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The Journal Lancet

Official Journal of the American College Health Association
Great Northern Railway Surgeons' Association, Minneapolis Academy of Medicine, North Dakota State
Medical Association, Northwestern Pediatric Society, South Dakota Public Health Association,
North Dakota Society of Obstetrics and Gynecology and North Dakota Pediatrics Society

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The Journal Lancet

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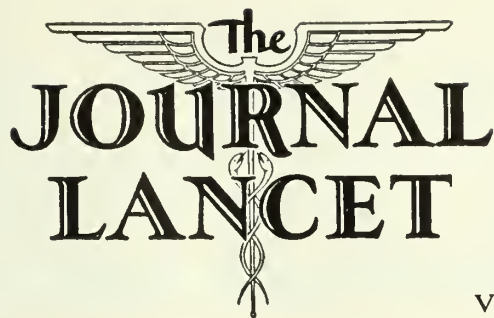
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The
JOURNAL
LANCET

JANUARY, 1951

Volume LXXI, No. 1

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JOURNAL-LANCET extends an invitation to the profession for articles with the understanding that they are original contributions not previously published.

Manuscripts are to be typed on one side of the paper, double spaced. Illustrations must be in the form of glossy prints or drawings in black ink. Statistical tables and charts should be set up according to the style used in this journal and should be presented on separate sheets rather than within the text material. Please do not attach legends to the pictures. A rea-

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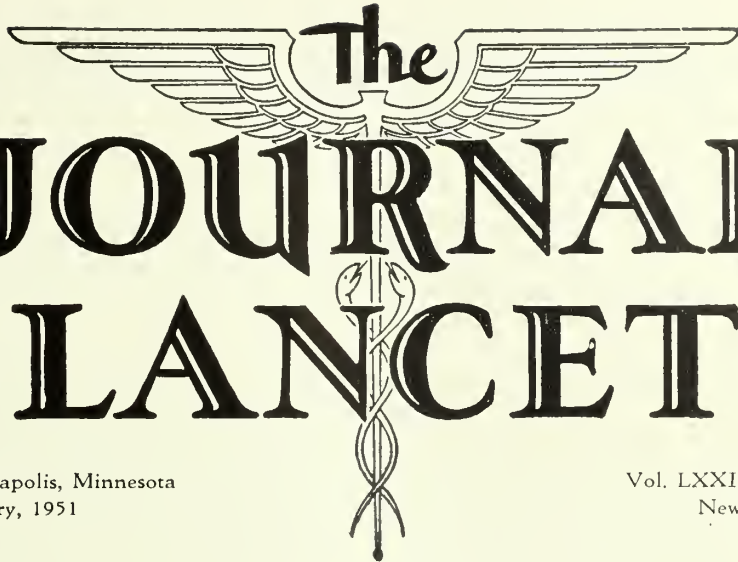
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The JOURNAL LANCET

Minneapolis, Minnesota
January, 1951

Vol. LXXI, No. 1
New Series

Foreword

As the year 1951 begins, the medical profession possesses the most effective armamentarium in recorded history. The system of practicing medicine, promoting public health, etc., in the United States has already been so effective that the span of human life in this country now exceeds that in any other large nation and is equal to that of the smallest nations. The dissemination of medical information through schools of medicine, postgraduate courses, continuation study centers and journals makes it possible for every physician to be informed and employ the most modern methods of diagnosis, treatment and prevention of all diseases and conditions which attack the human body.

The article in this issue of the JOURNAL-LANCET by Dr. H. E. French, covering a span of 70 years of medical practice in the Dakotas relates the magnificent accomplishments of the medical profession of that state. There is a preponderance of general practitioners in North Dakota and it is physicians of this group there, as well as elsewhere in this country, who have always done the lion's share of health work. North Dakota has also been blessed with some of the most outstanding physicians in all of the specialties. For the most part they have worked in larger cities where, in cooperation with the general practitioners, some of the best known clinics and hospitals for private practice in this country now exist.

An editorial in the December 1950 issue of the JOURNAL-LANCET by Dr. R. O. Saxvik, director of the State Department of Health, manifests a far-reaching vision for the future health of the citizenry of North Dakota. There is no place where physicians, nurses, social workers, veterinarians, pharmacists and the public at large is better informed and more thoroughly equipped to use the armamentarium of 1951 to the best possible advantage in relieving suffering, successfully treating curable conditions and controlling preventable diseases.

J. A. MYERS, M.D., *Chairman, Board of Editors*

North Dakota Medicine—A 70-Year Span

H. E. French, M.D.*

Grand Forks, North Dakota

EDITOR'S NOTE: In 1951 we mark the seventieth anniversary of organized medicine in Dakota Territory, that area now forming the present states of North and South Dakota. For this special anniversary issue, Dr. French has prepared this article covering the seven decades of medicine in the northern state. The historical material presented is condensed from a series of talks given by Dr. French to the medical students at the University of North Dakota.

“SEVENTIETH ANNIVERSARY YEAR” takes us back to the very beginnings of the bona fide settlements in North Dakota as well as to the beginnings of its medicine. In 1870 what is now the state was an undeveloped part of Dakota Territory. Before that time there had been rather a large number of trading posts, some of them temporary, scattered over the area, which were centers and stopping places for traders, trappers and hunters and for the fewer squatters along the streams. From about 1859 there were also a few army posts or forts, again sometimes temporary: Abercrombie, Rice, Totten, Pembina, Lincoln and others. The only medical men had been a few army doctors assigned to these posts or to expeditions protecting wagon trains on their way to the Pacific Coast or to armies in the Indian Wars of the 1860's. The population of what is now the state was said to be 2,405 in 1870.

About 1870 squatters began to occupy land along the west bank of the Red River, and in the southern counties there were simply extensions of the settlements in Minnesota and the southern part of the Territory. Fargo began thus in 1870 when a couple of squatters settled on land now within the city limits. The next year the Northern Pacific Railway crossed the Red River and the village began to grow rapidly, and soon had a population of 1,000, then 2,000. It incorporated as a city in 1875. The first practitioner of medicine was a Dr. Kurtz,¹ an employee of the railway, who came with the construction crews, and went on with them as the railway pushed on rapidly toward Bismarck. About the same time another doctor moved over from Moorhead, and others followed rapidly, among them Dr. E. M. Darrow, who came in 1878, and who soon established himself as a leading professional man in the city and in the Territory and the state. The city directory of 1884 lists fourteen doctors.

Grand Forks, where at times there had been something of a trading post and a landing for steamboats on the Red River, was first settled by squatters on Government lands in 1869 and 1870, and was organized as a village in 1875. When the Great Northern Railway entered the town from the east, Crookston and Fisher's Landing in 1880, its population was estimated at 1,700. It was incorporated as a city in 1881 and by 1885 claimed a population of 4,000. The first doctor was Dr. George A.

Haxton in 1877, who died of smallpox the next year. Other doctors followed rapidly, among them Dr. H. M. Wheeler who came in 1880, and who was recognized as an outstanding professional man and citizen until well into the present century.

Throughout the 1870's, 1880's and in the first two decades of statehood the population by immigration increased rapidly. The population in 1870 has already been given as 2,405. By 1880 it was 36,609; by 1890, 182,719. Going on into statehood the population in 1900 was 319,146; by 1910, 583,888. If the population in the early days increased by the thousands, doctors surely came by the dozens. They came not only to the larger towns and cities, as recorded earlier, but to the small towns and villages as well. There were doctors in many villages of less than 100, and doctors in what have been ghost towns for sixty years. Very often there were two or more doctors in towns of less than 500; some of these towns became larger and more important as time went on, but many of them, as of now, have not had a resident doctor for thirty years.

We cannot be sure how many doctors were in what is now North Dakota in any particular year, or even at the time of statehood. By 1875 there were a few, but they continued to come; a few died, some at least did not remain long but moved to other states; many established their homes, and continued to practice until well into this century. Only one of the 200 or so men licensed in Territorial days is listed in the Directory of the American Medical Association for 1950—Dr. Burrows of Bathgate, now living in retirement. By 1890, or statehood, we can suppose there were between 175 and 200 doctors practicing in the state. The Territorial Board (1885 to 1890) left a list of doctors that had been granted licenses to practice in the Territory. A count of the names on that list that are reported as of counties, cities or towns later included in North Dakota gives a total of 201. This confirms our estimate above, allowing for some deaths and removals. Polk's Medical Directory 1893, three years later, lists 192 doctors in the state at that time. By count these 192 doctors are listed under 92 cities and towns. A further study shows that nine of the cities had populations of 1,000 or more: Bismarck 2,186; Casselton, 1,000; Fargo, 5,613; Grafton, 1,594; Grand Forks, 4,979; Jamestown, 2,296; Mandan, 1,325; Valley City, 1,089; Wahpeton, 1,510. There were twenty-two towns with populations between 500 and

*Professor of anatomy and dean emeritus, School of Medicine, University of North Dakota.

999; sixty-one towns with one or more doctors had populations of less than 500 (twelve of them had less than 100). The doctors at that time listed under what have been for perhaps fifty years, the four largest cities in the state were Bismarck, 6; Fargo, 14; Grand Forks, 14; and Minot, 4.

A further study of the list of physicians licensed by the Territorial Board (201), shows that they were all young or middle aged. Very many of them had come to the Territory immediately after graduation. It also shows that the most of them had been trained in medical schools of the United States, all the way from New England to the Missouri River, all the way from the Great Lakes to Virginia, Kentucky and Missouri. Schools in Chicago, New York, Philadelphia, Ann Arbor and the Twin Cities are perhaps mentioned most frequently; but many other schools are mentioned, some of which are no longer extant. It is also noticeable that rather a large proportion, perhaps 10 per cent to 12 per cent, were from Canadian schools, and that schools in such European cities as Christiania, Edinburgh, Paris and others also appear.

The medical men of Territorial days were all "horse and buggy doctors" if not "doctors on horseback". Their chief diagnostic instruments were the stethoscope, the clinical thermometer, and simple means of determining sugar and albumin in the urine. There were no x-rays, or any of the many tests, laboratory or otherwise, of a later time. There were almost no hospitals.

The mortality from the diseases that were common in those days was high. We know this not only from the fact that it was high in all the states where vital statistics were better than in Dakota Territory, but we know it from accounts of epidemics in the reports of Territorial and early State Health Officers. To cite only one example, though from a few years after statehood, an epidemic of typhoid fever occurred in Grand Forks,¹ in the winter of 1892-93. It is said that 10 per cent of the population of the city contracted the disease, perhaps 450 cases, and that more than 150 deaths occurred from this cause alone. There had been a few cases of typhoid in Crookston, whose sewage was emptied into the Red Lake River from which Grand Forks obtained its water supply. This was only a few years after the work of Eberth, but before the cause of typhoid was fully understood and before the hygiene of the disease had made any progress. The city at once installed a slow sand filter, the second of its kind in the United States, with the advice and supervision of Professors Babcock and Brannon of the University. The system was later changed to rapid filtration and has been enlarged several times since. But the city has had no more typhoid.

Until just about the time of statehood, 1889, the standard medical course in the best of the medical schools of the United States consisted of two yearly courses of five months each, following two or three years of apprentice or preceptorial training with a practitioner. General, or what today we call premedical, education varied greatly, the ambition of the candidates,

the wisdom of his preceptor and even the standards of the medical schools, it might be anything from a complete college course and a degree to nominal high school graduation or less. The standard course as late as the end of North Dakota's territorial days was two years of five months each, supplementary to preceptorial training. The student was perhaps well trained in gross anatomy, which was at times the only laboratory course; he was taught gross pathology and saw a few postmortems; he was taught materia medica and drilled in the use of drugs, their dosages and even pharmacy; he was likely to be less well trained in chemistry and physiology; he was well drilled in symptomatology and taught to make a diagnosis and a prognosis; he was taught to be observing and self reliant. At times at least he was given better training in the art of practice than men of later years.

That many of the doctors of Territorial Dakota had taken both more or less premedical as well as postgraduate training can be proved by examining Dr. Grassick's book.¹ In his biographical sketches of the presidents of the North Dakota State Medical Society we find thirteen men, coming to the state before 1890 and licensed by the Territorial Board. Of these, four had graduated with the B.A. degree before they entered medical school (one had the M.A. degree as well). Of others the statement is frequently, "attended college," or words to that effect, but how long or if to a degree is not apparent; in one case "received his preparatory and college training in the Academy of Paris, University of France," "taught French in University of and was tendered a professorship," but he chose to take medical training. Most of them are recorded as having taken certain additional or postgraduate training in this country or in Europe. The same was no doubt true for many others.

The doctors of Territorial days were civic-minded.¹ Many served on their local school boards and as mayors of their respective cities. Several were members of the Territorial legislature. One was a member of the commission that located the capital at Bismarck. Three doctors with two laymen constituted the first board of regents of the University. They were interested in, and had a part in, the legislation, regarding medical practice, 1869, the creation of a Board of Medical Examiners and a Territorial Board of Health, 1885, and that of the State Boards, 1890. Space does not permit an analysis of these laws at this time. These efforts were very inadequate from the point of view of later years, but they were pioneer efforts not only for Dakota but for all of the states at that time. It is interesting to note that the first Secretary of both Territorial Boards¹ was Dr. E. M. Darrow of Fargo, and his successors until statehood were both from the northern part of the territory: Dr. Swain of Wahpeton and Dr. Millspaugh of Park River. They understood the importance of professional meetings.

TERRITORIAL SOCIETY FORMED

A Territorial Medical Association¹ was organized in 1881, incorporated in 1885. Anticipating the division

of the Territory and statehood, the doctors of the northern part had an organization meeting to create a "North Dakota State Medical Association" in 1887; the first regular meeting occurred in 1890; at the same time the doctors of the southern part changed the Territorial organization to the "South Dakota State Medical Association."

Local organizations began in Fargo: the City Directory of 1881 lists the "Red River Medical Association," briefly states its purposes and lists its officers; its organization probably dates from 1880. It seems to have been succeeded by the "Cass County Medical Society," organized in December of 1881.¹ Similarly the "Missouri Medical Society" was organized in 1884. Still other societies followed.

CHANGES

The population of the new state continued to increase for a time but less rapidly than it had done up to 1910. With slight ups and downs it has seemed to level off for the present at least at something over 600,000. The number of doctors also increased for a time and likewise seems to have leveled off for the present at about 500 (475 by the latest edition of the Directory of the American Medical Association). Some of the cities and towns have increased and are increasing in population and importance, others are decreasing. But more important than changes in numbers would seem to be differences between the conditions in Territorial days and in 1950, and these are very many. It is proposed to notice a few of the changes that we see in medicine, not necessarily in chronological order, and to examine their causes.

Changes in the location of doctors:

This is discussed first because it was one of the first changes to attract the attention of sociologists and because in origin at least it was due chiefly to the more general causes. Articles on the subject appeared with increasing frequency in the 1920's in both medical and popular magazines, in the latter type of discussion often with the inaccurate suggestion of the passing of the family doctor. The writer began to receive letters from bankers, school superintendents, and other citizens of many of the small towns in the state that had recently lost their doctor, or sometimes two or three, soliciting help in finding a doctor; the letters were often interesting sales talks for their respective towns. The writer prepared a hasty article on the subject in 1926,² comparing conditions of about 1906 with those of 1925. Professor L. O. Lantis³ of Minot Teachers College did the same in 1930, while a graduate studying with the University. A book, "American Medicine and the Proper Health," by Harry H. Moore appeared in 1927 discussing the subject at length.

An illustration of the changes is furnished by Cass County. In 1906 there were 20 doctors in the county outside of the city of Fargo; by 1925 there were 8; by 1950, 5, and one of the five is attributed to West Fargo, an industrial suburb close to the city and not mentioned in the Directory prior to 1938. Several other

counties, as well as stretches of the railways between larger cities, and along the branch lines show similar findings.

There has undoubtedly been a decided shifting of doctors away from the smaller towns and to the larger cities, and it has been much the same in all states with large rural areas. At first it was due chiefly to the coming of the automobile. As the years have gone on the presence of hospital facilities and other advantages of medical progress available in the larger cities and towns have entered more largely into the decision as to where the young doctor will locate, but there are still many general considerations such as housing, schools, and churches, that pull him to the city.

Whether this change is good or bad, and if bad what can be done about it, are questions too large for satisfactory discussion here. Very briefly, the smaller towns clamoring for a resident doctor are not all alike. Some have lost a doctor just as they have lost a hotel, a bank, or a large store, to say nothing of a livery stable, because of changing general conditions. Here the problem is not very important in many if not most of the cases. With the telephone, better roads, and better means of travel, these communities would seem to be just as accessible to professional service, not to say much better service, as they were forty years ago, and particularly so if they are within a radius of not more than forty miles from any of the larger cities and towns of the state. But there are towns that never had a doctor, and communities more remote than those discussed, and perhaps some of the twenty or thirty key cities and towns do not have adequate medical facilities at least for a larger load. Probably no simple formula can ever be devised that would cure all cases. Many plans have been suggested. Every case requires careful consideration in itself, and in its relations to other parts of the larger problem. What a local community may do within its means is pretty well its own problem, but in connection with its hospital legislation the state has set up certain minimum requirements in the interests of safety for hospital construction and it offers advisory services in these cases.

The development of modern medicine:⁷

There had been many interesting personalities in medicine as well as many good investigations and a few important discoveries in the 17th and the 18th centuries. But the "fullness of time" did not come until after the work of Virchow and Pasteur about the middle of the 19th century. Both men met with opposition and stormy times, but their work was gradually accepted, and it marks the beginning of the development that we now call modern medicine.

It will be noticed that this period of development coincides almost exactly with the seventy years of medicine in North Dakota. Virchow and Pasteur both lived until after our statehood, as did many others of the early leaders. North Dakota can claim no heroic part in the beginning of the development, but her medical profession has always been alert to the changes; some of her sons have been taking part in the researches and many of

them are practicing, in this and other states, medicine that is very different from the medicine of seventy years ago.

Hospitals:

North Dakota started with nothing in this line, but no doubt the railways made temporary provisions at an early date. By 1885, there were three hospitals: Cass County about 1881, St. Alexius, 1884, and the beginnings of the State Hospital for the Insane, 1885. In city directories of about that time and the years following until 1900 we begin to see mention of smaller private hospitals of a few beds not only in the larger towns, but even in some of the smaller places. Doctors often built and operated five to ten bed hospitals. In general these were temporary or short-lived efforts. A more permanent type of both construction and organization began with the twentieth century so that by about 1915 some fifteen or twenty such hospitals were built, and in the next fifteen years as many more.

Several of the hospitals in the larger towns have from time to time done additional building and increased their facilities. Both of the hospitals in Grand Forks have construction work going on at this time: an addition to the Deaconess is nearing completion and St. Michael's is building an entirely new plant. These two projects alone should add some 300 beds. The Deaconess at Grafton recently opened up a new addition and a new Veterans hospital at Minot was also opened within the year. Projects are underway for new construction in Bismarck, Dickinson, Fargo, Jamestown and other cities.

In addition, there is work in progress on several projects, some ten or twelve by this time, in key centers in the less densely populated parts of the state. This is by virtue of the Hill-Burton Act and under the Federal Security Agency. By June 1, 1949, the Agency¹⁰ had approved six such projects in the state and had paid out \$467,000 on projects whose total cost was estimated at

\$1,403,000. In May of 1949 the state committee that considers the requests of local communities reported that eight projects were receiving Federal aid or had been approved for such aid; it estimated that these projects would add 162 beds. In May of 1950 it reported that eleven projects had been scheduled for Federal Aid. In the meantime, it has been announced that the Federal aid funds for the current year has been reduced 50 per cent.

As of 1950 the American Medical Association^{4,5} lists 48 hospitals and related institutions in the state, giving location, number of beds, bassinets, average census, etc. The list, of course, does not include the new construction in progress. The list involves thirty-five cities and towns, and includes four hospitals of the Indian Service, with 42, 18, 31 and 47 beds; one Veterans Hospital, 319 beds; the State Hospital, 2,084 beds; the State School, 1,040 beds; the State Tuberculosis Sanatorium, 328 beds; one County Hospital, 40 beds; one Isolation Hospital, 10 beds; and the Florence Crittenden Home with 56 beds. The others are general hospitals. One has 243 beds; nine have from 100 to 188 beds; four, from 81 to 90 beds; twenty from 25 to 75 beds; and four have less than 20 beds. Of the hospitals in the state, nineteen are approved by the American College of Surgeons, four are approved by the Council on Medical Education for intern training, and three are approved for resident training.

Surgery:

North Dakota came to statehood just at the time of the beginning of aseptic surgery. We do not know who performed the first appendectomy in the state, or when or where. The "first" has been attributed to two or three of the early surgeons. We may be quite sure, however, that surgeons in several of the larger towns of the state were beginning to do this and other major operations before 1895. The doctors in the smaller towns were

TABLE I
Numbers of Deaths from Selected Causes and Rates
1905—1906 (Two years combined) 1947—1948

	1905—1906 (Two years combined)		1947—1948			
	Number of Deaths	Rates per 1,000	Number of Deaths		Rates per 100,000	
			1946	1947	1946	1947
Tuberculosis	316	.72*	86	83	16.	15.
Pneumonia	145†	.32	189	239	35.	43.3
Typhoid	106	.24	0	3	0	.5
Diphtheria	78‡	.17	7	5	1.3	.9
Cancer	88	.201	643	597	119.7	108.2
Intra. Cran. Vascular	69§	.15	471	507	87.7	91.8
Heart	115	.26	1393	1505	259.4	272.6
Accidents (including vehicle and horse drawn 5)	168	.38	143 (auto)	129	26.6	23.4
			297 (other)	312	55.3	56.5

* Multiply by 100, or move decimal point two places to right to get rate in terms of modern days.

† Does not include bronchopneumonia and influenza.

‡ Does not include croup, or "membranous croup"—two additional causes in the larger chart.

§ Here listed as apoplexy.

The table is introduced to show (1) the triumphs of modern medicine in control of many of the infectious diseases, (2) the changes in the type of work that confronts the practitioner.

beginning to think in terms of asepsis as they treated their wounds and took care of their obstetrical work. As more and better hospitals began to be built about the turn of the century and men with more recent training continued to come to the state, surgery became more frequent. For many years all of the operations most frequently mentioned on the lists of large metropolitan hospitals have been matters of everyday occurrence, not in such large numbers but in proportion to population and needs. Between the alertness of the earlier surgeons and the longer and better as well as more recent training of the men of later years, the state has not suffered for the lack of good surgical service.

