported by the jacket he had constant pain in his back, and was unable to sit erect for more than a few moments. Plaster jackets, applied while the patient was partly suspended by the head and shoulders, were renewed at intervals of about six months for a period of two years. The patient recovered control of his bladder and rectum in about eight months, and was able to walk with the aid of a cane in about a year, and at the end of two and a half years was perfectly well.

There are certain points of similarity in all these cases upon which I wish to dwell with especial emphasis. They all of them remained more or less completely paralyzed for long periods after the receipt of the injury—in one case over two years—and marked improvement did not begin until traction was made on the spinal column. In every case when the spine was stretched the patients said they felt better; they had more control of their limbs and sensation was keener. In one case the patient was unable to evacuate the bowels or bladder except when the superincumbent weight of the body was lifted off. All of these cases continued to feel this improvement so long as they were properly sustained by properly-fitting plaster jackets. When the support became broken down and failed to retain the spine in its stretched position the symptoms began to return, to disappear again on the reapplication of the stretching and retention of the spine in this position by an accurately adjusted support.

A NEW PAPER SPINAL CORSET.

By L. A. WEIGEL, M. D., of Rochester, N. Y.

From time to time various substitutes for the removable plaster of Paris jacket have been proposed. Leather, felt, silicate of soda, wire, wood, and other materials have been resorted to in the construction of jackets on account of their greater durability and comparative lightness. All have their advantages and disadvantages. To many patients the odor of leather is objectionable, and a leather jacket is not particularly light in weight. Felt and wood jackets are apt to get out of shape from becoming softened from the heat of the body in summer and they also absorb perspiration even when thoroughly shellacked.

The jacket I propose is free from all of these objections and possesses certain advantages not found in the others. The material of which it is made is a wood-pulp paper and linen and is of course made on a cast of the patient's trunk, which may be corrected and modeled as may be desired. The plaster cast should be a smooth one, either solid or hollow. The process of construction is substantially the same as the wood jacket described by Waltuch in the "Centralblatt für orthopœdische Chirurgie," January, 1889, the only difference being in the material used and the method of finishing. The jacket is made as follows:

A piece of linen thoroughly wet is smoothly stretched on the cast and secured by tacking it along a line in the center of the cast in front and also at the top and bottom. In subjects with well developed breasts and hips the application of linen will be much facilitated by approximately fitting it to the cast by sewing seams of proper shape along the axillary lines after the manner of fitting a dress waist to the form.

The linen thus applied should be free from wrinkles. When this is done the paper is put on in the following manner:

The paper is saturated with water and the excess removed by placing it between towels or absorbent cloths. It is then cut into strips of suitable width and length, the size depending upon the jacket to be made. The paste used for cementing the various layers together is what is known as "Boston steam paste," such as is used by paper hangers, bookbinders, etc. It is applied thoroughly to each strip with a flat brush, but an excess should be avoided. In applying the paper the order given by Waltuch for his wood jacket may be followed. The first layer is put on in vertical strips, the second horizontally, as shown in the accompanying photograph.

It will be found convenient in putting on the vertical strips to begin in the center of the back and work in both directions towards the front, and if special strength is desirable in the waist line the vertical strips could be put on in two pieces, allowing them to overlap each other an inch or two in the center. The horizontal strips should extend across the back to the axillary lines where they are overlapped by strips coming from the center of the cast in front. After these two layers are applied a layer of linen cut into strips of convenient width is applied around the whole cast. It is always desirable to have the linen thoroughly dampened before application.

The next step is the application of two oblique layers of paper, as shown in the illustration, followed by another layer of linen. Two additional layers of paper are now applied as the first ones, that is horizontally and vertically. If desired a layer of linen may be applied as a finish, but this is not necessary.

Special points may be strengthened by a few strips of a paper applied like an elliptical wagon spring. or by simply crossing them at right angles to each other.

The jacket should be allowed to remain on the cast until thoroughly dry and artificial heat may be resorted to to hasten the drying process. Before removing it from the cast it is perforated to any desired extent with a drive punch. The jacket is removed from the cast by cutting along the upper and lower edges with a sharp knife and removing the tacks along the center in front, when it may be sprung off the cast.

It is then ready for enameling. There are various kinds of prepared enamels on the market which may be used. Aspinall's enamel is perhaps the best, and is applied with an ordinary flat brush. It is desirable to apply two or three coats of the enamel, allowing each coat to become thoroughly dry and hard before applying the next. When the enamel is thoroughly dry the edges of the jacket are bound with kid, and strips of leather, provided with lacing studs, are sewn on.

The special advantages of this jacket consist in its lightness and absolute cleanliness. The enamel prevents absorption of perspiration as it is waterproof, and if it becomes soiled it can be readily cleaned with soap and water.

A CONVENIENT APPARATUS FOR THE GYMNASTIC TREATMENT OF LATERAL CURVATURE.

By L. A. WEIGEL, M. D., of Rochester, N. Y.

The apparatus about to be described combines in one piece several others and is especially desirable where a physician is limited for room.

It consists of a rectangular frame constructed as shown in the illustration. It is 4 feet wide and 8 feet high. The uprights are about 4 inches square and are bolted to the crosspiece. The uprights are slotted throughout nearly their whole length and provided with holes 1 inch in diameter for receiving the pegs for a peg ladder. These pegs are simply inserted into the holes and are kept in proper position by a shoulder turned on them. The pegs are removable for two reasons: First, the distance between pegs may be increased or diminished, and, second, they also serve the purpose of securing any crossbars that may be put in the frame at any height. The crosspiece is provided with a hook for the ordinary head-suspension apparatus.

On the face of the crosspiece four pulleys are screwed on for carrying the rope to which the swinging trapeze is attached. The base of this frame is provided with means for fixing the feet in the rotary exercises, which consist of a pair of roller skates, from which the rollers have been removed, fastened to a secondary board, which may be firmly fastened to the base with a thumbscrew running into a nut secured underneath.

It is unnecessary to go into detailed description of the various exercises that may be taken in this arrangement. The principal ones are shown in the accompanying illustrations and consist of self-suspension, climbing the peg ladder, rotation and oblique suspension by the hands.

When it is desirable to fix the pelvis for the purpose of twisting the trunk an arrangement similar to that shown in one of the illustrations may be adopted. It is the pelvic fixation mechanism I use in the apparatus for pressure correction.

THE ORTHOPEDIC AND GENERAL TREATMENT OF INFANTILE PARALYSIS.

By L. A. WEIGEL, M. D., of Rochester, N. Y.

It goes without saying that the prevention of a deformity is very much easier than its subsequent management when developed. The natural tendency of all paralytic cases is toward deformity of some kind, and it is rather surprising that the general practitioner pays so little attention to the management of this affection in its earlier stages calculated to give the child the best possible results. It is not uncommon to meet with cases in which drugs have been given for months at a time with the idea of influencing the paralytic condition, no attention having been paid to the insidious but sure development of all kinds of deformities we are so familiar with.

It would be a simple matter to support a paralytic foot, for instance, by some simple contrivance so as to prevent contraction of the tendo achillis or to prevent the foot from assuming either a varus or valgus position. The importance also of artificial support for paralysis of the quadriceps extensor muscles does not seem to be fully appreciated. Knee joints are allowed to become relaxed, misshapen, or hyper-extended for want of proper support. There can be no doubt that the progress toward improvement is materially aided by keeping a limb or extremity in its normal position. The weight of the body falling upon the joints out of their normal plane by reason of the absence of the natural muscular tonicity rapidly induces and aggravates any existing tendency to deformity.

It is not my purpose, however, to dwell upon these special points, but rather to call your attention to the management of deformities that are fully developed. Among these the most common are the various forms of talipes and malpositions due to paralysis of the adductor and abductor muscles of the leg. In untreated cases structural shortening nearly always occurs, which makes the deformity a permanent one, only to be relieved by operative or other methods of treatment. In some cases it is not always practicable to determine whether the deformity is due to actual structural shortening or to contraction of the unaffected muscles. In such cases the use of anæsthetics is of material assistance, as it enables us to eliminate the spontaneous or voluntary contraction and determine the exact amount of structural shortening that has taken place, and also enables us to determine the necessity for operative interference. By this means considerable time may be saved, and we may also be spared the annoyance of failure by purely mechanical treatment, for if an operation be necessary we can at once correct a deformity that might be subjected to mechanical treatment for an indefinite period without material benefit.

Permit me to relate briefly a case in point. Mary F., now aged 13, gives a history of infantile paralysis dating back to her second year. Upon examination it is found that the left foot is drawn up, the whole leg rotated inward and firmly adducted to the extent of 7° The practical shortening is 1½ inches and the actual shortening less than one-half an inch; the inward rotation is about 60°. Under anæsthesia the malposition of the hip could be entirely overcome, whereas contraction of the heel remained permanent. The tendo Achillis was tenotomized and the foot brought into a normal position and maintained by plaster-of-Paris bandages. As there was no necessity for operative interference to overcome the adductions and no preparations had been made to prevent a recurrence of the deformity, after recovering from the anæsthetic it was necessary to resort to its use a second time. To prevent a recurrence of the adduction and inward rotation I constructed a simple wire ischiatic crutch which could be held in place by plaster-of-Paris bandages. It consists, as you will see, of a piece of wire bent so as to from a crutch, which rests up against the ischiatic fold of the opposite side. The upper curved portion is properly padded, while to the lower end is attached a strip of roughened tin or copper to be incorporated in the plaster bandages. This was applied and left on until a brace could be made to be worn for some further time.

This idea suggested itself by the method of overcoming crural adduction described by Dr. Henry Ling Taylor in 1889. It was found that the limb could be maintained perfectly in the corrected position obtained while the patient was completely anæsthetized. The application of this wire splint is shown in the photographs. The brace, which is to be worn for some time, was made with a foot plate shaped to the foot, to which was attached the upright, having a stop joint at the ankle to prevent the recurrence of the foot deformity. At the knee there is a free joint, and just above the knee joint a traction or pushing mechanism is hinged to swing laterally.

This mechanism consists of a piece of steel tubing carrying a crutch head properly padded. In this tubing a screw runs, which is worked by a milled nut, which allows any desired amount of traction to be made. This mechanism does not differ materially from that described by Dr. Taylor so far as the principle is concerned, and is simply applying the same principle in a different way for accomplishing the same purpose.

The result obtained by this method of treatment has been eminently satisfactory, and the extreme and distressing malposition maintained for eleven years was entirely corrected and the patient was walking about on the brace in less than four weeks.

The use of dry heat for the purpose of increasing the general nutrition of a paralyzed extremity is frequently advised, and undoubtedly does help to improve the condition. It is, perhaps, immaterial how the heat is applied, and the choice of methods is largely one of convenience and the facilities for doing it thoroughly. When left to the average parent of a paralytic child, it is my experience that whatever treatment is advised is very inefficiently carried out at home, so that I find it necessary to have strict personal supervision in the carrying out of any plan of treatment. For applying dry heat I have devised a heating box which works very satisfactorily. It is constructed upon the circulating hot water system, and is absolutely safe; there is no danger of accidental burns, and the degree of heat may be regulated to a nicety.

It consists of a rectangular box of galvanized iron, heavily lined with asbestus paper. In the bottom of the box are two coils of pipe, from which the heat radiates; at one end of the box there is a water tank holding about 2 quarts of water, from which the water enters a boiler below, this boiler consisting simply of a circular coil of pipe, underneath which is placed a small gas stove. The water in this boiler is rapidly heated, and enters the first coil at its highest point; then, after passing through the various coils, returns to the boiler to again start in its circulation. The other end of the box is provided with a circular opening, through which the leg is passed, the latter being supported by strips of webbing. The temperature may be raised to from 140° to 160°, and maintained at that point for any desired length of time. The heat thus produced appears to be a pleasanter one than that furnished by other means, and the little patients do not object to being roasted for a sufficient length of time to thoroughly heat the extremity.

The use of salt baths, electricity, and massage are sufficiently well known not to require any reference.

THE PROBABLE CAUSE OF THE LIMP OF THE FIRST AND SECOND STAGES OF HIP-JOINT DISEASE.

By HARRY M. SHERMAN, A. M., M. D.

Orthopedic surgeon to the Children's Hospital, San Francisco, and to the San Francisco Polyclinic—the post-graduate medical department of the University of California.

I have never met with a satisfactory explanation of the cause of the limp of hip-joint disease; nor, even in those works that treat of the disease itself at greatest length, have I seen a full description of the limp and of the changes in its detail as the disease progresses. This is the more remarkable for all writers give the limp a prominent place in the list of symptoms, and most of them accord it the rank truly due it as the symptom of chief importance.

Gibney and Barwell are the only authors I know who have attempted to picture it. The former says (Diseases of the Hip, p. 234): "The lameness that shows itself as the earliest sign is the lameness peculiar to bone lesion." There is something about it that is often pathognomonic. In my notes I have come to speak of it as the "hip limp." Throughout all the stages when the patient does walk the element of stiffness is present. At times it is a mere awkwardness, and the child does not raise the foot so high as the other is raised: the step is shorter. "Later the gate develops into an unmistakable limp, the body, as the step is taken, being thrown cautiously to the side on which the disease exists." .

Barwell is fullest on the subject when he is giving the differential diagnosis between the forms of the disease which he recognizes. (Diseases of Joints, p. 303.)

MODE OF LIMPING.

Synovitic.—Dragging of the limb, which is slowly and badly lifted; less marked in the morning, strongly marked in the evening or after exercise. Patient will bear his weight on limb pretty well with little complaint.

Femoral.—Foot not dragged, not advanced in front of the other; stands on it as short a time as possible, bringing sound one forward very quickly; body swung over to diseased side. If made to put much weight on limb complains much.

Pelvic.—Foot advanced a little before sound one, when weight comes on it body thrown to sound side; apparent great sense of insecurity, and patient often refuses to put weight on diseased limb; rather, it seems, from fear than pain.

Neither of these writers, however, in any way explains the cause and mechanism of the limp, yet I think an explanation may be given which will take account of and satisfy all the conditions, vital and mechanical, and help to make greater the already great value of the limp from a diagnostic point of view.

In making such an explanation it will be necessary to separate in the mind the limp as a symptom from the pain as a symptom. Those writers who have suggested the cause of the limp, Wright and Barwell, have given evidence of a connection, in their minds, between the pain and the limp, and the belief is quite general that a limp is due to pain or to an effort to avoid pain, and this idea was indeed held by me until I had observed the painless limp many times and been impressed by the fact. G. A. Wright says "the limp is due to tilting of the pelvis to take the strain off the tender limb" (Hip Disease in Childhood, p. 43), implying that if the strain was put on the tender limb the tenderness would be increased, and would be painful. Barwell acknowledges that "every limp is not produced by pain," thus saying by inference that other limps are produced by pain.

That the limp is quite separate, in point of time, from the pain can be easily shown out of the writings of those who have described the disease. Wright (*lib. cit.* p. 43), Howard Marsh (Diseases of the Joints, p. 384), Barwell (*lib. cit.*, pp. 292–293), Bradford & Lovett (Orthropedic Surgery, p. 262), and Steele (Encyclo. Dis. Children, Vol. III, p. 1116) all mention the variability and even total absence of pain in a certain number of cases, but emphasize the constant presence of the limp in all cases, and the fact of its being the initial symptom.

In offering the explanation that I believe to be the true one it will be necessary to refer to the pathological condition present in hip-joint disease and its location; to consider the mechanical disposition of the parts; to review the normal movements of locomotion, and to describe the limp and its probable causation.

The pathological condition is the common one of tubercular infection of bone. Under the stimulus of the product of the bacillus of tuberculosis the infected region becomes infiltrated with round embryonal cells—"infected granulation tissue"—and these crowding into the intertrabecular spaces strangulate the blood vessels, and cut off the circulation. This "infected granulation tissue," too, "by its pressure and after-caseation, with its associated fluid, produces wasting of the osseous trabeculæ." (An American Text Book of Surgery, p. 264.) This result, the wasting of the trabeculæ, is of the same importance in infection of bone as is the destruction of lung parenchyma in infection of those organs, it is the destruction of functionating tissue; and just in proportion as the trabeculæ are wasted or destroyed is the function of the bone impaired, that is, its resistance to strain is lessened.

It is very likely that this is not at all a late result of the process, for "infected granulation tissue" is the earliest product of the tubercular infection, so that we would find, very nearly contemporaneously with the initial lesion, structural weakness of the bone.

This tubercular infection is most frequently in the head or neck of the femur. My own cases of excision of the hip lead me to think the initial lesion is very close to the epiphyseal cartilage, and a little more frequently on the diaphyseal side of it. In something over fifty such operations I have not seen one case where the conditions found would suggest that the disease had begun in the acetabulum. The general consensus of opinion, however, as given by Bradford & Lovett, is as follows (*lib. cit.*, p. 256):

Although in most cases the head of the femur is the primary seat of disease, there is no question that in others the floor of the acetabulum is first affected.

In the majority of cases, then, and I believe a very large majority, we have structural weakness of the femoral head and neck as the immediate and constant result of the disease.

This portion of the skeleton is constructed and arranged, relatively to other bones, in a particularly interesting manner. The arrangement of the trabeculæ in the interior of the neck, so that a very compactly latticed beam of bone springs from the end of the shaft, and extends by a gentle curve into the neck and head to bear the weight of the body, is too familiar to all to require more than mere mention here. But looked at from the outside, the mechanical arrangement of the head and neck of the femur constitute what is practically a cantilever, being fast at one end and extending out to bear weight at the other. ("Cantaliver, cantilever, I. *n.* 1: A block or large bracket of stone, metal, or wood, framed into the wall of a building and projecting from it to support a molding, a balcony, eaves," etc.—Century Dictionary.)

The pelvis with an eccentric supported point in the acetabulum and its horizontal position maintained by the thigh abductor muscles—attached above to the ilium, and below to the trochanter—constitutes practically an extension of the cantilever. Consequently the necks and the heads of the two femora and the united ossa innominata correspond to the definition of a cantilever bridge. ("Cantaliver, cantilever, I. *n*, 2: One of the two long brackets or arms projecting towards each other from opposite banks or piers, serving to form a bridge when united directly or by a girder."—Century Dictionary.)

In regard to its work the cantilever is equivalent to that portion of a lever of the first order which is between the fulcrum and the weight, and the longer the arm is the greater is the disadvantage at which it works, and the greater is the strain upon its structure. Now with the pelvis horizontal transversely, and the body supported by one limb, the center of gravity, said to be located just anterior to the twelfth dorsal or first lumbar vertebra, would be furthest from the trochanter, and the body weight would be supported at greatest disadvantage and with greatest strain on the tissues, and obviously most upon those of the neck of the femur, through which all force is transmitted. To lessen this strain and to increase the mechanical advantage at which the parts work, the center of gravity must be brought more nearly, or exactly over the point of support, so that the support is by a prop, and not by any force of leverage. This change is not possible in respect to the head and neck of the femur, for these parts are rigid.

The most that can be done is to bring the center of gravity over the head of the femur, and so to shorten the cantilever arm by the distance through which the center of gravity is thus moved. In a position, then, with the pelvis tilted on the single supporting femur, and, in addition, such lateral motion between the lumbar vertebræ as is necessary to bring the anterior surface of the twelfth dorsal and first lumbar vertebræ directly over the head of the femur, the body weight is supported by the femoral neck at the least disadvantage.

There is in each step, at the time the body weight is supported by a single femur, a tendency to the assumption of this position.

Instantaneous photography, an instrument of precision in recording and measuring the positions assumed by bodies in motion, has shown that in each step, apparently only an act of progression, there are two other principal rythmical motions, and several more that are of less moment. These two are oscillations, one in a vertical and the other in a lateral direction, and they are quite as much a part of the step as is the progression. Of these two the vertical oscillation represents the rise and fall of the body, which traverses, during the progression, a curved line, of which the supporting leg is the radius, the trajectory thus described not being a mathematical curve, but, instead, irregular, the length of the supporting limb varying by joint motion.

The lateral oscillation represents the sway of the body as its supporting point is changed from one acetabulum to the other and is not ordinarily visible as we see a person walking. It is an equilibration both to counteract the tendency of the body to fall towards the unsupported side, and also to balance the weight of the lifted limb and the pull developed by its swing forward, and at the same time it is the beginning of a lateral sway, which, if continued, would move the center of gravity sideways until it was directly over the head of the femur.

In the first stage of the disease, shortly after the time at which the pathological process begins, and while the lameness is not constant, but noticed only in the morning, or after rather violent exercise, or after the whole day's play, the limp is a slight increase in the lateral sway of the body towards the affected side and nothing more. It is very slight and must be looked for to be found, and then can not be seen if the gait is at all faster than a walk. During this first stage, while joint motion is checked at the extremes it is still ample for the purposes of locomotion, and none of the stiffness which is so marked later is apparent.

In the second stage, the area of infected bone increasing, and muscular rigidity lessening joint motion, the lateral sway, in the first place, is greater and, in the second place, the progression on the affected limb is shortened. The lateral sway, considered alone, soon reaches a maximum and is constant there, but it is combined with the other unusual movements which result from the crippling of joint motion. The crippling of extension introduces the "element of stiffness" and it is compensated by a slight act of extension between the lumbar vertebræ. A little later flexion has been curtailed, the proper advance of the foot is impossible, and what advance is accomplished is assisted by the swinging forward of the side of the pelvis by a rotation inwards at the opposite hip. Still later, rigid flexion permits too little extension to let the heel reach the floor, and the patient walks on the toes with a decided up-and-down motion from step to step; rotation inwards at the sound hip to advance the foot of the affected side is more extensive, and, in addition to violent lordosis of the lumbar spine, there is a little swing of the whole body on the tip-toed foot to accomplish some progression.

All of this somewhat complicated action is reducible to two elements. One is the lateral sway, the other is the lessened joint motion. The latter is easily traceable to muscular rigidity maintained to prevent an amount of motion that would be a trauma. The lateral sway, however, is present before either pain or checked motion. so far as this is appreciable in the step. It is, at the beginning, the merest increase in the range of the normal lateral oscillation of locomotion, but it gradually increases until it is in each and every step, a very close approximation to the position in which the center of gravity of the body is over the head of the femur and the strain on the neck of the femur is reduced to a minimum. It is an act which lessens the strain put on a part structurally weak, and an act which is, in all probability, instinctively taken for the express purpose of lessening that strain. It is sharply in contrast to every other act in the detail of the hip limp in that it is neither a limitation of a normal motion in the diseased joint nor any increased compensatory motion in other articulations, but it is an independent motion, at first present alone, and then coexisting with the others; but whether it be alone or not it serves the purposes indicated, and has all the semblance of a means adapted to an end.

Barwell states that in cases of original pelvic infection the body is thrown to the sound rather than to the diseased side when weight comes on the diseased joint. I have never seen such a limp, but, other conditions being the same, the explanation here offered for the femoral is equally applicable to the pelvic cases. If the floor of the acetabulum is affected in any but its lower portion, no motion but that towards the sound side will lessen the strain; other motions will change the direction of the strain, but they will not, in any material degree, lessen it. The motion to the sound side is a fall of the body towards the unsupported side while the sound limb is lifted, advanced, and replaced on the ground, and is prompted by a refusal to put the full strain on the structurally weak bone, even if the act might not cause definite pain. The dilemma of the pelvic cases is noted by Barwell, who says the refusal is prompted by fear rather than pain, and it is evident that in the refusal they take the only course left to them to lessen the strain.

There is one other consideration this explanation suggests which is of some interest—there must be some means by which an appreciation of the work done by a bone is communicated to the central nervous system, a "bone sense" akin to the so-called "muscle sense." It is no more improbable than the "muscle sense," nor the fact that in the case of the skin—a passively working tissue like bone, as distinguished from an actively working tissue like muscle—we have an appreciation of pressure or of stretching; for bone is, like all the other organs, a living tissue, and is properly supplied, we know, with the grosser sets of nerves as is the rest of the economy. Furthermore, in the disease locomotor ataxia we see the general sensibility, and with it the "muscle sense" abolished, and at the same time can observe that in some cases the patients use, without pain or limp, joints that are completely disorganized, and with quite extensive necrosis of the bone. Of course this could not be witnessed in cases where the larger and more important articulations were so affected that the mechanical conditions were disturbed enough to interfere with function;

then, of necessity, there would be a limp, but I have seen in a tabetic patient complete disorganization of the metatarso phalangeal articulation of the great toe, and it did neither pain him nor in any particular affect his gait; that is, he put on the diseased and weakened bones the strain that he did on his sound bones.

There is another pathological condition which produces in the neck of the femur the same effect as does tuberculosis, namely, structural weakness, and as a result of this a perfect imitation of the "hip limp" as seen in the first stage of the disease, and that is, osteo-sarcoma of the femoral neck. A girl was admitted to the Children's Hospital in San Francisco, with a swelling in front of the great trochanter. She walked with a "hip limp." The diagnosis of malignant disease was made, the thigh was amputated through the hip joint, and the specimen showed that the tumor had its origin in the center of the neck of the femur, and that, growing from this point and perforating the shell of the bone, it had destroyed about one-half of the tissue of the neck. In the facts of the presence of structural weakness and the character of the limp the case was like one of hip-joint disease.

If the paralysis of acute anterior poliomyelitis affect the thigh abductor muscles, the preservation of the equilibrium of the body is impossible without lateral sway of the trunk, so as to bring the center of gravity over the head of the femur. This limp is very like, but not exactly similar to the hip limp. The resemblance between them, which has been mentioned by Bradford and Lovett (lib. cit., p. 280), is enough to deceive a careless observer.

After resection of the hip and recovery of the patient so that walking without a stick or crutch is possible, there is a limp very similar to the limp of hip-joint disease. After a hip resection the mechanics of the joint are, of course, completely abolished, and in locomotion the trunk must be accurately balanced on the end of the shaft of the femur. This is done by a lateral sway of the trunk, and the equilibrium is, in part, maintained by all the muscles that reach from the femur to the os innominatum, contracting and acting as stays for the unstable pelvis. This motion has been illustrated in an article by me entitled, "Instantaneous photographs illustrating the gait of a child from whom both hips had been removed," and published in the third volume of the transactions of the American Orthopedic Association.

OBSERVATIONS ON THE ROTARY-LATERAL CURVATURE OF THE SPINE, WITH SPECIAL REFERENCE TO ETIOLOGY AND TREATMENT.

By JACOB TESCHNER, M. D., New York.

The subject, rotary-lateral curvature of the spine, is one upon which there has been much written, concerning the etiology, pathology, and treatment, and upon which there has been considerable discussion. This would in a measure indicate the usually unsatisfactory or only partially satisfactory results that are derived from the treatment of these cases, and the importance of giving them proper and early attention.

I shall not in this paper attempt to enumerate all the ideas and views of the etiology and treatment of this condition as presented by the leading orthopedists of this country and Europe, but I shall as briefly as possible classify the causes which are generally accepted, and give the results of my observations, laying the greatest stress upon the most important and the most frequent causes, and submit the treatment which I have found successful.

Rotary-lateral curvature occurs most frequently, according to several observers, between the seventh and fourteenth years, only a small percentage occurring after the eighteenth year. The following figures will show the percentages occurring during the different periods in 1,000 cases of Eulenberg, viz:

No.	Years.	Per cent.	No.	Years.	Per cent.
0	2	0.5	6	7	21.6
2	3	2.1	7	10	56.4
3	4	0.9	10	14	10.0
4	5	1.0	14	20	2.8
5	6	3.3			

Girls are more prone to this disease than boys. Why this should be has not been definitely determined, but there is little doubt that the differences in the rapidity of growth and development during the earlier years, the organization of the nervous systems, the conditions favoring or opposing muscular development, and the habits of the sexes after school hours are important elements in determining this fact.

I will pass over the pathological and anatomical causes, viz: Pleurisy with adhesions, empyæma, paralyses from different causes, rachitis, Potts' disease of the spine, inequalities of the length of extremities, and loss of an extremity, and consider only the following causes, viz: (1) Hereditary tendency. (2) General temperament and the condition of the mind and nervous system. (3) Lack of development of the muscular system, and the general physical condition. (4) Habitual faulty position with superimposed weight.

(1) *Hereditary tendency.*—I have not been able to find any allusion citing this as a factor in the etiology of the disease, but I have frequently noticed slight curvatures, and upon closer examination found decided scolioses in the mothers of girls brought to me for treatment.

I have at the present time 4 patients under treatment whose mothers have distinct scolioses, and one of these patients has 4 sisters, ranging from 15 to 20 years of age, with slight curvatures.

I am of the opinion that if this condition of the mothers of patients were more closely investigated, that "hereditary tendency" would become generally accepted as one of the causes.

(2) *General temperament, and the condition of the mind and nervous systems.*—This heading is one which is apt to give rise to considerable doubt when cited as a cause, because most observers lay all their stress upon the deformity and its mechanical treatment, and to a certain extent lose sight of the general, mental, and nervous conditions of the patients.

The general temperament of most girls afflicted with rotary-lateral curvature is apathetic, indifferent, somewhat lazy, and sometimes a trifle morose. As a rule they are backward in their studies at school, and usually show a decided disinclination to romp and play, after school hours, with the same vigor and enjoyment as do their companions.

The facial expression is frequently a vacant stare, the lower jaw dropping and the mouth being open, giving the patient a silly appearace.

This was particularly well marked in a patient sent to me for treatment by Dr. Leonard Weber, of New York, and it became more conspicuous by its absence, as noted by Dr. Weber, after the patient had been under treatment for a short time. Of course, there are all gradations between an highly intelligent and an almost idiotic countenance, but where there is a lack of intelligent expression the face certainly changes after energetic treatment.

Under this heading, I would also call your attention to a peculiar lack of coordinating power, or lack of muscular control, with which some patients are possessed. It seems to some patients, until properly instructed, almost an impossibility to fully extend an entire extremity, either upper or lower. If, for example, a patient be instructed to hold an upper extremity abducted at a right angle to the body, palms down, and hold it rigid at all the joints and fully extended, the observer will find that if the wrist be extended, the elbow is apt to be flexed, or if the elbow be extended, the wrist will be flexed, or if both the wrist and elbow be extended, the fingers will be either flexed or hyper extended.

This lack of coordination or lack of muscular control can be and is made to disappear through the muscular instruction and development which forms part of the treatment.

Patients usually, when told to grasp an object firmly, a cane, for instance, neither properly approximate the palm to it, so as to exert an even pressure upon it, nor do they encircle it with the thumb; they hold it between the thenar and hypothenar eminences of the palmar surface of the first set of phalanges, the thumb being at a right angle to the phalanges, and the palm being hollow, thereby showing their inability to exert muscular influence in a normal or proper direction.

(3) *Lack of development of the muscular system and the general physical condition.*—General muscular development is frequently found to be very poor or almost wanting. In most cases the trapezii, the rhomboidei, the sterno-mastoids, and deltoids especially are found almost rudimentary. The back, chest, and abdominal muscles are generally found in worse condition than the muscles of the extremities. With this state of affairs we naturally expect and find a lolling and lounging muscular habit, and a general want of muscular tonicity and precision. Patients, when suspended, are rarely able to sustain their own weight.

The physical condition is as a rule not good, the patients being frequently the victims of a poor digestion accompanied by malassimilation. In girls leucorrhœa is generally present and frequently copious. In mentioning the general condition of health I do not wish to be understood to claim that when the general system is run down a curvature will occur, or that there are no cases of curvature in which the general health is not impaired, but I do claim that when there are tendencies to a curvature, as cited above, with the conditions as explained in the next paragraph, an impaired condition of the general health will greatly assist the rapid development of the deformity.

(4) *Habitual faulty position with superimposed weight.*—Resting the weight of the body upon one foot while standing, or sitting more upon one buttock than upon the other, and in either position permitting the shoulders to fall forward and the chin to approximate the chest, shows a relaxation of all the muscles which hold the spine erect in the normal condition, and permits a sagging of the upper portion of the body upon the lower, and twists the spine and trunk into a mild form of deformity, the mechanism of which was so ably demonstrated by Dr. A. B. Judson* at the meeting of the American Orthopœdic Association, in September, 1890. This deformity passes off when a normal standing or sitting position is assumed, but when such temporary deformity occurs not only daily, but several times a day, and for protracted periods, it gradually increases and later becomes permanent and fixed, and produces the actual bony and ligamentous changes which are met with in cases of long standing.

The faulty sitting position is more frequent than the standing, as children, as a rule, spend about five hours in the twenty-four sitting in schools. I will, therefore, call your attention to the school habits of children, while sitting, and their shifting of positions to relieve the tiring of the strained groups of muscles.

Dr. A. Baginsky † in his admirable paper read before the "German Society for the Care of Public Health" at Berlin in March, 1888, says, "More and more are

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* The rotary element in lateral curvature of the spine. A. B. Judson, M. D., N. Y. Trans-American Orthopœdic Ass'n, Vol. III, 1890.

† "Ueber Ruckgrads-Verkrummungen der Schulkinder." Deutsche Med. Zeitung, Berlin, 1888, IX, pp. 529–541.

surgeons convinced through their anatomical and physiological investigations and from their practical observations, that scoliosis, the most important of all deformities of the spine, in a very large majority of cases owe their origin to the influence, of school life upon the organism of the child."

This writer further shows that if we observe a class of children during the early portion of school hours, more particularly if the subject of the lesson be interesting and the weather cool, they will all sit quite erect, with their heads well poised, their chests brought forward, their feet evenly placed upon the floor (if the lower extremities are not too short to reach it), and the frontal plane of the body parallel to the edges of the desks in front of them. Later on, one by one, the children will permit the shoulders to drop and fall forward, the chins to approximate their chests, thereby changing the entire contours of their spines.

There is a tendency to turn the trunk to the right or left, in order to relieve one buttock of the weight of the superimposed body. Some are apt to cross the thighs, thereby producing the same effect. The frontal planes of the bodies of the children are then no longer found to be parallel to the edges of their desks.

Dr. Baginsky shows even worse positions which are assumed by children during their writing lessons, when the frontal planes of their bodies are placed at right angles to their desks.

Any change of position, no matter how slight, changes the center of gravity, and those muscles which hold the body upright are strained as soon as the position recedes from the erect one. When one set of muscles is thoroughly tired, the child changes position to relieve the strained set of muscles, and brings those muscles which have not been taxed into play.

When children become habituated to faulty positions in sitting, they are apt to and do assume analogous faulty positions while standing, and when these faulty positions have been maintained for a while, decided scoliotic attitudes are seen, and, as I stated before, even though they be temporary, they become habitual, and lay the foundation for well-marked deformities.

Before taking up the treatment of scoliosis, I do not think it amiss to call general attention to the pernicious effect of long and continued school hours, without intermission for play or calisthenics, and also the improper furnishing of schoolhouses with benches, chairs, and desks of a regulation size, without regard to the varying sizes of the pupils, and consequently without any regard for their comfort and well being. Sitting at best is tiresome, not only to children, but to everyone.

TREATMENT.

In every case of rotary-lateral curvature, from the mildest case to the one which appears beyond redemption, the first efforts should be directed to the prompt removal of the causes, apparent or real, of the deformity. Any shortcoming of the extremities from paralysis, inequalities, or deformities, as well as disturbances of vision, should be corrected. The child should at once be prohibited from attending school, thereby eliminating the most persistent and potent cause. The general condition of health should be carefully attended to by the correction of any disturbances of digestion or assimilation, by frequent baths to improve the condition of the skin, by the administration of tonics, if found necessary, to improve the nervous and muscular systems, and by sufficient open-air exercise.

The patient should have a properly constructed chair to sit upon; the seat of the chair should incline downward from before backward, the inclination forming an angle of about 8 degrees with a line parallel to the floor upon which the chair rests. The back of the chair should be properly shaped to receive the back of the patient, and it should extend at a right angle to the seat, up to the shoulders of the patient; the seat of the chair should be at such a height that the patient can rest the feet comfortably upon the floor. In a chair of this description the patient assumes a slightly reclining position, thereby relieving all muscular strain.

The patient should be instructed to rest frequently for from five to fifteen minutes at a time by lying supine upon the floor, the lower extremities fully extended, and the upper extremities also fully extended above the head. Self-suspension by means of a Sayre apparatus twice a day should be advised, and the patient should be instructed in exercises while suspended from an horizontal bar or from rings.

I shall now consider the various degrees of scoliosis, with reference to the treatment of each degree.

(1) Habitual scoliosis which can be obliterated by the voluntary muscular efforts of the patients.

(2) Scolioses which are not affected by muscular efforts, but which can be reduced or obliterated by suspension of the patients.

(3) Scolioses which are not affected by muscular efforts or by suspension, the deformities being fixed.

In all three forms of scolioses nothing is of greater importance than proper, thorough, and regular gymnastic exercises, which will equally develop the entire muscular system. Various kinds of exercises have been advocated by different writers, and excellent results have been claimed by them.

I wish especially to call your attention to that excellent paper of Dr. Reginald Sayre,* in which he minutely describes the gymnastic exercises which patients should be taught. These exercises with slight variations, according to the requirements of individual cases, are the ones I use in cases which come to me for treatment.

(1) Habitual scolioses which can be obliterated by the voluntary muscular efforts of the patient.—In these cases I place my entire dependence for good results upon the general directions before described, and systematic and regular gymnastic exercises. I neither consider it necessary nor wise to give support to the patient by means of any apparatus or even a corset, but I prefer to leave the muscles which are being developed and strengthened by exercises, entirely unrestrained and free.

(2) Scolioses which are not affected by voluntary muscular efforts, but which can be reduced or obliterated by suspension of the patients.—In this class of cases I adopt the same course and plan of treatment as in the first class of cases, but in addition I find it necessary and beneficial to apply well-fitting, light, and well-cemented plaster-of-Paris corsets, while the patients are suspended in a Sayre apparatus, and to permit the patients to wear them, if the deformities are obliterated when the first corsets are applied, until they have improved sufficiently to enable them to correct their deformities through their own muscular efforts. They are then treated as patients of the first class. In those cases in which the deformities are only reduced but not obliterated by suspension, as the patients improve under treatment, new corsets are applied from time to time, until at last the deformities can be entirely obliterated by suspension. These also become patients of the first class.

(3) Scolioses which are not affected by voluntary muscular efforts or by suspension, the deformities being fixed.—The treatment of this class is the same as that in the foregoing class, but other means must be resorted to, to reduce the fixed deformities of the ribs and spine. I have found the forcible daily twisting of the spine in compression of the ribs of considerable value in reducing the fixed deformities, and I have within the past two weeks begun the use of an apparatus used by Dr. Albert Hoffa, of Wurtzburg. This apparatus is described in the Zeitschrift für orthopädische Chirurgie, 1891. Although I am not in position to claim any results or benefit from the use of the apparatus, I judge from appearances, and from the combined effect of suspension, fixation of the pelvis, twisting of the spine, and pressure upon the scoliotic eminence, that it will prove to be a powerful adjunct to the more successful treatment of old cases of fixed scolioses.

It will give me great pleasure to report the results of cases treated in this manner, whether successful or otherwise.

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* New York Medical Journal, 1888, Vol. XLVIII, pp. 533–538.

DISCUSSION.

Dr. SCHAPPS, of Brooklyn. The result of my experience in the treatment of scoliosis has been to discard braces or supports in all cases, except possibly those who had been already using supports and could not be weaned from them.

THE TREATMENT OF POTT'S DISEASE OF THE SPINE.

By A. B. JUDSON, M. D.,
Orthopedic surgeon to the Out-patient Department of the New York Hospital.

While caries of any part of the vertebral column can not be considered an unimportant affection, it is well to recognize the fact that much depends on the region of the spine involved. In the middle dorsal region it is perhaps the most serious trouble, excepting malignant disease, that can attack the bones of the growing child. In this part of the spinal column the destruction is often extreme and the deformity great, evidently because the affected bones are at the greatest disadvantage mechanically. Lower down the vertebral bodies are so large that they do not lose their relation of mutual support until the loss of substance is very extensive, and above, the vertebral bodies, though small, have less weight to sustain. But in the intermediate portion, not only do the bones feel the incessant movements of respiration, but they are also more widely moved in flexion and extension and in lateral curving with rotation than in other parts of the column, and furthermore they are exposed in a peculiar manner to the risk of overstrain from their position in the middle of the column. I think it is in the experience of all of us that in this middle and upper dorsal region Pott's disease continues longest before consolidation takes place.

Here we have a most striking illustration of the fact that the recovery from articular osteitis is postponed by unfavorable mechanical environment. As joints in the upper extremity, free from the mechanical stress attending locomotion, recover easily, while those which, in the lower extremity, bear the heat and burden of the day, recover only after prolonged and extensive destruction, so articular osteitis in the cervical region of the spine is easily curable while in the upper and middle dorsal region relief and repair come only after desperate and prolonged risk.

How can we best assist nature to cure this disease in this difficult part of the skeleton? The same general rules apply here as in the treatment of articular osteitis in the lower extremities. We can not cut short the disease by an operation or by any procedure whatever, but can expect with confidence, and must promote by our best endeavors, the arrest of destruction and the beginning of repair. What, then, can we do to put the affected vertebræ in their best attitude and to raise the defensive and reparative powers of the system to their highest efficiency? As in articular osteitis occurring elsewhere we desire (1) to relieve the bone of the duty of supporting weight and concussion, and (2) to prevent the affected joint from motion, believing that the arrest of these two functions, weight bearing and motion, are essential to good treatment.

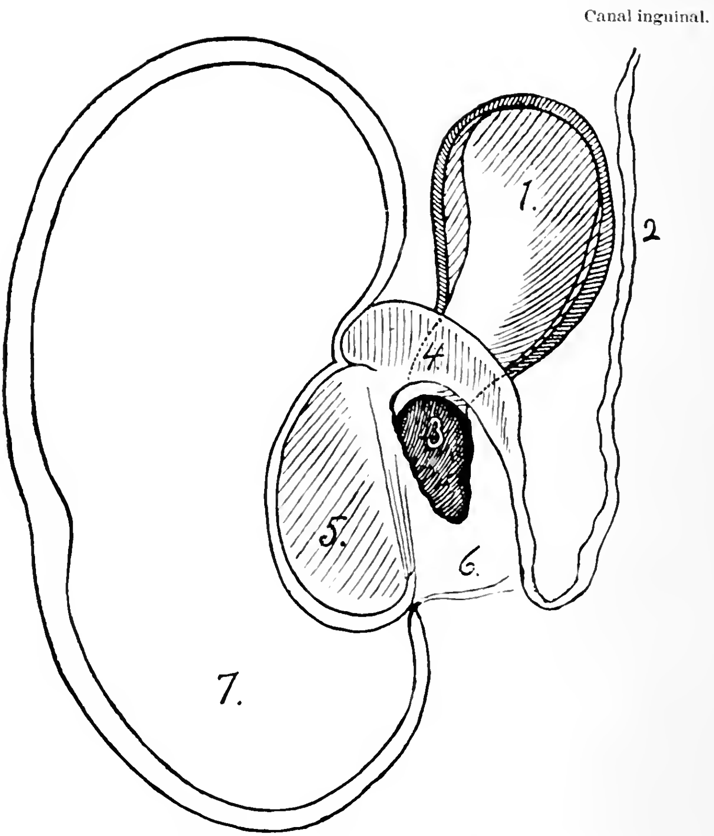
It does not seem wise to keep the patient recumbent for the long period necessary. In the management of hip diseases we put the affected limb to bed, so to speak, while the patient is up and about. But a similar resort in Pott's disease is impossible. Since the patient must be up and to a certain extent active in locomotion, our best resort, in my opinion, is to take what benefit can be had from the application of a lever making pressure from behind forward in the neighborhood of the posterior projection, and counter pressure from before backwards at two points, one above and the other below the level of the seat of the disease. In a limited sense this application relieves the diseased joints from the weight of the body, while the patient is up and about because antero-posterior pressure thus applied transfers a part of the weight and concussion incident to standing and walking from the diseased bodies of the vertebræ to the processes, which remain sound. Having thus (1) removed as far as is practicable injurious pressure from the diseased structures, it is obvious that we have also applied the most effective kind of retentive splint for (2) the arrest of motion in the affected joints.

It does not take much practical experience to convince one that efficient pressure applied in this manner is productive of good. It may not at once arrest morbid action and induce cicatrization of the carious bone. For these events we must wait for the natural reaction, but it is not difficult to believe that nature will the more promptly intervene with reparative efforts if our mechanical applications relieve distress and substitute a feeling of strength for weakness and apprehension. A well applied support at once gives a degree of relief which finds plain expression in the face and attitude of the patient. As a matter of fact, a feeling of security and comfort is afforded by the use of a corset made from any of the materials in ordinary use. I will not indicate the defects of apparatus of this kind. The inexpensiveness of jackets, and the ease with which they can be obtained and applied, make them of the greatest service to a vast number of patients who otherwise would have no mechanical support whatever. But when, and where it can be done, it is necessary to give the patient the benefit of accurately adjusted antero-posterior pressure.

At the best, antero-posterior pressure, no matter how carefully applied, fails to give all the support which is desirable. This is because the leverage is deficient. In the vertebral column there is found no long, bony lever, such as is at hand in making a mechanical application for fixing the knee. There is rather a succession of irregular bones movable upon each other, which, from the nature of the case, impair the success of any attempt to arrest motion or support the column by pressure from behind forward and counterpressure from before backward, because the pressure from before backward will, a part of it at least, be expended in bending backward portions of the vertebral column above and below the projection. The force thus employed is, however, by no means wasted, as it secures an ultimate improvement in the shape of the trunk, which is often characteristic of patients who have been thus treated.

The apparatus needed is essentially simple, consisting of two parallel uprights united below by a pelvic band, and diverging at their upper ends at the base of the neck, and curving over the tops of the shoulders. Pressure from behind forward is made by two pads attached to the uprights at the level of the projection, and applied a short distance from the median line on each side. Counterpressure from before backward is made below by a strap passing from one end of the pelvic band to the other in front of the pelvis, and above by straps, one on each side, passing from the upper end of the upright through the axilla to be buckled to the upright. The most important feature of a brace constructed to carry out these views is the use of mild steel for all the metal parts. The use of this material puts in the hand of the surgeon the power to modify the degree and direction of pressure to the changing shape, and to meet the increasing tolerance of the skin to pressure. The reaction of the skin should receive special and constant attention and gentle and gradually increasing pressure should be made till the limit of comfortable tolerance is reached.

By patient attention to details, apparatus thus designed may with certainty be made comfortable and efficient. The diffused support furnished by a jacket is often secured by the addition to the simple lever described above of aprons and other pieces which add to the feeling of stability and security without interfering with the chief function of the apparatus which is to make antero-posterior pressure. One hardly knows where to begin and where to end in the consideration of the



1. Sac situé en arrière de la grande vaginale et au-devant des éléments du cordon.
2. Canal déférant.
3. Orifice d'entrée du sac diverticulaire.
4. Tête d'épididyme.
5. Coupe du testicule.
6. Vaste espace ovalaire entre l'épididyme et le testicule.
7. Coupe antéro-postérieure destinée à montrer les rapports du sac secondaire avec les autres organes.

details which demand attention in practice of this kind. I will close by saying that cheapness and cleanliness may be promoted by leaving the steel parts of this brace unpolished and covering them with a single layer of adhesive plaster and then with strips of Canton flannel or silk cut bias, and renewed without much trouble as often as may be desired.

OBSERVATIONS CHIRURGICALES.

Par le Docteur LÉON AUDAIN,

Ancien Interne en Médecine et en Chirurgie des Hôpitaux de Paris, Membre correspondant de la Société anatomique de Paris, Membre du Jury médical central de la République, etc.

HYDROCÈLE À DOUBLE SAC SUPERPOSÉ SUIVANT LE PLAN ANTÉRO-POSTÉRIEUR.

Au point de vue clinique, l'examen du malade n'offrait rien qui put faire soupçonner la particularité dont il était l'objet. Le scrotum présentait seulement une dépression médiane, transversale, comme on le voit souvent dans les hydrocèles volumineuses. Après l'incision de la vaginale, qui était très-épaisse et blanchâtre, nous aperçûmes entre l'épididyme fortement déjeté en dehors et le testicule un orifice à bords froncés. L'introduction du doigt nous permit de constater que cet orifice était extensible et pouvait laisser passer jusqu'à deux doigts et nous permit également de reconnaître l'existence d'une poche remontant jusqu'au niveau du canal inguinal. Nous avions donc en présence deux poches bien distinctes: l'une formé par la grande vaginale, et l'autre par un développement très-considérable d'un cul-de-sac rudimentaire à l'état normal. La grande poche offrait des parois épaisses, blanchâtres, rugueuses; la seconde, au contraire, avait les parois souples et glissait facilement en arrière de la précédente dont elle n'était séparée que par une faible épaisseur de tissu cellulaire. Le fond du sac ayant été accroché par le doigt, nous pûmes, en l'attirant, la retourner comme un doigt de gant et l'emmener à dehors. Nous constatâmes alors que la muqueuse dont elle était tapissée offrait un aspect rosé, contrastant singulièrement avec la précédente. Une incision circulaire faite au niveau du collet de ce sac, en respectant naturellement le testicule et l'épididyme nous permit de la détacher avec facilité. Les deux lèvres furent rapprochées au moyen d'anses de catgut et l'opération fut achevé suivant les procédés ordinaires.

Cette particularité est intéressante et n'a pas été, jusqu'ici, que nous le sachions, ni représentée, ni décrite par les auteurs. Le Professeur Tillaux, dans son traité d'anatomie topographique, nous dit que peut-être, dans certains cas d'hydrocèle, ce cul-de-sac se trouverait distendu. Ce prolongement considérable du cul-de-sac épididymo-testiculaire ne ressemble en rien aux hydrocèles diverticulaires de Bérand, dans ces dernières, les sacs étant situés sur un même vertical et n'a rien non plus de commun avec les hydrocèles en bissac. Nous nous félicitons d'avoir, dans ce cas en particulier, employé la méthode de la cure radicale de l'hydrocèle, car nous avons obtenu une guérison radicale par première intention, et sans nul doute la récidive se fut montrée si nous avions employé la ponction suivie d'injection iodée. Dans ce cas, en effet, après l'écoulement du liquide contenu dans les deux sacs, l'orifice du sac postérieur, revenant sur lui-même et la main qu'on place d'ordinaire au niveau de la région inguinale, comprimant la partie supérieure de ce sac, la teinture d'iode n'aurait pas pénétré dans sa cavité. Nous sommes, du reste, partisans de la cure radicale, car elle offre sur l'autre méthode des avantages incontestables; absence de douleur post-opératoire, rapidité plus grande de la guérison, garantie plus considérable au point de vue de l'avenir. Disons, en outre, que ce malade, ayant été opéré quelque temps après d'une autre hydrocèle, et s'étant marié quelques mois plus tard, sa femme ne tarda pas à devenir enceinte. Ce fait est en contradiction avec l'opinion générale que les malades, porteurs d'hydrocèles volumineuses et anciennes comme le nôtre sont souvent inféconds.

ANGIÔMES.

Nous avons eu occasion d'opérer une enfant de huit mois de deux angiômes: l'un situé à la paroi abdominale, au niveau de la région sus-ombilicale, l'autre, au cuir chevelu.

Nous croyons devoir communiquer au Congrès cette observation à cause de l'innocuité absolue de ces sortes d'opération, lorsqu'on a soin d'appliquer, dans toute sa rigueur, l'hémostasie préventive. Ces angiômes avaient l'un et l'autre les dimensions et la forme d'une grosse prune allongée; ils étaient entièrement sessiles.

Pour réaliser l'hémostase préventive, deux tiges de trocart ayant été placées perpendiculairement l'une à l'autre, au-dessous de la base de ces tumeurs nous enserrâmes cette base fortement dans une anse de crin de Florence. Pour que l'hémostase fut encore plus complète, une aiguille armée d'un fil double fut passée au-dessous de ce lien circulaire et deux autres anses de crin, appliquées au-dessous de la précédente.

Les tumeurs furent alors incisées dans toute leur longueur, suivant le grand axe, jusqu'au contact des tiges de trocart. Il ne s'écoula que le sang qui avait été emprisonné dans ces tumeurs par la constriction de leur base. Elles furent enlevées par morcellement dans leur totalité. Cette méthode d'hémostasie préventive, combinée au morcellement (méthode du Docteur Péan, de Paris), comme on peut le voir dans la thèse que nous avons l'honneur de présenter au Congrès, rend d'incontestables services.

RÉSECTION PARTIELLE DE L'URÈTHRE.

Nous avons eu occasion de pratiquer chez trois de nos malades (hommes) la résection partielle de l'urèthre pour rétrécissements anciens et étendus qui avaient résisté jusqu'alors à tous les procédés opératoires.

Chez notre premier malade (observation No. XXII) l'urine s'écoulait en totalité par une fistule du périnée. Après ablation de la fistule et des tissus fibreux du périnée, la paroi antérieure de l'urèthre fut ouverte et réséquée sur une étendue d'environ deux centimètres et demi. Une sonde ayant été introduite dans la vessie, les tissus mous du périnée furent soigneusement réunis au catgut en deux plans superposables. Un troisième plan, constitué par la peau, fut suturé au crin de Florence. Pour éviter la formation de clapiers, nous eûmes soin de faire cheminer les crins de Florence presque dans le voisinage de la sonde intra-urétrale de façon à enserrer dans leurs anses les trois plans formés. Ces crins furent enlevés du troisième au huitième jour et nous obtînmes une réunion par première intention, sauf à la partie tout à fait antérieure de la plaie, où pendant une dizaine de jours il s'écoula quelques gouttes d'urine. La sonde ayant été laissée à demeure pendant environ une vingtaine de jours, la fistule se tarit d'elle même.

Dans l'observation No. LXXIII notre conduite a été à peu près la même; mais outre la résection partielle du canal uréthral, nous dûmes faire une petite opération supplémentaire pour corriger une déviation de l'urèthre dans la région bulbaire. L'axe prolongé du bout antérieur passait à quelques millimètres de l'axe prolongé du bout postérieur. Ces deux bouts étaient rejoints par un coude très marqué au niveau duquel existait un rétrécissement extrêmement serré. Après avoir incisé ce rétrécissement à sa partie antérieure, nous dûmes tailler, dans le bulbe même, sur le prolongement du bout antérieur, une sorte de coin à base superficielle. De l'autre côté nous fîmes une incision libératrice qui nous permit de fermer la perte de substance en coin et de corriger le coude que formait l'urètre. Cette bulboplastie nous a donné un bon résultat. La section du bulbe n'a donné lieu qu'à une hémorrhagie très faible, qui s'arrêta dès que les catguts furent placés. Le reste de l'opération est analogue à ce que nous avons décrit plus haut.

Dans l'observation No. LXXXIX le malade, atteint de rétrécissement uréthral d'origine blennorragique, portait de nombreuses fistules du périnée et une fistule vésico-abdominale dont le trajet sous-cutané rejoignait par les parties latérales du scrotum les fistules périnéales. Après ablation de cette fistule et de celles du périnée (grattage des fongosités et excision des parties fibreuses), nous arrivâmes, non sans difficulté, à reconnaître le canal uréthral. Celui-ci, ponctionné en un point accessible à la sonde cannelée, fut ouvert sur une étendue de six centimètres environ, d'avant en arrière (dans ces six centimètres se trouve compris le rétrécissement) long de deux centimètres et demi. Les parties fibreuses qui l'entouraient furent réséquées. Une sonde en caoutchouc rouge fut placée à demeure dans la cavité vésicale. La perte de substance fut si considérable que nous crûmes prudent de laisser la plaie se fermer par bourgeonnement. Les suites opératoires furent des plus simples. Les bourgeons charnus s'unirent peu à peu au devant de la sonde; le périnée se combla et deux mois après le malade repartit guéri pour son pays.

Comme particularité, il est à remarquer que la sonde laissée dans la vessie vingt-trois jours avant d'avoir été enlevée pour la première fois, n'offrait aucune infiltration calcaire ni aucune altération.

Cette pratique de résection partielle de l'urèthre n'est pas la nôtre. Nous l'avons vu maintes fois appliquer à l'Hôpital Néeker (Paris), par Monsieur le Professeur Guyon et nous avons lieu de nous féliciter d'avoir suivi l'exemple du grand maître.

APPENDICITE ET PÉRIAPPENDICITE.

Notre observation No. CXXXI est celle d'un jeune homme de 22 ans qui est venu nous consulter dix jours après le début d'une maladie que nous reconnûmes être une appendicite et périappendicite perforante. La marche de la maladie ayant été assez lente, nous nous crûmes autorisé à patienter avant d'entreprendre l'opération. Cette conduite, qui est absolument contraire à la pratique américaine, mais qu'on préconise assez généralement en France, offre, croyons-nous, certains avantages. Le pus formé a le temps de se bien collecter; l'opération devient plus simple, moins longue et partout moins périlleuse pour le malade. L'habitude qu'ont certains chirurgiens d'opérer dans les vingt-quatre heures de la maladie ne saurait être posée comme règle générale; d'une part à cause de l'incertitude forcée du diagnostic, et d'autre part de la résistance qu'on trouverait dans la clientèle privée. Cette opération hâtive ne se comprend guère que dans les cas d'appendicite suraiguë. Lorsque la marche de cette affection est lente, les fausses membranes ont le temps de se produire, de s'organiser, isolant suffisamment la grande séreuse abdominale. Nous pensons néanmoins que le chirurgien doit être toujours prêt à intervenir en prenant pour guide la marche clinique de l'affection. Nous ne sommes cependant pas partisans d'une expectation trop prolongée, car il serait à craindre que la résistance de la paroi abdominale, étant plus forte que les fausses membranes, celles-ci ne vinsent à céder.

Dans notre cas l'opération eut lieu le dix-huitième jour de la maladie. La collection purulente faisait une saillie très nette sous la peau. Après incision de celle-ci et des couches musculaires au point d'élection, il s'écoula un flot de pus vert à odeur fécaloïde. La cavité de l'abcès offrait des parois irrégulières, anfractueuses, recouverts de fausses membranes très-résistantes, surtout au niveau de l'extrémité inférieure du cœcum. Elle fut lavée avec une solution phéniquée à 1 pour cent. Pendant le lavage nous vîmes sortir un corps étranger que nous reconnûmes être une graine de tamarin. Cette graine avait dû séjourner très longtemps dans le tube intestinal, car ses couches externes étaient fortement attaquées. Nous cherchâmes avec soin l'appendice, mais il fut impossible de le retrouver. Les muscles furent suturés au catgut et la peau au crin de Florence. Nous eûmes soin dans cette dernière suture de comprendre également la couche musculaire. Un orifice de 5 centimètres environ fut laissé vers la partie moyenne de la plaie. La cavité fut saupoudrée d'iodoforme et bourrée de gaze iodoformée.

Les suites opératoires furent excellentes; le malade guérit en cinq semaines (du 3 mars au 10 avril 1893); il n'a plus ressenti aucune douleur abdominale ni aucun trouble intestinal.

SPINA BIFIDA DE LA RÉGION LOMBAIRE.

Méthode de l'excision après ouverture du sac.—Nous avons opéré le 24 octobre 1892 un enfant de huit jours, atteint de spina bifida de la région lombaire. Il avait à peu près le volume d'un œuf; ses parois étaient extrêmement mince, presque translucides, et l'on pouvait voir par transparence, dans la profondeur, des cordons noirâtres que nous prîmes pour des vaisseaux sanguins.

La tumeur était entièrement réductible; elle offrait à son point culminant une ulcération large comme une pièce de 10 sous. Il n'y avait aucune paralysie des membres inférieurs et aucun trouble de la sensibilité. Du côté de la tête, on constatait que les fontanelles antérieures et postérieures étaient énormes et qu'il existait entre les deux frontaux jusqu'à la racine du nez un sillon plus large qu'un travers de doigt. Étant donnés les caractères de la tumeur que nous venons de signaler, nous crûmes que nous nous trouvions en présence d'un spina bifida simple, de ce spina bifida que l'on se croirait autorisé à traiter par l'excision après ligature de la base. Bien nous en prit d'avoir préféré, à cette méthode et à la ponction suivie d'injection iodée, l'excision après l'ouverture du sac. En effet, cette tumeur, malgré sa parfaite réductibilité, contenait le cordon médullaire, et, circonstance plus sérieuse encore, ce cordon adhérait à la peau sur une étendue de plus de 2 centimètres.

La moelle fut disséquée de ses adhérentes et réintroduite dans la cavité vertébrale. Les méninges exubérantes furent réséquées et suturées au catgut. Un second plan de sutures au crin de Florence réunit la peau. Nous ne fîmes pas de drainage. Le lendemain l'enfant mourut d'une complication hydrocéphalique.

Le résultat fâcheux n'est pas pour faire repousser la méthode de l'excision après ouverture du sac, méthode qui a été si remarquablement défendue dans la thèse de notre collègue, Monsieur Bellanger, de Paris. Quelle que soit la méthode employeé, les statistiques sont toujours mauvaises. Dans ce cas, il nous paraît préférable de recourir à celle qui nous offre le plus de garantie, qui est la moins aveugle et partant la plus rationnelle.

KYSTE DERMOÏDE DOUBLE DE L'OVAIRE ET KYSTE PARA-OVARIQUE CHEZ UNE HERMAPHRODITE.

Notre malade est une femme de 29 ans, de forte constitution, réglée depuis l'âge de 15 ans, mais d'une façon très imparfaite. Les règles, après une courte apparition, disparaissaient parfois pour ne plus se montrer que plusieurs mois, voire même une année plus tard. Les allures de notre malade sont celles d'un homme; elle a une forte moustache, une barbe épaisse (qu'elle a soin de raser); les seins sont peu développés, la poitrine, l'abdomen et les cuisses couverts de longs poils.

Du côté des organes génitaux, on constate que rien de particulier n'existe du côté de la vulve et du vagin, mais le clitoris offre un développement très exagéré (longueur, 3 centimètres; grosseur d'un doigt; gland bien formé). L'urèthre occupe son siège normal. En pratiquant le toucher, on constate une atrophie très marquée du col de l'utérus dont on devine l'existence par une saillie circulaire au centre de laquelle on trouve un petit orifice. Au spéculum, nous n'avons jamais pu arriver à le saisir. Depuis quatre à cinq ans la malade s'est aperçue que son ventre grossissait. Lorsque nous l'examinâmes, il nous fut facile, par les caractères cliniques qu'offrait cette tumeur, de diagnostiquer un kyste dermoïde de l'ovaire.

Cette malade fut opérée le 23 mai 1893. L'incision s'étendait du pubis à deux travers de doigt au-dessus de l'ombilic. Après la section du péritoine nous découvrîmes une tumeur d'aspect rosée, rémittente, que nous ponctionnâmes. Il s'écoula environ 1 litre de liquide clair comme de l'eau de roche. Une ponction plus profonde amena environ 6 litres d'un liquide noir. Après avoir attiré au dehors les parois du kyste, nous extrayâmes de l'abdomen une tumeur solide, volumineuse, située sur la partie latérale gauche de l'utérus. Cette tumeur se continuait avec le ligament large par un pédicule de 20 centimètres de large. Nous fîmes la section de ce pédicule au-dessus de deux pinces; nous sectionnâmes également le pédicule du kyste para-ovarique dont la longueur était d'environ 10 centimètres. Nous pratiquâmes ensuite la ligature en chaîne de ces deux pédicules.

Du côté droit, nous découvrîmes une troisième tumeur du volume du poing d'un adolescent, extrêmement adhérente au grand épiploon. Son extirpation n'eut pas été impossible, mais l'opération ayant déjà duré quatre heures, nous crûmes prudent de ne la point tenter, estimant que le chirurgien, dans le pays où la grande chirurgie n'est pas acclimaté, où le moindre insuccès est commenté outre mesure et considérablement augmenté, est tenu à une réserve plus grande. Dans le cas présent, nous nous trouvions encouragé par ce fait que les gros dermoïdes de l'ovaire sont et que celui-là avait peut-être déjà acquis son maximum d'accroissement.

Les suites opératoires furent excellentes, la plaie se réunit par première intention et la malade guérit. Cette opération est intéressante: 1° Par l'existence d'un double dermoïde, fait relativement peu commun. 2° Par l'existence d'une troisième tumeur (kyste para-ovarique). 3° Par l'énorme volume de l'une des dermoïdes; celui de gauche contenait 6 litres de liquide, et la partie solide, formée de cheveux, de dents, de matières huileuses, de mastic, etc., pesait plus de 2 kilogrammes. 4° Par l'hermaphrodisme. Il est permis de se demander si l'existence d'une double tumeur dermoïde de l'ovaire, en altérant, dès l'ère embryonnaire l'organe principal du sexe n'a pu faire dévier ce sexe vers l'autre et donner lieu, par conséquent, à l'hermaphrodisme. Nous croyons qu'il serait cliniquement intéressant de rechercher si, chez les individus qui présentent des traces d'hermaphrodisme, il n'existe pas des kystes dermoïdes doubles de l'ovaire de volume plus ou moins considérable.

INSTILLATIONS INTRA-UTÉRINES DANS LE TRAITEMENT DES ENDOMÉTRITES.

Nous avons eu occasion, dans le cours de ces deux années de pratique chirurgicale de faire cinq curettages pour cas grâves d'endométrite sans lésion des annexes (endométrite chronique suppurative et hémorrhagique du corps et du col).

Dans tous ces cas nous avons obtenu des résultats extrêmement satisfaisants: les écoulements purulents ou hémorrhagiques et les douleurs disparurent; bien plus, plusieurs de nos malades (observations VI, XCIV, CXV) devinrent enceintes. L'une d'elles (observation VI), accouchée à terme d'un enfant bien constitué; la seconde, chez laquelle il existait une antéversion bien marquée, eut une grossesse gemellaire qu'elle ne conduisit qu'au troisième mois, faute de précaution; la troisième est actuellement au cinquième mois d'une grossesse qui semble évoluer normalement. Donc 60 pour cent de nos curettées ont conçu peu après l'opération.

Il n'est pas dans notre idée de ressusciter la vieille lutte des partisans du curettage et des cautérisations escharrifiantes au chlorure de zinc. Nous croyons que chacun de ces procédés a des indications absolument spéciales et que c'est au chirurgien de savoir s'il doit curetter ou cautériser. Nous voulons seulement attirer l'attention sur un procédé qui, nous le croyons, est nouveau et qui dans l'espèce nous a rendu les plus grands services: les instillations intra-utérines.

Les instruments à l'aide desquels nous procédons sont les suivants: la seringue à instillations de Guyon pour uréthrite postérieure et la sonde à instillations du même auteur.

Le manuel opératoire est extrêmement simple: Après antisepsie de la vulve, du vagin, application du spéculum et antisepsie du col de l'utérus, on saisit la sonde à instillations avec une pince longue et dirigeant son extrémité dans la cavité cervicale on pousse lentement jusqu'à ce que l'on sente la résistance du fond de l'utérus. Pour éviter l'introduction de l'air dans la cavité utérine, on a eu soin, avant cette petite manœuvre, de placer la sonde au bout de la seringue à instillation et de faire jaillir une certaine quantité de liquide. Lorsqu'on a atteint le fond de l'utérus, on instille quelques gouttes de solution; puis tirant la sonde de quelques millimètres, on fait une nouvelle instillation, et ainsi de suite, jusqu'à ce que la sonde sorte de l'utérus.

Dans nos cinq cas de curettage ce procédé a toujours été employé. Il offre surtout dans les cas de déviations utérines un avantage considérable sur les autres procédés de nettoyage, d'antisepsie et de cautérisation de la cavité utérine; la muqueuse n'est jamais blessée, l'introduction est facile, rapide et non douloureuse. A la suite de l'opération du curettage, nous avons l'habitude, ainsi que cela se pratique d'ordinaire, de laisser en place le premier pansement pendant quatre jours. C'est donc le cinquième jour que nous pratiquons la première instillation.

Avant de la faire, nous avons toujours soin de pratiquer avec une sonde à instillation un peu grosse une instillation préparatoire au sublimé ou à l'acide phénique afin de débarrasser la cavité utérine des débris de muqueuse, des caillots et des mucosités qu'elle peut renfermer. Nous pratiquons, alors seulement, une instillation de nitrate d'argent à 1 pour cent (environ 3 grammes). Nous répétons tous les deux jours les instillations en élevant de plus en plus les doses suivant la tolérance des malades: ainsi la deuxième instillation est de 1 pour 80, la troisième 1 pour 60, jusqu'à arriver à 1 pour 10. Nous les supprimons alors et nous nous contentons de faire faire matin et soir une injection antiseptique. Les suites de cette petite manœuvre sont simples. La femme ressent pendant un quart d'heure à deux heures quelques légères douleurs au bas ventre. Nous avons été amené à employer des doses progressivement élevées parce qu'ayant instillé d'emblée une injection à 1 pour cent, nous eûmes une congestion utérine violente avec perte de sang pendant plusieurs heures. En dehors du curettage, les instillations intra-utérines, faites de la même façon, nous ont données d'excellents résultats dans plusieurs cas d'endométrite passibles du traitement médical. C'est surtout dans ces derniers cas que l'on reconnaît les avantages des instillations.

Les cavités du col et du corps n'ayant pas été préalablement dilatées comme dans le curettage, il est à souhaiter que ce procédé si comparable aux instillations uréthrales soit essayé par les gynécologues.

ANÉVRISME DE LA FÉMORALE.

L'observation de notre statistique où il s'agit d'un anévrisme de la fémorale par balle de revolver offrait ceci de particulier:

L'anévrisme était extrêmement volumineux (le volume de la cuisse avait doublé); les orifices d'entrée et de sortie étaient le siège d'une suppuration assez abondante.

Après la ligature de la fémorale au-dessous de l'arcade de Fallope, ligature rendue pénible par l'existence de nombreux ganglions dans la région et de volumineux trousseaux fibreux; les battements, le souffle disparurent immédiatement. On pouvait être tenté à ce moment de désinfecter les orifices d'entrée et de sortie de la balle et de laisser la tumeur sanguine se résorber; mais nous crûmes plus prudent d'ouvrir largement le foyer hémorrhagique afin de réaliser une antisepsie plus parfaite.

A peine la plaie eut-elle été débarrassé des caillots, qu'il se produit une hémorrhagie extrêmement abondante dont nous ne pûmes nous rendre maître qu'en plaçant dans la profondeur quelques pinces à mors longuets. L'hémorrhagie s'était-elle produite par le bout inférieur de la fémorale ou par quelques branches profondes? Nous ne saurions le dire. Nous n'eûmes qu'à nous féliciter de la conduite que nous avions tenue; car les pinces ayant été laissées en demeure quarante-huit heures (hémostasie définitive), il ne se produisit aucune hémorrhagie secondaire; et la plaie, bien aseptisée, guérit avec rapidité.

Par la suite, il se produisit une légère escharre du talon, qui guérit à son tour; et depuis longtemps le malade a repris, sans claudication, l'usage se son membre.

DES MOUVEMENTS MUSCULAIRES DE LA PAROI ABDOMINALE SIMULANT LES MOUVEMENTS FŒTAUX.

Dans le cours de notre pratique en Haïti nous avons eu l'occasion d'observer très fréquemment des cas de grossesse imaginaire due, chez des femmes nerveuses, à une adipose rapide des parois abdominales; mais un cas, entre tous, attira notre attention.

Il s'agissait d'une jeune femme dont les parois abdominales étaient moyennement épaisses et qui nous affirma avec la plus grande énergie être enceinte depuis deux ans, n'avoir jamais vu depuis cette époque ses règles et sentis, d'une façon indubitable, les mouvements du fœtus.

Cette femme avait eu déjà deux grossesses. Nous crûmes, à cause de la durée de la grossesse, à une grossesse imaginaire.

Nous fîmes coucher notre malade sur le lit d'examen, et après avoir noté que le ventre avait un certain développement, nous plaçâmes la main sur l'abdomen. Grand fut notre étonnement, lorsque nous sentîmes des mouvements absolument comparables à ceux du fœtus dans les derniers mois de la grossesse. Nous pratiquâmes le palper abdominal. Pas de tumeur. Par l'auscultation, nous entendîmes des battements fréquents; mais ceux-ci sont isochrones au pouls de la mère.

Le palper abdominal, combiné au toucher vaginal, nous montra que l'utérus avait sa forme et ses dimensions normales.

Après avoir laissé cette femme pendant environ un quart d'heure sans la toucher, nous plaçâmes de nouveau la main sur le ventre et nous constatâmes que ces mouvements étaient produits par une contraction brusque et énergique de la paroi abdominale de haut en bas.

Ce petit fait est cliniquement intéressant, car tout pouvait faire supposer à la malade qu'elle était nullement enceinte.

Et nous nous étions contenté d'un examen superficiel en nous basant sur l'un des meilleurs signes de la grossesse: le mouvement du fœtus, nous eussions commis une grave erreur.

La malade partit allégée de ses craintes et de ses espérances.

OBSERVATION D'UN HOMME QUI S'EST TIRÉ DANS LA BOUCHE UNE BALLE DE REVOLVER.

Le 21 mars 1892 nous fûmes appelé à donner des soins à un homme qui venait de se tirer une balle de revolver dans la cavité buccale. Bien que la perte de sang eut été considérable, le blessé avait conservé toute sa connaissance, mais ne pouvait répondre que par signes à nos questions.

Ses lèvres étaient tuméfiées; sa langue portait dans sa moitié droite un sillon profond qui se perdaït vers sa base.

La langue ainsi que le palais offraient une coloration noirâtre due à la poudre. Impossible de suivre plus loin le trajet de la balle.

En examinant le cou du malade, on pouvait constater que du côté droit il existait une tuméfaction considérable sans dureté. La carotide battait régulièrement ainsi que la temporale. Pas de troubles dyspnéiques. Devant ces signes nous portâmes un pronostic favorable; comme unique traitement, nous prescrivîmes un lavage fréquent de la bouche avec une solution phéniquée à 1 pour cent.

Au bout de quelques jours la tuméfaction commença à diminuer et toute la région put être explorée sans grande douleur. Il existait cependant un point dans le voisinage de la bosse occipitale externe où la douleur était vive. Nous glissâmes le doigt sur le cuir chevelu et nous sentimes un corps dur. C'était, nous le pensions, la balle qui s'y était logée.

Le 18 avril les plaies buccales étant complètement guéries, la tuméfaction cervicale ayant disparu, nous résolûmes d'inciser le cuir chevelu et d'aller à la recherche de la balle. L'incision, ayant une forme légèrement convexe en haut, était parallèle à sa partie moyenne, à la crête occipitale.

Le cuir chevelu, ayant été mobilisé sur une étendue de 8 centimètres environ, nous constatâmes qu'au-dessus du tendon du trapèze le corps dur était inégal. Ce tendon fut sectionné au niveau de la crête osseuse.

La pince à balle, introduite par l'orifice cheminant parallèlement à la face externe de l'occipital, rencontra á 0.01 de profondeur ce corps dur, qui fut facilement pris et extrait. C'était bien la balle, comme nous l'avions pensé. Son calibre correspondait au No. 9 du revolver. Les faces étaient aplaties et offraient des raillures dans le sens du grand axe de la balle; et, en plaçant la pointe de la balle dans la position qu'elle devait avoir dans le moment où le coup avait été tiré, on pouvait constater que cet aplatissement correspondait à la partie interne de la balle. Il nous fut possible alors de reconstituer le trajet qu'elle avait dû suivre avant de se loger à la place où nous l'avions trouvée. Apres avoir parcouru la cavité buccale d'avant en arrière, elle a dû se heurter à l'apophyse basilaire ou au corps des premières vertèbres cervicales, contourner leurs apophyses transverses et cheminant entre les masses musculaires du cou les gros troncs vasculo-nerveux sans les atteindre et gagner la face externe de l'occipital; et delà suivre cette face externe jusqu'au niveau de la crête occipitale externe.

Cette observation est cliniquement intéressante en montrant d'une part l'inutilité des recherches et des extractions immédiates des balles, et de l'autre, l'efficacité des moyens antiseptiques pour prévenir la suppuration des épanchements sanguins même lorsqu'ils se trouvent au contact avec des cavités, telle que la bouche où pullulent les microbes.

La plaie se réunit par première intention, et huit jours après le malade était totalement guéri.

TRAUMATISMS AND TRAUMATIC ANEURISMS OF THE VERTEBRAL ARTERY AND THEIR SURGICAL TREATMENT, WITH THE REPORT OF A CURED CASE.

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I.

The operative surgery of the vertebral artery may be truly said to be an acquisition of the latter part of this century. Up to 1860, but a few names would have sufficed to cover the whole bibliography; the names of Dietrich, Velpeau, Nunziante Yppollito, Sédillot, Fraeys, Chassaignac, Landi, and Maisonneuve would have completed the list of the most important authors who have given any personal attention to the subject. The majority of the great writers of the period referred to, such as

MATAS—LINE OF SCAR RESULTING FROM THE INCISION IN CASE OF TRAUMATIC ANEURISM OF THE VERTEBRAL ARTERY

A. Cooper, Lisfranc, Larrey, Vidal, Malgaigne, Guérin, Béraud, and Follin, taught practically that the vertebral artery was of scarcely any interest to the surgeon.

The spirit of the times was reflected by Sanson, of Paris, in his treatise on traumatic hæmorrhages, which was published in 1836. In commenting upon a case of injury to the vertebralis, he said:

> The vertebral artery can not be ligated, on account of its great depth, nor compressed, because of the osseous canal which protects it; it can still less be cauterized. The wounds of this vessel are beyond the resources of art.

In 1853, the accomplished Maisonneuve * proved that this teaching was erroneous, for, in a remarkably daring search (for the period it was a very bold feat) for the bleeding vessel in a wound of the neck, he, aided by Favrot, successively ligated the inferior thyroid and the vertebral as it entered the canal of the transverse process of the sixth cervical vertebra. This had never been done before, and the gravity of so unparalleled a procedure as the ligation of the vertebral artery can be gleaned from Maisonneuve and Favrot's report, when they say, with a solemnity which sounds somewhat strange to our *fin de siècle* surgery: "It was suspected that the hæmorrhage came from the vertebralis. In the presence of so grave a contingency, for the relief of which the records of surgical experience suggested no remedy, we hesitated, and for a moment felt uncertain as to the proper plan of action. But the life of the patient was involved and we had to stop the hæmorrhage at all hazards." And this they did admirably and with perfect success.

We find that as early as 1833, Velpeau † suggested that the ligature of the vertebralis, in its first portion, was a feasible operation and could be effected by an incision in the space between the sternal and clavicular heads of the sterno-cleido-mastoid, as previously suggested by Sédillot for the ligation of the common carotid. Dietrich,‡ in 1831, proposed two methods for the ligation of the upper part of the vertebralis, one for tying the artery in the occipito-atloid region and the other in the atlo-axoid, or first intertransverse space. In 1834, Respoli,§ of Naples, while witnessing the ineffectual efforts that were being made by a colleague (Ramaglia's case), to control the bleeding from a stab wound of the vertebral artery, suggested that this vessel should be ligated en masse by passing a curved needle through the bleeding intertransverse space, thus inclosing all the soft parts within the ligature.