Internal medicine and practice:

That at least some of the doctors in territorial days were alert to the newer developments can be illustrated by two instances: (1) Dr. E. M. Darrow,¹ the first Territorial Health Officer (1885-87) was called upon at one time to settle a moot point regarding disinfection; he made a statement involving contagion, disinfection, cleanliness and fresh air, too long for quoting here, but as clear-thinking and as modern as if it were made 65 years later. (2) The last examination for licensure given by the Territorial Board⁶ just before statehood, contained three questions under preventive medicine as follows:

1. Given a case of diphtheria, what precautions would you take as to prevent its spread?
2. What is a case of puerperal septicemia?
3. What is a case of typhoid fever?

Early in statehood diphtheria antitoxin began to be available and to be used. A sanitary water supply system was established in Grand Forks in 1893, in a successful effort to prevent typhoid fever. As time went on the practice of medicine has continued to share in the ever increasing findings of modern medicine. A State Health Department, started as early as 1885 as the Territorial Board of Health, has become a strong and influential factor with many divisions and departments. A vital statistics law just before the turn of the century and the Model Vital Statistics Act of 1907 have finally led to a strong division in the Department. The Public Health Laboratory System, also created by the legislature in 1907, and at first connected with the Department of Bacteriology and Pathology of the new School of Medicine, is also a division of the State Health Department. It had been started long before many of its present procedures were heard of, even the Wassermann Test. Always a busy and important service, it has multiplied many times in size of staff and number of examinations done. The state has also long maintained a Pure Food and Drug Department. In 1912 a State Tuberculosis Sanatorium was opened, which has grown until it now has modern buildings and equipment and more than 300 beds for patients. The cities and towns, assisted by the State Health Department, have been reasonably alert in securing sanitary water and milk supplies and sewage disposal. The changes listed in this paragraph, together with the accessibility of hospitals to much of the population and the generally better housing and living conditions, make the practice of medicine and the health

problems of the state very different from what they were sixty and seventy years ago.

The proof of the pudding is said to be the eating, or what of vital statistics? Unfortunately, there was no such thing until the turn of the century. We know, however, from many sources that morbidity and mortality from all of the common infectious diseases was very high. Notice comments in the optimistic third Biennial Report of the State Board of Health, 1895-96. The secretary remarks on epidemics of diphtheria in seven counties, "promptly controlled" by "isolation, the free use of disinfectants, and in some cases the use of antitoxin." There were "only 20 deaths." In contrast he cites the experience in a six months period in 1893 when there were 65 deaths, 36 in Mercer County alone. He gives the typhoid deaths for 1895, so far as he knew them, as 55. In the fourth Biennial Report, 1897-98, there is a tabulation to show the incidence and mortality of a few of the contagious diseases for a period of ten months; tuberculosis, pneumonia and typhoid are not included, but diphtheria is reported as giving 61 cases and 21 deaths, scarlatina, as 109 cases and 45 deaths.

With the Biennial Report of 1901-02 and those that follow, we begin to see an effort to give a more complete picture, and tables more like those of today, but the secretaries admit the incompleteness of their reports. (The state was not recognized as in the Registration Area until 25 years later.) There are comments also that diphtheria is not at all the factor it was before antitoxin. We have selected a few figures, from tables in the report of 1905-06 to compare with similar figures from the report of 1947-48. It will be noted that the numbers of deaths in the earlier report are for the two-year period and the rate is figured on 1,000 of population, not as now on 100,000. The population of the state in 1906 was evidently considered about 400,000, in 1948 about 600,000.

THE SCHOOL OF MEDICINE

The School of Medicine of the University of North Dakota dates from 1905. Dean Brannon, its organizer and the dean for six years, and President Merrifield were aware of existing conditions in medical education. They conferred with the doctors of the state and with the deans of medical schools and other leaders in the field. Dean Brannon and his associates outlined a course of four years leading to the B.S. degree in a combined Arts Medical curriculum. The first two years consisted of general and liberal arts studies, approximating very well what soon became the recognized standard premedical requirements; the third and fourth years were made up of medical courses gradually established in the next few years in the medical laboratory sciences. North Dakota was one of the first medical schools to establish the two-year premedical requirement. In the early years of the school, however, there was a "short course" in contrast to the "long course" outlined above, and a few men who later transferred to other medical schools to complete their training, entered the school to take some of the strictly medical subjects without regard to the liberal arts requirements. The plan was soon discontinued.

It might be wondered if the earlier efforts were not premature. But the movement was in the air at that time.³⁴ Most of the two-year schools were launched in that decade; a few schools that had been in operation as complete schools, one for nearly 100 years, abandoned the clinical program and became two-year schools. The movement was encouraged by many of the leaders of medical education; in the words of a Dean of one of the leading Chicago Schools, in conversation with the writer a few years later: "All state universities should do the same as you are doing. If the state does not have a city large enough to provide clinical facilities it should at least provide and support laboratories in the medical sciences." We can surely suppose that there was a minimum of ambition, either personal or for the University, in the minds of Dean Brannon and his associates. It was their thought to extend the usefulness of the University and to provide certain opportunities for the youth of the state. The first bulletin put out by the new school reported that "over fifty young men and women had been compelled to leave their own commonwealth to secure even the first two years of medical training." Another deciding factor was the fact that state laws and State Boards had begun to specify in their requirements for eligibility, that four years, 45 months, must have elapsed between the matriculation and the graduation of the candidate. This action was being taken in an effort to correct certain defects in the earlier plans. It, however, was unfortunate from certain points of view. Until that time many of the schools had been giving the candidates for entrance with a college degree time credit for one year of the four years if he desired it and if he seemed promising; he was given subject credit in such fields as organic chemistry, biological chemistry, histology, embryology and bacteriology, that were often well done in the universities. Universities that were giving such courses had been advising students that were looking forward to medical entrance to take such courses as a part of their college training before they entered medical school, and in general many of the colleges and universities were giving better courses in those fields than at least very many of the medical schools of that time.

In the first year of its operation the school reported seven medical students, in the second year, thirteen. These figures, however, included a few in the "short course" and others at various stages along the featured program. The first student to complete the regular program and receive the B.S. degree was the late Dr. Sverre Oftedahl, 1909, who received his M.D. degree at Rush in 1911, and who practiced in Fargo for many years. A second completed the program in 1910, with an M.D. in 1912 from Rush. He practiced for many years at Minot. Five completed the program in 1911.

Dean Brannon was transferred to the deanship of the College of Liberal Arts in 1911. He later served successively as president of the University of Idaho and Beloit College, and as chancellor of the University of Montana. He died early in this year in Florida, where he had been living in retirement.

The writer was called to the school in 1911 as professor of anatomy and dean; he came from a department in the similar new school of South Dakota. He found small but possible quarters assigned the school in Old Science Hall, with laboratories and class rooms in proportion. Laboratory equipment and library showed intelligent and thoughtful care. There was a small but good faculty, and there were about a dozen medical students, and perhaps twenty students in the premedical years. In short, the school was a going concern.

No changes in the fundamental plan or organization were called for, nor have they been required or even possible since that time. Many minor changes involving details have been made from time to time as the school grew and as conditions demanded. The line between premedical work and that of the Medical School proper began to be recognized more definitely in 1911-12, this for purposes of recording and reporting, also from the point of view of medical entrance requirements. In the next year organic chemistry became a part of the entrance requirement and was shifted to the second premedical year. In 1934 announcement was made of the three-year entrance requirement.

Until the fall of 1949 the School remained in Old Science Hall, but its quarters had been enlarged two or three times in the course of years by the shifting to other departments. In general, student laboratories and class rooms have been reasonably satisfactory. It was in rooms for office, storage, library and research that the School was long deficient.

The budget for salaries, equipment and supplies and for library, until within the last two years, has been very modest. But conditions were promising in the early years, again from 1920 to 1930, and still again since about 1945. They were desperate in the 1930's, and only a little pick-up in appropriations in 1937 saved the school from worse than probationary rating. The school has never shared in the great gifts for building and endowment that have gone to many schools in the last thirty years. The school, however, does have a couple of student loan funds, one established by the Kellogg Foundation in 1942, the other by the Fargo Clinic in 1949; others are hoped for or in prospect. It also has a small fund for one or two tuition scholarships, and a prize for scholarship founded by the Grand Forks District Medical society. Some departments have for many years received some aid from outside sources for research. Aid for research has increased greatly in the last two years; the North Dakota chapter of the American Cancer Society should be mentioned as a supporter.

From what has been said it would be supposed that the faculty has been small. This is true, but the School has been fortunate in having had in its service many able, well trained, and faithful men. At the same time it has been unfortunate. It could scarcely be claimed that the school has been a training field, but over the years it has lost to other schools, the United States Public Health Service, and research departments of industry over a dozen men who had given from one to several years of faithful service here.

The students, 95 per cent from our own state, nearer 100 per cent for the last thirty years except for the effects of A.S.T.P. and Navy V-12, have come from good stock and backgrounds. Moreover they have been fairly well selected for quality as well as quantity in their requirements. Their numbers have grown from the estimates of the early days to an average of about twenty-five in each class for the last thirty years. The present freshman class has thirty-six, the sophomore class, thirty.

The total number of graduates is now 760 (743 men, 17 women). It will be remembered that our graduates still have two years of medical school training and a year at least of internship, before they can be eligible for license to practice; many also take additional training in residencies. The number to be thought of as probably ready for location would be approximately 100 less than the 760. Of the total number 760, perhaps ten made no effort to go on, giving up medical training because of lack of financial means or lack of interest. Only one who cared to go on has ever failed to find acceptance in an accredited school. Only three who entered other schools have had scholastic or other difficulties that stopped their advancement.

Of the 660 who have finished their formal training, a few have retired, several have died, two or three are in foreign missionary fields, and many are with the armed services and still more were in such service in World War II. At least ten occupy responsible positions in teaching and research in other medical schools; as many more are in the Public Health Service, other agencies of the government, and research work for industry. The remainder are in practice in this and other states and territories. By count 111 are listed as in North Dakota in the Directory of A.M.A. for 1950. Many are licentiates of the National Board, many hold certificates of the various American Specialty Boards.

The new Building:

The legislature in 1945 made an appropriation for a building to house the School of Medicine. Because of war conditions nothing could be done at that time. The next session of the legislature, 1947, renewed the appropriation and added enough to make \$400,000.00, plus

\$20,000 for equipment. The building was completed and began to be occupied in the fall of 1949. It furnishes much better and more convenient room in every way, including room for research and the Medical Library.

The Medical Center:

The legislature of 1945 also created the Medical Center, and provided the creation of a State Medical Center Advisory Council. The session of 1947 provided for a popular vote at the time of the general election in November of 1948 upon an amendment to the State Constitution which if approved would authorize a one-mill levy upon the taxable property of the State, which when collected would be placed to the credit of the Medical Center at the University. The measure carried. In 1949 the legislature passed a bill implementing the amendment and directing how disbursements should be made. Funds began to be available under the amendment and the laws in March, 1950. So far the funds are being used to pay salaries of the larger faculty of the school, to strengthen equipment and library, and to provide courses in nursing education and in laboratory technic. At this time it does not appear just what expansion can be undertaken safely and wisely, and no announcements can be made.

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ANTIBIOTIC CHANGES SEEN

Streptomycin and other "miracle drugs" may eventually become more effective against disease by the addition of certain chemicals to them, according to a report by Henry P. Treffers, professor of microbiology at Yale University. In experiments with chemically-modified streptomycin, it was found that the drug halted the growth of bacteria which were completely resistant to the action of ordinary, unmodified streptomycin. At the present time the use of the chemicals is barred by the fact that they are too poisonous for human beings.

Blood Sugar Methods in Clinical Medicine*

A Study of Folin-Wu, Somogyi-Nelson and Wilkerson-Heftmann Blood Sugar Determinations in 100 Subjects

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THE EVALUATION of blood glucose is among the commonest and most important of all chemical procedures in clinical medicine. Indeed this procedure will be performed with increasing frequency in the search for nearly one million diabetics currently undiscovered in the United States alone and in view of the statement that "according to present indications, by 1985 the diabetic population will have increased seventy-four per cent compared with an increase in the general population of only twenty-two per cent."¹

In the absence of the obvious clinical signs and symptoms of diabetes mellitus this determination is the major criterion to establish or refute the diagnosis by virtue of fasting blood sugar levels and curves derived from the various "glucose tolerance tests," although one must be alert to the old dictum that "every diabetic has a high prolonged glucose tolerance curve, but every high prolonged curve is not indicative of diabetes." While the well informed clinician is aware of this lack of specificity of various glucose tolerance tests, he may nonetheless be easily misguided by certain discrepancies in blood glucose determinations which, if unrecognized, may lead to erroneous conclusions. A thorough understanding of the many factors which affect the level of blood glucose exclusive of variations incident to the ingestion and utilization of sugar is tantamount to proper interpretation of the results.

The present study was undertaken with two basic objectives in mind: first, to reemphasize with factual data the distinct inaccuracies inherent to the time-honored Folin-Wu method of blood sugar determination as compared with an accepted method for true blood sugar estimation; second, to evaluate the accuracy of the recently adopted Wilkerson-Heftmann rapid blood sugar screening test for diabetes detection. Analysis of the results disclosed additional data of fundamental importance in the precise interpretation of blood glucose values.

REVIEW OF THE LITERATURE

The recent excellent investigations of Mosenthal, and of Mosenthal and Barry^{2,3,4} demonstrate clearly the inadequacies of Folin-Wu blood sugar determinations. Yet this is still the most widely used method for the estimation of venous blood sugar. Adherence to this procedure apparently hinges on the long established misconception

that the non-glucose reducing substances unavoidably included in a Folin-Wu estimation of blood glucose produce a "fairly constant" positive error of from 10 to 30 mgm. per cent.⁵ On the other hand, it has been stated that this procedure may yield results 15 to 18 per cent less than the true value when the blood sugar is at hypoglycemic levels of 50 mgm. per cent or less.⁶

The known "saccharoids" or non-glucose reducing substances in the blood, assuming no role in sugar metabolism, are glutathione, ergothionine, creatinine, cysteine and levulose. The latter two are usually thought to be insignificant in amount, particularly in the fasting state. In addition to these known substances, a number of unidentified saccharoids exist which further confound interpretation of Folin-Wu blood sugar values.

TABLE I*
Normal Values for Non-Glucose Reducing Substances in Whole Blood. (Mgm. per cent)

Non-Glucose Reducing Substance	Minimum Mgm.%	Maximum Mgm.%	Average Mgm.%
Glutathione	24.0	26.2	25.1
Ergothionine	.....	.....	18.0 ± 8.0
Creatinine	1.2	1.5	1.3
Total Mgm.% Non-Glucose Reducing Substances	.....		44.4 ± 8

*Adapted from Sunderman, F. W., and Boerner, F.: Normal Values in Clinical Medicine, Philadelphia, W. B. Saunders Company, 1949, p. 110.

In table I are listed three known saccharoids in whole blood which more recently are thought to average 44.4 mgm. per cent. Practically speaking, knowledge of these figures is useless and misleading because comparative studies between simultaneous Folin-Wu and "true blood sugar" determinations carried out in highly efficient laboratories disclosed unpredictable values ranging from zero to 78 mgm. per cent for non-glucose reducing substances.^{2,4,7,8} Thus Mosenthal found values exceeding 30 mgm. per cent in 27 per cent of 200 blood sugar determinations during one investigation⁴ and values exceeding 30 mgm. per cent in 38 per cent of 200 determinations in another series.²

It is generally believed that neither the height of the true blood sugar nor the status of alimentation affects the total quantity of saccharoids in any given instance. In advanced renal insufficiency, however, these substances are more consistently at higher levels in the blood.⁷

*From the Department of Internal Medicine, Grand Forks Clinic, Grand Forks, North Dakota.

Read at the Clinical Conferences on Diabetes Mellitus, 99th Annual Session of the American Medical Association, San Francisco, California, June 26 to 30, 1950.

In view of the foregoing remarks it is obvious that the Folin-Wu procedure should be defined as a method for determining the "blood sugar" rather than blood glucose since the calculated result includes an indefinite non-fermentable moiety commonly referred to as saccharoids or non-glucose reducing substances. Collectively these substances are represented by subtracting the value for true glucose from that for the Folin-Wu procedure when both determinations are made from samples of a single specimen of whole blood. While the saccharoids were formerly thought to be a "fairly constant" error of 10 to 30 mgm. per cent, the more recent investigations just mentioned show that these values are not only inconstant but frequently much higher. It therefore follows that the amount of these substances "may be so great as to nullify the meaning of blood sugar values."² Thus, utilization of the Folin-Wu technique in various glucose tolerance tests has not infrequently led to an erroneous diagnosis of diabetes mellitus when other clinical criteria were equivocal or lacking. Moreover, insulin reactions may conceivably be induced by overdosing a low renal threshold diabetic whose hyperglycemia is more apparent than real when determined by the Folin-Wu method.

The application of a venous tourniquet "results immediately in significant changes in the venous blood sugar."⁹ As a rule there is a rise in the blood sugar to as much as 24 mgm. above the control level within two minutes after the tourniquet is applied. This increase is ascribed to the forcing of arterial blood with its higher glucose content into the occluded veins. However, since the arterio-venous blood sugar difference in the fasting state is accepted to be practically zero, it should follow that the effect of a venous tourniquet on the *fasting* blood sugar level is negligible, unless other factors are responsible. Exclusive of the first determination of a glucose tolerance test probably all blood specimens should be obtained without the use of a tourniquet, because the arteriovenous blood sugar difference after glucose assimilation may be considerable.

A number of procedures are currently utilized for the determination of blood glucose or "true blood sugar."^{10,11,12,13,14,15} Which of these methods one prefers is not as important as the degree of refinement in technique attained by the technician in a given procedure. Hence, it would seem wisest to adopt one method and adhere to it since despite this "it is curious how even the most skilled and conscientious technicians may slip into inaccuracies."² The normal fasting "true blood sugar" is generally stated as ranging from 70 to 100 mgm. per cent for venous blood and from 75 to 105 mgm. per cent for arterial (capillary) blood.¹⁶ (It has been shown that capillary blood has the same sugar content as that derived directly from the arteries.)¹⁷ Since, as previously mentioned, the arteriovenous blood sugar difference approaches zero in the fasting state the values for venous and arterial blood may for practical purposes be considered identical. After glucose ingestion, however, the arterial blood sugar may exceed the venous level by as much as 102 mgm. per cent.²

The present investigation is limited to blood sugar studies in the fasting state, hence the reader is referred

to the extensive investigations of Mosenthal^{2,3,4} for a comprehensive analysis of the problems incident to stabilizing the procedures for glucose tolerance tests.

In 1948 Wilkerson and Heftmann¹¹ developed a blood sugar screening test which has since been employed in mass diabetes detection tests by the American Diabetes Association. The method is based on that of Hagedorn and co-workers¹⁸ but the steps requiring experience in chemical techniques and fluid reagents have been eliminated. Only 0.1 cc. of whole blood is required from the finger tip and the entire procedure may be performed in about five minutes. Any intelligent and reasonably dextrous lay individual could perform this simple analysis with a little practice. To interpret the results the analyst need only remember that a blue color indicates blood sugar values below the screening level for a given reagent tablet, while a clear solution indicates values above the screening level. In their original investigation on fifty cases Wilkerson and Heftmann found the test to be accurate within approximately 10 mgm. per cent.

Although this procedure is now widely used for diabetes detection tests, very little has been published to further establish the accuracy, reliability and potentialities of this procedure. The present investigation was inspired in part by this fact.

PLAN OF INVESTIGATION

One hundred subjects were selected for this study 66 (66 per cent) of whom were diabetic and 34 (34 per cent) non-diabetic. Each subject reported in the post absorptive (fasting) state early in the morning and physical activity was restricted to a minimum before blood and urine samples were obtained. Urine specimens were "second voidings" (i.e. the bladder emptied and specimen for analysis voided one-half hour later.) Six cc. of blood was withdrawn from the median basilic or median cephalic vein at the bend of the elbow. Gentle digital pressure was applied just above the site of venipuncture in 86 (86 per cent) subjects while in the remaining 14 (14 per cent) the brief application of a tourniquet was necessary before venipuncture could be achieved.

Immediately after venous blood was obtained two pipettes were filled with finger tip (capillary) blood, each measuring 0.1 cc. of whole blood. Without delay, four blood sugar determinations were then made as follows:

1. 1.0 cc. protein free filtrate—
Somogyi-Nelson Procedure
2. 2.0 cc. protein free filtrate—
Folin-Wu Procedure
3. 0.1 cc. capillary (arterial) blood—
Wilkerson-Heftmann Procedure
(130 mgm. per cent screening level tablet)
4. 0.1 cc. capillary (arterial) blood—
Wilkerson-Heftmann Procedure
(180 mgm. per cent screening level tablet)

To conserve space details of the three procedures utilized will not be described here. The Folin-Wu procedure is available in any standard clinical laboratory text.

Table II
Simultaneous Blood Sugar Determinations in 66 Diabetic Patients

Case No.	Age	Venous (mgm.%)		Arterial (mgm.%) (Capillary)		Urine	Total Non-Glucose Reducing Substances mgm.%
		Folin-Wu	Somogyi-Nelson	Reagent 3A 130	Reagent 3B 180		
1	22	137	127	C	B	0	10
2	59	222	192	C	C	0	30
3	53	196	156	C	B	2	40
4	53	202	133	C	B	2	69
5	39	282	210	C	B	1	72
6	22	195	166	C	B	0	29
7	31	220	196	C	C	0	24
8	78	195	165	C	B	tr.	30
9	42	146	118	C	B	0	28
10	60	178	185	C	B	0	—7
11	35	257	228	C	C	2	29
12	57	222	200	C	C	0	22
13	48	215	182	C	B	0	33
14	56	154	125	B	B	0	29
15	54	142	120	B	B	0	22
16	51	200	146	C	B	2	54
17	20	400	330	C	C	3	70
18	57	265	200	C	B	2	65
19	58	189	170	C	B	0	19
20	38	163	140	C	B	0	23
21	35	184	127	C	B	0	57
22	53	222	192	C	C	2	30
23	60	170	134	C	B	0	36
24	60	197	166	C	B	0	31
25	60	222	210	C	C	tr.	12
26	52	184	150	C	B	0	34
27	51	195	165	C	B	2	30
28	60	249	200	C	C	3	49
29	23	257	218	C	C	0	39
30	50	163	133	C	B	0	30
31	24	195	162	C	B	0	33
32	60	228	218	C	C	1	10
33	38	160	127	C	B	0	33
34	69	207	162	C	B	0	45
35	62	168	133	C	B	0	35
36	38	222	170	C	B	0	52
37	59	195	180	C	C	0	15
38	78	141	127	C	B	0	14
39	41	222	218	C	C	0	4
40	27	436	386	C	C	3	50
41	38	163	140	C	B	0	23
42	49	154	140	C	B	0	14
43	69	228	218	C	C	0	10
44	54	228	192	C	C	0	36
45	41	146	120	B	B	0	26
46	58	168	146	C	B	0	22
47	58	163	148	C	B	0	15
48	22	195	146	C	B	2	49
49	17	189	178	C	B	0	11
50	58	154	140	C	B	0	14
51	77	207	198	C	B	0	9
52	49	158	136	C	B	0	22
53	58	154	146	C	B	0	8
54	28	173	162	C	B	1	11
55	36	135	133	C	B	0	2
56	55	154	140	C	B	0	14
57	58	178	146	C	B	0	32
58	58	297	254	C	C	4	43
59	27	386	314	C	C	3	72
60	55	242	200	C	C	0	42
61	34	220	190	C	C	0	30
62	41	149	120	B	B	0	29
63	60	142	120	B	B	0	22
64	20	400	330	C	C	3	70
65	57	150	122	B	B	0	28
66	29	146	118	B	B	2	28

Av. Age 47.6

Av. 30.6

Code: C—Colorless, indicating blood sugar level above 120 mgm.% with Reagent 3A and above 170 mgm.% with Reagent 3B.

B—Blue, indicating blood sugar level below 130 mgm.% with Reagent 3A and below 180 mgm.% with Reagent 3B.

Glycosuria is expressed in terms of zero to 4 plus, using Benedict's Qualitative Reagent.

Table III
Simultaneous Blood Sugar Determinations in 34 Normal Subjects

Case No.	Age	Venous (mgm.%)		Arterial (mgm.%) (Capillary)		Urine	Total Non-Glucose Reducing Substances mgm.%
		Folin-Wu	Somogyi-Nelson	Reagent 3A 130	Reagent 3B 180		
1	61	129	108	C	B	0	21
2	52	122	76	B	B	0	46
3	25	101	87	B	B	0	14
4	20	118	78	B	B	0	40
5	21	118	100	B	B	0	18
6	36	121	80	B	B	0	41
7	20	116	70	B	B	0	46
8	38	129	92	B	B	0	37
9	26	106	70	B	B	0	36
10	75	114	80	B	B	0	34
11	46	114	102	B	B	0	12
12	67	114	100	B	B	0	14
13	69	141	92	B	B	0	49
14	17	111	100	B	B	0	11
15	64	114	104	B	B	0	10
16	46	129	114	B	B	0	15
17	17	98	76	B	B	0	22
18	26	114	100	B	B	0	14
19	61	117	76	B	B	0	41
20	54	126	104	B	B	0	22
21	34	89	76	B	B	0	13
22	61	114	92	B	B	0	22
23	22	105	80	B	B	0	25
24	22	86	64	B	B	0	22
25	52	114	92	B	B	0	22
26	46	129	86	B	B	0	43
27	58	118	92	B	B	0	26
28	51	141	114	B	B	0	27
29	54	122	80	B	B	0	42
30	22	63	52	B	B	0	11
31	32	118	98	B	B	0	20
32	64	122	114	B	B	0	8
33	22	146	104	B	B	0	42
34	58	77	50	B	B	0	27
Av. Age 42.3							Ave. 26

Code: C—Colorless, indicating blood sugar level above 120 mgm.% with Reagent 3A and above 170 mgm.% with Reagent 3B.

B—Blue, indicating blood sugar level below 130 mgm.% with Reagent 3A and below 180 mgm.% with Reagent 3B.

Glycosuria is expressed in terms of zero to 4 plus, using Benedict's Qualitative Reagent.

The Somogyi-Nelson and Wilkerson-Heftmann procedures may be found in the newer texts, brochures* or in the original publications.^{12,14}

RESULTS

Analysis of tables II and III will enable quick appraisal of the data sought and results obtained.

Sex: Of the entire 100 subjects 59 (59 per cent) were females and 41 (41 per cent) were males.

Age: The age range for all 100 subjects was 17 to 78 years, the average being 45.8 years.

Non-Glucose Reducing Substances: As previously mentioned, the non-glucose reducing substances were estimated by subtracting the value for the Somogyi-Nelson procedure from that for the Folin-Wu procedure in each

instance. In one case (Case 10, table II) the value was minus 7 mgm. per cent. All other values were positive, ranging from 2 mgm. per cent to 72 mgm. per cent in the diabetic group (table II) and from 8 mgm. per cent to 49 mgm. per cent in the normal group (table III). The averages for the diabetic group and normal group were 30.6 mgm. per cent and 26 mgm. per cent, respectively. The overall average value for non-glucose reducing substances in 100 subjects was 29.05 mgm. per cent, but values exceeded 30 mgm. per cent in 39 (39 per cent) cases. It was further noted that values exceeded 30 mgm. per cent in 27 cases (40.1 per cent) of the group of 66 diabetic patients and in 12 cases (35.3 per cent) of the group of 34 normal subjects. There were four instances in which values were 70 mgm. per cent or over and these occurred only in the diabetic group. The true blood sugar values in these four cases were 210 mgm. per cent, 330 mgm. per cent, 314 mgm. per cent and 330 mgm. per cent, respectively (table II, Cases 5, 17, 59, and 64). This data is summarized in tables II, III and V.

*Materials for the Wilkerson-Heftmann procedure used in this investigation were from Eli Lilly and Company. Their "Test Kit No. 7" contains explicit directions for the procedure and interpretation of results.

Folin-Wu Procedure: Among 66 diabetic patients the fasting blood sugar values by the Folin-Wu method ranged from 135 mgm. per cent to 436 mgm. per cent (table II), while among the 34 normal subjects values ranged from 63 mgm. per cent to 146 mgm. per cent (table III).

Somogyi-Nelson Procedure: By this method the fasting blood sugar values among the 66 diabetic patients ranged from 118 mgm. per cent to 386 mgm. per cent (table II), while values among the 34 normal subjects ranged from 50 mgm. per cent to 114 mgm. per cent (table III). In the latter group neither clinical hypoglycemia nor diabetes mellitus could be proven to exist in any of the cases exhibiting such deviations from the known normal values.

Wilkerson-Heftmann Procedure: As illustrated in tables II and III, each of the entire 100 subjects was screened at two levels, represented by reagents 3A and 3B. The former tablet screened at the 130 mgm. per cent level, the latter tablet at the 180 mgm. per cent level. Thus, for reagent 3 A (130 mgm. per cent screening level) the final solution was colorless when the blood glucose was above 120 mgm. per cent and blue when the blood glucose was below 130 mgm. per cent. Likewise, for reagent 3 B (180 mgm. per cent screening level) the final solution was colorless when the blood glucose was above 170 mgm. per cent and blue when the blood glucose was below 180 mgm. per cent. Results are interpreted in this fashion because the test is thought to be accurate within ± 5 mgm. per cent, the variability probably being due to slight variations in the reagent tablets, the amount of water, heating, etc.¹⁴ On the basis of the above criteria the following results were found:

In seven instances (3.5 per cent of 200 screening tests) the Wilkerson-Heftmann procedure was shown to be inaccurate beyond the ± 5 mgm. per cent accepted variance. The values indicated by the screening test in these inaccuracies varied from 12 mgm. per cent too high to

TABLE IV
Degree of Error in the Wilkerson-Heftmann Procedure

Case No.	Somogyi-Nelson mgm. %	Wilkerson-Heftmann Reagent 3A 130 mgm. % level	Wilkerson-Heftmann Reagent 3B 180 mgm. % level	Mgm. % Error
1*	108	clear	.....	+12
5	210	.....	blue	-30
9	118	clear	.....	+2
10	185	.....	blue	-5
13	182	.....	blue	-2
18	200	.....	blue	-20
51	198	.....	blue	-18

Using the SOMOGYI-NELSON procedure as the criterion of actual values, the degree of error inherent in the Wilkerson-Heftmann procedure varied from -30 mgm. % to +12 mgm. %, discrepancies occurring in only 7 (3.5%) of 200 determinations.

*Case No. 1 is a normal subject; the remaining cases are diabetic patients.

TABLE V
Values for Non-Glucose Reducing Substances Among 100 Subjects (66 were Diabetic; 34 were Normal)

	Total 100 Cases	Diabetic Group 66 cases	Normal Group 34 Cases
Range	-7 mgm. % to +72 mgm. %	-7 mgm. % to +72 mgm. %	+8 mgm. % to +49 mgm. %
Average	+29.05 mgm. %	+30.6 mgm. %	+26 mgm. %
No. of Cases Exceeding 30 mgm. %	38 Cases (38%)	26 Cases (39.4%)	12 Cases (35.3%)
No. of Cases with 70 mgm. % or more	4 Cases (4%)	4 Cases (6%)	None

30 mgm. per cent too low. Only two of these errors occurred with reagent 3 A (130 mgm. per cent level) while the remaining five occurred with reagent 3 B (180 mgm. per cent screening level), (table IV).

In only four instances was the degree of error of any moment which, on the basis of 200 screening tests, is equivalent to only two per cent. Only one determination exceeded the accepted ± 5 mgm. per cent deviation among 68 Wilkerson-Heftmann procedures performed on 34 normal subjects.

Glycosuria: As previously mentioned, a urine specimen was obtained immediately following the withdrawal of blood samples on each subject. All specimens were sugar-free among the 34 normal subjects. Eighteen specimens (27 per cent) exhibited glycosuria ranging from one to four plus among the 66 diabetic patients, while two specimens (three per cent) showed only a trace (table II). On the other hand, twenty specimens (30.3 per cent) in the same group were entirely sugar-free despite the fact that the fasting true blood sugar in each instance exceeded 160 mgm. per cent. The true blood sugar values were 200 mgm. per cent or more despite sugar-free urines in 5 (7.6 per cent) cases of the diabetic group. (Table VI.)

DISCUSSION

Obviously, a much simpler plan of investigation would have been to carry out all four blood sugar determinations in each instance on fractions of a single sample of venous blood. This was purposely avoided because it was felt that the Wilkerson-Heftmann procedure should be carried out in the manner employed in actual practice,

TABLE VI
Correlation of Blood Glucose and Glycosuria in 66 Diabetic Patients

Status of Glycosuria and/or Blood Glucose	Diabetic Group (66 Cases)
Urine Sugar Free	46 Cases (69.6%)
1 to 4 Plus Glycosuria	18 Cases (27%)
Trace of Glycosuria	2 Cases (3%)
Blood Glucose over 160 mgm. % but Urine Sugar Free	20 Cases (30.3%)
Blood Glucose 200 mgm. % or more but Urine Sugar Free	5 Cases (7.6%)

that is from finger-tip blood. Since one objective of this investigation was the evaluation of non-glucose reducing substances of the blood it was further decided that micro methods might not be as reliable for comparison of Folin-Wu and Somogyi-Nelson blood sugar values as the conventional procedures. One questionable objection to judging the accuracy of the Wilkerson-Heftmann (capillary) procedure by comparison with the Somogyi-Nelson venous blood sugar estimation resides in the status of arteriovenous blood sugar difference in the fasting state. There is practically universal agreement on the statement that the fasting arteriovenous blood sugar difference approaches the zero level, and results of this investigation are in accord with this concept. However, Mosenthal has shown that exceptions to this do occur, both in normals and in diabetics.²

Non-Glucose Reducing Substances. Analysis of the data herein presented precludes any valid justification for the continued widespread use of the Folin-Wu and similar procedures, except perhaps for the time factor. It is true that the Somogyi-Nelson procedure requires about seven minutes longer than the Folin-Wu method, but these few minutes of the technician's time may prevent the imposition of months or years of unnecessary physical, mental, and financial stress in an individual falsely diagnosed as diabetic. Particularly is this a crucial point in the case of insurance examinations.

Case 10 (Table II) represents an impossible situation in which the value for the Somogyi-Nelson procedure exceeded that for the Folin-Wu method, yielding a negative quantity for non-glucose reducing substances, or minus seven mgm. per cent. This is doubtless due to analytical error. Very likely the Somogyi-Nelson value was actually much lower as evidenced by the simultaneous Wilkerson-Heftmann test which indicated that the true blood sugar value was below 180 mgm. per cent.

Specifically, it may be said that the quantity of saccharoids in a given case is entirely unpredictable and is not reliably consistent with age, sex, the height of blood sugar or the presence or absence of diabetes. However, the overall pattern of this investigation does suggest some generalizations which are of little or no value as applied to the individual case. The four highest values (ranging from 70 to 72 mgm. per cent) for non-glucose reducing substances occurred in younger diabetics whose ages were 39, 20, 27, and 20 years respectively, and whose fasting blood glucose ranged from 210 mgm. per cent to 330 mgm. per cent (Somogyi-Nelson Method) (Table II, Cases 5, 17, 59, and 64). Since values between 30 and 69 mgm. per cent are widely dispersed among all age groups, and bear no consistent relationship to the blood glucose values, the four cases mentioned may be in a younger age group and exhibit more decided hyperglycemia by sheer coincidence. It may be significant that the average for non-glucose substances in the non-diabetic group is 4.6 mgm. per cent lower than that for the diabetic group. Unfortunately the validity of this comparison is weakened by the fact that the diabetic group is almost double the number in the normal group.

It should be mentioned that none of the cases exhibiting high values for saccharoids had any renal insufficiency which is a known cause for increased values.

Our observation that 39 per cent of the total 100 subjects tested had non-glucose reducing substances exceeding 30 mgm. per cent compares strikingly with the 38 per cent reported by Mosenthal and Barry² on the basis of 200 determinations. It is a curious fact that the 29.05 mgm. per cent overall average of saccharoids for 100 subjects studied compares most favorably with the upper limit of 30 mgm. per cent customarily accepted. The result is very misleading if the wide divergence in individual cases is not given close scrutiny. Even the higher average values listed in table I cannot be reliably applied to the individual case.

The statement by Cantarow and Trumper⁶ that the Folin-Wu procedure "may yield results 15-18 per cent less than the true value when the blood sugar is at hypoglycemic levels of 50 mgm. per cent or less" merits clarification. In the opinion of these authors it appears that the reducing capacity (in terms of glucose) of non-glucose reducing substances in the blood varies somewhat with the quantity of glucose present. In the experience of Cantarow,¹⁹ with the original Folin-Wu procedure, the value for non-glucose reducing substances is higher at high glucose concentrations than at lower glucose concentrations. In a broad sense this phenomenon can be read into the statistics of the present investigation but again knowledge of this is valueless in the clinical interpretation of Folin-Wu blood sugar readings in the individual case.

Effect of using a tourniquet. As previously mentioned, it was necessary to apply a tourniquet in only 14 of 100 venipunctures. Analysis of the results does not indicate that this eventuated in any significant alteration of values between the corresponding Wilkerson-Heftmann (arterial) and Somogyi-Nelson (venous) determinations. The use of a tourniquet should not increase the venous blood glucose in the fasting state for reasons already stated.

Wilkerson-Heftmann procedure. On analysis of table IV it is immediately apparent that exact evaluation of the maximum degree of error in each of the seven instances encountered among 200 Wilkerson-Heftmann determinations is somewhat hypothetical. However, one can be certain that each error listed represents a definitive minimal value. What is much more important is that in only seven of 200 determinations were inaccuracies demonstrable beyond the accepted ± 5 mgm. per cent variation. In one of these seven instances it is quite possible that the Somogyi-Nelson and not the Wilkerson-Heftmann value was inaccurate in view of the impossible negative quantity for non-glucose reducing substances encountered in this instance (Case 10, tables II and IV). If this could be proven, the demonstrable percentage of error among 200 screening tests would be 3 per cent rather than 3.5 per cent. The inclusion of Case 10 with its obvious analytical error is simply an honest admission of inaccuracies that will occasionally occur despite conscientious

tious and competent technique. This incident altered the overall results very little.

Detailed analysis of tables II and III discloses that quantitative appraisal of the reagent tablets within a range of 20 mgm. per cent was actually possible in only 55 of the 200 Wilkerson-Heftmann determinations. To increase the number of determinations so evaluated would have required further reagent tablets screening at several different levels, each requiring an additional procedure. This was not done because the objective here was to evaluate the accuracy of the two reagent tablets currently utilized in diabetes detection tests.

Minor variations in arteriovenous blood sugar difference may have enhanced the degree of error encountered, but the relatively high degree of accuracy apparent in the Wilkerson-Heftmann procedure militates against any appreciable departure from the zero level.

The Wilkerson-Heftmann test kit used in this investigation is equipped to screen at a level of 50 mgm. per cent by simply altering the number of reagent tablets used. Obviously screening tests at this level would not yield worthwhile data when only two of one hundred determinations revealed true blood sugar levels below 64 mgm. per cent, neither of these being under 50 mgm. per cent.

The most impressive observation in the entire study is the comparison between Folin-Wu and Wilkerson-Heftmann determinations. It is a curious paradox that a five-minute blood sugar screening test from finger tip blood, although merely indicating a level of distinction in values, is possessed of a much higher degree of accuracy than the 40-minute Folin-Wu procedure requiring venipuncture. It follows therefore that this simple rapid procedure has potentialities of application well beyond simple diabetes detection tests. Not only should this become as much an integral part of every routine physical "checkup" as the urinalysis, but it can be used to economic or practical advantage for the following:

1. The rapid distinction between diabetic and insulin coma in the absence of obvious signs. (Actually this is simpler, more rapid, and more reliable than a catheterized urinalysis for sugar.)
2. The emergency treatment of diabetic or hypoglycemic coma when adequate facilities are not available.
3. The office management of diabetic patients (especially children) when expense must be minimized.
4. A routine procedure (carried out at two screening levels) on all unexplained cases of coma. Screening at two levels would still require only one-fourth the time necessary for a conventional blood sugar determination.

Root²⁰ urges the universal adoption of a single method for true blood sugar estimation as soon as one is found that will be given unanimous endorsement. The crying need for unified action on this point becomes increasingly apparent from even a cursory review of the multitude of blood sugar methods and their "modifications." The American Diabetes Association is best quali-

fied to make this ultimate decision, thereby standardizing the interpretation of blood sugar values as they have standardized the insulin syringe in order that we may all speak the same language. Whichever method is finally adopted, the Wilkerson-Heftmann rapid blood sugar screening test should still retain the advantages outlined above.

Glycosuria. The simultaneous estimation of glycosuria by means of Benedict's qualitative reagent in each of one hundred subjects studied reemphasized the inherent limitations of this procedure as an index of blood glucose levels.

There is wide divergence of opinion regarding the so-called "renal threshold" for glucose. Strictly speaking, the renal threshold should be defined as the level of glucose in arterial blood at which abnormal amounts of glucose appear in the urine.⁴ However, in the fasting state this level may be considered identical for both venous and arterial blood sugar. Naturally the threshold actually depends not only on the blood sugar level but upon glomerular filtration and the integrity of tubular reabsorption.²¹ The renal threshold for true blood sugar has been shown to vary from 99 to 228 mgm. per cent, 80 per cent of cases ranging from 140 to 190 mgm. per cent.²² Mosenthal⁴ observed that the level for arterial blood at which glycosuria appears is about 200 mgm. per cent.

The point of this commentary is that it is possible to state a "normal" value for the renal threshold in only a very broad sense. With these facts in mind it is conceivable that the urine was sugar-free despite true blood sugar values in excess of 160 mgm. per cent in 20 cases (30.3 per cent) of the diabetic group, five of whom disclosed values of 200 mgm. per cent or over (table VI). The necessity of combining blood glucose estimations with urinalyses in diabetes detection tests is thus obvious. These findings also demonstrate the not infrequent finding of aglycosuria despite marked hyperglycemia among diabetics. Subscribing to the concept that sustained hyperglycemia is deleterious, such diabetics should be managed with emphasis on true blood sugar values rather than urinalyses. Conversely, there are diabetic patients with a subnormal renal threshold^{23,24} which again require correlation with blood sugar values if insulin reactions are to be avoided.

Finally, the fact that 46 of 66 diabetics (69.6 per cent) with fasting hyperglycemia had sugar free urine specimens carries the startling implication that nearly all of these cases would have escaped detection in the common office practice of performing urinalyses in the fasting state, although the latter specimens are not usually "second voidings." This is in curious contrast with the finding by Wilkerson and Krall²⁵ that when urine specimens are collected post prandially the observation most commonly positive was glycosuria in the absence of hyperglycemia.

SUMMARY AND CONCLUSIONS

A total of 400 fasting blood sugar determinations were made on 100 subjects in an effort to demonstrate the

limitations, reliability, and problems in clinical interpretation of values for the time-honored Folin-Wu procedure, the recent Somogyi-Nelson procedure and the new Wilkerson-Heftmann rapid blood sugar screening test. Sixty-six subjects were diabetic and the remaining 34 normal. For the Folin-Wu and Somogyi-Nelson procedures, venous blood was used while Wilkerson-Heftmann determinations were carried out at two levels on finger tip (arterial) blood in each case. Venipuncture was accomplished without use of a tourniquet in all but 14 subjects. Glycosuria was evaluated in each instance, using Benedict's qualitative reagent on "second voidings."