In 1835 Nunziante Yppolito,‖ who had also had personal experience with the difficulties in the way of completely controlling the bleeding in injuries of the vertebral artery, concluded, after an able study of the subject, that the ligation of the vertebral in its first portion was perfectly justified for the control of hemorrhage, and that a ligature could best be thrown around it by making an incision on the outer border of the sternomastoid. Unfortunately, he had no experience on the living subject with his method, though it was almost identical with the procedure independently adopted by Smythe, of New Orleans, in his memorable case, and which is now frequently referred to as "Alexander's method."

In 1848, Fraeys, ¶ of Gand, described a method of securing the vertebral by making

* Maisonneuve and Favrot: Journal des Connaissances Médico-Chirurgicales, Paris, 1852, 2e s., Vol. II, p. 181.

† Velpeau: Nouveaux Éléments de Médecine Opératoire, Paris, 1839, T. 2me, p. 221.

‡ Dietrich: Das Aufsuchen der Schlagadern, etc., p. 81, 1831, Nuernberg. *Vide* also Chelius's Surgery.

§ Respoli: Quoted by Nunziante Yppollito, Annali Clinici, Napoli, 1835. Also in pamphlet on Ligatura dell' Arteria vertebrale nei casi di aneurismi della stesa, 1838. Also quoted by A. Gherini in memoir on Ferite dell' Arteria Vertebrale, Milano, 1867.

‖ *Vide supra, loc. cit.*

¶ Smythe's operation was performed as follows: The head of the patient was thrown backward and turned slightly to the left, an incision 2 inches long was made from a little above the clavicle along the posterior border of the sternomastoid muscle. The edge of the muscle having been exposed and drawn aside, the prominent anterior tubercle of the transverse process of the sixth cervical vertebra was readily felt and taken for a guide, the artery lying vertically below it. A layer of fascia was divided, some loose cellular tissue with lymphatics and the ascending cervical artery was pulled to an incision on the inner border of the sternomastoid, which was very much enriched by the admirable topographical suggestions of Chassaignac, whose masterly studies on the importance of the anterior tubercle of the sixth cervical vertebra as a guide in this operation, caused it to be named after Chassaignac rather than in honor of its true originator—Fraeys.

Finally, the lamented Barbieri, of Milan, whose "Monograph on the Vertebral Artery" will ever remain an imperishable monument to his prodigious erudition, summarized, in 1867, all the arguments in favor of the ligation of the vertebral and laid down all the details of the technique for its typical ligation, in ignorance, however, of the successful demonstration of the practicability of this operation on the living subject that had been given to the surgical world in 1864 by Andrew W. Smythe, of New Orleans. This operation is the most towering landmark in the surgical history of the vertebralis, and in conjunction with the first successful ligation of the innominate artery for the cure of subclavian aneurism, with which it was performed as an auxiliary measure, is justly recorded in the classics as one of the most brilliant achievements of American surgery.

The operation performed by Smythe, although classical, deserves more than passing mention, because it was the first systematic and carefully premeditated, as well as successful, attempt to control the vertebralis at the point of election in the root of the neck. The object of the ligature of the vertebralis was, in this case, to cut off the collateral supply from the circle of Willis to a subclavian aneurism.

The patient was William Banks, a mulatto, aged 32 years, who consulted Dr. Smythe for the relief of an aneurism of the right subclavian artery, which filled the posterior-inferior triangle of the neck, and which had resulted from muscular strain in the efforts made by the patient to save himself from drowning in a collision at sea. On May 15, 1864, a silk ligature was placed on the innominate artery, a quarter of an inch below its bifurcation and another ligature was also applied to the common carotid an inch above its origin. Repeated and profuse secondary hemorrhages took place at various intervals, which threatened the life of the patient, as in all previous cases in which the ligature of the innominate had been attempted, and in spite of the ingenious method of hæmostasis resorted to by Dr. Smythe, viz, the filling of the bleeding wound with fine shot. In view of the impending danger, and being satisfied that repeated occurrence of the bleeding in the fatal cases of this operation could all be accounted for by a retrograde current through the vertebral, the hemorrhage coming directly from the brain, the bold operator decided to ligate this all-important collateral. He says:

> Having satisfied myself by repeated attempts on the subject that the vertebral artery could be ligated just before it enters the foramen of the sixth cervical vertebra, through an incision made along the outer edge of the sternomastoid muscle, and the aneurism having diminished enough in size to permit of the operation, I determined to try it, and, on July 8 (fifty-three days after the ligation of the brachiocephalic), with the assistance of Dr. P. C. Boyer, a ligature was placed on the vertebral artery.*
>
> No further hemorrhage took place. The ligature came away from the vertebral artery on the tenth day, and on the 15th day of September the wound had healed and the first successful typical ligation of the innominate and vertebral arteries recorded in the annals of surgery was an accomplished fact.

After the publication of Smythe's brilliant operation, the ligation of the vertebralis soon became one of the classical acquisitions of surgery, especially since the safety of the aseptic procedure has been so frequently demonstrated in the heroic but ineffectual attempts to cure epilepsy by the ligation of both vertebrals, as first

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the inner side of the scalenus anticus and longus colli muscles which were separated from each other close to their insertion into the tubercle, when the artery and vein became visible. The vein was drawn to the outer side (a point of importance, according to Dr. Smythe), and the needle was passed round the artery from without.

* New Sydenham Society's biennial retrospect for 1885-'86. From N. O. Medical Record and Mott's Velpeau, Vol. II, p. 229; also New Orleans Charity Hospital report for 1876.

practiced by Alexander, of Liverpool, who alone operated 36 times with only 3 deaths, and who has been followed by Bernays, of St. Louis, Chalot, of Toulouse, France, and others.

II.

The class of injuries which are about to engage our attention are fortunately of great rarity *—fortunately indeed, for when they do present themselves for treatment they are well calculated to cause no little worry to the surgeon whose judgment, courage, and resources are usually taxed to the utmost by a combination of complications and obstacles that experience teaches are thrown in the way of his curative efforts in a manner that is hardly paralleled by any other class of vascular injuries. It is hardly necessary to dwell long upon the reasons for the peculiarly grave character of the traumatisms that involve the vertebral artery. A glance at the surgical anatomy of this vessel as it lies deeply hidden in the skeleton of the neck, only escaping at very short intervals from its osseous canal to become immediately invested by very important and vital cervical nerves as they issue from the spinal foramina, will at once remind us of the magnitude of the purely technical difficulties in the way of its atypical ligation and of the errors of diagnosis that must be incurred, owing to the proximity of so many large arterial trunks.

Furthermore, its unique termination in the cranial cavity, where, anastomosing directly with its fellow artery, it becomes continuous with the carotid system through the circle of Willis—will also convince us of the unreliability of the ligation of this artery, whether proximately or distinctly applied, as a permanent means of controlling the blood supply of any aneurismal tumor that may be situated between either one of its cervical extremes.

One of the initial difficulties that are usually presented by aneurisms of the cervical portion of the artery is that of their differential diagnosis from similar tumors connected with the carotid trunk and its branches. That this difficulty is not fanciful but real is most eloquently proved by the fact that in more than 16 out of 36 traumatisms of the vertebral artery (or $44\frac{4}{9}$ per cent) hæmostasis was attempted by ligation of the common carotid as the presumed source of hemorrhage. In these cases either the carotid alone or together with some other artery (the inferior thyroid, Maisonneuve; the occipital, Fenger) was ligated first instead of the culprit vertebral, the error being recognized only *post operationem*. The necessity for correct differentiation is, therefore, manifest, and its importance can not be overestimated, especially when we consider that the ligation of the common carotid under these circumstances is fraught with especially harmful consequences. As Timothy Holmes † correctly stated:

In the first place, by throwing the strain of the anastomosing circulation on the vertebral it tends to aggravate the disease it was meant to cure, and in the second, if the circulation in the wounded vertebral artery is interrupted before the operation (which to some extent it almost certainly must be), the stoppage of the supply from the carotid artery is rendered doubly perilous to the nutrition of the brain.

* Some idea of the comparative rarity of the wounds of the vertebral can be obtained when we consider that in the sixty years that have elapsed from the foundation of the New Orleans Charity Hospital, from 1832 to 1892, during which period 463,894 patients have been treated within its walls, but one case of wound of the vertebral has been recorded in the annual reports, and that was the traumatic aneurism that came under my observation, and that has been described in this paper at some length. Stone's case was treated in his private infirmary, and would be the second recorded case from New Orleans up to 1893.

In consulting the surgical history of the war of the rebellion, second volume, we find that out of a total of 2,235 cases of arterial hemorrhage of head, neck, chest, trunk, and upper and lower extremities in which the bleeding vessels were indicated by name, only two cases (one a primary injury, the other a secondary) are attributed to the vertebral (Table C, XXIV). These hemorrhages were furnished by a grand total of 245,790 gunshot wounds and 922 saber and bayonet wounds which were inflicted during the civil war from 1860 to 1865.

† Surgical treatment of aneurism in its various forms, London Lancet, July 26, 1873.

The explanation of the frequency with which this error of ligating the common carotid for the vertebral has been committed is solely to be accounted for by the topographical relationship between the two arteries, and the facility with which pressure upon the common carotid at the root of the neck will control the circulation of the vertebral. This fact was distinctly pointed out by Fraeys, of Ghent, in 1848,* and can be easily demonstrated by repeating this observer's experiments on the cadaver. "After having removed the skull cap and the contents of the cranium, taking care to cut the vertebral arteries below their junction in the basilar, tie the axillary arteries and the upper part of the abdominal aorta, then inject water through the arch of the aorta. The liquid will be shot out through the two internal carotids and the two vertebrals at the base of the skull. But as soon as even slight pressure with the finger is put on the course of the common carotid, in the space extending between 2 or 3 inches above the clavicle, between the trachea and internal border of the sterno-mastoid, the jet will no longer flow from either the internal carotid or vertebral, on the side compressed, but will recommence as soon as compression is removed. If both sides are compressed at once all the arteries cease to squirt. If pressure is made with the same force on the common carotid above the "carotid tubercle" (i. e., the anterior tubercle of the transverse process of the sixth cervical vertebra), the space below that tubercle being left free, the jet from the internal carotid wholly ceases."

As stated by T. Holmes,† the surgeon who, knowing the true position of the transverse process of the sixth cervical verteba, and knowing that pressure applied along the course of the carotid anywhere below this, i. e., for 2 inches, at least, above the clavicle, will most probably stop the pulsation in the vertebral also, will not conclude that the aneurism affects one of the carotids, or some branch of the external carotid, until he has seen that pressure also stops the pulsation when applied on a higher level, or when applied to the carotid by lateral pinching of the sheath through the relaxed sterno-mastoid muscle, as recommended by Rouge, and effectually practiced in the case here reported.

The importance of Rouge's lateral method of compression should not be forgotten, when we consider that the vertebral not infrequently takes an anomalous course in front of the vertebral column, and avoids the sixth transverse process to enter into a transverse foramen much higher up, selecting even that of the third and second vertebræ. Under these circumstances direct compression backwards upon the common carotid, no matter how high above the carotid tubercle, would be sure to compress the vertebral, as well as the common carotid arteries, and thereby make the experiment fallacious.

Another lesson that is reenforced by experimental evidence is the demonstration of the great freedom of the collateral circulation of the vertebral through the circle of Willis If the vertebral be exposed through its whole length in the neck by laying open the vertebro-transverse canals with a costotome and gouge forceps, and the artery be divided in the middle of its course, an injection of water into the aorta will immediately cause a flow through both the divided distal and proximal ends by streams of equal size and velocity. If a separate receptacle is attached to each end of the divided artery, both will fill up at the same time, proving that the supply of blood from the distal and proximal end is simultaneous and practically equal. The bearing of this experiment upon the treatment of traumatic aneurism by the ligation of the vertebral trunk at its origin is obvious.‡ No definitive cure could always be expected by such a procedure, since the supply from the cranial side would be as great as from the proximal side; the only rational hope for success by systematic

*Annales de la Societe de Medecine de Gand, 1848, p. 211, Vol. XXI.

† Loc. cit.

‡ In cases of wounds of the vertebral in which the artery has been completely divided, both ends of the artery may bleed with equal vigor, as, e. g., was well demonstrated by Kocher's patient (No. 15; Table II).

ligation would be to attempt the combined ligation of the distal end, in the suboccipital triangle, by Dietrich's method, and that at the proximal end by either Smythe's or Alexander's method. But the ligation of the vertebral artery on the distal side in a case of traumatic aneurism is not only impracticable but tantamount to the Antyllian operation, for in the vast majority of cases the aneurism already occupies the suboccipital space, and the artery can only be secured by the incision and evacuation, or displacement of the aneurism. The cases of aneurism, in which the tumor occupies a region far enough from both the points of election to make the ligation practicable, have not yet presented themselves, and it is probable that such a procedure will never be realized, or if it is at all carried into execution, it is very doubtful that it will be associated with less traumatism than that which is connected with a direct attack upon the aneurismal sac by any of the modifications of the method of Antyllus.

So much, therefore, for the *a priori* experimental and anatomical evidence. Let us now listen to the teachings of experience.

III. Remarks on Primary Bleeding from Injuries of the Vertebral Artery.

It is impossible for us to draw any definite and safe conclusions as to the best course to pursue when confronted by so grave an injury as a wound of the vertebral artery without consulting the lessons of the past and gathering from all reliable sources those teachings of actual clinical experience which are most rational and have furnished the most salutary results. To satisfy my own inquiries I have searched all the available literature at my command for reports of cases, and have succeeded, with the valuable assistance of the distinguished librarian of the Surgeon-General's Office, Dr. Billings, in collecting 53 cases of the lesions of the vertebralis.*

These observations I have grouped in three tables, thus: Table I, in which only endo-cranial eneurisms of the vertebralis are considered. They number eleven cases. Table II embraces only the extra-cranial or cervical aneurisms. They number 20 cases. Table III is a collection of wounds or lesions of the artery, involving its surgical or extra cranial portion. This embraces 22 reported cases.

We are at once forcibly struck by the great mortlaity of this class of injuries, for out of a total of 53 cases we find that 45 died in direct consequence of the lesion of the vertebral artery or complicating circumstances associated with it.

We should at once eliminate the table of endo-cranial aneurisms, as these lesions were all, with one exception, of purely pathological interest, having resulted from degenerative changes in endo-cranial arteries and appertaining to a domain entirely foreign to our present subject. We will only add that all these cases, without exception, ended fatally—100 per cent.

Of the 20 cervical aneurisms which are grouped in Table II 6 recovered, leaving a mortality of 70 per cent for this class of injuries. These aneurisms were all traumatic with the exception of case No. 7, which was reported by Stubbs. In Table III, which exhibits the nonaneurismal injuries, 22 in number, we find that all but 3 were the result of traumatisms, chiefly stab, punctured or gunshot wounds. We note that of these 22 cases only two recovered, leaving a mortality of 90 per cent for the nonaneurismal traumatisms. If we add the 19 wounds of Table II, which gave rise to the 19 traumatic aneurisms and the 22 nonaneurismal wounds of Table III, then we will have 41 cases of wounds, with a total morality of 80.69 per cent, and a percentage of recoveries equal to 19.31 per cent, which gives a more approximate idea of the general results of the traumatism of this dangerous artery.

We notice that in all the tables the males have preponderated by a large majority.

As to age we note also that while the endo-cranial or pathological lesions of the vertebral occurred in subjects averaging 39.10 years of age, the traumatic aneurisms presented themselves in patients averaging 22.10 years.

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* I have references to several other cases, but they are so lacking in detail they are useless for purposes of study or tabulation.

In considering the influence of the weapon with which the injury was inflicted, on the career of the case and the final mortality, we observe that 14 out of 24 punctured or stab-wounds terminated in 14 traumatic aneurisms, and that only 4 out of 14 gunshot injuries terminated in aneurisms. One man who was gored by an ox (Pirogoff's case) died from an aneurism of the vertebral, resulting from the injury. Two deaths, which were caused by erosion of the vertebralis by tubercular abscesses, terminated without aneurismal formation, and another pathological erosion of the artery (Küster's case) terminated by cerebral and other complications, after the bleeding had been permanently controlled, without aneurismal formation.

This would seem to indicate that while the final mortality is practically the same for either class of injuries (stab and punctured, 79.16 per cent, and gunshot injuries, 78.14 per cent), there appears to be greater prolongation of life after stab and punctured injuries than after those caused by firearms. This must be due to the multiple and more complicated character of the injuries caused by the last class of weapons, which often end the life of the patient too soon to allow of the provisional hemostasis implied by an aneurismal formation.

If we now investigate the immediate causes of death in the 43 tabulated cases of injury of the vertebralis, we will readily recognize five essential factors which, in the order of their frequency and importance, I would put down as follows: (1) Hemorrhage; (1) shock; (3) sepsis; (4) exhaustion; (5) cerebral complications.

Very rarely did one of these conditions alone cause death; almost as a rule, the fatal result was due to the association of two or more of these lethal elements.

In the majority of the cases hemorrhage was the dominant factor; in some cases alone, but usually combined with one or all the other conditions. In at least 35 per cent the hemorrhage was not definitely controlled before the other complicating elements fatally closed the career of the cases. It is nevertheless an encouraging fact that in as many as 20 out of the 43 tabulated wounds of the vertebral, or nearly one-half of the traumatisms, the physiological resources of nature, with very little external aid, were sufficient to control the primary bleeding from the artery and circumscribe it within the limits of an aneurismal cavity. It is probable, indeed, that in the simplest or least complicated types of this injury the primary hemorrhage from the bleeding artery can be controlled by the natural methods of hemostasis, if only aided by some comparatively simple external treatment—such, for instance, as superficial pressure over the wound applied digitally, by suturing the wound, or by bandaging or plugging it externally.

This is conclusively proved by the case reported by L. Stromeyer,* which is worthy of citation here:

A soldier was wounded in the neck in the battle of Idstedt, July 25, 1850. He was taken to Gottorp, near Schleswig, where Dr. Herman Schwartz extracted the ball, which could be distinctly felt in the nucha. News came that the battle had been lost, and to avoid capture the patient fled on foot 8 miles to Kiel, where he died on July 29, four days after the injury, with meningeal symptoms. At the autopsy it was found that the ball had penetrated the right cheek half an inch from the angle of the mouth, going inward in the direction of the posterior wall of the pharynx. It grazed the tongue, barely touched the internal carotid, and, after penetrating the posterior pharyngeal wall, fractured the transverse process of the first cervical vertebra, lacerating the vertebral artery at this point and lodging finally under the skin of the suboccipital region.

The absence of hemorrhage in this case is remarkable, and the explanations given by the findings in the autopsy by Prof. Webber, of Kiel, are worth noting. He says:

The wounded vertebral had not bled and was not likely to bleed. The two divided extremities had completely retracted; the upper end was cut on a level with the transverse process of the atlas; the lower end, much retracted, was filled with a resistent thrombus an inch and a half in length. There was no notable extravasation of blood in the vicinity; the upper end was likewise completely plugged with a thrombus.

* Maximen der Kriegs Heilkunst, Hanover, 1861, pp. 443–553; also by Pirogoff in his Kreigs Chirurgie, 1864, p. 563.

It is true, nevertheless, that in the majority of the cases, or at least 50 per cent, the conditions of the wound, or rather its complications, are such that the natural hemostatic process is entirely insufficient, even in a merely provisional sense, and that surgical assistance of the most determined and skilled sort must be immediately appealed to if danger to life from hemorrhage *alone* is to be averted. If we now analyze the table of 22 cases of wounds which did not become aneurismal, we will observe that in some the hemorrhage was so sudden and profuse that death came on before any skilled assistance could be rendered; in others, and these were more numerous, the fatal hemorrhage was never controlled, even when the patients were opportunely taken to hospitals or to competent surgeons.

As has already been stated, in over 44 per cent of the injuries of the vertebral artery in which any surgical treatment was attempted, errors of diagnosis were almost invariably committed, so much so that in 16 out of 36 cases the common carotid artery was ligated by mistake. This error was always of very serious consequence, for it not only increased the shock by adding to the traumatism, but it aggravated the hemorrhage by increasing the strain on the vertebral circulation, and, furthermore, greatly increased the risk of secondary cerebral complications.

It must be stated also that from the standpoint of hemostasis alone the cases in which the injury to the artery has been inflicted through the mouth are of still greater gravity, especially if the bleeding is taking place in the pharynx, where it is almost impossible to control the bleeding orifice by plugging it or by other direct procedures. This is well shown by case 2, Table III, reported by L. J. Sansom.*

In July, 1830, an adult male was admitted in the Hotel Dieu, of Paris, to be treated for a gunshot wound in the head and neck. The ball had penetrated by the right nostril, had fractured the palate, and was lost in the pharyngeal region. Slight bleeding had taken place from the nose and throat immediately after the injury, but it had stopped spontaneously. About the tenth day after the affair very abundant hemorrhage took place. The course and track of the bullet did not lead the attendants to suspect a lesion of the vertebral. A wry neck had supervened, but it was attributable to independent causes. Preparation was made to ligate the carotid, but the patient died before the operation could be attempted. At the autopsy it was discovered that the ball had fractured the transverse processes of the upper cervical vertebra, and had injured the vertebral in its course.

The fatal cases reported by Voisin, Thurot, Kade, and Peters emphasize the fact that the syncope and exhaustion of surgical anemia from frequently repeated and profuse hemorrhages of the vertebralis, is to be regarded as of primary importance in influencing the mortality.

In all wounds of the vertebralis there is always a certain amount of shock, which varies in intensity with the extent, importance, and multiplicity of the structure involved, and shares the responsibility, equally with hemorrhage, in determining the final issue, or may even exceed it in importance.

This is especially true of the cases of injury of this artery in which death is practically instantaneous.

Types of this class are the cases reported by Jolly, of Clermont, France; Carter, of Bombay; and Saviotti, of Milan.

In Jolly's case (a wound in the neck caused by the penetration of a load of wadding from the discharge of a pistol loaded only with powder), death was instantaneous. The autopsy revealed that the transverse processes of the second and third cervical vertebræ had been torn away *en masse* and that the fourth had been fractured into fragments. The vertebral artery was completely torn away; a terrific hemorrhage had taken place through the wound and the spinal meninges were exposed and covered with clot.

In Saviotti's case, a man aged 30 years was stabbed in the neck. He fell almost unconscious immediately, but shortly after the injury he picked himself up and succeeded in dragging himself up to the stairway of the Ospidale Maggiore of Milan, where he dropped dead as he attempted to ascend the stairs. In the autopsy it was discovered that the fatal wound had completely severed the vertebral artery in the inter-transverse space between the third and fourth vertebræ. An extensive extrav-

* Des Hæmorrhagies Traumatiques, Paris, J. B. Bailliere, 1836, p. 352, 8vo.

asation about 12 centimeters in length filled up the retro-pharyngeal space and pressed important structures.

In Carter's case, a native Naique policeman, aged 25 years, was stabbed in several places by another policeman and died about one hour after sustaining his injuries. In this case the vertebral artery had been severed in the inter-transverse space between the third and fourth cervical vertebræ. Here the phrenic and other structures had been injured.

In another group of cases we find that while the patients have survived the primary hemorrhage and shock, the repeated bleeding from the vertebral and a septic condition of wound, which is maintained by the manipulation and the various styptic and other applications that are made to the wound with a view of controlling the hemorrhage, finally exhaust the vitality of the sufferer and cause death by the combined influences of anemia, shock, and exhaustion.

The observations reported by Barbieri and Monti, Prichard and Pirogoff, illustrate the characteristics of this group.

Another group is distinguished by the most fatal form of complication, viz, a disturbance in the cerebral circulation and secondary encephalic lesions from septic causes—such as cerebral embolism, meningitis, softening, etc. Typical examples of this group are: Stromeyer's case, already cited, in which meningitis carried away the patient after the hemorrhage from the wounded vertebral had been completely controlled, four days after the injury. Maisonneuve and Favrot's remarkable and now celebrated observation in which we notice that, after a most laborious and intrepid search, these operators ligated the vertebralis and arrested an obstinate hemorrhage from a stab wound of the neck,* only to lose the patient one month after the operation from septic cerebral embolism, due to infection of the wound. The case of Watson, in which the jugular and common carotid were ligated and the subclavian was compressed for a complicated vertebral hemorrhage. The patient rallied after a most terrific ordeal and was apparently going to improve, when cerebral symptoms set in, and the patient died in coma, three days after the injury.

Still another group of cases may be separated from the others, in which the distinctive feature lies in the pathological orgin of the injury to the vertebralis. In these cases the artery is eroded by perivascular suppurative foci, usually tubercular, sometimes septic, and always secondary to other traumatisms or diseases.

Typical of this group are the cases reported by Perrin, Neuretter, Van Buren, and Küster. This is an essentially unfortunate group as far as the ultimate prognosis is concerned, for the vertebral injury is usually the last act of a long tragedy. The patients are generally exhausted by long-existing disease or extensive traumatisms to the cervical skeleton, and when the hemorrhage comes there is little strength and vitality left in the patient to stand any further drafts on their blood supply or their nutrition. Küster's case is especially interesting in this group, not only as a type of the condition referred to, but also because it occurred in the practice of an eminent contemporary surgeon, who was able to cope with the difficulties in his way with the resources of modern surgery. His case is also one of the few in which the hemorrhage from the bleeding vessel was permanently controlled, and, although the patient finally died from cerebral disturbance, the method pursued in controlling the bleeding artery is worthy of remembrance in the treatment of similar cases.

Observation.—A dyspeptic female, aged 35 years, very marasmic and addicted to morphine, developed a tubercular abscess of the neck, on a level with the fourth cervical vertebra. The patient's condition was so unfavorable that Küster declined to open the abscess. As the abscess threatened to burst spontaneously and hectic began to manifest itself, he decided to open it. After extirpating the walls of the sac, he discovered a sinus which could be traced to one of the transverse processes and which had to be dilated with a dressing forceps. This allowed the finger to detect the exposed portion of the second cervical vertebra, which was loose and necrosed. The sequestrum was pulled out with forceps, but at that instant a stream of arterial blood poured out of the wound, which was quickly stopped by the immediate reintroduction of the finger into the sinus. After a short delay the finger was

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* In this case the vertebral was ligated *in situ* for the first time in the history of surgery.

partially removed and the blood again poured out. It was now evident that the arteria vertebralis had been injured. As the strength of the patient did not allow of any loss of blood, no further experiments were tried with the finger, but in its stead a tampon of iodoform gauze was introduced and insinuated until it was firmly packed in the corresponding intertransverse space. The hemorrhage then stopped at once and never returned. A compressing bandage around the head and neck added to the secure retention of the plug. The tampon was allowed to remain ten days. When removed it had a distinct odor of iodoform and the wound was entirely free from inflammatory reaction. In the meantime diverse disagreeable symptoms had developed, which were at first attributed to iodoform poisoning. On account of this sublimate gauze was substituted for the iodoform, temporary improvement followed, but vomiting and cerebral symptoms ensued, which terminated by the sudden death of the patient nineteen days after the operation. The autopsy revealed an aseptic wound in the neck and complete laceration of the vertebralis in the transverse process of the axis, but both ends of the divided artery were effectually closed with a strongly adherent thrombus, showing very advanced organization, the lower of which extended 3 centimeters and the upper extended to the level of the foramen transversum of the atlas.

Setting aside the explanation of the manner of death, which, as the author says, might not be quite simple, we learn from this observation that an iodoform tampon can effectually and permanently arrest a hemorrhage from an artery of the caliber of the vertebralis, and remain in place for ten days without calling forth local disturbances. This is the essential feature of the modern antiseptic tampon, as contrasted with the plug used by the older operators, who not only used materials that were far from being aseptic, but actually saturated this material with styptic agents which irritated the wound and favored the development of septic suppuration, thus interfering with the proper organization of the clot.

The great value of the tampon, especially the aseptic or antiseptic tampon, systematically applied in the very depths of the wound and directly against the bleeding point in the arterio vertebral canals, in permanently arresting vertebral hemorrhage, is not only demonstrated by Küster's case, but is still more strikingly emphasized by the fact that in the only 2 cases of primary vertebral hemorrhage that recovered, out of the 22 collected cases, the only agent employed was a tampon. In J. Mason Warren's case ordinary sponges were first used and subsequently sponges dipped in styptic solutions, and in King's case oiled lint and graduated carbolized compresses were used; if we add that 3 of the 6 traumatic aneurisms (see Table III) that recovered, were also saved by systematic plugging of the bleeding orifice, making in all 5 out of the 8 permanent recoveries in the whole collection of 43 injuries that are due to plugging, we will appreciate still more forcibly the value of the tampon as a hemostatic agent. We shall again refer to this invaluable aid in the treatment of vertebral hemorrhages when we reach our practical conclusions.

We must now hasten to the consideration of the traumatic aneurisms of the vertebral artery, which we have separated in a distinct group of 20 cases for special consideration.

IV. Traumatic Aneurisms of the Vertebralis.

While a traumatic aneurism of the vertebral artery is only a sequel to the primitive injury that originated it, the clinical difference between a primary bleeding wound of this artery and the false aneurism that may follow it is of sufficient practical importance in the treatment to justify a separate consideration of the two conditions.

While a traumatic aneurism may develop so promptly after an injury, and the extravasated blood may diffuse itself so rapidly and widely that immediate surgical action may be demanded for the salvation of the patient, it is the rule that the concealed and progressive hemorrhage which causes the aneurismal state is so well circumscribed by the resistant perivascular tissues that a temporary respite is given to the patient, and more time is gained by the surgeon for deliberation and the application of conservative measures of treatment. It is by this delay, which gives time for preparation, that the prognosis is improved and the ultimate chances of recovery are increased in traumatic aneurism.

If we now inquire into the facts of clinical experience, we will again observe that while the prognosis of traumatic aneurism is always very grave, that the number of recoveries is greater than in the primary bleeding injuries of this artery, for, in a tabulated record of 20 reported cases of traumatic aneurism, 6 patients recovered, or 30 per cent, while in a collection of 22 primary nonaneurismal injuries only 2 recovered, or 9.2 per cent, which would result in a difference of 20.+ per cent in favor of the traumatic aneurisms.

We have already stated that in a collection of 31 reported cases of aneurism of the vertebral artery gathered up to 1893, 20 were cervical and 11 intra-cranial. We need not again refer to the intra-cranial for the reasons previously given, but referring to the 20 cervical aneurisms we will observe that 14 were caused by punctured wounds, 4 by gunshot injuries, and 2 were not specified. In 11 out of 20 cervical aneurisms of the vertebral, the common carotid artery was ligated by mistake, and in a large majority the initial curative efforts were directed toward the control of the carotid circulation. Finally, of these 20 cervical aneurisms only 6 recovered.

These 6 successful cases are most instructive and interesting from the standpoint of surgical therapeutics, and deserve individual mention. Chronologically we will consider them as follows:

Observation No. 1, by Mœbus:* On December 27, 1827, the author was called to attend a man, aged 23, who had been stabbed in the neck, and who was apparently dying from hemorrhage. The patient was almost pulseless and bathed in a profuse icy perspiration. The wound had ceased to bleed spontaneously when M. arrived. The wound was situated in the inferior right half of the occipital region, and was directed downward and forward in the direction of the mastoid. It measured 2 inches and 3 lines in depth. A firm plug or compress was packed into the depths of the wound, and the plug held in place by a firm bandage. Ether, opium, and cinchona were administered to restore the patient.

The patient improved steadily until the fifteenth day, when secondary hemorrhage took place from the wound, which had not yet completely healed, but this was arrested by firm pressure. On the seventeenth day a pulsating tumor the size of a bean was detected at the wound; an alum solution was directly applied to the bottom of it, with the help of a firm compress, and bandaged. On the twenty-seventh day the tumor was very much larger in spite of local astringent applications and ice poultices, which were now applied for the first time. The tumor soon measured 5¼ by 4¾ inches in size. The diagnosis of vertebral aneurism was made after testing the effect of pressure on the carotid circulation. An operation was proposed, but patient would not consent to it. Ice poultices were now constantly applied, while the patient was kept in bed. On July 26, or about fifty-nine days after the injury, the tumor became perceptibly harder, and the pulsations diminished. Improvement rapidly followed, and by March 6 the patient was entirely well.

This case, therefore, demonstrates that a traumatic vertebral aneurism may be completely controlled by cold, direct pressure, and general as well as local rest, which were the only therapeutic agents resorted to by the medical attendant.

Observation No. 2, Warren Stone,† New Orleans, La.: A negro slave, aged 30 years, was brought to Stone's Infirmary five months after he had been stabbed in the left side of the neck. He bled profusely at the time of the affray, but the hemorrhage was arrested. A swelling commenced soon after, which gradually increased "until the integuments were about to give way." A careful examination showed that the carotid artery and jugular vein were not wounded. Ausculation gave no sign, and Stone came to the conclusion "that either the external jugular vein or one of the cervical arteries had been wounded." He says: "I concluded to open the tumor, empty the sac, and secure whatever had been wounded. The opening was made, when a small portion of the coagulum was discharged and a sudden gush of arterial blood took place. I placed my thumb upon the carotid artery, but with no effect; the incision was enlarged, the whole coagulum was forced out, and it was found that the vertebral artery had been wounded. For a moment a finger was thrust between the transverse processes, by which means the violence of the bleeding was con-

* Graefe's and Walther's Journal, Vol. XIV, p. 98.

† New Orleans Medical and Surgical Journal, Vol. I, p. 555, 1849.

trolled. Lint was stuffed in place, granulations shot out luxuriantly, filled up the wound and plugged up the wounded artery." The patient was shortly after discharged, entirely well, from the hospital.

This is the first recorded case in which operative interference in a traumatic aneurism of the vertebralis was followed by recovery.

Observation No. 3, reported by Th. Kocher,* Berne: A. S., 42, was wounded three weeks before admission to Kocher's clinic. He had been stabbed four times in different parts of the body, a wound in the neck being considered the only serious one of the four. Examination revealed a wound between the fifth and sixth cervical vertebræ to the left of the spinal column. The wound had not healed kindly, and it was for this reason that the patient consulted Kocher. Upon raising the scab that covered the granulations, the wound bled. The introduction of the finger excited a more considerable arterial hemorrhage. The index finger was reintroduced its whole length into the wound, and easily penetrated through a semisolid mass of coagula until it touched the posterior surface of the transverse process. As the finger failed to arrest the hemorrhage, the wound was enlarged 3 inches, and a quantity of coagulated blood was expelled. The exploring finger now discovered a spacious cavity, the size of a small apple, in the deeper parts of which the transverse processes of the vertebræ could be felt. After enlarging the wound the interior of the cavity could be easily inspected. It was then discovered that the bleeding came from the intertransverse space between the fifth and sixth transverse processes of the cervical vertebræ. A strong arterial stream from the lower and another of equal size from the upper foramen in the transverse process poured out of the wound. Pressure applied to either orifice controlled the bleeding. A ligature could not be applied to the divided artery because of its retraction to the level of the vertebral orifices, and there was nothing to hold the thread. For this reason a round charpie plug, the size of a pea, which had been previously dipped in a perchloride of iron solution, was introduced into the upper and lower vertebral arterio-transverse orifices and tightly packed into the osseous canals. Hemorrhage was immediately and perfectly arrested. A firm compress was applied, and the head was immobilized with a stiffened cravat to secure absolute rest to the wound. The plugs were removed four days after their introduction, and no hemorrhage followed.

Erysipelas set in, however, but it was subdued with turpentine, and the patient finally completely recovered and was discharged about five weeks after admission.

Observation No. 4, reported by Christian Fenger, † Chicago: G. C., a male cook, aged 19, robust and well nourished. Had always enjoyed good health until January 6, 1881, when, while intoxicated, he was shot in the neck with a 32-caliber revolver. A large stream of blood spouted from the wound, and in fifteen minutes his face, around the lower jaw, became so swollen that he was unable to open his jaws for more than half an inch. On admission to the Cook County Hospital an external bullet wound was found to exist an inch external to the left of the posterior nuchal median line, on a line with and 2 inches behind the mastoid. There was great swelling of the corresponding side of the face and neck, showing great interstitial effusion of blood. Five days after admission, while straining a stool, the patient felt something give way behind the angle of the jaw. This was followed by intensely agonizing pain, accompanied by decided pulsation in the left sub-auricular region. Four days later a decided aneurismal bruit was detected over this. As there could be no doubt of the existence of a traumatic aneurism at this point, Dr. E. W. Lee ligated the left common carotid artery. The patient felt well with the exception of a slight headache and slight sensation of pulsation below the left mastoid process. No aneurismal bruit was detectable on stethoscopic examination.

Three days subsequently, while undergoing cross-examination in court, the sensation of pulsation increased, and, on return to the hospital, a decided thrill, but no bruit, could be detected behind and below the left mastoid process. "By February 9 the pain and pulsations had markedly increased. As it was obvious that a traumatic aneurism had recurred and was endangering life, I decided to make the radical operation, and began by securing the external carotid. An incision was made, 3 inches in length, along the entire upper half of the sternomastoid; the tissues were carefully separated; a careful watch kept for the pulsating vessels around the border of the pulsating tumor, with a view of ligating them before opening the aneurismal sac. When pulsation on pressure, in various places, had been apparently felt, and the aneurismal pulsation seemed to cease, an aneurism needle, armed with heavy aseptic silk, was passed successively around the area of the tissues involved, and ligature applied en masse, but in vain.

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*Ueber Verletzung und Aneurysma der arteria vertebralis, nebst mittheilung eines glücklich verlaufen. Falles, Archiv. f. Klin. Chirurg., Berlin, 1871, Vol. XII, p. 867.

†Medical Standard, Chicago, March, 1887, Vol. I, No. 2.

I then determined to lay open the sac and catch up the supplying artery *in loco*. A transverse incision, 2½ inches in length, was made, extending from the upper end of the former incision backward from the mastoid process through the skin and insertion of the sterno-cleido mastoid, in order to secure the posterior occipital artery, possibly the source of the aneurism. On removal of the sterno-cleido mastoid the pulsations were more markedly felt. After a thin layer of the deep nuchal muscles had been cut through the aneurismal sac was opened and found filled with dark clots, on removal of which arterial blood spurted out. This hemorrhage could be controlled only by the pressure on the bottom of the cavity at its deepest part. The squama ossis occipitis was found denuded and in the internal wall formed by the atlas and axis some splinters of bone were felt. The tissues were cut through downward along the transverse processes of three or four cervical vertebræ and the whole sac laid open, which necessitated the removal of the upper fourth of the sternomastoid muscle. Artificial respiration and injections of whisky were required at this stage, as respiration had ceased. When the respirations again began search was made for the vertebral artery, which was finally taken up, at its curvature around the axis, and ligated. The bleeding stopped. The vertebral artery was nearly as large as the internal carotid. During ligation the respirations had stopped, and the patient was pulseless and seemed dead. After dressing the wounds, 8 ounces of defibrinated blood were transfused. The patient rallied rapidly, and on April 7 left the hospital entirely well. *

Observation No. 5. reported by Dr. Robert F. Weir:† On December 8, 1883, a man named Robert Adams, aged 28, was brought into my ward at the New York Hospital, having received a short time previously a stab wound in the right side of the neck from a knife held in the left hand of his opponent, who faced him when striking at him. The patient said he had bled very freely, but his clothes were not much stained with blood, nor was he weakened or exsanguinated. When first seen by the house surgeon no further bleeding was taking place from the wound, which was situated about three-quarters of an inch below the lobe of the right ear, and just anterior to the sterno-cleido mastoid muscle, transverse in direction and about half an inch in length. There was below this point and extending several inches downward an ovoid, soft, nonpulsating tumor, running and posterior to the mastoid muscle. All exploration of the wound was avoided and an iodoform dressing applied and secured by a compress and firm bandage.

December 10: Tumor has almost entirely subsided; wound nearly healed; patient yesterday afternoon suddenly experienced almost complete paralysis of sensation and motion of the left arm and hand; this was preceded by a "queer" confused, not painful, feeling in his head, momentary in duration: consciousness not lost.

December 15: Tumor has disappeared; wound entirely healed; paralysis is slowly disappearing; at a point 2 inches below and 1 inch posterior to lobe of right ear palpation discovers a faint pulsation slightly expansive in character, and on auscultation a slight bruit is audible.

December 25: Since the last record all the signs of aneurism have developed at the point indicated in last note; pressure on the carotid just below the level of thyroid cartilage does not affect the pulsation in the tumor, but pressure over the tubercle of sixth cervical vetebra controls it at once, nor does it react as long as the compression is continued. Ice bags and pressure were ordered to be applied alternately every three hours over the tumor.

January 1: The signs of aneurism, including pulsation, thrill, tumor, and bruit, are still more pronounced; no appreciable effect has followed the treatment by ice and pressure; the area of pulsation is now nearly 2½ inches in diameter; the paralysis of the left arm is becoming less marked.

January 3: To day digital pressure was resorted to at the lower anterior edge of the aneurism, where yesterday it was found that compression arrested all pulsation; this was continued for seven hours by the house staff, assisted by relays of students; considerable force was necessary at first to control the circulation in the sac, which occasioned some pain and discomfort, and required morphia, gr. ⅓, hypodermically

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* This is the first and only case in which the vertebral artery has been ligated in situ with permanent success in a case of traumatism or traumatic aneurism of this artery. Maisonneuve and Favrot, in 1852, were the first to ligate the artery in situ in a case of gunshot injury of the vertebralis, but the patient died seventeen days after the ligation of the artery of septic embolism. These are the only two recorded cases in which a ligature has been applied to an injured vertebral artery. Attempts have been made to ligate this vessel in situ in several cases mentioned elsewhere, but the local conditions and urgency of the symptoms compelled the operators to resort to immediate plugging or some other measure to arrest the bleeding. Fenger is in error when he says (*loc. cit.*) that his is the fifth case "in which vertebral artery ligation for a wound involving a traumatic aneurism of the vertebral artery has resulted in recovery." His was the second case of ligation, the others were simply illustrations of effectual plugging.

† Archives of Medicine, Vol. XI, No. 1, February, 1884.

to keep the patient quiet; no cerebral symptoms occurred at any time during pressure; after two hours there was great diminution in force of pulsation, and slight pressure controlled it without further discomfort to the patient; after three hours the pulsation could not be felt and all signs of the aneurism, save the resistance due to the tumor on palpation, had disappeared; pressure was continued lightly until 7 p. m. (in all seven hours), at which time a firm graduated compress was applied; no cerebral symptoms were noticed during the treatment; no return of symptoms; a solid tumor can be appreciated at site of aneurism; paralysis of arm has almost completely disappeared; general condition excellent.

January 12: Since last note patient has been up and about; no return of sign of aneurism; only a slight trace of the swelling can now be felt; the patient was to-day discharged from the hospital as cured.

This case, so happily terminated by a bloodless procedure, is especially interesting on account, not only of the variety of the mode of termination, but also because of the method employed, which is unique in the record of this class of arterial injuries.

Observation No. 6, by the author: Traumatic aneurism of right vetebral artery occupying the suboccipital triangle caused by gunshot injury and involving the artery in the atlo-axoid space. Incision; extirpation of sac; plugging of bleeding point; recovery. The patient, Vance J., is a bright mulatto youth, aged 21, a native of Louisiana, admitted to Ward No. 2, Charity Hospital, July 6, 1888. He states that about two months before admission he was accidentally shot in the back of the neck by another person who stood about 7 feet away from him, the injury being inflicted by a revolver (Smith & Wesson) which carried a .44-caliber bullet. He says that immediately after being shot he became paralyzed in his right arm and leg and also became quite numb in the corresponding side. His arm and leg were almost "lifeless," but about ten days after the accident he began to recover some control of his arm and hand and has been steadily improving since, so much so that now he can "use" his limbs almost as well as before the injury. He furthermore states that he bled very profusely from the bullet wound at the time of the injury and that he has bled more or less freely from it ever since. The orifice made by the bullet has apparently healed at various times, but it "broke" open again as often and bled each time profusely, so much so that he was so weak that he could only with great difficulty sustain the fatigue incident upon his travel to the hospital. These repeated hemorrhages alarmed him more than all his other symptoms and have caused him to seek the assistance of the hospital surgeons.

Status præsens: The patient is anæmic and his pulse is weak and compressible, it averages 100; temperature 99°. He was immediately put to bed and examined. A prominent pulsating tumor was at once recognized in the upper post-cervical region. The swelling is diffused in the right suboccipital space extending from the posterior border of the sternomastoid in front to the median line posteriorly. It reaches the inferior occipital curved line above and descends to the level of the fourth cervical vertebra below. A perforation in the center of a circular bluish cicatrical spot indicates the aperture of entrance. This opening is situated 3 inches below the external occipital protuberance and 1½ inches to the right of the same point and about 3 inches in a horizontal line behind the mastoid process. These measurements were taken with the head midway between flexion and extension. The pulsations of the tumor, which is diffusely spheroidal, are visible to the eye at a considerable distance and are associated with a moderate thrill on firm pressure. The swelling is reducible under firm pressure, though the pulsations are so strong that a 4-pound weight is easily lifted up and down synchronously with them. A very low quasi-placental bruit is heard over the tumor under stethoscopic examination. Firm pressure over the common carotid at Chassaignac's carotid tubercle (sixth cervical transverse process), sufficient to arrest all temporal pulsation, exercises no influence on the pulsations. Even very hard pressure below this point, with the view of controlling the vertebral, has little effect in arresting the aneurismal pulsation. Simple compression of the carotid above the tubercle of the sixth cervical vertebra had no effect in arresting the pulsations of the tumor. Rouge's method of compressing the common carotid by pinching the sheath between the thumb and index through the relaxed sternomastoid succeeded in arresting temporal pulsation, but had no effect on the aneurism. In view of this unequivocal evidence it was plain that the tumor was not connected with the carotid and that consequently it must be a traumatic aneurism of the upper vertebral artery (probably diffused), involving this artery shortly before its entrance into the cranium. My colleagues in the surgical service, Drs. Miles, Parham, Laplace, Chassaignac, and Michinard, who saw the case with me, likewise concurred in this opinion.

Treatment: The patient was at once put to bed and given the benefit of complete rest. He was informed of the nature of his condition in order that the necessity for complete repose, especially of his neck and head, be more thoroughly impressed upon him. An ice bag was applied over the swelling.

On July 9, a 3-pound weight, wrapped up in cotton and gauze, was applied directly over the tumor and held *in situ* with an elastic (Martin's) bandage wound around the forehead.

July 10: Patient complained that the pressure of the elastic bandage was intolerable and that he could not stand it longer. The tumor pulsated almost as vigorously as ever, apparently unaffected. The elastic was removed and an ordinary roller gauze bandage substituted to hold the weight which was replaced over the swelling.

July 11: Patient can only stand the weight intermittingly; compelled to relieve him of the solid weight altogether, and substitute a bag of bird shot (No. 6) weighing 5 pounds, which is adapted much better to the contour of the swelling and causes less complaint. This weight the patient can stand, without the addition of retaining bandage, for one or two hours at a time, when he removes it and rests for half an hour or more. In the intervals of rest the ice bag is applied.

Thus far very little impression has been made upon the swelling. At times I fancy the pulsation is less vigorous. The dimensions and appearance of the swelling have certainly been unaffected. Patient complains of greater soreness and is growing tired of treatment.

July 13: Two long electrolytic needles are connected with the negative pole of a McIntosh 18-celled galvanic battery. The current furnished by 12 cells was applied; the needles were introduced as deeply as possible in the softest parts of the tumor. This application lasted about an hour without any very perceptible result when the needles were withdrawn. Ice bag and weight were continued intermittingly.

July 20: A marked change has taken place in the tumor since yesterday. The wound of entrance which, since the application of the shot weight had closed cicatricially, is now swollen and projects upward as a distinct conoidal swelling rising about 1 inch above the level of the tumor. Just in the center of this elevation, at the point corresponding to newly formed cicatrix, the skin is purplish and threatens to tear open at the least provocation. The tumor proper appears to be more diffused and pulsates vigorously, though not with so strong an impulse as on the day of admission. On the other hand the pulsating area appears to have been extended over a larger surface, so that it is now very close to the external occipital protuberance, and is advancing over the median line in spite of the natural barriers to further progress in this direction. The general appearance of the swelling indicates that it is ready to burst through the original wound, and in view also of the increasing restlessness and impatience of the sufferer it is plain that operative interference can not be deferred much longer. The direct compression of the tumor is now abandoned altogether, and I decided to run the risk of opening the sac with deliberation and thorough preparation rather than expose the patient to the great danger of accidental rupture without the benefit of immediate assistance. After preparing a considerable quantity of iodoform gauze and other antiseptic material that might be required in permantly packing the wound, I decided to immediately cut into the newly formed nipple-like swelling and then through it make a digital exploration of the interior. This acuminated point was, therefore, punctured; an opening, large enough to insinuate the index finger into the tumor, was made. A jet of dark serosanguinolent fluid shot out of the opening the moment the incision was made, and the pointed or nipple-like swelling collapsed. Before the index finger could be well introduced into the opening, the flow of the bloody fluid had entirely ceased, and it was evident, much to our surprise, that there was going to be no immediate hemorrhage. The cavity of the aneurism proper had evidently not been opened, and the teat-like swelling communicated only with an encysted bloody accumulation which had been emptied by the first incision. The tumor, however, continued to pulsate showing that the aneurism proper existed, but not so actively as before. I now proceeded to avail myself of the wound just made to explore the aneurism proper and to familiarize myself with its topography. I found that the newly enlarged wound of entrance led into a sinus that freely admitted the left index. The exploring finger could also be swept over and around a smooth, spheroidal, pulsating, and well-defined tumor, apparently about 2 inches in diameter. The tumor appeared to be distinctly separated from the surrounding parts at its periphery, and gave the impression that it was a tense globiform sac. The free portion of the tumor appeared to be directed toward the suboccipital triangle, but it doubtless originated in the inter-transverse atlo-axoid space. Toward the mesial line it reached the ligamentum nuchæ, and upward it distinctly reached the inferior curved line which had been exposed by the dissection of the tumor. Further down, deeper than this, the finger could not explore without risk of injuring the sac. I was pleased to notice that, after the withdrawal of the exploring finger, no hemorrhage followed, showing that my fear of immediate rupture had been unfounded. Dr. Laplace was also able to confirm these topographical data by a cautious repetition of my exploration. By this operation we had obtained several important data: (1) The aneurism was not diffused, but distinctly circumscribed and was contracting. (2) Its topographical relation to the vertebræ and probable origin between vetebral transverse processes had been very approximately obtained. After consultation I decided to go no further, but to avail myself of the newly made opening to directly compress the aneurismal sac by carefully and systematically packing the sinus that led to it with iodoform gauze and then apply a firm compress and external retaining dressing. By this means I hoped to obtain a complete solidification of the contents or, in the event of failure to obtain this, to still further circumscribe the sac so as to enable me to reach the wounded artery more readily when attempting a radical operation at a later moment.

July 21: The patient was quiet and comparatively comfortable; the dressings were clean; no hemorrhage. The packing had evidently served its purpose well. I decided not to delay further action. The packing could not permanently remain in the wound, and, as it had to be removed at some early time, it was best to make a systematic and well prepared attempt to secure the wounded vessel outside of the sac by exposing the transverse processes of the vertebræ above and below the sac, and ligating it in the intertransverse space in the manner suggested by Gherini and Dietrich; or, in the event of failure to do this, to simply lay the sac open, following Sime's modification of the operation of Antyllus, then seek the bleeding orifices and plug them in the vertebral canals, as had been done successfully before by Lücke and Kocher in two similar cases. I was encouraged to believe in the feasibility of the first plan, viz, the ligation in the intertransverse spaces, because I had reason to suppose that the firm packing against the sac, which had been maintained during the preceding twenty-four hours, would have some effect in shrinking the tumor and probably solidifying it, thus permitting an unobstructed exposure of the transverse processes of the vertebræ and a comparatively easy dissection of the artery. I furthermore prepared to follow or expose the artery in case of need in the vertebral canals themselves by chiseling or biting off the transverse processes with rongeur forceps, which form the walls of the canal containing the artery, immediately above or below the sac. With this plan in mind the patient was brought to the amphitheatre, where, with the able assistance of several members of the staff, the operation was undertaken. After the removal of the dressings, excepting the plugs in the wounds, the parts were subjected to the usual antiseptic preparations, and the patient anæsthetized, and the wound of entrance at once enlarged by a longitudinal deeply made incision through the integument to the level of the sac, downward and parallel with the spine, about 4 inches in length, and then upward to the external occipital protuberance. When this incision was completed the globular surface of the aneurism could be distinctly seen as it projected upward, apparently partially released from the cramped confinement in which it had been held by the strong muscles (trapezius, splenius, and complexus) which covered it. The exposure of the tumor was now helped by an additional transverse incision, which, starting nearly at right angles from the vertical incision, extended outward through the thickness of the posterior cervical muscles to the mastoid, terminating on a level with the posterior origin of the sterno mastoid. This incision involved the occipital artery, which began to bleed profusely, but was promptly clamped, and gave no further trouble. By these two incisions a thick and triangular musculocutaneous flap was obtained which, when reflected downward, permitted a very clear view of the tumor, which at this juncture was seen pulsating, though very feebly as compared with its vigorous movements on previous days. This proved that the direct pressure, exercised by the packing, had been quite effectual in consolidating it. The exploring index, introduced at this moment in the depths of the wound, very readily circumscribed the tumor which appeared to spring up from the space between the atlas and axis, the transverse processes being readily recognized. While engaged in this exploration, preparatory to the denudation of the transverse processes in question, I noticed that the tumor apparently gave way, became partially collapsed, and was without any assistance bodily lifted out of its nest; at the same time a profuse gush of arterial blood flooded the wound, and no doubt a very alarming hemorrhage would have occurred had I not seized a handful of very small aseptic sponges, that had been held in readiness for the occasion, and immediately and tightly packed them in the bottom of the wound, in the intertransverse space and into the orifices of the canal from which the hemorrhage appeared to come. Over these small sterilized sponges a thick packing of iodoform gauze was applied, and the flap was held with two deep silver sutures over the packing, thus giving firm support to it. A careful sublimate dressing was applied externally and the whole firmly held in place by an elastic woven bandage wound over the forehead and neck. No further attempt was made to seek the artery, because the patient, who was already anæmic from previous losses, could ill-afford to stand more hemorrhage. At any rate the sequel happily proved that further search was unnecessary, and that in this case, as in those of Lücke and Kocher, Stone, Warren and

Küster, King and Simes, careful plugging was all that was really necessary to permanently relieve the condition. About five hours after the patient had been brought to bed the elastic bandage was removed and a gauze roller bandage substituted. The patient continued to do well.

On July 26, five days after the operation, the dressings and tampon were removed. The wound looked perfectly clean; no pus visible. Only three of the six small sponges were removed; the remaining three were left as grafts in the intertransverse space, and were soon entirely amalgamated with the rapidly-growing granulations.

Eleven days after the wound was entirely healed, and on August 24, 1888, the patient was discharged entirely well.

About eleven months afterward the patient returned to the hospital with his wound entirely cicatrized and entirely free from any aneurismal lesion, but he stated that a few weeks after leaving the hospital (after the preceding operation) the scar, corresponding to the lower end of wound had "festered," and that a physician whom he had consulted had discovered the ball that had caused all the trouble and had extracted it. The ball had evidently grazed and possibly fractured one of the vertebral transverse processes and given rise to traumatic caries. At any rate the patient was now well and entirely rid of his aneurism.

The aneurismal sac, which was removed *in toto* at the time of the operation, presented the appearance of a spheroidal sac measuring 2¼ inches in diameter. It was very firm in all its surface, except that portion which was evidently connected with the artery: here the walls were very thin. The sac walls consisted almost entirely of very compact and finely-laminated active clot; the interior was partially filled with soft, dark, grumous passive clot; a considerable mass of clot blocked that portion which has been attached to the artery. These clots were of very recent formation, and I do not doubt proved the efficacy of systematic compression. The sac had shriveled considerably, and surely did not represent when removed the full dimensions of its active period. The specimen was kept for a long time in the pathological museum of the hospital, but about a year ago, owing to some misunderstanding, was thrown away together with a lot of spoiled specimens.

In the fourteen fatal traumatic aneurisms the immediate cause of death may be summed up, as in the case of the nonaneurismal wounds of the vertebralis, viz: (1) hemorrhage; (2) shock; (3) sepsis; (4) exhaustion; (5) cerebral complications. The cases are worthy of individual mention:

(1) Chiari, 1829: The common carotid was litigated without effect; patient succumbed with cerebral and septic symptoms.

(2) Prof. Cattolica, of Naples, 1861: The commom carotid was ligated; six days after, the aneurism burst spontaneously, and the patient died of hemorrhage before assistance could reach him.

(3) Prof. Cattolica, also 1861: Exposed the course of the common carotid, but before closing the ligature tested the effect of temporary compression of the artery. As this did not arrest the pulsation of the tumor, the ligation of the artery was abandoned, and the incision was allowed to heal *per primam*. Two months after this attempt the patient succumbed to "gastric fever," with his aneurism pulsating (?) and unruptured.

(4) Prof. Nunziante, 1838: Cold; compression; aneurism ulcerates and patient dies of uncontrolled hæmorrhage.

(5) Gherini, 1861: Cold; compression; perchlorid of iron injections; ligation of common carotid by Monti; then plugging of wound. Thirty-six hours after ligation of common carotid patient succumbed to syncope from hemorrhage and exhaustion.

(6) Ramaglia, 1834: Common carotid was exposed and ligature applied but not tightened when it was discovered that its compression had no effect on aneurism. This patient died finally from uncontrolled hemorrhage.

(7) Kluyskens, 1848: Digital compression of common carotid totally arrested pulsation in tumor. The common carotid was, therefore, ligated, but after ligation the tumor continued to pulsate as vigorously as ever. Shortly after, the aneurism burst and the patient died of hemorrhage.

(8) A. Branco, 1862: Pulsation diminished markedly by compression of common, carotid; this trunk was ligated, but ineffectually as regards tumor which grew much more rapidly. Patient died of exhaustion.

(9) A. Lücke, 1867: Carotid compression diminishes pulsation in tumor. This trunk was, therefore, ligated, but without benefit; on the contrary, marked aggravation. As the tumor threatened to rupture, injection of five drops of the iron perchlorid made into the sac in different places; slight sloughing of the skin took place and copious hemorrhage followed, and the method of Antyllus had to be appealed to. A free incision into the sac was followed by "a frightful gush of blood," which nearly carried the patient's life away, but was controlled by a styptic plug

insinuated between the occipital and atlas. The patient recovered from the immediate effect of the operation to die shortly after from cerebral complications, which were in a great measure attributable to injection and the ligation of the common carotid.

(10) Stroppa, 1866: A hematoma connected with the vertebral artery is incised; plugging arrests hemorrhage, but patient succumbs to repeated secondary bleedings.

(11) South, 1847: The common carotid is ligated under mistaken diagnosis; tumor rapidly enlarges and bursts into trachea.

(12) Simes, 1888: This is a most interesting case and most forcibly illustrates all the dangers and diagnostic difficulties that are liable to be thrown upon the surgeon while attempting to deal with the injuries which involve the vertebral. "Pressure upon the common carotid, while lessening the pulsation of the tumor did not, however, perfectly stop it. Before tying the ligature, which had been passed around the carotid artery, the operator continued his incision upward over the swelling and threw a ligature round the artery above it. The ligature below was now tied, and instantly the most terrific flow of blood gushed out of the wound. The upper ligature was immediately tied, but had no control over the hemorrhages; artery forceps and fingers were employed to seize any and all the bleeding points, but the blood continued to flow until finally Dr. Nancrede thrust his finger deep into the wound against the vertebra, when the hemorrhage at once stopped. Attempts to plug the vertebral foramen with a cork plug failed, but the hemorrhage was finally controlled by packing the canal with a long strip of lint reinforced by systematic packing of the wound. While the patient was improving from the immediate effects of the operation, and when all danger from hemorrhage had ceased, cerebral symptoms developed and the patient died. In this case it is more than probable, as Dr. Nancrede stated in the discussion, that several vessels were involved in this injury; the distal end of the internal jugular and carotid were bleeding at the same time as the carotid. He did not think that the vertebral alone could have poured out this large stream of blood.

In addition to these cases there are three more that must be accounted for to complete the list:

(*a*) The case of F. Verardini, in which cold, rest, and compression were systematically applied without much benefit, the patient escaping the observation of the surgeon and probably dying from spontaneous hemorrhage.

(*b*) The case of Stubbs, of Liverpool, in which a very rare case of idiopathic cervical vertebral aneurism was mistaken for a carotid aneurism and this artery ligated without benefit, the patient succumbing to hemorrhage.

(*c*) The case of Sydow, also idiopathic, of which I only know that it resulted fatally, though not from what cause.

Other observations in which injuries involving the vertebral artery are recorded may be found scattered here and there in the general literature, but they are mere passing references which can not be quoted with any advantage to the reader, as they are too meager in details for classification or instructive inference. Indeed, several, even many, of the cases that are included in my tables have been very insufficiently described, and I have found it often difficult to secure sufficient data for simple tabulation.

CONCLUSIONS.

A. Treatment of traumatic aneurisms.—(1) There are certain favorable cases (Mœbus, Weir) of traumatic aneurism in the upper and more superficial portion of the artery, in which recovery is possible without operative interference. Rest, direct compression, and cold being apparently sufficient to arrest the circulation in tumor.

(2) That in every case, when the danger of rupture of the sac is not immediate, good results may be expected, if only as adjuvants to future radical treatment, from the systematic application of cold, local and general rest, combined with direct pressure on the sac or digital pressure over the artery below the carotid tubercle, using for direct compression ice bags containing shot, which are easily adapted to the contour of the affected region.

(3) That in the majority of cases the natural tendency of the aneurism is to progress rapidly to a fatal termination, in spite of the preceding measures, the sac usually rupturing in the direction of its weakest point, viz, the track of the wound that caused it.

(4) That this tendency to spontaneous rupture is markedly favored by the increased tension caused by the ligation of the carotid trunks, so frequently and unfortunately done under the impression of a mistaken diagnosis.

(5) That this deplorable result should always be avoided in case of doubt by a careful observation of the effects of temporary compression of the carotid upon the circulation of the tumor before applying the definitive ligature.

(6) That in almost all cases but one (Fenger's case), in which a deliberate and prepared attempt has been made to ligate the artery in the aneurismal region, or at the bleeding point, the efforts of the operator have been frustrated by the copiousness of the hemorrhage, and temporary plugging of the bleeding spot, and, at times, the more accurate plugging of the arterio-vertebral canal have been forced upon the surgeon as methods of necessity instead of the method of election.

(7) That fortunately this method of plugging, when combined with the free exposure of the bleeding region and clearing out of the clots, has thus far given the most encouraging results, and that the more aseptic and nonirritating the material used in plugging the greater the simplicity of the after-career of the case, and, judging by the especially fortunate or excellent results which were obtained by Warren Stone, 1817, with plain charpie lint; J. Mason Warren, of Boston, with sponges; by King, of Hull, with oiled lint; by Küster, with iodoform gauze; by Sime, with plain lint; and my own experience with well sterilized sponges, reinforced by iodoform gauze, it would be unnecessary to resort to styptic plugs (as in Lücke's or Kocher's cases), which have a tendency to inflame a wound and render its aseptic management most difficult. In addition, as in the writer's case, small fragments of sterilized sponge, if they are used only in plugging the canals, have the advantage that they may be allowed to remain permanently in the wound, where they are incorporated as grafts by the living tissues.

(8) That the use of coagulant injections is especially to be condemned; the perchlorid of iron (as in Lücke's case) having proved most pernicious. Ergotin (Langenbeck) injected into the periphery of the sac may aid in effecting a cure, but it is exceedingly doubtful if this material will distinguish itself more favorably in this region than in the treatment of other aneurisms; while the newly isolated physiological fibrin ferments (Wright) may prove less irritating, they will be likewise open to objection from the mechanical standpoint (embolism). Possibly, electrolysis and Macewen's aseptic method of securing the formation of white thrombi by "needling" may claim some success in the future, but this is very doubtful, and the most authorized opinion would point, at present, to

(9) The acceptance of the method of Antyllus, modified by the conditions of modern surgery, as the only reliable, if still dangerous, method of dealing with this always formidable condition, at least, in the majority of the cases. If this operation is decided upon, every preparation should be made to meet all emergencies. Saline infusion may be required, but a good supply of sterilized sponges, iodoform gauze, and long-handled, strong hemostatic (hysterectomy) forceps will be most useful, the latter especially in grasping bleeding points, or in applying strong pressure on the deep and unusually rigid tissues, in which they are found. The gouge, chisel, or "rongeur" forceps should not be forgotten; the rapid resection of a part of the transverse process may be required in order to permanently secure the artery; though, usually, the plugging of the arterio-vertebral canal alone will be quite sufficient to accomplish permanent hemostasis, and should always be attempted first, if only as a provisional measure, or in cases in which the exhausted condition of the patient will not permit more radical procedures.

(10) In the extremely rare cases of idiopathic cervical aneurism and in the circumscribed traumatic aneurisms that are situated high up in the posterior portion of the neck, and which would not be encroached upon by any of the classical incisions for the ligation of the vertebral artery its at origin, a ligation on the Hunterian principle might be attempted with some prospect of success, especially if cold and pressure and rest were resorted to as adjuvants in the treatment. While the collat-

eral flow from the circle of Willis is very rapidly reestablished, more so even in the vertebral circuit, than in that of the carotid, it is nevertheless possible that the contents of the sac may be completely coagulated before this collateral supply has been reëstablished.

(11) In aneurisms that are situated lower in the neck, the Hunterian ligation, if applied by any of the classical incisions for securing the vertebral at its origin, will almost certainly end in an Antyllian operation, for it will be impossible to reach the trunk of the artery without involving the sac in the incisions.

(12) When the aneurism is well circumscribed, is high up in the neck; when the ordinary local treatment has failed and the operator decides upon the method of Antyllus as a last resort, then it is justifiable to make an incision parallel with the anterior border of the sterno-mastoid, and following the lines mapped out by Fraeys and Chassaignac, reach the vertebral below the anterior tubercle of the sixth cervical transverse process and under the sheath of the carotid compress the vertebral before it enters the foramen, with the finger of an assistant. In that way the arterio-vertebral circulation will be temporarily arrested until the wounded artery has been definitely secured at the bottom of the aneurismal cavity. By this procedure, there will be much less traumatism inflicted on the weakened patient than if a formal ligation had been attempted. In addition, the danger of secondary cerebral complication will be lessened.

B. Treatment of the primary bleeding.—(1) In the management of bleeding wounds (non-aneurismal) of the vertebral artery, the principles of treatment are practically the same as in those which guide the surgeon in the open or Antyllian method of attacking the traumatic aneurisms of this artery.

(2) In some rare cases the nature of the injury is such that a direct attack on the bleeding point is practically impossible. This is notably true of those complicated gunshot injuries in which the missile has penetrated through the mouth, and the blood is pouring into the pharynx or retro-pharyngeal space. In these cases there is usually an associated wound of one of the carotid branches, especially the internal carotid, and the hemorrhage is so violent that death takes place before any assistance can be rendered. The differential diagnosis can not be attempted under these circumstances, and as plugging through the mouth is impracticable, the only hope for the patient lies in the immediate but provisional control of both the common carotid and the vertebral artery of the corresponding side, with a view of cutting off the entire arterial supply from the injured region. This result can be obtained without much difficulty by rapidly exposing the carotid sheath at the point of election and passing a ligature around the artery, which is not to be closed, however, but should be transferred to an assistant who can control the circulation of the artery by simply pulling on the loop; the operator then presses with his finger in the depth of the wound at a point just below the anterior tubercle of the sixth cervicle vertebra and in this way arrest the flow from the vertebral artery. A complete control of the two vessels is thereby obtained; the hemorrhage is arrested and the differential diagnosis can be undertaken with more deliberation. The definite ligature may then be applied to either one of the exposed arteries, or to both if necessary.

(3) In cases complicated with an injury of the internal jugular, high in the neck and communicating with the pharynx, the resources of surgery are reduced to a minimum. But the traumatism is so great that the shock of the injury alone will often kill the patient almost instantaneously, and if this is not the case the bleeding will be so profuse that life will ebb out long before any efficient assistance can be rendered.

(4) In the more common cases the difficulties and dangers are greatest in the lower cervical course of the artery before its entrance into the foramen of the sixth cervical vertebra, owing to the immediate proximity of vital structures, especially on the left side. Wounds of this portion are generally fatal before the surgeon is called upon to deal with them, owing to the rapidly lethal effects of associated

hemorrhage from the carotid and subclavian arteries and corresponding veins. In wounds of this and the remainder of the cervical portion of the vertebral artery the fundamental maxim in the treatment of hemorrhage, viz, "to control the artery while bleeding and at the bleeding point," imposes itself as a first duty. This control can only be effected by the methods previously indicated when dealing with traumatic aneurism, and may be finally summarized in a general way as follows:

(*a*) If allowed by the position of the wound, deep and strong pressure should be made, by an assistant, below the carotid tubercle with a view of compressing the vertebral at this point.

(*b*) The wound should be freely enlarged in order to more directly expose the artery.

(*c*) Direct pressure with the finger in the wound should be applied to the bleeding point.

(*d*) Pressure on the bleeding point with strong hemostatic (hysterectomy) forceps holding a small sterilized sponge, or by actually clamping the bleeding point en masse, as a substitute for the finger, and allowing the hemostat to remain in situ for several days, if ligature is impracticable.

(*e*) Denudation or exposure of the artery in the intertransverse space, or, if necessary, by biting with "rongeur" or gouging out the antero-external portion of the bony canal in which the artery is contained. This last procedure is perfectly practicable in any part of the vertebral canal, provided a free exposure of the transverse process is obtained and the bleeding be provisionally controlled by digital or forcipressure.

(*f*) Careful attention to antiseptic, systematic packing with iodoform gauze being the best protection against infection, which, in this class of injuries, is especially liable to fatal consequences long after hemostasis has been secured.

TABLE I.—*Intra-cranial aneurisms of the vertebral artery.*

No.	Situation of aneurism.	Age.	Sex.	Cause of injury.	Operative and other measures of treatment.	Name of operator or reporter.	Date and title of publication in which found.	Result.	Remarks.
1	Intracranial	24	Male	Idiopathic	None	Henry J. Gore, 1826.	Journal Morbid Anatomy, London, 1828, p. 22.	Died	Discovered at autopsy.
2	do				do	1849	Am. Journal Med. Sciences, Phila., 1849, No. 3, XVIII, 122.	do	No history; specimen presented to Dr. J. Neill, University of Pennsylvania.
3	do	61	Female	do	do	Sydow	Torh. Svens. Lak. Sällsk. Sammank, Stockholm, 1865, 1866, 191.	do	
4	do	67	Male	do	do	M. E. Echeverria.	Med. Rec., N. Y., 1869, 1870, IV, 1.	do	Discovered at autopsy.
5	do	19	do	do	do	Lorne	Bull. Soc. Anat. de Paris, 1869, 20, XIV, 455.	do	
6	do	45	do	do	do	Sevestre	Bull. Soc. Anat. de Paris (1872), 1874, 2 s, XVII, 415.	do	Cerebral tumor; syphilitic.
7	do	49	do	do		V. G. Fontarbe	Un cas d'hemiplegie alterné par Aneurysme de la vertebral, 4th Paris, 1874, Paris, Thèse.	do	Discovered at autopsy.
8	do	56	do	Traumatic		F. Schultze	Arch. f. path. Anat., Berl., 1875, LXV, 585.	do	
9	do	63	Female	Idiopathic		E. Leclaire	Presse Med. Belge, 1876, XXVIII, 153.	do	Discovered at autopsy.
10	Intracranial, double.	25	Male	do			Guy's Hospital Reports (1890).	do	Cerebral hemorrhage; discoved at autopsy.
11	do	30	do		Potass. iodid	Anderton	Trans. N. Y. Path. Soc., 1880, IV, 180.	do	

TABLE II.—*Traumatic aneurisms of the vertebral artery.*

No.	Situation.	Age.	Sex.	Cause of injury.	Operative and other measures of treatment.	Name of operator or reporter.	Date and title of publication in which found.	Result.	Remarks—Errors in diagnosis, if any.
1	Cervical	23	Male	Punctured wound.	Cold applications	Mœbus, 1827	J. d. Chirurg. und Augenheil k. Berlin, 1830, XIV. 98.	Recovered.	The common carotid was compressed, but no ligature tied because it was observed that pulsation of aneurism was not arrested thereby.
2	Cervical, first and second vertebræ.	28	do	do	Ligature of common carotid.	Chiari, 1829	Chassaignac: Traite clin. et pract. d'oper chir., 1861, I, 334. Translated from Il Filiatre Sebezio, Ann. 3, fasc. 2, and also reported as Caroselli's case by Barbieri.	Died	
3	Between second and third vertebræ.	20	do	do	The carotid artery was exposed and a ligature placed around it, but not tightened.	Ramaglia, 1834	Arch. genl. de Med. Paris, 1834, 25, V, 138–140. Translated from Il Filiatre Sebezio, 1834.	do	
4	Behind angle of inferior maxilla.		do	do	Ligature of common carotid.	Cattolica, 1836	Gaz. Med. de Paris, 1836, 2 s. IV, 425. Translated from Il Severino.	do	
5	Behind angle of inferior maxilla.		do	do	Compression and styptic application.	do	Same reference	do	
6	Below and behind apex of mastoid.	30	do	Stab	Cold; compression of common carotid, and plugging ulcerating opening. Prof. Respoli suggested ligature of the vertebral in the intertransverse space, en masse, but not done.	Prof. Nunziante Yppolito, 1838.	Monograph "Ligatura dell'Arteria vert. nei casi di Aneurismi della stessa." 16 pp. 1838. Quot. by Gherini (A.) in his memoire, Ferite del 'Arteria Vertebrale, Milan. 1867.	do	Diagnosis suspected in course of operation only.
7	Between fourth and fifth vertebræ.	40	do	Idiopathic	Ligature of carotid	H. Stubbs, 1846	Liverpool Med. Chirurg. Journal, 1857, I, 110–112.	do	Supposed at first to be an aneurism of internal carotid.
8	Upper cervical region.		do	Wound?	Ligature of common carotid.	South, 1847	Chelius' Surgery, Vol. I, p. 1067, 6th Ed., quoted by T. Holmes and Barbieri, *vide infra*.	do	Fifteen days after ligation of carotid the aneurism burst into the trachea. Diagnosis made post-mortem.
9	One inch below mastoid.	23	do	Punctured	do	Kluyskens, 1848	Ann. Soc. de Men. de Gand., 1848, XXI, 211.	do	
10	Back of neck	30	do	Stab	Incision; plugging in intertransverse process.	Stone, 1849	New Orleans Med. and Surgl. Journal, 1849, 1850, VI, 555.	Recovered.	This was a nonpulsating tumor, and was supposed to be an abscess, and incised.

11	Between second and third vertebræ.	29	...do	Punctured wound.	Ligature of carotid	A. Branco, 1862 .	Gaz. Med. de Lisbon, 1862, x, 597.	Died...	It was first diagnosticated an abscess, and afterwards an aneurism of the carotid or one of its branches.
12	Between atlas and occiput.	23	...do	Punctured wound.	Ligature of carotid; aneurism injected with perchloride of iron.	A. Lücke, 1867 ..	Arch. f. klinische Chirurg., Berl., 1867, VIII, 78.	Died ...	
13	Between fourth and fifth cervical vertebræ.	.....	...do	Gunshot	Incision; plugging; patient succumbed to repeated bleeding.	Stroppa, 1867	A. Barbieri: Monograf., dell' Arteria Vertebrale, Milano, 1867–'68, Gazz. Med. Lombard., 1867–'68.	...do ...	This was originally an abscess which ulcerated the vertebral artery.
14	Below atlas and axis.	20	Female .	Stab	Cold; compression; ligature of common carotid by Monti.	Gherini	Gherini: "Ferite dell' Arteria Vertebrale," Milano, 1867 (Memoir).	...do ...	On post-mortem examination the artery was found to be anomalous; entered the foramen of fifth cervical vertebra, which accounted for temporary arrest of bleeding by compression over common carotid.
15	Between fifth and sixth vertebræ.	42	Male....	Punctured wound.	Incision and plugging of artery in transverse canal.	Kocher, 1871	Schmidt's Jahrbücher, Leipzig, 1872, CLV, 191. From Arch. f. klin. Chirurg., Berlin, 1871, XII, 867.	Recovered.	
16	Behind and below mastoid process.	33	Female .	....do	Cold; pressure; electropuncture.	Verardini, 1872 ..	Bull. Soc. Anat. d. Bologna, 1872, 58, XVII, 415.	Died ...	Patient disappeared, and could not ascertain result, but he was not improved when he deserted.
17	Two inches below, and 1 inch post., to lobe of right ear.	28	Male....	....do	Digital pressure and compression.	R. F. Weir, 1884.	Archives Medicine, New York, 1884, XI, 157, 1162.	Recovered.	
18	Between atlas and axis.	19	...do	Gunshot	Ligature of left common carotid; incision of sac, and ligation of vertebral artery.	C. Fenger, 1881 ..	Med. Standard, Chicago, 1887, I, 336, 35, 1887.	...do ...	Intra-venous transfusion was required to revive patient.
19	Fifth cervical vertebra.	41	Female .	....do	Ligation of common carotid, and plugging of vertebral in canal.	G. Henry Simes, 1888.	Proceedings Phila. Acad. of Surgery, June 4, 1888; Med. News, vol. LVIII, 1888, p. 78.	Died ...	Other vessels were involved in the injury.
20	First and second cervical vertebræ.	21	Male....	....do	Incision of sac, and plugging vertebral in canal.	R. Matas, 1888 ..	Annals of Surgery, Nov., 1893, p. 477.	Recovered.	

TABLE III.—*Wounds and other (non-aneurismal) injuries of the vertebral artery.*

No.	Situation.	Age.	Sex.	Cause of injury; weapon.	Operative and other measures of hæmostasis and treatment.	Name of operator or reporter.	Date and title of publication in which found.	Result.	Remarks, errors of diagnosis, if any, etc.
1	Between occiput and atlas.	Adt.	Male	Stab	None	Fabricius, 1750	Fabricius, Philip, Conradus of Buzbach, in *Præcipuæ in cautiones in sectionibus et perquisitionibus cadaverum humanum observandæ*. Bruckmann, 1750. A. Barbieri. Monograf. dell' Arteria Vertebrale, Milano, 1867, VI.	Died	
2	Extreme upper portion; R.	do	do	Gunshot		L. J. Sanson, 1830	Des Hémorrhagies Traumatiques, Paris, J. B. Baillière, 183.	do	First bleeding stopped spontaneously; then secondary hemorrhage set in on tenth day, which caused death before carotid could be ligated. True nature of injury only discovered after death.
3	Second cervical vertebra; R.	31	do	Stab	Ligation of common carotid by mistaken diagnosis; plugging of wound.	N. Vosin, 1841	Opérations Chirurgicales; Gaz. Méd., Paris, p. 138, 2e s., vol. IX	do	Death from secondary hemorrhage; exhaustion. True nature of injury only discovered after death.
4	Second and third cervical transverse processes.	58	do	Gunshot		Jolly, 1841	Gaz. Méd., Paris, 1841, 2e s., IX, p. 138.	do	Death was instantaneous, and source of hemorrhage only discovered after death.
5	Upper cervical	Adt.	do	Stab	Ligation of common carotid.	Thurat, 1848	L'Ossieur: Annal. Soc. Méd. d'Emulation de la Flandre occidentale, Roulers, 1848, II, 306	do	Source of hemorrhage only discovered after death.
6	First cervical vertebra.	do	do	Gunshot		Stromeyer, 1850	A. Barbieri: Monograf. dell' Arteria Vertebrale, *loc. cit.*, et Pirogoff, Kriegs-Chirurgie, 1864, p. 563.	do	Death instantaneous; other injuries.
7	Sixth cervical vertebra; L.	do	Female	do	Ligation of inferior thyroid and vertebral arteries in the wound.	Maisonneuve and Favrot, 1852.	Journal des Connaissances médico-chirurgicales, Paris, 1852, 2e s., vol. II, p. 181.	do	Death caused by purulent infiltration of neck and sepsis.
8	Below sixth cervical vertebra transverse process; L.	do	do	Stab	Ligation of common carotid artery, internal jugular vein, and attempted ligation of left sub-clavian artery.	J. Watson, 1853	J. R. Wood: N. Y. Med. Journal, 1875, n. s., III, 40.	do	Cerebral complications and sepsis.

9	Between third and fourth cervical tranverse processes.	25	Male....	....do	....	J.H.Carter, 1854.	Trans. M. and Physical Society of Bombay, 1853, 4, 1855, n. s., II, 313.	...do ...	Died almost instantaneously; no time for surgical assistance; other injuries.
10	Fifth cervical vertebra; R.	18	...do	Gunshot........	Plugging; or pressure, superficially applied.	W. H. Van Buren, 1857.	N. Y. Journal Medicine, vol. II, 3 s., 1857.	...do ...	Other injuries; the hemorrhage was secondary to ulceration of vertebral from retro-pharyngeal suppuration, etc.
11	Second and third cervical vertebræ.	11	...do	....do	Systematic plugging of wound with small bits of sponge dipped in styptic solution.	J. Mason Warren, 1861.	Surgical Observations with Cases, Boston, 1867, p. 553; also, Boston Med. and Surg. Journal, 1862, LXVI, p. 389.	Recovered.	
12	Fourth cervical transverse process.	Adt.	...do	Ulceration of artery from tubercular spinal caries.	Plugging of bleeding abscess cavity.	Perrin, 1861–'62..	Bulletin Société de Chirurgie de Paris, 1861–62, 2 s, p. 97.	Died...	This injury of the vertebral is entirely due to pathological causes.
13	Fourth cervical ..	do	...do	Gunshot........	Plugging	Kade, 1862	Gazz. Med. de St. Petersburg, Vol. II, 1862; Archiv. f. klin. Chirurg., Vol. V; P. Landi, Lezioni di Chirurgia Operatoria, Bologna, 1867, p. 231; quoted also by Barbieri, *loc. cit.*	...do ...	Other complicating injuries of mouth and pharynx; source of hemorrhage ascertained only after death.
14	Between occiput and atlas.	30	...do	Stab............	Plugging; ligation of common carotid by mistake.	Prichard, 1863...	Augustus Prichard: Proceedings Bristol Branch British Med. Assn., British Medl. Journal, 1863, I, 399.	...do ...	True source of hemorrhage only discovered at autopsy.
15	Before entering the sixth transverse process.	Adt.	...do	Gored by ox....	....	Pirogoff, 1864 ...	Pirogoff. Krieg Chirurgie, 1864, p. 563.	...do ...	Other complicating injuries; exact nature of injury only ascertained after death.
16	First cervical vertebra.	27	...do	Gunshot........	Pressure over carotid.....	D. C. Peters, 1865.	D. C. Peters: Am. Journal Medl. Sciences, 1865, N. S., XLIX, 373.	...do ...	The internal carotid, as well as vertebral, was injured; other complications added to the gravity of the injury.
17	Between first and second cervical vertebra.	20	Female .	Stab	Ligation of common carotid by mistake.	Monti, Barbieri, 1861.	A. Barbieri: Monografia dell' Arteria Vertebrale, Milano, 1867; and Gazz. Med. Ital.-Lombard, Milan, 1867, Vol. II.	...do ...	The autopsy alone revealed the true source of the hemorrhage.
18	Between third and fourth cervical vertebra.	30	Male....	.... do.........	....	Saviotti, 1867 ...	Gherini, jr.: "Ferite dell' Arteria Vertebrale," 1867, pamphlet, Tip di Marini, via Durini, No. 31 (12mo., pp. 43)	...do ...	Death took place shortly after the injury before assistance could reach patient. Source of bleeding only discovered by autopsy.

TABLE III.—*Wounds and other (non-aneurismal) injuries of the vertebral artery*—Continued.

No.	Situation.	Age.	Sex.	Cause of injury; weapon.	Operative and other measures of hæmostasis and treatment.	Name of operator or reporter.	Date and title of publication in which found.	Result.	Remarks, errors of diagnosis, if any, etc.
19	Between fourth and fifth cervical vertebræ.	Adt.	Male....	Stab..........	....	Caspar Liman, 1871.	Caspar-Liman: Prakt. Handbuch der gerichtlichen Medizin. 5 aufl., Berlin, 1871.	Died...	This case is of interest simply because no profuse hemorrhage appears to have followed the injury; other causes carried off the patient five days after the injury.
20	Second cervical vertebra.	11	...do....	Ulceration of artery from tubercular disease.	....	Neuretter, 1873.	Oestr., Jahrb. für padiat., 1873.	...do...	In this case the vertebral was eroded by osseous tubercular disease.
21	Upper cervical region.	25	...do....	Stab..........	Systematic plugging and pressure.	King, 1885......	The Lancet, November 28, 1885.	Recovered.	One of the transverse processes was felt to be fractured.
22	Second cervical...	35	Female.	Pathological (tubercular abscess of neck involving second transverse cervical process).	Systematic plugging with iodoform gauze after opening abscess.	Küster, 1883....	Berliner klinische Wochenschrift, No. 48, November 26, 1883.	Died...	Hemorrhage from vertebral was perfectly controlled, but patient died nineteen days after opening abscess from some cerebral cause and other complications.

THE USES AND ABUSES OF THE DRAINAGE TUBE. IN WHAT CLASS OF WOUNDS IS DRAINAGE ADVISABLE?

By HENRY O. MARCY, M. D., Boston, Mass.

The object of this paper is to ascertain if we even now possess the requisite data from which we may draw deductions and formulate rules for guidance in the employment of drainage in wounds. My limits, however, prevent the proper consideration of any closely co-related subjects which are fundamental to the discussion.

It has always been a subject of comment, and is even yet one of surprise, to note the possibility of the extent of injuries undergoing rapid and easy repair, where the protecting external surfaces have remained unbroken. Extensive bruises, laceration of the tissues, large effusions of blood into the soft parts, etc., all are cared for with little disturbance when uncontaminated by extraneous substances. Note, however, the difference when the more or less devitalized material becomes the site of bacterial infection.

It is accepted without discussion that such injured or dead material, serous or bloody effusions, have become in a large degree foreign to the organization which would be benefited by their removal, if safely effected. It seems perfectly rational that such removal should be undertaken, and when such material is or has become fluid that the drainage-tube would be very conducive to this purpose. It was undoubtedly a contribution to surgery of very great value, when in 1859 Chassignac formulated the conditions which were judged demandatory for drainage. Then, as a rule, all wounds were septic, and the less the retention therein of the decomposing fluids the better. However, all bleeding vessels were generally ligatured with silk and one or both ends left long enough to protrude from the wound.

The conservatism of one's nature is such as to hold with a retentive grasp the teachings which have generally been accepted as demonstrated to us by our former masters. This is well exhibited in our present subject. Even Mr. Lister, who has lived to see the full fruitage of his revolutionary doctrines, based upon the knowledge of bacterial infection, fails to appreciate the lessening need for the escape of the fluids from aseptic wounds, and emphasizes with painstaking care the requisites of thorough drainage. Such measures, however, demand the most rigorous care and attention with multiple, clumsy, and expensive dressings; and the wound, necessarily open, even when thus protected, is recognized as a source of danger.

Under such leadership, is it to be wondered at that the general practice still is to drain all wounds of any considerable extent, without making clear distinction why or demonstrating the benefits to be derived therefrom? I quote from a recent authority:* "But when the wound secretions are allowed to flow off as rapidly as they form, a most important if not the most important aid to repair is thus secured. Hence arises the surgical law, now almost universally adopted, that all wounds of any magnitude must be provided with drainage from the outset."

We will return to the subject of tension and distension of wounds later in the discussion, and take up for the present the conditions pertaining to wounds where the necessity for drainage is generally accepted, to wit, a suppurating wound not easily or safely susceptible of disinfection. Here we have necrotic tissue and albuminoid secretions, kept at a nearly uniform temperature favorable for bacterial development. Food, fluid, heat, soil most fitting for the growth of the already germinating seed. On the other hand, a good individualistic, vital, resistant power will have summoned aid to the extent of its resources to limit the evil it may not destroy, and the assistance here rendered by the surgeon is often of the highest value. Disinfection of such a wound is rarely primary, and drainage is of much importance to aid in the elimi-

* Handbook of Medical Sciences.

nation of the foreign material. With our present knowledge of the best methods for the treatment of such wounds, drainage is to be considered essential.

Notwithstanding the above premises seem sufficiently definite in order to determine when drainage should be used, we are met with a diversity and confusion of ideas and opinions, when we take into consideration the general class of aseptic wounds. That no clear, fundamental basis of conditions has been formulated is the more surprising, since the logical deductions, based upon the noninfected state of wounds made in the healthy structures of a well-vitalized individual would be to restore the parts so that complete primary union could ensue, and to protect the same from a possible secondary infection. I need not refer to the general prevailing practice of drainage in wounds in all our large hospitals upon both continents, and shall only quote briefly from very recent writers who have specially discussed the subject. In the routine treatment of laparotomy for pelvic lesions, without special considerations of septic conditions, Dr. McMurtry, of Louisville, writes:

The object of drainage is to dry as quickly as possible all the peritoneum around the bottom of the tube. * * * When peritoneal drainage is conducted in this way it is thoroughly efficient, and I have never known septic infection to occur thereby.*

Dr. Price, of Philadelphia, expresses his views as follows, upon the operative methods for the removal of uterine myomata: †

As to the importance of drainage, I would simply have to give up my work, if it were not for abundant drainage. I value it above all other methods of saving life. It is true, however, I have had very few cases of simple operations. I operate constantly for advanced disease, yet my mortality falls below 5 per cent, and I attribute it largely to my uniform practice of drainage.

Dr. Mundè, of New York,‡ in discussing the prevention of fistula after cœliotomy, states:

The use of a drainage-tube, in my opinion, decidedly favors the formation of an abdominal fistula, since it causes the production of a canal surrounded by adhesions and leading upward through the abdominal wound, and by its mere pressure provokes sero-purulent fluid. The cutting through of silk or of other imperishable sutures likewise tends to promote deep irritation and suppuration in the pelvis and the reopening sooner or later of the wound. A probe may pass down 5 or 6 inches and the exploring forceps may find and withdraw the offending suture, whereupon the sinus gradually closes. * * * In the prevention of fistula after cœliotomy one is to use all the well-known antiseptic precautions, remove all diseased and infected tissue, employ only absorbable animal sutures, close the wound completely, and there will be no fistula. * * * Nonabsorbable sutures, such as those of silk often prove to be, keep up a focus of irritation at the bottom of the wound, which at best excites suppuration and the burrowing of the pus towards the most available opening, usually the abdominal incision; and until the cause of the irritation, the suture, is removed the discharging sinus exists.

Let it be granted from the brief review of the foregoing premises that the object of drainage is to remove safely deleterious substances from a wound, which, if allowed to remain, will in a greater or less degree retard cure, or even endanger life. The infected materials not only become dangerous in themselves, but they generate a chemical poison, which in amount is often sufficient to cause death.

To what degree the living tissues are endowed with resistant power for self-protection can perhaps never be determined with accuracy. It is, however, settled beyond doubt that the healthy structures do have a resistant power to prevent to a certain extent the invasion of bacterial infection, and that this is in a more or less direct ratio to the physical vigor of the individual.

The phagocytic power of the cells to destroy bacteria under favorable conditions is also a most valuable aid in the preservation of life.

It is important that the surgeon devitalizes as little as possible the remaining tissues, that he approximates carefully clean surfaces in order to make the soil unfruitful to the accidentally implanted bacterial seed.

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*American Journal of Obstetrics, March, 1893.

†American Gynecological Society, May, 1893.

‡American Journal of Obstetrics, June, 1893.

Is the present state of operative procedures sufficiently accurate to warrant the assurance that complications arising from infection are not to supervene? This is the important question which must first be satisfactorily answered before we are in a position to determine at all positively when in wounds believed to be aseptic we are to use, if always, or not at all, drainage in the hope thereby to remove material possibly dangerous if allowed to remain.

It is certainly clear that the experience of the last twenty years has been leading toward the solution of this problem, until now it seems demonstrated beyond a doubt that an aseptic wound may be made in aseptic tissues and maintained aseptic until restoration is complete.

If this is true the *modus operandi* of modern wound treatment must be mastered, as the ritual service of a higher religion, before the surgeon is competent to enter upon the serious responsibility of his office. This portion of the subject would lead me too far from the theme under consideration, but fortunately we may accept that the members of this body require little instruction in this direction. If aseptic conditions are maintained then we may safely conclude that drainage of the wound will not be necessary, and if unnecessary certainly undesirable. At the best the drainage tube is a foreign body, and its presence in the wound prevents primary union of that portion of the tissues which are seperated by it. It keeps the wound to a certain extent an open one, and as such makes secondary infection so probable that the most careful antiseptic dressings are required to absorb and disinfect secretion and prevent atmospheric contamination.

In an aseptic wound, after the removal of the tube, the final closure of the tract is comparatively slow and by granulation. These are well-recognized objections, and efforts have been made to overcome these by many ingenious devices.

If drainage is to be discontinued in aseptic wounds it must be accepted that the greatest care is to be exercised in leaving as little devitalized tissue as possible. The wound should be clean and dry; the different layers of the tissues should be joined with as little injury as possible, and the external wound protected from infection. To secure the best results it is important to have clean incisions, devitalizing as little as possible the structures, minimizing irrigation, sponging, compression with artery forceps, injury from retractors, etc. The divided tissues must be rejoined by light-running, continuous, buried, tendon sutures. The skin is easily coaptated by a similar buried continuous suture, taken from side to side, parallel to the incision, through the deeper layer only. Then the wound is sealed with a germ-proof layer of iodoform collodion, reënforced by a few fibers of cotton. Such wounds go on rapidly to repair without edema of the tissues, pain, or even tenderness; the resulting cicatrix is minimized, which is of much importance in facial wounds, and often after some weeks is scarcely to be recognized.

Are all aseptic wounds in healthy organisms to be thus treated? Certainly, as experience abundantly demonstrates. The affirmative to such an important question, however, is undoubtedly to be maintained only by the most scrupulous of aseptic measures. When in doubt it may be better to drain large wounds, but I can not myself question that he who uses the drainage tube in aseptic wounds, unconsciously however it may be, thereby in a measure at least confesses his lack of confidence in his ability to maintain an aseptic condition. In the dealing with wounds the first consideration is over the safety of the patient. This is best conserved by a careful study of the individual and his surroundings, his possible external and internal foes. Locally the soil and the seed and the varying conditions of each must be kept in consideration. When in doubt of an infection in a wound, especially when its character is such that it will be likely to be attended with an abundant albuminoid secretion, drain; but let the surgeon ever remember that the highest theoretic condition is the restoration of the tissues to their normal relation as nearly as possible and retention at rest in an aseptic condition. This, in the great majority of wounds, renders drainage not only unnecessary, but when applied it is a positive detriment and a source of danger.

Complete closure of an aseptic wound by aseptic buried animal sutures, retained at rest by a germ-proof dressing, comes nearer to the ideal than any method yet devised. There is no fear of hemorrhage in an aseptic wound thus closed. There is no further danger from infection; expensive, clumsy, antiseptic dressings are entirely avoided, little subsequent care is requisite on the part of the surgeon or attendant, and the patient is relieved from the fear of suffering in the removal of stitches (stitch abscesses are impossible), is free from pain, and goes on to a rapid convalescence. I am assured that a better knowledge will restrict the use of the drainage tube almost entirely to septic wounds, and that operative wounds in aseptic tissues will be aseptically maintained without drainage.

AMPUTATIONS PROTHETICALLY CONSIDERED.

By GEORGE E. MARKS, A. M.

Intercourse with a considerable number of surgeons, those that live in the centers of prothetical industry, as well as those who reside in more remote parts, shows a lamentable absence of knowledge on the subject of "amputations viewed in the light of Prothesis." In consequence we artificial-limb makers have frequently brought to our presence stumps that are good, bad, and indifferent; stumps that could have been better; stumps that reflect credit, discredit, and no credit on the surgeons who performed the operations or attended to the stumps after amputations; stumps that can readily be inserted in artificial limbs with the assurance that the possessors will enjoy the sublime consolation of having realized the removal of their disabilities for all practical purposes; stumps that might have been better and would have been beyond criticism had operators taken advantage of opportunities which familiarity with the subject would have suggested; stumps that prevent the wearing of artificial limbs with that degree of comfort and efficiency that should accompany every case. The time has long been at hand when this subject should receive more thought and when prothetical knowledge should be more liberally disseminated.

I shall discuss the subjects from only a few standpoints.

(*1*) *Length of stump.*—No stump that is well covered with integumental tissue can be too long. I am well aware that when I advance this proposition I am antagonizing the views of artificial-limb makers who have not kept abreast of the times, and am controverting the rules that have been laid down by some writers on the subject. The progress that has been made in the development and construction of artificial limbs during the last decade or two has been noticeable. To-day artificial limbs are constructed that can be applied to stumps of any length, tibio-tarsal, medio-tarsal, and tarso-meta-tarsal amputations not excepted. Any stump that is capable of enduring pressure on the extremity is preferable to one that can not. In all partial foot amputations care should be exercised by the operator to prevent the contraction of the tendo Achillis. Tenotomy should be employed. The foot must be held in proper position, even if it necessitates fixation of the ankle joint. The advantages of a partial foot amputation, as well as a tibio-tarsal amputation, are many. For example: Artificial legs can be applied to stumps that result from such amputations that will restore the wearers to the amplitude of their usefulness. Artificial legs for such stumps do not cost more than half as much as artificial legs for stumps that do not extend as far down as the ankles. If the financial means of the possessor of any one of the above stumps will not permit him to procure an artificial leg he can get along tolerably well by walking on the remaining portion of the planter surface of his partially amputated foot, or by improvising an end-bearing socket himself.

(*2*) *Flaps.*—All stumps should, if possible, be provided with ample integumental flaps. I do not wish to be understood as advocating redundant flaps. If periosteal flaps can be secured it is always desirable to do so, as they provide more natural cushions for the extremities and prevent integumental flaps from becoming adherent to the ends of the bone. If an amputation is to be made below the middle third of leg, bone can safely be sacrificed in order to secure integumental flaps, but if the amputation is to be made above the middle third of leg the sacrifice of healthy bone will not be warranted under any consideration. A stump extending below the knee, no matter how short, is preferable to a stump extending only to the knee, and a stump extending to the knee is preferable to a shorter stump. Stumps resulting from knee disarticulations are preferable for prothetical purposes, if the condyles and nodules of the femora are not removed. If the patella can be placed and secured in the intercondylic space it is desirable to do so. All amputations in the thigh should be made as distant from the body as possible.

(3) *Disposition of cicatrices.*—The rules established by Heys, Lisfranc, Choparts, Hancock, Pirogoff, and Symes should be rigorously observed in placing the cicatrices in all partial foot or ankle-joint amputations. The cicatrices of all amputations of the leg or thigh, forearm or arm, at any point between the articulations, should, if possible, be placed away from the extremities of the bones, whether anterior, posterior, exterior, or interior.

(4) *Treatment of stumps.*—I desire to call attention to the treatment of stumps. After stumps have become sound and healthy they tend to fatten or become edematous. This can, to a great degree, be obviated by the use of tight bandages.

(5) *Time to apply artificial limbs.*—It is safe to apply an artificial limb to a stump that results from traumatism as soon as the stump is healed and the possessor is able to get about on crutches. Nothing can be gained in such cases by waiting; in fact, waiting not only entails a loss of time, but offers an opportunity for the stump to become enervated from disuse. Stumps that have been caused by disease, especially if of a malignant nature, should be obliged to wait until there is a certainty that the vascular, cellular, and osseous contsruction will not suffer from confinement, compression, or exercise.

CURA RADICAL DE LAS HERNIAS.

Por el Dr. Luis C. Maglioni, Buenos Aires, Argentina.

Segunda serie: Diez casos operados con buen éxito.

En el número de junio de 1892 de los "Anales del Círculo Médico Argentino," publicaba mi primera serie de cuatro casos de cura radical de hernias, sin ningún fracaso operatorio. Hoy tengo la satisfacción de publicar las observaciones correspondientes á mi segunda serie de diez casos operados todos tambien con el mejor éxito, y entre los cuales figuran una hernia estrangulada y otro que es de trascendental importancia ó interés clinico: el caso 12 á 14.

Debo attribuir estos buenos resaltados, además de á un estudio minucioso y prolijo de los casos y al cuidado especial en las manipulaciones operatorias, al empleo de la mas estricta antisepsia, como acostumbro emplearla en todas mis operaciones.

Caso 5. Hernia ingüinal doble; enterocele; operación en el lado derecho; curación: N. N., italiano, alienado, de unos 35 años de edad próximamente. Imposible obtener del enfermo datos precisos respecto de la aparición de sus hernias.

La hernia derecha es mas voluminosa que la izquierda. Ambas reductibles, pero dificilmente coercibles por medio del braguero.

Vacilé algun tiempo sobre si practicaría la operación en dos veces ó si operaría ambas hernias en la misma sesión. Me dicidí por lo primero, convencido de que para hacer bien esta operación se necesita emplear generalmente bastante tiempo, que éste se duplicaria, so pena de proceder rápidamente en actos quirúrgicos de suyo minuciosos.

Resolví, pues, operar una sola de las hernias y elegí la derecha por ser la mas voluminosa, conforme hubiese podido elegir la izquierda.

El sábado 25 de junio de 1892, ayudado por los Dres. Quiroga (D. Atanasio), Gimenez y el practicante Sr. Gomez, procedi á la operación. Esta duró una hora y media. Descubierto el saco, aislado ó incindido, no encontré nada en su interior. Según el último precepto de Championnière, busqué, con el índice, en el interior del abdómen, el epiploon, con el fin de atraerlo al exterior y resecar una parte de él. En lugar de éste salieron unas ansas de intestino delgado, las que, lavadas y desinfectadas convenientemente, fueron nuevamente reducidas. Ligadura y resección del saco; sutura con crin de Florencia; tubo de drenaje.

Al dia siguiente, estado fisiológico y así los demás dias. Resolví no remover la curación hasta cumplidos los siete días.

El sábado 9 de julio descubrí por primera vez la herida. Excelente estado. Ni una gota de pus. Retiré todas las suturas y totalmente el tubo de drenaje. Nuevo vendaje suavemente compresivo.

El sábado 9 de julio levanté por segunda vez el vendaje. Cicatrización completa por primera intención.

A fines de agosto el operado está aún en cama, pues por ser alienado y por la imposibilidad de aplicar á estos individuos bragueros de precaución, temo especialmente en ellos la recidiva.

Pude observar en este caso un hecho señalado ya por Championnière, y es, en las hernias dobles, el referente al aumento de volúmen de una de ellas cuando la otra es operada. En mi enfermo, á pesar de no haber hecho visiblemente grandes esfuerzos y permaneciendo en cama, la hernia izquierda adquirió en menos de dos meses un volúmen mayor aún que el que tenía la derecha antes de ser operada y que era entonces mucho mayor que la izquierda. Se diría que las vísceras herniadas en el lado derecha aprovechaban la válvula de escape de la region inguinal izquierda, habituadas por otra parte á estar fuera del abdómen propiamente dicho, ó si se quiere, habituado el abdómen á contener en su gran cavidad una cierta cantidad de vísceras de menos.

Volveré mas adelante sobre este caso al ocuparme de la operación en el lado izquierdo.

Caso 6. Hernia ingüinal izquierda; enterocele; resección del saco; curación: Cárlos Pifferi, italiano, 57 años, cuerdo. Hace un año y medio que le apreció su hernia, segun dice él. Es ésta muy pequeña. Apenas desborda el anillo ingüinal externo.

Es reductible. Usa braguero, pero le molesta mucho.

Resuelta la operación, la practiqué el miércoles 13 de julio de 1892, asistido por el Dr. Zeballos y los practicantes Coé, Pizarro, Gomez, presenciándola el braguerista Mr. Le Balle.

La operación duró una hora.

Antes de operar á este enfermo supuse, por los dolores que acusaba en la región del anillo externo y por la falta aparente de una reducción completa, que se tratase de un epiplocele adherente. Abierto el saco no había nada en él. Introducido el dedo en el abdómen, no fué posible, en algunas lijeras tentativas, hallar el epiploon, ni lo consideré tan indispensable para insistir en ese propósito.

Nada de particular en éste caso. Ligadura y resección del saco. Sutura y drenaje.

A los ocho dias descubrí por primera vez el campo operatorio. Excelente estado. Retiré el tubo de drenaje y todos los hilos.

No volví á descubrirlo hasta el 27 de julio en que encontré una cicatrización completa por primera intención.

Estuvo en cama sin embargo hasta el 15 de agosto, como medio precaucional en contra de la recidiva.

Caso 7. Hernia ingüinal congenital; ectopia testicular; castración; resección de 100 gramos de epiploon; canalotomia; reseccion del saco herniario; curación: Emilio N., italiano, alienado, 39 años, excelente constitución. Presenta una hernia ingüinal derecha; no sabe decir desde cuando. La hernia es mediana en cuanto á volúmen y fácilmente reductible. En mi primer exámen no pude constatar la presencia del testiculo derecho, pero momentos antes de la operación, estando la hernia reducida, era perceptible el testículo considerablemente atrofiado y muy inmediato al anillo ingüinal externo.

Diagnostiqué: hernia congenital, es decir, ausencia de túnica vaginal independiente del saco herniario, lo que confirmó la operación.

Practiqué esta el sábado 6 de agosto á las 10 a. m. ayudado por los Dres. Seco, Colon y Zeballos, los practicantes Coé, Gomez, Torres y Mr. Le Balle.

Abierto el saco me encontré con el pequeño testículo cuyo cordón estaba completamente retraido y adherente en la parte superior. Hubiera sido muy difícil si no imposible su desadhesión con el propósito de bajarlo y fijarlo en el escroto haciéndole previamente un espacio. Creo que esta fijación, que no hubiese tenido sino un objeto moral tratándose de otro paciente, hubiese fracasado en este caso, por lo que, y de acuerdo con los colegas que me acompañaban, resolví extirpar este órgano verdaderamente inútil por su atrofía y la del cordón.

En un golpe de tos apareció en el campo operatorio una franja de epiploon. Toméla y, extrayendo hácia afuera una buena porción de ese tejido, resequé unos 100 gramos en peso.

En seguida determiné hacer, por primera vez, la seccion del canal ingüinal según el procedimiento de Championnière. Sutura en U con cat-gut y algunas suturas mas en las paredes del canal.

El 7 y el 8 de agosto, el enfermo seguia sin la menor novedad.

El 12, sospechando la existencia de pus en la herida, descubríla y efectivamente fracasó la primera intencion, obtenida tan completa en los dos casos anteriores.

No obstante esta lijera supuración, el enfermo estaba completamente curado y en pié en los primeros dias de setiembre.

Caso 8. Hernia ingüinal doble; operación de la hernia derecha; canalotomia; resección del saco; curación: Vicente Luis, español, 39 años. Dice tener sus hernias de nacimiento. La izquierda es casi imperceptible, rudimentaria. Me ocuparé exclusivamente de la derecha.

Tiene además un hipospádias balánico. La hernia derecha es pequeña y reductible. No usa braguero. Reclama la operacion animado por los muchos casos análogos que sabe han sido operados con éxito en el hospicio.

Siendo esta hernia de nacimiento, según el enfermo, pensé fuese vaginal, aunque por la independencia del testículo, creí pudiese haber alguna unión completa ó incompleta de la serosa peritoneal.

Procedí á operar á este individuo el sábado 27 de agosto de 1892, ayudado por los Dres. Sarmiento, Acuña y Zeballos y los practicantes Pizarro, Vatteone, Torres y Zabala.

Descubierto el saco, noté su independencia cavitaria de la vaginal, pero al mismo tiempo su íntima adherencia con esta túnica, sitio de fusión probable de la serosa peritoneal. Abierto el saco, salió un poco de líquido. No habia nada en su interior; Busqué y extraje del abdómen una cierta cantidad de epiploon que ligué y resequé.

El anillo era pequeño, como se observa generalmente en las hernias congenitales, y en tal virtud, habia pensado no hacer en este caso la canalotomia, pero era peligroso hacer pasar el pelotón de epiploon con sus ligaduras por un anillo tan pequeño. Temí el deslizamiento de una ó mas de dichas ligaduras, la hemorragia consiguiente, etc., por lo que incindí el canal inguinal, ó mejor dicho, su pared superior.

Practicadas las suturas coloqué dos pequeños tubos de drenaje, uno entre los elementos del cordón y la primera línea de suturas profundas y otro entre estas y la piel. Vendaje antiséptico y compresivo de la región operada.

Siguió el operado sin novedad. A los 8 dias, es decir, el 3 de setiembre, levanté por primera vez el apósito, y encontrando la cicatrización de primera intención, retiré todos los hilos y tubos. Practiquéle el segundo vendaje.

El 10 de setiembre levanté por segunda vez el apósito. Cicatrización completa.

Este enfermo, contra mi recomendación espresa, habia hecho algunos movimientos inconvenientes, levantándose de la cama para sus necesidades, etc.

El 12 se quejó de un dolorcito en la cicatriz. No le dí importancia.

El 13 seguia el dolor y aún algo aumentado.

El 14 dolor, inapetencia, pero falta de fiebre.

Examinando la zona operada noté á la vez que dolor, un poco de elevación hácia la pared abdominal. Se siente en ese sitio como un *plastrón* profundo. Diagnostiqué: flemón del tejido celular intra-parietal.

El 17 supuró dicho flemon y en 10 dias mas el enfermo estaba completamente bien y ha seguido así, sin recidiva ni inconveniente de ninguna clase, hasta el dia en que escribo esta historia.

Caso 9. Hernia ingüinal derecha estrangulada; canalotomia; resección del saco; curación: Luis Bernasconi, suizo, 60 años, domiciliado en la calle Venezuela 884. Tenía una hernia ingüinal derecha reductible y coercible por medio de un braguero desde la edad de 26 años. Era una hernia de tamaño mediano.

El 5 de setiembre de 1892, despues de defecar, en momentos en que se levantaba para abotonarse el pantalón notó un dolor en la hernia y le fué imposible reducirla. Esto tenía lugar á las 2 p. m. A las 3 p. m. de ese dia el Dr. Giraud, médico de cabecera, me hizo llamar.

El enfermo se quejaba de fuertes dolores en la hernia, la cual estaba dura y muy sensible á la presión. No había vómitos, el pulso era fuerte y regular pero no emitía gases.

Resolvimos verle de nuevo á las 5 p. m. después de hacer tomar al enfermo un baño caliente. El taxis era imposible y de todos modos inconveniente. Creo que, despues de la antisepcia y de los progresos que ha hecho la cura radical de las hernias, el taxis, en los casos de estrangulación, es un absurdo terapéutico y como tal está contraindicado.

Resolvimos, pues, con el Dr. Giraud operar á este enfermo sin pérdida de tiempo, difiriendo sin embargo hasta las 9 p. m., tomándome cuatro horas para la conveniente desinfección y preparación de los instrumentos, etc., tanto mas cuanto que la estrangulación era relativamente reciente.

A las 9 p. m. estábamos reunidos con el Dr. Giraud y el Dr. Valdez. El primero se encargó del cloroformo. La operación empezó á las 10 p. m.

Descubierto el saco se notó en la parte superior el relieve del intestino globuloso y por debajo un cuerpo rico en tejido adiposo, que en un principio nos pareció el epiploon.

Practiqué primeramente la canalotomía.

Hecha la incisión del saco, que era bastante delgado en su pared anterior, apareció el intestino fuertemente congestionado, muy alterada su coloración.

En la parte posterior del saco se notaba un tejido tan espeso que, no siendo epiploon ni intestino, pensé un momento si no sería la vejiga herniada, para lo cual exploré con la sonda uretral el receptáculo urinario, obteniendo un resultado negativo. Entonces el Dr. Valdez me sugirió la idea de que fuese el saco mismo espesado notablemente en esa parte.

Mientras resolvíamos esa duda nos ocupamos del ansa intestinal herniada. Deshice las adherencias en el cuello del saco, saqué hácia fuera una porción mas de intestino, hice una prolija desinfección y reduje fácilmente.

En seguida, hallando razonable la observación del Dr. Valdez independicé este espesísimo saco que por añadidura estaba aun doblado, en la pared posterior, de una espesa capa de tejido grasoso.

Practiqué, bien alto, la ligadura del cuello con tres hilos de cat-gut en cadena, seccioné y reduje. Sutura del canal, sutura estratificada, drenaje, sutura final con crin de Florencia, curacion, vendaje, etc.

La operacion terminó á las 11 y 25.

Vuelto en si del cloroformo el enfermo, manifestó encontrarse muy aliviado.

Para abreviar esta historia, diré someramente que en este caso no pude obtener la cicatriz de primera intencion, que el trayecto de la herida supuró un poco, formándose un flemón en el tejido celular intermuscular, como en el caso anterior, lo que produjo por algunos dias algun malestar en el enfermo, fiebre, etc., y alarma en la familia. Todas estas complicaciones fueron no obstante dominadas por medio de un tratamiento médico-quirurgico apropiado, hasta que el enfermo completamente curado se levantó de la cama en los primeros dias del mes de noviembre.

Al escribir esta historia, el Sr. Pernasconi está perfectamente bien. Librado de la estrangulación y de la hernia por la intervencion quirúrgica, anda sano y ágil como nunca, usando por mi consejo el braguero de precaución para evitar la recidiva.

Para concluir permítanseme algunas reflexiones :

La hernia del Sr. Bernasconi era una hernia en gran parte *grasosa*, es decir, que la grasa que aumentaba tanto el espesor de la pared posterior del saco era grasa subperitoneal herniada conjuntamente con la serosa. Esto exponía á un error anteoperatorio, pudiendo creerce que la hernia propiamente dicha fuese mayor de lo que en realidad era, siendo así que el continente en este caso abultaba tanto ó mas que el contenido.

Recordando aquí, lo que dije al principio de esta historia, que se trataba de una hernia de tamaño mediano, se deduce, pues, lo que realmente comprobó la operación, á saber: que se trataba de una hernia incompleta, que no alcanzaba á haber ni siquiera una ansa intestinal herniada; hernia intestinal sin mesenterio visible. Esto, unido á la ausencia de epiploon en el saco, agrava considerablemente estos casos de estrangulación y explica porqué á las *ocho horas* del accidente el intestino de este enfermo presentaba una coloración y un aspecto temible que hubiesen puesto en muy grave compromiso su vida si se hubiese demorado en operarle.

Por esto creo que, en casos análogos y por mucha importancia que dé, como el que mas, á la prolija antisepcia preoperatoria, tiene tal vez mas importancia el decidirse, como Dios lo ayude al cirujano, á operar pronto estos casos en que por momentos, por minutos, cambia seriamente la escena.

Caso 10. Hernia ingüinal doble; operacion en el lado izquierdo; enterocele; canalotomía; reseccíón del saco; curación: Ignacio Tócoli, italiano, 45 años. Tiene hernia ingüinal doble. La izquierda, que es la mayor, es de tamaño mediano. Hace 22 años que la tiene. Es reductible y coercible, pero le molesta mucho.

Conocedor de mi serie feliz, reclama ser operado, animado tambien por su médico el Dr. Sarmiento.

El sábado 17 de setiembre efectué la operación ayudado por los Dres. Sarmiento, Mujica, Acuña, Seco, Moranchel y los practicantes Vatteone, Gomez y Zabala.

Tardó mucho tiempo en cloroformarse este enfermo.

La operación empezó á las 10 y 5 y terminó á las 11 y 20. Descubrí el saco y, después de aislado bien, procedí á la canalotomía, según el procedimiento de Championniere. Después, haciendo una lijera tracción, ligué el cuello con dos hilos de cat-gut encadenados y seccioné debajo. Suturé en U el canal ingüinal; suturas perdidas y flojas con cat-gut: tubo de drenaje, etc. Antisepcia y vendaje compresivo.

Sucedió á esta operacion una lijera retención de orina que cedió pronto.

El 18, cuando le ví, había ya orinado solo. Se encontraba perfectamente bien: temperatura y pulso normales; lengua húmeda, etc. Deseaba fumar.

El 21 de setiembre le saqué el apósito por vez primera. Habia alguna supuración que se evacuó fácilmente por el tubo. Como hubiese alguna tumefaccion en la parte superior de la herida y alguna fluctuación, debridé el tejido cicatricial que empezaba á hacerse en ese punto; salió algun pus y puse un nuevo tubo de drenaje.

El 26 le curé porsegunda vez. Había muy poca supuración. Estado general satisfactorio. Marcha regular del proceso. Sale de alta el 15 de octubre en el mejor estado.

Respecto de la otra hernia, como era muy pequeña y la contenía muy bien con un braguero, convinimos en no atacarla por ahora.

Caso 11. Hernia ingüinal izquierda (correspondiente al caso 5º de hernia ingüinal doble); canalotomía; resección del saco; curación; recidiva á los ocho meses en el lado derecho. Se trata del enfermo de hernia doble de que me ocupé al principio de este trabajo (caso 5º) y al cual operé con el mejor éxito su hernia derecha.

Como ya he dicho es un alienado y su hernia izquierda, que en el principio era pequeña, creció considerablemente por causa de la operación en el lado derecho.

El sábado 1º de octubre de 1892 procedí á operar por segunda vez á este enfermo, ayudado por los Dres. Seco, Zeballos y Acuña y los practicantes Vatteone y Pizarro.

La operación empezó á las 9 y 30 a. m. y terminó á las 11 y 15 a. m.

Descubierto el saco que era bastante delgado y homogeneo, encontrando que el anillo era algo grande, hice la canalotomía. Siendo el saco delgado y transparente no quise deliberadamente abrirlo, convencido de que no había en su interior ni intestino ni epiploon y así integro le conservo en mi museo con la sola sección circular del cuello. Tomado el fondo del saco con dos pinzas y tironeado hácia arriba para ligar bien alto su pedículo, dicho saco, aplanado, formaba un triángulo isósceles con las siguientes aproximadas dimensiones: base, 6 centímetros; lados, 13 centímetros cada uno.

Omito describir los demás detalles operatorios para decir brevemente que este enfermo curó como todos los demás y que á principios de noviembre le permitía levantarse.

Solamente me detendré á hacer algunas reflexiones que reputo de gran importancia.

En esta segunda operación no me fué posible obtener la cicatriz de primera intención como en la primera (veáse 5º caso).

La canalotomia fué hecha en la segunda operación y no en la primera.

Ahora bien, este operado anduvo perfectamente bien durante ocho meses, especialmente espuesto á la recidiva por su condición de alienado en quien hubiese sido utópico pensar en la aplicacion de un braguero preventivo. La recidiva se ha presentado en efecto en los primeros dias del mes de marzo y llamo sobre esto la atención, *recidiva del lado derecho*, en donde la cicatriz fué por primera intención, pero en donde no se hizo la canalotomía, como se hizo en el izquierdo, en que se presentó la supuración.

La canalotomía es una modificación de última data que ha introducido Championnière en la cura radical de las hernias.

He practicado dicha canalotomía seis veces (casos 7º, 8º, 9º, 10º, 11º, y 14º) y en todos ellos no he podido obtener la primera intención, no sé si debido al número considerable de suturas en tan corto espacio de tejidos ó por algun defecto inapreciable en la antisepcia, pero precisamente en ninguno de esos casos ha habido recidiva. Ahora bien, Championnière insiste mucho en el mayor peligro de recidiva que existe en los casos supurados. En este último caso la recidiva se ha hecho precisamente en el lado en que no hubo ni una gota de pus, pero en el que no hice la canalotomía.

¿ Será que realmente esta consigue estrechar la puerta de salida de las vísceras aún sobre la base de una herida supurada ? ¿ Serán el ideal de estas operaciones, á los efectos terapéuticos lejanos, la canalotomía unida á la cicatriz por primera intencion? El tiempo y la experiencia lo dirán.

Caso 12. Entero-epiplocele adherente; herniotomía exploratriz; curación. "*Melius est sistere gradum quam progredi per tenebras.*" Es preferible detener el paso á marchar en la oscuridad. Juan Scaroni, argentino, de 25 años de edad, constitución robusta, ha gozado en general de buena salud.

Tiene una hernia ingüinal derecha bastante voluminosa. Diámetro vertical: 21 centímetros. Diámetro transversal y ántero-posterior: 12 centímetros, correspondientes, estos últimos, á una circunferencia de 37 centímetros y ½.

No recuerda bien cuándo apareció esta hernia, pero cree hace un año y medio, poco mas ó menos. Practicado el taxis, dos veces por mi y una por el Dr. French, mi colega del hospital, nos fué imposible reducirla. Hernia, pues, irreductible.

Resuelta la intervención quirúrgica, procedí á operar este enfermo el mártes 8 de noviembre á las 9 a. m., asistido por los Dres. Seco y Zeballos y algunos practicantes.

La anestesia fué dificilísima. Á las 10 y 30 a. m. pude empezar la operación (primer contratiempo).

El testículo se notaba en la parte inferior del tumor, en donde formaba relieve, pero llamaba la atención lo reblandecida y pequeña que estaba esta glándula.

Descubierto el saco, que estaba bastante adherente á los elementos del cordón espermático, elegí el punto mas blando para hacer una pequeña incisión por donde salió una regular cantitad (como 350 gramos) de líquido seroso.

Olvidaba decir que, en vista de la matitez y de la irreductibilidad que presentaba esta hernia, habia formado el diagnóstico de epiplocele adherente, diagnóstico incompleto como va á verse.

Las desadherencias exteriores del saco me dieron, como en ningun otro de mis casos, bastantes puntos hemorrágicos teniendo que poner hasta ocho pinzas hemostáticas y practicar algunas ligaduras (segundo contratiempo).

Hecha prudéntemente la incisión del saco en una extension de 12 centímetros, encontréme hácia el lado derecho y cara anterior con un pelotón de epiploon adherente á la parte inferior, perfectamente libre hácia el canal ingüinal, lo que hubiese hecho fácil su resección juntamente con la del saco. Pero, hácia el lado izquierdo y posterior habia también un pelotón casi informe de intestino adherente de un modo sólido al saco (tercer y gran contratiempo).

Para determinar bien la naturaleza de este cuerpo adherente extraje del interior del abdómen algunas ansas de intestino delgado que le eran contínuas, por lo que, y por algunas franjas que pude notar en los intersticios de aquel magma grasoso, deduje ser el intestino ciego con su apéndice vermicular invisible lo que tenía entre las manos.

Eran las 11 y 45, á una hora y un cuarto del principio de la operación, que se me presentaba el para mí difícil problema de atacar la inserción intestinal en el cuerpo del saco.

No se improvisa así no mas una resolución de esa clase. Tuve dudas, vacilé y persuadido de que avanzar hubiese significado engolfarme en una aventura quirúrgica, preferí, con bastante desagrado por otra parte, hacer una operación incompleta á comprometer muy sériamente la vida del enfermo primero y despues á alterar la pureza de mi inmaculada estadística de once casos de cura radical operados todos con el mejor éxito.

Veremos mas adelante, me dije; consultaré la experiencia ajena, formaré resolución con calma sobre esta inesperada dificultad y si el enfermo lo consiente haré, en otra sesión operatoria, una segunda y final tentativa.

Entretanto queda esta primera parte como una *herniotomía exploratriz* que, á los efectos de la estadística en lo que se refire á la gravedad operatoria de la cura radical, representa tanta ó mas importancia que un caso de operación completa, como le probaré mas adelante.

Reduje todo, suturé con cat-gut los bordes del saco y las túnicas mas inmediatas á él independientemente y luego la piel con crin de Florencia. Coloqué un tubo grueso de drenaje en el interior del saco. Curación suavemente compresiva.

El 9 de noviembre por la mañana el enfermo está muy bien. No hay reacción ninguna desfavorable.

Hícele curaciones diarias, acortándole gradualmente el tubo de drenaje.

El 28 de noviembre estaba ya en pié y me pedía permiso para pasar en su casa unos quince dias de descanso, antes de volver á someterse á una segunda operación si yo la juzgaba conveniente.

He dicho que hasta aquí es este todo un caso de cura radical, y como tal lo consigno en el órden numérico que le corresponde, pero, se entiende, con relación solamente á la gravedad operatoria y á la estadística, que es un punto importantísimo á estudiar en esta clase de intervenciones quirúrgicas.

Creo que este caso, del punto de vista de la gravedad operatoria, tuvo mas que los comunes, pues como en ellos se incindió el peritoneo y se manipuló el intestino y el epiploon y á diferencia de ellos, en vez de cerrar completamente á la acción exterior, por medio de una ligadura en el cuello, la cavidad peritoneal, se dejó un tubo de drenaje estableciendo comunicacion del exterior con la cavidad del saco herniario, es decir, por propagación, con la cavidad general del peritoneo.

Caso 13. Hernia ingüinal derecha; apendicele: resección del saco; curación. Tomás Dominguez, español, 47 años. Hacen 27 años que le apareció la hernia. Ha usado y usa braguero. La hernia es reducible y coercible. Es una hernia pequeña. Desciende, haciendo esfuerzos, hasta la mitad del cordón.

Pide ser operado para verse libre de algunas molestias, y el sábado 12 de noviembre procedí á ello ayudado por el Dr. Seco y por el cabo de la sala D. Hugo Carletti.

Empezó á dársele el cloroformo á las 3 y 45 p. m. La anestesia era completa á las 4 y 30 p. m.

Practiqué una incisión de 5 centímetros. Aislado el saco en sus 5/6 externos, noté, hácia la parte interna, un cuerpo cilíndrico y algo duro. Abierto el saco, me encontré con que éste estaba ocupado exclusivamente por el apéndice vermicular del ciego. Dicho apéndice estaba libre en casi su totalidad. Solamente en su porción superior, á la altura del anillo ingüinal externo, estaba adherente á la pared póstero-interna del saco, mejor dicho, formando él mismo una parte de dicha pared.

Dime cuenta que la operación de cura radical, en este caso, no podría hacerse tan amplia, por no poderse ligar el cuello del saco á la altura conveniente. Sin embargo, reduje el apéndice vermicular y ligué el cuello del saco lo mas alto que pude, concluyendo la operación como de costumbre.

La operación duró 1 hora y 45. No hice la canalotomía sobre cuya conveniencia no estoy decidido.

El enfermo siguió sin novedad, obteniendo, á los quince dias, una cicatrización completa por primera intención.

Caso 14. Entero-epiplocele adherente; desinserción del intestino; sección del epiploon; canalotomía; reduccion del intestino; reseccion delsaco; curación. Scaroni, el enfermo del caso 12º restablecido de la primera operación exploratriz, después de pasar una temporada con su familia, volvió al hospital, resuelto á someterse á la segunda intervención quirúrgica que le propuse y aceptó.

Ingresó al hospital bastante adelgazado y tomé como pretexto dicho adelgazamiento para diferir una operación que me inspiraba bastantes temores.

Por fin, y á ruego del enfermo, quien, á pesar de conocer el especial peligro que iba á correr, queria, no obstante "jugar el todo por el todo," resolví operarle el miércoles 11 de enero de 1893.

La operación había sido fijada para las 3 p. m.

Hacía un calor tremendo (34. 5º á la sombra).

No siendo puntuales los invitados se empezó á dar el cloroformo á las 4 p. m. y á las 5 p. m. recién estaba anestesiado el enfermo.

Acompañábanme los Dres. Enrique Mujica, Murphy y Zeballos, los practicantes Vatteone, Pizarro y Zabala y el hábil enfermero Hugo Carletti.

Practigué la incisión sobre la cicatriz. La cavidad vaginal contenía una gran cantidad de serosidad. La túnica vaginal considerablemente espesada y dura, por lo qual escindí de ella todo lo que pude. El saco herniario que, cuando la primera operación, era delgado, estaba también bastante grueso, presentando en conjunto todos los tejidos un aspecto de degeneración muy diferente del que tenían dos meses atrás. El epiploon, adherido en el sitio descrito (caso 12º), estaba apenas reconoscible en su porción adherente, negruzco y algo endurecido.

Ataqué primeramente la porción intestinal herniada y adherida. Tironeando un poco hácia la parte superior salió de la cavidad abdominal una ansa de intestino delgado que hacia continuación con la parte implantada, pero, examinando á ésta prolijamente, no tardé en reconocer al intestino grueso por una de sus franjas apenas visible entre la atmósfera grasosa apelotonada y adherida. Diagnóstiqué: hernia del ciego con su apéndice vermicular, hipertrofia del tejido grasoso ó franja grasosa y adherencia al saco.

Resuelto á practicar esta vez la desincerción de estas adherencias, lo hice poco á poco, colocando algunas pinzas primero y despues ligaduras con cat-gut en los puntos que daban sangre. Deliberadamente no hice reseccién de tejido grasoso sino en los puntos en que era éste mas prominente. En seguida ligué bien alto el epiploon herniado previa extracción al máximum del interior del abdómen.

Los anillos y canal ingüinales eran sumamente pequeños para dar paso al intestino engrosado por el pelotón adiposo, masa torpe y desprovista de aquella maleabilidad y poder de escurrimiento de que están dotadas las ansas intestinales en los casos comunes de hernia. Para salvar esta dificultad, seccioné anillos, canal ingüinal y algo mas allá en la pared misma del abdómen, para lograr reducir aquel pelotón entero-adiposo, lo cual me dió bastante trabajo.

En seguida ligué bien arriba el saco con tres anillos de cat-gut y seccioné. Presentose al poco rato una hemorragia arterial que la atribuí á un ramúsculo de la epigástrica. Fué fácilmente contenida.

Eran las 8 p. m. cuando practiqué las suturas finales, quedando todo concluido á las 8 y 30 p. m.

El pronóstico que la mayoria de los circunstantes hizo respecto de este caso fué desastroso, participando yo tambien de la creencia muy posible en un fracaso.

El 12 por la mañana el enfermo se siente muy molestado con los vómitos dependientes de su larga cloroformización; pero no tiene fiebre, la lengua está húmeda y el pulso normal.

Ha pasado mala noche.

El 13 se encuentra mejor. Persisten algunos vómitos.

El 14, bien; no hay dolores, ni vómitos, ni fiebre. Obró abundante y espontáneamente. Habiéndose ensuciado el vendaje con la orina resolví curarle. La herida en el mejor estado.

Los tejidos vecinos algo indurados é inflamados.

Le permití tomase un huevo con el caldo.

El 19 volvió á mover libremente el vientre.

El 22 le curé. Disminuí el tubo de drenaje. Estado satisfactorio; desea levantarse.

En definitiva, y para dar una idea de la buena marcha del caso, el sábado, víspera de Carnaval, es decir, el 11 de febrero, salió del hospital sin mi aprobación, dejando dicho al cabo de la sala que deseaba tomar participación en las fiestas.

Dos meses depues he sabido que sigue muy bien.

APARATO DE BONNET MODIFICADO PARA LAS FRACTURAS DE LA PIERNA Y MUSLO.

Por el Dr. REYES G. FLORES, Méjico.

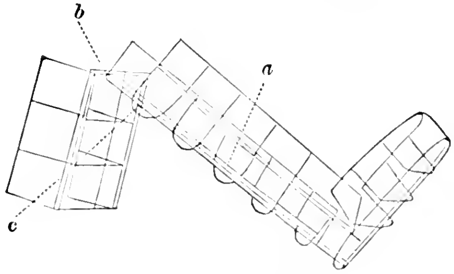

Fig. 1.—Aparato cerrado.

La regilla (*a*) está fija porlos lados abrazando por la mitad inferior los dos tercios de la pierna, de este punto se divide de abajo arriba, longitudinalmente, hasta la corva, en donde vuelve á dividirse trasversalmente y se articula en (*b*) con otra porción que llega hasta el trocánter (*c*), teniendo tambien divididos los lados longitudinalmente, cuyas divisiones así como las de la pierna, sirven para descubrir la pierna ó muslo, sin quitar el aparato y curar con comodidad al paciente, aun cuando las fracturas estén complicadas con heridas ó sean conminutas: la visagra de la corva (*e*) sirve para doblar la pierna y darle la inclinación que desee el paciente para descanzar, sobre un plano más ó menos inclinado, cubriendo la pierna con algodón,

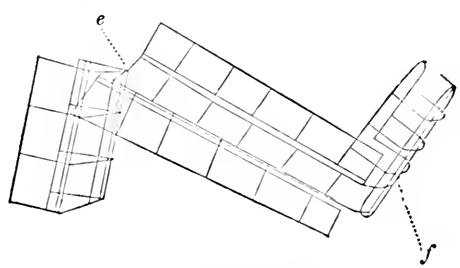

Fig. 2.—Aparato abierto.

sujeto con un vendaje de 18 cabos protejido por cogines; cerrando el aparato y colgándolo con unos hilos, queda espedito para mudar de lugar, con ayudantes ó solo, según el periodo de la enfermedad: el pié queda encerrado en la rejilla (*f*) inmóvil como una chinela.

PYOTHORAX AND ITS TREATMENT.

BY CARL BECK., M. D., NEW YORK.

Among all so-called surgical diseases none shows a greater prevalence in this city than empyema. Its predisposing cause is probably due to the rapid variations of climate, which favors so much the development of pleuro-pneumonia. If it be true that figures demonstrate its prevalence, it becomes evident by the fact that, during a period of eleven years, I have performed resection of a rib in this city in 141 cases for empyema. You will find a great difference in the statistics of European surgeons. So, for instance, with the one exception of König (76 cases during twelve years), some of the most eminent surgeons furnish reports of between ten and thirty-five cases treated likewise during the same length of time.

The Universal Medical Journal, of Philadelphia, in its last issue, June, 1893, published the statistics of empyema treated by F. C. Holt, of Christiania, from 1874 to 1891. It impresses the reader that the 23 cases operated upon during this time were regarded to be a large number.

The St. Louis Clinique* does not disdain to draw classical rules from the observation even of two cases. That under the auspices of antiseptic principles the question is still pending whether aspiration, incision, or resection should be the treatment is a deplorable fact, the explanation of which, in my opinion, can only be found in the fact that the general practitioner is seduced to attempt the solution of surgical problems, which lead to the fields of speculation. One of the few glorious exceptions is represented by Gerhardt (as shown in his excellent essay about diseases of the pleura).

When, last year, I was visiting one of the greatest surgical clinics in Europe,† on inquiry I was told by the chief that only one case of empyema had been treated in the surgical ward during the whole year, as the other cases had to be under the attendance of the physician on internal medicine.

At the last Medical Congress in Vienna no less than six methods for treating pyothorax were still advocated; they were:

(1) The expectant treatment.

(2) Simple aspiration (done once or more), recommended by Silly, Ewart, Kapteyn, Peri, Hughes.

(3) Aspiratory puncture followed by antiseptic irrigation, recommended by Senator, Reichelt, Baelz, Kashimura.

(4) Permanent aspiration (Bülau's method), recommended by Subbotin, Bowditch, Immermann, Leyden, Curshmann, and Playfair, and modified by Phelps.

(5) Simple incision, recommended by Kussmaul, Bartels, Quincke, Ewald, Rose.

(6) Resection of one or more ribs, recommended by Roser, Kœnig, Schede, Bardeleben, Runeberg, Billroth, Rydygier, Weir, Bull, McBurney, Estländer, Ziemssen, Glaesser, Raczynski, Gerhardt.

There is no doubt that the latter method, resection, is gaining ground more and more, especially among and through the real professional surgeons, and it will be the endeavor of this paper, in analyzing the other methods, to convice you of their insufficiency.

It is particularly Kœnig who deserves the most credit for having first offered clear, simple, and methodical indications of a true surgical character.

The genius of my great teacher, Gustav Simon, even at the pre-antiseptic era, found a way to heal old cavities by resecting from three to seven long pieces of ribs, thus enabling the thoracic wall to approach the retracted lungs.

I may be allowed on this occasion to give this eminent surgeon, who performed the first nephrectomy, due credit for this ingenious method, which generally is attributed to Estländer.

The last year saw us admire Schede, who obtained satisfactory results by removing even the whole thoracic wall. Ribs had been perforated already by Hippocrates, the great master, and by studying his book, De Morbis, one can not help getting the impression that, long before him, opening of the chest-wall was a well-developed operation, the indication for which was well defined and must have also been based upon a very frequent and extensive employment of the different methods of incision by knife, cautery, or by perforation of a rib.

In the seventh book of the History of Nature, Plinius, for instance, describes the case of a certain Pharæus, who, after having been given up by his physicians, wanted to die on the battlefield. But when a spear was thrust into the chest pus escaped, and the seeker of death recovered—in fact being cured by the weapon in

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*Arnot Spence, February, 1893.

†University Place, with 500,000 inhabitants.

the hands of his enemy. Euryphon, of Knidos, is supposed to have saved the life of Kinesios by opening his thoracic cavity with the actual cautery.

There can be no doubt that, based upon nearly perfect diagnostic means, such operations were performed frequently and successfully during the great Hippocratic era and that the most of its admirable knowledge had been lost during twenty-three centuries.

Is it not astonishing that Hippocrates laid great stress upon frequently washing the patient with warm water before the operation should be performed? Does this not appear like a dawning of aseptic principles, and explains so well why the successes of operations performed then were so excellent, that some are inclined to doubt their truthfulness?

It would suit the spirit of our sterilizing age to be reminded of the custom of frequent washing by our Hebrew friends, which was made a religious rite by Moses, who must have been the greatest connoisseur of human nature. It is a pity that just this doctrine is so poorly appreciated by some of his Russian offspring.

A slight impression of what we must have lost of the immense knowledge of the school of Kos, and how highly educated Roman surgery must have been, one may gain by visiting the so-called house of the surgeon at Pompeii. The streams of water which were constantly flowing through the streets of Roman cities were certainly apt to remove germs. But more than that—and I do not know if it has ever been mentioned from this point of view—the exceedingly large number of small wells in the house points to the more or less conscious knowledge of the principles of asepsis.

On a recent visit to this most interesting place I felt more than ever before how little advanced in fact we are in comparison with the medical civilization of many centuries ago. And why should not the ancient surgeon, with his fine art of diagnosis and with his powerful weapon—cleanliness—have obtained better results than the surgeon of not many years ago, who went directly from the autopsy room after having washed his hands, *secundum artem*, in a questionable fluid, to the operating-room, repeating his anatomical masterpiece on the living subject, and—with the same effect?

It is not at all astonishing that Sedillot, who brought the operation for pyothorax to light again, was not greeted enthusiastically. His results were so discouraging that the greatest surgeon of his time, Dupuytren, when suffering from pyothorax himself, being advised to be operated upon, declared that he would rather die from the hands of God than of the doctors. Bearing in mind that Velpeau had lost all his cases, and that of 59 cases of empyema he had only seen 4 recoveries, we may well appreciate his conviction.

Later on Sedillot and Langenbeck recommended trepanation, Roser resection. But, as a rule, even among such surgeons as were in favor of resection, it seemed still to be understood that resection should especially be done in adults, while aspiration or incision should be preferred in children, because of their greater tendency to recovery. When I, nearly eight years ago, as far as my knowledge goes, for the first time,* emphasized the adoption of the method of resection for all cases of empyema, without regard to its original cause or to the age of the patients, in a paper before the German Medical Society of this city, my views were received very unfavorably. There was indeed not one gentleman present who had not obtained so and so many excellent results by aspiration or incision, that it was a crime to mutilate poor patients by resection without any necessity, and at the end of the discussion I had the feeling that the condemned Shylock was a nobleman in comparison with me.

It is a great satisfaction to me to know that several of the gentlemen present at that time are now of the same conviction as myself, and it seems to be difficult for them to remember that they ever were possessed of a different one. At the same meeting I, on the strength of 24 cases, maintained that the main indication for resecting a rib was not only, as usually supposed, furnished by the necessity of having sufficient drainage or to induce the thorax to approach the pulmonal pleura, but for enabling the surgeon to introduce his index finger, thus making it possible to palpate the pleural walls.

It is, as I repeat to-day, indeed the only procedure which with certainty shows the presence and allows the immediate removal of clots consisting of fibrinous or

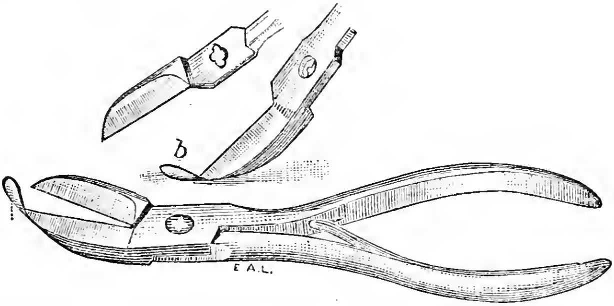
* Cf. New Yorker Medicinische Presse, December, 1886.

cheesy products attached to the pleura. My experience has shown me that in nine out of ten cases I could be certain to find such lumps—at an average of goose-egg size—free in the cavity as well as fastened to the pleuræ.

As long as we have no physical, mechanical, or speculative means to distinguish between this condition and a simple collection of pus, or so long as we can not liquefy these lumps by the use of a dissolving injection first, aspiration and even incision are insufficient and therefore unsurgical procedures. I tried to dissolve such masses by the injection of pepsin, but without avail, as the resection later showed clearly. In three such cases large clots were found afterwards. Anesthesia was only administered when the pulse was strong. Generally caffeine was given before. In the greater number of cases the operation, which can be done in a few minutes, was performed under ether spray.

If the patient or his relatives are adverse to the seeming cruelty of this treatment, their attention can be called to the immense dangers to which an anesthetic might expose the organs of the thorax, the functions of which are so much impaired already by their compression. Not more than one or two drops of chloroform should be poured into the mask, the smell of which often gives the patient the agreeable impression of getting or being insensible. This may explain why I never met with an accident during operation.

As the diaphragm after evacuation is always rising, I usually resected the sixth



rib. Only when the extent of the cavity is found to be very small, I incise above the same, using the aspiratory needle as a guide for the incision. As a rule, between the anterior and posterior axillary line—under antiseptic precautions, of course—I make an incision about 3 inches long, which at once divides the periosteum. From here the thoracic walls can be palpated equally well anteriorly and posteriorly. Furthermore, the patient, when brought on the edge of the table, can assume the dorsal decubitas; while, if the incision should be made farther back, he would lie on the healthy side, which on account of the pressure of the effusion would expose him to great danger. Then with a small curved elevatorium I lift the periosteum from the rib, which then is pushed underneath the rib so that the rib rides on the instrument. A blunt hook retracts the tissues alongside the rib toward the axilla. One blade of a bone scissors is introduced below the rib between hook and elevatorium, and the same cut through. Then the elevatorium is pushed toward the sternum, thus forcing the rib from the last fragment of adhering periosteum, the hook inserted opposite to the wound, and with scissors the same manœuver is repeated. If my own elevatorium shears (see cut) are used, it is only necessary to tear away the connection between the periosteum and the rib and cut the rib through, the instrument being of such a shape as to keep the tissue properly retracted. The one blade, if separated, can be used as an elevatorium, so that, without having anything else on hand than a knife and this scissors the whole operation could be performed. A piece long enough to allow the introduction of the finger suffices.

It is impossible to strike the intercostal artery during these manipulations. Iodoform (as a powder or as a saturated solution in ether) is then distributed above the wound surface, to prevent infection from the pus as it flows from the cavity.

Through a small opening made into the pleura with a bistoury a Pean forceps is introduced and the pus slowly evacuated. A sponge is pressed against the opening from time to time to interrupt the stream, to avoid a too rapid expansion of the lungs. (The time of evacuation should be at least twenty minutes.) The finger is now introduced, and lumps, which are now probably found to be adherent to the pleural walls, are wiped off with the index finger or with a blunt spoon made for this purpose (like a spoon for stone in the bladder). If bleeding should occur, this may be deferred for two or three days. An irrigation of a bichloride solution (1 to 5,000) is used mainly for mechanical purposes; that is, to evacuate thoroughly. The pleura is then stitched to the skin with four iodoform silk sutures, forming a mouth (pleurostomy.) These sutures at each edge of the wound and two opposite ones at its middle are generally sufficient to cover the wound surface, to prevent secondary hemorrhage, and keep the opening large. Some iodoform powder is put into the cavity to reduce the secretion, then the wound is covered with iodoform gauze. The whole side is protected by a pasteboard-like piece of sterilized moss, which, after being slightly dipped into a solution, adapts itself to the contour of the body like a plaster of Paris dressing. A strip of rubber adhesive plaster keeps it tight, so that no air can enter. During respiration it acts like an aspirating valve and absorbs at the same time. After three days a rubber drainage-tube, of the size of a man's index finger, secured by two large safety-pins in the shape of a cross, is introduced. I have refrained from introducing it immediately after operation, since I have witnessed considerable bleeding from it. Undoubtedly the constant respiratory movement of the pleuræ causes irritation in the way of rubbing. It seems that after the pleuræ become more accustomed to the contact of the atmosphere, as soon as granulations appear, they stand the irritation well. As the cavity is, indeed, entirely emptied after the operation, there is no necessity of washing it out afterwards. As an average, two weeks after the operation a smaller drain is introduced, which gradually has to be shortened. When the serous discharge becomes scanty the drainage-tube may be left out and a small strip of iodoform gauze introduced. For the following few days the patient has to be watched very carefully. It may be that the cavity is obliterated the following day, but very often union is only superficial and retention of pus occurs, as an expression of which an elevation of temperature will be noticed.* Then, of course, the drainage-tube has to be introduced again, and after a week the same manœuver must be repeated, until four days after the obliteration no secretion has been showing up and the temperature has remained normal. In doubtful cases the grooved director may reveal the presence of retained pus. The patient should always lie on the diseased side of his thorax, and should be lifted up by the feet about every four hours, so that the pus will flow into the dressing. This renders the procedure, as advised by Küster, unnecessary, to make a counter opening to avoid the retention of pus. There is no reason for introducing the gauze into the cavity.

The dressing has to be changed twice a day for the first week, later on once a day and after three weeks only every second, third, or fourth day. The patient, if in any way possible, should get up after one week. The thermometer is controlling the treatment, i. e., the change of the dressing. During the after treatment for the first few days small doses of morphine are administered for the purpose of immobilization. If the pulse be weak, strophantus or caffeine may be given at the same time. Later on, syrup. ferri iodid. or cod-liver oil is ordered. Nourishment is given frequently in small quantities to avoid distention of the stomach. Great stress is laid upon the necessity of gymnastics to prevent curvature. My experience leads me to the conclusion that simple empyema, operated early, will only under extraordinary circumstances turn out unfavorably. In other words, the chances of an empyema depend entirely upon the early diagnosis by the general practitioner. The diagnosis of empyema has to be made by the aspirating needle. If there is

* Cf. history of Case XIII.

much cheesy accumulation, or a small cavity, or if the fluid be encysted through the division of the cavity by adhesions, it has to be introduced quite often on different portions. I sometimes have explored ten times before I could corroborate my suspicion. I found it useful, when I could not draw any pus, to push the wire through the needle, a procedure which sometimes made a trifle of pus appear on the end of the needle.*

After deducting the 24 cases published seven years ago, 117 remain in this series. Among the cases 39 were below 3 years; 32 were between 3 and 5 years; 19 were between 5 and 10 years; 10 were between 10 and 16 years; 17 above this age. Of them 12 died above 16 years, 5 from tuberculosis; 98 were simple acute cases, 19 were complicated. Among 5 double-sided, 4 recovered.

In the case of a child 2 years of age, where I had operated one year ago, and where recovery was perfect four weeks later, I had to perform a resection after a second pleuro-pneumonia only four weeks ago on the same side.

All the empyemas with offensive odor (4 cases) died.

The average time of the healing process was five weeks. Recovery of a baby, aged 6 months, was perfect after six days.

Among the cases of simple empyema (collection of pus—*bonum ac laudabile*—following an acute inflammatory process in the lungs or pleura) in 63 the diagnosis was made early. These cases recovered without exception.

Among the 37 cases which were diagnosticated late, 5 showed the typical vaulting of the thorax. (In two of them a fistula remained; one of them died after resection of seven ribs.)

In 6 cases I was doubtful whether tuberculosis was causing the empyema, or if the long standing of the latter did not cause the tuberculosis. In fact, I can not understand how an accumulation of pus could occupy any portion of the body for months without causing sinister manifestations.

Two cases where tuberculosis was diagnosticated, and therefore considered non-operable, recovered after resection. So they, according to the wisdom of the dissuading capacities, had, as one would imagine, been treated wrongly.

Based upon this experience (similar cases respecting cures are reported by Schede and Güterbock),† I repeat that resection of a rib should be performed whenever the presence of pus has been verified by the exploratory needle, no matter if tuberculosis is confirmed or not. What harm can be done by resection? A consumptive has nothing to lose and everything to gain.

As before alluded to, the differentiation between tuberculosis and simple empyema is not so easy as it seems on superficial contemplation. An abnormal condition, for instance, at the apex does not necessarily show the tubercular character of the empyema, and *vice versa* bronchial breathing, râles, and bronchophony during auscultation, the symptoms of compression as well as forced pectoral fremitus, can all be due just as well to a tubercular infiltration of the lung tissues.

I may, for instance, relate the following history: A machinist, 26 years of age, showing an excellent family record, took sick suddenly, never having been ill before, with a chill and nausea. Pleuro-pneumonia developed, which ended by crisis. Perfect recovery, however, did not follow, but the patient went around for three months while suffering from slight dyspnœa and low fever. Four months after the onset of the pleuro-pneumonia I had a chance to perform resection, but three months later the patient died from tuberculosis. Now, was the acute inflammation already the expression of commencing tuberculosis? Hardly!

In the cases of so-called stinking empyemata other serious suppurative processes had been present. So it may be that the patient succumbed to the multiple pyæmic foci. So if I abstract the deaths caused by pyæmia and tuberculosis, only 5 cases, including the 3 Estländer operations, remain, where I can attribute the fatal result directly to the consequences of the operation.

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* Cf. history Case IX.

† Cf. Berliner klinische Wochenschrift of June 27, 1892, p. 655.

My results of the so-called Estländer's operation were little encouraging. Among 5 cases where I had to resort to it, I saw only 1 recover perfectly (3 died) * and another is still mourning his fistula.

In a case of thoracic fistula, existing for two years, I recently tried the following osteoplastic experiment: On a man, 36 years of age, who after an attack of pleuro-pneumonia suffered from pyothorax, resection of a rib was performed only after repeated aspirations—that is, about six weeks after the onset of the suppurative process. The cavity did not fill up and a fistula still remained fifteen months after the resection. At this time the cavity would hold about a pint of irrigation fluid. The fistula was situated 1 inch behind the right anterior axillary line at the level of the seventh rib. Probe and finger introduced into the dilated fistula canal proved that the cavity extended from the second to the eighth rib. Laterally in its center it reached from the posterior axillary line forward to about an inch to the inner side of the sternum. According to my determination I made a semilunar incision from the upper margin of the second down to the upper margin of the eighth rib, dividing all the soft tissues at once. The beginning as well as the end of the incision was situated at the anterior axillary line. The middle of the segment nearly touched the sternum. While sharp hooks retracted the soft tissues, the periosteum was incised around each rib and with an elevatorium it was freed from its attachments. The rib was divided then with the bone shears. In this manner the third, fourth, fifth, sixth, and seventh ribs were cut through in the direction of the semilunar incision. Then they, still in their connection with the periosteum, could be pushed down into the cavity to a considerable extent. If I had had any difficulty in dislodging the ribs I would have resected pieces of them. The bleeding was insignificant. A very tight dressing, consisting of sponges and boards of moss, pressed the fallen-in ceiling of the cavity inward, which had been previously scraped and was slightly packed with iodoform gauze (but only toward the dorsum). Every second day the dressing was changed and pressure made upon the flap. The patient's condition was not impaired by the procedure, and three weeks after the cavity would hold only three-fourths of a pint.

Originally it had been my idea to make semilunar incisions, according to the periphery of the cavity, anteriorly as well as posteriorly at the same time, but the fear of insufficient nourishment of the flap prevented me from doing so. Therefore, I preferred to divide the same ribs further back twenty-four days after the first operation, when the condition of the depressed portion was such that I could expect the circulation to be well restored. Now the sunken-in area forms a deep depression. In proportion to this, 2 tablespoonfuls of the irrigation fluid is retained only by the cavity. The patient's general condition was very much improved.

It seems that I am justified in hoping for a permanent obliteration. Of course the adaptation of the thoracic wall to the pulmonary pleura is not as thorough at once as after total resection, but it is evident that, if my experiment proves to be a success, the patient enjoys the great advantage of not having suffered the loss of his bony support. At the same time I may call attention to the scant loss of blood, and especially to the impossibility of interfering with the intercostal arteries. (Further remarks about this case I reserve for a future communication.)

In reference to sero-fibrinous exudations I may state that I do not approve of resection as recently recommended in Germany. In this connection I may say that in two cases I have injected a 10 per cent mixture of iodoform in glycerine, with success, into the pleural cavity, after having aspirated first.

In reference to the etiology, I found pleuro-pneumonia occupying the front rank. Among the complete histories I found it 81 times, 29 times after influenza; scarlet fever, 8 times; puerperal processes and other septic infections, 4 times; whooping-cough, twice; and diphtheria, once.

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* Cf. histories.

As far as the pathological significance of empyema is concerned, I acknowledge that it is very different. The etiology as well as the extent of the exudation, the kind of pus (if thin, thick, smelling, or putrid), the age and constitution of the patient, the pulse, the temperature, the digestion, the subjective condition of the patient, and the stage of the disease, have all to be taken into consideration. Furthermore, it is of great importance to know to what particular microbe the empyema is due; that is, if to the streptococcus, the pneumococcus, the tubercle bacillus, the typhoid bacillus, to the staphylococcus aureus or albus. Some empyemas contain simultaneously several forms of schizomycetes.

Netter, in 109 empyemas, found: Streptococcus, 51 times; pneumococcus, 32; sapropleytic organisms, 15; Koch's bacillus, 12. About half of all empyemas contain streptococci. As this microbe is most commonly found in suppurative processes, and has its domicile constantly in and on the most healthy persons, it is self-evident that it frequently will be demonstrated in pyothorax.

It seems that it especially tends to the formation of solid masses. Its predilection is for the infectious diseases of adults. The pneumococcus of A. Fränkel is more prevalent in the primary empyemas of children. About 25 per cent in adults and 75 per cent in children.

This form of empyema shows the most benign character among all, so that some are inclined to attribute this to the microbe; but it seems to me that the vitality of the organs and the compliance of the thoracic walls are the main causative factors of the more benign character of empyemas in children. The absence of the tubercle bacillus does not prove the absence of tuberculosis, as it very often is not found. There are empyemas where only Koch's bacillus is found, and there are some where streptococci, staphylococci, and several mixed forms could be discovered. In the latter case tuberculosis has repeatedly been diagnosed by other methods. There is still left a good deal for future investigation, to make these microscopical examinations more useful for the surgeon.

All these points certainly influence the prognosis as well as the after-treatment, but certainly could not prevent me from performing the resection, as long as there is the slightest hope for recovery. As long as our diagnostic means are so insufficient that we never are able to know, before the operation, exactly if the lung will expand in proper time or not, we from the start must make our arrangements in such a way that we can meet all eventualities afterwards.

It is certainly very disagreeable if the patient, for instance, has been promised to be cured by incision, and then the ribs approach each other so much that drainage becomes imperfect and resection must still be done weeks after the incision! An occasion like this will hurt the reputation of the surgeon to the greatest extent.

Among the accidents I have witnessed I may mention that no less than four times I have been called to extract drainage tubes which were imperfectly secured (such as by one safety pin), or where the rubber was of an inferior quality, so that breakage occurred. Once I removed a drainage tube, 9 inches in length, a year and a half after operation by Bülau's method.

Breakage of a poor rubber tube, however, occurred to myself once, but fortunately I was able to grasp it with the forceps the moment it slipped off.

Once I assisted a general practitioner (cf. history below) who, when trying to stitch the pleura to the skin, broke his needle. I fortunately was able to extract the fragment from the cavity, where, on a level with the second rib, it was already driven into the lung.

In analyzing the six different methods mentioned above, I can hardly say anything else about the value of the so-called expectant treatment, than that I regard it to be a crime. How men of the standing of a Leyden can maintain that empyemas, following pneumonia, are very quickly absorbed as a rule, I fail to understand. I hold exactly opposite views—that is, that absorption takes place only under the most exceptional circumstances; and if it really does, it seems to me to be a great misfortune for the patient, because this procedure most probably furnishes the first step in tubercular infection.

P. K. Pel * mentions that the principle, *ubi pus, ibi evacua,* has justifiable exceptions, and that if empyemata be of small size, if the general condition of the patient be excellent, the pulse slow and well filled, if no fever be present, and the appetite remain good, absorption through thickening can be expected. Now, if one should recover from such a healthy disease without having used the exploratory needle, diagnosis will certainly be doubted; and, on the other hand, if an aspiration should have yielded pus, who will dare to recommend expectant treatment? Simple aspiration is to be condemned because it may only cure some of such cases, where no clots are present; and, as we have explained above, we have no means of knowing of their presence otherwise than by making an opening which allows the introduction of the finger. It is a hazardous procedure. When Pel says, "We, without performing resection several times, had perfect results," I may answer that I hardly know of any disease which, no matter how badly it was treated, has not occasionally been cured in spite of bad treatment. It is a pity that the advocates of the aspiration never have an opportunity to see the clots, and therefore they are under the impression that there are no such things in existence. They are satisfied in aspirating a certain amount of liquid pus; the patient is relieved and gladly submits to a second and third aspiration, because a stab with the needle is indeed no operation, and the most unsurgical physician can perform it.