Analytical comparison of Folin-Wu and Somogyi-Nelson methods provided conclusive evidence that the former procedure may yield values from 2 mgm. per cent to 72 mgm. per cent higher than the actual value for blood glucose, due to entirely unpredictable quantities of non-glucose reducing substances in the blood, and that it is therefore impossible to establish a practical "range" for these substances which would permit efficient clinical interpretation of Folin-Wu values, particularly in glucose tolerance tests, in insulin resistant cases²⁶ and in so-called "brittle" diabetics.²⁷

In 200 Wilkerson-Heftmann rapid screening blood sugar tests, demonstrable inaccuracies ranging from +12 mgm. per cent to -30 mgm. per cent occurred in only seven instances. It is a curious paradox that a five-minute blood sugar screening test from finger tip blood, although merely indicating a level of distinction in values, is possessed of a much higher degree of accuracy than the 40 minute Folin-Wu procedure, requiring venipuncture.

The brief use of a tourniquet in the fasting state does not effect an increase in venous blood glucose.

The renal threshold for glucose is extremely variable.

The results of this investigation justify the following conclusions:

1. The Folin-Wu and similar blood sugar methods which include the non-fermentable moiety known as non-glucose reducing substances should be totally abandoned. Only methods which yield "true blood sugar" values should be used.

2. The Wilkerson-Heftmann rapid screening test for blood sugar has potentialities of application well beyond simple diabetes detection tests. Its use is recommended for: the emergency distinction between diabetic and insulin coma; for the emergency treatment of either condition in the absence of adequate facilities; for the office management of diabetic patients when expense must be minimized; and as a routine procedure in all unexplained cases of coma. Screening at two levels would still require only one-fourth the time necessary for a conventional blood sugar determination. Above all, it should be a standard procedure in every routine physical "checkup" performed ideally within 90 minutes after a full meal in our search for the million diabetics currently undiscovered.

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Pheochromocytoma

Report of a Case

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THE clinical syndrome arising from the development of a pheochromocytoma is still considered rare, yet its presence is probably overlooked in many cases of hypertension. It was this fact, as well as certain peculiarities of a recent case, that prompt us to present this report. We hope it will add to the information already known about the pheochromocytoma.

The credit for reporting the first authentic case of pheochromocytoma goes to F. Frankel who published in 1886.¹ Very little progress was made toward the pre-mortem diagnosis until 1926 when Vaquez and Donzelot made the first correct clinical diagnosis.² The next year Charles Mayo accomplished the first surgical removal of the tumor.¹⁴ It was not until 1929, however, that the entity was carried through from correct clinical diagnosis to successful surgical removal with a symptomless survival.³ The emphasis on clinical diagnosis was increased as more cases of this rare condition were reported. In 1937, Beer, King, and Prinzmetal⁴ demonstrated the blood level of epinephrine to be high during the paroxysms of hypertension. This laid the groundwork for accurate diagnosis because pheochromocytoma is the only entity which gives a hypertension due to circulating epinephrine.⁵ As the diagnosis became more accurate, the surgical treatment and technique improved. The overall operative mortality decreased from 24 per cent of the 57 cases operated by 1947² to an operative risk of less than 16 per cent in 1949.⁷ It is logical to assume that the operative mortality will drop even more with earlier diagnosis and adequate preparation for surgical treatment.

To understand the clinical picture presented by this entity one must know something of the origin and function of the tissue of this tumor. The pheochromocytoma is composed of chromaffin tissue which secretes and has a vast store of epinephrine. Most of this tissue is found in the medullary portion of the adrenal gland. It is ectodermal in origin and arises from the ganglionated cord of the sympathetic nervous system. During the fifth week of embryonic life it migrates toward and most of it penetrates the interrenal mass. The rest may remain close to the sympathetic chain or at some distance between it and the adrenals. In the fourth month the tissue assumes chromaffin staining characteristics and begins to manufacture epinephrine.⁸ The effects of epinephrine are well known and too numerous to discuss in this paper.

The adrenal medulla or its prototype gives rise to three types of tumors. One type, the neuroblastoma, which is highly malignant and resembles sarcoma, affects children under four predominantly. The second type of tumor is the ganglioneuroma, which is benign, affects all ages, and is found in the brain, sympathetic chain, and adrenals. It is composed of adult ganglion cells. The last type is the pheochromocytoma, sometimes called chromaffinoma or paraganglioma.⁸

The report presented here concerns a case of pheochromocytoma.

The patient, a 36-year-old white female, was admitted to the hospital on December 11th, 1947. Her presenting complaints were recurrent attacks of generalized abdominal pains of one week's duration. She also had complained of severe frontal headaches associated with flashes of heat and marked flushing of the face lasting for two days.

According to her family history, her mother was living and well. Her father, also living, had had surgery for carcinoma of the rectum several years before. She had five brothers and five sisters, all living and well. One of the brothers had had some trouble with peptic ulcers. The family history was negative for tuberculosis and diabetes.

Her marital history was short. She had been married two years previously and was nulliparous. Her menarche was at 17 years of age. Her menstrual cycle was always a regular 28-day type, with a three-day painless flow of moderate amount.

The patient's past history revealed a left sided renal colic followed by a left nephrolithectomy in 1939 at another hospital. She had pneumonia twice during that year. She had been in the armed services and while there experienced right sided renal colic, as it was then diagnosed, in 1942.

One of us (W.E.G.L.) was called to see the patient at her home on the evening before her hospital admission. The abdominal pain she described was somewhat colicky in nature and recurred in "spells" three or four times per day. She had first noticed it one week before while leaving work as a clerk in a local store. Around 5:00 o'clock on that afternoon she experienced a sudden onset of sharp, knife-like pain in the left lower quadrant of the abdomen. She went home in a bus even though the pain was so severe as to cause her to double up. She went to bed immediately after arrival home and the pain subsided about 45 minutes after its sudden onset. She lacked appetite for supper and during that night she was awakened by several spells of similar nature.

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She continued to work that week despite repeated episodes, day and night, of the pain. The spells were quite the same for five days and then she noticed that a severe headache and hot flash accompanied each attack. Witnesses of these attacks told her that her face became very flushed. It was at this time, two days before admission, that she quit work. At the time of the home visit she said that the spells were lasting for 45 minutes and recurring three or four times daily. During this visit she was not having one of her attacks and there was nothing pertinent found during physical examination. Her blood pressure at that time was 100/70. Hospitalization for observation was advised. The patient was admitted to the hospital the next morning and re-examined by one of us (W.J.).

Physical examination revealed a well-developed, well-nourished adult white female who did not appear acutely ill. The eye reflexes and ocular movements were normal. Her visual fields and fundi were normal. The neck was negative and the thyroid gland was not palpably enlarged. The chest was clear. The heart showed no enlargement. The tones were of good quality. There was a short systolic murmur at the apex. Blood pressure was 100/70. The pulse was 72 per minute. The breasts and axillæ were negative. The abdomen was flat, soft, and no masses or rigidity could be felt. There was some tenderness on deep palpation two cm. lateral to the umbilicus. The back and extremities were essentially negative except for a left lumbar scar and a soft incisional hernia at that point. Pelvic and rectal examinations were negative. The reflexes were physiological.

Routine laboratory examination revealed a hemoglobin of 12 gm., 4.2 million erythrocytes and 8,400 white blood cells. The differential count was normal and showed no eosinophils. The urine and serology was negative. The routine chest x-ray showed an anomaly of the first and second ribs on the right, but it was otherwise negative. Special laboratory tests revealed a blood sugar of 112 mg., a blood urea nitrogen of 26 mg., a blood urea of 56 mg., total proteins 4.55 gm. with a normal ratio, a potassium of 16 mg. per cent and calcium of 9.6 mg. per cent. One basal metabolic rate was taken and read plus 13. An electrocardiogram was essentially normal.

However, before the special laboratory tests were ordered, observation of the patient revealed important information. Six hours after her hospital admission the patient had one of her "spells". It was witnessed by one of us (W.J.). She writhed in bed while holding her head. Her face and neck was markedly flushed and felt hot. She appeared to be in agony and cried about her headache and abdominal pain. Her pupils were dilated, pulse rapid, and her skin was moist from perspiration. Her blood pressure was taken and read at 220/110. Thirty-five minutes later it was 178/112, and 50 minutes after the initial reading it was 100/70. During this attack the attending physician (W.E.G.L.) was consulted. This correlation of history, physical findings, and the clinical picture of the episode of hypertension suggested the impression of pheochromocytoma. It was then that

the special laboratory tests were ordered to rule out positively tabetic crises, hyperthyroidism and brain tumor and to localize any chromaffinoma present. It was found that nitroglycerine 1/150 grs. and intravenous Demerol shortened her paroxysms and lessened the severity slightly. She had attacks on the average of four times in 24 hours and most frequently about four hours after a meal or early in the morning. It was decided to fulfill the criteria of our diagnosis by special tests and to prepare the patient for early surgical intervention.

A cold pressor test was performed three days after admittance and gave a negative response. It was noticed that bending the patient's body forward while the nurses bathed her, or during x-ray examinations would precipitate an attack. X-ray examination of the urinary system showed a calculus in the pelvis of the right kidney. The contour of the kidney appeared normal. The left kidney was atypical in contour which could have been explained by the previous surgery. There was no evidence of calcification, but it was rotated so that the pelvis was displaced laterally. The region around the left kidney was palpated deeply but no real attack followed. However, the patient felt nervous and had alternating hot and cold sensations all night. On the fourth day after admittance it was decided to use histamine acid phosphate .05 mg. intravenously as a provocative agent.⁹ A typical spell was provoked three minutes after the injection of histamine was completed. The blood pressure rose at once to 230/140. She was immediately given 1/100 gr. of nitroglycerine sublingually and 100 mg. of Demerol intravenously. Five minutes after this the blood pressure dropped to 180/110, and 15 minutes later it was 134/96. This test was cautiously repeated with the same results. Blood samples taken during attacks revealed the blood sugar to be 181 mg. per cent and the urine after attacks was positive for sugar to grade 2. Since the patient had had previous renal surgery, perirenal air insufflation was deemed inadvisable. It is also considered by many not devoid of danger.

The patient was sedated with phenobarbital, ½ grain every four hours. This seemed to lighten the attacks and her attacks were farther apart. At this time, five days after admission, our diagnosis was pheochromocytoma and although it was impossible to localize the tumor it was felt that surgical exploration was the next step. Dr. V. G. Borland, the surgical consultant, concurred that surgery was indicated as soon as the patient was prepared. Four days prior to surgery she was given 15 grains of sodium chloride every two hours and this was carried on until the day of surgery. One cc. of cortin was given intramuscularly during the evening before surgery. This was repeated at the time the patient entered the operating room. The eleventh day after admission she was operated upon.

Under general anesthesia (Pentothal Sodium and tubocurarine) a midline incision was made from the xiphoid process to three inches below the umbilicus. Briefly, the exploration revealed the liver, gallbladder, stomach, and spleen to be essentially negative. The pelvic organs re-

vealed no abnormalities. The appendix contained several fecal concretions and the lymph nodes of the mesentery appeared slightly enlarged. Palpation of the kidneys revealed no significant abnormalities and palpation of the adrenal glands was also negative. Blood pressure at this time was 150/80 and pulse was 120. For further inspection of the adrenal areas the gastrocolic ligament was divided along the greater curvature of the stomach to the esophagus and the tail of the pancreas was reflected medially. This exposed the left kidney and left adrenal gland. Careful palpation and inspection of this area from the diaphragm to below the left kidney showed no abnormalities. Massage over this area did not produce any typical change in the blood pressure reading. The right side was explored next, the duodenum was freed and reflected medially while the peritoneum over the hilar region of the right kidney was incised. The vena cava was exposed. The right adrenal gland appeared normal when exposed as did the left adrenal. Careful palpation and inspection of this region, in and around the kidney, around the inferior vena cava, and the adrenal area failed to disclose any abnormalities. Massage of this area likewise failed to produce any change in blood pressure readings. Careful palpation was then made of the aortic area inferiorly. The area between the aorta and the vena cava had no abnormalities. During the exposure of the left adrenal glands, some bleeding was present in the splenic pedicle, so the spleen was elevated and removed by division and ligation of the pedicle. A small gland from the mesentery of the small bowel was excised for study. The appendix was removed since it contained several fecal concretions and was considered to be a source of future trouble. During the course of the surgery, the patient received a blood transfusion consisting of 1000 cc. of citrated blood; five per cent glucose and normal saline solution was also given intravenously. At no time during her surgery did the systolic pressure exceed 150. Her general postoperative condition was good.

The patient's convalescence was complicated by a mild upper respiratory infection which responded satisfactorily to treatment and she was discharged on her tenth postoperative day. Biopsy of the lymph nodes showed essentially normal tissue. No chromaffin tissue was found in the spleen or in the appendix.

OUTLINE OF CLINICAL DATA

I. Incidence

- A. Males and females are equally affected.¹¹
- B. The majority of patients are under the age of 40.¹²
- C. Less than .5 per cent of all hypertensive cases are caused by pheochromocytoma.⁵

II. Symptoms

- A. Duration of symptoms varies from two months to 11 years.
- B. Duration of attacks average one to two hours.¹¹
- C. Predominating symptoms and signs in decreasing order of frequency are:
 1. Hypertension (mostly paroxysmal).
 2. Abdominal pain.
 3. Rapid pulse, perspiration, dilated pupils.
 4. Mass in the abdomen.
 5. Hyperglycemia and glycosuria.

III. Diagnosis

- A. Besides the clinical picture several specific tests have been used.¹¹
 1. X-ray of the abdomen, intravenous pyelogram, perirenal insufflation.
 2. Massage and manipulation of suspicious regions.
 3. Starvation for 12 hours.
 4. Pressure over carotid sinus.
 5. Histamine intravenously.
 6. Benzodioxane.

IV. Treatment

- A. Surgical removal.

DISCUSSION

We were naturally hoping to find a tumor large enough to lay the hands on. The cessation of her symptoms and the return of her blood pressure to normal must mean that secretion from adrenalin producing chromaffin tissue has been interfered with. Just how remains a matter of conjecture as to whether in exploration the blood supply to a tiny mass of this tissue was tied off or whether the tissue might have been actually removed without detection. We do know that in some instances the tissue removed has been less than a centimeter in diameter.¹¹ In these cases of very small tumors the tissue present is extremely active and secretes much more epinephrine than the same amount of tissue from the normal adrenal medulla. In cases where the symptoms have persisted following surgery, re-exploration and the removal of additional particles of tissue has effected the cure. It is felt that the diagnosis was qualified in this case by the typical history, physical findings, laboratory studies, and specific tests. Many cases are being missed today and classified as hypertension because the entity is dismissed as too rare. It should be emphasized that many cases of pheochromocytoma have sustained hypertension and show signs of heart and kidney damage after a long duration of symptoms.² This entity should be included in the differential diagnosis with cases of essential or malignant hypertension, chronic nephritis, hyperthyroidism, and tabetic crisis. Other conditions where it should be kept in mind are neurasthenia anxiety states, and cardiac neuroses. It has been recently said the "index of suspicion" for pheochromocytoma is unduly low.⁵ The only way this can be changed is to keep the entity in mind and if suspicious, perform the simple specific tests for it. The cautious use of histamine acid phosphate⁹ has been used with 100 per cent results.⁷ When the entity is likely the benzodioxane test⁵ is safe in outpatient work. It was unfortunate that the material for this test was as yet unavailable for use in our patient. However, with cautious use we were able to avoid the dangers¹³ of sudden increased blood pressure in this young adult.

SUMMARY

1. A case with the characteristic signs and symptoms of pheochromocytoma has been presented.
2. Although surgical exploration failed to reveal recognizable chromaffin tissue, the patient's symptoms have been entirely relieved and no paroxysms of hypertension have recurred since her surgery.

3. After a follow-up of two years, repetition of the histamine test failed to produce the syndrome.

4. It was emphasized that the entity should not be considered too rare to be thought about.

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American College Health Association News

A. B. Denison, M.D., director of Student Health Service, Western Reserve University, will represent this Association at the National Conference for Cooperation in Health Education to be held on January 25 and 26, 1951, in Cleveland.

* * *

A. M. Menzies, M.D., has been appointed to the position of director of health service at the University of British Columbia, Vancouver.

* * *

S. I. Fuenning, M.D., University of Nebraska, is the new chairman of local sections. William R. Nesbitt, M.D., was called to active duty in the navy.

* * *

The Southwestern Section held a two-day meeting on November 29 and 30 at the University of Texas.

* * *

The fourteenth annual meeting of the Pacific Coast Section was held at the University of Oregon on November 24 and 25. Because all the big games were played during the same weekend, the attendance was smaller than usual. The thirty delegates represented ten colleges and universities. The modern new student union formed a beautiful setting for the meeting and the meals.

One session was devoted to three common clinical problems, namely, "Muscular Injuries in Athletics," "Infectious Mononucleosis," and "Infectious Gastroenteritis" presented by Donald S. MacKinnon, M.D., University of California at Los Angeles, George Houck, M.D., Stanford University, and Charles N. Lester, M.D., University of Washington, respectively.

The participants in a symposium on mental health were four university psychiatrists, namely, James Closson, M.D., Washington State College, Norman W. Brockman, M.D., University of Southern California, Harrington V. Ingham, M.D., University of California at Los Angeles, and S. Harvard Kaufman, M.D., University of Washington. An interesting discussion followed.

In the third general session the preparation of teachers in health education was discussed. It was concluded that the reorganization of the curriculum in teacher education institutions is necessary to adequately prepare health teachers to assume their responsibilities in the school health program.

The newly elected officers for the year 1951-1952 are: Donald S. MacKinnon, M.D., president; George Houck, M.D., vice-president; Catherine Wallace, San Jose State College, secretary-treasurer; Charles N. Lester, M.D., member-at-large on the executive council.

* * *

Two institutions have written in recently about their need of a physician. Anyone interested may write to: Dr. Gilbert S. Coltrin, Associated Colleges of Claremont, Claremont, California; E. R. Isbell, Dean of Administration, Michigan State Normal College, Ypsilanti, Michigan.

The latter college states that their Health Service serves some 2500 students, of which about half are men and half women. Facilities include a new, well equipped health residence with eight beds and the staff includes three full-time nurses.

CHANGE OF ADDRESS

In order to help us maintain an accurate mailing list, please send your change of address promptly to THE JOURNAL-LANCET, 84 So. 10th St., Minneapolis 3, Minn.

The Cardiovascular Management of Prostatectomy Patients*

A. C. Grorud, M.D.†
Bismarck, North Dakota

THE cardiovascular complications which may arise in prostatectomy cases are the same as those seen in any major surgical operation plus some that are peculiar to this common urologic procedure. Benign prostatic hypertrophy is the diagnosis for the bulk of most urologists' practice, and this condition is primarily a disease of older age. Because of age, this class of patients is prone to present abnormalities of the heart and blood vessels either before, during, or after prostatectomy, regardless of whether it be of the transurethral, the perineal, or one of the peripubic approaches. Arteriosclerosis is the common denominator underlying most of the undesirable episodes with which we are concerned in this discussion. Practically all of these patients, therefore, are potential candidates for coronary (arteriosclerotic) heart disease.

A preoperative medical consultation, together with routine chest x-ray and electrocardiogram, is highly desirable. An exercise tolerance test for latent coronary insufficiency may be indicated. A careful history is very important; if dyspnea on moderate exertion or other cardiac symptoms are elicited, the surgeon is forewarned. Prior attacks of frank decompensation or nocturnal dyspnea are, of course, clear-cut indications to perform only the minimal amount of surgery. Nevertheless, in this older age group, circulatory emergencies arise all too often, even in the absence of a significant history and in the presence of a negative chest film and an electrocardiogram that is considered to be within normal limits. Routine preoperative digitalization of all surgical patients was formerly quite commonly practiced as a sort of insurance against cardiac disturbances, whether apparent or not. At the risk of being considered old-fashioned and unscientific, I would recommend this practice, except when the electrocardiogram reveals a heart block. It must also be determined if any digitalis had been taken during the preceding three weeks. Full digitalization may be accomplished either rapidly or more slowly, depending upon the exigency of the situation. Ordinarily, it is preferable to give a digitoxin preparation by mouth, in divided doses every six hours, during the immediate two preoperative days, until the average full digitalization dose of 1.2 mg. has been given, unless toxic signs or symptoms appear before this total is reached. Postoperatively, 1½ grs. of a digitalis leaf product is given as a daily maintenance dose for a few days. The patient may be digitalized parenterally if necessary.

*Presented at the annual meeting of the North Dakota Urological Society, Fargo, N. D., October 20, 1950.

†Now with the Department of Internal Medicine, The South Bend Clinic, South Bend, Indiana.

There is no good evidence that the heart is directly subjected to an increased work load during surgery. Scherf has stated that the two greatest dangers are anoxia and shock, each of which may precipitate myocardial ischemia.¹ The choice of the anesthetic agent in known or suspected coronary heart disease is the one which will cause the least anoxia. Nitrous oxide-oxygen or ethylene-oxygen, with added ether if necessary, are best in this respect. Pentothal, chloroform, and cyclopropane are best avoided. Spinal anesthesia is notorious for causing a marked drop in the blood pressure with resultant decreased coronary flow. The safest procedure is to do as much as possible under local anesthesia. In many instances the choice of anesthetic may well determine the type of prostatectomy to be done. The Thorn test² may be run pre-operatively to learn the status of the patient's adrenal cortex. A poor eosinophil response to the injection of 25 mg. ACTH would indicate a tendency for shock to develop. If surgical shock does supervene, the use of blood transfusion, plasma, human serum albumin, epinephrine and central stimulants such as coramine and metrazol, are commonly employed. However, if the shock state is profound, the above measures should be given intra-arterially, rather than intravenously, for rapid restoration of the circulating blood volume. Appreciation of this mode of administration may prove life saving. In addition, adrenal cortical extract or ACTH may be necessary during or after surgery, the choice of which will depend upon the result of the preoperative Thorn test. If the test indicated good adrenocortical function by showing a significant drop in the total eosinophil count, ACTH in the dosage of 25 mgm. every three hours (for two or three doses) is the one to use. Lack of, or a poor eosinophil response (less than 50 per cent decrease), means that the adrenal cortex is not capable of effective stimulation by the anterior pituitary. In this circumstance, adrenal cortical extract in doses of 30 cc. to 50 cc. is indicated.

The chief features of the common cardiovascular abnormalities with which you may be required to deal are briefly outlined:

Coronary atherosclerosis. Adequate oxygen supply and the prevention of marked acceleration of the heart rate and fall of blood pressure are the significant points to keep in mind.

Hypertension. It is the degree of co-existing coronary artery sclerosis, cerebral artery sclerosis, and nephrosclerosis that is more important than the degree of elevation of the blood pressure. A sudden drop from hypertensive to normotensive levels is liable to initiate myocardial or cerebral ischemia or uremia.

Acute left ventricular failure. Usually associated with hypertension. The advent of pulmonary edema calls for prompt venesection, oxygen therapy, and the intravenous injection of 0.5 gm. aminophylline.

Auricular fibrillation. The surgical risk is not increased *per se*. However, it is well to have the patient fully digitalized.

Heart block. This always means an added surgical risk in the older age group, since it is usually due to coronary sclerosis. A history of Stokes-Adams attacks makes any operation hazardous.

Ventricular arrhythmias. If ventricular tachycardia supervenes it should be treated, for if allowed to continue any great length of time, collapse may occur. Ventricular fibrillation is, of course, always serious. It is often based on toxic effects of the anesthetic on the myocardium (cyclopropane especially). The use of procaine amide hydrochloride* appears to be the most effective drug for prevention and treatment of ventricular arrhythmias. It may safely be given intravenously while the patient is under anesthesia.

Pulmonary embolism. This unpredictable phenomenon is said to occur more frequently after prostatic operations than any other surgery. The work done at the Massachusetts General Hospital emphasizing the value of superficial interruption of the femoral veins³ is well known. Often done as a routine prophylactic method, carried out preoperatively whether or not diagnosis of phlebothrombosis of the leg veins has been made, femoral ligation should always be performed if there is clinical evidence that a thrombo-embolic process is beginning.

Overloading the circulation. Most physicians are familiar with Creevy's demonstration that the prostatic veins

are capable of admitting appreciable quantities of irrigating water into the systemic circulation with resultant hemoglobinemia leading to lower nephrosis.⁴ By the same route, irrigating with normal saline after prostatectomy could conceivably be a factor in adding to the sodium intake (and retention) in the case of a cardiac patient who is on the verge of decompensation and who is otherwise on a low sodium regimen. The cardiac status should always be considered in the giving of post-operative intravenous fluids in general in regard to kind, amount, and rate of administration.

SUMMARY

1. Prostatectomy prospects are also candidates for significant atherosclerosis of the cardiovascular system because of their age.
2. Anoxia and shock are the chief hazards.
3. Individual preoperative evaluation of the cardiovascular status is important.
4. The routine preoperative digitalization of these patients is considered justifiable in most instances.
5. The commonest cardiovascular complications of prostatectomy were outlined.

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DOCTORS' DILEMMA

Doctors are sometimes as well known for their accomplishments in some extracurricular field as for their achievements in medicine. The medical men listed below are all contemporary writers who studied, and in some cases practice, medicine. All have had books published within the last few months. Do you know them?

(a) This man, a peripatetic Englishman who is sometimes called the dean of living novelists, wrote his greatest book about a young man in a London medical school; he is not recommended for heart trouble; (b) an expatriate Irishman now living in the United States, he can correct that ophthalmic condition brought on by too close attention to his books, which are also good for the risibilities; (c) you wouldn't need this elderly but avante garde American poet unless you're expecting; (d) this highly popular novelist has most successfully treated the soul, in and out of clerical garb; his current offering is high on the best-seller list; (e) a Floridian, his name is especially appropriate to many people's conception of the profession. Surgery only.

The physicians who have tried to heel themselves in letters as well as medicine are: (a) Somerset Maugham; (b) Oliver St. John Gogarty; (c) William Carlos Williams; (d) A. J. Cronin; (e) Frank Slaughter.

DILEMMA RESOLVED

—Adapted from the *New York Times* Book Review Section, December 3, 1950



Dr. Fred G. Lundy of Dakota Territory*

Richard M. Hewitt, M.D.†
Rochester, Minnesota

RECENTLY, perhaps due largely to the stimulus of Mark Sullivan, readers have come to realize that this country was making history in the final quarter of the last century. Many articles are appearing in which the text of documents of that period are being preserved, and the personalities of outstanding local figures are being explained. They are of interest now, and will be of value in years to come. Accordingly, this article is offered in the hope, by quotation, interpretation, and photography, of recording a bit of the life and times of Dr. Fred G. Lundy, a territorial physician of superior character.

One of Dr. Lundy's ancestors, an Englishman, settled in Bucks county, Pennsylvania, in 1676. From Pennsylvania the descendants of this settler scattered. Some went to the warm regions of Maryland and Virginia; others to regions noted for anything but warmth. Dr. Fred came of the latter group. Born in New Market, Ontario, June 24, 1861, he became a physician in Inkster, Dakota Territory, in 1885 and, in 1887, an organizer of the North Dakota Medical Society.

The foregoing facts and the impressions and facts to follow have been gleaned from the contents of an old valise and an older doctor's bag, formerly the property of Dr. Lundy. They were put into my hands by his son, Dr. John Lundy,‡ of Rochester, Minnesota, widely known for his work in anesthesia. Supplementary infor-

mation has been given me by this son and by Mrs. Lila Woods Lundy, the mother of Dr. John and the widow of Dr. Fred.

There is no need to tell most of those who will read this article of the conditions of life on the north central prairie in the eighties of the last century. Many can recall the struggle with the elements, and with men, of fifty years ago. The same blizzards, cyclones, and crashing storms fell on the plains then as now; the difference is that the territorial residents traveled in buggies and box sleds, and sometimes saw sod walls melt in the rain, on them and on what they possessed.

There was no Indian trouble about Inkster in Dr. Lundy's time, but there were white men on the plains, who had an eye for such horses as the doctor drove. Dr. Lundy had, as companions on his calls, three huge dogs, who would be wakeful if he should doze at an inopportune time. Mrs. Lundy relates that, as the doctor jogged across the prairie, he could drop birds on the wing, armed only with a revolver, which he carried in a shoulder holster.

Into this environment, from which all of the hardships of earlier days had not disappeared, Dr. Lundy threw his body, training, mind, skill, and personality, all of which, judging from his personal records, diaries, and correspondence, must have been of a high order.

MEDICAL STUDENT

To a physician, the education which Dr. Lundy pursued in those days, when extended education was not a prerequisite to licensure, is impressive. His family has preserved his diploma in medicine from the University of Michigan, dated 1884, a similar diploma from Trinity College, Toronto, dated 1885, and his certificate of admission to the College of Physicians and Surgeons of Ontario, dated 1885. His certificate of licensure in the Territory of Dakota is dated 1885. Among the effects there is no certificate from the New York Polyclinic, but Dr. Lundy attended there in 1891.

*Reprinted from THE JOURNAL-LANCET 51:358, 1931.

†Senior consultant, Section on Publications, Mayo Clinic, Rochester, Minnesota.

‡Dr. John Lundy is well known to readers of JOURNAL-LANCET as the head of the section on anesthesiology at the Mayo Clinic. At the 1950 meeting of the North Dakota State Medical Association held in Grand Forks in May, the Society presented Dr. Lundy an honorary license to practice medicine in North Dakota, in recognition of his own achievements as a physician, and the fact that he was the son of one of North Dakota's pioneer doctors. This is believed to be the first time that such a license has been granted in the history of American medicine.

While he was a student, he began the habit, which he followed all of his too short life, of keeping notes and records of his work, and to some extent of his views. The first notebook is dated 1881, and contains a "List of subjects to be read and textbooks available."* The list of subjects is followed by records of pages read and dates on which the reading was performed.

This notebook, as all of them, is kept minutely in parts, sketchily in other parts, and many pages are blank. The one who kept them was no automaton. Apparently he would resolve to keep them up to date, but would lapse in spite of himself, then take a fresh resolve. Most medical students and physicians will recognize this alternation of laudable enterprise, with the extremely human relapse into merely doing what the working hours will allow.

In 1884, while he was attending the University of Michigan, the student had reached the bedside. On January 1, he wrote: "Holiday. Attended my patient (boy) in hospital morn, and eve. Skating on Huron river. Good sleighing." On January 6, is the first mention of his brother who later became a dentist in Inkster. The two were very close friends, as some brothers are not, lived together as students in Ann Arbor, and were in close touch always thereafter. Under February 1, 1884, appears the entry: "During whole month of Jan., I arose at 7 $\frac{3}{4}$ a.m. (average) and retired at 10 $\frac{1}{2}$ p.m. (average). Consequently I slept 9 $\frac{1}{4}$ hours." On the following Sunday he wrote, "Reviewed my cash book up to date. In all day." On Wednesday, February 13, appears the following: "Last night, shirts were stolen from our line. Lost one new one. 14 $\frac{1}{2}$. Cost 83 $\frac{1}{2}$ ¢." On May 18 he wrote: "In eve attended Baptist Church. Heard McVicar of Toronto preach." This minister was a relative of the late Dr. C. S. McVicar of the Mayo Clinic. On that same Sunday, he talked with two other students of forming a Canadian Society, and less than a week later twenty-six students met, and formed the Canadian Students' Association. After a committee had been appointed, of which F. G. Lundy was chairman, to draft a constitution and by-laws, the meeting adjourned. Those present dispersed after singing "God Save the Queen." This interest in organizations was characteristic of the man who was to become Dr. Lundy, as was his tendency to be a leader in them.

A notebook which he kept while he was at Ann Arbor, apparently well along in his course, contains odds and ends of information on drugs, treatment, diseases, pathology, history of medicine, and such quotations as the following: "Treat the patient rather than the disease." "In the study of natural truth we must consult experi-

ence, experience rather than reason." Da Vinci, 16th Cent." "Sharp observers study men and events as others study books." "Virtue is a thousand shields."

On June 26, Mr. Lundy received his diploma and degree of M.D. from the hands of President Angell, and two days later was in Sheffield, Ontario, where he "umpired a football match after tea."

PRACTITIONER

He lost no time in getting to work, for before the month was out he had apparently entered on a preceptorship or assistantship under Dr. J. W. Smith, his brother-in-law, of Dundas, Ontario. "Dr. Smith," he wrote, "said he would be willing to give me board, washing, etc., and \$25.00 per month if I remained till spring or a year." A few days later Dr. Smith went to Toronto for instruments and brought back for his assistant a watch, pocket case, hypodermic case and fever thermometer.

Dr. Smith continued to be the adviser of his assistant, for in June, 1885, he wrote to Dr. Lundy, who had by that time settled in Inkster: "You ask proportions of fever mist. I never make a large bottle contain strong medicine for fear people may mistake dose or may keep on giving it after its usefulness is gone. I generally use:

"R Tr. aconiti, m. xvi
Spt. ether nitr., drachms iv. to drachms vi.
Liq. ammon. acet. ad, ounces ii.
S. drachm in aq. p.r.n.

"In this case they can only give 16 doses and if they do give too large a spoonful they will not do injury."

After eight pages of consultative advice, Dr. Smith continued, "I shall always be glad to go over any cases in this manner and give you my views on them, and whether directly beneficial or not will perhaps help you into wider fields of thought in this ever widening field of science."

Good for Dr. Smith. Apparently a mature man and a young man of like stamp had met, with mutual respect. I wish I could reproduce the pages of these notebooks as they stand. Of course, I cannot. Rather, I must give an incomplete idea of the type of practice this extraordinary physician conducted, as it illustrates the type of man he was, and the conditions under which he worked.

The citizens of Inkster seem soon to have realized that they had a good doctor. Dr. Lundy's notebook for 1887 indicates that he was actively engaged. It is a mixture of memoranda of a bachelor practitioner; for instance, "Board, \$4.00;" "Tim Curtain, setting fracture, etc., \$10.00;" "Entertainment 35c;" "Haircut 35c;" "Geo. Williams, extg. tooth 50c;" "Butter 3 $\frac{3}{4}$ lb. 25c;" "To confinement \$10.00." One important entry of this period reads "Oscar telegraphed that I was county physician."

This notebook contains more concerning money than any of the others. Anyone who has been a recently graduated medical student and who could write, as Dr. Lundy could at this time, "Cash on hand \$22.50," will realize why the dimes are noted. A table of fees which is contained in this book follows:

*For their historic value the textbooks are recorded here: "Descriptive Anatomy, Gray; Physiology and Histology, Kirke, Sewell's Notes; Chemical Theory, Roscoe; Chemistry and Toxicology, Craft, Prescott; Materia Medica and Pharmacy, Garrod, Wood; Medical and Surgical Anatomy, Gray; Principles and Practice of Medicine and Therapeutics, Palmer, Flint, Horwitz; General Pathology, Green; Surgery, Ashhurst, Bryant; Surgery, operative, Ashhurst, Bryant; Midwifery, operative, Playfair, Lusk, Smith; Medical Jurisprudence, Husband, and Sanitary Science, Husband."

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Office advice, where no other advice required; not regular medical attendant	\$1.00 to \$5.00
First office advice of regular medical attendant	.50 to 2.00
Same advice with minute physical examination	2.00 to 5.00
Subsequent advice to same for same malady	.50 to 1.00

General Practice

Single visit, not regular attendant	2.00 to 4.00
Each visit, medical attendant	1.00 to 2.00
Detention, per hour	1.00
Night visits	plus 50%
Mileage	.50

Obstetrics

Ordinary obstetrics	5.00 to 10.00
Forceps (extra)	3.00 to 10.00

Miscellaneous

Fracture	10.00 to 20.00
Vaginal examination	1.00
Anesthesia	2.00 to 10.00

Dr. Lundy's range of work seems tremendous to the medical graduate of today. He did almost everything and did it all well. The confirmation of this estimate of his ability rests on the minute records which he kept of many of his cases. For example, January 1, 1893, the record of an obstetrical case began as follows: "Confinement—Puer. Used forceps. Born at 2 a.m. Labor began 24 hours before. Hard labor for 4 hours. Expected child to be born at midnight. P—120 after delivery. P.M.P.—104, T—99°; noon P—120, T—101.2°. Much flowing—passed piece of placenta."

Puerperal sepsis developed and the record continued for eleven days, with the utmost minuteness. The record for January 10 and 11 indicates that Dr. Lundy did not sleep for something like thirty-six hours. The last entry was made at 5:15 a.m. on January 11 as follows: "T—105; P—110, feeble and irregular."

The conclusion seemed obvious, and, after reading page after page, and coming to that conclusion, I felt genuinely depressed. However, in another notebook of that year, which records Dr. Lundy's visit to the World's Fair at Chicago, is the information that he met the woman and her husband in the California Building, and my spirits rose. He had won. The lady is still living.

Another dramatic record of a case appears in the notebook for April, 1894.

"Called at 11:30 a.m. to case of confinement. Mrs. _____, could not deliver the woman. On arrival, about 2 p.m., found a neglected shoulder presentation with hand born and black. This was the condition before I was sent for (don't know what the midwife had been doing). External version was first tried. But of no use. Then internal or podalic version was attempted under chloroform. This was persisted in for over two hours. The foetus lay breech high up and back to mother's right side. Head bent back onto body, chin down, and top of head near knees. Felt mouth and chin but could not make out child's neck. Felt ribs with right hand. Brought down each foot but could not turn child because of uterus turning with foetus. Gave up version. The woman was now failing fast and husband demanded that something be done to save her at once. Craniotomy

was out of the question from position of head. Embryotomy was indicated from failure of version and neglected transverse presentation. Decapitation was out of the question by having no suitable instruments, nothing but forceps and pocket case. Caesarean section was undertaken to save the life of mother who appeared to be sinking fast. I would have called another doctor but thought there was no time. Chloroform was continued. An abdominal incision was made in linea alba, first through skin, subcutaneous cellular tissue and fat, then through muscle, from below the umbilicus to within 2 inches of pubis. This was very carefully divided. Catheter introduced into bladder; no urine. An incision made through uterus which was well up to abdominal wall. The child's shoulder and mouth were seen on enlarging incision. The arm was first delivered; then incision extended higher up to allow head to come, after which child was delivered with legs under armpits on their own side and feet almost through the skin. A small vessel began to bleed just above the pubis and was tied. Some difficulty was experienced in removing placenta. Uterus was then well cleaned out by fingers and sewed up with four deep sutures x4. Superficial sutures of carbolicized silk. Instruments were in carbolic solution, 3 to pint. While I had no sponges, I used fine cloth in hot bichloride solution, 1:2000. The sutures were left long, eight of them, and ends brought outside together. Wound cleaned and dried. The abdomen was then closed by deep and superficial sutures but not very tight (silk). Abdomen washed off. Wound covered by cloth wrung out of bichloride. A clean, dry cloth over this and larger; then a binder, not tight. Operation about 6 p.m. Pulse 96 and 100 during next two hours. Felt pain on weight of clothes over abdomen. Fixed protection. Very pale and tired. Had given ergot. Left 1 P. opium 1/2 grn. for after pains."

The patient recovered. In June, Dr. Lundy called Dr. J. E. Engstad of Grand Forks for consultation in this same case. The patient was having abdominal pain, and an abdominal fistula had persisted. Dr. Engstad and Dr. Lundy operated successfully in Grand Forks. Anyone but a physician might expect that the husband would commend the doctor. But no, Dr. Lundy wrote that the husband "blames me for taking stitches out on tenth day," and that is all he wrote on that aspect of the case.

This quality of moderation in recording instances of ingratitude or incompetence is striking in Dr. Lundy's notes. One of his entries reads, "Baby 24 hours old. Fracture of left femur done at labor while midwife was using traction with her fingers, it being a breech presentation in which left foot was above head. She heard the snap." Another reads, "Carbuncle on chin. Beggs liver pills, 4, were given by Mrs. _____." There are statements of fact like these; no railing, even though the doctor wrote full comment on his cases.

But when he wrote a recommendation he was not so restrained: "I have found the bearer, Mrs. Picknell, a thoroughly good nurse in every way. She is careful, kind, and follows instructions to the letter. I therefore bespeak for her your goodwill and assistance."

In 1890, Dr. Lundy performed an operation for hare-lip. In the same year he operated for cataract. This operation was successful, and, in the following year, he operated successfully on the other eye. These fields of work, in which knowledge of detail was requisite, bring out another aspect of Dr. Lundy's nature. Moreover, there is in existence a letter of December 24, 1891, to Dr. J. S. Thacher, of 33 West Thirty-ninth Street, New York, which reads in part as follows: "I have concluded to have you select a microscope for me, using your own judgment. Enclosed please find draft on New York for \$125. The practical use I expect to make of it is in daily urinary analysis, and the examination of tubercle bacilli occasionally." Previously, as letters prove, Dr. Lundy had sent sputum to Dr. Thacher for examination and report. Physicians in medical centers today consider themselves scientifically broad if they possess an ophthalmoscope and a microscope and use both personally.

That Dr. Lundy recognized limitations in himself, also an attribute of a scientist, is evident in that he referred patients to specialists and sought consultations. One of his consultants was Dr. H. M. Wheeler of Grand Forks. Dr. Wheeler was the man who, when he was a medical student, killed one of Jesse James' band in Northfield, Minnesota, and wounded another. The incident is related in Dr. Henry F. Hoyt's autobiography, "A Frontier Doctor." For years Dr. Wheeler used to visit Rochester, Minnesota, a gun on each hip, to watch operations at St. Mary's Hospital. The story is current, although I have not verified it, that Dr. Wheeler was granted the body of the robber whom he shot for anatomic dissection. To one who asked him where he got the cadaver he is said to have replied, "Why, I shot him."

The doctor's practice, of course, did not consist entirely of extraordinary cases. There was the general run of the usual maladies and of prescribing of the day, when prescriptions tended to be long and fearful. Most of the prescriptions appear on the blank of John H. McLain and Company, of Inkster.

Then there was the difficult necessity of making a diagnosis of typhoid fever without the aid of the Widal test. There is the instance, minutely recorded, of the Schneider family, whose hired man was taken sick in September, 1889. Then, one after another, in October and November, the members of the family became ill, in all ten, or possibly twelve, persons of the household. Dr. Lundy reserved diagnosis for a time. Pneumonia developed in one case. Finally he recorded the diagnosis, and three deaths; those of the mother, aged 34 years, and of two girls aged ten and three years, respectively. This seems a good record. Nine years later, typhoid fever was decimating American troops in the southern United States and in Cuba. It was, at that period, one of the most dreaded diseases.

Odd items crop up in the notes from time to time. One of these reads as follows: "Extracted by water a bug from left ear. This bug got into his ear in July, 1882, while he was asleep on ground (8 years in ear). Bug dried but not changed otherwise. Even feet and

legs of bug were intact." There is the incident of the man whose epithelioma of the lip was due to smoking an iron pipe. I never heard of an iron pipe, although I have been a pipe smoker, and curious about pipes, for twenty years. Then there is the incident, which reads oddly to one not acquainted with place names of the region, of a confinement in Batchelor's Grove.

CITIZEN

The activities of a doctor are, or should be if possible, closely allied with his life as a member of his community. Dr. Lundy, as has been said, was county physician, and a number of clippings in his notebook for 1894 show that he took an active interest in the water supply. Early he must have concerned himself with local political affairs, for in 1887 he made a note of the nominee resulting from a town caucus. This interest was maintained to the last incident of his life. In 1892 he became a citizen of the United States, three years after his adopted territory had become a state. He was the one who proposed the building of a church by the religious society of which he was a member, and he was a teacher in the Bible school from the time of its founding. The Sunday School of his church still has a Lundy Memorial Library as a reminder of the man who was most earnest in efforts toward its establishment. Dr. Lundy was also Worshipful Master of his lodge, and among his effects are manuscripts of debates in which he took part, and one manuscript of an address on the significance of Children's Day.

In his personal life, the year 1893 may well have been his happiest, although he was driving long distances through the weather of what seems to have been a bitter winter. But it was not bitter to the doctor. On New Year's Day he made the following entry: "Visited Forest River. Took New Year's dinner at Woods." Left for home 10 p.m. Stormy and cold." Two weeks later: "Visited Forest River. After arriving home at midnight had to drive to Sims." Thermometer 22° below zero."