If the patient could with his intellectual eye see the lumps in his pleura, common sense would teach him, the layman, that they never can be aspirated. But as it is, he will be aspirated so long till he is emaciated; and he is sucked, in the truest sense of the word, till the lungs become contracted. Then, as a last resort, resection may be recommended, which at this late stage, when the expansion of the lungs is so much interfered with, usually proves to be a failure.

From this the aspirating enthusiast deducts that resection is an operation which yields a bad prognosis, and that "he never saw a good result from it." Albert says very well, in reference to aspiration:

> This procedure is analogous to the pumping out of other abscesses, for instance, suppurating buboes. In such cases a variety of aspiratory instruments have been tried, and once in a while a cure was effected.

The only courageous and clear treatment is the broad opening.

This whole surgical business is strictly analogous to the interference of a badly trained midwife. It is a great satisfaction to me to state that, among my personal professional friends, I have been able to convince every one of them of the incorrectness of aspiration, although they all, more or less, had experienced a few results with it. For conviction I needed only to invite them to a resection at the hospital, and when they had seen me remove the clots from the pleura they confessed they did not have the slightest idea of their existence, otherwise "they would not have tried their adventurous policy."

Aspiration, however, is by no means an innocent manipulation. The irritation in the pleural cavity may produce epileptic spells, vertigo, nausea, fainting, and even fatal collapse. At the same time a nervous physician may interfere with an intercostal artery. (As reports show, death has occurred repeatedly through extensive bleeding.)

Upon aspiration, followed by irrigation, only a few surgeons rely, so far as my knowledge goes. The idea to wash out solid particles is, of course, a very good one, but regarding the large size of the lumps, the evacuation through the small tube is absolutely impossible. Therefore, this method, which fifteen years ago was received with great enthusiasm, has dropped into deserved disuse, and in fact is identical with simple aspiration.

Nearly the same can be said about the aspiration followed by permanent drainage (Bülau's method). In cases of simple empyema of short standing, where the lungs still expand easily, or wherever there are no lumps present, this method would be

* Zeitschrift für klinische Medicine, p. 211. Berlin, 1890.

the ideal one. It consists in puncturing the pleural cavity with a trocar, into which a rubber tube can be introduced, this being long enough to reach a bottle partially filled with an antiseptic solution.

Analogous to the syphon-drainage after lithotomy, the pus should be constantly aspired, as negative pressure in the pleural sac is caused. But as the lump question can not be settled before a free opening is made, this method is nothing but an interesting experiment, although the author's results deserve attention.

It is certainly very interesting that once in a while fibrinous products, especially when tightly attached to the pleural walls, can slowly be absorbed. But as we, in fact, are not at all able to judge the conditions under which this takes place, and furthermore, as we, while trying to find out if the solid masses will be absorbed, or if we must not resect anyway, are losing so much precious time, it is only little better than the simple aspiration. Besides it is very probable that the absorption of the cheesy masses, if it exceptionally should occur, would favor tuberculosis. The tube, however, becomes easily displaced, so that its main advantage—the hermetical exclusion of the air—is void. Finally, the treatment can only be carried out in a hospital.

The method of simple incision has still many advocates, who claim that a small incision suffices. Furthermore, any general practitioner could perform the operation; while resection, a very difficult and mutilating operation, would require the skillful hand of an excellent surgeon. Resection should therefore be only performed in such cases where, after several months' treatment, the ribs have approached each other so much as to make drainage impossible.

In reference to the first point I may say, that if we open an abscess nowadays, we do not think that a small opening suffices, but we make the incision as broad as possible. Indeed, so wide that, if we have a chance, we try to overlook our whole field of operation. We may palpate the walls of the abscess and find, besides its thin lining membrane, necrotic tissues. After having noticed them, the immediate removal is a matter of course. Only after this do we mean to have evacuated our cavity thoroughly. Then we do not need to wash it out every day, as only a serous secretion is to be expected, and the natural sequence is a perfect and quick recovery.

Would a surgeon have the audacity to lance a large abscess anywhere else, to introduce a small drainage-tube, and to wash it out every day? Such surgeons perhaps change their antiseptic fluid once in a while, assuming this perhaps to be the cause of the insufficient progress? And where is the difference between this and a pleural abscess?

I am not able to overlook the field of operation and to introduce my finger into the pleura after incision. I can wash out small but no large clots, and it is impossible to diminish them inside. Furthermore, I can not detect those clots which adhere to the pleural walls. So they undergo fermentation and if the patient's condition stands it, they become decomposed, and until then, under repeated febrile elevations become dissolved and are then washed out. Therefore irrigations can not be dispensed with, which are destroying those very adhesions which we need so much for the obliteration of the cavity. How important these adhesions for the agglutination are, has been emphasized already in 1865 by Dr. A. H. Smith, of this city.

That retention of pus is always present in this condition is self understood. In regard to the difficulty of the operation, I am confident that herniotomy or tracheotomy, operations which every general practitioner should be able to perform, are much more difficult. As far as the possibility of interfering with the intercostal artery is concerned, this accident, on account of the anatomical situation of the same, happens much more easily than during resection. The incision is only made as far as to the periosteum. Then with blunt instruments the tissues, in which the artery is embedded, are pushed aside, so that it can easily be seen and avoided. For the same reasons there is no loss of blood, while after incision through the intercostal space, fatal bleeding has repeatedly occurred. In reference to the scarcity of the moving together of the ribs, I find that this condition is the rule. In fact, it is a healing process, it is the healing tendency of nature itself which makes the ribs approach, and so the remedy itself in this case is a prevention of the cure, because it occludes the opening.

Altogether, the only rational method of treating empyema is the subperiosteal resection of a piece of rib. It is a clean, easy, safe, and nearly bloodless operation. It guarantees a large opening for a sufficient length of time, and the resected piece, if the periosteum has been preserved, is always restored. Scoliosis I have never observed, with the exception of one case of Estländer's operation:

Among the histories I may report the following:

Case I.—Mrs. B——, aged 53, a widow, shows a healthy family record. In April, 1882, she had an attack of pleuro-pneumonia, which was followed by pyothorax. After several aspirations, each of which gave temporary relief, I was asked to make an incision. But I insisted upon performing resection, which was done in presence of Drs. Waechter, Stutzer, and George Stiebeling, of this city. During the three weeks following the operation hectic fever was almost continually present, which weakened the patient considerably. Irrigations were made daily. Nearly every third day, I confess to my own shame, I tried another irrigation fluid, in the erroneous supposition that "*in hoc signo*" I would be victorious. In this manner I used boric acid, salicylic acid, acetate of alumina, carbolic acid, chloride of zinc, and at last, in my despair, even made irrigations with solutions of tinctura iodi and argenti. nitratis, with a bad result, of course.

Just by accident I happened to introduce my finger to palpate the pleuræ. To my great surprise I found a large amount of adherent tissues, which I instinctively removed at once. On the following day the temperature was normal, and after a few weeks the healing process was perfect. So far as I know, the patient is still enjoying good health.

This case taught me to carry out the principle of cleansing more extensively *a priori*.

*Case II.**—A. L——, a girl aged 1 year, sickened with pleuro-pneumonia on the right side. Pyothorax followed, which was recognized by Dr. A. Aronson, of this city.

Five weeks after the onset of the inflammatory process I performed resection. Six weeks later healing was perfect. Two weeks afterwards pleuro-pneumonia developed at the opposite side. Resection of a rib was performed fifteen days after the beginning of the pleuro-pneumonia for an empyema of small extent. Lumps were present this time as well as at the first operation. Recovery took place three weeks after the operation, while being treated as an outdoor patient.

Case III.—M. R——, a boy 6 years of age, took sick with acute inflammatory symptoms which were supposed to be dependent upon typhoid fever. Four weeks later Dr. L. Haupt demonstrated the presence of pus. Resection was done immediately. Lumps were present. Recovery was nearly perfect, when, four weeks thereafter, the parents suddenly left for California, where, as it seems, through great negligence, a fistula became established. After four years' stay the patient returned to New York, where I found him in a desperate condition. The old fistula led into a cavity which extended from the second to the fifth rib and from the margin of the sternum to the right anterior axillary line. After having resected the second, third, and fourth ribs correspondingly, perfect recovery took place five weeks later.

Case IV.—E. F——, a girl 14 years of age, suffered from pyothorax after she had gone through a pleuro-pneumonia, as stated by Dr. A. H. Stiebeling.

Four weeks after the onset of the acute symptons resection of a rib was performed by me. (Lumps found.) After three months I was summoned again, as a discharging fistula still existed. I dilated and scraped. After an absence of five months I saw the patient again. Now I found that an assistant had performed resection of the sixth and seventh ribs, but only to the extent of a half inch, just to "make the rib sink in," as his idea was; but this scheme did not work, as the same *status quo ante* was still present. Now, I resected a very long piece of the fifth and two shorter ones of the sixth and seventh ribs, corresponding with the roof of the cavity, which would hold about 3 tablespoonfuls of fluid. Four weeks thereafter recovery was perfect.

Case V.—Miss E. L——, 33 years of age, of good family history, took sick with chills and sharp pains in the right side. She had coughed a good deal, and about three weeks after the onset of the disease (undoubtedly a pneumonia) was able to be about again. After this she was treated by her physician for two months, but only occasionally, until chills and pain in the right side compelled her again to stay in bed.

Dr. L. Weyland, who was called in now, found a prominence of the size of a man's fist at the right thoracic wall, the center of which corresponded with the sixth inter-

* Case presented to the German Medical Society, March, 1890.

costal space. The diagnosis of an empyema necessitatis was made then and an operation performed by me without delay. Considerable improvement followed, but a fistula remained, which in spite of repeated scraping, gymnastic exercise, and pneumatic treatment in Williams's cabinet, could not be obliterated. Therefore I undertook a resection of the fifth and sixth ribs to the length of 5 inches, as corresponding with the middle of the roof of the cavity. This was followed by a considerable decrease of the secretion, but still a year thereafter the cavity had not filled up.

Two and a half years after the onset of the disease I performed a third resection (St. Mark's Hospital). After the patient had inhaled only a few drops of chloroform pulse and respiration stopped. It was a long time before we succeeded in resuscitating the patient. I now, without administering any further anesthetic, resected four ribs more (third, fourth, seventh, and eighth). The very large opening was covered with iodoform gauze. After the operation was over the patient, still lying on the operating table, overwhelmed me with the assurances of her gratitude, a fact that shows clearly that she did not consider the omission of further anesthesia to be a cruelty. Six months later the cavity had become so small that it could hold only one-half table, oonful of an irrigation fluid. In accordance with this the patient's general health was excellent. In spite of the removal of seven ribs altogether, only a very moderate lateral curvature could be noticed. During the epidemic of spring, 1891, she became affected by the influenza, to which she succumbed quickly.

*Case VI.**—A. N——, 30 years of age, from a healthy family, took sick with repeated chills, disturbances of digestion, and rapid emaciation. He was treated first for malaria at his home in South Carolina, but when a slight cough set in he was supposed to be tuberculous, wherefore he was sent to New York, as at this time, under the jubilee hymns of the Koch Tuberculin era, an antituberculous institution had been established. There, however, in spite of the hyperactivity of the hypodermic syringe, the art of diagnosing had not been forgotten, and it was recognized that an abscess, originally situated in the liver, had perforated into the pleural sac.

The patient was brought to my department in St. Mark's Hospital, where I, after having performed resection of a rib, could make out a cavity of the size of a goose egg in the parenchyma of the liver. The communication with the bronchi could be demonstrated by irrigating an antiseptic fluid. The first few times when I did this the patient got such a severe attack of cough that he became dark blue in the face, and dyspnœa was so serious that I was very much alarmed. Finally, we both became accustomed to this phenomenon, and I could frequently demonstrate before my students the connection between cavity and lungs by irrigating. Six months after the operation the patient had gained 30 pounds, but there was still a cavity, wherefore I resected two ribs. Hereafter the cavity became smaller. I then lost sight of the patient. His general condition was excellent.

Case VII.—E. W——, boy, 6 years of age, shows a good family record. Three years ago I was called twice to perform intubation resp. tracheotomy for laryngitis. Each time I postponed the operation, and, as it is evident, with perfect success. (If intubation had been done the result would certainly have been a good one, and it would naturally have been supposed that it had saved the patient's life.) Now, after a preceding pleuro-pneumonia, empyema had developed, which was aspirated without success, as usual. The house physician was desirous to perform a resection himself, and asked me to lend him a helping hand. Everything went on nicely until the operator, too ardent in his desire to get the needle through the pleura, drove the needle into the rib so that the needle broke. The fragment could not be found. Although the optimistic colleague assured me that he saw it fall on the floor, I insisted upon palpating the pleural cavity. Here I soon discovered it at the level of the second rib, where it, being an inch long, had already perforated the lungs. As the sixth rib had been resected, I could just reach it with the tip of my index finger. By pressing it against the thoracic wall I at last succeeded in dislodging and making it fall down during inspiration. I had already given up hope of catching it this way, as I was afraid to push it farther inwardly by the use of a forceps during the respiratory movements, and had, therefore, thought of resecting the second rib. The patient recovered in spite of all, and as it is my principle never to allow a member of the family to be present during operation, this incident passed unnoticed.

Case VIII.—O. F——, boy of 15, took sick with pleuritis five weeks ago. The effusion first was of a serous and later on of a purulent character. When I was consulted by the house physician, I found the patient somnolent, in cold perspiration and with great dyspnœa. The temperature was subnormal and the pulse could hardly be felt. The exudation extended over the entire half of the thorax. I declared that under these circumstances the operation should be performed without delay and without an anesthetic. To this latter proposition the house physician

*Demonstrated before the German Medical Society of the City of New York, June meeting, 1892.

objected most emphatically, especially because the father objected to the cruelty of such a procedure. When I declined to intermingle in this aspect of the question altogether, the colleague reproached me with injuring him in his position as the family physician.

I can not spare myself the blame of having been thus intimidated and having sacrificed my scientific conviction to etiquette.

The punishment, however, was not long in forthcoming; after the patient had inhaled only a few drops of chloroform, the respirations, heretofore so frequent, stopped entirely and the face became cyanotic. I had insisted upon administering the anesthetic myself, and was at once ready with tongue-forceps, dilator, and electric apparatus. With this armamentarium and artificial respiration, I after half an hour's work, resuscitated the patient. Then the operation could be performed without any objection to the not administering of the anesthetic, so that at last the patient did well.

This was a good lesson for the colleague as well as for myself.

Case IX.—S. R——, girl of 10, four weeks after the onset of pleuro-pneumonia was aspirated for empyema in a hospital of this city. One week later an incision was made. When six months hereafter recovery did not take place, a resection was performed. This was done with a chain saw, and just as much of the rib had been removed as to enable a thin lead pencil to slip through the opening. Into this small canal a rubber drainage tube of the thinnest caliber was confidently introduced, which after it had courageously resisted the permanent rush of the retained pus, at last resigned and broke beneath the safety pin, which alone kept it *in situ*. As the parents moved just at this time to Long Island, the dressing was not changed for nearly a whole week.

It was reserved to Dr. Voegtle there to ascertain the error loci of the drain fragment. With his aid I performed a more thorough resection, and could then, as introduction of my index finger was very easy, extract the fugitive tube without any trouble. Scraping off a large amount of granulations completed the procedure. Four weeks later recovery was perfect, after the poor child had been aspirated, incised, and resected, first with saw and then with shears.

Case X.—In refererence to the case of the tubercular machinist mentioned above, I may state that on account of insufficient technique the exploratory needle, although repeated by one of the most prominent authorities of this city, yielded no pus. On account of this, the well-developed dullness was supposed to be due to an infiltration. Three days later, when I saw the case for the first time, I aspirated three times until I found pus.

A more striking illustration of the difficulty of the exploratory technique is the following case, which shows how grave an error I committed only a few months ago:

Case XI.—A. R——, 2 years of age, of a good family record, was sent to my office with a letter from Dr. Moskiviecz, stating that the child had suffered from pleuro-pneumonia, and that this was followed by empyema. Aspiration had yielded pus, and so he had referred the patient to me for operation.

The parents took the child first to another physician, a very well-known diagnostician in this city, and one who has had much experience with empyema. After several aspirations, in which he failed to find pus, he stated that no operation was required. The child not improving, it was brought to me. I made six aspirations, and then the parents objected to its further use, so I became somewhat perplexed and did not give any positive opinion about the case, although the symptoms of dullness, weakened respiration, and the history were in favor of empyema. The question of operation was, therefore, deferred for twenty-four hours. The next day pus was found and the operation performed. After resecting the rib I found a small cavity filled up with an immense cheesy mass, only about half a tablespoonful of pus being present in the cavity. The aspirating needle undoubtedly had been inserted into the mass repeatedly, and could naturally draw no pus.

Case XII.—L. I——, aged 12, had developed empyema after pleuritis. The exploratory needle yielded pus. On the following morning I had determined to operate on the child at St. Mark's Hospital, but during the night repeated attacks of cough, lasting several hours, brought on a considerable amount of expectoration.

In the morning I repeated the explorations a dozen times without finding pus, so that I, regarding this rapidly improved condition of the patient, restrained from operating. Shortly after perfect recovery took place. I assume that in the night, perhaps induced by the puncture, perforation into a bronchus had taken place.

Case XIII.—M. T——, a girl aged 8, with the same history, recovered after I had drawn pus. On the following day, before I wanted to operate, I could not find any more pus, even after I had aspirated a dozen times.

In this case no cough had been present. Perhaps there was a connection here between irritation by puncture and rapid absorption.

Case XIV.—M. L——, aged 6, strong boy, with good family record, took sick, after having swallowed a considerable amount of orange kernels. He located his very sharp pains in the right iliac fossa, had vomiting and slight convulsions. The temperature was 106° F.; pulse, 144; respirations, 42. It was not at all unnatural that the house physician thought of appendicitis, much more so as one of the patient's comrades had, during play, taken gymnastic exercise by jumping on his abdomen.

One of our most prominent surgeons was called in at once, who, as he could not ascertain any resistance in the right iliac fossa, advised expectant treatment. The right leg of the patient could be lifted without causing any pain. At the same time I had a chance to examine the patient. I got the impression that a difference of sounds was obtained by percussing the right lower lobe. But as the nuance was only slight, and people as a rule do not have much confidence in the percussion of of a surgeon, we agreed to have a well-known specialist for lung diseases present, who, indeed, when he had examined the child on the following day, could now easily make the diagnosis of pleuro-pneumonia.

Three weeks later I performed resection for empyema. The patient improved rapidly until the house physician, three weeks later, tried to do without a drainage tube. The opening obliterated outside at once, but a few days afterwards chills set in. As no subjective symptoms, especially no pains, were present, typhoid fever was thought of by the attending physician, a diagnosis which was corroborated by one of the greatest clinical teachers of this country.

When I was called two days later I, by forcing a grooved director into the old scar, could easily demonstrate the presence of pus. It is superfluous to say that its evacuation cured the "typhoid" immediately. A drain was introduced again, and eighteen days later perfect recovery had taken place.

SECTION V.—MILITARY MEDICINE AND SURGERY.

Honorary Presidents.

CHARLES SUTHERLAND, M. D., Surgeon-General, U. S. Army (retired).

J. MILLS BROWNE, M. D., Chief of Bureau of Medicine and Surgery, U. S. Navy (retired).

WILLIAM A. HAMMOND, M. D., Surgeon-General, U. S. Army (retired).

ROBERT MURRAY, M. D., Surgeon-General, U. S. Army (retired).

JOHN MOORE, M. D., Surgeon-General, U. S. Army (retired).

J. RUFUS TRYON, M. D., Surgeon-General, U. S. Navy.

Col. CHARLES PAGE, M. D., Assistant Surgeon-General, U. S. Army.

Col. FERNANDO LOPEZ, M. D., Mexican army.

Col. THOMAS CASAS, Medical subinspector of the first class, Spanish army, Havana.

Surg. Gen. ROBERT GRIEVE, M. D., Georgetown, B. G.

Surg. Gen. JOSEPH D. BRYANT, M. D., State of New York.

Surg. Gen. NICHOLAS SENN, M. D., Wisconsin National Guard.

Surg. Gen. WALTER WYMAN, M. D., U. S. Marine-Hospital Service.

Medical Director PHILIP S. WALES, M. D., U. S. Navy.

THOMAS A. McPARLIN, M. D., brevet brigadier-general, U. S. Army (retired).

EDW. P. VOLLUM, M. D., colonel, U. S. Army (retired).

Col. JOSEPH R. SMITH, M. D., Assistant Surgeon-General, U. S. Army.

Medical Director ALBERT L. GIHON, M. D., U. S. Navy.

JOHN H. BRINTON, M. D., Philadelphia, formerly surgeon, U. S. Volunteers.

HUNTER McGUIRE, M. D., Richmond, Va., formerly surgeon, C. S. army.

ROBERT WEIR, M. D., New York, formerly assistant surgeon, U. S. Army.

P. S. CONNER, M. D., Cincinnati, formerly assistant surgeon, U. S. Army.

Surg. Gen. D. BERGIN, M. D., Canadian militia.

Surg. Maj. FREDERICK W. STRANGE, M. D., Canadian regiment of infantry.

Executive President.

Brig. Gen. GEORGE M. STERNBERG, Surgeon-General U. S. Army, Washington, D. C.

Secretaries.

Maj. JOHN VAN R. HOFF, M. D., surgeon, U. S. Army (English-speaking), Governor's Island, N. Y.

Passed Asst. Surg. D. M. GUITÉRAS, M. D., U. S. Navy (Spanish-speaking), U. S. Naval Hospital, Philadelphia.

Dr. MALLO (Piedad 1259), Buenos Ayres, Argentine Republic.

Dr. HERNANDEZ, La Paz, Bolivia.

Dr. CARLOS FREDERICO S. X. AZEVEDO, Rio de Janeiro, U. S. of Brazil.

Dr. ABRAHAM APARICIO (Carrera 8), Bogota, Republic of Colombia.

Dr. JUAN J. ULLOA, San José, Costa Rica.

Dr. EDUARDO SEMPRUN (San José 10), Havana, Cuba.

Dr. D. E. GUESDE, Point à Pitre, Guadaloupe, French West Indias.

Dr. JUAN J. ORTEGA, Guatemala City, Guatemala.

Dr. A. COMEAU, Port au Prince, Haiti.

Dr. G. P. ANDREWS, Honolulu, Hawaii.

Dr. JOSÉ GAYÓN (Hospital Militar), City of Mexico, Mexico.

Dr. J. MARTINEZ, Granada, Nicaragua.

Dr. GABRIEL HONORÉ (Gaboto 151), Montevideo, Uruguay.

Dr. N. GUARDIA, Caracas, Venezuela.

Advisory Council.

Col. Louis Read, M. D., surgeon-general National Guard Pennsylvania.

Medical Director Newton L. Bates, M. D., U. S. Navy.

Lieut. Col. Eustathius Chancellor, M. D., medical director National Guard Missouri.

Bvt. Lieut. Col. Eugene A. Sanger, M. D., formerly surgeon, U. S. Volunteers.

Bvt. Lieut. Col. A. A. Woodhull, M. D., surgeon, U. S. Army.

Surg. Gen. Geo. Henderson, M. D., National Guard District of Columbia.

Maj. Robert M. O'Reilly, M. D., surgeon, U. S. Army.

Maj. Joseph K. Corson, M. D., surgeon, U. S. Army.

C. N. Hoagland, M. D., formerly surgeon, Ohio Volunteers.

Bedford Brown, M. D., formerly surgeon, C. S. army.

H. C. Goodman, M. D., formerly surgeon, U. S. Volunteers.

Melancthon Storrs, M. D., formerly surgeon, Connecticut Volunteers.

O. D. Ball, M. D., pension examining surgeon, Albany, N. Y.

Capt. H. O. Perley, M. D., assistant Surgeon, U. S. Army.

ORGANIZATION AND MINUTES.

With view to inviting the particular attention of physicians who are or have been military medical officers to this section, the following letter together with the section announcement, was sent to 5,000 medical officers in the U. S. Army and Navy of the U. S. Volunteers, of the Confederate States army, of the National Guard, and also of the Marine-Hospital Service. The labor involved in obtaining the addresses of this large number of physicians was very great, every effort was made to learn the names and residences of all living who had served or are serving as medical officers, and it is believed that, while some were unavoidably overlooked, a very large proportion were personally addressed:

My Dear Doctor: You are no doubt aware that a Pan-American Medical Congress is to be held in the city of Washington in September, 1893 (September 5, 6, 7, and 8.)

Among the sections which have been organized for this meeting is one upon military medicine and surgery.

It is the desire of the executive officers of this section to secure a full attendance of medical officers of the Army, the Navy, and the National Guard now on the active list, and also of retired medical officers of the different branches of the service and of medical officers of the Union or Confederate service who served during the late war.

It is believed that such a gathering will be both pleasant and profitable, as it will furnish an opportunity for the renewal of friendly relations among those whose experience in military medicine and surgery was gained during the war, and will enable the younger medical officers now on duty in the Army, the Navy, and the National Guard to make the acquaintance of these veterans and to profit by their experience, as it may be given in papers read before the section or in the discussion of these papers.

We hope also to have a large attendance of medical officers from the other countries which have been invited to take part in this Pan-American Congress, and to learn from these gentlemen the methods employed in their several countries in the treatment, transportation, etc., of sick and wounded soldiers and sailors, in whose interest the sessions of this section will be held.

We desire especially to have new methods of surgical treatment adapted to military practice, new appliances for the field or hospital, and improvements in means of transportation brought before the section for discussion, and, so far as possible, illustrated by an exhibition of the appliances referred to.

A general invitation is extended to those gentlemen who receive this letter to be present at the meeting and to take part in the discussions of the section on military medicine and surgery.

Papers intended for this section should be typewritten and should be sent to the English-speaking secretary, if in English, or to the Spanish-speaking secretary, if in Spanish, at least ten days before the meeting. Those who will contribute papers are requested to send the titles to one of the secretaries of the section at as early a date as is practicable. Abstracts should be forwarded to the secretary-general not later than July 11.

Very respectfully,

GEO. M. STERNBERG, M. D.,
Surgeon-General U. S. Army,
Executive President Section Military Medicine and Surgery.

Permission was granted by the board of regents of the Smithsonian Institution to the section of military medicine and surgery to use the lecture room of the National Museum building for its meetings, and authority to pich the tents pertaining to the field hospital was conveyed in the following letter, viz:

OFFICE OF PUBLIC BUILDINGS AND GROUNDS,
WAR DEPARTMENT,
Washington, D. C., July 15, 1893.

GENERAL: In compliance with the request contained in your letter of the 14th instant as president of the section of the Pan-American Medical Congress to be held in this city in September, 1893, you are authorized to pitch tents in the grounds immediately west of the Army Medical Museum building for the purpose of demonstrating to the members the method of arranging a field hospital, and also to show the drill of the hospital corps

It is understood that the tents will not be used for encampment purposes in the ordinary acceptation of that term; that they will remain in position only three or four days, and that all débris will be removed and damages to lawn, if any, will be repaired at the expense of your Department.

Very respectfully, your obedient servant,

JOHN M. WILSON,
Colonel, U. S. Army.

Brig. Gen. GEORGE M. STERNBERG,
Surgeon-General, U. S. Army, Washington, D. C.

FIRST DAY'S PROCEEDINGS.

WASHINGTON, D. C., *September 5, 1893.*

In accordance with the programme on the afternoon of September 5, 1893, a considerable number of members of the Congress met informally at the Army Medical Museum, and inspected the valuable collections therein contained; they also visited the famous library of the Surgeon-General's Office.

SECOND DAY'S PROCEEDINGS.

WASHINGTON, D. C., *September 6, 1893.*

ADDRESS TO MEMBERS OF THE PAN-AMERICAN MEDICAL CONGRESS.

By Brig. Gen. GEORGE M. STERNBERG, Surgeon-General, U. S. Army,
Executive President of the Section on Military Medicine and Surgery.

GENTLEMEN: We are assembled for the purpose of discussing questions relating to military medicine and surgery; to consider what progress has been made in the treatment of camp diseases and of gunshot wounds as a result of recent discoveries relating to the etiology of infectious diseases and of traumatic infections; to profit by the experience of those who have had experience in the care of wounded men upon the field of battle and of the sick of armies engaged in actual warfare; to deliberate as to the best methods of transporting the wounded from the firing line and of rendering them the immediate assistance which may be required to save life; to compare the injuries inflicted by firearms now in use with those which came under our observation when a larger bullet with a much less initial velocity was the missile which caused a majority of the wounds we were called upon to treat.

All of these questions are interesting to us as military surgeons and of vast importance so far as the victims of future wars are concerned. It is true that peace prevails everywhere in the New World; that a most friendly feeling exists among the republics of North and South America; and that the modern way of settling disputes between nations is by arbitration rather than by a resort to arms. But so long as armies exist and deadly weapons are manufactured it will be the duty of the military surgeon to be prepared to render efficient aid to those who fall in battle, and to give the victims of those "camp diseases" which sap the strength of armies the benefit of the most efficacious treatment.

A still more important part of the duty of the medical officer in garrison or in the field consists in the sanitary supervision of the command with which he is serving; for, without doubt, most of the sickness which prevails among soldiers, and especially among new levies of troops, is due to insanitary conditions, and is preventable to a greater or less extent according to circumstances. But the subject of military hygiene does not properly come within the province of this section, and we simply refer to its importance *en passant*.

We are, however, especially interested in the subject of the transportation of wounded men from the field of battle. And in future wars we will have to meet new conditions, arising from the use of weapons having an extremely long range and from the nature of the wounds inflicted by bullets of small caliber projected with enormous velocity. Men will be disabled in great numbers within very brief periods of time, and of those struck by these missiles a large portion will require to be promptly removed from the field of action, for a smaller proportion will be killed outright.

Under these circumstances it is evident that our organization for the purpose of rendering first aid to the wounded and transporting them to the field hospitals must be carefully considered, and that the most efficient service will require a corps of assistants especially trained for this duty.

This matter has already received the careful attention of medical officers in the U. S. Army, and we have now an organization designed to perform these duties, with the assistance of "company bearers" who also receive special training with reference to first aid, litter drill, etc. In time of peace our enlisted men of the "Hospital Corps" perform the duties of nurses, cooks, and attendants in post hospitals, and they are regularly drilled in the most approved methods of handling wounded men and removing them from the field of battle.

A manual of drill for the Hospital Corps has been prepared by a board of medical officers and approved by the Secretary of War. It will shortly be published "for the information and government of the Army and for the observance of the militia of the United States." A demonstration of the litter and ambulance drills, as directed by this manual, will be made by Maj. Hoff, of the Medical Department of the Army, English-speaking secretary of this section, who was one of the medical officers to whom the duty of preparing the manual was intrusted. After this demonstration I hope we may have a free discussion of the merits of the system, as compared with the older, haphazard way of caring for wounded men which prevailed during our civil war. There are many present whose experience upon the field of battle will enable them to judge of the advantages which are likely to result from system and previous training in handling wounded men, and also as to the practicability of carrying out, upon the firing line, the methods which have been adopted.

The results obtained by our military surgeons during the late war are summarized in the following table, which has been prepared, at my request, by Maj. Charles Smart, surgeon, U. S. Army from the data on file in the Surgeon-General's office. The table also shows the number of amputations and excisions made by medical officers of the Army since the war and the percentage of mortality from the same. It will be seen that the mortality rate has been considerably reduced. This is, no doubt, partly due to improved methods of treatment, and especially to antiseptic surgery, although a considerable proportion of the operations made since the war were made before the general adoption of antiseptic methods, or under circumstances which did not admit of the application of these methods:

Number of amputations and excisions of the extremities during the war of the rebellion and the period 1866–'91, with percentages of mortality.

	During the war.		Since the war.	
	Number of cases.	Percentage of mortality.	Number of cases.	Percentage of mortality.
UPPER EXTREMITY.				
Amputations:				
Shoulder	852	28.5	7	14.3
Arm	5,456	23.6	62	19.4
Elbow	36	8.4	1	....
Forearm	1.747	13.9	57	8.8
Wrist	68	10.6	10	....
Fingers, with or without met. carpals	7 812	2.6	830	1
Total	*16,001	....	967	....
Excisions:				
Clavicle or scapula	89	2.7	1	....
Shoulder	885	34.8	5	20.0
Humerus	696	28.5	11	....
Elbow	626	23.7	5	20.0
Bones of forearm	986	11.2	7	....
Wrist	95	15.6	1	....
In hand	116	8.6	22	4.5
Total	3,485	....	52	....
LOWER EXTREMITY.				
Amputations:				
Hip	66	83.3	4	75.0
Thigh	6,229	53.8	63	41.3
Knee	189	56.6	7	....
Leg	5.452	32.9	87	20.7
Ankle	161	25.1	21	9.5
Partial, of foot	1.518	5.7	182	....
Total	*13,615	....	364	....
Excisions:				
Hip	66	88.6	6	33.3
Femur	175	69.4	3	33.3
Knee	57	81.4	....	....
Bones of leg	387	28.2	6	16.7
Ankle	33	29.0	3	....
Bones of foot	97	19.3	6	....
Total	815	....	24	....

* In addition to the amputations reported above as performed for gunshot fracture during the war, there were 583 amputations of parts of the lower extremity, with a mortality 25.5 per cent, and 195 of the upper, with 10 per cent mortality on account of extensive flesh wounds, in which the fatality was due mainly to shock.

For the purpose of showing the enormous responsibility of the medical department of an army in time of war the following figures are given, showing the total number of cases treated in the armies of the United States during the late war, as given in the Medical and Surgical History of the War of the Rebellion. The figures relate to white troops only, and are for the period from May 1, 1861, to June 30, 1866.

The total number of cases recorded in reports of sick and wounded was 5,825,480, with a total mortality of 166,623. The total number of gunshot wounds was 230,018, with a mortality of 32,907. (The total number killed in battle was 42,724.) The total number of deaths from disease was 157,004, the principal causes of mortality being: Typhoid fever, 27,056+typho-malarial fever, 4,059=31,115; chronic diarrhœa, 27,558; inflammation of lungs, 14,738; consumption, 5,286; smallpox, 4,717; measles, 4,246; acute dysentery, 4,084; chronic dysentery, 3,229; remittent fever, 3,853. No doubt many of the deaths attributed to "remittent fever" were in fact due to typhoid infection, which in this war, as in many of those which preceded it, proved to be nearly as fatal to the troops engaged as the bullets of the enemy.

No question is more important for the medical officer than that which relates to the prevention of typhoid fever and the various forms of intestinal flux, which in the past have caused such enormous losses to armies engaged in active field operations. No doubt a very large proportion of the sickness from these causes could be prevented by the simple prescription—boil all water used for drinking purposes which does not come from a source that is unquestionably pure.

But the question of the prevention of these camp diseases so destructive to armies, and especially to new levies of troops in warm climates, belongs to the section on military hygiene, and I must restrict myself to topics which come strictly within the province of military medicine and surgery.

I therefore ask your attention for a short time to a subject which has been of great interest to military surgeons in the past, but which, in the light of our present knowledge, should be interesting to us rather from a historical than from a therapeutic point of view. I refer to the question of traumatic infections. Hospital gangrene, erysipelas, septicemia and tetanus have no longer the terror for us that they had for our predecessors, for the etiology of these traumatic infectious diseases has been elucidated by researches made during the past fifteen years and, knowing the cause, the proper measures of prevention are apparent and are systematically applied whenever this is practicable.

That the infectious diseases mentioned result from the introduction into wounds of pathogenic bacteria is now definitely settled, and in the case of erysipelas and tetanus we know the specific characters of the parasitic invader which gives rise to these forms of wound infection. But no such demonstration has been made as regards hospital gangrene, probably because bacteriologists have had no opportunities for investigating this disease since the introduction of Koch's admirable methods of research. The writer, while in charge of the surgical wards of a large general hospital at Portsmouth Grove, R. I., in 1862, witnessed a typical epidemic of this disease which served as a lesson never to be forgotten. The two wards devoted to the treatment of surgical cases were filled with wounded men from the Army of the Potomac. A considerable proportion of the cases were simple flesh wounds, progressing favorably to a cure by granulation and cicatrization. Others were of a more serious character and were attended with profuse suppuration. The hospital was favorably located on Narragansett Bay, supplies of all kinds were abundant, nurses were in sufficient number and attentive, but the medical officer in charge was young and inexperienced. Under his direction the wounds were systematically cleansed and dressed with absorbent lint, etc. Nature seemed to be fully equal to the work of repair, except in those cases where a mistaken conservatism at the field hospital had left compound fractures to her unaided efforts. In such cases profuse suppuration and septic toxemia sapped the strength of strong men. Possibly it was in such a case that the mischief commenced. Doubtless it was from one or more initial cases that the infection was carried by the sponges of willing but ignorant attendants to a considerable number of wounds which up to this time were progressing rapidly towards cicatrization. The result was a conflagration. Wounds previously healthy became inflamed, painful and angry looking, and within two or three days the cause of this change was apparent. The area of inflammation involving the previously healthy tissues rapidly extended and sloughs formed, sometimes as large as a man's hand and extending deeply among the muscles and along the planes of cellular tissue. Fortunately, the infectious nature of the malady was quickly recognized and the measures adopted arrested its progress. It is hardly necessary to say that these measures included the removal of those not yet infected from the overcrowded surgical wards, a general cleaning up, whitewashing of walls, etc., and the necessary precautions relating to the conveyance of infection by sponges, etc. The treatment of the gangrenous wounds consisted in deep cauterization by means of nitric acid applied with a swab, the removal of necrosed tissue as soon as practicable, and the application of charcoal poultices. Goldsmith's bromin treatment had not yet been suggested. Under the treatment adopted the local extension of the disease was promptly arrested, and as soon as the sloughs had separated healthy granulations sprang up and in time repaired the mischief which had so quickly occurred.

This brief account of an epidemic of hospital gangrene witnessed by myself is intended to serve as an introduction to some remarks upon the history and etiology of this affection.

It is altogether probable that it was known to Celsus, who had described a condition of wounds not properly treated, which appears to be identical with the affection known to us as hospital gangrene. Ætius, who wrote in the fifth century, refers briefly to a similar affection. Some of the ancient authors appear to have described the form of wound infection under consideration by the name of "carbuncle." Rolandus, who wrote in the twelfth century, had a chapter in his third book on wounds, entitled "De Carbunculo supervenienti vulneri." Alphonsus Terrus, who, in 1534, published one of the first treatises upon gunshot wounds, was of the opinion that all wounds of this class were poisoned by the gunpowder. He gives an account of the results of such supposed poisoning, which makes it appear probable that he encountered hospital gangrene. He recommended the actual cautery as a cure for this condition, and also as a preventive. Ambrose Paré combated the idea that gunshot wounds were poisoned by gunpowder or burned by the ball, and attributed the unhealthy condition into which such wounds were sometimes observed to fall to a "corrupted state of the atmosphere." He remarks that, owing to this cause, "Nous en sommes devenus sages par l'experience de tant de plaies, lesquelles lors que je m' éfforcais à les guérir, rendoient une telle et si grande puanteur, indice et temoinage tres certain de pourriture et infection, que les assistans ne la pouvoient sentir qu' a conter cœur, et avec bien grande difficulté."

Paré's treatment of hospital gangrene consisted in the application of an ointment containing pulverized alum, verdigris, and sulphate of copper. It does not appear to have been very successful, as he reports that in many of the wounded in the battle of St. Denis the wounds fell into putrefaction and were accompanied by putrid fever and other serious accidents, and nearly all the wounded died, although their wounds may have been slight and they were supplied with everything necessary for their proper sustenance and treatment. According to Paré the wounds made by swords, pikes, and lances became affected with gangrene (les pourritures) as well as those made by firearms.

La Motte, who wrote his Complete Treatise on Surgery early in the seventeenth century, gives a very complete account of hospital gangrene. He says:

> On prend ce mot (gangrène), properment pour un disposition a la mortification qui est ce qu'on appelle vulgairement pourriture a l'Hotel Dieu de Paris, laquelle survient et accompagne presque toutes les playes qui sont traités dans cet hôpital, et la plus grande partie des absces que l'on y ouvre, a cause de l'air corrompu qui y regene et que ces blessez y respirent.

The practice of surgery in a hospital where the opening of an abscess was likely to be followed by rapidly spreading gangrene must have been rather discouraging, and so long as the idea prevailed that this resulted from "a corrupted condition of the air," rather than from direct infection conveyed from wound to wound by instruments, sponges, etc., there was little chance of eradicating the evil.

Ponteau, who wrote in 1783, referring to the prevalence of gangrene in French hospitals, raises the question whether such institutions are not, on the whole, more pernicious than useful to mankind. What would these surgeons of two hundred years ago have thought of our laparotomies for removal of the appendix, etc.: of our operations on the principal joints; and of the absence of "surgical fever" after serious operations made antiseptically or with aseptic precautions?

Mr. John Bell, in his Principles of Surgery, published in 1799, says:

> There is no hospital, however airy or well regulated, where this epidemic ulcer is not found at times. (p. 112). He must indeed be ignorant who disputes this hospital sore being a general disease of the system; he must have observed very little who does not know it to be absolutely an infection. (p. 117). Is the surgeon to seek for washings and dressings, use ointments and plasters, and expend butts of wine to cure such a disease? No; let him bear this in mind, that no dressings have ever been found to stop this ulcer; but, on the other hand, that out of the circle of the hospital the patients are safe: carry them anywhere, and at any expense, even to a stable or a dunghill. (p. 118).

No doubt this was good advice in the absence of any exact knowledge as to methods of disinfection, for even if the infectious material was destroyed in the wounds by the actual cautery, or by applications of fuming nitric acid, there was always danger of reinfection so long as the patient remained in the infected hospital wards.

The total number of cases of gangrene reported during our civil war, as occurring among the wounded of the Union armies, was 2,642. Of these, 4 cases occurred in 1861; 223 in 1862; 623 in 1863; 1,611 in 1864, and 135 in 1865; 1,361 cases terminated in recovery, and 1,142 were fatal, but in a considerable number of the fatal cases death was due to the original injury or to other complications—septicemia, hemorrhage, etc.

For details with reference to the principal epidemics of hospital gangrene during the war I must refer to the interesting reports of Acting Assistant Surg. W. W. Keene, U. S. Army; Surg. J. H. Brinton, U. S. Volunteers; Surg. M. Goldsmith, U. S. Volunteers; Assistant Surg. William Thomson, U. S. Army, and others, ext acts from which will be found in the third surgical volume of the Medical and Surgical History of the War.

The facts detailed in these reports correspond with those previously observed in various parts of the world, and show that hospital gangrene is a local disease due usually to the infection of wounds from previous cases.

This brings us to the question as to the origin of the primary cases in an epidemic—a question which is of special interest, not only as regards this disease, but in its bearing upon the etiology of other local infectious processes.

Do epidemics originate *de novo* as a result of an increased pathogenic power on the part of some common putrefactive microörganism, or is there a specific "germ" of hospital gangrene? The former supposition appears to me to be more in consonance with the facts relating to the origin of epidemics, and is sustained by extended experimental researches which show that the pathogenic potency of many bacteria is greatly intensified by cultivation in albuminous fluids and under favorable conditions. This is true of the pus cocci, which may thrive upon the surface of the body of healthy persons or upon mucous surfaces as harmless parasites; but which under favorable conditions may invade the tissues, producing acute abscesses, erysipelatous inflammations or gangrenous sloughs, according to the pathogenic potency of the micrococcus and the degree of vital resisting power on the part of the tissues. The streptococcus pyogenes from a malignant case of erysipelas or from the abdominal cavity of an individual who has succumbed to puerperal peritonitis may give rise, when introduced beneath the skin of a healthy person, to the most violent local inflammation and to general septicemia. But if cultivated for a length of time in unfavorable artificial media its pathogenic potency may be so reduced that it gives rise to a local abscess only.

The same has been demonstrated, by experiments upon the lower animals, to be true as regards certain bacteria found in putrefying material. Some of these when injected beneath the skin of a mouse, a rabbit, or a guinea pig, give rise to a rapidly fatal septicemia; others cause an extensive inflammatory edema in the vicinity of the point of inoculation; still others to a progressive gangrene. By inoculating from animal to animal, the virulence of the pathogenic microörganism inducing these morbid phenomena is increased, so that the smallest fraction of a drop of blood, or of bloody serum from the subcutaneous tissues of an animal recently dead from such an inoculation, suffices to kill another animal of the same species within a brief period. But there is another element which influences the result when virulent putrefactive material is introduced beneath the skin of an animal for experimental purposes, or into an open wound by accident, i. e., the vital resisting power of the tissues. The body of a dead animal under favorable conditions of temperature is quickly invaded by putrefactive bacteria. But in the living animal such invasion is successfully resisted in many cases, even when putrefactive bacteria are brought in contact with open wounds. This is especially true as regards carnivorous animals, while the herbivora are especially susceptible to local or general infection when putrefactive material is brought in contact with an open wound. There is also a difference in individual susceptibility in animals of the same race. As a rule, young animals are more susceptible than adults, and susceptibility to infection is increased by depressing influences, such as insufficient food, excessive exertion, bad air from overcrowding, or putrid emanations, etc.

It is under such depressing influences that epidemics of hospital gangrene have commonly had their origin. That the disease may originate independently of preëxisting cases seems to be well established by the history of independent outbreaks in distant parts of the country during the war, in new hospitals, and among wounded men brought directly from the field of battle.

Billroth, in his surgical letters from the war hospitals in Weissenburg and Mannheim (1870), says:

> While I was at Mannheim but a single case of hospital gangrene occurred. This was in Barrack J of the hospital which had been placed under my direction. The medical officer of the day did not recognize the disease and first called my attention to it on the third day. Fortunately no other cases had become infected. I cauterized the wound (a gunshot fracture of the upper arm) with fuming nitric acid, and after separation of the slough it was again healthy. In Darmstadt, in the great barrack hospital, two or three cases occurred, which were treated the same way and isolated. So far as I am informed this was the end of the trouble.

In discussing the origin of these cases Billroth says:

> Where did the contagion come from for the one case in Mannheim and for the cases in Darmstadt? That I really can not say, but I suspect that the infectious material was attached to lint which had been made from hospital linen, or had been scraped in a hospital in which hospital gangrene existed. This suspicion may appear very singular to many physicians, but will serve to show how thoroughly I am convinced of the specific origin of hospital gangrene.

To the writer it appears far more probable that these were cases of the *de novo* origin of gangrene as a result of the introduction into a suppurating wound of saprophytic bacteria which, owing to favoring conditions in the wound itself or to slight resisting power on the part of the tissues, had acquired sufficient pathogenic virulence to enable them to invade living tissues. It may be that there is some particular saprophyte, which is widely distributed, to which this result is commonly due; or it may be that there are a number of putrefactive bacteria which under favorable conditions may acquire this power of invading living tissues. The result is probably due, to some extent, to the development of toxic ptomaines in the secretions of the wound by putrefactive bacteria present in these secretions, which, being absorbed, lower the vital resisting power of the tissues. Deep and profusely suppurating wounds, and especially gunshot fractures of the larger bones, in which pockets and sinuses occur from which it is difficult completely to remove accumulations of pus, furnish the conditions most favorable for the development of such pathogenic virulence as may suffice to make a saprophytic bacillus a facultative parasite.

The greater liability to the development of hospital gangrene in wounds complicated by fracture of bones is shown by the following table, which is taken from the Medical and Surgical History of the War. (Third Surgical Volume, p. 824.)

Summary of 2,642 cases of gangrene, indicating the result and relative frequency.

Seat of injury.	Recovery.	Fatal.	Undetermined.	Total.	Per cent of fatality.	Per cent of relative frequency.
Flesh wounds of head, face, and neck	5	7	....	12	58.3	60=2.2%.
Fractures and penetrating wounds of head, face, and neck	32	16	....	48	33.3	
Flesh wounds of trunk	36	32	7	75	47.0	216=8.2%.
Fractures and penetrating wounds of trunk	44	97	....	141	68.7	
Flesh wounds of the upper extremities	47	50	12	109	51.5	2,3668=9.6%.
Fractures of the upper extremities	476	245	14	735	33.9	
Flesh wounds of the lower extremities	125	127	92	344	50.3	
Fractures of the lower extremities	596	568	14	1,178	48.7	
Aggregates	1,361	1,142	139	2,642	45.6	

It is a remarkable fact that while the larger number of cases occurred in wounds attended with fracture, the greatest mortality resulted in simple flesh wounds.

From our point of view the etiology of hospital gangrene does not differ materially from that of traumatic erysipelas so far as general conditions are concerned, but the two diseases are doubtless due to different microörganisms. That which is the usual cause of erysipelas is now well known to bacteriologists under the name of streptococcus pyogenes, or streptococcus erysipelatous.

Whether hospital gangrene is a specific infection in the same sense that erysipelas is, i. e., an infection due to a specific microörganism, has not been determined, but it seems probable that such is the case. It does not follow from this, however, that all cases of these traumatic infectious diseases originate by direct or indirect transfer of the infectious agent from previous cases. Erysipelas does not necessarily result from the introduction of streptococcus pyogenes into an open wound. This streptococcus is frequently found in the pus of acute abscesses unattended with any erysipelatous inflammation. But under favorable conditions it may develop virulent properties, which are manifested especially by a tendency to invade the tissues by way of the lymph channels and along cellular planes, producing a dilation of the capillary vessels and more or less serous effusion, leading often to suppuration and sometimes to necrosis of the invaded tissues. The development of first cases of either disease probably depends upon predisposing causes relating to the individual or his environment.

A traumatism is more likely to be followed by erysipelas in a man whose vitality is below par on account of intemperance, insufficient food, bad hygienic surroundings, etc., and the same is true as regards hospital gangrene. Under such conditions the comparatively harmless streptococcus pyogenes may overcome the barriers established by nature to resist invasion by saprophytic bacteria, and having acquired the power to multiply as a parasite in tissues enfeebled by the causes mentioned it soon attains a pathogenic virulence which enables it to invade healthy tissues when transferred by accidental inoculation to another individual.

The view here advanced with reference to the *de novo* origin of erysipelas is supported by the fact that solitary cases frequently occur at remote military posts. Thus during the past year 28 cases are reported as having occurred among the enlisted men of the U. S. Army. Of these 18 occurred at 18 different posts, while 3 posts had 2 cases each and 1 post had 4.

The facts relating to the etiology of pneumonia correspond with those referred to as relating to that of erysipelas. In this disease, also, the specific cause has been shown to be a micrococcus (*Micrococcus pneumoniæ crouposæ*) which is frequently found in the salivary secretions of healthy persons, and which varies greatly as to its pathogenic virulence. Solitary cases of the disease occur at our military posts, as elsewhere, as a result, no doubt, of predisposing and exciting causes which give the specific cause the mastery over the resources provided by nature for resisting the local infection which constitutes the disease in question.

The total number of cases of traumatic erysipelas reported as occurring in the armies of the United States during the war was 1,097, with a mortality of 41 per cent.

The micrococcus which is now recognized as the usual cause of erysipelatous inflammations is capable of growing either in the presence or absence of oxygen; i. e., it is an aërobic and facultative anaërobic microörganism. We infer that the same is true as regards the microörganism which produces hospital gangrene. But in the case of tetanus, which has been proved by recent researches to be an infectious malady due to a bacillus widely distributed in the superficial layers of the soil, it has been shown that this bacillus is a strict anaërobic. It does not grow in the presence of oxygen and could not thrive in superficial wounds. This probably accounts for the fact that epidemics of tetanus are not common. The cases which occur are for the most part sporadic cases, due in each instance to infection, resulting from the introduction of surface soil or dust containing the tetanus bacillus. Such material in an open wound might be innocuous. But introduced into the depths of a gunshot wound, into a closed amputation wound, or into a punctured wound made by a rusty nail, for example, the tetanus bacilli (spores) present find the conditions favorable for development and this fatal infectious malady results.

Sporadic cases of hospital gangrene probably occur in a similar way, but as there is a free escape of virulent material from the infected wound, the danger of the disease being transmitted to other wounded individuals is infinitely greater.

The total number of cases of tetanus reported in the Medical and Surgical History of the War is 505, or a little more than 2 per 1,000 of the total number of injuries by weapons of war. More than one-fourth of the cases followed operations upon the extremities; 116 after amputations and 15 after excisions. We can scarcely doubt that a majority, at least, of these cases would have been prevented by modern methods of treatment—antiseptic or aseptic.

The same statement applies to the considerable number of cases reported under the heading pyemia. It seems probable that of the 2,818 cases reported under this heading a large proportion were in fact cases of septicemia resulting from wound infection. The very great mortality, and the results of post mortem examinations made, indicate this; but as it was before the days of bacteriological research there is no direct evidence on record showing the presence of bacteria in the blood and in the metastatic abscesses found in the lungs, the liver, the kidneys, spleen or joints in those cases in which an autopsy was made. Doubtless septic toxemia occurred in numerous cases but, as stated, we infer that a majority of the cases reported under the heading pyemia were in fact cases of septicemia resulting from infection through the wound by the pathogenic micrococci which are commonly concerned in this form of "blood poisoning," and especially by staphylococcus aureus. The mortality in the class of cases under consideration exceeded 97 per cent. Out of the total number of deaths (2,747) but 21 are reported to have resulted from other complications, viz, hemorrhage 7, gangrene 6, tetanus 2, erysipelas 1, peritonitis 1, and typhoid pneumonia 4.

One of the questions to be settled by the military surgeon in the next great war, which we earnestly hope will not occur on this continent, is to what extent the large mortality which has heretofore occurred from traumatic infections can be prevented by antiseptic methods of treatment. Certainly there will be no excuse for the occurrence of septicemia after amputations, or for the appearance of erysipelas or hospital gangrene in wounds made by the knife of the surgeon. But how far it may be practicable to prevent such complications in gunshot fractures remains to be seen, and the proper treatment of such injuries is an important point for consideration. If such cases could at once receive skillful surgical treatment, including the removal of splinters, foreign substances carried into the wound by the bullet, and antiseptic dressings, no doubt many would be saved without loss of life or limb. But the changing fortunes of the battle field often make it impossible for medical officers to give such prompt attention to the wounded. It is generally conceded that on the firing line nothing more should be attempted than the arrest of hemorrhage, and such support to the fractured limb as will enable the wounded man to bear transportation to the field hospital with the least possible suffering. It is here that the fate of the unfortunate victim of war will often be decided, and the responsibility resting upon the military surgeon under such circumstances can not be over estimated. His decision with reference to operative interference must be prompt, and will often be governed by circumstances other than those laid down in surgical text-books. How far must the man be transported before he will reach a resting place at a permanent hospital? What are the means of transportation? Is he to be left at the mercy of the enemy as a prisoner of war? Shall his case be passed by because of others more urgently requiring attention? Many a leg must be sacrificed which might be saved under more favorable conditions, and conservative surgery must often yield before the inexorable contingencies of the battle field.

In future wars the question will be decided as to the propriety of performing laparotomy at the field hospital in penetrating wounds of the abdomen, for the purpose of exploration and suturing the intestine if it is found to be wounded. This is so important a question that I have attempted to make it the most prominent surgical topic for discussion at the present meeting, and trust that as a result of this discussion we may arrive at definite conclusions as to what our action should be if called upon to treat such cases.

What has been said will suffice to indicate to the young medical officer that much is expected of him; and that in view of recent additions to our knowledge relating to the etiology of the more common camp diseases, and of traumatic infections, and to our resources for preventing and curing such diseases, we have a right to expect a great reduction in the mortality from sickness and wounds in the armies engaged in future wars.

PAPERS READ BEFORE THE SECTION.

Surg. Gen. Charles Sutherland, U. S. Army (retired), then presented the following paper:

THE ORGANIZATION OF THE HOSPITAL CORPS.

I will take only a few moments of your time in describing the origin as well as the formation of the Hospital Corps of our Army.

In the past, in our Army, as well as in other armies, dependence was placed upon irregular attendance for the care of the sick and wounded. These services were frequently so imperfect in character as to render them at times valueless, if not harmful. This unsatisfactory state of affairs no longer continues; and following the example set us by the principal European nations, which organized hospital corps for their respective armies, and that we might be benefited by this valuable addition to our own service, Congress, in March, 1887, authorized the establishment of the Hospital Corps in our Army. This act sanctioned the organization of a corps consisting of hospital stewards, acting hospital stewards, and privates, all regularly enlisted by the Surgeon-General of the Army, permanently attached to the medical department, and charged with the performance of all necessary hospital services in garrison, camp, or field. The strength of the corps, now about 700 in number, is made discretionary with the Secretary of War, but the qualifications of the personnel are prescribed by law. The pay and status of the stewards were raised to a much higher plane, corresponding with the higher grade of service officially required of them. Many of our stewards were capable of rendering this higher service, but to assure that this ability shall not be wanting, the law now requires that a searching examination be made into the qualifications of every member before his promotion. The duties of the privates were defined as those of wardmasters, nurses, cooks, and attendants in hospitals, litter-bearers and ambulance-drivers in the field, and any other duties as might by proper authority be required of them. The corps is raised by transfers from the line, and by enlistments from civil life as well, of such men as have a desire to enter this special service, and who are carefully selected on account of their fitness, intelligence, sobriety, and general aptitude. Promotion is always open to the capable and diligent who desire to secure an honorable position in the non-commissioned staff of the Army with its increased compensation.

In addition to this corps, the position of company-bearer was instituted, and 4 men of good character and fair intelligence from each company throughout the Army are selected from time to time, changing when required, to practice litter drill and first aid. Transfers are constantly occurring, and there is no difficulty in obtaining good men for the corps. Many intelligent and able young men, ambitious of promotion, have joined its ranks, and the record of their examinations would prove a surprise to many who are familiar with the work of the examiners at medical colleges and boards of registration. As an example of many who have presented themselves for examination for promotion, the following record may serve, viz: The percentages show of some 17 hospital stewards, 4 ranged from 92 to 95; 4, 89, and 9, from 80 to 85. Of 40 acting hospital stewards, 1 was 99; 2, 97; 2, 96; 11, 90 to 95; 14, 80 to 89; 9, 75 to 79, and only 1 just above the limit of 70 per cent.

The pay, which at first was only that of their comrades of the line, was found to be inadequate for the duty exacted, and for a time was a drawback to the strength as well as efficiency of the corps. This was happily changed by Congress in July, 1892, increasing the pay of the privates from $13 to $18 per month. This has given new energy to the corps and a future of greater excellence lies before it.

Three years after its creation the new corps was tested in active service in the field in the Sioux campaign, and demonstrated its value as an organization for the care of the wounded. On the battle field at the action of Wounded Knee 2 of its members rescued a wounded officer from extreme peril, which fully entitled them to the certificate of merit which they received as their reward, while the services that the remainder rendered were so orderly and well regulated, that not only our own wounded men, but wounded Indians, were with great promptness and dispatch removed and cared for in the field hospitals which were extemporized for their benefit.

Being impressed with the importance of thoroughly instructing the members of the corps in all their duties, by approval of the commanding general of the Army, I established 2 schools or companies of instruction and training at military posts west of the Missouri River, selecting 2 of the largest, viz, Fort Riley, Kans., and Fort Russell, near Cheyenne, Wyo. Their personnel consists of 3 medical officers, or more, for instruction; 7 noncommissioned officers from the stewards and acting stewards; 1 bugler; 1 artificer; 1 tailor, and 40 or more privates. The object of these schools is twofold; first, always to have at hand, for any emergency, a trained body of sanitary soldiers accustomed to working together; and second, to build up a training school through which all enlisted men of the Hospital Corps should pass. The course of instruction at these schools is by recitations, lectures, and demonstrations, and is both theoretical and practical, combining at once the training common to all enlisted men with the special instruction of the sanitary soldier. The curriculum is sufficiently comprehensive to give the men a fair knowledge of the requirements of their position, and comprises infantry drill and riding, the chief end of which in this connection is discipline; elementary lessons in human anatomy and physiology; nursing; rudiments of materia medica and pharmacy (including poisons); surgical instruments, dressings, and preparations for operations, accidents, and emergencies, and in resuscitating the apparently drowned; first aid, bandaging, bearer drill; fieldwork, including the pitching and striking of tents, formation of dressing stations, field cookery, use of field equipments, practical application of first aid in the field, the use of wheel and pack transportation, care of horses, driving, etc.

In connection with the theoretical instruction, the men are in turn detailed for special instruction in the various departments of the hospital. The company and hospital kitchen constitute a school of practical cookery, in which men who have an aptitude in that direction are taught the management of the ration and other food supplies and its preparation for the table and the sick. After a course covering about six months, those sufficiently proficient are assigned to duty with the several detachments serving throughout the Army, where their practical education will be of the greatest value. In originating the first school at Fort Riley, the plan for its organization was carefully studied and digested. It was largely experimental, nothing of the kind having ever before been attempted in our Army. That it has been a great success I need scarcely tell you. To the energy and ability of its accomplished instructor, Maj. John Van R. Hoff, of the medical department, is due that excellence and high standing.

In conclusion, I will add that first aid and litter drill are being rapidly adopted by the National Guard of this country, and many of the State guards have arrived at a high point of excellence in this respect.

First aid is now taught also to the police in some of the larger cities, and the time is not far distant when ambulance and first-aid corps will become permanent parts of municipal administration, it being just as important to aid the sick and injured in time of peace as to succor the sick and wounded in time of war.

REMARKS OF DR. BERGEN, SURGEON-GENERAL OF THE CANADA MILITIA.

Mr. PRESIDENT AND GENTLEMEN: It would afford me great pleasure indeed to address you on this occasion if I had been prepared for anything of the kind. I need scarcely say to you that I have listened with very great attention and with very great pleasure to the learned exposition upon hospital gangrene which our president has made this morning. I listened also with very great pleasure to Gen. Sutherland, and I quite agree with him that the time is not far distant when municipalities will be obliged, in deference to public opinion, to establish first aid and stretcher drills everywhere; because, as the general has very aptly said, we must have regard for the injured and the wounded in time of peace as well as in time of war.

In the country from which I come (Canada) we have made some little progress in the way of teaching the volunteer militia, which is the only army we have, not only first aid and stretcher drill, but a great deal of what is necessary to be known in connection with laparotomy. Some of our regiments of Canada militia have made astonishing progress in this way and are almost as perfect as it is possible for volunteer regiments to be.

From what I can learn I think that at 2 o'clock to-day we will all obtain a lesson such as it will not be our good fortune perhaps to receive again for many a day. I refer to the drill of the Field Hospital Corps by Maj. Hoff. From what I know and have heard since I came here, I feel that we will have such an exposition this afternoon as will confirm the belief entertained, that perfection has almost been attained by the U. S. Army Hospital Corps.

I shall not detain you longer, gentlemen, because it would be an abuse of your patience, and would be occupying time which can be better improved by others.

At the close of these remarks the executive president said: I had hoped that as the meeting of the session this morning Dr. Hunter McGuire, of Richmond, who is one of our honorary vice-presidents, would be present to read a paper. But in his absence I would like, if he is so inclined, to hear from Dr. Bedford Brown, of Alexandria, Va., as a representative of the confederate service and who had great experience during the war of secession.

REMARKS BY DR. BEDFORD BROWN, OF ALEXANDRIA, VA.

Mr. President and Gentlemen: It was my fortune to be a surgeon in the Confederate army for nearly four years. During that period my services were confined entirely to the field, and all practice that I saw or had was field practice. I saw little or nothing of hospital practice, and what I am going to say will be confined entirely to the first mentioned.

In the beginning, I will state that probably no army of equal size and of equal intelligence and strength with the Confederate army had so few surgical appliances or medical remedies as it had. I will relate here a little incident to illustrate this:

In the campaign in northwest Virginia in 1861, through which I passed, on one occasion in an army containing about 17,000 men we had 4,000 cases of sickness. Gen. Lee was in command, and being destitute of almost everything, I approached him on one occasion and stated to him the facts in regard to our destitution, and in regard to nourishment and medicines. I do not believe that there were half a dozen ounces of quinine in that poor army. We had hundreds of cases of typhoid fever, diarrhea, dysentery, pneumonia, and bronchitis. I asked him what we were to do under the circumstances. We were cut off and confronted by a large army under command of Gen. Rosecrans. He said: "Doctor, I sympathize with you and these suffering men; but you must make something out of nothing; that is all I can say to you." And that was the prevailing rule at nearly all times. We had to "make something out of nothing."

The address of our President has impressed me most favorably, especially that portion in regard to hospital gangrene. While I did not see what was called hospital gangrene, I saw camp gangrene, which is probably an analagous disease, and I am satisfied that his ideas in regard to the infectiousness of this disease are eminently right and proper. At that time we knew very little about asepsis; we had but a vague idea of it. We knew that certain remedies had power, to a certain extent, to correct infectious disease—local remedies. But this knowledge has been developing during many ages, until it has culminated in our present advanced condition. In the treatment of hospital gangrene I found that isolation was absolutely essential, and that it was necessary to confine the cases, not in houses, but under tent flies. It being nearly always warm weather, I placed them under tent flies and the shade of trees that the air might sweep over them fore and aft, and I found that that was one of the best methods I could adopt.

In regard to the local treatment of camp gangrene, not possessing at that time what we now find to be the best remedies, I treated them with a concentrated solution of sulphate of zinc, and ultimately with bromine, when I could get it. They were the most powerful antiseptics I could find. I made a concentrated solution of the sulphate of zinc and sulphuric acid and my rule was to dress these cases with hot-water applications; if I could procure it on the battlefield so much the better. I had a favorite servant who took his hot-water camp kettle and tin cup and poured the hot water on the wounds of our men and washed them thoroughly, and then when any symptoms of gangrene occurred I saturated cotton with sulphate of zinc and kept it applied, and the stimulating effect of this upon the wound was wonderful. Sloughs would separate and granulating surfaces would appear, and as soon as they appeared the application would prove so painful that I would be compelled to suspend it. I was not always able to procure bromine—of which I can not speak too highly in cases of camp gangrene. I also believe that nourishment and powerful stimulants are essential in the treatment of this disease.

Gentlemen, I will not detain you further in this discussion.

LAPAROTOMY IN CASES OF GUNSHOT WOUNDS OF THE ABDOMEN.

By Dr. P. S. CONNER, of Cincinnati.

Of the serious gunshot wounds coming under care, none are more grave than those in which penetration of the abdominal cavity has occurred. Though it is not altogether true as stated by Gale three hundred years ago: "If the shot have pearced through the bellie, and have wounded either the stomacke, liver, splene, kidnies, intestines, bladder, or any of the great veines or arteries, then there is no hope of life to be looked for," yet the mortality rate of these lesions is very high. That individuals may recover and have recovered from wounds of the solid or hollow viscera, even of the small intestine, can not be denied. In very many of the cases, though, reported as of this nature, in which healing took place, reasonable doubts may be entertained as to the correctness of the diagnosis; based as it not seldom was upon shock, hemorrhages from stomach or bowels, gaseous distention, or the course of the ball—each and all of more or less uncertain diagnostic value. But eight years have elapsed since the lamented Parkes, in this city, as chairman of the surgical section of the American Medical Association, delivered his memorable address, in which were detailed the results of many experiments upon dogs, and direct operative interference in cases of wounds of the abdomen advised and urged. From the time of the delivery of this address, following as it did close upon that of the operations of Kinloch (1881), Kocher (1883), and Bull (1884), may well be dated the introduction of laparotomy as a proper and systematic method of treatment.

The questions before us for consideration are, does this operation lessen the danger of a fatal result of the shot wound, and if so, under what conditions, and why? That these questions may be satisfactorily answered, it must be first ascertained, if possible, what is the death rate of the cases not operated upon; and just here lies the greatest difficulty in the solution of the vexatious problem. The reports from the great wars of the third quarter of our century show that 65 to 92.5 per cent of the cases coming under treatment died, and they were only a minority of the whole number wounded, the majority quickly dying on the field, of hemorrhage. But these statistics can not be taken as a basis of argument. The wounds were made by bullets of large size, the cases came comparatively late under care, and protection against septic infection from without was very imperfect. In the wars of the future the bullets used will probably be of a caliber of about 30, instead of 55, 50, or 45, as before, and antiseptic treatment, more or less rigorous, according to circumstances, will be employed. The primary damage and the secondary risk must, therefore, be markedly diminished.

It is in the termination of the injuries of civil life, ordinarily produced by pistol balls, and those, too, observed during the last twenty years, that we must find, if anywhere, the death rate of abdominal wounds treated other than operatively. The data afforded are, unfortunately, very limited, and there must enter into the calculation elements that are very disturbing in the widely different conditions of time and place under which the wounds were treated, and the greater or less thoroughness with which an antiseptic state was secured and maintained. Stimson found that at the Chambers street, New York, and Roosevelt hospitals, in the years 1876–1884, of the 23 cases treated without operation 15 died—65 per cent. T. G. Richardson reported to the Surgical Association in 1887 that in the preceding five years 32 cases had been treated without operation in the Charity Hospital of New Orleans, of whom 19 died, i. e., 59.4 per cent. Reclus & Noguès collected, chiefly from journal reports, 91 cases, of which 22 died—24 per cent; but it must be remembered that it is always largely the fortunate, exceptional cases that are thus reported, and further, in a considerable number of the cases that recovered the symptoms as stated in the table can not be accepted as of positive diagnostic value. Neither vomiting, hemorrhagic discharges from stomach or bowels—certainly if small in amount—shock, gaseous distention, or the apparent course of the ball, proves that a viscus has been wounded. In 3 or 4, or it may be 7 per cent of the cases a bullet will enter and pass through the abdominal cavity without doing such damage.

Senn found that in 1 of the 5 cases upon which he operated, and in 5 of the 14 experimental wounds made upon the cadaver, no intestinal or other visceral injury of moment was inflicted; but such experience is certainly very exceptional. In the large majority of cases of penetration there is wound of viscus or viscera, and the symptoms just mentioned are present in greater or less measure. On the other hand, it has not seldom been found upon autopsy that though symptoms were absent, or present in but slight degree, penetrations and perforations had occurred. It is much to be regretted that we have not a report of the cases under treatment in the various hospitals of all our larger cities during the last twenty years, for had we such, a tolerably close approximation to the mortality rate of the cases not operated upon might be secured. There are, of course, many difficulties in the way of procuring such statistics, but efforts certainly should be made to collect them.

What in contrast is the death rate of the cases upon which laparotomy has been done? Here we are upon more certain ground. Körte collected 64 cases, with 42 deaths—65.6 per cent. Morton 110 cases, with 74 deaths—67.27 per cent. Barrow 112 cases, with 74 deaths—66 per cent. Martin and Hare 129 cases, with 86 deaths—66⅔ per cent. Coley 165 cases, with 111 deaths—67.2 per cent. An average mortality of 66.7 per cent. There is, of course, present the error always associated with statistical tables based upon journal reports made by many operators, to wit, an undue proportion of successful cases published. Stimson found that at the 3 New York hospitals already specified (Chambers street, New York, and Roosevelt), in the years 1884–1889, 16 laparotomies were done, with 13 deaths following—81.2 per cent, but here the numbers are so small that a just conclusion can not be drawn from them.

To eliminate as far as possible the errors arising from suppression of unfavorable cases, from limited number of patients, and from the influence of place and operator, I addressed a few months ago a circular letter to the members of the American Surgical Association, and certain other well-known surgeons in our Eastern, Southern, and Western States, asking a report of the whole number of cases operated upon by each and the number of recoveries following. Answers were received from 73; 18 had never operated; the remaining 55 had done 174 laparotomies; 123 of the patients died—70.67 per cent. I have not included in my table a report sent to me of 14 operations done at the city hospital of St. Louis in less than twelve months ending March 10, 1893, with 10 recoveries; a mortality of 28.5 per cent. Were these cases taken in, the number of operations would be increased to 188, the deaths to 127, and the mortality rate reduced to 68 per cent.

Twenty-three operators reported each a single case, with a death rate of 82.6 per cent. Twenty-three others had operated 2, 3, or 4 times, the mortality rate of their 65 cases being 80 per cent. Four had operated 5, 6, or 7 times, 18 of their 26 cases dying—69.23 per cent. Five had operated 8, 10, 14, and 18 times, respectively, with a mortality rate of 75, 40, 90, 66⅔ and 33⅓ per cent.

A decidedly lower death rate is found, as might be expected, in the practice of those who have done the operation several times. That a large number of intestinal perforations need not necessarily prevent a successful result is shown by one of Miless' (New Orleans) cases in which there were 16 of such injuries. In another case of equal number (Halsted's), which, however, did not terminate favorably, 2 circular enterorrhaphies were made.

So far as may be indicated by the comparatively small number of cases collected, the chances of recovery are greater when operative interference is not made—38½ per cent taking the Reclus, Stimson, and Richardson cases together, as against 68 or 70 per cent. But that comparison of figures may properly be made and opinion based thereon, the classes of cases must be fairly comparable. Are these that are under consideration? Most certainly not. The Reclus table is made up largely of scattered cases, not a few of which were reported because their result was not that usually observed. The hospital statistics given are much limited in time and number. Another set of 50 cases in the same hospitals might have shown a fatality of 70 or 80 per cent or more. Again, many of the laparotomies were done only after abstention had for a day or days been practiced, until grave symptoms had presented themselves and the death of the patient was almost certain to occur, unless prevented by section, ligation, and suture. The fatal result in such should surely be regarded as in spite of, not in consequence of, the operation. The wisdom of a laparotomy done in extremis may generally well be questioned, though every once in awhile an apparently hopeless case will be saved by it; but an unfortunate termination of it should be credited to the preëxisting conditions, to the time, the manner, it may be, of its performance, not to laparotomy as a method of treatment. The time element is a very important one in any abdominal section, especially so, we may well believe, in that for gunshot injury. A short exposure, ready discovery of the few wounds present, easy suturing, and early closure of the operation wound means much less risk to the patient than does hours-long searching for and stitching up of multiple lesions. In Martin and Hare's table the mortality of operations completed in an hour was only one-third of that of those lasting twice as long.

Of what do the subjects of abdominal gunshot wounds die? Of shock, hemorrhage, or septic infection. Few of those coming under care, and not operated upon, perish of shock; while, on the other hand, shock is not seldom an important factor in the production of a fatal result in those submitted to operation; shock consequent upon prolonged exposure and extensive handling of the intestines. Here lies one of the dangers of active interference. To simply open up the abdominal cavity is a small matter, exposing the patient to very slight risk; but to thoroughly examine the intestinal tract and to locate wounds of it, and also those of the associated viscera, can not but take considerable time and give rise to decided nervous disturbances. The greater the experience of the operator the quicker and more systematically will he work, but in cases other than those in which the lesions are few and slight, the time required and the exposure which is unavoidable can not but exert a positively injurious influence upon the chances of recovery. It is much to be regretted that we have not some quick, certain, and safe method of determining the place and number of intestinal lesions. Insufflation, which at first seemed to so satisfactorily answer the indications, has been shown to be unreliable, even injurious; not always revealing the existence of a perforation, at times making it more difficult to replace the intestines, and occasionally, at least, causing fecal extravasations. I have myself once seen it fail of accomplishing its desired purpose because of fecal accumulation in the colon, and in one of my operation cases there had taken place such adhesion of the omentum to the inner opening of the track through the abdominal wall that no gas could have escaped from the entrance wound. Had the test been employed there might have been observed a rapidly increasing distension of the abdomen, of diagnostic value; and again there might not.

A very considerable proportion of cases die of hemorrhage, and without doubt much of the fatality attributed to shock has been due to collapse, the disturbance being primarily vascular, not nervous. That there has been such loss of blood may be determined in doubtful cases by hæmoglobin measurement, as suggested by Martin and Hare. Bleeding from other than a small vessel, or from a considerable laceration of the liver, spleen, or kidney, is not very likely to cease spontaneously; and if it does not there can, under the non-operative treatment, be but one result. Even if the hemorrhage does stop, if it has been to any considerable extent, there is left in the cavity a most excellent culture medium for septic organisms carried in from without or escaping from the intestine. Where there are symptoms present proving or rendering probable that active bleeding is going on, laparotomy should always be done. It may not be possible to effect the necessary ligation, but generally it will be, and the patient given some chance of recovery. He may die, and very often will, but not in the majority of cases, certainly, in consequence of the laparotomy.

A very large proportion—practically, we may say all—of the deaths occurring after the first few hours are because of septic infection. And how could it be otherwise? The bullet itself may, though only very exceptionally, carry in the pathogenic organism. The experiments of Assistant Surgeon La Garde, U. S. Army, and of Messner have proved that the hitherto universally accepted belief that the heat of the explosion must destroy all organisms is not founded on fact. Any piece of clothing carried in is necessarily more or less infectious. The skin bacteria may readily be conveyed internally upon the foreign body introduced. The track of the ball offers a way of approach for the germs in the air. Pyogenic cocci in the circulating fluid may be deposited in the clot. The opened intestine contains them in abundance; and the ever-present colon bacillus may exert its deleterious influence, even though the wall of the intestine is not pierced. Fecal extravasation, which fortunately occurs in but a small proportion of the cases, can not but cause a bacterial inflammation, occasionally limited, but ordinarily generalized. If the organisms are but few, they may be safely disposed of by the peritoneum; if in abundance, they cause a rapidly destructive toxæmia, or, as is more often the case, one slower but scarcely less dangerous.

However produced, the development of septic infection is usually but the prelude to a fatal termination of the case, unless laparotomy is quickly done, the parts cleaned, and drainage secured; and even then the chances of recovery are so slight that many surgeons have declared that the operation should never be done under such circumstances; that it is only likely to do more harm than good. But such declaration is too sweeping. Here, as in other questions of surgical diagnosis and treatment, the words "ever" and "never" should have no place in our language.

That non-operative treatment may be successful hemorrhage must be slight, the wound of the intestine, if intraperitoneal, so small as to be spontaneously closed by contraction, approximation of its edges, or by eversion of the mucous coat; or protecting omental or bowel adhesions must be quickly formed; or firm attachment to the parietal peritoneum must occur; or, suppuration taking place, it must be localized, so that the resulting abscess may safely be opened, or open of itself externally—of likely occurrence only in wounds of the large intestine, or of the kidney from behind. An exceedingly interesting illustration of the protective influence of an omental plug in the external wound was reported by Assistant Surg. Patzki, U. S. Army (1872). Though the wound (by a bullet of caliber .38, at very close range—1 foot) was located 1½ inches above the umbilicus and one-fourth inch to the right of the median line, not an untoward symptom was manifested, and healing was complete on the seventeenth day. When the patient was first seen there was a constricted omental protrusion 2½ inches long, which was removed six days later with the wire ecraseur.

Leaving out of consideration the cases in which there is extensive hemorrhage or discharge externally of fæces, urine, or bile—cases in which operation should certainly be done, and that as soon as possible—the propriety of laparotomy must be determined by consideration, on the one hand, of the likelihood of the occurrence of septic infection if it is not done; and, on the other, of the probable amount of shock that may be expected in the doing of it; bearing in mind all the while the fact that the necessary manipulations of the laparotomy may be a determining cause of toxæmia, in the breaking up of already formed protective visceral adhesions.

When the wound has been made by a ball of quite small caliber, especially when it is well above the umbilicus, or when it is near to the lateral line, and the probable course of the ball has been away from the center of the abdomen, in the absence of any grave symptoms abstention is the wisest policy. When, on the other hand, the bullet is large, the direction of the shot and the location of the entrance wound indicate possible—still more, probable—injury of the intestine, especially the small, and that multiple, or of a solid viscus or the bladder, operation should be done. Because of hemorrhage or septic infection such wound, left to itself, will very generally prove mortal; and the ill effects of shock and danger of breaking up any existing adhesions are not to be weighed against the benefits of closing wounds and cleaning the peritoneal sac. When there is any reasonable question as to penetration of the cavity, the wound should be followed down until the peritoneal opening is found or its absence made certain.

To every judicious mind occupied with the problem now before us it must soon become apparent that no unchanging and unchangeable law can be established. Cases may and do recover when left to themselves; operations may and do cause death. Every case coming under care must be a law unto itself, and is not to be treated in one way or another because statistics show that to be the better one. Nothing is more fallacious than experience, except figures; and he who bases his treatment of abdominal wounds upon arithmetic is not wise.

The technique of the operation has, in large measure, been definitely settled. In the great majority of cases section of the abdominal wall in the median line is much preferable to that farther out or through the external wound, permitting as it does of the quickest and most thorough examination of the contents of the cavity. A free incision is better than a short one, because of the resulting saving of time in the after steps of the operation. The bowel should be run over with as little exposure of it as possible, determination of the direction of its examination being made by reference to the relations of the mesentery.* When the intestinal damage necessitates removal of a portion of the bowel, either because of the primary extent of the lesion or because suturing the wound would be followed by dangerous stenosis, the choice of operation will lie between circular enterorrhaphy and lateral anastomosis, the former at present being most in favor. Very possibly the "Murphy button" may be employed with great advantage. Though drainage may safely be dispensed with in many cases where the lesions are comparatively slight, yet because of the possibility even in these of accumulation in the peritoneal sac of serum, germ laden to a degree beyond the capacity of the membrane to safely take care of, it is prudent to use a drainage tube for at least the first two or three days. When there has been extensive extravasation of blood, or of bile urine or feces in any amount, the tube should always be employed.

How far operative interference can be carried in military surgery is to be determined only by future experience. The wounds may be expected to be less severe than those heretofore met with, the bullet being of smaller caliber, harder and smoother, its velocity markedly greater, it will undergo neither deformation nor deflection; it will not lodge. The intestinal wounds produced will probably be found to be of less size, with edges less contused, and because of the through and through piercing of the body early drainage of the cavity will be more complete; though this may perhaps be prevented by the smaller diameter of the track through the soft parts, and the resulting more frequent falling together of its walls. Recent experiments by Griffith (Kansas City) seem to indicate that when the intestine is distended with fluid extensive and rapidly fatal lacerations of it will occur on account of the great hydrostatic pressure developed by the impact of the rapidly moving shot. A like greatly increased hydrostatic pressure in the liver and spleen must render more grave the lesions of those organs. That laparotomy may properly be done and recovery therefrom made other than accidental, the wounded man must soon come under care, the operator must have time enough in which to work and those things at hand necessary to antiseptic operation and dressing, and the patient must be kept quiet until healing has taken place. How often can such concurrence of favoring conditions be reasonably looked for?

If what is known to-day warrants dogmatising, which is very questionable, it may be said: (1) Neither always nor never should laparotomy be done. (2) When the

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* "Lift any segment of the small intestine, make tense the mesentery, pass the hand back to the spine with palm against the smooth tense mesentery. The border of the hand, looking toward the patient's head, is next to the upper segment of the bowel."

wound has been made by a small ball (caliber .22 or less), especially if it is well above the umbilical level, or, without regard to the size of the bullet, is far out toward the lateral line, and it may reasonably be expected that its course has not been toward the median line of the body, and if the patient's general and local condition is good, abdominal section should not be made. (3) When symptoms indicate decided hemorrhage or fecal extravasation operative interference should be made at the earliest possible moment. (5) When the bullet is of medium or large size, has in all probability passed through the area occupied by the small intestines, or wounded the liver, spleen, kidney, or bladder, laparotomy should be done, and that as soon as possible. (5) Even if peritonitis has developed, its presence does not contraindicate operation, though it makes the prognosis much more grave.

REMARKS OF PROF. ALBERT VANDERVEER, M. D.

MR. PRESIDENT AND GENTLEMEN OF THE SECTION: Dr. Conner has had an exceedingly difficult subject to handle. He has gone over the ground in a very systematic manner so far as he is able to give us statistics, and has carefully weighed them in a conservative manner. When we come to study his paper later on we shall find that it contains a great deal of true merit and much which will be of value to the surgeon in an emergency when treating a case of gunshot wound of the abdomen.

I regret the absence of Dr. Bryant. I know him so well that whatever facts he might have given us here in the way of discussion would be given in a straightforward and honest manner, and have added interest to the statistics which Dr. Conner has brought to our attention. We also regret the absence of Dr. McGuire, whom we all respect so much.

Now, as regards my own position here in discussing this paper, it is one that we have to approach, as it were, on the spur of the moment. We have had no abstract given us of the paper, no points presented. One has to follow up a paper of this kind and perhaps jot down his impressions and weave them into the line of thought presented. I was pleased to have Dr. Conner exercise somewhat the element of doubt with reference to cases that are reported as cases of recovery without operation. I believe that many of these cases are exceedingly doubtful, and that many misstatements have been made for the purpose of getting the case on record as one of recovery from penetration in which the bullet had not entered the cavity at all. On the other hand, again, I believe that many cases are not recorded where an operation has been made.

I entered the Army during the late war in the spring of 1862, and I remember a very painful experience of nearly four years in watching gunshot wounds of the abdomen. I saw them on the battlefield, and well do I remember seeing some of my fellow officers, whom I attended and had learned to love as brave soldiers, brought in suffering with gunshot wounds of the abdomen, inflicted by the large bullets in use during that war. We saw cases that were sickening to look upon. I call to mind several cases in which, although an attempt was made to close the wound in a natural manner, it was found to be impossible.

The few autopsies we were able to hold showed that the most of these cases really had hemorrhage.

Now, when we come to watch these cases in civil practice we shall have a different class to deal with. We shall have a class of cases in which the caliber of the bullet must be taken into consideration. It is not so great. Many of these wounds are from a .22-caliber weapon, which does not do the same amount of harm. It does not give to the abdominal cavity that amount of shock which the larger bullet does.

The symptoms of penetrating wounds of the abdomen are certainly very uncertain. We have a condition in which the patient for a few hours does not present any alarming symptoms, but there is a hemorrhage going on which ultimately proves fatal. Now, we must take into consideration the make-up of our patient.

This is a condition that must be considered, and we must look over it carefully as we examine the patient, especially as to the element of shock.

I have placed a great deal of stress upon the first examination of patients. I spend quite a good deal of time in learning as to the direction of the bullet. How did you stand? What was the position of the one who fired the shot? This in order to ascertain the direction the bullet may have taken. The intestine may not be injured at all.

Now, if we have a case in which we think that hemorrhage is present let us confer with the responsible party, the parent or guardian. Let us put the case fairly and squarely before them; and the patient must also understand it. The cases where the element of hemorrhage is present ought not to be left at all. Do the operation at once. Go on with it, for the hemorrhage must be controlled. The foreign substances must be looked after carefully, and in that direction some good is to come. The case in which there is an escape of fecal matter without hemorrhage, and in which the patient died without hemorrhage, is a reproach.

Now, as to the test that we may make for doubtful cases. Concerning the use of gas I must say that my belief in that is badly shaken, and, all things taken into consideration, I am opposed to it.

We stand on ground, as regards the closing of the wound, a good deal as we have stood for some years regarding the best method for the cure of hernia. No man can say this is the best method for curing hernia. We must take any method that will close the wound the quickest; and let it be done with celerity, but not undue haste, and the surgeon should be thoroughly familiar with his work. Close the wounds in the method that can be done the quickest. The man who can do the operation the quickest can do it the best.

Now, as to the employment of drainage, in these cases of hemorrhage where the intestine has been perforated. It is of the greatest importance that drainage should be made use of in order to avoid the possibility of closing in septic material. A thorough washing and cleansing of the abdominal cavity, and thorough drainage, may save your patient.

We should, as conscientious men doing this work in abdominal surgery, place upon record every case we have, and I earnestly hope that this will be one of the points that will be carried out thoroughly in the Army hospitals, where a systematic course can be pursued as regards the collection of statistics. It should also be done in private hospitals. I know of two or three cases in my own city that were not reported. They were fatal cases, although I may add that they would have been so in the hands of anyone. I have no fault to find with them for this—only that they should have been reported.

REMARKS BY CAPT. LOUIS A. LAGARDE, ASSISTANT SURGEON, U. S. ARMY.

With reference to the distinctive effects of the projectile of the new armament upon the abdominal viscera in future wars there are several things to be considered.

We all know that the amount of destructive effects in gunshot injuries depends on three factors—(1) the velocity of the projectile on impact, (2) its deformation, and (3) the resistance offered by the part hit. For the abdominal contents we may practically throw out deformation. We then have but two factors—resistance and velocity.

The two things in the human body principally concerned in offering resistance to projectiles are the hard bones and fluids. Reasoning thus, we are to estimate the destructive effects in this particular region by the velocity of the projectile and the amount of fluid contained in the various organs, the alimentary canal included.

Burns, Hobart, and others have noticed the effects of the small jacketed projectile on the heart, lungs, liver, spleen, and intestines and they report that they are enormous in the zone of explosive effects, which for the new armament extends to 350 yards, and in tissues containing much fluid enclosed in cavities with rigid walls like the brain, heart, and lungs up to 500 yards.

Griffith, of Kansas City, lately performed experiments on the Fort Leavenworth range on live dogs with the Krag-Jorgensen rifle within 200 yards. Three of the animals were shot through the abdomen and they are reported to have died as promptly as though they had been electrocuted. The post-mortem showed the wound of entrance equal in diameter to the caliber of the projectile; the wound of exit scarcely exceeded this diameter. Upon opening the abdomen the amount of destruction was found to be very extensive. The intestines were not only perforated in the track of the projectile, but they were more or less pulpified. The surprising thing about his results was that no vital part was hit which might account for the instantaneous death of the animals.

Owing to the resistance offered by the abdominal contents and the high velocity of the small jacketed bullet, both of which are concerned in determining destructive effects, I doubt if the skill of the surgeon will avail in saving human life in this class of wounds, especially when they are inflicted within the zone of explosive effects. Beyond this range the conditions in the wounds will certainly be more favorable, and this will be due especially to the smaller caliber of the new projectile.

REMARKS BY DR. AUGUSTUS C. BERNAYS, OF ST. LOUIS, MO.

Mr. President and Gentlemen of the Section: I only rise to make one point in this discussion, which, however, will be admitted to be of probable importance. By way of introduction I will say that the treatment of gunshot wounds of the abdomen has been particularly in my line of work, as those know who have followed the literature of the subject, and I am pleased to say that the conclusions arrived at by Dr. Conner to-day are almost in exact accord with my own, reached after a period of about ten years. I think the first operation I made was in 1882; and, strange to say, just before coming into this hall I called at the library of the Surgeon-General's Office and asked to see the transactions of the Surgical Association of German Colleges, of which I am a member, where this subject was discussed in April last, the paper being read by Von Bergman and discussed by several German physicians of prominence, and I found the conclusions were almost identical with those of Prof. Conner here to-day.

When I first published my paper on my first five cases (of which three were successful), I was a rabid enthusiast in regard to laparotomy in gunshot wounds of the belly. I labored under an erroneous idea as to the danger in gunshot wounds of the intestines. I believed that Sir William Thompson, who states that 99 per cent are fatal, was thoroughly wrong.

Now, the point I want to make is this: In regard to the condition of the intestinal tract so far as containing or not containing victuals is concerned, I know from my own experience, and I have had about 1,015 cases, that preparatory starvation must be resorted to and the operation done when the tract is absolutely empty. When this course is followed it is perfectly wonderful to see how rapidly the patient recovers.

I had an instance in my experience in gunshot wounds which will illustrate this. I operated on a boy who was shot between 5 and 6 o'clock in the evening, the bullet entering just below the kidney and making its appearance near the umbilicus. I found eight perforations of the smaller intestines, and no large vessel bleeding. Of the eight holes which were made by the bullet passing from intestine to intestine, I only stitched three; the others I thought it would be an error in the way of surgery to touch. Now, that boy's intestines were entirely empty, he having had dinner at 12 o'clock, and the result was that he rapidly recovered. I want to make the point that when a soldier goes into battle it should be upon an empty stomach. I believe it would be good surgical treatment not to perform laparotomy unless there were signs of hemorrhage, and that such men would get well. In one case I had the patient was a gourmand. I found cabbage, potatoes, pieces of venison, etc., loose in the abdominal cavity. That man would have died without the operation. We all know that the contents of the intestine contain certain numbers of saprophytic bacteria, and probably some pathogenic bacteria as well. At least it is possible, and therefore, in the case of a man shot soon after partaking of food, I think that laparotomy is indicated in every case, and I would advise the starvation treatment and absolute rest. I would go so far as to put a plaster of Paris dressing over the abdomen. In these days of antiseptic surgery the point of giving the injured parts rest is being sadly overlooked by a great many surgeons. It is just as important to give an injured limb rest as to prevent infection.

ADDITIONAL REMARKS BY PROF. P. S. CONNER, OF CINCINNATI, OHIO.

Mr. President: I have but a word to say in addition to what I have already given on this subject. It is one of extreme interest to me, and it is one which can not be disposed of in the words "ever" or "never." What we need especially is the truth with regard to what has been done. To know how many have been successful, and, if not successful, the reason why. I want to get, if I can, a statement of all laparotomies done in this world by physicians, and I would take it as a great personal favor if any one present; knowing of operations having been done, will give me the name and address of the operator, that I may ask him how many times he has operated and what the result has been. I may add that I have operated on seven cases.

ARE PROJECTILES FROM PORTABLE HAND WEAPONS STERILIZED BY THE ACT OF FIRING? CAN A SEPTIC BULLET INFECT A GUNSHOT WOUND?

By LOUIS A. LAGARDE, Captain and Assistant Surgeon, U. S. Army.

[From the laboratory of the Johns Hopkins University and Hospital.]

In the following paper I will endeavor to show that (1) the majority of projectiles in original packages are sterile or free from septic germs; (2) a projectile contaminated by a specific pathogenic microbe is apt to produce its specific disease when fired into susceptible animals; (3) the projectile of the small-bore rifles forming the armament of the European armies, does not readily become contaminated in ricochetting; (4) the medico-legal phase of gunshot wounds in the light of the results obtained; (5) conclusions.

The communication of sepsis by projectiles is a subject almost as old as the history of gunpowder. The literature of gunshot injuries shows that it comes up for discussion periodically, and especially upon the breaking out of every war. The great improvements that have been made in the military rifle in recent years, and the superior velocity and penetration conferred upon the new jacketed projectile, have once more revived the question of septic bullets.

The notion was pretty generally entertained prior to the evolution of the new armament that projectiles were purified by the act of firing, and, among the more prominent advocates of this notion, I would mention the names of Esmarch and Volkmann. With the advent of the highly polished projectile of hard exterior, which encounters so much more resistance than the softer leaden bullet of the old armament, the claimants of the asepticity of projectiles by the act of firing again advanced their side of the question. I believe it was Bruns who, upon picking up a steel-jacketed bullet that had just traversed a resistance target, found it so hot that he was led to remark that he did not see how organisms could live upon the projectiles because of the great amount of heat which it exhibited.

Until the advancements in our bacteriological technique had come about it was impossible to accurately determine the pro or con of this important question. Those who in former times advocated the asepticity of projectiles did so upon the evidence afforded by their uniformly good results in the clinical field, while those who opposed the idea did so upon evidence furnished by unfavorable results in the same quarter.

As a preliminary to the work of noting the effects of firing bullets that had been previously contaminated, it was considered proper to ascertain the condition, bacteriologically speaking, of bullets in their original packages. This was done with the result shown in the subjoined table A.

We find that out of 26 gelatin rolls (Esmarch tubes) examined, there were altogether 26 colonies, and that 14 of the tubes had no colonies, while the remaining 12 tubes contained a total of 26 colonies with a maximum of 4 and a minimum of 1. Since each tube represents the number of microörganisms on 1 bullet, we conclude from these data that 53 per cent of the missiles examined were absolutely sterile, and that the remaining 47 per cent were practically so.

TABLE A.—*Cultures from bullets taken out of original packages.*

Date.	Number of cultures.	Caliber.	Whence obtained.	Medium in which bullets were placed.	Date of observation.	Result in colonies.
May 31, 1892..	1	.22	Ammunition store in Baltimore	Gelatin roll...	June 5	1
June 2, 1892..	2	.22	......do	...do	June 7	....
Do.......	3	.22	......do	...do	...do ...	1
Do.......	4	.22	......do	...do	...do ...	....
Do.......	5	.22	......do	...do	...do ...	....
Do.......	6	.22	......do	...do	...do ...	4
Do.......	7	.22	......do	...do	...do ...	....
Do.......	8	.38	......do	...do	...do ...	2
Do.......	9	.38	......do	...do	...do ...	....
Do.......	10	.38	......do	...do	...do ...	3
Do.......	11	.38	......do	...do	...do ...	....
Do.......	12	.38	......do	...do	...do ...	2
Do.......	13	.38	......do	...do	...do ...	....
Do.......	14	.38	......do	...do	...do ...	1
Do.......	15	.38	......do	...do	...do ...	....
Do.......	16	.38	......do	...do	...do ...	1
Do.......	17	.38	......do	...do	...do ...	....
Do.......	18	.38	......do	...do	...do ...	4
Do.......	19	.38	......do	...do	...do ...	....
Do.......	20	.38	......do	...do	...do ...	....
Do.......	21	.38	......do	...do	...do ...	2
Do.......	22	.38	......do	...do	...do ...	....
Do.......	23	.38	......do	...do	...do ...	....
Do.......	24	.38	......do	...do	...do ...	2
Do.......	25	.38	......do	...do	...do ...	....
Do.......	26	.38	......do	...do	...do ...	3

Because examination of a number of bullets from the same source since the data were collected in Table A fails to show any pyogenic bacteria we conclude that the remaining 47 per cent were practically sterile.

These results are what we might expect, when we consider the process employed in the manufacture of cartridges in detail.

Ordnance Memoranda, No. 8, of the U. S. Army, 1870, describes the method of manufacture of the center-fire metallic cartridge, which is about the same as that employed by private firms.

Although there have been some improvements in the process of manufacture since the circular was issued, the employment of heat and the use of acids and alkalies remains about the same.

The cartridge consists of the following parts: (1) The case of copper or brass, (2) the cup anvil, (3) half a grain of percussion composition, (4) 70 grains of musket powder, (5) a lubricated bullet weighing 500 grains.

During the manufacture of the copper cases they are annealed once or twice by subjecting them to a red heat in a charcoal fire. They are subsequently treated once with a solution of sulphuric acid in water (1 to 15), and twice finally with a solution of caustic potash and caustic soda, $1\frac{1}{2}$ pounds of each to 5 gallons of water, after which they are thoroughly dried in a drying room at a temperature of 125° F.

The lead of which the bullets are made is melted and skimmed of dross, after which it is cast into cylindrical molds of suitable diameter and length. The subsequent steps of compressing the lead and cutting the bullets into proper length is done entirely by machinery.

The act of loading is also accomplished by machinery, and before each bullet is pressed into its copper case its surface and cannelures are lubricated by a mixture of grease and wax which has been previously subjected to a high temperature.

The cartridges are finally packed and hermetically sealed into paper boxes, the frames and skeleton divisions of which are made of tarred boards. The employment of heat, acids, alkalies, and absolute cleanliness are necessary to insure the keeping qualities of the powder and to obtain constant results in firing.

As additional evidence of the sterile condition of projectiles, we have but to refer to the clinical history of the wounds inflicted by them. The consensus of opinion among surgeons is that gunshot wounds are, as a rule, aseptic, and I believe the data in Table A explain why this is so.

If we make, as a contrast experiment, a bacteriological estimate of the number of microörganisms on bullets that have been kept loose in a bureau or washstand drawer, or on shelves in a closet, the usual places for storing these projectiles at home, or if we will take cartridges from the belts of men in barracks or from lots that have been lying in camp out of the original packages for some time, not to speak of the cartridges in time of war which are carried by the men in all kinds of weather for days before actual battle, we will find, on dropping cartridges from these sources into gelatin tubes and then converting the latter into rolls, that the number of colonies which will develop under favorable conditions of temperature will not correspond to a maximum of 4 and a minimum of 1, as observed in the specimens examined from the original packages, but that the minimum will be more apt to correspond to scores, and the maximum so great that counting will become irksome.

Knowing that microörganisms are, as stated, found on unclean bullets, the following experiments were conducted to determine whether germs were still apt to be found on projectiles after firing: To be sure that the germs, if found, emanated from impurities on the bullets and not from the weapon employed, a six-chambered Colt's revolver, .38 caliber, was thoroughly sterilized by subjecting it to a moist heat in an Arnold's sterilizer for an hour before firing.

Twelve .38-caliber cartridges were thrown upon the floor of an unswept room. The room was then swept and the cartridges and sweepings placed in a dustpan, from which the former were taken as often as it became necessary to load the revolver.

At a range of 13 feet these projectiles were fired upon an iron target enveloped in a wire screen, the target and the screen having been previously sterilized by the flame. As each shot was fired the iron target was slipped out of the screen through a slit at one side and subjected anew to the flame by an assistant, while I occupied myself in transferring the pieces of the leaden bullet with sterilized forceps into a test tube of melted agar-agar. This done, the wire in turn was again subjected to the flame and the target put back in place. This process was observed after each shot.

At the end of the firing the test tubes of agar-agar, which had been in the meantime kept at a temperature of 40° to 42° C., were converted into rolls (Esmarch tubes). At the end of forty-eight hours, at the ordinary room temperature, the majority of the tubes contained scores of colonies. The smallest number of colonies in any of the tubes was 17.

I should state in this connection that the fragments of lead in the agar-agar showed a great deal of undissolved dirt still adherent to them, and that the number of colonies observed did not in all likelihood represent more than a fraction of the microörganisms in each tube.

As already stated, clinical evidence teaches us that the majority of gunshot wounds are aseptic. But we know also that pyæmia, erysipelas, tetanus, malignant odema, etc., do at times occur after gunshot wounds. Such complications are generally attributed to ignorance or neglect on the part of the surgeon in the application of his primary dressing, to unnecessary exploration with septic fingers or probes, or from dirt or pieces of clothing having been forced into the wound by the missile at the time of the injury. From the teachings of the present day, I believe I am correct in stating that a gunshot wound, in which all the faults mentioned have been excluded, would be considered aseptic—free from any inherent danger of infection—by the vast majority of surgeons. Is this so? Could there not be a source of infection which we are overlooking, the elucidation of which might go far to explain conditions that have been very puzzling to us in the past?

The experiments with the bullets which lay in the sweepings before firing would seem to prove conclusively that microörganisms on bullets are not destroyed by the act of firing, certainly not when fired from a .38 caliber Colt's revolver.

Lest there should have been some error in these experiments, I adopted the plan of using a very uncommon germ, and one which, at the same time, possesses the merit of being readily recognized by its morphology and specific effects on animals.

In this connection, therefore, I wish to call attention to the following tables, which give in detail certain experiments made to determine the fate of anthrax germs in various forms when applied to bullets before firing:

TABLE B.—*Experiments with infected bullets.*

[Organism placed in a small hole in the conical end of bullet, the hole being finally sealed with wax; used Colt's revolver, caliber .38; organism used, anthrax spores.]

Date.	Range.	Sterilized material used as a target to recover bullets.		Media used in making cultures from bullets.			Date of observation.	Result.	Remarks.
		Jute.	Cotton.	Agar.	Gelatin.	Bouillon.			
1892.	*Feet.*								
June 13.	10	......	1	1	......	......	June 14, 15, 16, and 17.	No colonies.	Ball recovered in cotton split in two lateral halves. Each half was put into an agar tube, and the latter were converted into rolls.
Do...	10	......	....	......	......	1	June 14.	Anthrax bacilli.	The ball missed the basket of cotton, struck a brick wall, and bounded back 13 feet. It was immediately picked up with fingers and placed in tube of bouillon.
Do ..	10	......	....	1	......	......	June 16.	....do	The ball missed the basket of cotton, passed into a barrel, was recovered through bunghole, and put in an agar tube, the latter rolled on ice.
June 14.	10	......	1	1	......	......	June 17.	....do	Ball recovered in cotton with sterilized forceps, dropped in agar, etc.
Do...	5	......	1	1	......	......	June 15, 16, and 17.	See remarks.	As no colonies had formed on the 17th, the bullets were examined and each orifice was found sealed with the wax. The plug of wax and bullets were dropped into two bouillon tubes. The medium was found swarming with anthrax bacilli on the 19th.
Do...	5	......	1	1	......	......			
Do...									
June 15	5	......	1	......	......	1	June 17.	Anthrax bacilli.	This bullet went entirely through the basket of cotton, and was found on the ground 6 inches from bottom of basket enveloped in cotton.
June 15.	5	......	1	......	......	1	June 17	Anthrax bacilli.	Same as preceding result.
Do...	5	......	1	......	......	1	....do ...	....do	Ball found in cotton in bottom of basket. The heat of cotton was still perceptible, from recent sterilization, by which wax in end of bullet had been entirely melted.
Do...	5	......	1	......	1	......	....do ...	....do	
Do...	5	......	1	......	1	......	....do ...	....do	Same as last result.
June 17.	5	1	....	1	......	......	June 19.	....do	The bullets in these experiments were recovered direct from the jute.
Do...	5	1	....	1	......	......	....do ...	....do	
Do...	5	1	....	1	......	......	....do ...	....do	
Do...	5	1	....	1	......	......	....do ..	....do	
Do...	5	1	....	1	......	......	....do ...	....do	
Do...	5	1	....	1	......	......	....do ...	....do	

TABLE C.—*Experiments with infected bullets.*

[Organism mixed with a mixture of grease and wax (1 to 4), which was applied to bullet at conica end; used Colt's revolver, caliber .38; organism used to infect bullet, anthrax spores.]

Date.	Range.	Target.	Media used in making cultures from bullets.		Date of observation.	Result.	Remarks.
			Agar.	Gelatin.			
1892.	*Feet.*						
June 19.	13	Iron sterilized.	1	....	June 21.	Anthrax....	The bullets in these experiments invariably struck the iron target point end first. They were recovered, as a rule, in a number of fragments with sterilized forceps and dropped immediately into the medium.
Do...	13	....do	1	....	...do	....do	
Do...	13	....do	1	....	...do	....do	
Do...	13	....do	......	1	...do	....do	
Do...	13	....do	1	....	...do	....do	

TABLE D.—*Experiments with infected bullets.*

[Organism placed in concavity of missile next to the powder; used Colt's revolver, caliber .38; organism used to infect bullet, anthrax spores.]

Date.	Range.	Target.	Medium used in making cultures from bullets.	Date of observation.	Result.	Remarks.
1892.	*Feet.*					
June 22.	13	Iron sterilized.	Bouillon	June 25.	Anthrax....	The anthrax spores were placed in the concavity of the bullet with the platinum loop, unmixed with wax and grease.
Do...	13	....do	....do.........	...do	....do	
Do...	13	....do	....do.........	...do	....do	
Do...	13	....do	....do.........	...do	....do	

TABLE E.—*Experiments with infected bullets.*

[Used Colt's revolver, caliber .38; organism used to infect bullet, vegetative form of anthrax.]

Date.	Range.	Target.	Medium used in making cultures from bullets.	Date of observation.	Result.	Remarks.
1892.	*Feet.*					
June 27.	13	Iron sterilized.	Bouillon ..	June 30...	Anthrax....	The bullets in these experiments were infected on the surface at the conical end with a thin-paste made from the organs of a mouse that had died of anthrax the night before.
Do...	13	....do	....do......	July 1, 2, 3.	No anthrax.	
Do...	13	....do	....do......	...do	....do	
Do...	13	....do	....do......	June 30...	Anthrax....	
Do...	13	....do	....do......	...do	....do	
Do...	13	....do	....do......	...do	....do	
Do...	13	....do	....do......	...do	....do	The bullets in these experiments were infected in the concavity next to the powder with the material above mentioned.
Do...	13	....do	....do......	...do	....do	
Do...	13	....do	....do......	...do	....do	
Do...	13	....do	....do......	...do	....do	
Do...	13	....do	....do......	...do	....do	
Do...	13	....do	....do......	July 1, 2, 3.	No anthrax	

Examination of tables B, C, D, and E shows that 37 shots were fired into and upon sterilized targets, that the bullets were infected with anthrax germs in different forms, and that the missiles were recovered and dropped into test tubes containing media of various kinds. The column of results shows that 34 out of the 37 bullets recovered were still infected with anthrax germs. The experiments so far demonstrate conclusively, therefore, that anthrax germs in any form, when applied to the projectile of the .38-caliber Colt's revolver, are rarely, if ever, entirely destroyed by the act of firing.

The results as stated induced me to fire anthrax bullets into animals to determine whether or not this might prove to be a source of inoculation.

On July 7, 1892, 2 white rabbits were shot at the Johns Hopkins Pathologica Laboratory. The weapon used was a .22-caliber revolver. The projectiles wer previously infected by smearing the conical end of the lead with a culture of anthrax germs from a slant of agar-agar which had been prepared from the blood of a gray mouse that had died from the effects of this microörganism the day before.

In the case of the first rabbit the missile passed through the left ear near the skull. The ball penetrated a pine board a few inches beyond, where it was recovered. The animal died July 11, 1892. Cover-slip preparations from the blood stained with a solution of gentian-violet showed anthrax bacilli in abundance. The presence of anthrax was shown by Gram's method in the liver, lung, spleen, and kidneys.

In the case of the second rabbit the ball entered the external surface of the left thigh near the hip joint, and glancing upward lodged under the skin over the sacrum. Although droopy on the fourth day, he made a gradual and complete recovery.

On July 23, 1892, I shot a bull calf 5 weeks old at Fort McHenry at a range of 4 feet. The weapon used in this instance was a .38-caliber double-action Colt's revolver. The bullet was infected by smearing a recent culture of anthrax bacilli upon the conical end. The ball entered the left thigh and lodged in the perineum. The animal sickened on the third day and died July 30. Cover-slip preparations stained with methylene-blue from the blood of the spleen, liver, and heart showed anthrax bacilli.

The experiments with firearms conducted so far give results with but 2 weapons, namely, a .22-caliber 6-chambered revolver and the .38-caliber 6-chambered double-action Colt's revolver. The bullet of the former weighs 29 grains, while the charge of powder weighs 3 grains. The bullet of the .38-caliber Colt's revolver weighs 125 grains. It is fired by 16 grains of powder.

The amount of heat imparted to these projectiles by the act of firing and at the moment of impact must be inconsiderable when compared with that imparted to the .45-caliber projectile of lead belonging to our service rifle, and also to the projectiles of the rifles of small caliber forming the armament of the foot troops of Germany, France, Austria, etc. The last guns mentioned (the Mauser, Lebel, and Mannlicher) may be taken as types of the portable guns with which the wars of the future are to be fought. The projectiles fired from them have a leaden nucleus with an outer covering of steel, nickel or German silver.

On September 2, 1892, the fate of anthrax spores on the projectile of the .45-caliber Springfield rifle was tested as follows:

The full charge of powder—70 grains—was used at a range of 10 feet. Three bullets were infected in grooves made by the pressure of a knife blade upon the conical end of the lead. The bullets were fired into a target of pine boards, each board being an inch thick, disposed at intervals of an inch.

The first bullet penetrated 18, the second 17, and the third 19 boards. Each bullet was recovered with a pair of sterilized forceps and placed in a test tube of bouillon.

Repeated examinations of these tubes after the lapse of forty eight hours failed to show the presence of anthrax bacilli. The shallow grooves in which the anthrax germs were smeared were invariably effaced, while the bullets were very much "set up" by the resistance encountered in the target.

Three more bullets were infected on the same day and fired into the same target. In this experiment the bullets were infected in the concavity next to the powder. The penetration of the projectiles was 19. 23, and 18 inches, respectively. Each bullet was recovered with a pair of sterilized forceps and dropped in a tube of bouillon.

Examination of the medium after the lapse of forty-eight hours demonstrated the presence of anthrax bacilli in two of the tubes.

Although I had no rifle of small caliber with which to continue my experiments, I was fortunate enough to secure the use of a modified Springfield rifle, which has virtually the same ballistic properties as those of the Mauser, Lebel, and Monutecher.

The modified Springfield shoots a .30-caliber bullet, weighing 231 grains, made of a leaden nucleus covered by a mantle of either German silver or copper. It is npressed by 36 grains of smokeless (Wetteren) powder. Its initial velocity is bout 2,100 feet per second.

On August 30, 1892, four full-grown white rabbits were shot at Frankford Arsenal ..ith a modified Springfield as follows:

Rabbit No. 1 was shot at a range of 10 feet with a copper-covered bullet infected /ith anthrax spores at the conical end. The bullet passed through both ears and he intervening scalp. The bullet then penetrated a target of pine boards an inch hick, placed an inch apart. It was recovered in the thirty-fifth board, having penetrated 34 inches of pine.

The bullet was secured with sterilized forceps and dropped into a test tube of bouillon.

The rabbit died from shock, the missile having grazed the skull, two hours after the shooting.

Twelve cover-slips and two agar-agar slants, prepared from the blood in the track of the bullet twenty-four hours after death, failed to show the presence of anthrax; and no anthrax bacilli were ever found in the tube of bouillon containing the bullet.

Rabbit No. 2, like the preceding, was shot with a copper-covered bullet infected with anthrax spores at the conical end. Range, 10 feet.

The bullet passed through both ears, about an inch from the skull, and was recovered between the twenty-eighth and twenty-ninth pine boards with sterilized forceps and placed in bouillon. The bullet was deformed at the conical end—set up—having very likely struck a pine knot in one of the boards.

The rabbit died on September 3, 1892.

Careful search for anthrax failed to demonstrate the presence of the microörganism in either the blood or tissues, nor did it develop in the bouillon containing the bullet.

Rabbit No. 3 was shot at a range of 10 feet with a leaden bullet covered with German silver. The bullet passed through the right ear 2 inches from the scalp. It was recovered from the twenty-first board, and with sterilized forceps placed in bouillon.

The rabbit died on September 3, 1892. Cover-slip preparations from the blood of all the organs, stained with a solution of gentian-violet, demonstrated anthrax bacilli in abundance. The germs were also found in the tissue of the kidney, liver, and heart, by Gram's method.

The bouillon containing the bullet never developed anthrax.

Rabbit No. 4 was shot at a range of 10 feet with a leaden bullet covered with German silver. The bullet passed through both ears near the scalp, and penetrated 43 inches of pine. It was placed in bouillon with sterilized forceps.

The animal died on September 2, 1892.

Anthrax was found in the blood of the heart, and Gram's method revealed its presence in the tissue of the liver, heart, and kidneys.

From the foregoing it appears that only the two rabbits shot with the bullets covered with German silver died of anthrax.

The presence of anthrax could scarcely be expected in the first rabbit shot with a copper bullet, for the reason, as stated, that death was caused by shock only two hours after the injury.

Although the result was negative in the second rabbit shot with a copper bullet, I am very much inclined to believe that further experiments with this projectile would show it to be as capable of transmitting anthrax as the projectile covered with German silver.

The projectile in every instance was placed in tubes of agar-agar, and the latter in turn were converted into rolls. No colonies of anthrax deaveloped in the rolls, which was doubtless due to the great friction encountered in the target of pine boards.

Bullets infected with the streptococcus of erysipelas, with a culture of tetanus, and with the bacillus pyogenes soli of Bolton, were fired through the ears of rabbits with a .45-caliber Colt's revolver. The erysipelas coccus was communicated to one animal, and the bacillus pyogenes soli was recovered from the wound of another; tetanus was not communicated.

A bullet infected with a culture of the bacillus of tetanus was fired into a horse with the modified Springfield rifle with negative results; rabbits inoculated with some of the same culture died promptly. At the suggestion of Prof. Meade Bolton, of the Johns Hopkins Hospital, a bag of tetanus earth was placed against the hip of another horse, and the projectile of the .30-caliber experimental Springfield rifle was fired through the earth into the fleshy part of the ham without result.

Having found that a projectile is not purified by the act of firing, it was considered in the line of our experiments to determine whether or not a projectile can become contaminated in transit after leaving the rifle. It is fair to assume that the old leaden projectile, which deforms so readily in ricochetting, will carry septic matter upon its irregular surface. This proposition was considered so self-evident that no experiments were deemed necessary to prove it. The projectile of the new armament presents different conditions, however. It is made up of a leaden nucleus incased in a hard envelope of either German silver or nickeled steel. In ricochetting, this projectile is not apt to assume an irregular surface, unless it encounters very resistant objects, and when it does deform to any marked extent it is apt to separate into many fragments, a circumstance which must soon end its efficiency.

In order to ascertain whether the hard, polished exterior of the jacketed projectile was apt to carry germs from one point to another in its trajectory, the following experiment was performed at Jackson Park, Chicago, Ill., August 30, 1893. A piece of sheet lint, which, when folded upon itself three times measured 15 by 30 inches, was saturated with a culture of the red water bacillus of Dr. Wilson in beef-tea infusion, and suspended in the air 25 yards from the muzzle of the experimental Springfield rifle. Fifty yards from the target of sheet lint, in direct line with it, was placed a can, 24 inches high, 20 inches wide, and 3 inches deep, filled with sterilized mashed potato. Seven sterilized German silver jacketed projectiles were fired through the lint and potato medium. The orifice of entrance and exit in the latter were plugged at once with sterilized cotton. At the end of forty-eight hours, under favorable conditions of temperature, the red water bacillus failed to develop in the potato. This result shows that the well-polished projectile of hard exterior will not readily carry infection in ricochetting unless it becomes deformed, which it seldom does, and the result, I believe, serves to make the jacketed projectile that much more humane.

The medico-legal phase of this subject of septic bullets is one which deserves attention. As the value of cleanliness and antisepsis becomes better known by the laity, it is only a question of time when surgeons will be held accountable in the courts for inflicting sepsis in wounds. Indeed, such cases may have already arisen. There are two aspects of the practitioner's liability: He may be prosecuted criminally for negligence producing death, or he may be asked civilly to respond in damages by the party injured or by his heirs. For the purposes of this paper, however, the rules of evidence and the burden of proof may be treated as substantially the same.

Speaking thus, with approximate accuracy, if the plaintiff or the prosecution establishes (1) The existence of blood-poisoning, (2) surgical uncleanliness in the use of instruments or dressing, (3) failure on the part of the operator to render his hands or those of his assistants aseptic in the ordinary way, a prima facie case is made against the surgeon, which he must overcome.

Ordinarily he might avail himself of evidence that (1) the patient's clothing, pierced by the bullet, was old and dirty, and hence probably not aseptic, and (2) that his skin at the wound of entrance and exit bore specific germs.

In the light of the results of the foregoing experiments, two additional lines of defense are open to him, viz: (1) The bullet itself might have been septic when fired, and (2) by ricochet, or otherwise in transit, it may have become septic—two conditions, either of which is well within the bounds of possibility.

From the experiments with projectiles I believe we can sum up the following conclusions:

(1) The majority of cartridges in original packages are sterile and free from septic germs.

(2) The sterile condition of cartridges is due to the thorough disinfection and absolute cleanliness observed in the process of manufacture.

(3) The majority of gunshot wounds are aseptic because the vast majority of the projectiles inflicting them are either sterile or free from septic germs.

(4) Anthrax spores or bacilli when applied to the projectile of a portable hand-weapon are seldom if ever entirely destroyed by the act of firing.

(5) When a gunshot wound is inflicted upon a susceptible animal by a projectile infected with anthrax bacilli the animal becomes infected with anthrax and dies, in the vast majority of instances, from said infection.

(6) The streptococcus of erysipelas and the bacillus pyogenes soli when placed upon the projectile of the .45-caliber Colt's revolver are not always, at least, destroyed by the act of firing, and they are liable to cause infection.

(7) Projectiles from portable hand-weapons are not sterilized by the act of firing.

(8) A septic bullet can infect a gunshot wound.

In a partial report to the Surgeon-General, U. S. Army, published in the New York Medical Journal of October 22, 1892, credit was given Profs. William H. Welch and W. T. Councilman for invaluable assistance and advice in the preparation of the foregoing data, and I beg to refer once more to the debt I owe these gentlemen.

The section at 1.45 p. m. took a recess until 2 p. m.

A BRIEF DESCRIPTION OF THE ORGANIZATION AND EQUIPMENT OF A FIELD HOSPITAL, U. S. ARMY.

By Maj. JOHN VAN R. HOFF, surgeon, U. S. Army.

Under existing regulations a field hospital is attached to each military division of the Army. This hospital is divided into 3 brigade sections, and each brigade section is divided into 3 regimental units.

The field hospital presented to the members of the Pan-American Medical Congress for their inspection represents the regimental unit of the divisional field hospital.

The canvas of a regimental field hospital consists of 3 hospital tents with flies and 1 common tent.

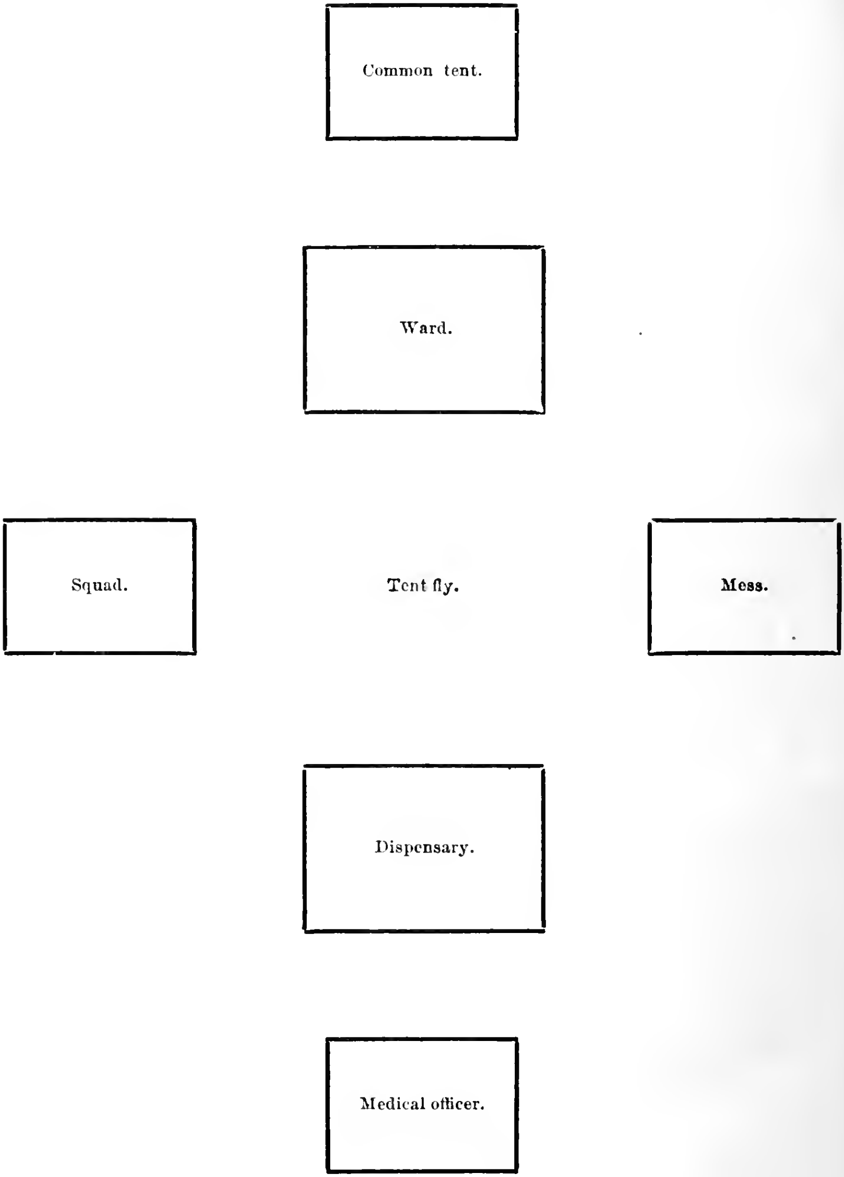
In this particular instance an additional hospital tent was added to be used as a squad tent (which would be the case in permanent camp), instead of the shelter tents ordinarily used by the men of the Hospital Corps in active campaign.

Tentage for medical officers is not included in that for the field hospital. Each medical officer is allowed one wall tent complete.

A hospital tent is 14 feet long, 15 feet wide, and 11 feet to the ridge, the walls being $4\frac{1}{2}$ feet high. It requires to pitch it a ridge and 2 upright poles, and 18 large and 24 small tent pins. This tent furnishes comfortable accommodation for 6 patients, may be made to contain 10, and, with the extended fly, will afford shelter to 20 patients.

Ordinarily one of the regimental hospital tents is used as a dispensary, another as a ward, and the third as a kitchen and mess tent. The common tent will generally be used as a "sink" cover.

It has been found most convenient in practice to pitch the tents cross shaped, as follows:



REGIMENTAL FIELD HOSPITAL, U. S. ARMY, PRESENTED FOR THE INSPECTION OF THE PAN-AMERICAN MEDICAL CONGRESS, 1893.

1. Medical officer's tent.
2. Dispensary tent.
3. Hospital tent fly.
4. Ward tent.
5. Mess and cook tent.
6. Squad tent.
7. Ambulance wagon.
8. Hospital Corps detachment.

Private, Hospital Corps. Field equipment (rear view).

MEDICAL DEPARTMENT, U. S. ARMY.

This was the plan adopted with the model hospital, as shown in the illustration:

The materials entering into the formation of the hospital were obtained by requisition upon several staff departments of the Army, and were as follows:

MATERIAL REQUIRED FOR REGIMENTAL FIELD HOSPITAL.

[From the Surgeon-General, U. S. Army.]

6 folding field cots.
6 folding chairs.
3 folding tables, bedside.
2 folding tables, mess.
2 folding chairs, arm.
6 blankets, gray.
6 bedsacks.
6 pillowticks.
12 pillowcases, cotton.
2 blanket cases, canvas.
6 mosquito bars.
6 shirts, cotton.
6 drawers, cotton.
1 blanket, India rubber.
12 towels, hand.

1 medical chest and canvas cover.
1 surgical chest and canvas cover.
1 mess chest.
1 food chest.
1 reserve chest.
1 commode set.
1 field desk, new pattern (complete with blanks, etc.).
1 pack saddle.
4 buckets, galvanzed iron.
3 hand litters, new pattern (complete with slings).
1 surgeon's field case.
1 medical officer's orderly pouch.

[From the Quartermaster-General, U. S. Army.]

4 hospital tents, 8 upright poles (2 with extra long pins), 5 ridge poles, tent pins (large and small).
5 hospital-tent flies, 8 long guys.
1 common tent (closed corners), 4 upright poles, 1 ridge pole, tent pins.
1 wall tent, 3 upright poles, 2 ridge poles, tent pins (large and small).
1 wall-tent fly.
1 field-hospital flag.
1 flag pole, jointed, 16 feet long, with halyards.

5 Sibley tent stoves.
15 joints Sibly tent stovepipe.
1 pickax.
1 pickax helve.
1 spade.
4 mauls.
1 ambulance, new pattern, complete.
1 ambulance guidon.
1 travois, new pattern.
1 ax.
1 ax helve.

[From the Commissary-General, U. S. Army.]

1 Dutch oven.
1 Buzzacott's oven.

In connection with the sanitary organization of a division of the Army (which is the fighting unit), it has been found that in the event of the more or less permanent detachment of a regiment a Hospital Corps detail of 2 non-commissioned officers and 8 privates will be required to man the regimental field hospital.

It is, of course, understood that these men are directly under the command of the senior medical officer attached to the regiment and that they bear the same relation to him as is borne by other enlisted men to their immediate commanders. This relation, while it greatly adds to the efficiency of the military sanitary organization, entails considerable additional work upon the medical officer—all of the work, indeed, performed by the company commander beside the strictly professional work pertaining to his office.

The military equipment of the Hospital Corps is supplied by the Ordnance Department and consists of—

Blanket bag.
Blanket bag shoulder straps, pair.
Blanket bag coat straps.
Canteen.
Canteen strap.
Cup, tin.

Fork.
Haversack.
Hversack strap.
Knife.
Knife, Hospital Corps.
Knife, Hospital Corps, scabbard.

Meat can.
Revolver.*
Rifle, Springfield, muzzle loading.†
Shotgun, Springfield.‡
Shotgun, reloading outfit.§
Spoon.
Sword belt for hospital steward.
Sword-belt plate for hospital steward.
Sword frog for belt.
Waist belt.
Waist-belt plate.

The technical equipment consists of a waterproof canvas pouch issued to each private soldier, and containing as follows:

Ammonia, aromatic spirits, *exp* .... ounces..	1	Pins, common, *exp*.‖ .... papers..	1
Bandages, roller, *exp* .... number..	4	Pins, safety, *exp*.‖ .... number..	6
Candle, in tin box, *exp* .... do....	1	Plaster, adhesive, *exp* .... spools..	1
First-aid packet *exp* .... do....	1	Scissors, medium ‖ .... number..	1
Forceps, dressing‖ .... do....	1	Splints, wire .... do....	2
Iodoform sprinkler .... do....	1	Sponges, small, in bag, *exp* .... do....	2
Jackknife .... do....	1	Thread, linen, *exp*‖ .... yards..	20
Lint, sublimated, *exp* .... ounces .	2	Tourniquets, field .... number..	2
Needles, medium, *exp*. ‖ .... papers..	1	Wool, boracic, *exp* .... ounces..	2
Petrolatum, carbolized, *exp* ... . ounces..	½		

A first-aid packet is issued to each noncommissioned officer; this packet contains 2 antiseptic compresses of sublimated gauze in oiled paper; 1 antiseptic bandage of sublimated cambric, with safety pin; 1 Esmarch's triangular bandage, with safety pin (mode of application illustrated on same).

The special equipment of the medical officer, which he himself carries, consists of a field case in mahogany case, with leather pouch, containing:

Bistoury, curved.. .... number .	1	Needles, wire, suture, *exp* .... number..	6
Bistoury, curved, probe-pointed .... do....	1	Probe, bullet, long .... do....	1
Bistoury, straight .... do....	2	Probe (Nélaton's) .... do....	1
Catheters, silver, Nos. 3, 6, and 9 ...... do....	3	Razor .... do....	1
Catling, long .... do....	1	Retractors .... do....	2
Catling, medium .... do....	1	Saw, bow, 2 blades .... do....	1
Director .... do....	1	Saw, chain .... do....	1
Elevator .... do....	1	Saw, Hey's .... do....	1
Elevator and raspatory, combined ...... do....	1	Saw, metacarpal .... do....	1
Forceps, artery, spring .... do....	1	Scalpel .... do....	1
Forceps, bone, curved .... do....	1	Scissors, angular .... do....	1
Forceps, bullet .... do....	1	Scissors, straight .... do....	1
Forceps, dissecting .... do....	1	Sounds, steel, silvered, double curve, Nos. 1-2, 3-4, 5-6, 7-8, 9-10, 11-12 ...... number..	6
Forceps, dressing .... do....	1	Tenaculum .... do....	1
Forceps, sequestrum .... do....	1	Tourniquet, screw, with pad .... do....	1
Knife, amputating, long .... do....	1	Trephine, brush for .... do....	1
Knife, amputating, medium .... do....	1	Trephine, conical, and handle .... do....	1
Knife, hernia .... do....	1	Trocar and cannula, curved .... do....	1
Ligature silk, *exp* .... cards..	4	Wax, *exp* .... pieces..	1
Needle, aneurism, handle and 3 tips, number..	1	Wire suture, silver, *exp* .... loops..	3
Needle, key, artery .... do....	1		
Needles, surgeons', *exp* .... do....	12		

* Revolvers will be obtained from the post commander for service in an Indian country, when necessary. If it is impracticable to obtain them for temporary service in this way, they may be procured by requisition on the Chief Ordnance Officer of the Department. Circular S. G. O., April 30, 1891.

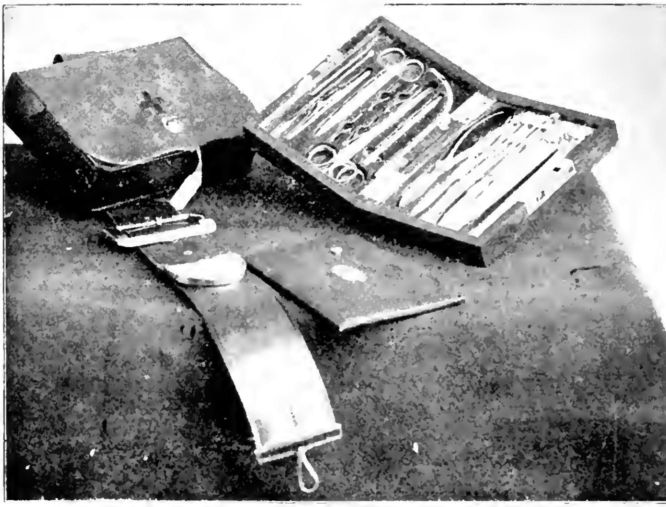
† The issue of two Springfield muzzle-loading rifles to each military post for company bearers' drill is authorized. Decision Acting Secretary of War, 1888.

‡ "Upon requisition of the post surgeon (through the usual military channels), duly approved by the Surgeon-General, the Ordnance Department will issue, for use at posts west of the Mississippi River, a shotgun with necessary appendages and ammunition for the use of members of the Hospital Corps." Decision Chief of Ordnance, 1889.

§ The reloading outfit of the shotgun consists of the following. The articles with * prefixed are expendable, and may be replaced by annual requisitions upon the Chief Ordnance Officer of the Department.

Brush wiper .... number..	1	Drift .... number..	1
Canister, tin, for powder, 2 pounds .... do....	1	Funnel .... do....	1
Canister, tin, for powder, 5 pounds .... do....	1	*Gun wads, No. 18, pink edge... ..... do....	2,000
*Cartridge primers .... do...	1,000	Packing box .... do....	1
*Cartridge shells, 20 gauge .... do....	50	*Powder, musket .... pounds..	7
Charger, adjustable .... do....	1	Priming tool (Frankford) .... number..	1
*Cotton cloth .... yard..	1	*Shot, No. 8 .... pounds..	50
*Cotton waste .... pounds..	1¼		

‖ Articles marked thus are contained in special case.



Field case.

Private, Hospital Corps. Full uniform (rear view).

Medical chest. (Dimensions, 22[illegible] by 11[illegible] inches by 16 inches; weight, 102 pounds.)

MEDICAL DEPARTMENT U. S. ARMY.

Also an orderly pouch, carried by his orderly, containing:

Ammonia, aromatic spirits, *exp*	ounces	1
Bandages, roller, *exp*	number	2
Basin, pus	do	1
Case, medicine, with tablets [1]	do	1
Catheter, elastic (No. 8), *exp*	do	1
Chloroform, *exp*	ounces	4
First-aid packet, *exp*	number	1
Glass, medicine, *exp*	do	1
Lint, sublimated, *exp*	ounces	2
Petrolatum, carbolized, *exp*	ounces	$\frac{1}{2}$
Pins, common, *exp*	papers	1
Pins, safety, *exp*	number	6
Scissors, medium	do	1
Sponges, small, in bag, *exp*	do	2
Syringes, hypodermic, with tablets	do	1
Tags, diagnosis, *exp.*, with pencil	books	1
Tourniqnet, Esmarch	number	1
Wool, boracic, *exp*	ounces	2

Each regimental unit of the divisional field hospital is equipped with chests as follows, viz:

The contents of the medical and surgical chests are expendable, with the exception of those to which an asterisk is prefixed. A list of contents is stamped on morocco pad, which is carried, reversed, under the cover of chest.

No. 1.—*Medical chest.*

CONTENTS OF TRAY.

Left of tray (4-ounce bottles):		
Acetanilid (tablets)	grains	3
Camphor and opium (tablets)		
Cathartic compound (tablets)		
Cathartic compound, vegetable (tablets)		
Copaiba compound (tablets)		
Cough (tablets)		
Diarrhea (tablets)		
Dover's powder (tablets)	grains	5
Liniment (tablets)	do	20
Potassium bromide (tablets)	do	10
Quinine sulphate (tablets)	do	3
Sodium bicarbonate (tablets)	do	5
Sodium salicylate (tablets)	do	5
Magnesium sulphate	ounces	4
And two empty bottles.		
Front of tray—(half ounce bottles):		
Acid arsenious (tablets)	grains	$\frac{1}{40}$
Alterative (tablets)		
Capsicum (tablets)	grains	$\frac{1}{2}$
Colchicum, fluid extract (tablets)	minims	$\frac{1}{2}$
Croton oil (tablets)	do	$\frac{1}{10}$
Ergotin (tablets)	grains	2
Iodine	ounces	$\frac{1}{2}$
Nitroglycerin (tablets)	grains	$\frac{1}{100}$
Podophyllin (tablets)	do	$\frac{1}{4}$
Santonin (tablets)	do	$\frac{1}{2}$
Silver nitrate, fused	ounces	$\frac{1}{8}$
Tincture digitalis (tablets)	minims	5
Tonic (tablets)		
Back of tray (8 and 16 ounce bottles):		
Alcohol	ounces	16
Ammonia, stronger water	do	8
Brandy	do	16
Chloroform	do	8
Ether	do	16
Back of tray—Continued.		
Oil, castor	ounces	8
Turpentine	do	8
Whisky	do	16
Stoppers, rubber, for above	number	10
Center of tray:		
Cotton wool	quantity sufficient	
Envelopes, small, for tablets	number	100
Graduates, glass, 2-ounce	do	1
Graduates, glass, minim	do	1
Labels, for vials	do	50
Links, split, for pack saddle *	do	4
Ointment boxes, in nests of three	nests	4
Pocket stove *	number	1
Vials, 2-ounce	do	10
Right of tray (2-ounce bottles):		
Acid boracic (tablets)	grains	5
Acid tannic (tablets)	do	5
Alum (tablets)	do	5
Ammonium chloride (tablets)	do	5
Antipyrin (tablets)	do	5
Bismuth subnitrate (tablets)	do	5
Blue mass (tablets)	do	5
Calomel (tablets)	do	2
Chloral (tablets)	do	5
Ipecac (tablets)	do	1
Lead acetate (tablets)	do	3
Morphine sulphate (tablets)	do	$\frac{1}{8}$
Opium (tablets)	do	1
Peptic (tablets)		
Phenacetin (tablets)	grains	5
Potassium chlorate (tablets)	do	5
Potassium iodide (tablets)	do	5
Salol (tablets)	do	5
Tincture aconite root (tablets)	minims	2
Zinc sulphate (tablets)	grains	5

CONTENTS OF DRAWERS.

Drawer No. 1.		
Hypodermic tablets: [2]		
Apomorphine hydrochlorate, gr. $\frac{1}{10}$	bottles	1
Atropine sulphate, gr. $\frac{1}{100}$	bottles	1
Cocaine hydrochlorate, gr. $\frac{1}{6}$	do	1
Ergotin, gr. $\frac{1}{10}$	do	1
Morphine sulphate, gr. $\frac{1}{8}$	do	1
Pilocarpine hydrochlorate, gr. $\frac{1}{8}$	do	1
Quinine bimuriate, gr. $\frac{1}{2}$	do	1
Strychnine sulphate, gr. $\frac{1}{60}$	do	1
***Drawer No. 1*—Continued.**		
Ophthalmic discs.		
Atropine sulphate, gr. $\frac{1}{500}$, 50 in box	box	1
Eserine sulphate, gr. $\frac{1}{2000}$, 50 in box	do	1
Miscellaneous:		
Caustic holder, rubber *	number	1
Corkscrew, folding *	do	1
Medicine droppers	do	2
Pencil, indelible *	do	1
Pencil, indelible, leads for	do	6
Pencils, camel's-hair	do	12

---

[1] The six half-ounce bottles in this case contain the following tablets:

Acetanilid	grains	3
Antiseptic		
Compound cathartic		
Cough		
Diarrhœa		
Quinine	grains	3

[2] The contents of tubes of hypodermic tablets hereafter issued to replace those expended should be placed in the screw-cap bottles.

CONTENTS OF DRAWERS—Continued.

Drawer No. 1—Continued.

Miscellaneous—Continued.

Syringe, hypodermic *	number	1
Thermometer, clinical	do	1
Tongue depressor	do	1

Drawer No. 2.

Bandages, suspensory	number	5
Flannel, red	yards	1
Jute, salicylated, in ¼-lb. pkgs	packages	4
Syringe, rubber, self-injecting *	number	1

Drawer No. 3.

Book, prescription	number	1
Forceps, dressing [1] *	do	1
Index of medicine (Carpenter) *	copies	1
Plaster, blistering	yards	1
Plaster, mustard	do	4
Reagent case * [2]	number	1
Scissors *	do	1
Spatula *	do	1
Spoon, tea	do	1
Stethoscope, h. r. *	do	1
Syringes, p. g., in wooden case	do	3
Syringes, p., h. r	do	5

Drawer No. 3—Continued.

Tags, diagnosis, 24 in book	books	1
Towels *	number	2

Drawer No. 4.

Beef extract, in 4-oz. cans	pounds	1
Jute, salicylated, ¼-lb. pkgs	packages	6

Drawer No. 5.

Bandages, roller, assorted	number	30
Cotton, absorbent, ¼-lb. pkgs	packages	4
Soap, castile	ounces	8

Drawer No. 6.

Candles	number	18
Flaxseed meal	pounds	2

Drawer No. 7.

Cupping tins *	number	4
Gauze, sublimated, 1-yard	packages	3
Lint, absorbent, ¼-lb. packages *	do	4

No. 2.—*Surgical chest.*

CONTENTS OF TRAY.

4-ounce bottles.

Acid, boracic, tablets, gr. 5	bottle	1
Antiseptic, tablets	bottles	2
Compound cathartic, tablets	do	1
Opium, tablets, gr. 1	do	1
Potassium bromide, tablets, gr. 10	do	1
Bucket, folding, canvas *	number	1
Catheters, flexible *	do	6
Dressing paper	roll	1
Ether	pound	1
Felt for splints	pieces	2
Links split for pack saddle	number	4
Muslin	yards	3

8 ounce bottles:

Carbolic acid, pure	bottles	1
Chloroform	do	2
Glycerin	do	1
Laudanum	do	1
Whisky	do	2
Stoppers, rubber, for above	number	10
Petrolatum	pound	1
Pocket case, aseptic *	number	1
Pus basin *	do	1
Razor *	do	1
Razor strop *	do	1
Towels *	do	2

Drawer No. 1.

Bandage, rubber	number	1
Brush, nail	do	1
Gauze, sublimated	yards	2
Goggles	number	2
Iodoform sprinkler *	do	1
Ligature, catgut, carbolized	spools	3
Ligature, silk	cards	5
Needles, thread, etc., in case	cases	1
Pencil, indelible, lead for	number	3
Pins, common	paper	1
Pins, safety, assorted	dozen	4
Plaster, isinglass	yards	10
Speculum for ear and nose *	number	1
Tape	piece	1
Tape measure *	number	1

Drawer No. 1—Continued.

8-ounce bottles—Continued.

Tourniquet, Esmarch's *	number	1

Drawer No. 2.

Case, tooth-extracting * §	number	1
Cotton, absorbent	packages	2
Drainage tubes, rubber	yards	3
Plaster, adhesive, 1-inch	spools	4
Plaster, adhesive, 2-inch	do	1
Sponges, in bags	bags	2
Syringe, fountain *	number	1

Drawer No. 3.

Bandages, suspensory	number	2
Beef extract, in 4-ounce cans	cans	1
Brush, shaving *	number	1
Cotton, absorbent	packages	2
Medicine-measuring glass	number	1
Minim measuring glass	do	1
Needle, sail	do	1
Needle, upholsterer's	do	1
Pencil, indelible *	do	1
Scissors *	do	1
Surgery, operative *	copies	1
Syringe, p. h. r	number	1
Tags, diagnosis, 24 in book	book	2
Tool, universal *	number	1

Drawer No. 4.

Bandages, flannel	number	4
Bandages, roller	do	6
Emergency case, complete *	do	1

Drawer No. 5.

Gauze, sublimated	yards	4
Jute, salicylated, in ¼-lb. packages	pkgs	6
Lantern, small *	number	1
Soap, castile	ounces	8

Drawer No. 6.

Bandages, roller, assorted	dozen	4

---

[1] For the convenient removal of cotton from tablet bottles.

[2] Consisting of—

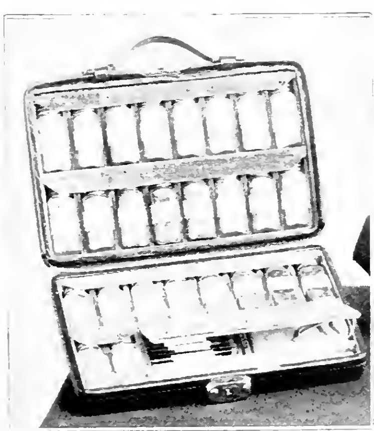
Acid, citric	tubes	1
Dropper, medicine	number	1
Paper, litmus, blue	slips	6
Potassium ferrocyanide	tubes	1
Sugar test powder	tubes	1
Test tube	number	1
Urinometer *	do	1

With circular of directions.

§ This tooth-extracting case consists of—

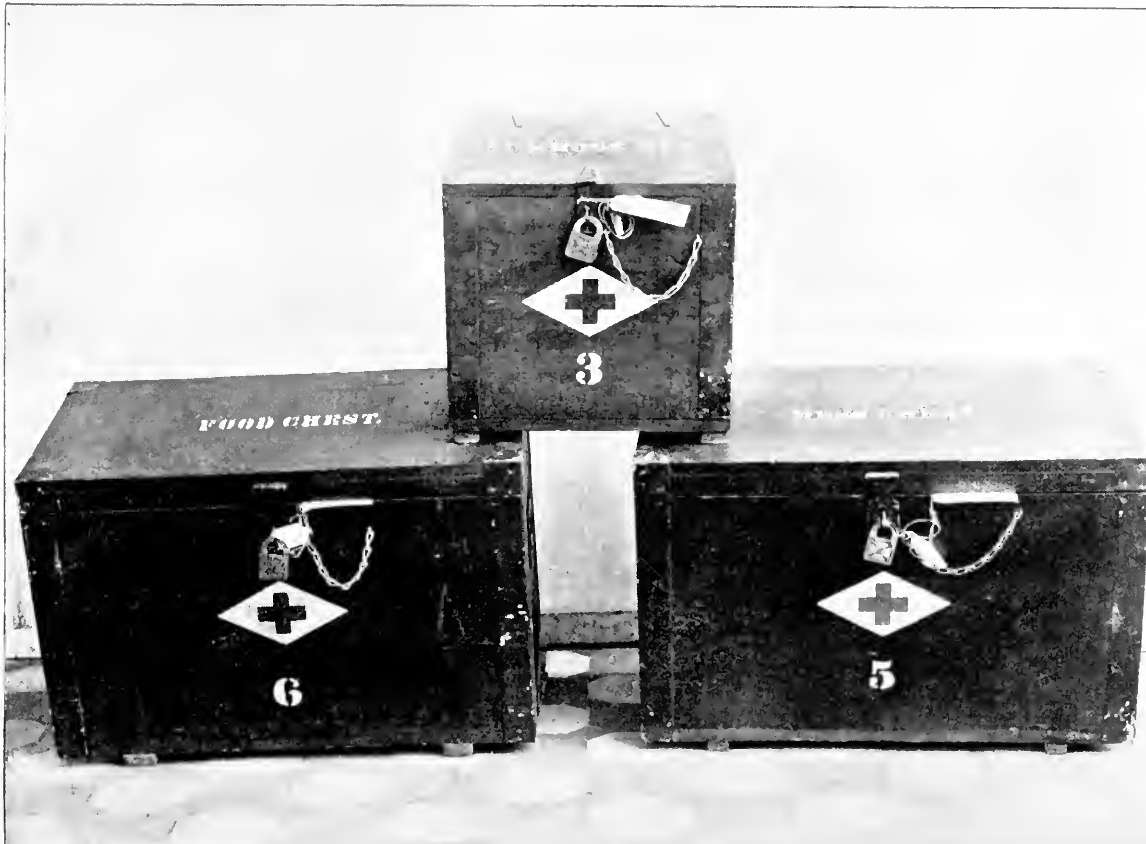
Case, leather, rolling	number	1
Lancet, gum	do	1
Elevator	do	1
Forceps, "half-curved root"	number	1
Forceps, "lower wisdom"	do	1
Forceps, "wisdom"	do	1

No. 2 surgical chest. (Dimensions, $22\frac{1}{4}$ by $11\frac{1}{4}$ inches by 16 inches; weight, 92 pounds.)

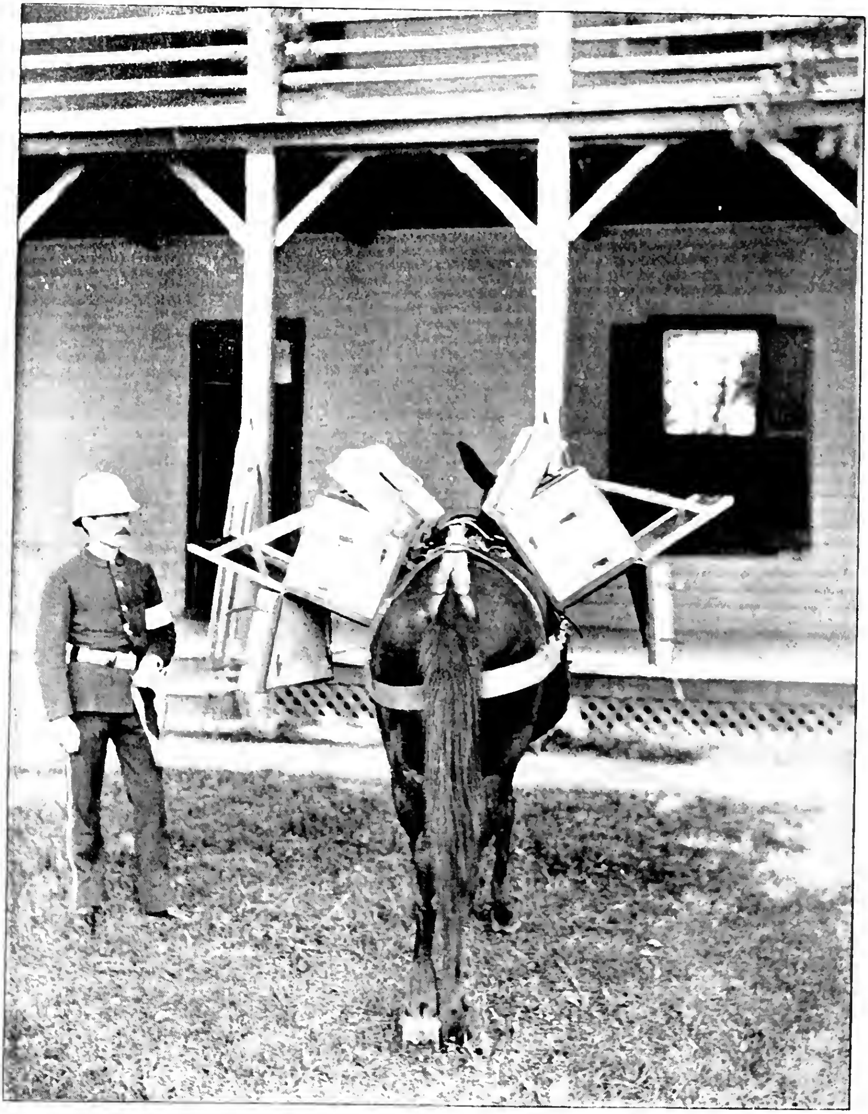


Emergency case.

MEDICAL DEPARTMENT, U. S. ARMY



MEDICAL DEPARTMENT, U. S. ARMY.



Pack saddle and medical and surgical chests in position.

MEDICAL DEPARTMENT, U. S. ARMY.

The "emergency case" carried in the surgical chest contains a sufficient variety of compressed medicines to meet the ordinary requirements of a company, or even two companies on detached service from the regiment for a few days. It contains:

Tablets in half-ounce bottles:		
Acetanilid	grains	3
Acid, boracic	do	5
Acid, tannic	do	5
Alum	do	5
Ammonium chloride	do	5
Antipyrine	do	5
Calomel	do	2
Camphor, grains 2, and opium grain 1		1
Cathartic compound		1
Colchicum, fluid extract	minim	$\frac{1}{2}$
Cough		[illegible]
Diarrhœa		1
Dover's powder	grains	5
Ergotin	do	2
Ipecac	grain	1
Morphine, sulphate	do	$\frac{1}{8}$
Nitroglycerin	do	$\frac{1}{100}$
Opium	do	1
Phenacetin	grains	5
Potassium, bromide	do	10
Potassium chlorate	grains	5
Quinine sulphate	do	3
Sodium salicylate	do	5
Sulphonal	do	5
Tincture aconite root	minims	2
Tincture digitalis	do	5
Tablets, hypodermic, in tubes:		
Apomorphine hydrochlorate[1]	grain	$\frac{1}{10}$
Atropine sulphate	do	$\frac{1}{100}$
Cocaine hydrochlorate	do	$\frac{1}{6}$
Digitalin	do	$\frac{1}{100}$
Ergotin[1]	do	$\frac{1}{10}$
Morphine sulphate[1]	do	$\frac{1}{8}$
{ Morphine sulphate[1]	do	$\frac{1}{8}$
{ Atropine sulphate[1]	do	$\frac{1}{100}$
Pilocarpine hydrochlorate	do	$\frac{1}{6}$
Quinine bimuriate	do	$\frac{1}{2}$
Strychnine sulphate	do	$\frac{1}{60}$
Syringe, hypodermic	number	1
Thermometer, clinical	do	1

No. 3.—*Commode set, dimensions 17 by 18 by 16 inches.*

Bed pan, agate ware	number	1
Chamber pot, agate ware	do	1
Paper, toilet, *exp*	packages	6
Spit cup, agate ware	number	1
Urinal, agate ware	do	1

No. 4.—*Field desk.*

Books:		
Army Regulations	copy	1
Epitome of Tripler's Manual, Greenleaf's	copy	1
Handbook for the Hospital Corps, Smart	copy	1
Information slip book	copy	1
Manual of Drill of Hospital Corps	do	1
Morning Report, Hospital Corps	do	1
Morning Report, sick and wounded	do	
Order and letter book	do	1
Standard Supply Table	do	
Transfer book	do	1
Stationery:		
Book, blank, 8mo	number	1
Elastic bands, assorted	gross	$\frac{1}{2}$
Envelopes, official, large	number	12
Envelopes, official, letter	do	50
Envelopes, official, note	do	25
Eraser, steel	do	1
Ink, black	bottles	2
Ink, red	bottle	1
Inkstands	number	2
Mailing tubes	do	4
Pads, prescription	do	4
Paper, blotting	sheets	4
Paper-fasteners	number	12
Paper, writing, legal cap	quire	1
Paper, writing, letter	quires	2
Paper, writing, note	quire	1
Pencils, lead	number	4
Pens, steel	do	12
Penholders	do	2
Portfolio for medical department blanks	number	1
Blanks.		
Medical Department:		
Examination of recruits, monthly report	number	4
Hospital fund, statement	number	4
Medical property, return of	do	2
Blanks—Continued.		
Medical Department—Continued.		
Medical supplies, invoice of, single sheet	number	6
Medical supplies, receipt for, single sheet	number	6
Medical supplies, special requisition for	number	8
Report of sick and wounded	number	12
Report of completed cases	do	12
Return of personnel, etc., H. C	do	6
Quartermaster's Department:		
Clothing and equipage, quarterly return of	number	2
Clothing and equipage, requisitions for	number	4
Fuel, forage, and straw, requisitions for	number	4
Invoices, abstract "E"	number	2
Receipts, abstract "E"	do	2
Requisitions, special (No. 48)	do	6
Stores, quarterly return of	do	2
Subsistence Department:		
Ration returns	number	12
Ordnance Department:		
Invoices	number	2
Quarterly statements	do	2
Receipts	do	2
Adjutant-General's Department:		
Certificates of disability	number	2
Descriptive lists	do	2
Discharges	do	2
Final statements	do	4
Furloughs	do	2
Inventory of effects of deceased soldiers	number	2
Muster and pay rolls, hospital	number	8
Outline figure cards	do	6
Physical examination of recruits, form for	number	6
Surgeon's certificate of disability for officers	number	2

[1] Tablets marked thus are in the hypodermic syringe case.

No. 5.—*Mess chest.*

[Dimensions, 30 by 17¾ by 20 inches.]