That year spring was late. On Sunday, March 5, the temperature was 10° below zero, but the doctor had a "pleasant time." He visited at Woods', left for home at 11 p.m. and arrived home at 2 a.m. There is something strange about this. A doctor may have high regard for his patients but he scarcely has a "pleasant time" while attending them. It seems unlikely that anyone was sick at Woods'; still in subzero weather Dr. Lundy was driving for three hours around midnight, and his only comment is that he enjoyed it. On the thirteenth there was a blizzard and the temperature was zero. Nevertheless on the nineteenth, Sunday, in a snowstorm, he drove to Forest River again, and here is the solution of the mystery. That night he proposed to Lila Woods, and was accepted.

By April he was in the full swing of courtship, and on the eleventh his brother Oscar and he journeyed to Grand Forks, where they met Lila and another young lady, for the purpose of seeing the play, "Bleak House." On the next day, Oscar took charge of the young ladies

and the doctor departed for Larimore. Winter was not over. A blizzard swept down, or across, since he was on the prairie. Three engines were wrecked on the main track, and next day, the blizzard continuing, another was derailed. The doctor did not reach home until noon of April 14.

In May, he was arranging for the building of his house, which still stands in Inkster. On the twenty-first, two days after one of the worst blows ever seen in Dakota, he wrote: "After making some calls at McDonald's arrived at Woods'. Remained to 10:30."

In July he was planning his wedding trip: "Ira Gallagher and wife arrived home from World's Fair today. He says that a couple can be gone three weeks for \$100 not counting railroad fares. It cost himself and wife less than \$200 and he bought a good many extras."

In September the couple was married and started for the World's Fair, traveling in a drawing-room. The trip was eventful, however: "Arrived at St. Paul at 7:30 a.m., where I registered self and wife. Left for Chicago at 1:25 p.m. over Wisconsin Central. Saw miles and miles of forest fires near Abbotsford, Wis. Delayed at Withee, bridge burned out. From Withee to Marshfield is 40 miles, but had to back to Chippewa Falls, Eau Claire and Marshfield, 150 miles. At Marshfield, No. 4 from St. Paul wrecked our engine, which was on side

track, too close to main track. Had to remain all night on track. Left Marshfield 13 hours later."

They had a week at the World's Fair, crowded with activity, all of which is recorded in a special notebook. Then they returned to Inkster, where the doctor took up his busy practice. His call book for 1894 is crammed with records, and in July of that year is the record of the birth of his son, now, as has been said, an authority on anesthesia. There is a letter of congratulation from the old preceptor, Dr. J. W. Smith of Dundas, Ontario, who had been writing off and on in friendliness and counsel for all these years. There is also a letter from an uncle, Dr. J. B. Lundy, of Preston, Ontario.

Dr. Lundy's happy, apparently buoyant life went on until April, 1896. At that time he went to a Republican caucus at Fargo. He was ill when he started, with a cold contracted on a long drive, but he was determined to go. Pneumonia developed while he was in Fargo, where his brother Oscar, the dentist, stayed with him until he seemed to be recovering. On April 24, however, there was a relapse, from which the patient did not recover, and a life which had been a force for all that was best in a new state of the union came to an end, after thirty-five years. Several columns of the Inkster *Tribune* of April 24 are occupied by tributes and resolutions, which, although written in the fulsome style of the time, seem not, in fact, to have been exaggerated.

WISCONSIN INSTALLS HIGH VOLTAGE X-RAY MACHINE

A powerful tool for treating certain types of cancer will soon be installed at Wisconsin General hospital on the University of Wisconsin campus. Packing a million-volt charge, this new x-ray machine is the first of its size in Wisconsin and one of the few such treatment machines available in the nation.

The x-ray tube on the machine protrudes about 23 inches from the transformer, and the head can be rotated and rays directed in any direction desired. This makes it possible for the patients to be placed in many different positions and still receive full benefit from the rays. The million-volt machine is completely self-contained and entirely sealed off. It weighs two tons, complete with 1,000 pounds of built-in lead to protect those working with the machine from excessive radiation.

The building where the machine will be installed houses an x-ray treatment room with concrete walls 18 inches thick. The room is entered through a special door of half-inch steel and half-inch lead at the end of a four and one-half foot maze with walls 12 inches thick. The ceiling is of 12-inch-thick concrete to shield personnel working in the machine room above the treatment room.

The source of the x-ray beams is a cylindrical tank which may be turned horizontally through 360 degrees by electric pushbutton control. In addition, it may be angulated vertically throughout a wide arc. Insulation in the transformer tank is by gas instead of the conventional oil, resulting in a great weight saving. About 100 pounds of gas performs the insulating function of 12,000 pounds of oil.

Subdural Hematoma Complicating Meningitis

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WITH most small children now recovering from meningitis, our attention is turning more toward prevention of such deforming sequelae as hydrocephalus, convulsions, and mental deficiency.

In January of 1950, McKay et al¹ reported nine cases of children who developed subdural hematomas following influenzal meningitis with complete cure following their removal. We did not know of his report, however, until after our case had been diagnosed and treated.

It is not clear whether this lesion represents exudation or hemorrhage into the subdural space as a complication of the meningitis itself, or is a complication of the antibiotic therapy. The first premise seems the most likely. One should be alert for this probability in all small children with meningitis, especially those under one year who do not do well following adequate chemotherapy.

CASE REPORT

This is the case of a six-month-old, white female, who at five months of age developed fever and petechiae. This was diagnosed as meningococcus meningitis by the local physician. She was treated for six days with combined chemotherapy, including sulfadiazine and penicillin. At the end of this period, as she seemed much improved, the parents signed her out of the hospital against medical advice. One week after discharge from the hospital the child developed intermittent spells of twitching of the left arm and leg, and was referred to one of us. On admission she appeared to be a rather thin, pale child who was quite irritable. Examination was otherwise negative except that she did not seem to move the left leg or arm normally and the reflexes were increased somewhat in the left leg and arm.

At that time she had a temperature of 100.6° rectally; hemoglobin was 60 per cent; white count was 22,400, with 73 per cent polys and 25 per cent lymphocytes; and the urine showed albumin, red cells and white cells. Lumbar puncture revealed clear spinal fluid with eight polys, seven mononuclear cells and normal sugar and protein (48 mg. per cent). Subdural taps revealed 20 cc. of bloody fluid on the left side and none on the right.

Five days after the second admission and two days after the subdural taps she was referred to Minneapolis as there were no neurosurgeons in the vicinity of the first hospital.

On admission she was shown to be a rather poorly nourished, chronically-ill appearing child who was quite irritable. The pupils were unequal, the right being larger than the left. There was a purulent discharge

from the nose and a slight amount of inflammation in the throat. The anterior fontanelle felt normal. The child was quite spastic on the left side with all the reflexes being quite hyperactive.

Accessory clinical findings revealed a normal urine, a hemoglobin of 9.2 gm. and a white blood count of 12,800 with 73 per cent P.M.N.'s and 27 per cent lymphocytes. Blood sugar was 92 mg. per cent and serum calcium was 10.8 mg. per cent. Subdural taps revealed 25 cc. of xanthochromic fluid on the left side and only a few drops on the right side. This hematoma could not be tapped from the fontanelle except when it was completely filled; a more lateral tap through the coronal suture was necessary. This was no doubt due to the lateral location of the hematoma centering around the pterion.

Four days after admission, the child was taken to surgery by one of us at which time a trephine hole in the right temporal region revealed nothing of note so a frontal subdural craniotomy flap was turned down on the left side. The dura on the left side had the characteristic blue color over the temporal region that is suggestive of subdural hematoma and on reflection of the dura, an intact subdural hematoma was seen. This was then dissected out. Also seen at operation was an area of chronic meningitis overlying the medial portion of the central sulcus ranging from yellow to green in color.

The patient tolerated the procedure well and was returned to the ward in good condition.

The subsequent course in the hospital was uneventful. She was given several transfusions and continued on penicillin and sulfadiazine for ten days after surgery. When she was discharged, she appeared quite normal. She was continued on the sulfadiazine at home for another two weeks and at the present time is quite normal.

SUMMARY

The subject of this paper is a six-month-old child, who developed a subdural hematoma, after meningococcus meningitis which had been inadequately treated. At operation a large subdural hematoma was removed from the left side of her brain and a localized area of chronic meningitis was found around the region of the central sulcus. Her subsequent course has been normal.

We feel that this condition should be watched for very carefully in all small children who have meningitis and that the best preventive for this type of complication is accurate diagnosis and adequate chemotherapy.

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Extrarenal Azotemia*

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UREMIA is usually an anticipated complication of nephritis, obstruction to the urinary tract, and all inflammatory or degenerative diseases of the kidneys. When these conditions are not present, it is less commonly found and less commonly searched for. It may be regarded that uremia would be discovered more frequently if a blood determination for nitrogenous substances were always made in the face of a toxic-appearing patient. As far back as 1912 two French physicians, Froin and Marie¹ reported the occurrence of prerenal azotemia in choleric form enteritis, although O'Shaughnessy² pointed out a rise of blood urea in cholera as long ago as 1832. Also in 1912, Nobécourt, Bidot and Mailler³ reported this condition in gastrointestinal conditions in infants, and in 1914 Tileston and Comfort⁴ reported it in intestinal obstruction with vomiting.

Because of the complicating and critical features of this condition the subject will be discussed further in relation to two cases recently experienced in our local hospitals.

CASE REPORTS

Case 1 was a male, age 45, admitted to the hospital on November 24, 1949, with an acute illness characterized by chest pain, chills, fever, nausea and vomiting of about three days duration. He had been taking pneumothorax refills for pulmonary tuberculosis for 16 years with a 50 per cent collapse of the right lung. His last refill was two weeks prior to this illness. During all these years he was active, at work, and in good general health.

On admission the essential findings in his physical examination were the rapid pulse at 110, temperature 101°, blood pressure 90/60 (he usually had a mild hypotension), marked decrease of breath sounds over the right chest, but no rales or impaired resonance. On the next day his temperature rose to 104°, he had leucocytosis and a chest x-ray revealed what appeared to be consolidation of the lower lobe of the right lung (which was the collapsed side). In addition there was a small amount of fluid in the right chest. On antibiotics his temperature subsided in a few days, but his chest fluid increased to a typical empyema and he became very toxic. He also developed an auricular fibrillation; his blood pressure dropped to 80/50, he developed a pulse deficit, and a mottled radiographic appearance of his left lung.

On the fifth day, because of his mental disorientation, giddiness, hiccoughs, mild nausea with some vomiting,

plus his toxic appearance in spite of an almost normal temperature, blood chemistry examination was ordered, which revealed a blood urea nitrogen of 200 mg./per cent. His urine specimens revealed normal findings with specific gravity 1019, except for two days at the peak of his uremia when he had a 2-plus albuminuria, a few blood cells and an occasional granular cast. At this same time his blood creatinine was 4.2 and his blood chlorides 368.

From the fifth to the twelfth hospital days his intravenous fluids of five per cent and ten per cent dextrose in water and in saline were increased to 3000 cc. daily, and he was also given one 500 cc. blood transfusion. At times aminophyllin was added to his intravenous fluids. With this treatment, his uremic state gradually declined so that the blood urea nitrogen determination on his 24th hospital day was 33.7 mg./per cent.

Following this acute episode of his illness his empyema continued to be a problem. He had a subsequent rib resection and drainage of his chest and still later a three-stage thoracoplasty. At present he is back at work and in fairly good health.

Case 2 was that of an obese male, age 53 and weight 260 pounds who was admitted to the hospital on August 2, 1949, complaining of crampy lower abdominal pain, nausea and vomiting of three days duration.

His general health had always been good previously except for his obesity.

On physical examination he was markedly tender in the lower right quadrant of his abdomen, with rebound tenderness. His white blood cell count was 13,000 and his urine specimen was with specific gravity 1018. He was operated on the evening of his admission and found to have a perforated gangrenous appendix with generalized lower abdominal peritonitis. On the day after surgery his urine specimen revealed a 2-plus albuminuria with a few white blood cells and occasional granular casts. The following day, in spite of a mild degree of fever, he seemed quite toxic with mental disorientation. A blood urea determination was taken which revealed a level of 118.6 mg./per cent. In addition to antibiotic therapy his intravenous fluids were increased to three and four thousand cc. daily using some dextrose in plain water and some in saline.

His blood urea determination on the ninth hospital day had declined to 42.2 mg./per cent and his urine specimen was normal. He was discharged on the eleventh hospital day and has remained in good health since that time.

DISCUSSION

Extrarenal uremia is a clinical state characterized by elevation of the blood nitrogen, dehydration due to loss

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of extracellular fluid and electrolytes, normal or low blood pressure, and oliguria which may progress to anuria. The eye grounds appear normal, and the specific gravity of the urine is not markedly diminished, if at all lowered. Casts, red cells and white cells with moderate albumin may be present in the urine, but these characteristically disappear. The primary responsible factors are extrarenal in origin, and in the cases in which death occurs, structural changes in the kidneys are either entirely absent or are of insufficient degree to account for failure of renal function.

The conditions in which extrarenal uremia may occur are mentioned by Jeghers and Bakst⁵ as follows: coronary thrombosis, peritonitis, alkalosis, pyloric obstruction, liver-kidney syndrome, yellow fever, gastro-intestinal hemorrhage, postoperative complications, congestive heart failure, reaction to transfusions and intravenous therapy, Weil's disease, Addison's disease, pneumonia, allergy, diabetes mellitus, shock, acute pancreatitis, diarrheal disease, drug intoxication, and burns.

The clinical picture of prerenal azotemia is, of course, superimposed upon each of the widely diverse diseases mentioned above, although there are certain features differentiating the azotemia from that due to organic kidney disease. A summation of the clinical picture along with the all important laboratory studies are usually conclusive. The striking clinical improvement and the rapid disappearance of the uremia with intravenous saline and glucose usually gives us the final proof of the diagnosis.

Perhaps the most disturbing problem in a consideration of extrarenal azotemia is its pathogenesis. Many theories have been mentioned since the first recognition of this symptom-complex. Some time ago, diminished renal function due to degenerative changes in the tubules, so-called "toxic nephritis," was thought to be the chief cause of the uremia.⁶ Then, with the life-saving effects of fluid and salt and the infrequency of renal pathology in these cases, the condition was considered to be the direct result of dehydration and electrolyte loss (particularly chlorides), exaggerated sometimes by an increased destruction of protein and low arterial pressure. It is of interest to note that these factors were no doubt present in case 1 reported here. In an all-over survey of the whole subject of extrarenal azotemia, Jeghers and Bakst⁵ list six basic mechanisms, the various combinations of which they believe will explain all of the many situations in which this syndrome arises. These mechanisms are: (1) fall in blood pressure; (2) hypochloremia and hyponatremia; (3) dehydration; (4) increased protein catabolism; (5) loss of deaminizing power of the liver; and (6) local renal factors, including cases with tubular damage or edema of the kidney.

Fishberg⁷ gives an unusually concise and well formulated opinion as to the basic mechanism of extrarenal azotemia. He first states that the impaired renal function is due to "a concentration of urine disproportionately low in comparison to urinary volume." He then considers the problem as to whether the uremia is due to overloading of the kidneys (increased destruction of protein) or to failure of the kidneys, and concludes that the latter can be shown to be the cause, if kidney func-

tion is judged in the light of his above stated definition. Besides citing previous evidence of impairment of renal function shown by various tests, Fishberg notes that in the majority of patients with prerenal azotemia, comparison of the specific gravity with the urinary volume shows a definite decrease in the concentrating ability. Thus, while a specific gravity of 1.020 is evidence of good kidney function when the urinary volume is normal, it is too low if the urinary volume is very small.

In the mechanism of impairment of renal function, it is shown that hypochloremia, low blood pressure, toxic nephritis, and alkalosis, cannot produce such impairment by themselves and that where present they appear to play accessory roles. Fairly good evidence is presented to indicate that the primary pathogenetic factor in most, if not all instances, is decrease in blood flow through the kidneys, aided by peripheral circulatory failure with decrease in circulating blood volume. In this concept the diminished volume of blood flow through the glomeruli is aided by the lessened concentrating ability of the impaired tubular function on an ischemic basis.

The common factor, then, in the pathogenesis of extrarenal uremia appears to be diminished blood flow through the kidneys, which fortunately is reversible in many cases, provided treatment is started early. If treatment is instituted too late or is inadequate, irreversible renal damage may occur.

The treatment of extrarenal azotemia involves the replacement of water, sodium and chloride, maintenance of the normal circulation and volume of the blood and adequate treatment of the underlying disease process. In almost all cases this is best accomplished by the intravenous administration of sodium chloride solution with or without glucose. The oral administration of fluid cannot be relied upon, and especially so in the presence of vomiting. Shock, if present, must be combated and blood transfusion probably will be helpful. Relatively moderate amounts of glucose solution, given intravenously, may be sufficient to lessen protein destruction and to combat starvation acidosis, but large quantities of saline solution are usually required. The total of both substances must be sufficient to restore the depleted fluid and electrolyte concentration in the body. This will, then, automatically establish a normal urine output with rapid disappearance of the retained nitrogen and other toxic products of catabolism. If food is tolerated, small feedings should be given every two hours consisting of concentrated liquid or semisolid carbohydrate food. Antispasmodics of the belladonna group are often of value. If nausea and vomiting are present nothing should be given by mouth, because food which is regurgitated actually does harm by increasing the loss of electrolytes in the gastric secretions. The same unfavorable result may be brought about by food when it aggravates severe diarrhea. Successful termination of azotemia which has been induced by pyloric obstruction of the type described by O'Donovan and Murphy⁸ has been brought about by gastrojejunostomy and is recommended by them. Other useful measures that may be adaptable in specific cases could be discussed, but space allows only the essential points as they have been presented.

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Meet Our Contributors

HARLEY ELLSWORTH FRENCH is a graduate of Northwestern University school of medicine in 1907, took graduate work at the University of Chicago and Wistar Institute, taught at the University of South Dakota from 1907 to 1911, when he came to the University of North Dakota as professor of anatomy and dean of the school of medicine. He is a member of A.M.A., Grand Forks District Medical Society, past president of the state society and past president of the American Association of Anatomists.

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REINHOLD O. GOEHL received his medical degree in 1931 from the University of Minnesota, specializes in cardiovascular disease and internal medicine in Grand Forks, North Dakota. He is chief of medicine at Deaconess Hospital, on the medical staff of St. Michaels, and serves as chief of the University of North Dakota Dispensary. He is a member of the state medical society, A.M.A., American College of Physicians, and the American Board of Internal Medicine with subspecialty of cardiovascular disease.

★

ALTON C. GRORUD was graduated from the University of Wisconsin medical school in 1936, specialized in internal medicine in Bismarck, since November 1 has been a member of the staff of the South Bend Clinic in South Bend, Indiana. He is a member of the A.M.A., F.A.C.P., F.A.C.A. and the Association for the Study of Internal Secretions.

★

EDGARD A. HAUNZ was graduated from the University of Buffalo medical school in 1943, and took a three year fellowship in internal medicine at the Mayo Foundation. He serves on the National Committee on Diabetes Detection of the American Diabetes Association, as chairman of the Committee of the state medical society, and as executive secretary-treasurer of the North Dakota Diabetes Association. He is a fellow of the A.M.A., a member of Sigma Xi, and Nu Sigma Nu.

★

RICHARD M. HEWITT, a graduate of George Washington University medical school, is senior consultant in the Section on Publications of the Mayo Clinic, which he joined in 1928 after three years as assistant editor of the *Journal of the American Medical Association*. He is a fellow of the A.M.A. and an honorary member of the Olmsted-Houston-Fillmore-Dodge County Medical Society and the Minnesota State Medical Association.

★

WILLIAM H. JOHNSON was graduated in 1947 from the University of Illinois medical school, served as surgical resident at St. Luke's Hospital in Fargo, North Dakota. Since July, 1950, he has been on the staff of the Veterans Administration Hospital in Des Moines, Iowa.

DOROTHY C. KERANEN is a graduate in medical technology of the University of Minnesota, who now serves as laboratory technician with the Grand Forks Clinic. She is a member of the American Society of Clinical Pathologists.

★

WILLIAM E. G. LANCASTER is a graduate of the University of Toronto in the class of 1922, specializes in internal medicine in Fargo, serves on the staff of St. Luke's Hospital and St. Johns Hospital in that city. He is a member of the Cass County Medical Society of which he was president in 1943, the North Dakota State Medical Association, and a fellow of the American College of Physicians. He is president-elect of the North Dakota State Medical Association for 1950-1951.

★

JOHN H. MOORE, a graduate of the Northwestern University medical school in 1917, specializes in obstetrics and gynecology in Grand Forks, North Dakota. He is a member of district and state medical societies, a fellow of the A.M.A., a diplomate of the American Board of Obstetrics and Gynecology, a member of the American Gynecological Society and the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, the Chicago Gynecological Society and the Minnesota Society of Obstetrics and Gynecology, a past president of the Central Association of Obstetricians and Gynecologists and a fellow of the American College of Surgeons. He is director of the American Committee on Maternal Welfare, Inc.

★

CARLETON KENT OLSON was graduated from the University of Minnesota medical school in 1943, took a four year fellowship in neurosurgery, now practices neurological surgery in Minneapolis, where he is on the attending and consulting staffs of several private hospitals. He is a member of Alpha Omega Alpha and the Hennepin County Medical society.

★

RICHARD BERESFORD TUDOR is a graduate of the University of Minnesota medical school in 1941, specializes in pediatrics in Minneapolis. He is a member of the A.M.A., Northwest Pediatrics Society, Minneapolis Academy of Medicine, the American Board of Pediatrics.

★

ROBERT BRUCE TUDOR was graduated from the University of Minnesota medical school in 1938, took graduate work at Duke University Hospital in 1946-1947 and Johns Hopkins Hospital in 1947-1948, specializes in pediatrics in Bismarck, North Dakota. He is a member of the Northwestern Pediatric Society and the North Dakota Pediatric Society.

Book Reviews

The Nose, an Experimental Study of Reactions within the Nose in Human Subjects During Varying Life Experiences, by THOMAS H. HOLMES, M.D., HELEN GOODELL, B.S., STEWART WOLF, M.D., and HAROLD G. WOLFF, M.D. 154 pages. Springfield, Illinois: Charles C. Thomas, 1950. Price \$4.50.