Basin, wash-hand, agate ware . . . . . number . .	1	Matches, in waterproof case, *exp* . . . . . boxes . .	12
Boilers, double, agate ware . . . . . do	1	Meat-cutter, small . . . . . number . .	1
Bowls, soup, agate ware . . . . . do	6	Meat dishes, agate ware . . . . . do	2
Box for salt . . . . . do	1	Mill, coffee . . . . . do	1
Box for pepper . . . . . do	1	Nails, assorted, *exp* . . . . . pounds . .	4
Brush, scrubbing, *exp* . . . . . do	1	Pan, frying, steel . . . . . number . .	1
Can-openers, *exp* . . . . . do	2	Pans, mess, agate ware . . . . . do	2
Cleaver . . . . . do	1	Pans, sauce, steel, tinned inside, with cover, number	1
Cookbook, Army . . . . . do	1	Plates, dinner, agate ware . . . . . number . .	6
Cups, coffee, agate ware . . . . . do	6	Pot, coffee, agate ware . . . . . do	1
Cups, large, agate ware . . . . . do	1	Pot, tea, agate ware . . . . . do	1
Dippers, agate ware . . . . . do	1	Rope, ¾-inch, *exp* . . . . . feet . .	50
Graters, nutmeg . . . . . do	1	Sickle . . . . . number . .	1
Gridiron . . . . . do	1	Spoons, basting, agate ware . . . . . do	1
Hatchet . . . . . do	1	Spoons, table . . . . . do	6
Kettles, steel, nested, with covers . . . . do	3	Spoons, tea . . . . . do	6
Knife, butcher . . . . . do	1	Steel . . . . . do	1
Knife and fork, carving, of each . . . . . do	1	Towels, crash . . . . . do	6
Knife and saw, combined . . . . . do	1	Tray, metal, japanned . . . . . do	1
Knives and forks, of each . . . . . do	6	Tumblers, agate ware . . . . . do	6
Ladles, agate ware . . . . . do	1	Wire, *exp* . . . . . coil . .	1
Lantern, candle . . . . . do	1		

No. 6.—*Food chest.*

[Dimensions, 30 by 17¾ by 20 inches.]

Beef extract or an equivalent preparation.
Candles.
Condensed milk, in original cans, 8 pounds.
Soap.
Vinegar, in 1-quart wicker covered bottles, 2 bottles.
Yeast powder, in one-half pound original cans.

Tins for the following-named articles:
- Beans.
- Butter.
- Coffee.
- Salt and pepper.
- Sugar (2 tins).
- Tea.

Considerable vacant space is left in this chest to allow latitude to each medical officer as to the character of the supplies he may wish to carry or can obtain.

No. 7. Reserve chest.—Contains an additional supply of material to replenish that used from the professional chests.

The medical and surgical chests are ordinarily carried in the box of the ambulance wagon; they are also arranged to be carried on the back of an animal if the character of the country should preclude the use of the wheel transportation. Pack saddles are issued by the Medical Department for this purpose.

The travois is furnished to transport wounded where wagons can not be taken.

It consists of a frame, having 2 shafts, 2 side poles, and 2 crossbars (fig. —), upon which a regulation litter may be rested and partly suspended. When in use a horse or mule is attached to the shafts and pulls the vehicle, the poles of which drag on the ground. One pole is slightly shorter than the other, in order that in passing an obstacle the shock may be received successively by each pole and the motion equably distributed over the entire structure.

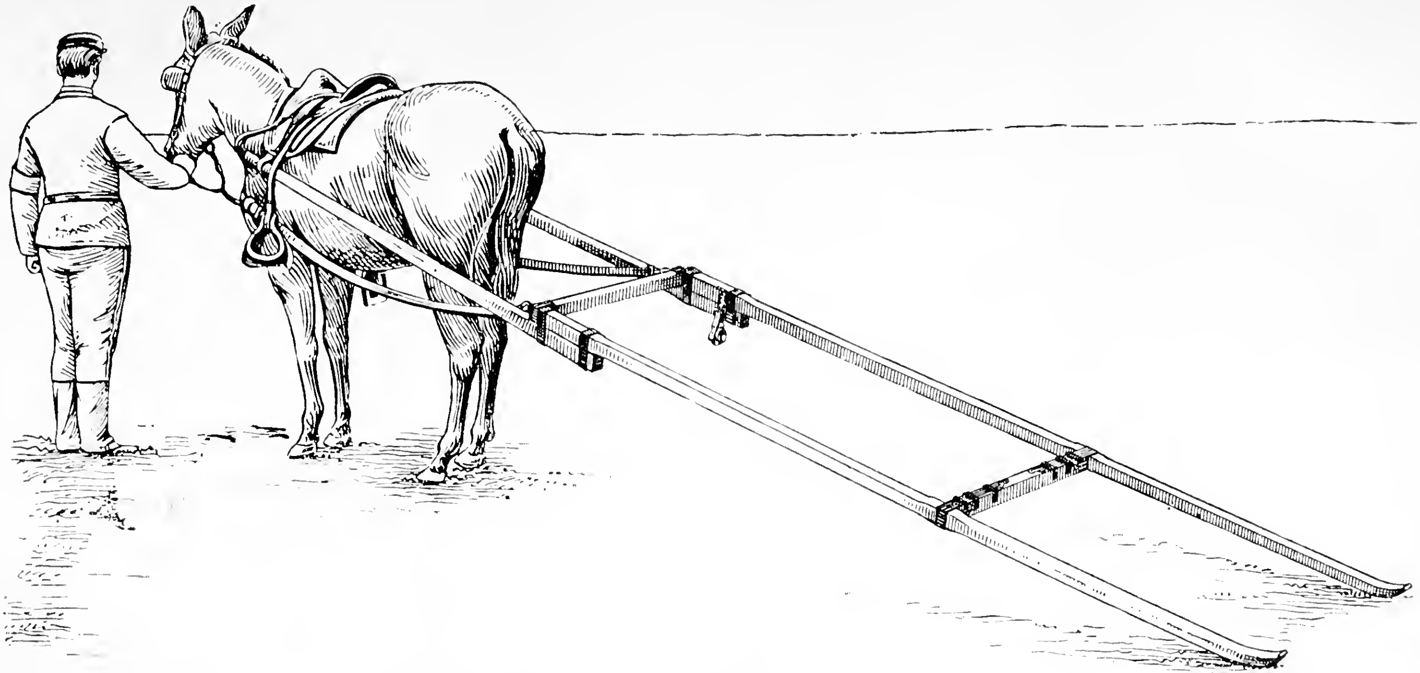
To assemble the travois:

(1) Pass the shafts through the collars on the side pole from the rear to the front, pulling them until they are snugly "home."

(2) Pass the front crossbar over the iron ends on the front of the side pole, driving it smartly "home" until its collars strike the front collar of the side pole.

(3) Pass the rear crossbar (keeping uppermost the surface on which are the flat bolts) over the rear ends of the side poles, pushing it forward until it reaches the squared points on the side poles intended for its place and passes the bolt slot on the side of the pole. Having passed this point, throw the barrel bolts into place.

To place a litter on the travois, throw the flat bolts on the rear travois bar back so that they leave the mortises free; set the litter legs into these mortises (keeping the litter poles parallel with side poles) and throw the bolts so that the litter legs are securely fastened to the crossbar; then pass the leather loops on the front end of the side pole over the front handles of the litter pole.



Travois.

MEDICAL DEPARTMENT, U. S. ARMY.

Ambulance, pattern of 1892.

Front View.

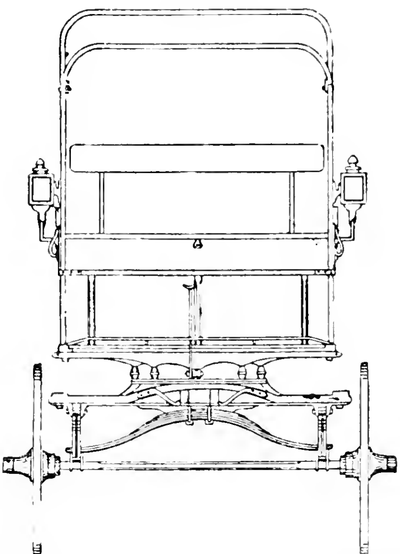


Fig. 2.

Back View.

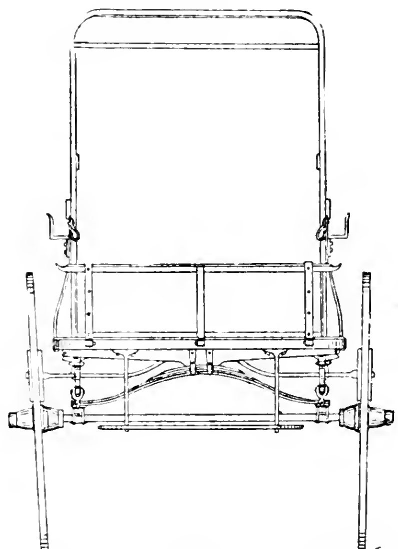
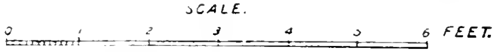


Fig. 3.

SCALE.



Ambulance of 1892 pattern.

MEDICAL DEPARTMENT, U. S. ARMY.

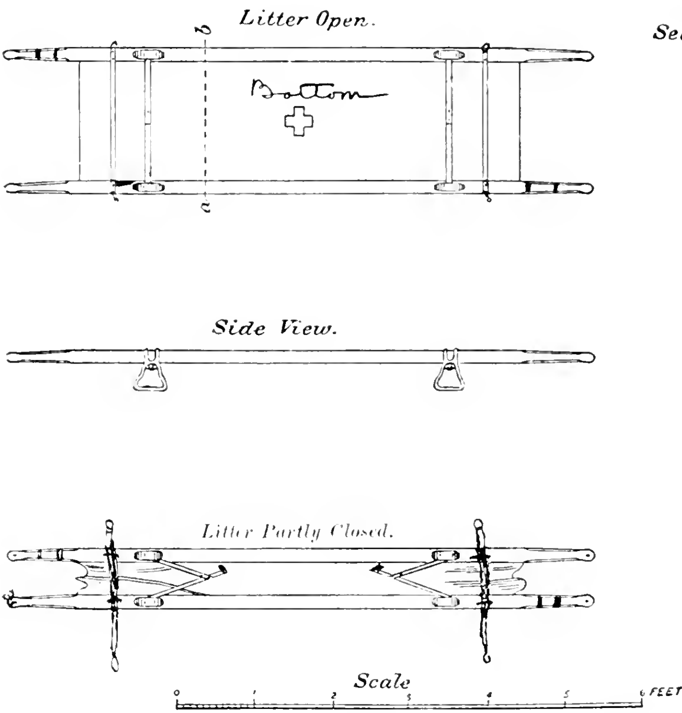


Fig. 4.—Regulation hand litter, 1893.

MEDICAL DEPARTMENT, U. S. ARMY.

To harness the travois, place the animal between the shafts, and, if he has on an ordinary wagon harness, put the rings that are on the front end of the shafts over the iron hook on the hames, and fasten the toggle of the trace chains to the ring on the side pole.

If the animal is saddled, after placing him between the shafts fasten the ring that is on the front of the shafts to the rings on the pommel of the saddle by means of the straps that belong there, and secure the shafts by a surcingle passed over all.

To pack the travois, reverse the movements required to assemble the travois and separate each from its fellow; lay 1 shaft, 1 side pole, and 1 crossbar together, the front end of the shaft resting in the collar irons of the side pole, and secure them by the two leather straps furnished for that purpose; the entire travois is then in two bundles, which are to be carried in a wagon with tentage, etc.

It is believed that this simple contrivance perfected by Lieut. Col. Charles R. Greenleaf, Deputy Surgeon-General, U. S. Army, will be of great use in future wars in removing the wounded from the battlefield. In this sliding litter the horse takes the place of 2 human bearers and, so far as strength and endurance are concerned, does the work of 8 men.

The regulation hand litter of the U. S. Army, constructed in accordance with a model submitted by Maj. John Van R. Hoff, surgeon, U. S. Army, consists of a canvas bed 6 feet long by 22 inches wide, made fast to 2 ash poles 7½ feet long and stretched by 2 jointed cross braces. The ends of the poles form the handles, 9 inches long, by which the litter is carried. The fixed iron legs, to which are attached the cross braces, are stirrup shaped 4 inches high and 1¾ inches wide. On the left-front and right-rear handles a half-round iron ring is fixed, 4½ inches from the end; between this and the canvas plays the movable ring of the sling. The cross-straps, each with a ring at one end and a snap at the other, play through staples fastened to the bottom of each pole at either end beneath the canvas, and near its free edges. When the litter is closed they are passed around it through the free loops of the slings and the rings are fastened to the snaps, thus securely closing the litter.

One pair of regulation slings is permanently attached to each litter. They are made of gray woolen webbing 2¼ inches wide, with a leather-lined loop at one end and a leather strap (with a buckle and swivel snap) at the other; the snap is attached to the eye in the movable ring.

This litter weighs 22 pounds complete; two of them will fit into the new pattern ambulance, and one can be suspended upon the travois; it may, if necessary, be used as a bed, or under any and all conditions in which such an appliance is indicated.

The regulation ambulance wagon is a 4-wheeled 2-horse vehicle; it provides transportation for 8 patients sitting or 2 recumbent on litters; or 4 sitting and 1 recumbent.

The dimensions of the body are 9 feet 3 inches long, 4 feet 2 inches wide, 5 feet 3½ inches high over all, 7 feet 8 inches long back of driver's seat, 3 feet 11 inches wide, 5 feet ½-inch high in the clear inside. The body hangs 3 feet 4 inches from the ground. The framework of the body is of white oak. The forewheels traverse the body of the wagon and permit the vehicle to make abrupt turns, or to turn "on its own ground," while the diameter of the forewheels has not been diminished so as to interfere seriously with the traction of the wagon. The driver's box is 18½ inches deep, 15 inches wide, and 3 feet 11 inches long. A drawer or tool box, 19¾ inches long, 7⅝ inches wide, and 3⅝ inches deep, slides under the near side of toeboard. Two silver-plated candle lamps are secured, one on each side of the ambulance; the front glasses of the lamps are white, the outside and rear glasses red. This ambulance wagon has 4 inside seats, 2 on each side, each 3 feet 8¾ inches long and 14 inches wide. Each seat is held in position by 2 legs of ⅝-inch round iron, secured to the floor by knuckle joints let in flush with the top of the floor and by 2 dovetailed hooks working in slots set into the side of the wagon. The seats are so arranged that when packed they hang against the sides of the wagon, thus forming side cushions. Two wooden tanks, 24¾ inches long, 9 inches wide on top, 8 inches on bottom, $6\frac{1}{2}$ inches deep, with one nickle-plated faucet each, are placed 1 inch below the sills of the body in front of the center bar. They slide on grooved bars $1\frac{1}{4}$ inches wide, $1\frac{1}{4}$ inches deep, which extend the full width of the body of the wagon. The litter for the ambulance wagon is shown in the accompanying figure. The ambulance complete weighs 1,450 pounds.

The course of training laid down for the sanitary soldier in the U. S. Army, and the results obtained therefrom, are admirably outlined in the address of Brig. Gen. Charles Sutherland, U. S. Army (Surgeon-General retired), delivered before this section.

ORDER OF EXERCISES.

Hospital Corps drill.

(1) Inspection of Hospital Corps detachment.

(2) Inspection of the field hospital, including field appliances, method of administration, etc.

(3) Bearer drill, with hand litter; with extemporized litter; (blanket, coat, and rifle); lifting, lowering and carrying patients by 4, 3, 2, and single bearers; passing obstacles; with ambulance.

(4) First aid drill. The application of temporary dressings; utilizing materials for splints, etc., ordinarily at hand on the field of battle. Subjects: Fracture of right clavicle; dislocation of left shoulder; fracture (compound) of right arm, middle third; fracture of left forearm, near elbow; hemorrhage from right femoral artery (middle third of thigh); flesh wound of scalp (large) over right parietal bone; perforating gunshot wound of left chest; gaping knife wound, right abdomen; fracture (compound) of left femur, lower third; fracture of right tibia, middle third; sunstroke; resuscitation of apparently drowned.

(5) Assembly of squads and return of litters.

(6) Tent pitching and striking.

(7) Formation and dismissal of detachment.

Afternoon Session.

The meeting was opened at 3:30 o'clock with the executive president in the chair. He said:

Gentlemen: The next subject upon our programme is a discussion on "first aid to wounded and transportation of wounded from the battlefield and field hospitals." You have witnessed the demonstration made by Maj. Hoff and many of those present are familiar with this work; several of our senior medical officers present are especially familiar with it and I shall first ask them to say something upon the subject and afterwards we will have a general discussion. I will call first upon Col. Page.

REMARKS BY COL. CHARLES PAGE, ASSISTANT SURGEON-GENERAL, U. S. ARMY.

Mr. President and Gentlemen of the Section: After the very able and exhaustive address we heard this morning, and the object lesson that we have just had, it seems to me there is very little left to discuss. There is one thing that occurred to me while witnessing the demonstration, and that is we can not expect to give aid to every wounded man. In case of battle a great many wounded men will get off the field without any assistance whatever. I think we can all speak in praise of this hospital corps and litter drill. I am certain that in future wars the wounded will be much more carefully handled than they were in the past. In the same way that skilled labor is better than unskilled.

There has been a great deal said about the new firearm. Of course, we expect the number of wounded to be multiplied, and for that reason we must have a multiplication of hospitals and the Hospital Corps. I do not think there will be any difficulty in that because the subject is one that is receiving particular attention by the armies of nearly all nations, and in our country it is receiving particular attention not only by the regular Army but by the National Guard. At the beginning of the late war we had a sanitary commission and a Christian commission, but they did not remain long with us. At the second battle of Bull Run I remember starting from Washington with a party of volunteer nurses to pick up the wounded. The men having had no experience or previous training could not be depended upon and were soon glad to get back to Washington.

Mr. President, I do not think I have anything to offer which is original in regard to this matter and will not occupy the time of the session further.

REMARKS BY COL. B. J. D. IRWIN, ASSISTANT SURGEON-GENERAL, U. S. ARMY.

Mr. President and Gentlemen: Those of you who have been through our late war and who have witnessed the drill of our Hospital Corps to-day will be able to appreciate the wonderful progress we have made since that time. We see it here under some disadvantages in regard to the number present. If you could have seen it as I have recently where there were some 40 or 50 men drilled at a time through all the maneuvers upon the field, you would appreciate still further how far we have advanced in the management of our wounded on the field of battle. We are reaching perfection, but we have not quite reached it yet. There are a good many little details that can be improved upon. Some of them, of course, may not be manifest to those who have not paid attention to that branch at present, but by and by they will be observed and made right.

There is one point which I desire to call special attention to as it involves the care of the wounded by our volunteer forces and our militia, and that is, too much reliance is placed upon what is known as company bearers or litter bearers. In my recent inspections, during the last three years, I have become convinced that it is unreliable. We have a detail of, say, 4 men from each company. They are supposed to drill in certain matters, such as first aid, etc., but, as a general rule, you will find that you can not depend upon more than 1 or 2 of them to turn out when necessary. They may be on detached duty, furloughed, or some particular occupation that will render it impossible for them to be present for drill. They are under the control of the commanding officer, under his orders, therefore I deem it necessary that we should increase the number of men.

I would go further and recommend that all enlisted men get from 4 to 6 drills each month and be instructed in ordinary care of the wounded; how to lift them; how to assist them; not all the duties pertaining to the Hospital Corps men. In that way you will always have a number of reliable men who would be all the more valuable in time of war. To show the indisposition of the men to do this duty I will illustrate: They get off as frequently as possible under one pretext or another and say they have other military duties to perform than "playing the sick soldier," and the company commanders look upon it as rather burdensome, taking them away from their companies. A short time ago a medical officer obtained permission to drill an entire company, and in a few days they were instructed in litter drill, etc., and all able to take care of each other; there was no condition in which they could not give practical assistance to a wounded companion. Therefore, I think the time is approaching, if not already at hand, when we should make an effort to have our enlisted men drilled to a limited extent, as I have stated. Then the soldier should be furnished with a few things which should be carried at all times and which would be useful in an emergency.

The present system of Hospital Corps companies I regard as most excellent. The men are properly and thoroughly trained in the work, and being educated in this way are of the greatest value not only to the Medical Corps but the Army at large.

REMARKS OF COL. CHARLES H. ALDEN, ASSISTANT SURGEON-GENERAL, U. S. ARMY.

Mr. President and Gentlemen: I join very heartily in expressing the pleasure I am sure we have all had in witnessing this interesting drill, but I do not know that I can add very much to what has been said. It has been particularly interesting to me, as I have recently come from the medical charge of a department in the Northwest, where our officers are very much scattered at isolated posts and the post surgeons have had to work out this problem from the manual for themselves. There was a decided tendency at the outset, I found, to introducing the parade element, with quickness of movement, etc., but I think this was quite natural, and since they have come to know and appreciate the practical value of this hospital corps drill very much of that has disappeared and there is a growing feeling of its usefulness, not only among the medical officers, but among line officers as well.

In regard to the point raised by Col. Irwin, I would add my voice to his in that regard. I have a very strong feeling that the detail of company bearers as at present arranged is of very little value. They are usually the most intelligent men in the company after the non-commissioned officers, but their regular attendance can not be secured, and they are constantly changing in personnel. For these reasons the instruction can not be made what it should be. It practically amounts to very little even with the best efforts. At one post in the department of Dakota the commanding officer suggested that the post surgeon should take each organization in turn and instruct it every afternoon at a time when the men were not otherwise occupied. This was done, and the company drilled every afternoon for about six weeks until the post surgeon was able to report to the post commander that he had carried the work as far as it would be advisable. The result was quite satisfactory. I question very strongly whether it is worth while to go into their instruction in anatomy and physiology, except to a very limited extent. I think we must rely upon teaching them only the most practical duties. It is only instruction in first aid on the field that has enlisted the interest of the men. By the instruction of the men of the company generally we have a large number to draw the company bearers from in time of need.

REMARKS BY MAJ. D. L. HUNTINGTON, SURGEON, U. S. ARMY.

Mr. President and Gentlemen of the Section: The utility of an organized corps of hospital attendants and for duty on the battlefield during the late war of the rebellion became at once apparent as a necessity, and, after some time, an ambulance corps, as it was then called, was organized by a special act of Congress and men were instructed in the duties which would be incumbent upon them on the field of battle. I may say that in time our ambulance corps in the years 1864–'65 became under its organization as perfect as the necessities of the circumstances would allow. At the close of the war we of the Regular Army went back to our old system of attendants, cooks, and nurses. All the medical officers present will appreciate fully the trouble that resulted from that course, and gradually it became evident that something must be done to raise a force for attending the sick in hospital and for use in the field during time of war. I was fortunate enough to be in Washington at the time when this matter was brought to the attention of Congress. Gen. Bragg, of Wisconsin, then chairman of the military committee of the House of Representatives, took an active interest in the matter. Realizing that some other means must be determined upon to raise men for duty in hospitals, he requested me to report a bill organizing a hospital corps. He said: "That is what we want." Gen. Moore was then Surgeon-General of the Army. I was sent for by Gen. Bragg to superintend the appropriations for the Medical Department. We sat down together and in a few hours constructed the bill which afterwards became a law. The design of that bill was to secure a class of men now known as hospital stewards, who should be intelligent and capable men, and a second class of acting hospital stewards who might take their place at any time and be eligible for promotion to the first grade. We wished to give each of these men in their respective grades that sum of money which would enable us to secure the services of desirable men and make it an object for them to enter the service. It was introduced in the House the next day and in two days more it became a law. From that time, having this bill to start with, we have added improvements and the result you have seen in Maj. Hoff's demonstration this afternoon.

I believe the organization of the Hospital Corps is now as perfect as it can be made under the circumstances. We desire nothing more than that this should be the nucleus around which in time of war we can gather the volunteer forces. And I believe that in every post the bill is carried out. I have taken great interest in watching it and trying to harmonize the different parts of it at the different posts. The attendance has not been what it should be, although there has been some improvement in this at nearly all posts. The drill is now 4 times a month and becomes tedious. Something must be done to change this. I think the suggestion made by Col. Irwin is a good one, that a company should be taken and drilled. I think each post surgeon should interest himself to talk with the commanding officer and show him the good that can be derived from it, and company officers would willingly put the post surgeon in the way of devising some plan for the general instruction of the men of their companies.

It often occurs that an accident happens in the barracks. A man falls down stairs, or falls into a pit, and is injured, or falls in the water and is taken out apparently drowned. In two instances this service has been the cause of saving the life of 2 men. I trust with the added interest which the new Manual of Drill will inspire at all the posts, and as company and post commanders become more and more interested the difficulties will gradually die away.

I believe the Hospital Corps has over and over again proven its utility.

REMARKS BY PASSED ASSISTANT SURGEON HENRY G. BEYER, U. S. NAVY.

Mr. President and Gentlemen of the Section: I have for a number of years watched with what I might almost call jealousy the progress which has been made in this direction in the Army, and I can only express my admiration for the able manner in which this has been conducted from the beginning to the end. To-day is the first time I have had this long looked for opportunity of seeing a practical drill in the field. The U. S. Navy has no regular drill in first aid to wounded.

I agree with the preceding speakers in regard to personal instruction to all enlisted men. Every man in the company ought to be able to take the place of those regularly drilled company bearers. They ought to be able to assist each other. We all know that in time of war there are never enough trained men present to do what there is to be done.

I can only express my thanks and my admiration for the able manner in which this drill has been conducted, and I hope the day is not far off when we in the Navy will be equal with the Army in this respect.

REMARKS OF CAPT. C. E. WOODRUFF, ASSISTANT SURGEON, U. S. ARMY.

Mr. President and Gentlemen of the Section: I intended to make a few remarks this morning after Dr. Conner's paper. As it has a very close connection with the subject of transportation of wounded men from the field, I ask permission to make them now, as you will see when I finish that it relates directly to the subject under discussion.

I want to ask somebody to think out and give to us military surgeons some definite rules for our guidance in the field. They have worked out in the most admirable way rules for their own guidance in hospitals, and we read in medical journals what is to be done for this and that, but when we come to apply them I d, know where to turn. To illustrate: We take first the question of antisepti, the field. Prof. Joseph Lister points out the fact that every one of the prin, disinfectants used by surgeons depends upon large quantities of sterilized w. This is almost impossible in the field. We have never yet had large quantiti water and I do not know how we are to get them. He points out that in cert places where battles are fought water is scarce; at other times it is plentiful. are liable to have a battle any time where we can not get water, and of course, can not use fresh (?) water without its having been sterilized. Of course, we mi, overcome this in certain cases by having a system whereby certain men could, drilled in securing large quantities of water and keeping it aseptic for our use, unless this is done we would be without this means of relief.

The next point is dust in the field. This is so important that surgeons constru special operating rooms to keep out the dust, and they contend that it is only i these rooms that certain operations should be made. Now, imagine how we woul be situated in a tent with the wind blowing at 60 miles an hour, as it sometime does at my post. I had an operation to perform in the open field. I had certain basins full of antiseptics, but on account of the wind and dust I was unable to use them. Now, in a tent it is going to be almost as bad, and there are some operation that could only be performed in the hospital. For lack of time how little can b done by the surgeon on the battlefield. Then again, is the lack of instruments we have in field work. Any man who makes a success in a particular line of work has an abundance of special instruments at his side. Again, certain operations for certain injuries or diseases depend for their success upon the previous preparation of the patient. Attention was called to this this morning. Now, in military work we never see the patient until he is brought to our table, and the subject of previous preparation must be thrown overboard entirely. We can not expect to get those results that are achieved in civil practice.

Another point, which civilian physicians are not often confronted with, is the question of the filthy and horrible condition in which soldiers will get after a very long and severe campaign. Nothing like it in civil life is seen except in the very lowest slums of large cities. Soldiers may go for days without seeing water; can barely get enough to drink, and as to taking a bath, it is utterly out of the question. They have often gone on the field of battle covered with vermin, etc., and the probabilities are, therefere, that every wound such men receive will be an infected wound.

Now, take up the question of injuries to the knee: In statistics recently I saw that if these cases are not seen for twenty-four hours something like 80 per cent die. If they are seen immediately they will recover. All cases of this kind, as well as gunshot wounds of the abdomen, should, of course, be given the right of way over all others and sent immediately to the rear. Even compound fractures should be put aside and these given the preference and hurried along as quickly as possible where appliances are on hand for proper treatment.

REMARKS OF LIEUT. COL. WILLIAM H. FORWOOD, DEPUTY SURGEON-GENERAL, U. S. ARMY.

Mr. President and Gentlemen: I had no intention of entering into this discussion, and do so now merely to say a very few words.

In addition to what you saw illustrated outside on the lawn, the Hospital Corps is supplemented by certain men taken from the ranks, called company bearers. There are 4 of these men to each company, who report to the surgeon for instruction. As has already been said, that plan is a failure. It causes friction between the company and medical officers. I have insisted from first to last, ever since the Hospital Corps organization came up, upon a plan to remedy this, which has been knov l to in part, and which I wish to state more fully. That is, to add a few seco, tactical forms to the drill regulations now in use by line officers, and by the and which the men can be instructed to aid their companions on the battlefield. men should be done in every company by the company officers all through the the . The medical officers should have nothing to do with drilling the company It ers. It is not necessary. Medicine and surgery have become of sufficient law tance that we may now instruct not only the enlisted men, but the officers, in an rinciples of first aid, and everyone liable to be wounded should be instructed Indering assistance to their comrades and themselves on the field of battle. ma e officers should instruct the men and the surgeon instruct the officers. I have th cated this plan since the corps was first organized.

REMARKS BY PROF. P. S. CONNER, M. D., OF CINCINNATI, OHIO.

Mr. President and Gentlemen: I want to express my great pleasure and admition in what I have seen to-day in the demonstration of the Hospital Corps drill given by Maj. Hoff.

With reference to this matter of treatment of injured men, it seems to me it is to be remembered always that simplicity is of great value. It is not necessary that multitudinous arrangements should be made, and it is not necessary that a man should have a great many instruments to perform an operation. A most important thing is to place an antiseptic pad on the wounded man, and, if he is carefully handled, he may go twelve hours, or, if necessary, forty-eight hours, before the peration is performed. If a man has not what he wants, he must use what he can t. You can not have all the things that are supplied. True, the result may not as satisfactory, but it will be vastly more satisfactory than the results obtained old times. It strikes me, as I look back upon my army life, that many cases would ve been much better treated had I known then what I know now; and I am sure at the same thought would apply to others. If a man has a gunshot wound of e kneejoint, let him alone. *Dirty fingers and dirty probes have killed more men than llets.* One can get along pretty well with a very few things and a limited supply f water.

REMARKS BY MAJ. J. S. BILLINGS, SURGEON, U. S. ARMY.

Mr. President and Gentlemen of the Section: There is a maxim among engieers that it is not worth while to design a building or a bridge in such a way that t shall withstand a tornado. So I fancy that in our arrangements for dealing with he emergencies of war it would not be wise to undertake to provide for every possible contingency. I have seen a reasonable number of battles and I have never been in position where I could not get plenty of water, such as it was, and I have always had boiled water. There is very great weight to be placed upon the remarks of my friend Dr. Conner about the necessity of doing the best you can under the circumstances. In the days of 1862 in Washington we preferred to get those wounds that had never been dressed at all, except by the man himself with a rag.

The question immediately before us is this matter of the hospital corps drill and transportation of wounded from the battlefield. I had to deal with transportation of wounded in the early days of the war when there was no organization. Soon came the ambulance corps, which worked extremely well—when it was present. And then came one of those "tornado" cases. We had a fight the first day. We had about 11,000 wounded, and the ambulance corps was occupied in getting the wounded back to the rear. The next day immediately following this we had another fight, and there was no Ambulance Corps. And yet I do not mean to say by this that it is necessary to have two ambulance corps in an army. We made ambulances in those days out of commissary wagons and ordnance wagons, covering the bottom of the wagon to the depth of 3 or 4 inches with blankets.

I approve of the system of putting tags on cases that require the first operation. We used it successfully at Gettysburg, and a few men were picked out to be attended to immediately. When you have a large number of wounded they do not take their turn at all. They are examined rapidly and the men picked out who are the worst injured.

With regard to the drill to-day, I can say that I have seen similar drills in the English armies, the best one being at the St. Thomas Hospital in London, where all the medical students are trained to have that knowledge who become medical officers; and that is the point Dr. Hoff has suggested. I think extremely well of it. I may say that after having seen the drills at Aldershott and St. Thomas, I think the exhibit of this afternoon is perfectly satisfactory as compared with them. I do not say it was the best, but it was a very satisfactory exhibit.

One might get the idea that men are enlisted in the hospital corps for the purpose of going about and picking up the wounded. Now this of course is erroneous. They have to be made trained nurses, and this is a very important part of the business of the men of the hospital corps. It is one of the things with which we had the greatest difficulty before the Hospital Corps was organized. The trouble was to get men who would stay and do nursing and go through the long, tedious, difficult and oftentimes disagreeable duties of the nurse. That is a very essential feature, and one which has been borne in mind in prescribing their duties and arranging for their instruction. What you have seen to-day is rather the showy side of the work of the men of the Hospital Corps.

REMARKS OF DR. ALBERT VANDERVEER, ALBANY, N. Y.

Mr. President and Gentlemen: I read a year or more ago Dr. Hoff's little book which he published at that time, and was very much interested. To-day I have been more than pleased in witnessing the maneuvers of these men, and I realize now how much good will come of the knowledge acquired here in the way of extending it in civil life in this way.

We have in our State a most excellent fire brigade, but I have seen people taken out of buildings in a manner that was anything but pleasant by the firemen, who, although they meant well, had never been instructed in this art. These men having leisure time, it occurs to me that this system could be profitably extended to the fire department.

As Dr. Billings has said, it is not altogether the men who can pick up the wounded, but the men who will stick by them afterwards and act as nurses, and I could see here to-day that these men had been well posted, especially in regard to hemorrhage, and they are capable of knowing something about anatomy, etc.

REMARKS BY MAJ. JOHN VAN R. HOFF, SURGEON, U. S. ARMY.

Mr. President and Gentlemen of the Section: The deepening shadows warn me that there is left but a few moments to conclude this most interesting discussion, and I will devote the time to a single phase of it, the company bearer.

I hesitate to advance an opinion upon this subject, in this company, no matter how firmly I am convinced of its correctness, lest it would seem presumptuous in me to even appear to take ground against the views of those whose opportunities and experiences in all phases of military sanitation have been far beyond my own.

Have we not, I may ask, been considering the company bearer from the wrong standpoint? He certainly is an important factor in the sanitary organization of an active army. Is it not possible that nearly thirty years of comparative peace have made us forget the ever present probability for which alone we exist, war? This is the standpoint from which, it seems to me, we should approach this subject, and the questions are—

(1) What is the best military sanitary organization for active service?

(2) How can we best make that organization apply to present inactive conditions?

The sanitary organization of an army, as I understand it, contemplates a permanent department, such as we recognize our Hospital Corps to be, which under ordinary circumstances is adequate to the work required of it. But experience has taught that no matter how large a Hospital Corps we have, oftentimes, unaided, it would be overwhelmed with work; consequently our sanitary organization also contemplates an auxiliary corps, which is called the "company bearers."

It is clearly understood that the company bearers are simply emergency men who, under certain circumstances, are to supplement the Hospital Corps. In order to an efficient performance of their important duty they must be instructed in first-aid work. It oftentimes would seem that company commanders fail to appreciate the value these men must be to their organizations, and thus failing, do not always select the best material for instruction. This is doubtless due to the prolonged period of peace. Some have never heard the whistle of a hostile bullet and others have forgotten its once familiar sound. To them wounds and other injuries cut no figure in their military scheme, and when an effort is made to prepare for these contingencies they cry *cui bono*. Commanding officers, too, are sometimes indifferent, and appear to forget the obligation imposed upon them by paragraph 1575, Army regulations, which says "The company bearers * * * shall be instructed * * * for at least four hours in every month." The regulation is absolutely mandatory; nothing excuses from at least this amount of instruction.

Perhaps we of the Medical Department are not wholly blameless for the unsatisfactory results reported by previous speakers. The opposition of the company commander and the indifference of the post commander will sometimes affect the not over-enthusiastic medical officer, and the result of bearer instruction under these conditions can not but be worthless, yes, worse than worthless, for it throws discredit upon a system which is absolutely essential to the proper care of the wounded in active practice.

I venture to offer my own experience in support of some of the foregoing points.

Since the organization of the Hospital Corps in 1887 I have served at 3 posts, widely separated from each other, and under conditions quite as varied as are the average conditions of the service. Upon the day I received the order directing the detail and instruction of company bearers I began that instruction, and for one hour each week, rain or shine, hot or cold, in post or field. I have continued it.

I have been fortunate in escaping the difficulty complained of by others of getting a large percentage of my bearers present for drill. There is always 80 per cent, and more frequently a much larger percentage present.

Now, since this has been my experience, and not the experience of others, how does it happen? The regulations state that 4 company bearers shall be detailed from each company and that they shall be instructed at least four hours each month. At my station they are detailed, and they are drilled four hours every month, one hour each week on the appointed day. On the day following each drill I make a formal report thereof in writing to the commanding officer as to the number of men present, the condition in which they reported, etc., so that he may be thoroughly informed as to the efficiency of the instruction and impressed with the idea that the medical officer is obeying the spirit as well as the letter of the law. Should the bearers fail to report at the appointed time I request that the absentees be sent at some other hour during that week. The result is, as I said before, I never have any trouble in getting company bearers for instruction.

The suggestion that the entire company should be instructed I regard as of value, but simply as an adjunct. I do not think we can get along without regularly detailed company bearers.

I might say much more upon this, to me, most important subject, but will stop with the narration of one personal experience.

It was my fortune to be the senior medical officer with the Seventh Cavalry in the North a couple of years ago. We had a pretty sharp fight with Big Foot's band of Sioux, and many people got hurt. After everything was over and the wounded were removed to the field hospital about 15 miles to the rear, an old cavalry captain, scarred in many an Indian war, a man who had gone through all the grades from private up, and who, rigid as a bar of iron in his views, was not easily susceptible to any new ideas, came up to me and said, "Captain Hoff, I want to say to you that I have often been instrumental, with others, in making sport of you and your methods, and have said that it was all d—d nonsense, but now I desire to say that I never, in all my experience, saw wounded men so well and quickly handled, and if any man raises his voice against your methods he will hear from me." I thanked him heartily, and then told him that to a very large extent the wounded were handled by his own men, the company bearers.

The section then, at 6 p. m., adjourned to meet to-morrow at 11 o'clock a. m.

THIRD DAY'S PROCEEDINGS.

WASHINGTON, D. C., *September 7, 1893.*

The meeting was called to order at 11:50 a. m. by Surg. Gen. J. Rufus Tryon, U. S. Navy. Gen. Tryon said: GENTLEMEN OF THE SECTION: I have been invited by the Surgeon-General of the Army to preside this morning at the session of the section on military medicine and surgery of the Pan-American Medical Congress. The first paper to be read and discussed is "The avoidance of intestinal disorders in the field," by Bvt. Lieut. Col. Alfred A. Woodhull, Surgeon, U. S. Army, and which will be read by Col. B. J. D. Irwin, assistant Surgeon-general, U. S. Army.

THE AVOIDANCE OF INTESTINAL DISORDERS IN THE FIELD.

By Bvt. Lieut.-Col. ALFRED A. WOODHULL, Surgeon, U. S. Army.

Excepting in the shortest of fierce wars, the deaths from disease greatly exceed those from injury, and the cases of sickness are much more numerous than those of wounds. This is so well recognized as merely to require announcement, not statistics. Among the diseases those of the intestines are usually the first induced; they far outnumber the others, and, when not fatal in the field, some forms of them persist for years after the campaigns are past. As with other evils, prevention is not only better, but it is usually easier than cure.

The induction of diarrhea may depend upon: (1) Indigestion. (*a*) With a newly raised army the dietary leads to it. Men always well at home when fed with accustomed food, will fail to assimilate the coarser table of the barrack or the camp. Large bodies of men, healthy on a diet peculiar to their own region, may suffer when transferred to another territory. They seek to subsist upon a diet indiginous there. As, for instance, in our civil war Union prisoners were made ill on the nutritious corn meal of the South, and Confederate prisoners sickened with the wheat flour of the North. It is well understood that troops from temperate climates in sailing through the tropics are to be guarded against their fruits. But when such food is good of its kind the system ultimately accepts it. (*b*) Soldiers perfectly accustomed to the military ration in barracks will break down under the imperfect cookery of the field. It is in that direction that the U. S. Army is accumulating wrath against the day of wrath. The average mess table of the permanent post is luxury itself beside what the ruder appliances of the field will yield, and the garrison mess, where both responsibility and instruction are removed from the company organization, is educating, if not a generation of epicures, at least one of incapables. Such men will go into the field with many wants and no resources. Failure to provide instruction in field cooking is the special point of weakness in the organization of the National Guard, and it is where all newly raised armies suffer. Recruits fail to satisfy themselves with their field ration, and then fill their stomachs with all sorts of trash from the sutlers' wagons. The imperfect cooking of the camp, supplemented by the indifferent supplies of the sutler, is a fruitful source of indigestion and consequent diarrhea. A judicious medical officer will advise, and a competent commanding officer will enforce, strict supervision over food supplies outside of the subsistence department, with regulation and confiscation if necessary. Where the official commissariat is straitened, either in retreat or by reason of swift advance, foraging upon the country is sometimes imperative. This is liable to lead to the same result—semi-starvation, occasional repletion, and constant temptation to swallow unripe fruit or raw food. But these inevitable troubles are temporary in nature and are to be outgrown, as the teething of infancy. Some men succumb, but the most survive and may be the stronger for the experience. It is in the matter of food that, as I understand, the Mexican soldier, inured to frugality and to self-care, marches anywhere and is strong upon what would leave our men fainting by the way. We can never educate our volunteers, or even our regulars, to the Mexican standard, but with interested care our men at arms may have this evil minimized. (2) The direct action of drinking water. Change of water, so well recognized by civil travelers, is a still more active factor in the field than indigestion. For the unsatisfying, nauseous, and purgative alkaline waters of many deserts no remedy but distillation has yet been found, and distillation on a large scale is out of the question. It is a by-question here, but there is no doubt in my mind that malarial disease may be introduced through drinking water, and this may be a factor in diarrhea. Boiling practically neutralizes the poison, and, although inconvenient, this may be done. The soldier who makes his coffee in a tin cup can as easily boil water and fill his canteen with it. But unless watched, he will not. If the taste for tea, which is so much easier than coffee to brew, could be cultivated in armies the general health would be much improved, first by the boiled water and secondly by the astringent leaves.

A considerable amount of the hardness of water from lime salts, leading to diarrhœa, may be dissipated by boiling for half an hour; which again will not be done by troops on the march.

The mechanical irritation of mud in suspension is a very important cause of diarrhœa. To one who has not tried the experiment, it will be astonishing how clear water will become after resting from twelve to fifteen hours. This sedimentation is perfectly practicable in permanent camps that depend upon muddy rivers for their drinking supply. It can not be carried out with a marching column. Unless the water is very soft, and it may be artificially hardened for the occasion by the addition of a little lime or soda; alum will clarify it even when very muddy.. A small quantity, 5 or 6 grains to the gallon, may be stirred into the water; or a large piece of alum may be repeatedly passed through it, agitating the water. The suspended particles are entangled with the calcium sulphate and the bulky aluminum hydrate and sink with them. This is a practical and very valuable process that has been used on a large scale with marked success, and is easily applicable in all cases where the individual soldiers do not draw their own water. Chopped cactus leaves will also clarify muddy water. The removal of mud not only means a good deal to the senses, but to the intestinal system, for it often provokes serious and persistent diarrhea. Portable filters, sometimes used as individual equipment and sometimes on a large scale, deteriorate with use. They require great care in cleansing not to become agents for the propagation instead of the prevention of disease, and, speaking generally, of intestinal disease.

(3) Variations in temperature.

(*a*) Cold. As soon as troops take the field the variations in temperature and the frequent necessity of sleeping in damp clothes or upon ground not perfectly dry lead to much sickness. This is not always abdominal in nature, but a good proportion of it is. Terrestrial dampness is well neutralized by a waterproof sheet, but raw troops can never be induced to carry on the person anything for which there is not an evident and constant necessity. In permanent camps dry resting places can be obtained, and often in bivouac an old soldier will make such. But on the march the most of the men must lie as the ground offers itself. This nocturnal cold operates through the same channels as excessive heat.

(*b*) Heat. In my opinion solar heat, and in a less degree animal heat, leads to a great deal of diarrhea. The abdominal blood vessels are numerous and capacious; they are distributed so as to be easily drained by exosmosis into the intestines; they are readily influenced through the walls of the abdomen. It is an anatomical fact that all the blood in the body may be concentrated in the vessels of the abdomen without occupying their full capacity. Now, solar heat acts in two ways, (1) by gentle stimulation, keeping the arterial tension at the proper key, and (2) by the relaxation following excessive heat and the passive dilatation leading to overflow. That is to say, either the vessels of the belly may be in good condition during the day and suffer from cold at night; or, in hot weather, they may be fairly paralyzed by the heat and become congested canals ready to exude at every point. The correction and especially the prevention of this condition, a condition that by opening the way to simple diarrhea may lead to widespread disease among bodies of men, has great interest to medical officers upon whose prevision the health of armies largely depends.

In warm, and even in what are called temperate climates, the protection of the abdomen is of very great importance. From immemorial time the natives of India have used the "cummerbund," a protective wrapping around the loins, to fortify the contained organs against the debilitating agency of the climate. Under the grim name of cholera belts the English soldiers and the United States sailors in tropical climates are served with what might better be known as abdominal protectors. I know by practical experience, under both civil and military conditions, that it does not require tropical residence to make a flannel apron, large enough to cover the abdomen and worn under the clothing, an almost certain preventive of heat-diarrhœa and a frequent remedy for it. The apron should be large, reasonably thick (preferably double), and worn next to the skin. By conserving the cutaneous temperature it keeps the blood near the surface or draws it thither after diarrhœa, not due to mechanical or specific causes, has set in, following passive congestion. It is so simple a device that the ignorant, unless compelled by discipline, discard it and the learned overlook it.

But, as already said, diarrhea is a disease of armies. Cases and many cases will occur in spite of the best care. It is also true that enteric fever is a disease of modern armies, if not of the older ones. "Camp fever," which formerly was a synonym of typhus, has almost come to mean typhoid. The disciples of the specific doctrine are compelled to admit that this disease is coëxtensive with modern warfare in desert as well as in inhabited fields. Whatever theoretical objection there may be to the pathogenic doctrine formulated by Murchison that this disease "may be generated independently of a preëxisting cause, by the fermentation of fecal and perhaps other forms of organic matter," it is quite unsafe to reject it off-hand as applied to troops in campaign. Davies, of the British army, has shown the strong probability that enteric fever in the field is diarrhœa-bred. The observations made by Arloing, Gabriel Roux, Von Babes, and others point to a connection between the bacillus communis coli and the bacillus of Eberth.

I have long believed that in the course of many bacterial generations, which may be included in a relatively short season, an innocent bacillus by its environment may become pernicious, and I see no reason why, in the interest of safety, this may not be adopted as a working hypothesis. I think we are warranted in holding that in the field every case of fever, not distinctly paroxysmal, should be looked upon as enteric until the contrary is proved, and particularly that every camp diarrhœa is to be regarded as a possible source of infection. I do not wish to be misunderstood as holding that all camp fevers may become enteric, but to insist as a precaution necessary for the health of the command that those preventive measures be taken habitually that would be enforced with a developed case.

However camp diarrhœas originate, and I believe that they are in part malarial, in part due to changes of temperature, and in part specific, there is little doubt that once established they are widely spread by the dejecta. Foul sinks and the droppings outside of sinks become foci. It is a well-established dictum in all armies to avoid old camping grounds. But the same reason that forbids one to live among the excreta of our predecessors forbids us to make our own camp foul. Unnatural as it may seem to those accustomed to the refinements and conveniences of domestic life, freedom from fecal pollution is one of the most difficult conditions to enforce. The relief of nature is often so pressing as to be imperative, and few camp guards are so vigilant as to prevent a contaminated fringe outside of the directly inhabited limits. Within the lines the cover of night and the pressure of diarrhea are conditions often leading to the same state. This is particularly apt to be the case with raw troops.

These details are not pleasant to recite, but it is among the most important duties of a medical officer to see that all such factors are eliminated, or, more correctly, are not created. After guarding the water supply, the most important duty on establishing a camp is to prepare the sinks. Ordinarily the two can be done simultaneously; and the care of each is a constant charge. The condition of the sinks is a good measure of the efficiency of the camp, just as the state of their closets indicates the civilization of a community. Some military writers say that every camp longer than for over night should have a sink. In my judgment every camp, certainly in a warm climate or as part of those of a large army, although designed for only a night, should have its sinks, because no one can foresee what delays may occur. The oft-quoted orders of the great Israelitish general, Moses, on this subject (Deut. XXIII, 13) are as wise now as when issued. If this use of an independent intrenching tool could be enforced in bivouac, it would prove a defensive weapon in the best sense, guarding both the man and his comrades. The evil to be apprehended in unpoliced camps is that which dominates India: Air and water contaminated by flying desiccated particles of organic matter charged with causes of disease. Unless properly covered in, the sinks themselves, as reservoirs of concentrated distemper, are liable to make those who use them ill; for some forms of dysentery, at least, are eminently infectious to those directly exposed to the emanations from the discharges.

There are other forms of disease than intestinal that may ravage an army, but if this column can be effectually resisted much evil is averted. The foregoing are among the key-points for occupation by sanitary scouts, upon whose unobtrusive discharge of duty so much military efficiency, the prerequisite for success, depends.

The paper being open for discussion, Col. C. H. Alden, assistant surgeon-general, spoke as follows:

MR. PRESIDENT AND GENTLEMEN: One means of preventing intestinal diseases is, as stated, to secure good cooking, and in this connection I have been requested to give my experience as to the relative value of post and company messes. We have not in the Department of Dakota any post mess, but of course the question is one that has come before us and received a great deal of thought and consideration. The great objection to the post mess in a department in which troops are stationed for defense against Indians, and in which constant field service is expected, is that each company must be ready for action, and its mess outfit and material ready for immediate transportation. This is a very serious objection and at the same time a very difficult one to overcome, and I think we must approach the question in this way—that the post mess has its undoubted advantages for stations that are permanent. It is not equally advantageous for posts on the frontier. There are very great advantages in connection with the messing of troops in the post mess. There is a greater saving when all the men are messed together, better food can be supplied, and they get more skillful cooks and have better inspection. One officer perhaps can be picked out to take charge of that service who is particularly adapted to it.

I should say, therefore, that each has its proper place, the post mess for permanent posts and depots where detached service is rare, and the company mess for temporary posts and stations on the frontier.

REMARKS BY COL. IRWIN, ASSISTANT SURGEON-GENERAL, U. S. ARMY.

MR. PRESIDENT AND GENTLEMEN: I believe that in the Department of the Missouri, of which I am medical director, we have three of these post messes. One at Fort Leavenworth, one at Fort Riley, and one at Fort Sheridan. The oldest or first established of these three is at Fort Riley, the next at Fort Sheridan, and the next at Fort Leavenworth. I know that there has been great improvement in regard to the manner of keeping the mess. The Sheridan mess is much better than at Fort Riley, and the Leavenworth mess is a model of perfection.

The messing of large bodies of troops, especially such as at West Point, for instance, partakes a good deal of the character of a hotel. It has its advantages and disadvantages. In the military service the great disadvantage is that the troops are not all prepared to cook for themselves, especially on the frontier, as we used to call it; but our frontier has in a measure disappeared; it does not exist any longer. I think there will be no trouble in regard to this messing. The condition of military life in the United States is undergoing a very rapid change, and, as I said, our frontier is rapidly being obliterated.

REMARKS OF DR. BEDFORD BROWN, OF ALEXANDRIA, VA.

MR. PRESIDENT AND GENTLEMEN: I have listened with a great deal of interest to the excellent paper by Dr. Woodhull. I think he has covered the ground remarkably well.

I only wish to make an allusion to a single point in relation to this question of intestinal diseases in armies. I have no personal knowledge of the habits of the regular soldier. My experience has been confined to the volunteer service. I wish to allude to the vast difference in the number of cases of intestinal disease and the gravity of those cases as between the educated and cultivated and the ignorant and illiterate. I found that there were probably five cases of intestinal disease among the illiterate where there was but one or two among the educated soldiers. We had in our Confederate army of course a great diversity—all kinds—and those men were thrown together in the same companies necessarily. We naturally ask why should the illiterate soldier be the victim of this disease any more than the educated. The illiterate soldier is supposed to have an equally vigorous constitution, if not more so, but we often found that the clerks taken from villages and towns, and young lawyers and young gentlemen of leisure in the Southern army were rarely subject to these forms of disease, while the illiterate, taken from the same counties, had them by hundreds and thousands. I simply want to say that I think it is due to a knowledge of hygiene on the part of the cultivated; and not only that, but the natural pride of the cultivated man leads him to different pursuits and different habits.

Now as to the cooking: This paper put great stress upon that, and I think justly so. It is of the greatest importance, and especially so in army life, as not only a matter of comfort and pleasure but a matter of hygiene. The cultivated man had his cooking prepared in a way that cultivated people live, as far as it was possible to do. The illiterate man had his prepared in the way he was accustomed to prepare it at his home, and there was all the difference in the world between the two methods. They both had the same rations. There was no difference whatever that

I am aware of in that respect, but it was in the method of preparing the food. There was the point. And I believe that if a great army could employ a scientific head cook, with scientific and practical assistants who could prepare food not only palatable to the taste but digestible in the stomach, many of these intestinal disorders would be avoided.

REMARKS BY MAJ. D. L. HUNTINGTON, SURGEON, U. S. ARMY.

MR. PRESIDENT AND GENTLEMEN: I would like to occupy the attention of the section for one moment. The train of thought which has been so admirably presented by Dr. Brown is one upon which I intended to make a few remarks.

In the department which I represent (the old Department of Arizona, but now merged into the Colorado) at certain large posts in Colorado and Utah the company-mess system still prevails. Whether there is any modification now or not I am unable to say, but a visit of inspection through Arizona and New Mexico, where this system still exists, shows it is bad enough.

I think attention should be given toward scientific cooking in the Army, and the suggestion which has been offered by Dr. Brown to secure the services of one or more scientific and well-trained cooks, whose business it should be to educate and train up cooks for our different posts, is an excellent one. Until something of that kind is done we shall have no cooking that deserves the name of cooking. Some posts have the advantage of the services of a man who is fond of it and who has made a study of the science, and consequently the meals are well prepared; but that man may be sent away and the company goes back to the same old way. In peace as well as in war the troops should be well taken care of, and this is probably one of the most important points to be investigated and discussed.

REMARKS BY MAJ. JOHN VAN R. HOFF, SURGEON, U. S. ARMY.

MR. PRESIDENT ANE GENTLEMEN: I will offer but a word in the discussion of Col. Woodhull's admirable paper, and that upon but one subject—the feeding of our Army. While stationed at Fort Riley, Kansas, I saw the post mess there organized and carried through many tribulations to a successful result. My conclusions, based upon three years' experience with that mess, are summed up in a report to the Surgeon-General, U. S. Army, from which I venture to quote. * * *

The departure of this command would take out of the mess hall every man familiar with its workings. A new garrison would have to organize at the foundation and learn from experience what has been gained here by nearly three years' trial. I have reason to believe that experience would be a bitter one, and unnecessarily so, since, with a permanent personnel (which might be obtained through the instrumentality of the general service), a change of garrison would not leave the mess hall, as it now will, without a single man who knows anything of its workings. I have suggested the general service as a present means of attaining the end in view, but ultimately there should be a regularly organized corps attached to the subsistence department, from which mess hall and bakery assignments could be made. * * *

The proposed corps would necessarily be made up of cooks, bakers, waiters, etc., and with proper military organization would ultimately become an admirable training school of cookery, through the instrumentality of which a practical knowledge of good cooking, both in camp and garrison, would be disseminated throughout the entire Army.

Referring to Col. Woodhull's remark that "if the taste for tea could be cultivated in armies the general health would be much improved, first by the boiled water, and secondly by the astringent leaves," I desire in this connection to call attention to the advantages that are offered by the use of compressed tea tablets, in their smallness of bulk and ease of manipulation. Messrs. Parke, Davis & Co. are now experimenting at my request with a tea tablet containing saccharine, which I have no doubt will prove entirely satisfactory. A soldier will by this means be enabled to carry what will make three gallons of tea in a receptacle much smaller than a pocket match safe.

PERSONAL EXPERIENCE IN OBSERVING THE RESULTS OF GOOD AND BAD SANITATION IN THE CONFEDERATE STATES ARMY.

By Dr. BEDFORD BROWN, of Alexandria, Va.

During the first two years of the late war the laws of hygiene were greatly neglected in the conduct of the army of the Confederate States.

As a result of this neglect of the common laws of health, there was necessarily an enormous amount of disease and a high rate of mortality. This neglect of proper sanitary arrangements was not so much due to a want of intelligence or scientific knowledge, or a sense of their necessity, but rather to the unusual state of confusion incident to a condition of revolution in its incipient stages, and again to the general prevalence of the idea that the war would be a brief one. But as time rolled on and the war assumed larger and more gigantic proportions, and the end appeared more distant, the necessity of systematic attention to the hygienic affairs grew more apparent as a means of maintaining an army in full force and vigor for prosecuting a great war. Hence military hygiene, as the war advanced, became more and more a part of the army organization, and the inevitable result was not only an improvement in the health of the soldier, but an improved capacity on his part to withstand hardship, exposure, and privation.

In the commencement of this paper I desire to show you that an army located in the most salubrious climate, in a position of great altitude, with abundant supplies of clear spring water, surrounded apparently by circumstances the most favorable to human health, from want of proper attention to the laws of hygiene may become infected with the most deadly epidemic disease.

In the autumn of 1861 an army consisting of about 17,000 Confederates, under Gen. Robert E. Lee, was stationed for two or three months under circumstances of this kind on the summit of the Alleghany range, in West Virginia, in front of Gen. Rosecrans. The position of Gen. Lee was regarded as peculiarly favorable to health, and as apparently free of all septic influences, having a surface drainage that was perfect. But, notwithstanding all these natural advantages, this army was desolated by malignant disease, as typhoid fever, septic dysentery, and pneumonia. All cases of whatever kind rapidly assumed the typhoid type, indicating the gravity of the septic influence. In this army of about 17,000 there were at least 4,000 cases of disease, with an enormous mortality. We ascertained that the cause of the epidemic was purely excrementitial in character.

The entire army had been, in the absence of all sanitary arrangements, permitted indiscriminately to use the surface of the earth surrounding the camp for the deposit of the excreta of the sick and the well.

This excrementitial matter was washed daily, by copious rains, into the springs and fountains of our water supply, and was a constant source of pollution. The water, as it gushed from the mountain valleys, was beautifully clear and deliciously sweet, but when tested was found to contain a large amount of organic matter. In this connection I will cite another incident illustrating the results of prompt and thorough attention to the laws of hygiene in any army suffering from serious septic disease caused by unfavorable surrounding influences. During the months of August, September, and October, in the year 1862, in which the temperature ranged very high, the brigade of which I was senior surgeon was stationed at Drurys Bluff, on James River, after the great seven days' battle around Richmond. The locality was an open, flat, badly drained country that had been previously occupied by troops, and much of it was literally covered with human and animal excreta, which had from surface drainage been from time to time filtered into the fountains. Within a week, during this intensely hot season, an epidemic of typhoid fever, dysentery, and diarrhœa was developed, that threatened seriously to decimate the command. A large force of men was detailed daily with suitable implements, and not only the camp and entire surrounding country were thoroughly cleaned, but the springs and streams were also cleaned and purified and kept in a scrupulously cleanly condition, and in addition ample privy vaults were excavated at a distance below the level of the water supply. Within a reasonable period, by means of these sanitary measures, this epidemic was effectually arrested, and the brigade became a model for healthfulness. The systematic and practical hygiene of camps and armies is an interesting and vital question. It is the very foundation of strength and efficiency of an army. It has fallen to my lot to observe and attend an army without proper hygienic advantages, and to observe its crippled, dejected, spiritless, disorganized, inefficient condition, and to compare it with an army whose state of hygiene was strictly attended to, and to observe the vigor and force of mind and body, the dauntless spirit, the endurance of hardship and exposure of its soldiers.

At this stage of our progress I propose to present for consideration my personal experience, in the Confederate service, in the practical methods adopted for improving the sanitary condition of camps and promoting the health of armies.

In the preparation of this paper I have endeavored to discard all theoretical ideas and adhere strictly to facts based upon my own personal experience.

In considering the hygiene of armies, there are three subjects which must elicit our constant interest and study—the condition and quality of the water we drink, the air we breathe, the food we consume and its method of preparation. In the Confederate service experience proved that an army in motion or active service enjoyed better health and had a smaller death list from disease than one stationary in quarters. Even with the most scrupulous attention to hygiene there is an accumulation of a certain amount of débris, vegetable, animal, and excrementitial, that pollutes the common carriers of disease germs, water and air, of a great stationary body of men.

Then again, day and night, a stationary army is constantly inhaling an atmosphere that has passed through the lungs of thousands of healthy and diseased lungs an innumerable number of times. Another reason is an army shut up in quarters suffers for the want of active physical and mental exercise. On the contrary, an army in motion has the advantage of breathing a fresh air every moment while in action. It has also the advantage of drinking from fresh, unpolluted fountains of water. There is no accumulation of débris to contaminate either.

Fourthly, its digestion, assimilation, nutrition are promoted by an active physical and mental exercise.

Fifthly, active mental and physical exercise is always cheering to the spirits of an army. The corps of Stonewall Jackson, though almost constantly in motion, subjected to all the hardships, exposure, privation, and fatigue incident to long and forced marches, presented the smallest sick list and bills of mortality of any other corps in the Confederate army. These important facts teach us a lesson in military hygiene that is of value. In devising and executing my sanitary arrangements for the protection of the health of that portion of the army under my immediate medical supervision, when in quarters or stationary, I endeavored, as far as practicable, to imitate an army in motion—in other words, by scrupulous attention to cleanliness, changing the location of tents and quarters every twenty-four hours in warm seasons, and by cleansing the fountains of our water supply every twenty-four hours, to insure pure air and water. I discovered by practical experience that an army employed was far more healthy, happy, and contented than one in idleness. Idleness always breeds disease, discontent, and death.

My habit was, when I found my sick list increasing, to advise all hands to be put to work; it was not material what kind of work, so that it gave employment to mind and body.

I had a splendid regiment of Southern young men under my professional charge, at one time in 1861, which suffered fearfully from the effects of *nostalgia* or *homesickness*. They had never been from their homes except at brief periods, and while stationed in quarters the effects of *homesickness* became truly disastrous and alarming. These young men, the pets of their families and the life of their comfortable homes, in camp life would absolutely sink down into a state of listlessness and apathy, with the entire loss of spirits, hope, appetite, and ambition, and would fall an easy prey to all the diseases of army life.

It was ordered that every man in the regiment daily, from morning till night, be put to work with axes, hoes, rakes, cleaning up camp, changing the location of tents every day, cleaning up fountains, draining swamp lands, chopping and hauling wood, and very soon the good effects on body and mind were marvelous. When there was no work I studied to make work, and I was amply repaid. I will here present my method of camp hygiene in detail, but as briefly as possible.

The absorbent powers of the earth's surface occupied as a camping ground by a large body of men and covered by tents so as to intercept the rays of the sun are simply enormous. Under these circumstances the earth absorbs rapidly the exhalations of the human body and the germs of disease, and then in turn exhales these to be again inhaled. The earth under a house tent occupied by from 4 to 6 men will absorb sufficient effluvia in a few days to poison the earth and atmosphere under those tents. On entering the door of one of those close tents in the morning at sick call the atmosphere will be found disgustingly fetid and offensive. The house tent, when its sanitary condition is neglected and it is permitted to occupy one position for days and weeks, is responsible for an infinite amount of disease, but at the same time, by proper sanitary care, can be made not only comfortable but wholesome. In this particular I suggested a rule that was ever after carried out rigidly in our command, and resulted in infinite improvement in the health of the soldiers. In hot seasons every tent was struck after breakfast, and in cool seasons twice every week, its location thoroughly cleansed and the tents placed on the streets, and the former sites exposed to the action of the sun's rays and atmosphere for twenty-four hours. In this arrangement a double purpose was accomplished—the one hygienic, the other to give useful employment to the soldiers.

All débris collected was carted off and burned, so that no cause for septic influence should remain.

The next day the entire process was reversed.

By the rigid practice of this system our air and water were preserved uncontaminated. The second rule in importance adopted was the punishment of every man who used the surface of the earth for the deposit of excreta instead of the privy vaults, always located below the level of our water supply and at a distance from camp.

The excreta of all ill patients with typhoid fever, pneumonia, dysentery, diarrhœa, measles, were deposited in boxes filled with dry earth, to be carted off to the privy vaults twice daily. For the disinfection and deodorization of excreta I found the dilute sulphuric acid, when obtainable, efficient, and then the whole covered with dry earth. At the same time all horse stables and cattle pens were invariably located at a distance from and below the level of our water supply. By these sanitary arrangements we slept every night upon fresh ground, we had pure water for drinking purposes, and pure air for breathing purposes. We had a clean encampment—almost as clean and sweet as a fresh camp of an army in motion. And we had ample exercise for mind and body.

By this unremitting attention to the laws of health our command became a model of healthfulness and cleanliness. I became convinced that nothing but the direct chemical action of solar light and heat were capable of destroying the infectious exhalations of the human body, either sick or well, when absorbed by the earth's surface, on which these bodies habitually repose. I found that at least twenty-four hours exposure was necessary to accomplish this object. I instituted a series of simple experiments to test this matter. When each tent was struck, a small portion of earth in its inclosure was excavated to the depth of two inches, and when applied to the nose, after a tent had been erected for several days, was always found to give forth a more or less offensive odor. The action of the solar heat and light invariably dissipated these odors.

Education, intelligence, refinement, among soldiers exert a marked sanitary influence over their general health. The Confederate army was composed of companies and regiments of the most opposite extremes in these particulars. Some educated and refined in the highest degree, while others were steeped in the profoundest illiteracy and ignorance. To reconcile these diverse elements was a difficult matter. There was far less disease among the educated and refined than among the opposite classes. The former resisted the attack of disease more certainly, and recuperated from its ravages more readily. A company of soldiers who made their signature to the pay roll largely with a cross mark were sure to suffer much from disease.

The educated had more pride, self-respect, good taste, and ambition in attending to all the hygienic laws of life and in the preparation of more palatable, digestible, nutritious varieties of food, while the illiterate volunteer can not be made to comprehend the dangers of dirt and filth, or the importance of cleanliness in all things to health and life. Neither can his dull intellect understand why one method of preparing his food should be more conducive to digestion and health than another. He burns his bread and fries his food saturated with grease, and suffers from indigestion, colic, and diarrhea, but is ignorant of the cause. In the practical hygiene of armies a question of vital importance is the disposition of all excrement, human and animal, so as to prevent pollution of air and water. This is eminently true of the excreta of patients with typhoid fever, dysentery, and diarrhea.

In the Confederate service I at once saw that the more scrupulous attention that was paid to this subject the better the health of the command, and as certain as it was neglected, the army suffered in proportion with septic disease.

After one of the great battles around Richmond, in the intense heat of summer, my brigade was assigned to a location covered with human and animal excrement, and in twenty-four hours there were hundreds of cases of septic diarrhea.

In military, as in civil life, it is surface drainage that pollutes our water supplies, and therefore in armies and camps there should never be permitted accumulations on the surface of vegetable, animal or excrementitial materials.

In my own experience I found that absolute cleanliness of a camp was always practicable by excavating privy vaults at a distance, located below the water supply level, and the rigid enforcement of their use by the men.

The artesian well, from 100 to 300 feet deep, if practicable, furnishes probably the most certain protection to drinking water against the contamination of surface drainage. It is my opinion that the artesian well, sunk rapidly, by the modern facilities for constructing such means for drinking water, in camp, would be a step in the direction of economy in the health and life of an army.

During the winter and spring of 1862, I was placed in a favorable position to observe the diseases of volunteer recruits, and the best methods of preventing their extension. During these five or six months I acted as surgeon of the camp of instruction, near Raleigh, North Carolina. In that space of time some 10,000 volunteers, under the conscript law, passed through the camp. Of these, about 4,000 contracted measles. I found that when a recruit had measles and was retained in camp, or sent to the front, he invariably passed through one or more of the sequalæ of the disease—as diarrhea, dysentery, bronchitis, pneumonia, and not unfrequently typhoid fever, so that he was either on our hands as an invalid, or in the process of disease finally died. To prevent these untoward consequences and for the purpose of breaking in upon this chain of morbid tendencies, I determined to suggest a universal system of furloughs for every man who had passed through an attack of measles, of from two to three weeks. Consequently during this period there were furloughed from this camp more than three 3,000 soldiers, and the results were admirable. This method had the effect of absolutely correcting the evil. The diseases consequent to and traceable to measles cost the Confederate army the lives of more men, and a greater amount of invalidism, than all other causes combined, and if this method of general furloughs could have been adopted after an attack of this disease it would have resulted in preventing a vast loss of life and time, and would have proved a decided measure of economy.

In the month of February there appeared in this camp of instruction an epidemic of cerebro-spinal meningitis that threatened at one period to disorganize the camp. The type of the disease was so exceedingly malignant as to prove fatal in three-fourths of the cases, in opposition to the most approved methods of treatment then known. It appeared first in a company of recruits who came from a certain county in the State of North Carolina, where the disease had been prevailing as an epidemic, and then rapidly extended to other recruits in the camp. The disease appeared in several different forms—as the comatose, the convulsive, asthenic and collapsed, and the ataxic.

The course was usually rapid when fatal, and the few cases that recovered convalesced slowly, and ever after remained unfit for military life. How to prevent the extension of this epidemic, more fatal than Asiatic cholera, became a serious problem for solution. In relation to the prevalence of this epidemic and its peculiar history, I desire here to note two important points; one is that the disease was imported from a section where it had previously prevailed, and that it was eminently infectious. All recruits who came in contact with these patients suffering with the disease, from this infected district, contracted the disease. Even those inhabiting tents in the vicinity of the sick contracted it.

The second point is, that by a rigid system of quarantine, or in other words, prompt separation of the sick as soon as attacked, and his absolute isolation in a camp at a safe dstance were the only means capable of arresting an epidemic more fatal than Asiatic cholera.

Occupying only a secondary place to measles, diarrhœa was the bane of the volunteer recruit of the Confederate army. Nine-tenths of all new recruits suffered from an attack of diarrhœa. While these attacks were not in themselves fatal, they were the cause of a large amount of invalidism, and laid the foundation for other diseases that were often fatal.

How to prevent these cases of camp diarrhœa, and render the acclimatization to camp life easy and healthful, was a serious question of hygiene.

The new recruit when he entered the army left behind him his accustomed system of diet and took up a new one entirely and radically different. He left a mixed diet, vegetable and animal, and a fair method of preparing it, and took one largely animal, usually very badly prepared, which was resented by his digestive organs. He left an animal diet, cooked in the boiling pot, the baking oven, or the stew pan and substituted the frying pan for all of these.

The undisciplined Confederate naturally sought the quickest and readiest method of cooking his meals, and that was by the frying pan. This culinary utensil cost the Confederate army a vast amount of invalidism, and indirectly many lives.

It would ruin any army. But as time wore on and the mind of the soldier gained wisdom by experience, the stew pan was substituted for the frying pan, and then animal and vegetable food, when obtainable, were prepared together into a mass that was not only more savory, but far more digestible and wholesome, and thus much of this diarrhœa became a thing of the past. My experience in the treatment of the wounded, of infectious cases, as gangrene, erysipelas, typhoid fever, pyæmia, in hot seasons under tent flies, alone in high dry locations under shady groves, where the breezes had full sweep, was far more favorable in result than in crowded hospitals or tents.

In conclusion, Mr. President, it can be said in all truth that, in army life as in private life, the good results of systematic cleanliness, pure and simple, of method and thoroughness in its application, stands alone, and ever will do so, as one of the most potential, if not the most potential agent for the prevention and cure of disease at our command. In my own personal experience in military and civil life I have on many occasions, I could not say how many, seen the marvelously good effects of systematic cleanliness in clearing up endemic and epidemic disease, in preventing its extension and ravages. On the contrary, I have as often seen a want of care and inattention to cleanliness cause infinite trouble in the evolution and propagation of disease.

Cleanliness is one of the most conspicuous and prominent attributes of civilization, and it stands conspicuously as a landmark between civilization and barbarism. Our barbarous ancestors in ages past were decimated year after year by the most horrible and dreaded epidemics of pestilence. A want of cleanliness, pure and unadulterated filth, lay at the bottom of it all. There can be no civilization, no enlightenment without cleanliness, and the more filthy we become the further we descend on the down grade to barbarism.

Upon the close of the discussion of Dr. Brown's paper by Dr. Reyburn the following paper was read, Dr. Bedford Brown being in the chair.

THE CAUSES AND ORIGIN OF CONTINUED FEVERS, WITH REFERENCE TO NAVAL AND MILITARY SERVICES.

By Surg. C. A. SIEGFRIED, U. S. Navy.

The large amount of loss in life, strength, and efficiency in armies and navies, from the constant prevalence of continued fevers, is my excuse for presenting the following study on their causes and origin. From an experience gained under many different conditions of climate, environment, and service, I have become impressed with the importance of certain factors of causation among bodies of men under military and naval discipline, and under constant observation.

In the study of the phenomena as a whole, and their influence on mortality rates, abdominal typhus, or typhoid fever, furnishes the type for an analytical study, and of a morbidity that warrants the closest attention and endeavor toward a clearer appreciation of the causes and origin, the management, and its possible prevention. Aside from ephemeral or irritative fevers from various evident causes, the paludal fevers, and those common in regions coming under civilized man's domination for the first time, continued fevers are essentially diseases of aggregated humanity; they are contemporaneous with communal living, the customs, habits, social conditions, and appurtenances of civilization; also, and which is much the same, in circumstances of unusual crowding by a few, or even a single individual, confined to one spot or locality under certain conditions. They are prone to inflict the crews of ships in the Old World harbors, or in those waters which have for centuries received the wastes and sewage of cities; and at this moment they are the paramount causes of loss in all modern military forces. In former times, before the application of the principles of hygiene, the acute form—typhus exanthematicus—was a constant attendant upon life in the limited quarters of ships and old garrisons.

The argument I take the liberty of bringing forward here is that continued fevers, accepting Murchison's classification, some of the tropical fevers, Mediterranean fevers, and the class of "simple" continued fevers are all of similar origin, differentiating only finally and becoming the types as known to us, when the specialized microphytic elements concerned have gained the power, and virulence, of continuing their kind as such. This contention may be said to have been laid aside for the last twenty-five years in view of the pathological lesions involved, strongly marking some types, the character of symptoms, and quality of infection.

Up to within fifty years ago the ablest physicians made little distinction in continued fevers, the cases mingled alike in the hospitals, even as cases of diverse types mingle now; the common resemblances were the same, the mortality was equal in degree with the same variations according to the prevalence of type; and it was only in the quality of infection, and by the *gross lesions*, that distinctions came at first to be made.

What becomes of these "specific differences," when one observes closely the dying embers of a typhus visitation as compared with the great majority of cases of continued and typhoid fevers, cases with pyrexia lasting to twenty or more days, with or without any one or all of the symptoms usually associated with the so-called enteric fever? Is there a marked difference in mortality, symptoms, contagion and morbid lesions? Customarily, when the abdominal symptoms are pronounced, the label is "enteric fever." It is well known that we can not draw sharp lines in the vast majority of continued fevers, and this becomes possible only when the process has far enough specialized to form the types—the enteric lesion on the one hand with the association of the Eberth bacillus, and the putrid blood condition with exanthematous skin on the other—typhus. In all forms of continued fevers, however, there is a constant apparent blood change, eventuating in severe cases in disorganization, deposition of dissolved hæmatin, the cell protoplasm having lost cohesibility as a rule—the proteids of the blood tissue being under the disintegrating influence of new substances circulating in that fluid—derivations of illy formed leucomaines and enzymes.

We are taught that typhus exanthematicus, in contradistinction to typhus abdominalis, is an acute, infectious fever, characterized by sudden onset, a dark-red eruption, marked and peculiar nervous symptoms, and a termination usually by crisis at the end of the second week; that typhoid is an infectious fever, characterized anatomically by hyperplasia and ulceration of the lymph follicles of the intestines, parenchymatous changes in other organs, notably the spleen, and-that contagion is not a marked feature. Since 1880 appears the Eberth bacillus. The eruption is rose-colored; there is probably diarrhœa, abdominal tenderness, tympanites, splenic enlargement, and much is said of the typical thermal curves. But it is well known that all of these symptoms are extremely inconstant—even the fever may be wanting; in fact, the expression is heard that "there is typhoid without symptoms." According to the character of the epidemic or the intensity of prevalence, so is the mortality and consequently the approach to specificity.

Concerning the other forms of continued fevers (excluding relapsing fever at this time), occurring at all times, with all ages and sexes, and often in connection with prevalent typhus and typhoid, before, during, or following their usual outbreaks, there is little to be gotten from the books. They seem to be characterless, and, being devoid of malignancy, gain admittance nowhere. Yet they very often present excessive pyrexia, and some of the symptoms suggest a serious prognosis; and, as a rule, they come to an abrupt termination within the second week.

In such cases, in my experience, there is little alarming excepting the threatening heart failure, which occurred in two fatal cases, observed by me, on the sixteenth and eighteenth days, respectively. Post-mortem section revealed unusually fluid darkish blood and a peculiar granular change in the substance of the heart muscle. There were no skin eruptions, enteric involvement, or marked nervous phenomena. Such instances of continued fever are not at all uncommon among the aggregated men of navies in temperate climes, and can not be passed over as being gastric or irritative fevers, or as referrable to conditions not diagnosticated. They are not always benignant, and they unerringly indicate an unhygienic environment. I believe them to be but species of the same genus or family (including true typhoid), a group of diseases mainly characterized by disordered heat balance and ataxia, a *mixed infection* of the economy, varying only in degree and sequelæ, yet based upon the evolution of the same series of causes, the same ultimate origin in excremental matters, resulting in new bio-chemical products, from necrotic change set up in the epithelial elements lining the digestive tube and the respiratory tracts; the work of a class of saprophytes introduced in unusual numbers from without, upon or within our various supplies—air, food, water, etc. The same causes, long continued, combined with misery and famine—thus diminishing immunity and resistance—specialize the types by added and increased virulence of the mycrophytic elements.

There are cases of typhus without eruption, cases of typhoid without follicular enteritis. All the numerous names—as many as eighty—for "typhic," or typhus fevers in the various parts of the world, are shown to be one and the same thing by Pringle and Fordyce; and, from well-known causes, they may become devastating and depopulating, whether in military forces or in civil populations; and when they decline we always see the large class of benignant unclassifiable cases.

There can be no doubt that anomalous cases occur, concerning which a diagnosis can not be given—there are no specific characteristics—and the term simple continued fever has become a refuge for these uncertain fevers. (Aitken.)

Dr. Murchison, in his great and classical study into the nature of typhus and typhoid fevers, leaves out 200 cases that could not be classified as either typhus or enteric cases. Wunderlich and Murchison both refer these anomalous fevers to combinations of the poisons of typhus and typhoid, and that the characters of each do not remain distinctive. Dr. W. T. Gairdner notes the many anomalous fevers which at times have quite overcome the number of typhus and typhoid types.