The purpose of this interesting monograph, as stated by the authors in the preface, is to report and interpret results of an experimental study of disturbances in nasal and respiratory physiology occurring in response to a variety of situational threats. The usual nasal function of warming and moistening inspired air is recognized as well as the removal of impurities and noxious agents from the air. However, nasal obstruction due to mucus and mucosal engorgement may occur in situations unrelated to the commonly accepted functions of the nose and these changes are thought to increase the susceptibility of the nose and paranasal structures to infection.

The authors studied 100 patients with chronic or recurrent nasal complaints and found that it was often possible to correlate the nasal symptoms with adverse life situations leading to anxiety, resentment, humiliation and frustration. They quickly point out, however, that colds and nasal infections may occur without situational stress and also that nasal hyperfunction and obstruction may result from other causes. Situational threats involving interpersonal and social adjustments, however, occupy a position of importance and may modify the course of morbid processes regardless of the precipitating incident.

This unusual monograph is well illustrated and well indexed. A summary and bibliography at the conclusion of each chapter is helpful. This text should be helpful to the otolaryngologist, the psychiatrist and any medical man interested in disturbances of nasal function from local or systemic causes. S. S. C.

Bone and Joint Diseases, by J. VERNON LUCK, M.D. Springfield, Illinois: Charles C. Thomas, First edition, 1950.

This very excellent treatise on pathology correlated with clinical and roentgenological features of bone and joint diseases deserves careful study by every student and practitioner of orthopedic surgery. It is an extremely readable book and contains a wealth of information which could only otherwise be gained by an intensive review of the voluminous literature. It is well arranged, highly understandable, and is concise. The illustrations are excellent. Controversial issues, particularly in theoretical considerations of the etiology of many conditions whose classification and etiology are subject to some dispute, are for the most part avoided.

This is a book for study and re-reading again and again. It is a valuable addition to the literature of orthopedic surgery. J. H. M.

Acute Laryngotracheobronchitis, by A. HARRY NEFFSON, M.D. New York: Grune & Stratton, 1949. 197 pages, illustrated. \$5.00.

The author has treated at least 2000 patients with obstruction of the glottis and the vast experience gained from this material is well presented in his book. Treatment has been most satisfactory and the monograph reveals that this is due to the fact that reliance is placed on direct suction-laryngoscopy, intubation or finally on tracheotomy. Every effort should of course be made to avoid the latter procedure since the after-treatment may be beset with many difficulties. Nevertheless where indicated no one should hesitate to perform a tracheotomy, as it is a life saving measure. For this reason the book should be within the immediate reach of every practitioner.

A. V. S.

A Syllabus of Laboratory Examinations in Clinical Diagnosis, edited by THOMAS HALE HAM. Cambridge, Mass.: Harvard University Press, 1950. 496 pages. Price \$5.00.

This book, although designed for medical students, could be an extremely useful guide for practitioners of medicine, especially when they are confronted with the problem of interpreting laboratory data in fields with which they are relatively unfamiliar. The volume is the cooperative work of 32 contributors, mostly at the Harvard Medical School. In addition it has benefited by the criticism of 66 other experts who have each read the parts of the work dealing with their own special fields. Thus this book is not the ordinary sort of laboratory manual, but is really a kind of Harvard reference work on laboratory aspects of medicine. The authors make no attempt to outline a great variety of procedures. Rather they present the principle of a standard method and devote their real effort at what they call in the sub-title, a "Critical Evaluation of Laboratory Procedures in the Study of the Patient."

To the knowledge of the reviewer there is no really comparable volume in existence. It is a simplified version of Peters and Van Slyke's "Clinical Chemistry," extended to cover all laboratory procedures. It meets very real needs of the advanced medical student, the intern, the resident and of the time-pressed practitioner as well. This reviewer will not be surprised if many directors of clinical laboratories will themselves also find much that is of great value to them as a source of ready reference, to use in advising physicians about the significance of various findings. M. B. V.


The Antihistamines, by SAMUEL M. FEINBERG, M.D., SAUL MALKIEL, Ph.D., M.D., and ALAN R. FEINBERG, M.D. Chicago: The Year Book Publishers, Inc. 291 pages, 1950. \$4.00.

This book represents a most timely undertaking by a group of investigators who have had a tremendous amount of experience with the antihistamines. These drugs can no longer be excluded in the care of any allergic manifestations. Full knowledge as to their application is a necessity for every clinician. The monograph first presents a section on experimental studies, and then goes on to clinical observations with chapters on respiratory allergy, dermatoses, miscellaneous manifestations, administration and dosage, toxic effects. The appendix lists all American products of the antihistamine and the section on references is most complete. The book should be in the hands of every physician, general practitioner and specialist.

A. V. S.

The Nutritional Improvement of Life, by HENRY C. SHERMAN. New York: Columbia University Press, 1950. \$3.75.

This book is a companion to two other small volumes on nutrition and completes the series planned to bring the knowledge of this subject up to date. The book contains 216 pages plus an appendix. It contains tables but no other illustrations. An interesting history of the development of the science of nutrition is presented. The known facts about foods and the application of these principles to the improvement of life are stated in a readable style. The book is written without use of chemical formulas or technical language. A table of a "food plan" with amounts given in ordinary weights and measures should prove practical for the layman and for the use of physicians and dietitians in guiding patients' diets. The book concludes with a good selected bibliography which enhances its value to teachers. The index is carefully prepared, which is one of the salient features of a good book. R. L. T.



The
JOURNAL
LANCET

Official Journal of the American College Health Association
Great Northern Railway Surgeons' Association, Minneapolis Academy of Medicine, North Dakota State
Medical Association, Northwestern Pediatric Society, South Dakota Public Health Association,
North Dakota Society of Obstetrics and Gynecology and North Dakota Pediatrics Society

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Editorial

MEDICAL EDUCATION IN A RURAL STATE

One of the pressing problems facing American medicine today is the obtaining of a sufficient number of physicians to serve our rural population. Many schemes have been tried to remedy the lack of physicians in many rural areas but, with the notable exception of Kansas, most of these schemes, certainly in our midwest, have failed for very natural and very human reasons. They have forgotten to take the physician and his family into consideration!

North Dakota is one of the most rural states in the republic. Since pioneer days, it has shipped one of its most important raw materials, wheat, eastward to be manufactured into foodstuff. A very effective political machine was built upon the premise that insufficient financial returns were being made to the North Dakota farmer by "big business" and "grain gamblers" and North Dakota eventually found itself in the grain business. The economic and political ramifications of this venture are too widely known to need any further discussion. The writer is too much a "rugged individualist" to advocate socialization of agriculture or industry or medicine and he looks, with grave concern, upon bureaucratic meddling under the guise of democracy, into the right of free choice of the individual. Nevertheless there may be a not-too-far-fetched parallelism between the wheat farmer's market and the medical manpower market.

North Dakota has maintained a two year medical school at the University of North Dakota since 1911. It has taken young men and young women from North Dakota cities and villages and others from neighboring states and started them on the road to a medical education. This raw material has been "manufactured" into doctors of medicine in other states. Many of North Dakota's young people whose medical education was started in North Dakota have gone on to become famous in various fields of medicine. North Dakota is proud of the records they have made. But North Dakota also looks upon the diminishing returns she is getting from her medical "raw material" with enough concern to do something about it. The passage of the mill tax levy for the support of the North Dakota Medical Center, in the form of a constitutional amendment, was the answer of a very substantial majority of the North Dakota voters to the need for greater medical care.

Supplying greater medical care to a rural state is a complex problem and many factors enter into the solution of that problem. But all can agree that, basically, it is a problem of taking the medical "raw material," the medical student, converting it into the finished product, the doctor of medicine, and then arranging for a system of distribution of that finished product to the citizens of a state. But when the finished product is no longer available in sufficient numbers to meet the

demands, the system breaks down—and that is exactly what is happening in North Dakota.

A medical student spends two years in the medical school of the University of North Dakota. With ever-increasing difficulty, because of the large number of applicants for admission to complete medical schools throughout the country, he succeeds in being accepted for his third and fourth years in a school elsewhere. There he meets *The Girl*, frequently a nurse or some ally in the professional field, marries and starts on the search for an internship and, very likely, a residency. North Dakota moves further and further from his thoughts as a place in which to practice medicine for two very good reasons: His wife knows little or nothing about North Dakota and is not particularly anxious to learn; and the inducements to serve an internship in a large city hospital are so many and varied that they seem ideal. He has not yet experienced that institution, known in many quarters as "grand rounds," where the intern is most fortunate when the resident has the time and thoughtfulness to toss a few medical crumbs his way. He thus serves out his year, longing for the time when he can become a resident and fare better at the medical table. North Dakota recedes still further from his thoughts as a suitable place in which to practice medicine for the simple reason that he has now become a cog in the wheel of postgraduate medical education and he feels that he must continue in the only clinical environment he knows. Actually, he wouldn't know what to do with a rural practice if he had one! He does not know how to evaluate the individual needs of his patients for the simple reason that he has not had the patients to evaluate. His hospital training has, very largely, been on a mass production and not on an individual basis.

The writer is very old-fashioned. He still believes that the chief function of a medical school is to teach the student to practice medicine and that the chief virtue of internships and residencies is to develop the talents of the individual student toward that end. In this type of thinking, the patient still remains an individual and not a case number.

The modern trend in medical education is to erase the sharp line drawn formerly between the so-called basic science years and the clinical years in medical school and this trend is logical, practical and sensible. The college student of today who has decided to study medicine has planned his course to include those required basic sciences necessary for admission to medical school. The sooner, then, that the basic medical sciences can be linked, in his thinking, to the so-called clinical subjects, the better it is for his objective thinking toward his goal, that of becoming a physician. Is there any valid reason why a surgical seminar should not be included in his first year in medical school and thus help him to a realization that his study of gross anatomy

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is not merely a memory feat? Must biochemistry remain a laboratory abstraction until he learns of its clinical application only when he first sees a patient in diabetic coma or uremia? Many other illustrations could be given to illustrate the importance of linking the basic sciences to clinical medicine but they are not necessary. It is obvious that the medical school curriculum is crowded. It is equally obvious to many thoughtful clinicians that a most valuable introduction to the clinical problems the young physician will face can be given to him by an intelligent introduction to those problems in his first two years in medical school. The correlation of the basic sciences to clinical medicine should be emphasized by patient contact.

The key man in such a program is the private practitioner. This represents a return to the preceptor system of teaching, if you please. It represents individual instruction, an emphasis upon patient-physician relationships and a growing knowledge upon the part of the medical student of the economic, social and spiritual problems of those whom, we hope, he will ultimately want to serve, as well as a growing knowledge of their physical defects. It is from such a background that great clinicians are made. The fallacy that private patients cannot be effectively used for teaching purposes has long since been exposed. The patient is usually the first to realize that he benefits by being part of a teaching program. The only problem involved is to find the practitioners who will devote the time and thought necessary to make their teaching effective. One of the most effective ways to do this is to give them academic rank on the medical school faculty, commensurate with the time they spend in teaching. During the first two years of medical school, such clinical correlation with the basic medical sciences would have to be given by instructors who were geographically accessible to the school. In the third and fourth years, such a geographic proximity is not necessary. Since the object is to interest future physicians in locating in a rural state, it would be highly advantageous to decentralize their training throughout the state in the form of clinical clerkships on a rotating basis. Here, again, the important thing is the capability and the enthusiasm of the instructors.

When a student discovers that he has abundant clinical material for study, under the direction of clinicians who realize their responsibility to their patients and to him, it is only natural that he would select a hospital for intern training where he could continue the type of instruction he had had in his undergraduate days. That would give the hospitals in his own state first chance at his services. The competition among them for an adequate number of interns should result in higher standards for all concerned.

The program suggested is not revolutionary but evolutionary; not visionary but vital. Its main object is to supply adequately trained physicians for practice in a rural state. When you have accomplished that objective, you will find that you have trained physicians for practice in any state. The only selfishness about the business comes from the hope of citizens in a rural state that

enough doctors would see, first-hand, the many advantages such a state had to offer, and would become valuable additions to its population.

JOHN H. MOORE, M.D.,
Grand Forks, North Dakota



DR. GEORGE M. WILLIAMSON DIES
IN GRAND FORKS

Dr. George M. Williamson, one of North Dakota's most widely known physicians, died at Grand Forks on December 11 at the age of 83.

Born May 21, 1867 in Picton, Ontario, Dr. Williamson attended medical school in Winnipeg, and came to North Dakota in 1895, establishing his practice at Ardoch, where he was licensed by the state on October 10, 1895.

In 1906, Dr. Williamson disposed of his interest in Ardoch and went to Edinburgh, Scotland, for further medical study and received several degrees. In London he took special courses in surgery at Guys and Middlesex hospitals and in diseases of children at the Hospital for Sick Children at Great Ormonde street. From London, he went to Dublin, Ireland, for study in gynecology and obstetrics at the famous Rotunda hospital, under Sir Hastings Tweedy, returning to Grand Forks in 1908.

For 36 years, Dr. Williamson served as secretary of the North Dakota state board of medical examiners, a post to which he was elected in 1911 at the organization of the board. For the same period of 36 years, he was associated with the Federation of State Medical Boards of the United States, and that organization paid him special tribute at its meeting in Chicago in February, 1949.

He was president of the North Dakota State Medical Association in 1918 and chairman of the committee that framed the state medical practice act of 1911. In 1919, he was chairman of the committee that revised the constitution and by-laws of the medical association.



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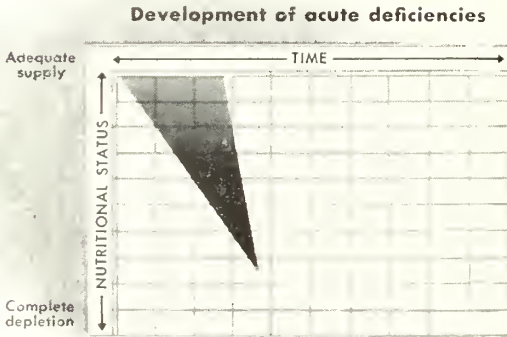
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News Briefs

North Dakota

BISMARCK HOSPITAL'S \$500,000 building fund campaign got underway officially on November 28 with a "kickoff" dinner in the World War Memorial building. Approximately 300 volunteer workers were present at the dinner.

* * *

DR. H. L. FREDERICKS, Bismarck, was elected president of the Sixth District Medical Society at the November meeting. Dr. H. M. Berg was elected vice president and Dr. C. H. Peters, secretary.

Dr. Richard Zarling, assistant professor of neurology at the University of Minnesota was the main speaker at the meeting, discussing neurological disorders and diagnosis of brain conditions.

* * *

THE North Dakota State Health Department has established a new service which will determine quickly for the doctor what antibiotic will kill the organisms causing a problem case of illness. At present the laboratories have seven standard antibiotics to be used in checking the sensitivity of micro-organisms. This service, which is available to physicians and hospitals, is provided by the public health laboratories in Bismarck and Grand Forks.

* * *

A NEW MEDICAL ARTS CLINIC has been opened in Jamestown under the direction of Dr. J. A. Beall and Dr. J. W. Jansonius. Dr. Beall is a graduate of Ohio Wesleyan University and George Washington University medical school, and served an internship and residency at the Rochester General Hospital, Rochester, New York. Dr. Jansonius, a native of North Dakota and a graduate of Washington University medical school, took advanced training in obstetrics and pediatrics at the Chicago Lying-In hospital.

* * *

New locations and appointments . . .

DR. ALBERT C. KOHLMAYER, formerly of Grand Forks, has opened a new medical practice in Larimore. Dr. Kohlmeyer, a graduate of the University of Illinois medical school, completed his internship and residence training at St. Luke's hospital in Fargo last summer.

* * *

DR. ELLIS OSTER, a graduate of the University of North Dakota and the University of Illinois medical school, has established a general medical practice in Mandan.

* * *

DR. S. B. SEITZ, of Barnesville, Minnesota, has opened an office in Mott. Dr. Seitz is well known to many of the people of southwestern North Dakota as a former athlete and high school coach.

* * *

DR. JOHN S. WESTLY has resigned from the Minot veterans hospital staff to enter private practice with his father in Manley, Iowa. A native of Iowa, Dr. Westly

came to the Minor hospital in May, following duty at the veterans administration center in Des Moines.

* * *

DR. C. A. CORBETT, a graduate of the University of Manitoba school of medicine and a former resident of Crystal City, Manitoba, has joined the obstetrical staff of the Lake Region Clinic at Devils Lake. Dr. Corbett served his internship in the Winnipeg General Hospital, from 1942 to 1946 served in the Canadian army, and from 1946 to 1949 practiced medicine in Crystal City.

* * *

DR. DAVID H. STEIN, who has been practicing in Rolla in association with Dr. A. M. Miles, left in November to accept a position in the Shaunessey hospital in Vancouver, Washington. Replacing him as Dr. Miles' associate will be Dr. Murray Atnikov of Winnipeg. Dr. Atnikov is a recent graduate of the University of Manitoba and for the past several months has been practicing at Steinbach, Manitoba.

Minnesota

DR. C. JAMES WATSON, head of the University of Minnesota department of medicine, has been appointed to a United States Public Health Service advisory council on arthritis and metabolic diseases. Also named to the council was Dr. Philip S. Hench, Rochester.

* * *

Dr. Henry W. Woltman, professor of neurology at Mayo Foundation, was appointed to the council on neurological diseases.

* * *

DR. PAUL A. O'LEARY was elected staff president at the recent annual meeting of the Mayo clinic staff. Other officers elected were: Dr. A. C. Davis, vice president; Dr. N. B. Coventy, secretary; and Drs. E. S. Judd and E. A. Hines, counsellors.

Retirement of five Mayo clinic physicians who have reached the age of 65 was also announced. They are: Drs. W. L. Benedict, A. C. Broders, N. M. Keith, G. B. New and R. M. Wilder.

Announced at the same meeting was the naming of 27 new members to the staff, twenty-one of whom have been fellows in the Mayo Foundation.

* * *

THE new 15-bed Dr. Henry Schmidt memorial hospital was dedicated at Westbrook November 28 with ceremonies at the high school auditorium.

* * *

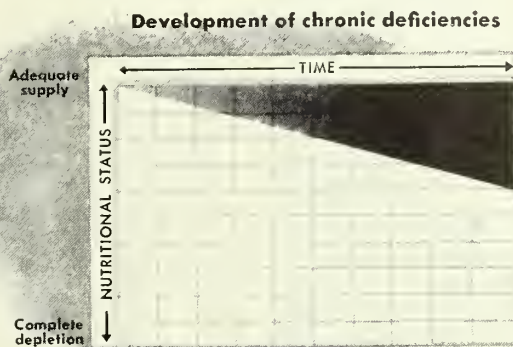
DR. KARL S. KLICK, Mount Vernon, New York, has been named medical director of St. Barnabas hospital, Minneapolis, and is expected to begin his duties about January 3. A graduate of Western Reserve university medical school, Dr. Klicka took advanced work in hospital administration at the University of Chicago. He has been director of Woman's hospital, New York City.

* * *

DR. ERWIN R. SCHMIDT, chairman of the department of surgery at the University of Wisconsin Medical school, was elected president of the Western Surgical society at a meeting of the society in Minneapolis. (Continued on page 40)

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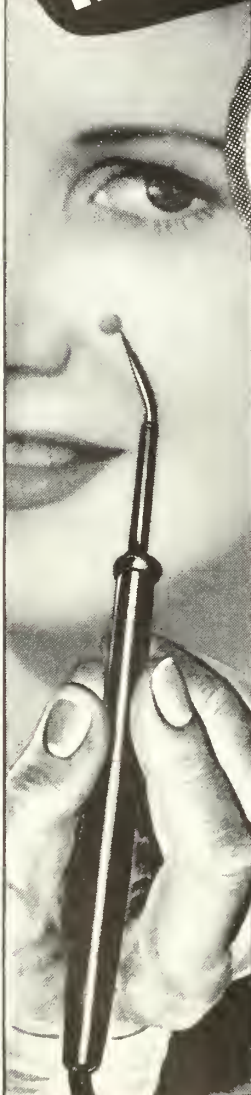
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NEWS BRIEFS (Continued from page 38)

November 29 to December 2. A year ago Dr. Schmidt was awarded the State Medical society's most coveted honor, the Council award, for his attainments in medicine and surgery, his teaching ability, and his promotion of research.

* * *

DR. MOSES BARRON will be chief of the medical staff at Mount Sinai hospital, which will open early in 1951. Other officers are: Dr. Max Seham, vice president; Dr. Samuel Balkin, secretary-treasurer; and executive committee members, Drs. Reuben Berman, William Bernstein, Malcolm C. Pfunder, Roy Swanson, David Siperstein and Oswald Wyatt.

* * *

DR. HERMAN DRILL, Hopkins, was elected president of the American Academy of General Practice. Dr. E. G. Oppen was named vice president, while Dr. Alexander J. Ross was re-elected secretary-treasurer.

* * *

CITIZENS of Buffalo Lake and the surrounding area joined in an Appreciation Day Sunday, December 10, honoring Dr. E. C. Gaines of Buffalo Lake, who completed a half century of service there last month. A graduate of the University of Minnesota school of medicine, Dr. Gaines came to Buffalo Lake from Steen, Minnesota the latter part of November, 1900.

* * *

DR. CHARLES D. MAY, associate professor of pediatrics, received the annual Mead Johnson Award at the October 18 meeting of the American Academy of Pediatrics in Chicago. The award was given in recognition of Dr. May's investigations in the field of intestinal insufficiency.

South Dakota

THE South Dakota State Medical association will hold its 1951 convention at Aberdeen next June 3 to 6.

* * *

DR. TED HOHM was elected president of the Huron District Medical Society at the December meeting. Also elected were: Dr. Hans Jacoby, vice president; Dr. Fred Leigh, secretary-treasurer; Dr. H. P. Adams, delegate to the state convention; and Dr. Roscoe Dean, board of censors.

* * *

EIGHTY-SEVEN DOCTORS, of which 31 were from outside Sioux Falls, attended the annual McKennan hospital staff clinic at the hospital at Sioux Falls November 29.

* * *

DR. G. A. LANDMANN of Scotland, South Dakota, was honored by the Scotland Commercial club at a surprise dinner November 9, for his activity and interest in community life. Dr. Landmann was born in Scotland, took his M.D. at the University of Illinois, and returned to Scotland to practice in 1912.