Dr. James Barr, Glasgow (Lancet, May 13, 1893) "objects to the term 'enteric fever,' as by it the lesion of the bowel is raised to the dignity of the disease, instead of remaining, as it undoubtedly is, the effects of the disease—an irritative chemical effect. These lesions are pathognomonic, but like other prominent lesions and complications are due to the specific bacilli and their products. He is not sure that the Eberth bacillus causes typhoid fever, but feels confident that no single ptomaïne could give rise to the very varied toxic symptoms characterizing different cases of the disease. In the majority of cases of the disease, the intestinal symptoms are not more prominent or more grave than those of the respiratory and nervous symptoms. *"Many most competent observers constantly mistake typhus, typhoid, and meningitis, at the present time."* Dr. B. A. Whitelegge (Lancet, March 18, 1893): "Occasionally in crowded manufacturing towns and villages we meet with typhus fever outbreaks which we can not suppose to have arisen *de novo*, but which seem to have had their beginnings in cases of illness which, apart from subsequent history of typhus fever, would have received no name more definite than febricula or simple continued fever." Mild forms of typhus occur among children in connection with such outbreaks (Mr. Spear), and Dr. Theo. Thompson suggests "the more or less universal existence of a specific organism which under ordinary conditions does not develop sufficiently to display its potential infectivity, but which under special conditions may so develop."

In Mediterranean latitudes, in the tropics everywhere, these anomalous, sometimes typically typhic fevers exist at all times. They receive various names, often from some local peculiarity or predominant symptom, and they may be found combined with paludal, bilious, and gastric disorders. The works of Morehouse and Ronald Martin give much information on the anomalous fevers of tropical and semi-tropical regions and of India. It is here that Murchison's doctrine, "pythogenetic fever," or fever of putrescence, is more clearly applicable, and these regions furnish us with cases requiring much more extended methods of investigation. They are of the utmost importance to science, for it must appear that the bulk of tropical and subtropical fevers are connected with the "typhic etiology." As a matter of fact, putrefactive and saprophytic organisms most abound in those regions of the globe, from the many well-known and apparently irremediable human agencies and effects present, mainly resulting from constant heat and moisture amidst, very often, degraded populations. I need not bring to bear the statistics of typhic disease on the shores of the Mediterranean, in Egypt, in India, and in similar regions. In temperate regions these forms of disease—"autumnal fevers"—follow the heats and trials of the hot months of the year, the same series of causes having been set in motion.

The tedious forms of continued fevers known as "Malta fever" and "Rock" or Gibraltar fever, have been investigated by Drs. Milnes (Lancet, January-August, 1892), Bruce and Hughes (Lancet, 3, December, 1892), of the English army, and by Dr. Gipps, English navy (Tran. Epidem. Soc., London, Vol. IX.) These observers have gone farther in their studies than any others who have labored in the same field, and their results are briefly as follows: The pyrexial condition is often chronic, lasting as long as four or six months, but with distinct remissions, not like intermittent. The temperature curves come in waves. Quinine and arsenic have no effect. There is obstinate constipation, progressive anæmia and debility, followed by neuralgic and rheumatic disturbances lasting for years. The death rate is low, but the time lost and the invaliding in the English services are enormous. The fever may be endemic and epidemic in character. Pathologically, the spleen is at first enlarged; the mucous linings of the alimentary tract are subject to irregular patches of congestion, not related to Peyer's patches. The mesenteric glands are enlarged, but less so than in pure enteric cases, and there is no malarial pigmentation. From the spleens of 15 fatal cases a special microörganism has been obtained. One observer, Dr. Louis Hughes, has carried the organism through 6 generations of pure cultivations.

Pure cultures have been introduced 4 times into the forearms of healthy monkeys (twice by Bruce and twice by Hughes) under the strictest precautions. No local changes took place, but the animals developed a similar fever. Two were killed in the third week, having a temperature of 106° and 107° F., and from each pure cultivations of the same organism were obtained from the spleen and liver, and in 2 from the spleen and blood. Enlarged spleens and irregular congested patches in the intestines were found in the bodies of the monkeys. Peyer's patches were normal. The organism was also carried from the spleen of one monkey to a well animal, again inducing the same fever, lasting over two months Thus, the three observers, agreeing essentially in most points, have placed the etiology of certain Mediterranean fevers on a sound basis. The organism believed to be the proximate cause of these fevers grows best in an alkaline nutriment medium, with an alkalinity not in excess of the blood, placed at 37°–40° C., preferably in 1 per cent peptone Agar. After inoculation from fresh human spleen the colonies will appear in five or six days as minute transparent, colorless drops on the surface, gradually becoming opaque. With transmitted light and low power they appear round, with granular edges, have an orange tinge, and without liquefaction. The colonies retain vitality for over two months. They die at 15° C., moist, but live a long time in the dry state. In the hanging drop the organism appears as a minute coccus (tending to cohere in very short chains), 0.008—0.3 mm. in size (Bruce); ovoid or nearly round, of rapid movement, and will stain readily. They can be easily found in fresh splenic substance after death, and in the blood, during life, of men suffering with the fever.

The originating and causative agencies are, by all observers of these Mediterranean, Danubian, and Red Sea fevers, put down as due to collections of fecal and organic matters, in porous soils oftenest, and infection is commonly believed to be by means of the atmosphere, and not by food and drink. As with so many and the most competent observers everywhere, regarding the typhic etiology, we have here again a "porous soil, human excrement, and a varying level of subsoil water."

The work of Dr. Pasquale, Studio Etiologico e Clinico delle Malattie Febbrili più Comuni a Massua, has cleared the Italian Red Sea littoral of the current ideas as to malarial infection. Among his conclusions he states that at Massaua "there is no fever infection, *sui generis*, such as climatic remittent, which some classifiers have called it. There are febrile maladies which might be confounded with common continued fevers, such as those arising from typhoid infection, principally of the so-called abortive and minor types." The Massawah or Suakim fevers are thus evidently of the same family as Malta, Neapolitan, Gibraltar, Cretan, and the other locally-named fevers common to the basins of the Red and Mediterranean seas.

Dr. G. H. Milnes, formerly of the English navy, summarizes the main points (Lancet, June 18, 1892), as observed by him of Mediterranean fevers, as follows:

These fevers are neither typical of typhoid or malarial fevers as commonly understood, yet they at times present symptoms of both in the character of the remissions of pyrexia, the congestions of the alimentary canal and the splenic enlargement, and the tendency to pulmonary congestions. Invasion is marked by loss of appetite, headache, backache, but seldom by rigors or vomiting. The rise of temperature may be gradual or sudden, oftenest reaching its highest point within the first four days. There may be a slight pulmonary or pleuritic congestion; slight jaundice may be present in a few cases; rheumatic symptoms are late manifestations; and, on the whole, the disease has no pathognomonic symptoms, excepting the tongue, which he considers typical. This organ is covered with a dead white, moist fur, persisting throughout the attack, and with its disappearance recovery has commenced. The bowels are constipated, and the abdominal symptoms are not very prominent. Enlargement of the spleen may or may not occur. The main features of the disease, if recovery does not take place within the first fortnight, are progressive debility and emaciation, and irregular temperature without rigors. Recovery is hastened only by transfer to cooler regions. The rarely occurring eruption is not exactly like the rose spots of typhoid. It is a disease of old, thickly settled towns and garrisons in warm regions and does not exist on open plains or in marshy regions. It is best treated with fluid diet, recumbency, early moderate calomel and saline purgation, and by hydrotherapy.

The English military and naval surgeons in Egypt state that "there are many fever cases of twenty-one days and longer duration, with no distinguishing characteristics, with thermal ranges common to true typhoid or enteric fever, but with no diarrhea, enlarged spleen, or skin eruption." Annually there occur in Egypt mild epidemics of typhus exanthematicus, following the season wherein the poorer natives huddle together in squalor and filth in crowded tents for warmth.

A similar class of low fevers, with symptoms and course not unlike those met with at Suakim and Massowah in the Red Sea, are common to the Black Sea region of the Danube, and though these Danubian fevers have, it is said, more rigors in their course (Lancet, August 13, 1892), a recent writer compares them to the Mediterranean fevers described so well by Dr. Hutchinson Milnes, they being neither typical of paludal disease or true enteric fever.

Thus, the common forms of Mediterranean and Red Sea fevers have but few distinctive characters, clynical symptoms, and negative lesions only, and according to the three above-quoted observers a specific organism is found in association in cases widely separated (Malta and Gibraltar) thus far, and which answers the requirements and postulates of Koch. Studies on the chemical products of the organism have not as yet appeared, and from such—much more difficult investigations—more valuable information as to the origin and pathology of these fevers is anticipated.

The diseases produced by the special poison or poisons of typhoid fever differ much among themselves. Some are so serious that life is almost inevitably destroyed; others are so trifling that patient and physician are in doubt whether there was disease at all. Between these two extremes, at every gradation, the lighter cases are often called a febrile abdominal catarrh, gastric fever, and so on, a custom practically not unjustifiable, and in numerous epidemics the imperfect cases are more common than the perfect ones. (Liebermister.)

With the discovery of the constant association of the Eberth bacillus with "enteric fever" or typhus abdominalis, it was hoped that a great practical advance in its etiology and in its management would be assured us. But twelve years have now passed, and knowing much of the biology, and even of the chemical products of that organism, it can not be substantiated that it has ever produced typhoid fever in experiments upon animals. I need not refer to the positive difficulty of finding the organism even in the excreta of many enteric cases, greater still in contaminated milk or water, and finally, the divergent views and beliefs regarding the etiological relation of the organism itself with typhoid fever. The Eberth-Gaffky germ in Germany is not the same as the one isolated by Babes in Buda-Pesth. Klebs describes the bacillus typhosus as large-sized filaments, 50 μ in length and 2 μ in width, without segments or ramifications; and Letscherich describes them as consisting of micrococci, either isolated in colonies or in chains, very dissimilar to those of infectious pneumonia, but which by cultivation reach a size twice or thrice greater. The eminent French observers Rodet and Roux have stated very positively that the typhoid bacillus of Eberth—the now universally recognized type—is merely an altered and virulent form of the bac. coli. commune of Escherich. Pasteur and others have long ago shown that attenuations as well as heightened virulence of pathogenic germs is attained by artificial cultivations without the animal body in the one case, and by using certain membranes and fluids of living animals as media on the other. The experimental proof that typhoid fever is due to the Eberth germ is wanting; the association, however, is constant, and there is no doubt of its etiological significance.

According to Rodet and Roux, the bac. coli. commune, without losing its general botanical characters, acquires a toxic nature within the human organism and becomes, in fact, Eberth's typhoid bacillus. Ordinarily the bac. coli. com. exists in the human organism without injury to the latter, but can become highly virulent and infective when introduced into water. It is concluded from this that not only typhoid dejections, but simple fecal pollution of water may produce typhoid fever in those who drink it. According to Rodet and Roux, a harmless saprophyte acquires, by contact with water, new and infective properties, and an organism derived from fecal matter can exist for weeks and months in earth and water, and eventuate in the materies morbi of typhoid fever.

It is a matter of common experience to find this fever prevalent or endemic over soils long fouled and filth-impregnated, and the foremost hygienists living ascribe to ground air, entering dwellings, the principal infective agency. A water supply derived from superficial wells and drainage from such an impregnated soil is an equally potent infective agency. A porous soil overlaying impermeable clay, once filth-impregnated, is forever doomed to originate typhoid diseases, according to Cameron (Cavendish Lectures, 1892).

Rising and falling ground water, varying atmospheric pressure, with the seasonal changes of temperature, supply all the necessary conditions for the evolution of the microbic elements of disease and their access to human habitations. Once specialized, transference becomes easy with the methods of crowded modern life.

The entrance of the true typhoid poison is usually by the enteric lymphatic system. The initial change is proliferation of the follicular tissue of the intestinal mucous membrane and of the mesenteric lymphatic glands. The typhoid process is more inflammatory than hyperplastic; that is, the affected parts are from the first the seat of active congestion and infiltration with leucocytes. Whether the typhoid process ever goes on to suppuration is a matter of question, for certainly the lymphatic glands, which are its principal seat, do not suppurate in the early stage of the disease, though in prolonged cases suppurations are among the most formidable of its consequences. These are by pathologists regarded as secondary. They are infective inflammations of typhoid fever, but not specifically so. They are due, not to specific poison, but to the diminution of the alexeteric power of the organism, by which the common phlogogenic or pyogenic microphytes are able to get the upper hand. This is not fancy, but fact, for whenever in typical fever the tendency to suppurate manifests itself, we find that, in the subcutaneous and submucous infiltrations which occur, the microphytes which are present have no special relations to typhoid fever, but are the common and specific class of suppuration organisms, "chain and cluster cocci." The bearing of this is that the cause of typhoid fever must be sought for in the early stages of the disease and in the tissues primarily affected, the mucous membranes and lymph glands of the intestines. (Sanderson.)

Welch has, however, found pure cultures of the Eberth germ, in cases of typhoid, seated at the ribs.

Prof. Victor Vaughan, in a paper read before the Association of American Physicians, May, 1892, regarding some germs from a drinking water, the consumers of which furnished cases of typhoid, states that "in their effects upon the lower animals these toxicogenic germs are fully equal in virulence to the Eberth bacillus." The post-mortem appearances in animals dying after inoculation with these germs are practically identical with those observed in animals killed by inoculation with the Eberth germ. "Two of these toxicogenic germs form on potatoes invisible growths, when taken from cultures in human spleen which have been kept at a fever temperature for some days. The fourth toxicogenic germ, when taken directly from water, forms an invisible growth on potato." "If we add to these the fact, well known to bacteriologists, that there are marked morphological and culture differences between Eberth germs from spleens in different epidemics of typhoid, and that the most skillful bacteriologists have reported diversely upon the reaction of the Eberth germ with staining reagents, the evidence becomes sufficient to convince me that the Eberth germ, as found in the spleens and other organs after death, is not a specific micro-örganism, but is a modification or involution form of any one of a number of related germs." The bacillus venenosus of Vaughan is identical with the so-called typhoid bacillus, and the germs found by him in spleens, after death from typhoid fever, differ from the typhoid bacillus obtained from Berlin and from one another as markedly as his "bacillus venenosus" differs from either or both.

By the most recent and reliable reports the pathogenic action of typhoid bacilli in animals agree, as a rule, in being in the nature of an acute intoxication, the organism being generally distributed in the body. If previously to the inoculation of the typhoid bacillus, soluble products or sterilized cultures of other bacteria—as for instance of streptococci, proteus vulgaris, and the colon bacillus—were injected, an intensified virulence attended the action of the typhoid organism (Annâles de L'insti. Pasteur, November, 1892). Inoculation experiments with both typhoid dejections and pure cultures of the Eberth bacillus have universally been without success. The few experiments in which a typhoid disease has followed inoculation or feeding have been made with impure material containing other active bacteria. It is known that a group of widely distributed organisms, which are, however, wholly different from the typhoid bacillus, have the power, when injected subcutaneonsly or intravenously, of producing in animals death with marked swelling and ulceration of Peyer's patches. (Flügge.) Neuridme $C_{15}H_{14}N_2$ elaborated by pure cultures of the Eberth-Gaffky bacillus only becomes poisonous to animals upon being mixed in the cultures with other putrefactive amines or alkaloids. If, with the formation of leucomaines in the fluid tissues there goes prompt oxidation, as for instance in the lungs, their poisonous effects are not exerted.

Some years ago, 1872-'75, when serving on a vessel of the U. S. Navy, the following conditions and consequences were noted. A wooden corvette had been for eight months out of use, lying in a fresh-water stream. In the summer months a large number of mechanics were employed upon her, making extensive repairs. In the month of November she was put in commission, and about 300 men were suddenly put on board in raw, inclement November weather. The ship was not clean, the men were not of the best material, and in much confusion they took up their abode in an unclean, steam heated (in parts) damp ship. It required many days of scrubbing to clean up the decks and dark corners, and all this time overcrowding, moisture, lack of sufficient ventilation, and somewhat irregular discipline and confusion among the crew reigned. Within three weeks there occurred six cases of continued fever, with macular eruptions, mousy odor, meningeal congestion and inflammation, mucous hemorrhages, and with a mortality of 33 per cent. The cases were not typical typhoid or typhus, and somewhat resembled cerebro-spinal meningitis. From a cold northern port the ship proceeded to a warmer southern port, where, during January, 1873, within ten weeks of the reception of her company, there were sent to hospital twenty-two cases of irregular fevers and rheumatism, including six cases of typical enteric fever, with a mortality of 23 per cent. With the lapse of time and improved hygiene, and an outside temperature allowing of free ventilation, all irregular fevers declined, pneumonias ceased to become typhoidal, and the simple continued and ephemeral fevers ceased altogether by the following summer. The cases followed upon the evolution and multiplication of ordinary saprophytic organisms becoming pathogenetic (following Drs. Woodhead, Roux, and Rodet) from moistened, heated, filthy decks in a confined atmosphere. I found developed under my eyes irregular, low, and continued fevers, with petechiæ, nosebleed, stupor, meningeal and lung involvement, and the enteric lesion among the symptoms of a certain proportion of cases; and, along with these, a number of mixed and milder continued and negative fevers, hovering like a nimbus over the others better characterized.

I have frequently found seamen to become ill with these irregular filth fevers, from among the crews of boats which, owing to the nature of their duties, were much delayed at city wharves near sewer exits, and only rarely were these cases typical of enteric fever. I have had two fatal cases of continued fevers of a negative character, and found at the end only a granular heart muscle and an excessively dark fluid blood; one dying on the 16th and the other on the 18th day and by heart paralysis.

Finally, I have found less fever the cleaner, dryer, and lighter the ship; in other words, no continued fevers in the absence of putrescence and its teeming microörganisms. Ships' crews consume as a rule only distilled water; all food, if anything is overcooked, and all drains go directly overboard. In the instances above cited the disease processes originated by the medium of the air by acting on the blood in the lungs, and on the intestinal linings by means of the food supplies in contact with such air.

With change in quality of respirable air come disorders and change in the physiological capacities of the lung chemistry (the exchange chemistry of the red cells when blood is exposed in the air cells), with sequence of disordered metabolism in the cells of the tissues in detail, ending in formation of new products and compounds derived from proteid molecules (ptomaines and leucomaines). This is followed by the setting up of new phenomena in vital activities (excess or loss) of function, excitability, irritability, degeneration or necrosis, the prominent phenomena being excessive metabolism and disordered heat regulating function—"fever." Blood being a living tissue, its cells and formed elements ever changing themselves, and performing varied and complex processes throughout the whole body, is the first constituent to undergo change when exposed to the evil influences of excremental emanations; or equally so when exposed to the same elements dissolved in water and food supplies and absorbed from the digestive tube. Prominent among the instances recorded of the origin of continued fevers, from street and soil emanations, from water and milk so polluted—originally human excretal deposits—confirmatory of this view, are the recent exact and accurate records of Roux and Vaughan; the former, the Lyons cases of typhoid, from the use of a drinking water containing the common colon bacillus; and the latter, the series of cases from the use of a lake water, fecal polluted, and markedly contaminated with "toxicogenic" organisms. (American Journal of Medical Science, August, 1892.)

Fever means an increased tissue change and has its immediate cause in alterations of the nervous system. (Virchow.) It follows the introduction of abnormal or unusual agencies (chemical products) in the fluid tissues of the body. Excessive molecular metabolism, oxidation, hydration, ferments, toxalbumoses, fibrins, etc.; also disturbing vaso-constrictor and vaso-dilator centers—skin, glands, central arterial system, changes in blood volume. It may follow direct poisoning of the nerve centers. It follows epilepsy, paralysis, fear, agitation, catheterization, and puncture of the corpus striatum—but here combined with disordered respiration.

The final compounds in the formation of heat, and in the transformation of chemical compounds, are H_2O, CO_2 and urea; and the amount of heat formed must go, *pari passu*, with the amount of these excreta. (Ziegler.) In other words, pyrexia ensues upon several conditions—from excessive formation of poisonous substances in the body, or their accumulation due to deficient elimination, or the inadequacy of some organ whose function is to convert harmful into harmless bodies; or from poisonous substances infiltrating from tissues into the blood current. Fibrin ferment, normally held in combination in the white blood corpuscle (Schmidt) may be liberated and readily excites fever, as in the course of aseptic surgery. Fatigue and exhaustion fevers may be of this class. Fatal ferment fever is produced in animals by injecting peptones. Parenchymatous degeneration of the muscles and large organs, hemorrhages in the intestinal canal, Peyer's patches and mesenteric glands are found.

The well-known poisons of the intestines or toxic alkaloidal bodies, some with an affinity for the central nervous apparatus, are due to the bacteria present, and the typhoid state may be charged to the mixed infection following their absorption. Some leucomaines of themselves and other converted by bacteria into definite toxic bodies, as Methylguanidine, when sprinkled upon exposed areas of the brain periphery readily excite convulsions. (Vaughan and Novy, ed. 1892).

The physiological facts in fever, according to Dr. T. J. Maclagan's "metabolic theory," are as follows: Two main processes are constantly going on in the system, constructive and destructive metabolism. During tissue disintegration various products destined for elimination are formed, urea, CO_2, and heat. Urea is eliminated chiefly by the kidneys, CO_2 by the lungs, and heat by the skin. In the case of each, production and elimination are so well balanced that no accumulation takes place in the system. In the case of heat this balance is so well maintained that the normal temperature is always the same, (98.4° F.) The various processes are presided over by the nervous centers, and it is by the regulating power of these centers that the normal balance is maintained. In fever this whole process is disturbed, there is increased formation of urea and CO_2, and the temperature rises above 98.4° F.

The thermal apparatus, according to Maclagan, is composed of—

(1) The tissues, particularly the muscles, in which heat is formed.

(2) The surface, from which heat is eliminated—skin 80 per cent, lungs 20 per cent.

(3) A central controlling power in the nervous centers.

(4) Nerves connecting this with the heat-forming parts of the body.

(5) Nerves connecting heat centers with the heat-eliminating surface.

Dr. Macalister (neurotic theory of fever) describes the thermal-nervous system as consisting of three parts: (1) The heat-adjusting mechanism, "thermotaxis;" (2) the heat-producing mechanism, "thermogenesis;" (3) the heat-discharging mechanism; "thermolysis." Disorder of the first implies irregularity of temperature; of the second, heightened temperature; and disorder of the first, second, and third implies excessive fever, dangerous increase of heat, and steadily rising temperature. These three centers are only found in the highest developed animal life. Cold-blooded animals possess a thermolytic mechanism—a nervous mechanism controlling the vessels and breathing only. In young mammals the theremogenetic system is developed before the thermotaxic.

Dr. Macalister, hence, looks upon fever as a dissolution—a relaxation of control from above downwards; thermotaxis is the first part of the mechanism to be disturbed and overthrown; thermogenesis then becomes more and more excessive; and lastly, the thermolytic mechanism fails to act.

These two theories supplement each other. The heat centers may alone be diseased; or, the exciting cause continuing, the whole organism may partake of a slowly spreading disorder of metabolism—an infective fever. A certain amount of pyrexia is by many held to be necessary to restoration of function in some forms of fever.

In fever there is wasting of nitrogenous tissues, increased consumption of H_2O, increased elimination of urea, increased rapidity of circulation, and preternatural heat. The presence in the blood of vast masses of living organisms, with their changing structural protoplasm and new chemical products, would seem to account for these phenomena of fever. Microörganisms reproduce and multiply in vast numbers, and consume a large quantity of N and H_2O. Voit has distinguished between the fixed or organ albumen, which enters into the composition of the solid tissues and changes slowly, and the circulating, or store albumen, which is contained in the blood and fluids of organs, and very rapidly undergoes change.

This circulating or store albumen consists of two parts—a constructive part, destined for the nutrition and building up of the tissues, and a retrogressive part derived from tissue waste and destin d for excretion. The former is converted into solid nitrogenous tissue; the latter into urea in the urea-forming glands, and as such is eliminated chiefly by the kidneys. The constructive store albumen is the source whence the "contagium vivum" would by preference naturally take its nitrogen, and so the tissues are starved in fever. The protoplasm of this contagium consists mainly of water, and for its growth a large consumption of water is required. This is drawn from the tissues and at the same time the water taken in by the patient is appropriated by the contagium—the multiplying microörganisms. Hence the dry skin and the parched mucous membranes of fever, as well as the inordinate thirst and loss of appetite, the scarcity of urine, and the constipation. The ingestion of water greatly increases the interstitial metamorphosis of tissue and consequent loss of weight; decomposed tissue is excreted partly in the urine and partly in solid fæces, and water formed in the organism by the change of tissue is augmented, as well as the nitrogenous constituents of the excretions. (Bocker, Brit. and Foreign Med.-Chir. Rev., Vol. XIV.)

Pflüger's views, in opposition to Voit's, assume that the proteid matter of the cell itself, "the organ albumen," undergoes decomposition the more readily; and recently Schöndorff (Archiv f. d. gesammte Physiologie, Band LIV, p. 420) has shown that the rate of decomposition of proteid matter in a tissue depends upon the nutritive condition of the cells themselves and not upon the content of albumen in the blood, lymph, and other fluids bathing the cells. But though the organ albumen may play the leading part in proteid metabolism of normal nutrition, the store albumen would seem to be still the most vulnerable and apparent pabulum for the suddenly acquired microörganisms, the "contagium vivum." J. Meyer's investigations (Hofmann and Schwalbe's Jahresbericht, 1881) show that when the tissues are full of disintegration products, the effect of water in increasing elimination is very marked, and that upon the wasting processes of the body the water exerts no influence.

Dr. H. C. Wood, quoting the above, adds, "that while we can not by water produce tissue disintegration, we can by it wash out the retained products of tissue change."

In conclusion, I may add that the present generally accepted treatment of continued fevers, based upon scientific principles, is becoming more and more successful. A certain number of cases are unquestionably aborted by the cautious use of internal antiseptic remedies and calomel; most cases are benefited by the ingestion of much water, and the greater percentage of all ca ses are successfully treated by the system of baths and hydrotherapy.

REMARKS OF CAPT. L. A. LAGARDE, ASSISTANT SURGEON, U. S. ARMY.

MR. PRESIDENT AND GENTLEMEN: I have seen some typhoid fever in the West, at isolated posts where I was serving, which puzzled me in many instances, in the beginning at least, as to whether I was really dealing with typhoid fever or with some form of malarial fever. They would not show the significant signs of typhoid fever as laid down in the books. I shall take the greatest of pleasure in reading Dr. Siegfried's paper, as I am very much interested in the subject. These cases of regularly continued fever can be converted into genuine cases of typhoid under certain circumstances. I have seen men who showed very little or no fever for days, and then it would be suddenly developed. To illustrate this, I had a corporal who would not take advice, and when he did, he did so in a very surly way. He had a light fever and was getting along very well, but thought that I was keeping him confined unnecessarily and grumbled, so that finally, out of supposed kindness, I told him he might get up and have the privileges he complained were denied him. It lasted two days. At one of the morning rounds I found the man in bed collapsed. The fever was high, and I then realized what I had been dealing with. This regularly continued fever that puzzled me before, I had converted into a genuine case of typhoid fever—so far as symptoms were concerned, at least—and the man died from it.

These cases occur in the practice of all physicians, and until we know from experience positively what we are dealing with, it is better to regard them as typhoid fever and treat them as such.

REMARKS BY MAJ. JOHN VAN R. HOFF, SURGEON, U. S. ARMY.

Mr. President and Gentlemen: On the plains in our Western country they have a continued fever which is known by a variety of names, depending upon the location. In Texas it is called the "Rio Grande" fever, and further north the "mountain" fever, etc., but in all the cases that have fallen under my personal observation the symptoms are almost identical. There is nothing absolutely typical of typhoid, and yet occasionally we get a decidedly well-marked case. It is observed that in these cases quinine will have no effect whatever; the temperature is usually not excessive, but persistent for several weeks; adynamic symptoms are not marked, and we have a continued fever which is at least typhoid in character.

About fifteen years ago, while I was serving in Wyoming, a regiment of cavalry went north into a country that had practically remained unexplored by white men from the time that Columbus discovered America. It had always been Indian country and mostly occupied by the Sioux. This command went into camp upon a creek of pure mountain water, cold as ice, flowing from the Wind River Mountains, and remained in camp absolutely beyond all contact with civilization for six weeks. In the autumn it passed through the post at which I was stationed and left five cases of fever which, for want of a better name, we called "mountain fever." Being very suspicious as to the true character of "mountain fever," and having made up my mind that it really must be a specific (possibly a hybrid) fever, in order to get a clear view of the situation, I treated all these cases tentatively. In a few days one man died from peritonitis, which an autopsy showed to have followed the perforation of an intestinal ulcer, and all the typical lesions of typhoid were found. The others recovered. I diagnosticated the disease as typho-malarial then, but to-day would pronounce it typhoid fever.

I have had no opportunity to determine what microörganisms are present in the blood of patients suffering from mountain fever, but assume from the inutility of quinine in those cases I saw that the *Plasmodium malariæ* would not be found.

The following paper was then read.

LAWS OF GROWTH OF BACTERIA APPLIED TO ASEPTIC SURGERY.

By Robert Reyburn, A. M., M. D.,
Professor of Physiology and Clinical Surgery, Medical Department, Howard University, Washington, D. C.

It has been well said by a great operator that every surgical operation is a study in bacteriology. There will be found we believe, at the present day very few surgeons who will gainsay the above statement, and yet it may be worth our while to examine the question whether our surgery, as practically carried out, is in perfect accordance with the laws of bacterial growth, which is the underlying basis upon which aseptic surgery has been built. To return to elementary principles, let us inquire what are the three essential conditions favoring the growth of bacteria and other microörganisms. The answer, of course, that would be given by every tyro in surgery, would be the well-worn statement heat (temperature, say 100° F.), moisture, and atmospheric air. In other words, the conditions which favor the growth of bacteria are precisely the same conditions that are essential to the growth and repair of all the tissues and organs of the human body.

The logical sequence of this results in the following statement, viz: That no treatment of the tissues or organs of the body involved in surgical operations can be successful which seeks by the action of powerful chemical agents to destroy bacteria in or around wounds; for if powerful enough to accomplish that object, the tissues themselves must be destroyed or injured.

A surgical operation is to a certain extent the opprobrium of medicine, for in having recourse to it we thereby confess the failure of our science. The ideal surgical operation, therefore, is one that removes the diseased or injured portion of the body with as little disturbance of the normal conditions of the tissues as possible. Repair without inflammation is, as all know, the motto of modern surgery. How preposterously absurd, therefore, is it for us after having removed, let us say, a tumor, or limb from the body to douche the seat of the operation with a solution of mercuric chloride or other powerful irritant, producing necrosis of the tissues and thus preventing the very end we seek to attain.

Notwithstanding the profound respect that all surgeons feel for the work and self-denying labors of Sir Joseph Lister, yet there can be no questioning the fact that the theory and practice of antiseptic surgery are rapidly being abandoned, and the more perfect science and art of aseptic surgery, is being substituted in its stead.

To Prof. Lister we owe the grand idea of excluding the bacteria and other germs from wounds, thus creating the then new science of antiseptic surgery. It is perfectly true that aseptic surgery, as now practiced in this country and in Europe, is very different from and far superior to the cumbrous procedures and dressings devised and practiced by the father of antiseptic surgery. The carbolic spray, once universally applied, has been almost entirely abandoned, and during my recent visit to Europe I never saw it once used. The many layers of protective gauze, mackintosh, etc., are now replaced by a simple layer of iodoform gauze, with an abundant layer of aseptic cotton firmly retained by bandages.

Another remarkable change is in the growing disbelief in the efficacy of the ordinary antiseptic solutions when used as germicides. A solution of carbolic acid has been shown to be a weak germicide, and the same may be said of a solution of boric acid, and of the other solutions used commonly for this purpose. Mercuric chloride has until the present time been our sheet anchor as a germicide. As we lost our faith in one germicide after another, we thought we could rely on that. Yet the iconoclasts are busy in their work of tearing down all idols in medicine, and now they have not left us this one. Recent investigations carried on at Johns Hopkins University (published in the Johns Hopkins Hospital Bulletin of April, 1891, pp. 50-60) by Dr. A. C. Abbott, on "Corrosive sublimate as a disinfectant against staphylococcus pyogenes aureus," on page 59, at the close of a very elaborate series of investigations on this subject, he says:

> It is seen that under the most favorable conditions a given quantity of corrosive sublimate has the property of rendering inert only a given certain number of individual organisms.

Ibid., page 60, he summarizes his results in the following words:

> In the light of these experiments and those of the experimenters quoted in this paper, it is plain that for use in surgical practice the solutions of corrosive sublimate do not possess all of the advantages hitherto attributed to them. * * * To the employment of sublimate solutions upon wounded surfaces it is plain there exists at least two serious objections: First, the albumen of the tissues and fluids of the body tends to diminish the strength of, or indeed renders entirely inert, the solution employed; and, second, the integrity of the tissues is materially injured by solutions of this salt.

Investigations made at the University of Michigan (published in the Medical News of October 1 and 8, 1892,) have shown that solutions of mercuric chloride, when used as a germicide, are often inert and still oftener actually injurious to the tissues when applied during surgical operations.

Dr. Charles T. McClintock gives in the above paper (Medical News, October 8, 1892, p. 399) the following summary of his experiments, viz:

(1) The high rank heretofore given to corrosive sublimate as a germicide is without warrant and was based on faulty experiments.

(2) The very varying power of resistance in different cultures, as pointed out by Esmarch and insisted on by Gruber, is an all-important factor to be noted in determining the germicidal power of any agent.

(3) That sublimate forms with cellulose, as cloth, filter paper, etc., with silk, with albuminous bodies, with some part of bacteria (probably the envelope), a chemical compound that can not be removed by any amount of washing with water.

Thus the sublimate, when acting upon a germ, forms a capsule around it that protects the germ for the time from the further action of the sublimate, and in turn forms an impenetrable barrier to the growth of the organism unless it be removed. This barrier may be removed with salines, and is more rapidly removed in proportion to the renewal of the salines, conditions that are fulfilled in the circulating blood.

The above-named experiments would seem to warrant the expression of the opinion that the use of solutions of corrosive sublimate in surgical operations should be limited to the cleansing of the surface of the part to be operated on, and to the disinfection of the hands and arms of the surgeon; and furthermore, that such solutions should never be applied to surfaces denuded of epithelium or cut surfaces of the body made during surgical operations.

Antiseptic surgery endeavors to destroy the microörganism in and around the wound, and thus prevent its development. How futile this effort must be when we consider that these organisms are everywhere and at all times present with us. They are in every breath we draw, in much of the water and in many of the articles of food that we consume, and, indeed, exist always in the alimentary canal and all parts of the body exposed to contact with the air. But, on the other hand, it must be remembered that there are bacteria and bacteria. There are some species of bacteria which, when planted in a wound, will bring forth as the result of the poisonous materials formed by them, the formation of pus with the resulting septic fever, just as certainly as the acorn when planted and nourished will develop into the sturdy oak. There are other species which, when they come in contact with a wound, are practically harmless. Of course we can not with the naked eye distinguish between the poisonous bacteria and the harmless ones, and hence our only safe plan is to, as far as possible, exclude them altogether from wounds, whether made by violence or during surgical operations. How can this be done? The first point to be observed is, to use as little water or watery antiseptic solutions as possible in contact with the wounds made during surgical operations. The reason for this course is that by so doing we remove one of the essential conditions necessary for the development of bacteria and thus prevent or at least hinder their growth.

It is of course practically impossible to diminish or prevent the growth of bacteria in a wound by either raising or lowering the temperature of the wounded parts, hence we can only endeavor to accomplish this object by making use of the other two methods of limiting bacterial growth, viz., to keep all wounded surfaces as dry as possible, and exclude them from the action of the atmospheric poisonous germs during the process of repair.

Simple and self-obvious as these principles of treatment may appear to be, yet they are largely neglected and ignored by very many surgical operators at this very time. Often during an operation performed even by the most eminent surgeons, let us say an amputation, we see the field of operation deluged with a solution of boric acid, a solution of carbolic acid, or, worse still, a solution of mercuric chloride. This seems to be radically wrong in practice, and entirely inconsistent with the elementary principles of aseptic surgery. Of course, in operations which require the opening or removal of large suppurating cysts or cavities, it is necessary to wash them out. This should be done, we believe, with fluids as near the composition of blood serum as possible. That wonderful operator, Lawson Tait, of Birmingham, England, who has nearly completed his third thousand of operations upon the abdominal cavity, uses no fluid to wash out the abdominal cavity during his operations, excepting recently-boiled water.

For use in surgical operations the following fluids only are necessary, viz., recently-boiled water used tepid (about the temperature 100°, F.) and normal salt solution

(0.75 per 100, easily made by dissolving one ounce, avoirdupois, of common salt in a gallon of boiling water.)

Aseptic surgery, therefore, after all, is nothing but cleanliness, but when we say that we mean cleanliness carried to a microscopic degree of perfection, and far surpassing the ordinary ablutions by soap and water. What we endeavor to do at the present time, before any surgical operation, is to so thoroughly cleanse the patient, the surgeons, assistants, nurses, surgical appliances, and dressings (of course, including the hospital and all its surroundings), that no germs of poisonous bacteria can infect the wound and cause suppurating fever and perhaps the death of the patient operated upon. Modern surgery starts out with the assumption that in an operation aseptically performed, upon an aseptic patient and by an aseptic operator, there should be neither suppuration nor fever following. This, of course, is the ideal of surgery, which can not always be realized, but, nevertheless, it is the goal toward which we should aim and which we should always endeavor to attain. Every instrument and surgical appliance must be sterilized shortly before the operation, either by boiling in water, containing 1 per cent of carbonate of soda (commonly called washing soda), half an ounce to three pints of water, or by being exposed to a dry heat above the temperature of boiling water (from 230° to 240° F.) for one-half hour before the operation.

This can be done in the various patterns of steam and dry sterilizers which are now on the market, and can be procured at a moderate cost. But my principal object in writing this article is to call attention to the fact that aseptic surgery can be practically carried out without the purchase of any apparatus whatever. A tin wash boiler, which can be found in the humblest home, is just as good for sterilizing surgical instruments as Arnold's or other of the steam sterilizers now in use. A still more simple sterilizer for small instruments is the ordinary oblong tin baking pan, so familiar to our eyes in our youthful days. This pan, when filled with boiling solution of carbonate of soda, may not look quite so ornamental as a porcelain evaporating dish or a $10 copper sterilizer, but it will do just as good work. As before mentioned, to the above must be added absolute cleanliness of the operator, assistants, nurses, and in fact of all who come in contact with the patient. It is scarcely necessary here to say that the part operated on, and the arms of the operator, assistants, and nurses, must be thoroughly scrubbed first with soap and water and then with solution of 1 to 2,000 mercuric chloride just before the operation.

One incidental and very great advantage in operating in private houses (providing they are clean and in good sanitary condition) is that the germs of poisonous bacteria are, for obvious reasons, not so liable to be found there as in the air of crowded hospitals. In regard to the sterilization by the dry method, the only thing that is absolutely necessary to be purchased is a good thermometer, graduated to a temperature of 300° F. Of course it is convenient, and perhaps more surgical looking, to buy a dry sterilizing apparatus, but it is by no means essential. The oven of a kitchen range or that of an ordinary cooking stove will answer every purpose. Take a common pasteboard box, such as letter envelopes are packed in, place in the bottom of it a layer of aseptic cotton about 2 inches in thickness, lay on this your instruments and surgical appliances (bandages, etc.), with your thermometer, and your apparatus will then be complete. Place in the oven and expose to a temperature of 230° to 240° F. This temperature can be easily regulated by a little practice, and is lower than the temperature required for ordinary baking purposes, which is said to be 207° F.

Finally, allow me to add the following maxims: (1) Never use a drainage tube in a wound unless you are absolutely certain you can not get union by first intention. (2) If you have an amputation to perform ligate every vessel requiring it with aseptic catgut, silkworm gut, or silk; cut the ligatures off close to the vessels and leave them in the stump; close the flaps with similar sutures, and use no adhesive plasters in contact with the flaps of the stump. (3) After you have stiched up the flaps, dust their surfaces with iodoform, boric acid, or subnitrate of bismuth. Place over this a layer of iodoform gauze, then an abundant layer of aseptic cotton, and over all this two layers, at least, of a well-fitting bandage. The reason why I do not use adhesive plaster in contact with the flaps of the stump is that it can not be properly sterilized and is very often the means of infecting the stump.

Above all things, never open a stump for ten or twelve days or even fifteen days after an amputation if the temperature of the patient is at normal point or even a degree above. The last limb I amputated was dressed for the first time on the sixteenth day after the operation. On the other hand, if the temperature goes up to 102° or 103°, open up the stump at once, and find out the cause of the trouble. At the Bichat Hospital (located in Paris, France), in August 1892, I saw a number of stumps of amputations which had only received two dressings, one on the fifteenth day and the other final dressing on the twenty-eighth day after the operation.

AFTERNOON SESSION.

Section called to order at 2 p. m., Executive President presiding.

In the absence of Dr. Stephen Smith the following paper was read for him by Maj. D. L. Huntington, Surgeon, U. S. Army:

SOME FACTS BEARING ON THE CONDITION AND SERVICEABLENESS OF THE STUMP AFTER AMPUTATIONS IN THE LOWER EXTREMITY AT DIFFERENT POINTS AND BY VARIOUS METHODS.

By STEPHEN SMITH, M. D., of New York.

During the latter years of the Civil War of the United States I was one of the surgeons to a military hospital located in the city of New York to which were sent large numbers of soldiers requiring artificial limbs. These cases were individually studied with great care, and full records were made of all of the useful facts connected with them. Many of the deductions then made from these facts do not now have the force which they then had, owing to the influence of antiseptic methods on the results of the treatment of amputation wounds. There were some features, however, of the investigations then made of a more permanent value, and which may prove instructive to the members of this section. It is in that view that they are brought forward in this paper.

1. INFLUENCE OF THE PLACE OF AMPUTATION UPON THE AMOUNT OF ATROPHY OF THE STUMP.

Among the final results of amputations, atrophy of the stump must be regarded as of the first consideration. Next in value to a firm and durable covering to the stump is a well-nourished extremity. If the stump undergo progressive atrophy, the artificial limb requires much more care to maintain its adaptation. The constant shrinkage of the extremity renders the appliance loose, and hence it requires reädjustment by continuous padding of the socket. This padding of the socket is not required when the limb maintains its full dimensions.

The accompanying tables enable us to determine how far the method of operating, and the point of the limb at which the amputation is performed, influence the subsequent nourishment of the stump. The measurements were made when the stump was healed and prepared for the final adjustment of the artificial limb. The first or proximal measurement was made in the thigh, at the highest point where the circumference could be taken, and in the leg immediately below the knee. The second, or distal measurement, was made directly around the extremity of the stump, at a point where the margins of the flap begin to incline toward the cicatrix. The figures entered in the tables under the head "Atrophy" express the difference in inches and fractions of an inch between the measurement at the points above indicated of the mutilated and uninjured limb.

Comparative amount of atrophy of stumps in the upper, middle, and lower thirds of the thigh and leg, in an aggregate of 430 cases.

[In inches and fractions of inches.]

Limb.	Upper third.		Middle third.		Lower third.	
	Proximal.	Distal.	Proximal.	Distal.	Proximal.	Distal.
Thigh	0.45	1.05	1.56	1.70	1.34	2.08
Leg	0.97	1.70	0.71	1.42	0.57	2.26

It must be borne in mind that the proximal measurements in the thigh are all made at the same point; and the same is true of the leg. It would appear from this table that the point of amputation exercises a very marked influence upon the degree of atrophy of the stump, both in the thigh and leg. In general, the amount of atrophy progressively increases as we recede from the trunk, an exception, however, being noticed in the middle third of both the leg and thigh, which we shall presently notice. In the thigh the proximal atrophy is least in amputation in the upper third, and greatest in amputations in the middle third. In amputations in the lower third of the thigh the proximal atrophy is slightly less than in those performed in the middle third, but still it is three times as great as after those in the upper third. This fact proves a progressive proximal atrophy as the point of amputations in the thigh recedes from the trunk. In the leg this rule is reversed, and the proximal atrophy diminishes as the point of amputation recedes. And this atrophy diminishes in regular order, being least in amputations in the lower third of the leg.

It must not be supposed that the proximal atrophy is influenced by the amount of inflammatory thickening subsequent to the operation, for in that case the degree of atrophy would in general depend upon the proximity of the amputation to the point of measurement. But this is by no means the case. Amputations in the middle third of the thigh, near the point of measurement, are followed by a greater amount of atrophy than those in the lower third, remote from that point; while in the leg the largest amount of atrophy is in amputations near, and the least in amputations remote from the point of measurement.

The distal atrophy, or that which occurs at the extremity of the stump, has in the thigh a progressive increase as we proceed from the trunk, being about twice as great, in the lower as in upper third. In the leg, on the contrary, the least distal atrophy occurs in the middle third, while that of the lower extremity is not so great, compared with that of the upper extremity, as was found existing between the upper and lower thirds of the thigh.

Comparing the atrophy of the stumps in thigh and leg amputations, we notice that the proximal atrophy is greater in amputations in the upper third of the leg than in the same region of the thigh, while in the middle third it is more than twice as great in the thigh as in the leg, and in the lower third the excess of atrophy is greater in the thigh in proportion than in the leg. The distal atrophy varies very markedly as follows, namely: In the upper third it is greater in the leg; in the middle third it is greater in the thigh; and in the lower third it is greater again in the leg.

These facts may be stated in general terms as follows: (1) In the thigh, the farther amputation is performed from the trunk the greater will be the atrophy of the entire stump. (2) In the leg, the farther amputation is performed from the trunk the greater will be the atrophy of the extremity of the stump and the less the atrophy of the body of the stump.

2. INFLUENCE OF THE METHOD OF AMPUTATION UPON THE ATROPHY OF THE STUMP.

We next proceed to inquire as to the influence of different methods of amputation upon the nourishment of the stump. The following table contains a distribution of the several methods of amputation in the thigh and leg, with a computation of the average amount of atrophy following each:

Comparative amount of atrophy of stumps after amputation by various methods in the upper, middle, and lower thirds of the thigh and leg.

[In inches and fractions of an inch.]

THIGH.

[Total number of stumps, 157.]

Method.	Upper third.		Middle third.		Lower third.	
	Proximal.	Distal.	Proximal.	Distal.	Proximal.	Distal.
Circular	0.7	0.7	1.4	1.9	1.6	2.5
Antero-posterior flaps	0.2	1.4	1.1	1.6	1.6	2.4
Lateral flaps			1.8	1.8	1.6	2.3
Anterior flap			2.5	2.2	1.3	2.4
Rectangular flap			1.0	0.0	2.0	2.8
Skin flaps and circular muscles					0.6	1.5
Posterior flap					0.7	0.7

LEG.

[Total number of stumps, 287.]

Method.	Upper third.		Middle third.		Lower third.	
	Proximal.	Distal.	Proximal.	Distal.	Proximal.	Distal.
Circular	1.1	1.5	1.0	2.3	0.5	2.3
Antero-posterior flaps	1.1	1.3	0.4	1.1	0.1	2.7
Posterior flap	1.3	1.1	0.5	2.2	1.0	2.6
Lateral flaps	0.4	2.9	1.0	1.0	0.7	2.6
Skin flaps and circular					0.5	1.1

This table illustrates in a very striking manner the influence of the various methods of forming the covering of the stump upon the nourishment of its cicatrical tissue. The difference in the amount of atrophy of the distal extremity evidently depends upon the extent to which the arterial supply has been sacrificed. In the thigh the arteries which are distributed to the muscles are principally, in the upper third, from the femoral branches immediately below Poupart's ligament, and in the middle and lower third from the profunda.

In the upper third of the thigh, therefore, a circular amputation would divide the branches of the femoral at a higher point than an antero-posterior flap, in which the posterior flap is usually longer than the anterior, and hence the atrophy would be greater in a stump formed by a circular than in one formed by an antero-posterior flap. The same rule would apply to these operations in other parts of the thigh, though perhaps not so markedly.

The method of operation by lateral flaps does not differ materially, in respect to the degree of atrophy, from the circular, and the results of the two are seen to be very similar.

The method of operation by making an anterior and rectangular flap differs in this important respect from the preceding methods, namely, that the flap is made wholly from the anterior part of the limb, while the tissues are completely divided to the bone in a perpendicular direction on the posterior aspect of the limb. By these methods the principal covering of the stump is poorly supplied with nourishment, and hence atrophy would be more likely to occur. This is seen to be the case especially in the anterior-flap method in the middle third and the rectangular flap in the lower third.

The methods which give the least atrophy of the stump, both in its proximal and distal portions, are the skin flaps and circular of the muscles and the posterior flap. It is not difficult to understand why the posterior-flap method gives results so favorable; it leaves quite intact the full vascular supply to the entire covering of the stump. In this respect it might well be regarded as the best method of operation in the thigh, but these advantages are so counterbalanced by the tendency of the flap to retain pus, its heavy and unsuitable position for transportation, etc., that it has but few advocates. The method by skin flaps and circular of the muscles gives results nearly as favorable as the posterior flap, and much more favorable than any other of the preceding methods. It is greatly preferable to the posterior-flap method, both on account of the facility of drainage and the neat apposition and lightness of the flaps, thus adapting it to transportation.

The influence of the various methods of operation upon the nourishment of the stump is not so well marked in the leg as in the thigh. This is unquestionably due to the peculiarity of the arterial distribution. The larger trunks are numerous, and are deeply situated in immediate relation with the bones. They are not, therefore, liable to division until the operation is about to be completed. There would, therefore, be but little difference among these operations as regards the vascular supply of the flaps, except so far as the extent of the flap should modify the ultimate distribution of arteries. A long flap would necessarily have less supply than a short flap, and would be more liable to immediate death and future atrophy. Of the different methods it will be noticed that the skin flaps and circular of the muscles gives the least atrophy in the leg as well as in the thigh.

3. COMPARATIVE VALUE OF STUMPS IN AMPUTATIONS IN THE LOWER THIRD OF THE LEG AND AT THE ANKLE JOINT.

It must be observed that amputation at the ankle joint is always an alternative operation. It is selected in preference to an amputation at a point higher up in the limb. It should also be added that it is an operation of expediency. It is not a dernier resort. If it fails of success the surgeon may still, with rare exceptions, perform the alternative amputation through the leg with the prospect of as favorable results as when the latter is the first operation.

In determining the value of ankle-joint amputations, therefore, the following questions naturally arise for our consideration: The comparative serviceableness of the resulting stump depends upon (*a*) the ability for unaided locomotion on the stump; (*b*) the adaptation of the stump for an artificial limb.

(*a*) *As regards unaided locomotion on the stump*—Ankle-joint amputations differ from amputations in the leg in this essential particular, namely, in the former the support is taken directly upon the extremity of the stump, and in the latter upon the sides of the limb. In model stumps of each class it will be found that the one which takes direct support upon the extremity is not only capable of enduring a much larger degree of service, but the person suffers far less inconvenience. Direct pressure upon the heel flap may be endured as long in Syme's stump as similar pressure upon the natural heel. And the same is true of stumps following Pirogoff's method. Patients with these stumps have frequently been known to walk successive days 20 and 30 miles with only the simple covering or protection of the heel of a common shoe or boot, and these are by no means exceptional cases. Surgeons who have been accustomed to meet with the results of this operation most frequently uniformly testify to the ease with which patients betake themselves to the stump with only such covering as they can rudely adjust. Of the stumps left by Syme's and Pirogoff's operation, the latter has the greater length, and this requires less compensation.

Amputations through the leg, at whatever point, and however skillfully performed, never furnish stumps which take direct support.* The limb is useless for

*Truax, an experienced manufacturer of artificial limbs, makes this statement: "When a section has been made through a bone no weight can be borne on the end of the stump. Disarticulation, or an osteo plastic operation, alone will admit of pressure."—*Amputations in the light of prothetical science.*

locomotion by any simple means of compensation; it is only when an artificial limb is accurately and skillfully adjusted that it serves the purpose of even simple progression.

Again, in amputation at the ankle joint, the patient retains power over the muscles of the calf which are essential to the act of running. It is extremely rare that a patient who has suffered amputation of the leg can make even the pretense of running upon his artificial limb. The muscles, especially of the calf, have shrunken from disuse, and progressive, permanent atrophy of the parts below the knee ensues. In ankle-joint amputations, however, the tendons of all the muscles employed in locomotion retain their former, or acquire new, attachments, and are immediately and constantly exercised in the movements of the limb. It is true this movement of the muscles is more limited than in the normal limb, but it is nevertheless sufficiently great to preserve much of their activity, and consequently their nutrition is but partially impaired. The importance of preserving the functions of the muscles of the leg is seen in the perfection of gait which persons with ankle-joint amputations soon acquire. They can not only run, often with great ease and facility, but they acquire the power of leaping, dancing, etc., to such perfection that their disability frequently passes unrecognized.

(b) *As regards the adaptation of the stump for an artificial limb.*—As previously stated, the stump after ankle-joint amputation takes direct support upon the extremity. Mr. Quain thus speaks of the advantages of direct support, in referring to Syme's amputation:

> It is free from any valid objection, and, what is more important, the result in practice has been found to be good. A person who has undergone this operation is enabled to bear his whole weight upon the end of the stump without inconvenience; and on this account the facility of progression is, with a proper apparatus, decidedly greater than when the amputation is performed at any higher part of the limb.

The advantages of the ankle-joint stump over those of the leg for the adaptation of an artificial limb are admitted by the most competent mechanical surgeons to be of the most undoubted character. In Syme's amputation the patient walks upon the end of the stump with ease and grace, can run, leap, and dance, and is capable of enduring fatigue little short of that of the sound limb. Dr. E. D. Hudson, of New York, a most skillful mechanical surgeon, and who was selected by the Government to apply artificial limbs to the soldiers in the hospital referred to, states that in fifty cases of ankle-joint stumps to which he applied limbs he had not met with a single instance where the stump did not after preparatory treatment take direct pressure without inconvenience and give a most happy result. No results at all comparable with this are attainable with any form of stump immediately above the ankle.

This review of the comparative merits of ankle-joint and leg amputation as exhibited by statistical evidence authorizes the following conclusions: (1) The stumps left after ankle-joint amputations are far more serviceable than those resulting from leg amputation for unassisted locomotion; (2) an artificial limb can be far more usefully applied to an ankle joint than to a leg stump.

Upon suggestion of the president of the section, the discussion of Dr. Stephen Smith's paper was deferred until the following paper had been read:

AMPUTATIONS PROTHETICALLY CONSIDERED.

By GEORGE E. MARKS, A. M.

Intercourse with a considerable number of surgeons, those who reside in the centers of prothetical industry as well as those who inhabit more remote parts, discloses a lamentable absence of knowledge on the subject of "amputations" when viewed in the light of prothesis.

In consequence of a want of familiarity with this aspect of the subject, we artificial-limb makers have frequently brought to our presence stumps that are good, bad, and indifferent; stumps that could have been better; stumps that reflect credit, discredit, and no credit on the surgeons who performed the amputations, or on those who attended to them after the amputations were performed; stumps that can readily be inserted into artificial limbs with the assurance that no trouble will follow and that the possessors will live in the sublime consolation of having realized the removal of their disabilities for all practical purposes; stumps that might have been better and would have been beyond criticism had the operators taken advantage of opportunities which familiarity with prothetical methods would have revealed to them.

The time has arrived when this subject should receive more thought and when prothetical knowledge should be more widely disseminated.

I can see in the not very distant future the subject of prothesis embraced in the curricula of the schools and colleges of surgery, when a graduate will be equipped with all the information requisite to guide him to not only amputate properly, but to put the stump in the most favorable condition for the prothetician; to take measurements, diagrams, and casts when necessary; to enable his patient to obtain a suitable appendage with the least delay; when his knowledge will enable him to detect defects in adjustment and to remove them; to prescribe changes that may be required in an artificial limb to accommodate changes that may take place in a stump. As surgeons will always be more numerous than leg-makers, it is all the more important that their information on this subject should be broad and thorough.

I shall discuss the subject of "amputations, prothetically considered" from but a few standpoints, confining myself to amputations of the lower limbs only.

(1) LENGTH OF STUMPS.

Any stump that is well covered with integumentary tissue can not be too long. I am well aware that when I advance this proposition that I antagonize the views of those artificial-limb makers who have not kept abreast of the times and am controverting the rules that have been laid down by some writers of repute on the subject.

Artificial limb-makers, not many years ago, almost to a unit decried the amputation of a leg below the junction of the lower and middle third, or "the point of election," so called, and were pronounced in their utterances against all ankle and partial foot amputations.

The methods which were then employed produced artificial legs that were not capable of adaptation to long stumps, particularly to stumps that extended to the ankles or below the tarsus. I may add that this adverse opinion on long stumps is still held by some protheticians, notwithstanding the fact that great departures have been made during the past decade or two in prothetical methods. When a leg maker of modern times says that an amputation should not be made below the point of election, you may regard him as confessing that he has not the ability to make a leg that can be worn on a long stump.

To-day artificial legs are made that can be worn on stumps of any length, tibio-tarsal, medio-tarsal, and tarso-metatarsal not excepted. Any stump that is capable of bearing weight on the extremity is preferable to one that can not. A tibio-tarsal amputation, made after the method of Dr. Syme, produces an end-bearing stump, and can be placed in the category of "the most favorable." An amputation after Dr. Pirogoff's method is also productive of an end-bearing stump, provided the os-calcis is properly placed and united to the tibia or securely held in the intermalleolar space. An amputation in the tarsus, or at the tarso-metatarsal junction, after any of the methods of Chopart, Lisfranc, Hancock, or Hey, is productive of a stump that is capable of being treated prothetically.

In every partial foot amputation care should be exercised to prevent the contraction of the tendo-achilles. Usually lashing in a suitable contrived splint will suffice. If this means will not accomplish the object, either tenotomy or fixation of the ankle joint should be resorted to, for if the heel is allowed to draw up and the amputated surface point downward, the possessor of that stump will be obliged to have an artificial leg applied that will not touch, but that will shield the amputated surface. This means that the artificial leg will elongate that side and necessitate the wearing of a thick sole and heel on the shoe worn on the well or companion foot. Such a stump ceases to be an end-bearing stump, and its disadvantages are apparent.

I have a horror for those modifications of Chopart's and Pirogoff's operations that do not provide flaps on which the weight of the subjects can be endured. A case was brought to my attention some years ago which I can opportunely refer to here. A young man, farmer by occupation, residing in Vermont, had his foot crushed. Amputation was deemed necessary. A modification of Chopart's operation was performed. The stump that resulted presented the appearance of an inverted cone, the apex scantily covered with tissue and extremely sensitive. This stump was hopelessly an end-bearing stump, and had to be treated the same as if amputation had been made above the ankle. It is obvious that inasmuch as a Chopart's operation could not have been performed, a Pirogoff's or a Syme's or even an amputation above the ankle would have given the patient a much better stump. This illustrates the importance of amputating for an end-bearing stump in a way to save the continuity of bone and to obtain an ample flap, even if the tarsus has to be sacrificed.

The advantages of a totally or partially amputated foot, producing an end-bearing stump, over a leg amputation are many. The more important are the following:

(1) An artificial leg for an ankle or partial foot amputation costs only one-half the standard price of an artificial leg for an amputation above the ankle.

(2) An artificial leg for any of the above end-bearing stumps does not incase as much of the leg and thigh as an artificial leg for an amputation above the ankle.

(3) The possessor of a stump extending to the ankle can improvise a sheath with suitable pad on which he can rest his stump and walk tolerably well; or if his stump extends to the metatarsus and he has a portion of the plantar surface of the foot left, he can walk and get about quite well without any contrivance. These are vital considerations for the poor man, and should be regarded by the surgeon.

The most modern and approved artificial legs for ankle and partial foot amputations provide phalangeal support, which will readily be conceded, is absolutely necessary to aid progression and prevent limping. The absence of phalangeal support is always felt by those who do without prothetical assistance.

During the past two years I have personally superintended the construction and application of over 300 legs to stumps that have followed tibio-tarsal, medio-tarsal, and tarso-metatarsal amputations. During the existence of the house of which I am a member (A. A. Marks), over 14,000 subjects, with amputations at various points of the leg, thigh, and arm, have been supplied with artificial limbs, Most of them have come under my personal supervision. With this experience, I feel myself competent to say that long stumps with ample flaps, that stumps resulting from tibio-tarsal, medio-tarsal, and tarso-metatarsal amputations can be supplied with artificial legs that will be comfortable and pleasant to wear and that will restore the wearers to the amplitude of their usefulness.

A stump extending below the knee is preferable to a stump extending to the knee, provided the stump is capable of flexion and extension. If the stump is disposed to become extended and anchylosed it will be preferable to sacrifice the leg to the knee.

I had occasion to share the regrets of a subject that was brought to my office not many years ago. This man's leg had been amputated about 4 inches below the knee articulation; the stump was extended and anchylosed. To make an artificial leg for him would necssitate a rigid knee in the artificial, or an articulating knee out of parallelism by about 4 inches with the natural knee. Either would place the fellow at a disadvantage, especially when sitting. If in the amputation of this leg the operator had had any indication that his patient's stump would have become extended and anchylosed, he would have displayed greater wisdom if he had amputated through the knee articulation. Any amputation below the knee should, so far as possible, be made with proper regard to the preservation of full knee mobility, and during the recuperative period the knee should occasionally be forced into action so as to prevent impairment of the flexors and extensors.

A stump extending to the knee is preferable to a shorter stump. The condyles and nodules of the femur should never be excised in knee disarticulations. The nodules afford means for securing an artificial leg and the condyles and articular surfaces are better prepared by nature to endure pressure than the saw or the knife can prepare them.

If the patella can be placed in the inter-condyloid space and properly secured it is always desirable to do so.

The foregoing, I hope, will serve as an appeal to every operating surgeon to sacrifice as little of the human limb as possible, giving a proper regard to the securing of integumentary tissue for the purpose of covering the extremity and protecting the partly excised bones. These are certainly the teachings of the wisest and most conservative surgeons of the past, and I know of no reason why they should now be relegated to obsolescence.

(2) FLAPS.

All stumps should be provided with ample flaps, not redundant flaps. A redundance of tissue on the extremity of a stump is no advantage. The prime office of a flap is to protect the extremity of the bones, and they should be only ample to effectually perform that function. Whether the flaps are anterior or posterior, external or internal, or a combination of any of the four, it matters not, so long as the extremities are well protected. Periosteal flaps are desirable, as they give additional protection to the bones and prevent integumentary flaps from becoming adherent to the bones.

If an amputation is to be made below the middle third of the leg, bone should be sacrificed in order to obtain suitable flap. If the amputation is to be made above the middle third, bone should not be sacrificed, even if transplantation is necessary in order to secure flap. Every inch of healthy bone above the middle third is desirable for leverage purposes. If a thigh amputation is to be made close to the knee, bone can be sacrificed in order to secure flap. The nearer the amputation is to be made to the body, the greater should be the care to save bone.

(3) THE DISPOSITION OF CICATRICES.

The rules established by all the accepted authorities on ankle and partial foot amputations should be rigorously observed. By so doing the disposition of the cicatrices will be the most advantageous for prothetical purposes.

In all amputations of the leg and thigh, as well as knee disarticulations, the cicatrices should, as far as possible, be placed well away from the extremities of the bones, and preferably along the posterior aspects. Contiguity or adhesion of the cicatrix with the extremity of a bone is frequently the cause of suffering.

(4) TREATMENT OF STUMPS AFTER THEY HAVE BECOME HEALED.

A stump, before it is called upon to perform the functions of operating an artificial limb, is an inactive remnant of an active member of the body. On account of its inactivity it becomes disposed to accumulate adipose tissue, and if permitted to do so it will become abnormally large and edematous. If possible, this growth or condition should not be permitted. Usually, tight bandages will prevent it. The bandages should be applied from the time the stump has healed until the artificial leg is applied. The bandages should be as tightly drawn as possible and not interfere with circulation. The bandages should be applied in the usual way, beginning at the extremity of the stump, and continued the entire length of the complete section of the limb above the stump. This means, for a partial foot amputation, that the bandage should be carried to the knee, and for a leg amputation, that the bandage should be carried to the body.

I have frequently met surgeons who incline to the belief that an attenuated stump should be allowed, and in fact encouraged, to grow so as to possess the dimensions of the companion leg before an artificial limb is applied. This certainly would be desirable if such growth would permanently and effectually resist the influence that an artificial leg will exert on the stump to reduce it.

It can be stated for a certainty that an artificial leg will harden, solidify, and diminish any stump. In consequence of this, it is desirable to keep the stump as small as possible, so as to minimize the changes that will follow the application and wearing of a leg.

(5) TIME TO APPLY AN ARTIFICIAL LEG.

It will be safe to apply an artificial leg to a stump that has resulted from traumatic causes as soon after the healing of the stump and the recovery of the patient to his normal vigor as possible. Nothing can be gained by waiting beyond that time. Waiting entails a loss of time and permits the stump to become enervated from disuse.

A stump that is the result of disease, especially if of a malignant nature, should be obliged to wait until there is a certainty that the pressure, confinement, and concussion that follows, more especially the initial operations on an artificial leg, will not excite a recurrence of the disease.

A child who has lost a leg is never too young to have an artificial leg applied. It should be observed that the tissues, bones, and articulations of an infant or a growing child must be forced into action in order to become developed, healthy, and vigorous.

To hobble about on one or a pair of crutches for a number of years is rather a severe and inhumane punishment to impose on a child because he is growing. An artificial leg of modern construction can be lengthened from time to time at a very slight expense, and as an artificial leg provides the nearest approach to a natural prop for the amputated side, it is the only means that will encourage healthful growth and symmetrical development.

To illustrate this fact, I can do no better than present the case of an infant, brought to me by Dr. Bacon, of New Haven, Conn. The child was not quite nine months old when I took her in charge. Her leg had been amputated 2 inches below the knee for congenital causes. The stump tended to flex and remain so and anchylosis was feared. I applied a neat-fitting leg with knee articulation. The artificial leg held the stump in extended and flexed positions, according to the manner in which the child was held or placed. In a few months the child began to creep, a few months later she was able to stand, and later still she learned to walk. The artificial leg assisted her in all these operations of progression. She developed rapidly and symmetrically and to-day she is a young lady of comely proportions, enjoying good health, walking as gracefully as one in possession of nature's limbs, a testimony of the wisdom of applying artificial limbs to the young when misfortune has deprived them of their share of extremities.

REMARKS OF PROF. CHARLES B. PARKER, M. D., OF CLEVELAND, OHIO.

Mr. President and Gentlemen of the Section: It seems to me that this subject we have before us is one that is well worthy of our attention. In our profession, as in others, there are certain fashions and fads. At the present time the subject of abdominal surgery is occupying very largely the surgical mind. Abdominal surgery is a subject which should be practiced only by a few, because the highest success is only acquired by great experience, and in operating one or two men should do the work. Mr. Marks has said that he finds the results of amputation good, bad, and indifferent. Now, there are a great many elements which go to make up a satisfactory amputation. Antiseptic methods are widely practiced and the surgeon is inexcusably ignorant if the healing is not prompt and perfect. But there are many considerations beyond the mere healing of wounds. It is necessary to do something more than simply remove the mutilated or injured extremity, such as the best position, the best point at which the amputation should be made, where shall the scar be, etc., and, in my judgment, to successfully carry out an amputation, to restore a man or individual to usefulness so that he can be a help to himself and others, is one of the greatest triumphs in life.

The subject of the first paper by Dr. Smith is somewhat different from what I had been led to expect, and as I had no synopsis I was rather surprised at the scope of the paper. I had supposed that he would confine himself to the place of selection. I was also surprised somewhat by the statement made by the second speaker in regard to amputations of the foot. I feel that this whole subject of amputation of the foot must be gone over once more. With reference to the length of the stump, I certainly am willing to listen to the advice of Mr. Marks, whose experience has been greater than mine. Most of us have been accustomed to look upon the point of selection as in many respects best. If you have to deal with a laboring man who has to use a stump, the amputation should be most carefully considered. I also believe that a splint is a useful thing in the first and early dressing of stumps and amputations. I usually place a straight back splint upon amputations of the leg. It prevents the tremor of the muscles and gives a good support to the dressings, and is a help in moving the patient about in the bed. I make this a rule in all amputations of the lower extremities. In amputations of the leg I prefer a lateral flap, which brings the cicatrix well to the outer side, and prevents the hamstring muscles from retracting so much.

I am very glad that this subject has been brought up, because I feel that some discussion in this line of work, and especially in regard to amputations upon the lower extremity, would be not only interesting but profitable. There is much to be said, and some of the methods that have been practiced and which are accepted as time-honored, I think, ought to be abandoned.

Col. Tomas Casas, medical subinspector of the first class of the Spanish army in Cuba, official delegate to the Pan-American Medical Congress and honorary president of this section, having been called to the chair by the executive president, addressed the section in Spanish.

Col. Casas expressed great pleasure in having been given the opportunity to meet so many distinguished medical officers of the U. S. Army, and of other services, and to have been permitted to take part with them in their deliberations. He congratulated the United States upon having so excellent a military sanitary organization as the Hospital Corps, as evidenced by the object lesson in field work given that afternoon, and expressed the hope that through the interchange of experiences by military medical officers at this and future meetings of the Pan-American Medical Congress much would be accomplished looking to the amelioration of the horrors of war.

Passed Assistant Surgeon D. M. Guiteras, U. S. Navy, Spanish-speaking secretary of the section, then presented the following named papers, written in Spanish, by medical officers of the Spanish army, which papers were read by title.

"Aprestos de Campamento de Uso en Cuba por los Medicos Militares." (Field Appliances in Use in Cuba by Military Surgeons.) By Dr. Felix Estrada Catoyra, Captain-Surgeon Spanish Army, Havana.

In this paper the author discusses the difficulties experienced in using the modern field appliances and ambulance service in countries almost entirely without roads, and gives a description of everything taken to the field by the hospital corps, appliances ready for use, and material with which to make them when it becomes necessary to replace them. He also describes their hospital tents and furniture, and the huts they have to build, with thick covering of dried palm leaves at times when the heat makes use of tents impossible.

APRESTOS DE CAMPAMENTO DE USO EN CUBA POR LOS MÉDICOS MILITARES.

By Dr. FELIX ESTRADA CATOYRA, Habana (Cuba), *Medico 1º del 10º. Batallon de Artilleria.*

La especial invitación dirigida por el ilustre presidente de la Sección de Sanidad Militar en el Congreso médico Pan-Americano, para disertar sobre el tema que sirve de epigrafe, me obliga, ya que personalmente no puedo concurrir á ésta gran manifestación que las ciencias médicas dedican al centenario de Cristobal Colon, á dirigiros éste escrito, sintiendio que la escasez de tiempo para preparar un estudio completo sobre el asunto, y la deficiencia de mis conocimientos, no me permitan llevar á cabo un trabajo digno de las eminencias científicas congregadas en el Capitolio de la gran República Norte-Americana.

Espero confiadamente, que teniendo en cuenta la buena voluntad que me guia, dispensareis vuestra benevolencia á ésta modesta disertación.

La historia militar nos revela, que desde los primitivos tiempos, fueron los ejércitos acompañados de cirujanos, encargados de la curación de los heridos, y de la asistencia de los enfermos; siendo objeto de varias esquisitas investigaciones la forma y manera en que se practicaban los servicios sanitarios entre los Egipcios, Griegos y Romanos. Sabemos así, que los ejércitos de Maratón, Platea, Nicopolis y Arbela, así como las falanges de Agesilao y Lisandro llevaban personal sanitario: que los Persas en sus guerras contra los Asírios también tenían médicos; que los Romanos establecían el *valetudinarium*, y llamaban *impedimenta* (estorbo) al convoy de enfermos y heridos que con los víveres y aprestos marchaban tras de los ejércitos.

Según cousigua Colombier, en los pasados siglos iban los heridos y enfermos en montones sobre los carros; por lecho solo tenían una poca paja; una ligera manta les preservaba del frío, sufriendos los ardientes rayos solares, sin mas socorros que alguna tisana. Por otra parte, era tan escaso el respeto que por las masas combatientes se guardaba á los heridos, que encontraríamos horrible la descripción de las matanzas y atropellos de que fueron objeto los que caían en poder del enemigo.

Hoy sucede lo contrario: el general en gefe de todo ejército, se preocupa tanto de sus soldados enfermos y heridos como de los que tiene en disponibilidad para el ataque ó la defensa. Además, el convenio de Ginebra, de 22 de agosto de 1864 ha establecido leyes humanitarias que obligan á todas las naciones beligerantes á la asistencia de los lesionados, á respetar la neutralidad de los heridos y de los prisioneros.

Siempre la aglomeración de enfermos y heridos ha producido funestos resultados como puede comprobarse por la historia de las guerras, guardandose memorable recuerdo de algunas campañas, como, por ejemplo, las de Napoleon. Por el contrario, el sistema de dispersión adoptado posteriormente ha dado brillante éxito, como lo demuestran los resultados de éste sistema seguido en las guerras modernas. Desde que el filántropo Larrey inventó aquellas ambulancias *volantes* que vemos aparecer en el ejército del Rhin, el socorro á los heridos se ha hecho cada vez mas rápido; y como dice un ilustrado escritor, "Desde entonces los cirujanos militares unen á la serenidad del hombre de ciencia, el valor y la audacia del hombre de guerra. Seguros de que serán socorridos inmediatamente, nuestros soldados se sienten poseidos de mayor ardor bélico, y puede afirmarse, que la victoria, mas de una vez, ha sido debida á la notable invención de Larrey."

Ardua empresa sería hacer una narración histórica de los diferentes sistemas empleados en las numerosas campañas para atender á la cura y transporte de los heridos; pero indudablemente que un trabajo de ésta indole, nos haria ver las sucesivas invenciones que el espíritu generoso de la sanidad militar fué poniendo en práctica, para mejorar la suerte de los heridos y combatientes lesionados en la guerra; así como las mejoras y perfeccionamiento por que fué pasando el material sanitario de campaña, desde los mas remotos tiempos hasta nuestros días, debido á la enseñanza que proporcionaron las diferentes guerras.

Los estudios que se han hecho de las campañas modernas á poco de terminarse, han prestado importantísimo servicio; todos los detalles han sido aprovechados por los hombres de combate en las sucesivas contiendas; ya influyendo en la estrategia, en los movimientos tácticos, en el armamento y municiones; en una palabra, en la manera de hacer la guerra. Pero mas interesantes han sido para la humanidad estos estudios, por las modificaciones imprimidas en los servicios sanitarios. La esperiencia adquirida en los campos de batalla por los médicos militares ha favorecido la recojida de los heridos, perfeccionado el transporte, estableciendo los sistemas de ambulancias, facilitado la evacuación del campo con nuevos aparatos; influyendo todo esto en las operaciones quirúrgicas, salvándose mayor número de heridos, evitando muchas complicaciones en los fracturados; perfeccionándose notablemente el servicio sanitario castrense, estando mas garantizada la vida de los combatientes; presentando el médico con sus inventos quirúrgicos y esmerados cuidados, un saludable contraste que sirve de valladar á esos mas rápidos y precisos sistemas de matar que constituyen el progreso de la guerra moderna.

Los adelantos de la cirugía militar no se han limitado al tratamiento y curación de las heridas y fracturas; á la aplicación de vendajes, al uso de camas especiales para los operados, etc., sino que ha dado lugar á los ingeniosos medios para el transporte de los heridos por fuerza animal y por máquinas, á la disposicion de los convoyes por agua y por tierra, empleando gran velocidad en atender á las necesidades facultativas que han nacido de la guerra. Cada campaña de los tiempos modernos ha traido un nuevo progreso á ésta parte de la cirugía.

No hemos sido los médicos españoles los mas estraños á estos estudios y á su adelantamiento, pues nuestras campañas han dado á la ciencia el resultado de la practica de nuestros cirujanos, cuyos escritos sobre el tratamiento quirúrgico de las heridas les ha proporcionado renombre universal en la história; *"fundandose la gloria de la medicina militar española en las operaciones que evita y no en las que hace."* * Nuestra cirugía clásica de los siglos quince y diez y seis ha sido observada en nuestras guerras modernas de este siglo, lo mismo en la que llamamos de la independencia contra los ejércitos de Napoleon, que en la civil de los siete años, † así en la campaña de Africa, ‡ como en la de Santo Domingo, en la carlista reciente, en la separatista de Cuba, § en las luchas sostenidas en las posesiones de Asia contra los joloanos y demos pueblos indígenos, lo mismo que en las escaramuzas revolucionarias y ataques de las barricadas, tan frecuentes por disgracia en nuestra pátria durante algunos años.

Pero si hemos sabido conservar las tradiciones de la cirugía militar española por lo que hace á la cura y tratamiento de las heridas y fracturas, y somos en general los

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* Véanse las siguientes obras publicadas entre nosotros:

Memoria sobre el orígen y vicisitudes de la terapéutica que han seguido los cirujanos españoles en las heridas de armas de fuego. Por D. Marcelino Gomez Pamo.

Tratamiento de las heridas de armas de fuego segun la práctica de los médicos militares españoles, seguido de ligeras nociones de higiene militar de campaña. Por D. Ramon Hernandez Poggio.

Terapéutica de los cirujanos españoles en las heridas de armas de fuego. Por D. Antonio Población y Fernandez.

Historia de la medicina militar española, del último autor.

† Véase: Reseña histórica de las principales operaciones quirúrgicas practicadas en los hospitales de campaña durante los siete años de la guerra civil.—1852.

‡ Véanse: Histório médica de la guerra de Africa. Por D. Antonio Población y Fernandez.

La campaña de Marruecos. Memorias de un médico militar. Por D. Nicasio Landa.

§ Remembranzas médicas de la guerra separatista de Cuba. Por D. Ramón Hernandez Poggio.

médicos españoles partidarios de la *cirugía conservadora;* no se han dejado de estudiar y perfeccionar los medios de trasporte, aumentando nuestros aprestos de campamento.

A pesar de las vicisitudes económicas por que ha pasado nuestra nación, en nuestras campañas no tenemos que lamentar desastres tan terribles como los sufridos por los Francess en Crimea.* Tampoco hemos tenido que sentir las deficiencias que caracterizaron la campaña de los Turcos en la Herzegovina, donde gracias á la asistencia de los cirujanos ingleses, y á las asociaciones particulares mejoraron las tristes condiciones de los heridos y enfermos.

En nuestra guerra de Africa nada faltó respecto á provisiones, tiendas, equipos y trasportes; en la espedición que hizo nuestro ejército á Méjico, el servicio y material sanitario fué tan completo que de nada carecian nuestros convoyes de enfermos. La historia de la guerra carlista fué un ejemplo de las ventajas en la rápida evacuación de nuestros primeros hospitales, y del buen servicio de las ambulancias. La misma campaña de Santo Domingo, á pesar de las dificultades creadas por las circunstancias contrarias del clima, y del terreno, tuvo su éxito en los hospitales flotantes y en la evacuación de Montecristi y retirada final de nuestros heridos y enfermos.†

No creais que al hacer estos elogios de nuestro servicio sanitario, vaya á suponer es superior al de otras naciones. Muy léjos de mi ánimo y de la verdad científica sería esta aserción. Hasta osado parecería esponerlo ante este Congreso celebrado en el país que mas pruebas de adelantamiento científico ha dado en la cirugía militar. La guerra de secesion de estos Estados,‡ proporcionó á la ciencia interesantísimo progreso, pues como dice muy bien el Dr. J. B. Ullersperger, de Munich, § se distinguió la guerra americana principalmente por la liberalidad en todos sus gastos y provisiones frescas; por el esquisito cuidado de los soldados sanos ó heridos; por la rapidez de los socorros y trasportes, en vehículos sumamente cómodos, ya en carruajes, trenes, ó vapores; por la conveniencia de sus hospitales de madera espresamente erigidos; por el buen reparto de heridos y enfermos evitando siempre su escesiva acumulación; y teniendo muy en cuenta prudentes medidas para precaver los funestos cambios de clima y desarrollo de enfermedades, y por la seguridad de los viajes, ya de reclutas ó ya de licenciados.

Y no creais que significo esto como falaz adulación hácia vosotros, por galantería rendida á la hospitalidad. Todos los comentaristas de la guerra americana tributan grandes elogios á los cirujanos y médicos y al servicio sanitario de hospitales y ambulancias empleados lo mismo por una que por otra parte.‖

No menos fecunda y de trascendencia suma para el adelantamiento de los servicios sanitarios en campaña, fué la guerra franco-prusiana, lucha terrible entre dos pueblos que allá en Europa se disputan la supremacía en asuntos militares.

Pero no quiero embeberme en la importancia de las medidas sanitarias y servicios de las modernas campañas, pues esto me alejaría del tema objeto de mi discurso, al que voy á pasar resueltamente. Mas antes consignaré una proposición que aunque os parezca atrevida por sostenerla quien carece de autoridad científica, es positiva; y que si vosotros le dais vuestro asentimiento, adquirirá el valor de una verdad axiomática: "Los inventos modernos de ambulancias y aprestos sanitarios de campaña, apenas tienen aplicación en las guerras irregulares; y menos en paises que carecen de vias de comunicación, y cuyo terreno es accidentado no permitiendo utilizar los medios de trasporte y conducción de heridos y enfermos."

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* Véase: Histôria quirúrgica del ejército francés en Crimea. Por Chenú.

† Cartas del Sr. D. Santiago Andrés Espala, publicadas por la Revista de Sanidad Militar de Madrid.

‡ Véase: Historia médico-quirúgica de la guerra de secesion de los Estados Unidos de la Union Americana, escrito bajo la direccion del médico general J. K. Barnes.

§ Noticias para la historia de la cirugía.

‖ Entre las muchas obras que pudieramos citar conviene hacerlo de la que "Sobre sanidad militar Norte-Americana," escribió el consejero ruso, Dr. H. v. Haurowitz. Stuttgart, 1866.

El ejército español posee en la Isla de Cuba un parque sanitario fundado en la Habana desde hace bastantes años, cuyo establecimiento si bien no construye material, pues lo recibe directamente del parque sanitario de Madrid, recompone algunos efectos de los que se destruyen con el uso, siendo su objeto principal la conservación y entrega á los cuerpos de cuantos aprestos constituyen el material sanitario ordenado por los reglamentos.

En dicho parque debe existir el material de ambulancias para el servicio y asistencia de los heridos y enfermos del ejército en operaciones de campaña, y para las atenciones del servicio en tiempos de paz. En sus almacenes estan clasificadas las existencias por grupos, figurando entre estos los siguientes que en parte detallarémos para que se pueda formar una idea de su importancia:

Primeras materias de construcción—cartón, cuero, hierro, hoja de lata, lienzo, lona, maderas varias, mimbre, etc.

Material de alojamiento—comprende dos grupos, el 1° de efectos para la construcción como argollas, columnas de madera, cuerdas, mazos, piquetes de hierro, mesas, tela preparada, travesaños, etc.; el 2° lo forma el material preparado como tiendas de campaña reglamentarias, cuadrilongas y cónicas.

Material de curación—medicamentos simples, como aceites, alcoholes, féculas, bálsamos vegetales, resinas, gomas, etc.; compuestos químicos, ácidos, sales, preparados amoniacales, ferruginosos, arsenicales, mercuriales, antimoniales, etc.; compuestos oficinales, estractos fluidos, tinturas, pomadas, ungüentos, glicerolados, soluciones, bálsamos, píldoras, cápsulas, etc.; todo segun el formulario de los hospitales militares.

Instrumentos de cirugía sueltos para repuesto, como compresores de arterias, cuchillos, bisturíes, pinzas, sacabalas, sondas, tigeras, sierras, etc., y agrupados formando bolsas de amputación, carteras para los practicantes, cajas de amputación, trépano, resecciones y otras varias.

Vendajes y apósitos, que comprende apósitos de fractura, arcos, férulas de alambre, férulas de madera, elásticas, tablillas, manoplas, bragueros, hilas, lienzo, vendajes de cabos, de cuerpo, vendas, algodon hidrofilo, makistoff y todo lo concerniente á las curas antisepticas.

Utensilios de farmacia—alcohómetros, básculas, balanzas, copas graduadas, embudos, espátulas, morteros, termómetros clínicos, pildoreros, etc.

Utensilios de ambulancia—cacerolas, cazos, cocinillas, cucharas, vasos, jofainas, piedras de afilar, etc.

Objetos de consumo—aceite de oliva, espíritu de vino, jabon común y fino, sal común, vinagre, etc.

Objetos de alumbrado—algodon de torcidas, mechas, bugías, faroles, linternas, yesca, etc.

Objetos de escritorio—cortaplumas, impresos, lápices, plumas, polvos de tinta, etc.

Envases de cristal—frascos de tapón esmerilado de diferentes tamaños, otros forrados de mimbre, etc.

Envases de hoja de lata—cajas para medicamentos, canutos, de distintos tamaños, frascos para aceites y otras sustancias, con tapón de tuerca.

Envases de madera—alfileteros, cajas botiquines, barrilillos para líquidos, etc.

Envase de lona y cuero—bolsas de cuero para herramientas, fundas de lona para camas, saquillos, etc.

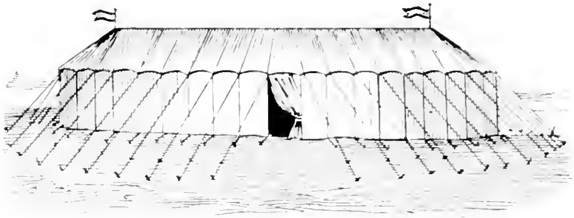
Envases de mimbre—cestones sencillos y dobles.

Ropas—blusas para oficiales, cabezales, delantales para enfermeros, jergones, mantas, paños, servilletas y tohallas.

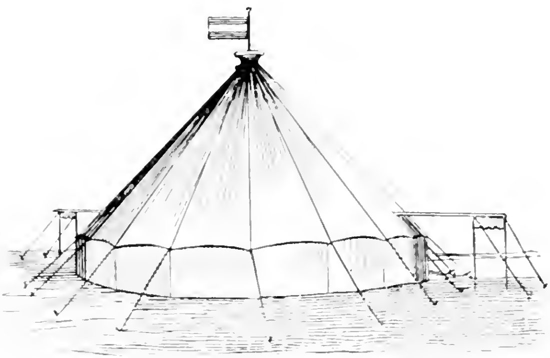
Muebles—mesas de operaciones, mesillas, etc.

Herramientas—agujas de embalar, atornilladores, clavos sentidos, hachas, limas, martillos, serruchos, tenazas, escoplos, palas, etc.

Objetos varios—atalajes, arreos de carga, banderas, banderines, cajas de farmacia, camillas, hamacas, furgones de dos ruedas.



Tienda de campaña cuadrilonga.



Tienda de campaña cónica.

Bolsa de ambulancia.

APRESTOS DE CAMPAMENTO. EJÉRCITO ESPAÑOL EN CUBA.

Material preparado—bolsas de ambulancia, botiquines de cirugía, botiquines de farmacia, cajas de repuesto de medicamentos, caros almacenes, cestones de repuesto de cirugía, cestones de utensilio de ambulancia, furgones de cirugía, maletines de ambulancia para caballería, modrilas de ambulancia para infantería.

Material de trasporte de heridos, compuesto de almohadas, asientos de lona con armadura de madera, atalajes para dos caballos, uno de ellos á la Daumont, bastes para artolas, idem para artolas-literas, cabeceras de hierro estañado, cinturones de cuero, cojines, correas para estribos de artolas, cubiertas de cuti, estribos de madera, juegos de correas de cuero para artolas-literas, lienzo para camillas, porta-camillas, porta-sillas, varas de haya para camillas con casquillos y topes de hierro estañado. Ademas existen preparadas camillas, sillas, artolas, artolas-literas y carruages de trasporte.

La expedicion que de Cuba salió, en 1860, para Méjico, cuando la intervención anglo-franco-española en aquella República, fué provista como dije antes de cuantos recursos sanitarios y aprestos de campamento se conocían por entonces, remitiendo además el Parque de Madrid, material nuevo de ambulancia, tiendas de campaña, botiquines, furgones para trasporte de material y utensilio de farmacia, utilizándose tan valioso convoy sanitario en las operaciones de avance del ejército expedicionario.

Al tener lugar la campaña de Santo Domingo, el Parque de Cuba facilitó también en abundancia material sanitario, á aquel ejército, que servió para organizar las numerosas enfermarias que hubo necesidad de improvisar. También en dicha guerra se hicieron uso de los hospitales flotantes, empleándose varios buques-hospitales que prestaron gran servicio pues facilitaron la evacuación de heridos y enfermos; debiendo significar que ya en nuestra guerra de Africa, nuestro ejército estableció el trasporte de heridos y enfermos por buques-hospitales, y tuvimos tambien hospitales-flotantes para los coléricos, adelantándose el cuerpo de sanidad militar español, á lo que tiempo después se hizo en la guerra de Italia, y en gran escala en la de secession americana, al utilizar las vias fluviátiles y marítimas para la pronta diseminación de los enfermos.

Es pues, el parque sanitario, el depósito de donde se surten los cuerpos y establecimientos militares, á cuyo fin se lleva una contabilidad particular reglamentada, pues cuenta con personal de plana mayor compuesto de un médico mayor director jefe del parque, un jefe médico encargado del detall, un jefe de administración militar que interviene la contabilidad, y dos oficiales administrativos, uno de ellos pagador, y otro encargado de los efectos, con cuyo personal de sanidad y administración, se constituye la junta económica que verifica las compras, hace las subastas de materiales, y rinde las cuentas al estado de la inversión de los fondos y caudales destinados á la adquisición de los efectos sanitarios, así como de las ventas que se hacen á los cuerpos. Para el servicio, existe un personal sanitario compuesto de sargentos, cabos, y soldados para la limpieza, oficinas, etc., así como personal civil de conserge, mozos, mecánicos y obreros.

El material sanitario que como propiedad particular poseen los cuerpos del ejército (regimientos, escuadrones, baterías, etc.), está dispuesto en reglamentos especiales, y podemos dividirlo en varios grupos.

Material de alojamiento.—Tiendas de campaña que las usuales entre nosotros son de dos classes: cuadrilongas de 12 metros ó de 5 metros; y cónicas de 6 metros ó de 4 metros. Dichas tiendas son de fácil manejo, como puede verse por los modelos que se acompañan.*

Material de curacion, que esta constituido por medicamentos simples, compuestos químicos, preparados oficinales, instrumentos de cirugía, vendajes y apósitos, utensilio de farmacia, utensilio de ambulancía, objetos de alumbrado, objetos de escritorio y objetos accesorios, formandose con todo, los *botiquines* de los regimientos de

* Esperamos poder acompañar modelos de todo nuestro material sanitario para presentarlo al Congreso, á cuyo fin lo interesamos de la autoridad competente.

infantería, cuyo modelo varía poco del de caballería. Está compuesto de dos cajas, divididas en compartimentos donde se guardan los efectos; de un baste con arreos, de una cubeta para agua, una bota para vinagre y una cubierta de carga. Los vendajes de éste botiquin representan 200 curaciones ordinarias, 3 especiales (fracturas), y 6 imprevistas.

Además de los botiquines, tienen los cuerpos de infantería la mochila de ambulancia que llevan los soldados practicantes, y en las que existen representadas 60 curaciones. Los escuadrones de caballería llevan un maletín de grupa, análogo en su objeto á la mochila de infantería, pero que va colgada en la silla del caballo.

Por separado las secciones de infantería poseen una bolsa de ambulancia que representa 30 curaciones y otra de compañía con 20.

Material de trasporte de heridos, lo forman las camillas, sillas, artolas, etc. Cada regimiento posee varias de éstas, siendo la camilla española quizás la mas sencilla de cuantas se emplean en los trasportes, por su fácil desarme, como podrá verse en el modelo; la camilla-litera lleva su cubierta de gutta-percha con dos ventiladores.

Las ambulancias urbanas que tanta importancia tienen bajo el punto de vista de la higiene pública, establecidas primero en New York, y después en Paris, por escitacion de los Drs. Galippe y Brémond, en 1881, son tambien reglamentarias entre nosotros desdes 1887, para la conducción de los enfermos y heridos, desde los cuarteles á los hospitales.

En nuestro ejército de Cuba se empezaron á usar, en 1890, que la estableció por mis gestiones el batallón de artillería, en que presto servicio, y nada diré de su buen resultado, pues en ninguna plaza como en la Habana es de mas necesidad que los soldados que pasan al hospital, vayan conducidos en un buen carruaje, pues la naturaleza infecciosa de las enfermedades predominantes, exige el cumplimiento de todos los preceptos higiénicos.

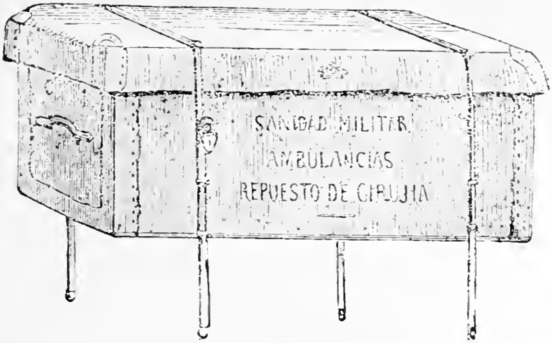
Acompaño una fotografía de la ambulancia urbana que posee éste batallón de artillería, y de paso significaré que ha sido construida aqui, en la Habana, y que no desmerece de carruajes análogos que he visto en los Estados Unidos y en Francia, así como en Londres, in 1884, en la Exposicion de Higiene que allí se celebró.

He dicho que en las guerras irregulares no es posible utilizar casi ningún material de ambulancias del adoptado por los ejércitos; y efectivamente, esto ha sucedido en la campaña sostenida en Cuba. Ciertamente que todos los cuerpos han estado dotados del material sanitario reglamentario que hemos indicado; pero la índole de las operaciones de la campaña hacia imposible llevar esa impedimenta de trasporte. El terreno de la guerra estaba desprovisto de carreteras y caminos, siendo preciso que las columnas fueran abriendose paso á través de la espesa cortina de follage, de la enmarañada red que forman en este país de exuberante vegetacion las plantas rastreras y trepadoras, los bejucos y llevas, arbustos y lianas que constituyen lo que llamamos manigua.

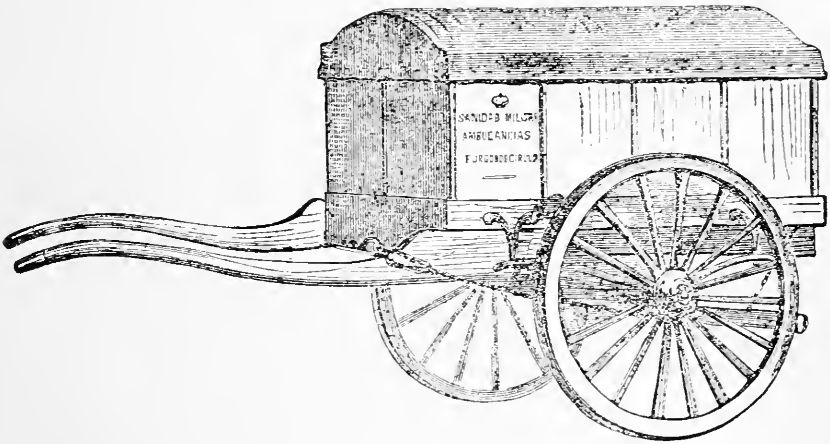
Imposible dar paso á carros, furgones, camiones y demas vehículos de trasporte por los terrenos pantonosos, signaneas ó tembladeras. Tan solo las acémilas, y para eso, no siempre han podido llevar los botiquines, pues el paso de los rios y arroyos naturales, de los charcos y lagunas formados por las lluvias, se ha hecho muchas veces imposible para las caballerías. ¡Cuantas veces la espesura de los potreros y sabanas ha impedido el paso de las bestias!

Los botiquines de los cuerpos han permanecido casi siempre en los campamentos que eran centro de operaciones de las brigadas, ó zonas de los batallones; no careciéndose de material de curación, porque cada compañía tenia su bolsa reglementaria, cada batallón su modúla, cada escuadrón ó batería su maletín de grupa; llevando ademas cada soldado una pequeña bolsa de socorro que contenia lo preciso para una cura. He ahí como pudieron ser atendidas las necesidades en el campo de batalla, y como los médicos de sanidad militar pudieron verificar después de una acción de guerra la curación de todos sus heridos.

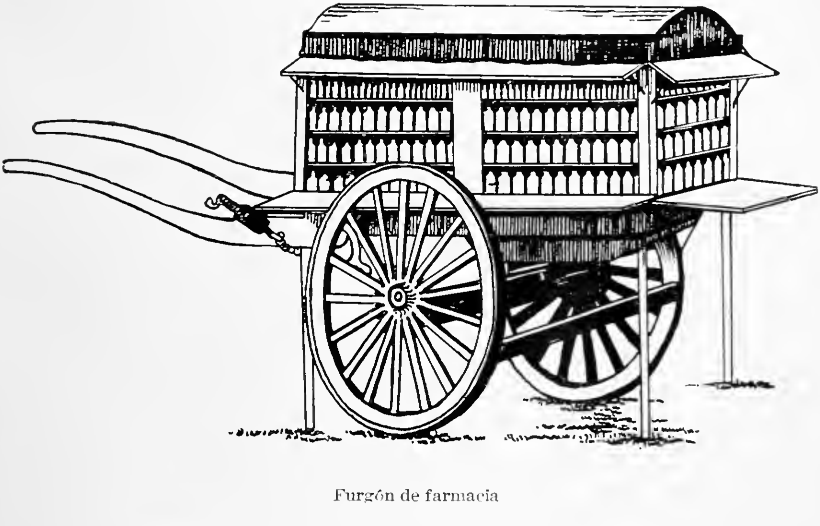
Hemos mencionado la camilla española, las sillas y artolas de que estan dotados los cuerpos de la Isla en operaciones, pero tampoco este material ha podido ser con-



Repuesto de cirugía



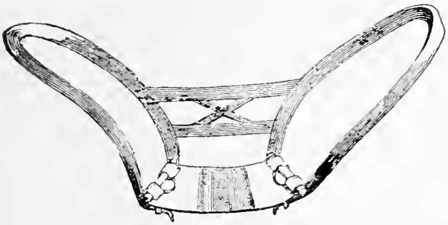
Furgón con material de cirugía.



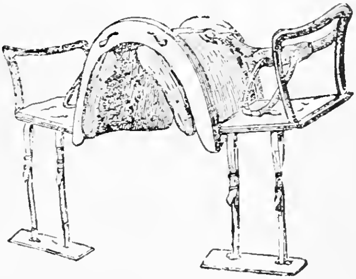
Furgón de farmacia

APRESTOS DE CAMPAMENTO   EJÉRCITO ESPAÑOL EN CUBA.

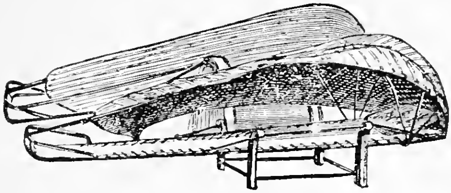
Camilla española.



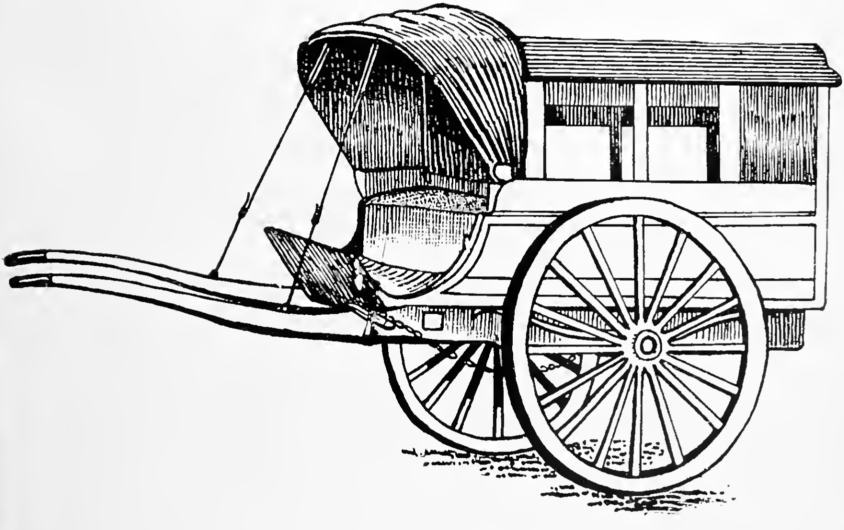
Silla sueca modificada por Auguiz.



Artola

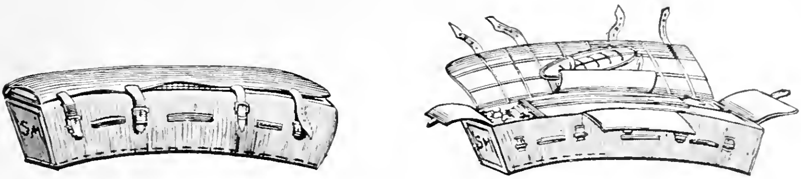


Artola-litera.



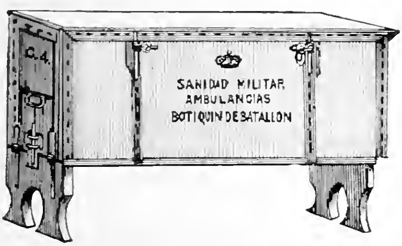
Carruaje español para heridos.

APRESTOS DE CAMPAMENTO. EJÉRCITO ESPAÑOL EN CUBA.

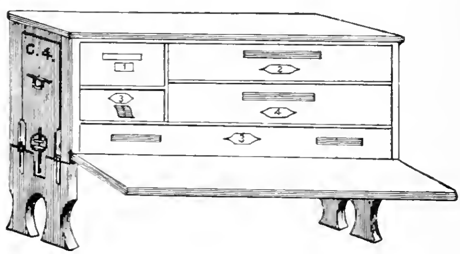


Maletín de grupa para los regimientos de caballería.

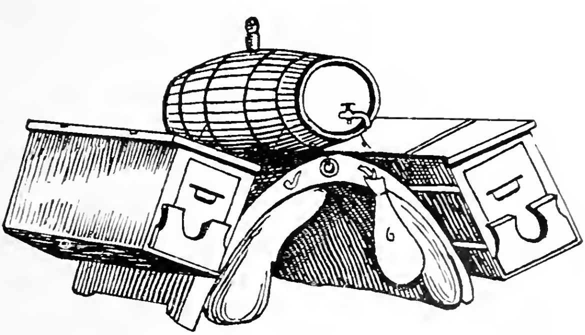
Mochila de infantería.



Caja-botiquín cerrada.



Caja-botiquín abierta.



Baste con los botiquines para cargar.

APRESTOS DE CAMPAMENTO. EJÉRCITO ESPAÑOL EN CUBA.

Ambulancia urbana del 10º batallón de artillería.

APRESTOS DE CAMPAMENTO. EJÉRCITO ESPAÑOL EN CUBA.

ducido, apesar de sus facilidades para el desarme. Las sillas y artolas necesitan cabalgaduras, y ya indicamos la dificultad que para los mulos y acémilas en general ofrecen los campos, por las enramadas de sus bosques vírgenes, máxime en la epoca de las lluvias que son torrenciales y se prolongan algunos meses entre nosotros. Pero la necesidad hace milagros, y nuestros compañeros improvisaron casi siempre las camillas, armando parihuelas como en los primitivos tiempos, con ramas de los frondosos árboles que por doquier se encuentran, y un pedazo de lona ó la tela de la hamaca prenda reglamentaria en esta campaña; y aun á falta de ésta se utilizaba la *yagua** y por medio de bejucos ó lianas, nuestros hábiles soldados entretegian con suma rapidez una armazon ó enrejado sobre el que se colocaba una manta de las que iban provistas todos los individuos.

La inventiva suplió siempre en todos los casos la necesidad; y así como al principio de hacer la guerra, todo era difícil, á poco de estar en ella se habituaba uno á cubrir el servicio y salvar todas las dificultades. Ejemplo de ello, las muchas enfermerías improvisadas en los campamentos, la facilidad con que estos se levantaban y luego se destruían al abandonarlos.

Nuestros oficiales y soldados con su espíritu valiente y sufrido, animados por el cumplimiento del deber, conviértense pronto á las costumbres del campesino criollo, del *guajiro*, y siguiendo el ejemplo que ellos le daban, aprovechaban cuantos elementos les brindaba la pródiga naturaleza. Por nuestra parte, los médicos, esforzando también el cumplimiento de nuestra misión, no nos amilanábamos; y de ahí que apesar de la inclemencia del clima, de las epidemias, de las necesidades que lleva en si una lucha prolongada entre hermanos, hemos salido con una estadística de heridos y enfermos, que el dia que se estudie detenidamente podrá desvirtuar la idea que existe de que ésta guerra ha sido fatal por el número de defunciones. Tan solo como una nuestra de la veracidad de nuestro aserto citarémos la estadística del tétanos en Cuba, durante el decenio de 1869 á 1879 que duró la campaña:

TÉTANOS.

Años.	Traumático.	Espontáneo.	Total.
1869	25	5	30
1870	37	5	37
1871	17	3	20
1872	17	2	19
1873	8	3	11
1874	23	3	26
1875	13	5	18
1876	18	6	24
1877	16	5	21
1878	5	1	6
1879	2	1	2
En diez años	181	33	214

Compárense estas cifras con las de cualquiera de las campañas modernas, y sus resultados vendrán á darnos la razón; y eso que debe tenerse en cuenta las causas predisponentes que se asignan á éste clima para esta complicación de las heridas, y la facilidad con que espontáneamente se presenta en este país.

La gangrena hospitalaria, apenas se ha visto en nuestros hospitales de campaña, y menos aún en las enfermerías de campamento.

Pero no nos salgamos de nuestro tema, y deigmos como se improvisaban las enfermerías, pues á ellas se debe quizás en parte el éxito de nuestras estadísticas. Para muchos de los congresistas es conocido lo que en las Antillas llamamos *bohios;* una barraca formada con cuatro ramas gruesas de árbol terminadas en bosqueta, un caballete como armazón de techo y una cobija hecha con guano ó séase las hojas

* Parte del peciolo de las hojas de las palmeras.

secas de las palmeras—"adorno obligado de todo paisaje cubano," como decia nuestro naturalista Poey; las paredes constituidas por yagüas: he ahí una casa de campo en nuestro país. Mas sencillos aun son los bohios llamados de vara en tierra cuya construccion se hace mas fácil y rápidamente, pues viene á ser un caballete apoyado ó clavado en el suelo, con bastante inclinación para que corran las aguas.

¿Las camas?... ya dije que la hamaca era prenda reglamentaria y muchas veces han servido para el descanso de los calenturientos; y cuando se han querido improvisar catres, en seguida se construian con cuatro horquillas cortadas en el monte, clavadas en tierra, que sostenian cuatro ramas delgadas; y en el sentido longitudinal se adaptaban ramas de cujes, que liado todo con bejucos constituian un camastro flexible, sobre el que se colocaba una manta ó la tela de la hamaca, descansando con cierta comodidad el herido, amputado, ó enfermo.

La renovación del aire en estas enfermerías era constante por las rendijas de los materiales de construccion, y por aberturas á manera de ventanas que se les hacían; y como todo era provisional al evacuar estas enfermerías se destruian, para rehacerlas en otro lugar.

En los trasportes de muchos heridos ó enfermos empleáronse los carros del país, cuyas grandes ruedas permitian la marcha á través de los caminos primitivos que existian; no siendo en ningún caso posible el trasporte en otros vehículos y menos en las ambulancias, que se desecharon desde un principio por ser imposible utilizarlas.

El único trasporte empleado lógicamente fué el de via fluviátil ó marítima, y para ello se emplearon vapores que ya por el rio Cauto navegable, ya por las costas norte y sur, repartían los enfermos y heridos en los hospitales de planta fija que existían en todos los puertos del litoral.

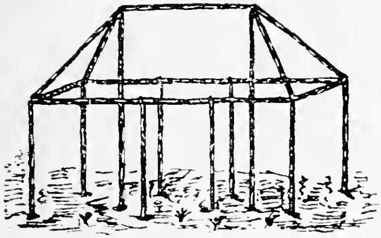
Respecto á las tiendas de campaña ni siquiera se intentó su uso, siguiendo en esto las frases de Napoleón: "Las tiendas no son sanas, vale mas que el soldado vivaquee." Nuestros campamentos eran verdaderos vivacs, y como dice muy bien un distinguido jefe de nuestro estado mayor, hablando sobre los campamentos de tiendas en Cuba: "La temperatura elevada y la abundosa humedad, hubieran bastado para proscribir las tiendas, aún en el caso de que hubiéramos llegado á salvar y connaturalizarlas con el esceso de material é impedimenta que hubieran representado."

La riqueza de materiales de construcción, la abundancia de maderas, permitía improvisar con gran celeridad los bohios según hemos indicado, y estos valian cien veces mas que cualquiera tienda de lona, aquí donde las lluvias se derraman en agüaceros torrenciales.

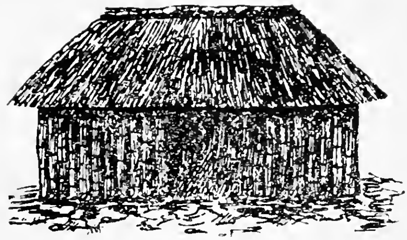
Pero no eran solo las enfermerías lo que se improvisaba para la asistencia de los enfermos y heridos. La riqueza de la vegetación del campo de Cuba ofrece elementos variados para llenar muchas necesidades; abundando el ramaje, varas, troncos, bejucos, majagua, yaguas, guano, hojas y frutos de que se saca gran partido. Así con las güiras secas * formábanse vasijas grandes y chicas para líquidos, empleándose en las enfermerías en vez de vasos, tazas, jofainas, etc.; con las yaguas † además de su aprovechamiento en los edificios se hacian carvastas, que reciben en el país el nombre de *catauros*, y sirven hasta para contener líquidos; la majagüa (*Hibiscus tiliaceus*) y otras muchas plantas textiles ofrecian sus fibras elásticas, resistentes para ligaduras; las ceibas (*Bombax ceiba*), los ceibones (*Paquira emarginata*), y las guarimas (*Guazuma ulmifolia*), facilitaban lana para llenar cabezales; en fin, todo médico que llevase unos meses de campaña poseía un arsenal en la riquísima vege-

* Fruto de la *Crescentia cucurbitina*, cuyo pericarpio es leñoso.

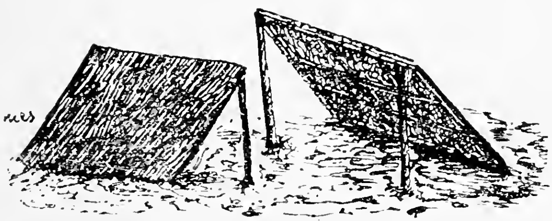
† Indicamos antes se llaman así las hojas de la palma real (*Oreodoxia regia*): La base de estas hojas se prolongan hasta metro y medio envolviendo al estipite que forma el tallo. En cada período lunar se desprende una de estas espansiones del peciolo, que cuando verdes son tan elásticas y consistentes que pueden desgajarse para formar cuerdas llamadas *ariques*. Estas espansiones, llamadas *yaguas*, tienen el aspecto de pieles curtidas, pero en estado fresco son muy flexibles, aprovechándolas para embalar el tabaco y otros muchos usos.



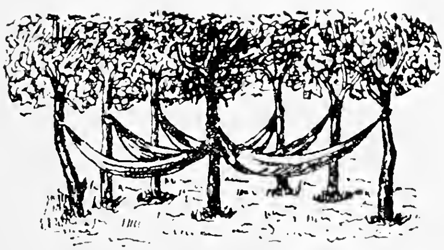
Armazón de un bohio.



Bohio cerrado.



Bohio de varas en tierra.



Hamacas tendidas en el bosque.

APRESTOS DE CAMPAMENTO. EJÉRCITO ESPAÑOL EN CUBA.

tacion tropical, y sabía aprovecharse de la pródiga naturaleza de este privilegiado país.*

Nada dirémos de los productos medicinales, pues aunque no faltaron nunca medicamentos, sobretodo la quinina y sus sales, el formulario de los hospitales militares de Cuba contiene un índice ó repertorio de plantas medicinales utilísimas en campaña, que fueron muchas veces empleadas.

Terminarémos para no hacer pesado este trabajo, con las frases de un historiador militar de esta guerra que dice: "En la campaña de Cuba ni se operó, ni puede operarse en grandes columnas" "La clase de guerra de Cuba sí ha de sostenerse con éxito, es indispensable que lleve en sí cierta irregularidad"—frases que encierran una gran verdad, y que nosotros plagiarémos repitiendo lo dicho ántes: "No todos los aprestos de campamento usuales en los ejércitos que operan en grandes columnas tienen aplicación en las campañas que pueden ocurrir en este país;" "Dada la irregularidad que demanda aquí la guerra, los médicos tienen que improvisar nuevos aprestos sanitarios, supliendo con su práctica las deficiencias, y acudiendo á la inventiva para llenar las necesidades imprevistas; y saldrán siempre victoriosos, pues la rica naturaleza de Cuba les brinda por doquier con elementos para satisfacer las exigencias de los servicios de campaña."

ESTADÍSTICA GENERAL DE ENFERMOS ASISTIDOS EN LOS HOSPITALES Y ENFERMERÍAS MILITARES DE LA ISLA DE CUBA DURANTE LA CAMPAÑA, Ó SEA DESDE 1° DE NOVIEMBRE DE 1868 Á FIN DE JUNIO DE 1878.

Por el Dr. JOSÉ CLAIRAC, *Capitan Cirujano, del Egérceto Español, Habana.*

Movimiento general de enfermos asistidos en los hospitales y enfermerías de la Ysla de Cuba durante la campaña, ó sea desde 1° de noviembre de 1868 á fin de junio 1878.

VIRUELAS.

Años.	Existencia anterior.	Entrados.	Salidos.	Muertos.	Quedan.
1868	5	103	88	14	6
1869	6	652	463	187	8
1870	8	741	496	205	48
1871	48	457	394	86	25
1872	25	151	140	36	0
1873	0	80	44	30	6
1874	6	480	271	151	64
1875	64	474	340	158	40
1876	40	370	283	85	42
1877	42	86	107	18	3
1878	3	66	45	20	4
Quedan	5	3,660	2,671	990	4

FIEBRE AMARILLA.

Años.	Existencia anterior.	Entrados.	Salidos.	Muertos.	Quedan.
1868	14	1,107	463	329	329
1869	329	4,581	2,841	1,947	122
1870	122	5,683	3,449	2,276	85
1871	85	3,449	1,949	1,472	113
1872	113	5,372	2,904	2,503	78
1873	78	2,8[illegible]3	1,885	1,040	46
1874	46	1.038	656	424	4
1875	4	2.033	1,085	901	51
1876	51	6.641	3,692	2,849	151
1877	151	5,495	2,279	3,269	98
1878	98	710	281	430	97
Totales	14	39,007	21,484	17,440	97

* Sus frutos comestibles en buena sazon aprovechaba, á los convalecientes, recordando todos con placer el agua del coco (*Cocus nucifera*) bebida agradable. La abundancia de colmenas permitia castrar sus panales y rocoger miel de excelente calidad que facilitaba la confección de jarabes y líquidos dulces.

CÓLERA.

Años.	Existencia anterior.	Entrados.	Suman.	Salidos.	Muertos.	Quedan.
1868	....	813	813	484	329	....
1869	....	3,932	3,932	1,945	1,967	20
1870	20	3,051	3,071	1,614	1,453	4
1871	4	912	916	333	539	144
1872	44	576	620	193	421	6
1873	6	46	52	24	28	....
1874	....	550	550	262	288	....
1875	....	....	....	....	....	....
1876	....	....	....	....	....	....
1877	....	2	2	....	2	....
1878	....	....	....	....	....	....
Totales	....	9,882	....	4,855	5,027	....

Movimiento general de heridos asistidos en los hospitales y enfermerías de la Isla de Cuba, durante la campaña ó sea desde 1º noviembre de 1868 á fin de junio de 1878.

HERIDOS.

Años.	Existencia anterior.	Entrados.	Suman.	Salidos.	Muertos.	Quedan.
1868	....	543	543	453	13	77
1869	77	1,936	2,013	1,702	175	136
1870	136	2,479	2,615	2,267	198	150
1871	150	2,116	2,266	1,881	177	208
1872	208	1,691	1,899	1,649	126	124
1873	124	1,936	2,060	1,740	116	204
1874	204	3,476	3,680	3,334	213	133
1875	133	2,044	2,177	1,820	158	199
1876	199	1,768	1,967	1,696	96	175
1877	175	1,841	2,016	1,692	149	175
1878	175	648	859	697	53	109
Totales	....	20,514	....	18,931	1,474	109

Resumen general de los enfermos asistidos, salidos y fallecidos en los hospitales y enfermerías de la Isla de Cuba durante la campaña, ó sea desde el 1º de noviembre de 1868 á fin de junio de 1878, con demostración del tanto por ciento.

MUERTOS.

Enfermedades.	Enfermos asistidos.	Curados.	Muertos.	Tanto por ciento entre asistidos y fallecidos.
Heridos	20,514	18,931	1,474	7.170
Fiebre amarilla	39,007	21,484	17,440	44.709
Cólera	9,882	4,855	5,029	50.890
Viruelas	3,665	2,671	990	24.283
Demás enfermedades	993,150	941,467	41,824	4.211
Totales	1,066,218	989,908	66,757	6.257

FALLECIDOS POR CUERPOS.

Marina	3,422
Artillería	2,827
Caballería	3,138
Infantería	30,373
Cuerpos auxiliares	5,619
Milicias y voluntarios movilizados	19,440
Prisioneros, servientes y demás clases, que no entran en la anterior clasificación	1,942
Total	66,757

CLASIFICACIÓN POR CLASES.

Jefes y oficiales	660
Tropa	66,097
Total	66,757

Resumen general del movimiento de enfermos habidos en los hospitales y enfermerías militares de la Isla de Cuba durante la campaña, ó sea desde 1° de noviembre de 1868 á fin de junio de 1878.

Años.	Existencia, anterior.	Entrados.	Suman.	Salidos.	Muertos.	Quedan.	Hospitalidades.
1868	667	15, 010	15, 677	14, 295	758	624	327, 206
1869	624	70. 251	70. 875	61, 316	5, 675	3, 888	1, 133, 952
1870	3. 888	85, 261	89, 149	78. 178	6, 339	4. 632	1, 461, 158
1871	4. 632	83, 770	88, 402	78, 117	4, 782	5. 503	1, 804, 574
1872	5, 503	98, 600	141. 103	93. 174	6, 121	4, 808	2, 142. 203
1873	4. 808	81, 756	86, 564	77. 224	3, 448	5, 892	1, 797, 958
1874	5. 892	135, 427	141. 319	129. 336	4. 749	7, 234	2, 482, 386
1875	7, 234	104, 432	111, 666	99 856	5. 320	6, 490	2. 251. 320
1876	6, 490	134, 879	141, 369	123. 536	8, 482	9, 351	2, 641. 325
1877	9. 351	184. 552	193, 903	165. 470	16. 170	12, 263	4, 129, 463
1878	12, 263	72. 280	84, 543	69. 406	4, 916	10, 221	1, 692. 212
Totales...	6, 667	1, 066, 218	....	989, 908	66. 756	10, 221	21. 833, 757

6. 257 por ciento.

MEMORIA-RESUMEN DE LA ESTADÍSTICA SANITARIA DEL EJÉRCITO ESPAÑOL CORRESPONDIENTE AL AÑO 1891.

Por PEDRO PEÑUELAS,

Inspector Cirujano del Ejército Español.

Al comenzar este trabajo el jefe que tiene la honra de dirigirse á V. E. pudiera empezar con las mismas palabras, estampadas en el resumen estadístico perteneciente al ejército de la Península y distritos ultramarinos correspondientes al año de 1890, y publicada en 11 de mayo del actual año.

En efecto; en la fecha citada no se habían publicado todavía las estadísticas extranjeras, y ahora, como entonces, tampoco tiene el negociado noticia de que se haya publicado ninguna estadística militar correspondiente el año de 1891.

Como no se mandan á esta inspección los datos que arrojan los trabajos militares publicados en Alemania, Francia, Italia, Austria, no puede asegurar terminantemente el negociado no se haya ejecutado en alguna de las expresadas naciones algún estudio estadístico del año que vamos á reseñar,* más como las revistas y los periódicos profesionales nada han publicado en el extranjero referente al año 1891 por lo que respecta á los organismos armados, creemos estar en lo firme al asegurar no se ha escrito ningún trabajo estadístico referente á los ejércitos europeos que se relacione con el citado año de 1891.

En la imposibilidad, por tanto, de poder hacer un estudio comparativo entre nuestra estadística sanitaria y otra cualquiera extranjera, vamos á emprenderla, teniendo en cuenta solamente los datos que han arrojado las nuestras durante los años 1890–91.

La fuerza en revista que tuvo el ejército de la Península durante el año de 1891 ascendió, por término medio, á 80,968 individuos imputables al ramo de guerra.

De ellos se asistieron en los hospitales 36,711, que causaron 924,147 hospitalidades. De éstos hubo 33,810 salidos, 815 fallecidos, y quedaron en hospitales en 1° de enero de 1892, 2,056 individuos de la clase de tropa. El promedio de la hospitalidad causada por cada individuo fué de veinticinco estancias, y el término medio de la hospitalidad general diaria ascendió á 2,531.

El número de ingresados por cada mil hombres de la fuerza en revista, fué de 453 por mil, y como en el año 1890 ascendió á 500, resulta una ventaja de consideración á favor del año de 1891.

También el número de fallecidos ha sido menor en el año que venimos reseñando, puesto que en 1890 fallecieron 829 hombres de la clase de tropa y en 1891 hubo 815.

* Unicamente Inglaterra remitió á nuestro ministerio de la guerra la estadística del año de 1890, cuando ya hacia bastantes meses se había publicado la española.

El negociado tiene la mayor satisfacción en hacer constar que el número de fallecidos por cada 1,000 hombres de fuerza en revista, va disminuyendo paulatinamente de tres años á esta parte. Así se ve que el año 1889 ascendió la proporcionalidad de fallecidos á 10.92 por mil hombres de fuerza en revista; en 1890 á 10.44 y en 1891 á 10.06. Como se ve, ha descendido cerca de un entero en este último año comparado con el de 1889. Dato halagüeño que el negociado hace constar con el mayor gusto, con tanta más razón cuanto el término medio de la fuerza en revista ha sido mayor el año 1889 que el 1890.

Para dar una idea ligera de las fuerzas asistidas en los hopitales militares y cívico-militares durante el año que venimos reseñando, vamos á dar á continuación dos estados en que se detalla el movimiento hospitalario por armas, imputables y no imputables al ministerio de la guerra.

IMPUTABLES.

Armas.	Asistidos.	Hospitalidades.	Salidos.	Muertos.	Quedan.
Infantería	24,938	609,598	23,049	563	1,326
Caballería	5,207	142,104	4,742	126	339
Artillería	4,093	113,457	3,764	69	260
Ingenieros	1,890	45,692	1,764	43	83
Brigada topográfica	2	20	1	1	....
Administracion	447	10 257	394	8	45
Sanidad	134	3,019	126	5	3
Inválidos	....	....	....	....	....
Totales	36,711	924,147	33,840	815	2,056

NO IMPUTABLES.

Jefes y oficiales	130	6,220	98	13	19
Guardia civil	601	16,772	540	24	37
Carabineros	670	16,275	606	16	48
Ultramar	942	36,117	857	28	57
Marina	369	9,527	325	4	40
Diversos	1,622	48,352	1,494	51	77
Totales	4,334	133,333	3,920	136	178

El movimiento por distritos de la fuerza imputable y no imputable al ministerio de la guerra ha sido el siguiente, durante 1891:

IMPUTABLES.

Distritos.	Asistidos.	Hospitalidades.	Salidos.	Muertos.	Quedan.
Castilla la Nueva	7,196	183,994	6,607	156	433
Cataluña	4,094	124,007	3,780	79	238
Andalucía	4,062	91,551	3,806	54	202
Valencia	2,553	67,548	2,338	52	153
Galicia	1,996	51,730	1,839	50	107
Aragón	2,114	55,055	1,954	59	101
Granada	3,140	82,287	2,904	73	163
Castilla la Vieja	2,613	61,660	2,411	77	123
Extremadura	1,105	24,246	1,039	18	48
Navarra	928	23,548	809	29	90
Vascongadas	2,975	63,247	2,665	56	254
Burgos	2,067	50,515	1,904	81	82
Baleares	693	17,944	661	4	28
Canarias	364	6,295	350	4	10
Ceuta	811	15,527	773	12	25
Totales	36,711	924,147	33,840	815	2,056

NO IMPUTABLES.

Distritos.	Asistidos.	Hospitalidades.	Salidos.	Muertos.	Quedan.
Castilla la Nueva	386	12,674	340	20	26
Cataluña	561	23,501	496	18	47
Andalucía	792	15,772	752	16	24
Valencia	463	17,641	422	16	25
Galicia	262	7,208	231	7	24
Aragón	74	2,675	64	5	5
Granada	1,068	29,250	977	27	64
Castilla la Vieja	63	1,419	56	4	2
Extremadura	77	2,763	71	1	5
Navarra	35	1,613	31	3	1
Vascongadas	101	2,435	90	3	8
Burgos	141	3,717	127	3	11
Baleares	113	3,768	106	1	6
Canarias	76	2,277	65	2	9
Ceuta	123	9,580	92	10	21
Totales	4,334	133,333	3,920	136	278

Las proporcionalidades de fallecidos en los distritos, ha sido la siguiente:

Distritos.	Muertos. Año 1890.	Muertos. Año 1891.	Distritos.	Muertos. Año 1890.	Muertos. Año 1891.
Castilla la Nueva	11.92	10.18	Extremadura	4.75	9.55
Cataluña	11.24	7.38	Navarra	9.08	10.78
Andalucía	8.44	6.80	Viscongadas	7.91	9.69
Valencia	5.91	7.71	Burgos	17.46	14.98
Galicia	12.64	17.69	Baleares	3.28	3.41
Aragón	11.53	10.67	Canarias	1.51	3.54
Granada	6.67	14.80	Ceuta	5.03	7.78
Castilla la Vieja	20.63	18.70			

Como se ve, los distritos más castigados han sido Castilla la Vieja, Galicia, Granada y Burgos; y los menos Baleares y Canarias. Se ve continúa la mortalidad en los distritos de referencia, lo cual indica siguen subsistentes las causas que producen aquélla, y de las que nos hemos ocupado en trabajos anteriores.

La mortalidad por grupos morbosos, es la siguiente: Medicina, 34.03; cirujía, 4.97; tuberculosis, 280.07; viruela, 115.83; heridas, 18.26; venéreo, 0.15, y comprobación, 31.58. Se nota una baja bastante acentuada en la clínica de tuberculosis, comparada con el año 1890, en el que ascendía la mortalidad á 345 por 1,000 en la clínica de referencia.

El resumen necrológico comparativo por cuerpos fué el que á continuación copiamos:

Armas.	Muertos. Año 1890.	Muertos. Año 1891.	Armas.	Muertos. Año 1890.	Muertos. Año 1891.
Infantería	10.50	10.36	Ingenieros	7.81	9.48
Caballería	13.17	10.36	Sanidad	1.95	10.18
Artillería	8.70	8.09	Administración	9.30	8.69

Se ve por el anterior resumen que las armas más castigadas han sido infantería y caballería, y la menos artillería.

ESTADÍSTICAS ESPECIALES.

Fiebres tifoideas.—Esta afección ha ocasionado la muerte á 146 soldados de infantería, 32 de caballería, 18 de artillería, 16 de ingenieros, 2 de administración y 3 de sanidad, ó sean 219. Como el año 1890 fallecieron 154, resulta desgraciadamente un aumento de consideración comparado con el año anterior. La proporcionalidad por cada 1,000 hombres de fuerza en revista ha sido la siguiente:

Distritos.	Muertos.		Distritos.	Muertos.	
	Año 1890.	Año 1891.		Año 1890.	Año 1891.
Castilla la Nueva	1.38	2.21	Vascongadas	2.02	1.73
Cataluña	2.66	2.52	Navarra	1.81	3.66
Andalucía	1.51	1.13	Extremadura	0.52	2.65
Valencia	0.69	1.71	Burgos	3.81	3.69
Galicia	2.66	8.84	Baleares	1.64	....
Granada	1.72	4.00	Canarias	....	0.88
Aragón	2.52	3.07	Ceuta	4.40	2.36
Castilla la Vieja	3.56	4.85			

Se ve que los distritos más castigados han sido en el año 1891, Galicia, Granada y Castilla la Vieja, y los menos Baleares y Canarias.

La proporcionalidad por armas ha sido la siguiente:

Armas.	Muertos,		Armas.	Muertos.	
	Año 1890.	Año 1891.		Año 1890.	Año 1891.
Infantería	1.85	2.68	Ingenieros	1.30	3.52
Caballería	3.25	2.62	Administración	1.16	2.16
Artillería	1.22	2.11	Sanidad	....	6.10

Se ve que en general las proporcionalidades han sido más elevadas en el año que venimos reseñando que en el anterior, y que sanidad ha tenido la cifra más elevada de mortalidad, sin duda por el contagio directo á que sus individuos se exponen en las salas de los hospitales.

Tuberculosis pulmonar—Las cifras de muertos é inútiles de esta terrible enfermedad durante el año de 1891, han sido las siguientes:

Armas.	Muertos.	Inútiles.	Armas.	Muertos.	Inútiles.
Infantería	84	246	Administración	....	4
Caballería	18	55	Sanidad	2	1
Artillería	10	42			
Ingenieros	11	23	Totales	125	371

Como en el año de 1890 fallecieron de tuberculosis 168 individuos, y en el año 1889, 190, resulta una notable mejoría en el año que venimos reseñando.

Las proporcionalidades de asistidos, muertos é inútiles en el año de 1891, por cada 1,000 hombres de fuerza en revista, han sido las que se detallan en el siguiente cuadro:

Distritos.	Asistidos.	Muertos.	Inútiles.	Distritos.	Asistidos.	Muertos.	Inútiles.
Castilla la Nueva	6.13	1.76	4.37	Vascongadas	9.52	1.09	7.61
Cataluña	5.88	0.74	5.13	Navarra	9.90	1.10	8.80
Andalucía	10.34	2.02	8.32	Extremadura	3.71	1.59	2.12
Valencia	1.82	0.34	1.36	Burgos	6.10	1.84	4.62
Galicia	9.19	3.53	5.65	Baleares	3.22	0.92	2.30
Granada	3.80	2.20	1.60	Canarias	3.54	1.77	1.77
Aragón	7.05	1.44	5.60	Ceuta	1.18	1.18	....
Castilla la Vieja	5.58	2.18	2.91				

Se ve que el distrito más castigado por defunciones ha sido Galicia, y el menos Valencia.

La proporcionalidad de fallecidos por armas ha sido la siguiente en ambos años:

Armas.	1890.	1891.	Armas.	1890.	1891.
Infantería	2.07	1.54	Ingenieros	2.82	2.42
Caballería	2.74	1.47	Administración	3.48	....
Artillería	1.22	1.17	Sanidad	....	4.73

Se ve que en el año 1891 sanidad acusa la mayor mortalidad y administración la menor.

Paludismo.—Han fallecido de esta enfermedad en el año que venimos reseñando 12 hombres de Infantería y ninguno en las demás armas. Como en el año 1890 fallecieron 21 y en el 1889 23, resulta una gran disminución á favor del que venimos reseñando.

La proporcionalidad por distritos es la siguiente en el año 1891:

Distritos.	Asistidos.	Muertos.	Distritos.	Asistidos.	Muertos.
Castilla la Nueva	22.26	1.51	Vascongadas	4.67	....
Cataluña	1.96	0.18	Navarra	1.46	....
Andalucía	35.81	....	Extremadura	31.84	1.06
Valencia	12.66	0.11	Burgos	7.02	....
Galicia	3.18	....	Baleares	12.44	....
Granada	37.21	0.80	Canarias	4.42	....
Aragón	1.99	....	Ceuta	27.79	1.18
Castilla la Vieja	14.33	....			

Los distritos más castigados han sido Castilla la Nueva, Extremadura y Ceuta, respecto á fallecidos, y los menos Galicia, Aragón, Castilla la Vieja, Vascongadas, Navarra, Burgos, Baleares y Canarias.

La proporcionalidad de asistidos y muertos por armas ha sido la siguiente:

Armas.	Asistidos.	Muertos.	Armas.	Asistidos.	Muertos.
Infantería	15.20	0.22	Ingenieros	14.55	....
Caballería	17.56	....	Administración	17.14	....
Artillería	12.91	....	Sanidad	6.10	....

Venéreo.—Han sido asistidos en hospitales 3,006 individuos de infantería, 1,257 de caballería, 693 de artillería, 434 de ingenieros, 146 de administración y 19 de sanidad; de éstos han fallecido 1 en infantería y se ha concedido una licencia temporal en la misma arma.

Las proporcionalidades de asistidos y muertos en el año 1891 han sido las siguientes, por cada 1,000 sanos:

Distritos.	Asistidos.	Muertos.	Distritos.	Asistidos.	Muertos.
Castilla la Nueva	97.53	....	Vascongados	25.97	....
Cataluña	51.38	....	Navarra	19.44	....
Andalucía	116.51	0.12	Extremadura	143.84	....
Valencia	50.87	....	Burgos	19.78	....
Galicia	98.33	....	Baleares	59.44	....
Granada	108.24	....	Canarias	7.97	....
Aragón	52.10	....	Ceuta	49.67	....
Castilla la Vieja	58.55	....			

La proporcionalidad comparada por armas ha sido la siguiente:

Armas.	Asistidos. 1890.	Asistidos. 1891.	Armas.	Asistidos. 1890.	Asistidos. 1891.
Infantería	53.57	55.34	Ingenieros	72.04	95.74
Caballería	51.45	102.49	Administración	89.53	158.17
Artillería	68.41	81.33	Sanidad	31.25	38.69

Sífilis.—Tuvieron ingreso en los hospitales á consecuencia de esta afección 298 individuos de infantería, 91 de caballería, 66 de artillería, 34 de ingenieros, 5 de administración y 1 de sanidad.

Se declararon 3 inútiles en infantería, 2 en caballería y 1 en artillería; no hubo ningún fallecido.

La proporcionalidad por distritos ha sido la siguiente:

Distritos.	Asistidos.	Distritos.	Asistidos.
Castilla la Nueva	8.22	Vascongadas	1.90
Cataluña	5.79	Navarra	2.20
Andalucía	14.24	Extremadura	6.36
Valencia	0.79	Burgos	6.39
Galicia	13.44	Baleares	11.52
Granada	8.50	Canarias	4.22
Aragón	5.97	Ceuta	....
Castilla la Vieja	3.88		

La proporcionalidad por armas es la siguiente:

Armas.	1890.	1891.	Armas.	1890.	1891.
Infantería	10.22	5.48	Ingenieros	18.88	7.50
Caballería	23.69	7.46	Administración	3.48	6.50
Artillería	13.60	7.74	Sanidad	5.85	4.07

Se ve que el arma más castigada fué artillería, y la menos sanidad.

Viruelas.—Se asistieron en los hospitales militares y cívico-militares de la Península 259 individuos; hubo 129 venidos de otras clínicas, 28 pasados, 306 salidos y 30 muertos, quedando el resto en tratamiento.

De los 30 fallecidos hubo 4 en Castilla la Nueva, 2 en Cataluña, 6 en Grenada, 3 en Vascongadas, 2 en Valencia, 5 en Aragón, 1 en Burgos, 4 en Galicia, 2 en Ceuta, y en Castilla la Vieja 1.

De éstos fallecieron 22 en infantería, 2 en caballería, 2 en artillería y 1 en administración. Total, 27; siendo el resto hasta 30 no imputables al ministerio de la guerra.

Los distritos más castigados han sido Granada, Aragón y Castillo la Nueva, y los menos Baleares y Extremadura.

Las proporcionalidades por armas han sido las siguientes:

Armas.	Muertos.	Armas.	Muertos.
Infantería	0.38	Ingenieros	....
Caballería	0.15	Administración	1.08
Artillería	0.23	Sanidad	....

Se ve que el arma más castigada ha sido administración, y la menos sanidad.

La proporcionalidad por distritos ha sido la siguiente:

Distritos.	Muertos, por 1.000 sanos.	Distritos.	Muertos, por 1,000 sanos.
Castilla la Nueva	0.19	Extremadura	....
Cataluña	0.09	Navarra	....
Andalucía	....	Vascongadas	0.51
Valencia	0.22	Burgos	0.18
Galicia	1.41	Baleares	....
Granada	0.80	Canarias	....
Aragón	0.90	Ceuta	1.18
Castilla la Vieja	0.23		

Se ve que los distritos más castigados han sido Galicia y Ceuta, y los menos Extremaduras, Baleares, Canarias, Navarra y Andalucía.

Vacunación y revacunación.—Para apreciar detalladamente los resultados de ésta, vamos á dar los resúmenes por armas y distritos del ejército de la Península, cuyos resultados, como se verá, son satisfactorios.

RESUMEN POR ARMAS.

	Número de vacunados.	Resultado.		Número de revacunados.	Resultado.		Totales.	
		Con éxito.	Sin él.		Con éxito.	Sin él.	Con éxito.	Sin él.
Infantería	13,726	11,200	2,567	10,312	6,281	4,028	17,484	6,595
Caballería	3.436	2.670	766	2,770	1,815	955	4.485	1,721
Artillería	1,982	1,654	328	2,100	1.373	727	3,027	1.055
Ingenieros	1,354	1,120	234	907	639	268	1,759	502
Administración	234	165	69	140	80	60	245	129
Sanidad	142	104	38	140	83	57	187	95
Totales	20,915	16,913	4,002	16,369	10,274	6,095	27,187	10,097

RESUMEN POR DISTRITOS.

Castilla la Nueva	6,265	4,882	1,383	1,652	906	746	5,788	2.129
Cataluña	3,782	2,910	872	1.164	584	580	3.494	1,352
Andalucía	436	379	47	2.100	1,850	250	2.229	293
Valencia	191	143	48	2,476	1,649	827	1,792	875
Galicia	1,373	797	576	429	74	355	871	931
Granada	2.610	2,827	283	1,564	794	770	3,121	1,053
Aragón	2,905	2,730	176	1,081	215	866	1,945	1,042
Castilla la Vieja	456	247	209	1.026	669	257	916	569
Extremadura	601	542	59	....	....	....	542	59
Navarra	47	45	2	882	534	348	576	350
Vascongadas	56	51	5	1,953	1,598	355	1,649	360
Burgos	994	789	205	1,701	1,255	446	2,044	651
Baleares	633	633	....	54	....	54	633	54
Canarias	52	38	14	9	7	2	45	16
Ceuta	523	400	123	278	139	139	539	262
Totales	20,915	16,913	4,002	16,368	10,274	6,095	27,187	10,097

Pneumonias y pleuro-pneumonias.—Han sido asistidos en los hospitales militares y cívico-militares de la Península: 956 en infantería, 276 en caballería, 101 en artillería, 42 en ingenieros, 13 en administración y 7 en sanidad.

De éstos han fallecido 101 en infantería, 31 en caballería, 10 en artillería y 5 en ingenieros, ó sean 147.

Como en el año anterior fallecieron 169, resulta una diminución muy acentuada á avor del año 1891.

Las proporcionalidades de muertos por distritos ha sido la siguiente:

Distritos.	Muertos.	Distritos.	Muertos.
Castilla la Nueva	2.41	Extremadura	3.71
Cataluña	5.28	Navarra	2.93
Andalucía	0.81	Vascongadas	1.21
Valencia	1.36	Burgos	13.50
Galicia	1.41	Baleares	....
Granada	2.60	Canarias	0.88
Aragón	1.44	Ceuta	1.18
Castilla la Vieja	3.30		

Se ve que el distrito más castigado ha sido Burgos, donde se ha triplicado la mortalidad con respecto á los de mayores cifras mortuorias.

La proporcionalidad comparada, por armas, ha sido la siguiente:

Armas.	1890.	1891.	Armas.	1890.	1891.
Infantería	2.01	1.87	Ingenieros	2.17	1.10
Caballería	2.74	2.54	Administración	1.16	....
Artillería	2.20	1.17	Sanidad	1.95	....

Se ve que el arma más castigada ha sido caballería, y las menos administración y sanidad.

Inútiles.—Han sido declarados 1,647 en infantería, 292 en caballería, 223 en artillería, 124 en ingenieros, 18 en administración y 11 en sanidad. Total, 2,315.

La proporcionalidad por armas, ha sido la siguiente:

Infantería	30.32	Ingenieros	27.35
Caballería	23.95	Administración	19.50
Artillería	26.17	Sanidad	22.40

Como se ve, el arma más castigada ha sido infantería, y la menos administración.

Examinando el número de individuos imputables y no imputables al ministerio de la guerra, nos encontramas con las siguientes cifras:

Distritos.	Fuerza imputable.	Fuerza no imputable.	Distritos.	Fuerza imputable.	Fuerza no imputable.
Castilla la Nueva	456	28	Aragón	129	6
Cataluña	281	94	Vascongadas	182	6
Andalucía	295	64	Navarra	94	2
Valencia	212	111	Granada	182	15
Burgos	195	26	Galicia	75	31
Castilla la Vieja	138	2	Baleares	16	5
Extremadura	29	1	Canarias	23	....

Las enfermedades que mayor número de inútiles han proporcionado, han sido las siguientes:

Enfermedades.	Infantería.	Caballería.	Artillería.	Ingenieros.	Admón.	Sanidad.
Hernias	252	42	34	12	3	2
Tuberculosis pulmonar	246	55	42	23	4	1
Hegm.ᵃˢ apart. resp.º	161	39	28	29	3	4
Debilidad general	89	23	13	8	3	1
Lesión org. corazón	91	9	10	6	....	2
Tiña	50	9	7	6	....	....

Traumatismos.—Han tenido ingreso en los hospitales militares y cívico-militares á consecuencia de herida por agresión ó por accidente, 287 heridos de infantería, 151 de caballería, 114 de artillería, 48 de ingenieros y 9 de administración. Total, 609.

De éstos han fallecido 5 en infantería, 2 en caballería, 2 en artillería. Total 9.

Han sido declarados inútiles 7 de infanteria, 3 de caballería, 3 de artillería y 1 en ingenieros. Total, 14; el resto han curado.

Licencias temporales.—Con objeto de convalecer de diferentes enfermedades, se han concedido las siguientes licencias en el ejército de la Península:

Infantería, 1,199; caballería, 313; artillería, 307; ingenieros, 157; administración, 36; sanidad, 26. Total, 2,038.

Las principales enfermedades por las cuales se han concedido licencia, han sido las siguientes:

Enfermedades.	Infantería.	Caballería.	Artillería.	Ingenieros.	Admón.	Sanidad.
Anemia	113	24	24	7	3	1
Bronquitis	69	47	55	19	1	1
Catarro pulmonar	150	26	34	17	5	3
Fiebres intermitentes	97	20	20	12	3	3
Fiebres tifoideas	73	28	10	7	1	....
Pneumonías	152	48	30	16	4	5
Reumatismo	100	20	38	16	1	3
Sarampión	77	10	7	3	....	....
Viruelas	88	16	28	11	4	1

Suicidios y cadáveres en depósito.—Ha habido 5 suicidios en infantería producidos por disparo de arma de fuego, y se han admitido 12 cadáveres en depósito pertenecientes: á infantería 9, á caballería 2, y á artillería 1.

Isla de Cuba.

El término medio de la fuerza en revista en esta Antilla, ha sido 12,857 hombres en infantería, 1,828 en caballería, 941 en artillería, 753 en ingenieros, 130 en sanidad y 4,232 en guardia civil, que es fuerza imputable, ó sea en total 20,744 hombres.

Fallecidos.—De éstos han sucumbido 378 en infantería, 42 en caballería, 40 en artillería, 17 en ingenieros, 3 en sanidad y 59 en guardia civil, que dan un total de 539.

Como en el año 1890 solamente fallecieron 363, resulta considerablemente aumentada la mortalidad en el de 1891, pues mientras en el primero fué de 16.47 por cada 1,000 hombres de fuerza en revista, en 1891 ascendió á 25.98 por 1,000 sanos. Esto se ha debido al considerable aumento que en el año que venimos reseñando ha tenido la necrologia por *fiebre amarilla*, según vamos á ver immediatamente.

	Fallecidos de fiebre amarilla.			Fallecidos de fiebre amarilla.	
	Año 1890.	Año 1891.		Año 1890.	Año 1891.
Infantería	131	299	Sanidad	3	....
Caballería	13	23	Guardia civil	29	32
Artillería	25	30			
Ingenieros	30	13	Totales	231	397

Así es, que mientras en el año 1890 fallecieron de esta sola enfermedad el 10.48 por 1,000 sanos, ascendió en 1891 al 19.13 por idéntica cifra de fuerza en revista. Sólo en el Hospital Militar de la Habana se asistieron de tan cruel dolencia durante el citado año, 881 individuos de tropa, de los que fallecieron 222, produciendo una mortalidad de 250.14 por 1,000 asistidos, cifra como se ve desconsoladora por lo alta.

Fiebres tifoideas.—Se asistieron de esta enfermedad 31 hombres en infantería, 9 en caballería, 1 en artillería, 2 ingenieros y 1 guardia civil, total 44. De éstos fallecieron 9 en infantería, 4 en caballería y 2 en ingenieros; es decir, 15, siendo por tanto las proporcionalidades por cada 1,000 sanos de 0.70 en infantería, 2.18 en caballería y 2.56 en ingenieros.

Tuberculosis pulmonar.—Hubo que lamentar la pérdida de 23 muertos en infantería por 47 asistidos, 1 muerto en caballería por 6 asistidos, 1 en artillería de 3 ingresados, 1 en ingenieros por 5 ingresados, 1 en sanidad por 3 ingresados y 6 de guardia civil de 12 entrados, es decir 33 muertos en total, además de 10 inútiles que se declararon de esta cruel afección y de 25 licencias que se concedieron por la misma. Las proporcionalidades de fallecidos por cada 1,000 hombres de fuerza en revista, fueron como sigue: 1.78 en infantería, 0.51 en caballería, 1.06 en artillería, 1.32 en ingenieros, 7.70 sanidad y 1.40 guardia civil, llamando la atención la alta cifra necrológica que correspondió á sanidad.

Paludismo.—Se asistieron de malaria 396 individuos de infantería, 56 de caballería, 38 de ingenieros y 58 de guardia civil; total 601. Como en 1890 se asistieron 1,558 y en 1889 hubo 2,051 ingresados en los hospitales por esta enfermedad, se nota una importantísima disminución de entrados en hospitales, que gustosísimos consignamos.

Los fallecimientos por la misma ascendieron á 15 en infantería, 4 en caballería, 2 en artillería y 6 en guardia civil, ó sean, 27 en total, lo que da una proporcionalidad de 1.16 por infantería, 2.18 por caballería, 2.12 por artillería y 1.41 por guardia civil.

Venéreo.—Hubo 669 asistidos en infantería, 74 en caballería, 53 en artillería, 51 en ingenieros y 83 en guardia civil, total 928. Todos curaron.

Sífilis.—Ingresaron 36 individuos en infantería, 2 en caballería, 1 en artillería, 3 en ingenieros y 14 en guardia civil, total 56; no hubo ningún inútil ni fallecido.

Pneumonía.—Se asistieron 19 en infantería, 1 en caballería, 2 en artillería y 1 en guardia civil, total 23. De éstos fallecieron 2 individuos de infantería 1 de artillería, siendo por tanto las proporcionalidades necrológicas de 0.15 por la infantería y 2.12 por la artillería.

Viruelas.—Hubo 1 muerto en artillería y 1 en guardia civil, lo que da la proporcionalidad de 1.06 por la primera arma y de 0.23 por la segunda. Resulta halagüeño para la estadística cubana tan exígua cifra necrológica por esta repugnante enfermedad en ejército de más de 20,000 soldados, siendo más afortunado éste que el de la Península, donde de 80,000 hombres de fuerza en revista, han fallecido 27, es decir, más del triple que en Cuba.

Inútiles.—Se han declarado 47 en infantería, 3 en caballería, 8 en artillería, 6 en ingenieros, 1 en sanidad y 12 en guardia civil, total 77. De éstos lo fueron la mayoría por tuberculosis, hernias, afecciones crónicas del aparato respiratorio, hipertrofia cardiaca, et cétera. Las proporcionalidades fueron las siguientes:

Infantería	3.65
Caballería	1.64
Artillería	8.50
Ingenieros	7.96
Sanidad	7.68
Guardia civil	2.83

Traumatismos.—Tanto por agresión como por accidente, hubo 63 heridos en infantería, 22 en caballería, 18 en artillería, 8 en ingenieros, 1 en sanidad y 13 en guardia civil, total 125. De éstos fallecieron: 1 en infantería, 4 en caballería, 1 en artillería y 1 én ingenieros, total 7. Hubo 3 inútiles en infantería, curaron el resto.

Regresados por enfermos á la Península.—Se embarcaron para España 147 en infantería, 35 en caballería, 28 en artillería, 48 en ingenieros, 2 en sanidad y 16 en guardia civil; total, 276. Las enfermedades que produjeron su baja en Cuba, fueron la cloroanemia, en 184 casos; la gastralgia, en 44; la tuberculosis, en 25; regresando el resto por padecer catarros, hepatalgias, infartos, etc.

ISLA DE PUERTO RICO.

Fuerza en revista.—El término medio en esta Antilla, fué de 2,196 soldados en Infantería, 7 en caballería, 470 en artillería, 25 en sanidad y 639 en guardia civil; total, 4,337. De éstos fallecieron 21 en infantería, 10 en artillería y 3 en guardia civil; total, 34. Como en el año 1890 murieron 101, resulta la mortalidad disminuida en *dos tercios* en el 1891. Así, mientras el tanto por 1,000 de fallecidos, fué en el primer año de 28.07, en el que venimos reseñando sólo fué de 9.69, cifra altamente ventajosa, tratándose de un país tropical.

Fiebre amarilla.—Fallecieron de esta cruel dolencia 7 individuos de infantería, 5 de artillería y 2 de guardia civil; total, 14. Lo que da una proporcionalidad de 4.57 por 1,000 sanos. El año de 1890 fallecieron de esta sóla enfermedad 74 individuos imputables á guerra, ascendiendo la proporcionalidad de dicho año á 20.77 contra 4.57 en el año de 1891. El resultado es consolador en alto grado por el año actual, y lo consignamos con el mayor gusto.

Fiebres tifoideas.—Uno asistido en infantería que murió. La proporcionalidad fué, pues, de 0.45 por 1,000 sanos.

Tuberculosis pulmunar.—Doce asistidos en infantería, 6 en artillería, 6 en guardia civil y 1 en sanidad; total, 25. De estos fallecieron 1 en infantería y 2 en artillería; total, 3. Se dieron por útiles 11, y 10 con licencia temporal. La proporcionalidad de muertos fué de 0.45 en infantería y 4.25 en artillería.

Paludismo.—Hubo 241 asistidos en infantería, 67 en artillería y 95 en guardia civil; total, 403. De éstos fallecieron 5 en infantería, curando el sexto. Las proporcionalidades fueron, pues, de 2.27 por 1,000 en Infantería.

Pneumonias.—Hubo 2 asistidos en infantería, de los que murió 1, y 1 en artillería, que falleció; total, 3. Las proporciones fueron, pues, de 0.45 por infantería y 2.50 por 1,000 sanos por Artillería.

Venéreo y sífilis.—Se asistieron 184 imputables á guerra que curaron todos. En sífilis ingresaron 50 que también curaron.

Viruela.—No hubo ningún fallecido de esta cruel afección.

Inútiles.—Hubo 29 en infantería, 4 en artillería y 1 en guardia civil, total, 34. Siendo las proporcionalidades de 13.23 por infantería, 8.50 por artillería y 1.56 por la guardia civil. Las enfermedades que dieron más inútiles fueron la tuberculosis, lesión orgánica de corazón y palpitaciones del mismo.

Traumatismos.—Hubo 6 heridos en infantería y 4 en artillería; total, 10. Todos curaron.

Pases á España por enfermos.—Regresaron por este concepto 23 individuos de infantería, 6 en artillería, 12 en guardia civil y 4 en sanidad; total, 45. Las enfermedades que produjeron sus regresos fueron principalmente la cloro-anemia, la tuberculosis, la debilidad general, los infartos viscerales y el catarro intestinal.

ISLAS FILIPINAS.

El término medio de la fuerza en revista en el Archipiélago ha sido de 2,271 europeos y de 10,750 indígenas de la fuerza imputable á guerra, toda vez que el resto hasta las cifras consignadas en los estados generales es de organismos no imputables al ministerio de la guerra.

De esta fuerza han fallecido 8 europeos y 233 indígenas en infantería, 1 europeo y 5 indígenas en caballería, 59 europeos en artillería, 1 europeo y 2 indíginas en ingenieros, 16 indígenas en guardia civil y 8 indígenas en guardia veterana, ó sean, en total, 69 europeos y 264 indígenas.

Las proporcionalidades de fallecidos han sido para los europeos 30.38 y para los indígenas 24.55. Como el año 1890 fueron de 555, para los europeos y 9.81 para los indígenas, resultan muy elevadas las proporcionalidades en el año actual. Esto se debe. en primer término, á las fiebres perniciosas que han ocasionado 20 muertos europeos y 76 indígenas. y á la disentería que ha arrebatado 7 europeos y 51 indígenas.

Fiebres tifoideas.—Se han asistido 21 europeos y 23 indígenas, de los cuales han fallecido 14 europeos y 22 indígenas.

Las proporcionalidades de fallecidos han sido para infantería de 0.36 europeos y 0.28 para los indígenas; para la artillería de 2.00 europeos y 0.00 para los indígenas; para los ingenieros de 2.35 en los europeos y 0.22 para los indígenas, y para la guardia civil 0 europeos y 0.30 indígenas.

Tuberculosis pulmonar.—Hubo 12 europeos asistidos y 76 indígenas; de éstos murieron 4 europeos y 31 indígenas, y se declararon inútiles 6 europeos y 39 indigenas, en infantería y se declararon inútiles 6 europeos y 39 indígenas.

Las proporcionalidades de fallecidos fueron las siguientes: 0.29 en infantería, indígenas; 0.22 en artillería, europeos; y 0.22 indígenas de guardia civil.

En inútiles hubo las siguientes proporcionalidades: 0.39 indígenas en infantería; 0.13 europeos en artillería; 0.67 indígenas en ingenieros y 0.18 guardia civil.

Paludismo.—Hubo 67 europeos ingresados de paludismo y 2,657 indígenas: de éstos han fallecido 20 europeos y 76 indígenas.

Se han concedido 427 licencias indígenas, y han regresado á España 12 europeos.

La proporcionalidad de fallecidos ha sido: 0.36 europeos y 0.98 indígenas en infantería; 1.00 en artillería y 0.13 en guardia civil.

Venereo.—Se han asistido 119 europeos y 52 indígenas; no ha habido ningún muerto ni inútil.

Sífilis.—Se han asistido 7 europeos y 27 indígenas imputables á guerra; se han concedido 4 licencias, curando el resto.

Pneumonias.—No ha habido ningún ingresado.

Viruela.—Han fallecido de esta cruel enfermedad 3 europeos y 9 indígenas, lo que da una proporcionalidad de 1.31 para los europeos y 0.83 para los indígenas.

Inútiles.—Han sido declarados inútiles 1 europeo y 166 indígenas en infantería, 6 indígenas en caballería, 26 europeos en artillería, 6 indígenas en ingenieros, 2 indígenas en sanidad, 17 indígenas en guardia civil y 1 indígena en guardia veterana, lo que da un total de 27 europeos y 198 indígenas.

La proporcionalidad de inútiles por razas fué de 11.67 europeos y 17.50 indígenas.

Las enfermedades que mayor número de inutilidades causaron fueron la debilidad general, las hernias, las palpitaciones de corazón y la tuberculosis pulmonar. De la primera se inutilizaron 3 europeos y 51 indigenas, de la segunda 2 europeos y 4 indígenas, de la tercera 1 europeo y 11 indígenas y de la cuarta 6 europeos y 39 indígenas.

Traumatismos.—Ingresaron en hospitales 67 heridos en infantería, 8 en caballería, 27 en artillería, 4 en ingenieros, 3 en carabineros y 6 en guardia civil; total, 115. De éstos fallecieron 2 en infantería, 1 en artillería. Además se declararon inútiles, 3 en infantería, 1 en guardia civil, 1 en carabineros y 1 en ingenieros. Finalmente, en varias acciones de guerra, fallecieron 5 en infantería, 2 en artillería y 7 de fuerza no imputable á guerra; total, 14.

Pases á la Península por enfermos.—Regresaron por este concepta á España 60 en infantería, 5 en caballería, 261 en artillería, 7 en ingenieros y 3 en guardia civil; total, 336.

Las enfermedades que les obligaron principalmente á regresar á la Península fueron en 280 casos la anemia, en 11 el catarro intestinal, en 12 el paludismo, y en 9 las palpitaciones del corazón.