* * *

THE STAFF of the Community hospital at Estelline have moved into a new west wing of the hospital which has been under construction for the past six months and will house the new laboratories and offices of the hospital.

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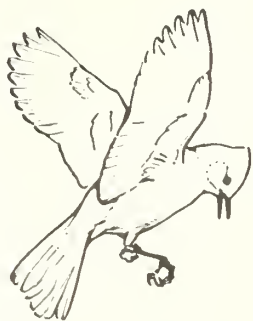
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Notices

A postgraduate course in diseases of the chest, sponsored by the council on Postgraduate Medical education and the Southern Chapter of the American College of Chest Physicians, will be presented January 22-27, 1950 at Vanderbilt University School of Medicine at Nashville, Tennessee.

* * *

The twenty-fourth annual meeting of the *National Conference on Medical Services* will be held Sunday, February 11, 1951 at the Palmer House in Chicago. The meeting is of special importance to presidents, secretaries and public relations personnel of state and county medical societies.

* * *

The *American College of Allergists* will hold its seventh annual meeting at the Edgewater Beach Hotel, Chicago, Illinois, February 12, 13, 14, 1950. This year the College is trying for the first time the experiment of offering its post collegiate instructional course on the three days just preceding its annual conclave. For further information and registration write Fred Wittich, M.D., Secretary-Treasurer, American College of Allergists, LaSalle Medical Building, Minneapolis, Minnesota.

* * *

The eighteenth *E. Starr Judd Lecture* will be given by Dr. Emile Holman, professor of surgery, Stanford University school of medicine at 8:15 p.m. Thursday, February 15, 1951 in the amphitheater of the medical sciences building at the University of Minnesota. Dr. Holman's subject is "The Surgical Treatment of Constrictive Pericarditis; Clinical and Experimental Observations."

* * *

The second of a series of seven sectional meetings of the *American College of Surgeons* will be held in Hot Springs, Virginia on February 26 and 27, with headquarters at The Homestead. The other five sectional meetings will be held in Philadelphia, March 5 and 6; New Haven, March 16 and 17; Portland, Oregon, March 26 and 27; Denver, April 6 and 7; and Detroit, May 10 and 11.

* * *

The *National Foundation for Infantile Paralysis* announces the availability of a limited number of predoctoral and postdoctoral fellowships to candidates whose interests are research and teaching in the field related to the problems of poliomyelitis such as virology, biochemistry, biophysics, orthopedics, pediatrics, neurology and epidemiology. Complete information concerning qualifications and applications may be obtained from Division of Professional Education, National Foundation for Infantile Paralysis, 120 Broadway, New York 5, New York.

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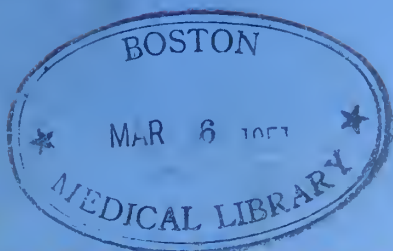


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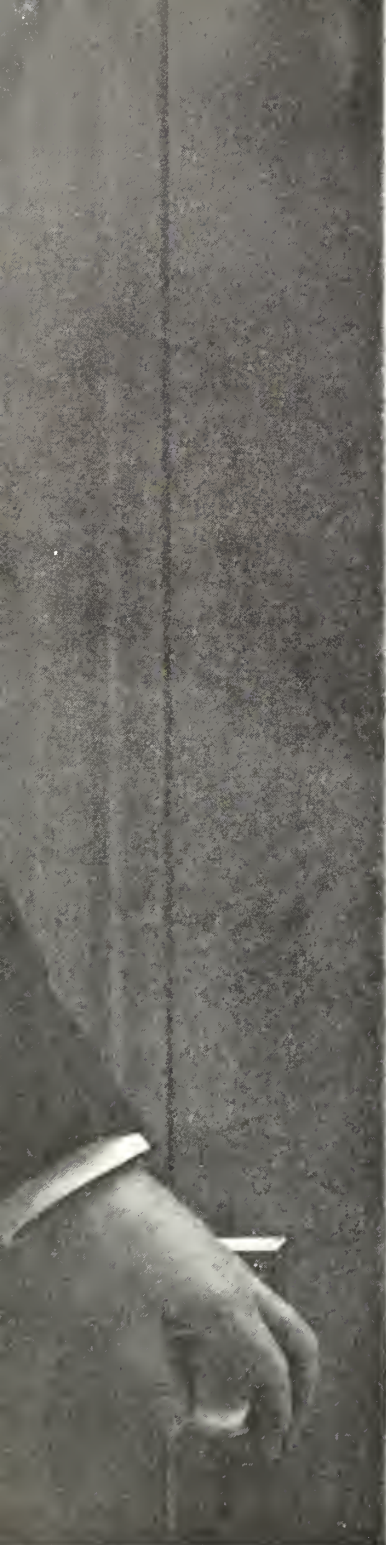
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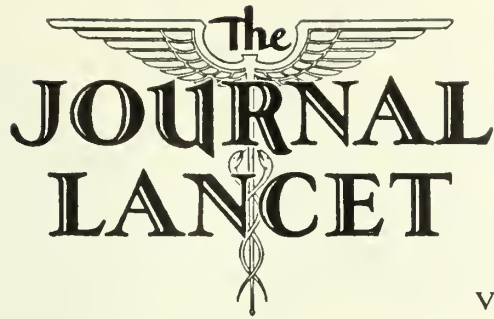
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FEBRUARY, 1951

Volume LXXI, No. 2

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PREPARATION OF MANUSCRIPTS

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Manuscripts are to be typed on one side of the paper, double spaced. Illustrations must be in the form of glossy prints or drawings in black ink. Statistical tables and charts should be set up according to the style used in this journal and should be presented on separate sheets rather than within the text material. Please do not attach legends to the pictures. A rea-

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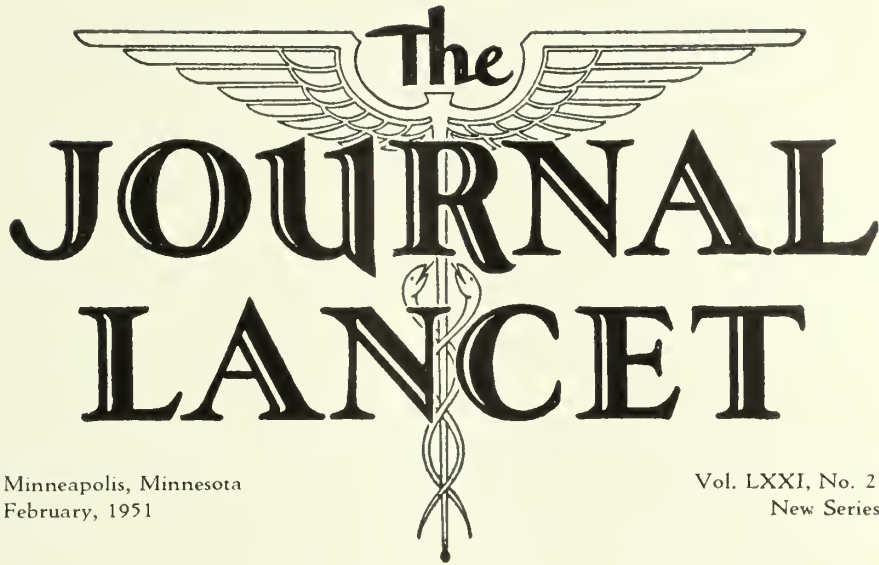
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New Series

Tracheotomy—One Solution for Pulmonary Problems in the Critically Ill Patient

Roy W. Dickman, M.D. and Ivan D. Baronofsky, M.D.*
Minneapolis, Minnesota

IT IS ONLY within the last year that we have realized that a more frequent use of tracheotomy has resulted in a decrease in mortality and pulmonary complications in critical patients presenting respiratory symptoms of retained bronchial and tracheal secretions.

The basic act of normal respiration is of far more importance than that with which it is usually accredited. The normal flow of air through the bronchi and alveoli helps clear the respiratory passages. The cilia of the respiratory epithelium constantly sweeps upward assisting in clearing the respiratory tract. Intratracheal irritants bring into play the cough reflex which violently expels the offending material. When a blockage of air intake occurs by either laryngeal, tracheal or bronchial obstruction, secretions tend to accumulate in the respiratory passages. Unless these secretions are removed early, more secretions of a more viscid nature form. These secretions clog the cilia and decrease their efficiency. If the patient is not able to expel these irritants, the cough reflex soon becomes dulled to these stimulants and secretions accumulate. This further increases the problem of clearing these passages. With progressive respiratory tract blockage, cyanosis and cerebral anoxia occur and lead to a state of somnolence and a still poorer re-

sponse to bronchial irritations. This is truly the "death cycle." It is too frequently noted at autopsy that patients who have had original nonpulmonary symptoms die with accumulations of thick, sticky, mucoid secretions in the bronchi. The lungs usually show some broncho-pneumonia and the final diagnosis is usually "terminal pneumonia." The impression is that the accumulated bronchial secretions and the "terminal pneumonia" are only associated findings and a more or less inevitable result of the original malady in its terminal stage. Too often it is believed that bronchial secretions may have contributed to the patient's exodus, but what can one expect when the patient is unconscious and is unable to raise accumulated sputum and is approaching death rapidly?

We do not take the view that bronchial secretions must be tolerated in critically ill or unconscious patients and that patients must come to autopsy with "terminal pneumonia." For too long tracheotomy has been considered a procedure used only for an acutely obstructed airway. It should be placed in the armamentarium of the surgeon and internist to combat the complications which are often aids in causing the death of the patient rather than merely associated findings.

Creech, Woodhall and Ochsner³ have reported recently the importance of tracheotomy in the treatment of the pulmonary complications associated with tetanus.

*From the Department of Surgery, Ancker Hospital, St. Paul, Minnesota, and the University of Minnesota, Minneapolis, Minnesota.

They, too, are firmly convinced that the procedure is a life-saving measure by which the respiratory tract can be kept clear of accumulated secretions.

It is interesting to note that the literature is replete with descriptions of the ease with which even a nurse can pass a nasal catheter into the larynx and adequately suction the tracheal and bronchial passages of an unconscious patient. In our experience, this has not held true. It has been necessary to rely on a laryngologist to gain adequate suction by this method which should be done as often as every thirty minutes in some cases to clear sufficiently the respiratory tract. After repeated aspirations in this manner, there is usually some bleeding from the larynx which testifies to the trauma of the procedure. If this were to be continued for days, as has been necessary in our cases, there is no question but that damage could and would occur to the larynx. Tracheotomy provides a more efficient route and bypasses an organ which should be carefully guarded. The introduction of a catheter through a tracheotomy tube provides a stimulus that causes the patient to cough forcefully and clear the smaller bronchi and bronchioles even though the reflex does not respond to the stimulus of accumulated mucus. This is of prime importance. Even in the deepest stupor this cough reflex to a true foreign body seems to be well preserved. The additional help of the suctioning catheter in removing the sputum when it is raised saves the patient considerable strength, since it is only with great effort that they can expel this sputum through the larynx. The larynx is an efficient block to both air and sputum in an unconscious patient.

METHOD

Our procedure of tracheotomy is simple. A longitudinal incision is made in the suprasternal notch. Bleeders, if any, are ligated or cauterized. The thyroid gland is avoided and the incision is deepened to the trachea. A small longitudinal incision is made in the trachea. No elliptical resection of the trachea is done. A No. 5 or No. 6 tracheotomy tube is inserted and the deep tissue closed with interrupted 000 plain catgut and the skin closed with 0000 silk. A gauze pad moistened with sterile saline or water is placed over the entrance of the tracheotomy tube. This is important to prevent dehydration of the bronchial and tracheal mucosa.

CLINICAL OBSERVATIONS AND RESULTS

Since January, 1949, seven patients on the surgical service at Ancker Hospital have had tracheotomies performed for the treatment of pulmonary complications. Six were done in 1950. A brief analysis of these cases demonstrates the benefit secured from a more aggressive approach to their respiratory problems.

Head Injuries:

Three cases were severe head injuries. All were unconscious, unresponsive and developed coarse bronchial rales in 24 to 72 hours. Nasal catheter suction through the larynx was unsatisfactory. All developed cyanosis, rapid pulse and rapid respirations. All had loud breathing signifying adequate respirations. However, auscultation

of the chest revealed very poor breath sounds. The paradox of loud breathing and cyanosis can be easily explained by the fact that during inspiration air readily entered the pharynx, larynx and upper trachea but did not fill the bronchials and alveoli because of mucus blockage. Tracheotomy provided a route for suctioning a very profuse amount of thick tenacious sputum from the trachea and bronchi. An unbelievable amount of thick sputum was removed in this manner; at times almost 20 minutes of continuous suction was necessary to relieve the patient of the accumulated mucus. The patient's cyanosis immediately disappeared and respirations slowed. The immediate improvement was very marked in all cases and the staff felt that tracheotomy was a life saving measure in these patients.

Chest Wounds:

Three patients had chest injuries with multiple fractured ribs or flaccid chests. Two had hemothoraces and tension pneumothoraces. One also had an associated severe mediastinal emphysema and all developed the typical "wet lung" syndrome.^{1,2} None could cough adequately and clear their bronchial passages. Tracheotomies were done at the first indication of increased bronchial rales. The respiratory passages were kept suctioned and all patients recovered without pulmonary complications which past experience would indicate should have been fatal. One patient had a gunshot wound of the chest and had a poor cough reflex. He rapidly accumulated bronchial and tracheal secretions. Through tracheotomy it was possible to keep a clear respiratory tract and he recovered.

Mediastinal Emphysema:

One patient was a postoperative pulmonary problem. She had had a gastric resection and the gastric tube had been erroneously removed during surgery. During insertion of another tube a small rent evidently occurred in the pharyngeal mucosa and the forceful stream of oxygen from a nasal catheter entered the mediastinum. She rapidly developed severe respiratory embarrassment necessitating mediastinal aspiration and tracheotomy. This is the first experience of this kind with nasal catheter oxygen that we had had. She improved rapidly following tracheotomy and recovered.

COMMENT

All of the patients were very critical from their original disease and from past experience we felt that the additional factor of their rapidly developing respiratory problems would lead to death. The marked improvement after the employment of tracheotomy in each case was very dramatic and gratifying. There were no complications following this procedure and after removal of the tracheotomy tubes the wounds healed in two to seven days. Of course, there arose the question that perhaps these patients would have recovered without the benefit of tracheotomy. Since none of these patients died, one still had no definite proof that our procedure was preventing death caused by accumulated intrabronchial secretions. Consequently we have used this pro-

cedure in seven other cases which were so serious there was little or no hope that they could recover from the original disease or injury. However, since one cannot predict with certainty which case will survive it was felt they should have the benefit of all the therapeutic care that could be mustered including tracheotomy. These cases truly represent the group that die with their bronchi filled with secretions and their lungs involved with broncho-pneumonia. All these patients were terminal and lived from one to seven days with a progressive downhill course due to their original disease. A brief review of these cases demonstrates the effectiveness of tracheotomy in their treatment.

There were two cases that were in extreme coma from their head injuries. One had such deep coma that laryngeal blockage occurred from the relaxation of his pharyngeal and laryngeal structures. Both developed retained pulmonary secretions with cyanosis and increased respirations. Tracheotomy markedly relieved their pulmonary symptoms and their respiratory tract was kept clear. Autopsy revealed clear respiratory tracts and nonbronchopneumonia.

One patient had posterior fractures of 11 ribs of the right hemothorax. Tracheotomy relieved her respiratory difficulty, although she subsequently died from intrapulmonary parenchymal hemorrhage caused by the ribs puncturing the lung at the time of injury. Autopsy revealed a clear respiratory tree.

One case had severe second and third degree burns of the face, neck, chest and back. He had inhaled hot gas and fumes. This type of case nearly always develops rapid respiratory tract blockage. Tracheotomy was done immediately upon admission. He lived ten days during which time very viscous, tenacious mucus was constantly being suctioned from his respiratory tract. Autopsy revealed the typical hemorrhagic bronchitis that is typical

of this type of injury. It was gratifying to note that his respiratory tract was entirely clear of accumulated mucus.

Three patients were postoperative cases in which tracheotomy was done prophylactically because of their critical condition and poor respiration. One had a perforated duodenal ulcer which was repaired. The patient died of an overwhelming peritonitis. His respiratory duct was shown to be clear at autopsy. The second case was a very poor risk patient that had a subtotal esophageal resection followed by separation of the suture line beneath the aortic arch. He had bilateral thoracotomy tubes to control the constantly developing pneumothoraces in spite of an indwelling gastric suction catheter. Autopsy revealed that both lungs were expanded and his respiratory passages clear. The third case had had cardiac arrest following a low spinal anesthesia. The heart was restituted by cardiac massage but the patient died from decerebrate symptoms. His respiratory tract was shown to be clear at autopsy examination.

These cases demonstrated clearly the efficacy of tracheotomy. None of the patients continued to develop the typical clinical symptoms of retained, pulmonary secretions. Those cases which had had these symptoms in addition to other serious and terminal conditions when tracheotomy was done, promptly became asymptomatic as far as retained pulmonary secretions were concerned and remained so until death. Autopsy examination confirmed this clinical impression. The tracheas and bronchi showed no evidence of trauma from the constant insertion of the suctioning catheter. It may be argued that tracheotomy was merely an additional operative load on these critical patients. It is felt that the procedure added no additional burden to the patient's condition. In fact, in each case there was marked improvement due to the alleviation of the blockage of the respiratory tract. Since most patients expire when this blockage occurs,

TABLE I
Summary of Cases in Which Tracheotomy Was Used

Number of Cases	Type of Cases	Symptoms	Results
5	Head injuries	All unconscious, four had profuse production of thick mucus, one had relaxed pharyngeal and laryngeal structures.	Immediate improvement. Clear respiratory passages. No bronchopneumonia.
3	Flail chest	All had the "wet lung" syndrome.	All had clear respiratory passages. One died from parenchymal lung hemorrhage caused by multiple punctures from fractured ribs.
1	Gunshot wound	Pneumo-hemothorax, "wet lung" syndrome.	Immediate improvement and recovery.
1	2nd and 3rd degree burns of face, chest and back	Accumulation of bronchial secretion and poor airway. Had inhaled hot fumes and gases.	Died from hemorrhagic bronchitis but autopsy revealed no intratracheal or bronchial secretions—no bronchopneumonia.
3	Postoperative patients	(1) Gastric resection, laryngeal edema and mediastinal emphysema. (2) Perforated duodenal ulcer with peritonitis and poor respiratory excursion. (3) Esophageal resection with recurrent tension pneumothoraces.	Cleared respiratory passages—no bronchopneumonia.
1	Cardiac arrest	Poor respiratory excursion. Decerebrate symptoms.	Improvement in respirations. Autopsy revealed no accumulations of respiratory secretions.

especially when superimposed upon some other serious affliction, it is felt that all should have the benefit of tracheotomy to eradicate this major factor that accelerates exodus.

SUMMARY AND CONCLUSIONS

1. Fourteen critically ill patients are presented in which tracheotomy was performed other than for an acutely obstructed airway. It was hoped that airways obstructed with accumulated mucus could be kept cleared and "terminal pneumonia" prevented.

2. Seven of the cases were so critical that there was little or no hope held that they would recover.

3. All patients markedly improved following tracheotomy and in the seven cases that died of their original malady none had retained secretions or "terminal pneumonia."

4. Tracheotomy should be used in those instances where a patient cannot raise and expel his intratracheal and bronchial secretions.

5. It is preferable to employ tracheotomy before the need arises or at the earliest possible time following the onset of symptoms of retained secretions. It facilitates the care of the tracheal bronchial tree with the least amount of trauma to larynx.

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3. Creech, O., Woodhall, J. P., and Ochsner, A.: The necessity for tracheotomy in the treatment of tetanus to prevent lethal respiratory complications. *Surgery* 27:62:1950.

LOUISIANA AND MINNESOTA CITIES FIND KEYS TO SOLVING NURSING SHORTAGE

Seeking to solve the problem of "manpower" in the nursing field, Shreveport, Louisiana, and Minneapolis, Minnesota, have found strikingly similar answers to a question that confronts many communities of the United States. The question: How to obtain more and better-qualified nurses? The answer: Provide better nursing education by combining the facilities of several existing schools.

Both Shreveport and Minneapolis have had a year's experience under their new plans. Both report heartening results — a vanishing student nurse recruitment problem and a more satisfactory educational experience on the part of the students. Significance of the achievements becomes obvious when the nation's some 300,000 active professional nurses are compared with an estimated need for 55,000 by 1960.

In Minneapolis four hospital schools of nursing—Abbott, Eitel, Northwestern, and St. Barnabas — are participating in a Central Teaching Program that permits each of the twenty-six instructors to concentrate on a chosen field, teach fewer courses, and therefore make better preparation for each. Instructors have the stimulus of working with others in the same field instead of being isolated, the only teacher of a subject in a small school. Examinations are prepared and graded on a more valid basis, and standards have improved measurably.

Students benefit from the better preparation of instructors, wider selection for medical teaching staff, use of best teaching facilities and equipment that any one school has to offer, stimulus to larger classes. Joint recreational programs have been so set up as to extend each student's interests into the community.

The Central Teaching Program began in a small way in 1947-48 when six schools shared in providing a "professional adjustments" course for seniors. It was a success and the Minneapolis Hospital Council, busy on the problem of more central hospital planning, became interested. A plan and budget for a centralized teaching program was prepared, and all schools of nursing in the city were invited to participate. One hospital discontinued its school. A second felt its program was too new to undertake the coordination. The other four entered into formal agreement to establish the Central Program in June, 1949. A year's experience brought a vote to continue this year.

Cost of the program is met in two ways. Token payments of 50 cents per bed are solicited from each member of the Hospital Council. Balance of the budget is divided equally among the four participating schools. The Council's executive committee administers finances while the nurses' advisory committee, composed of the four school directors, determines educational policies. A new position, that of coordinator, was created. In her office class schedules for all schools are arranged, courses outlined and program evaluated.

The Shreveport and Minneapolis programs hold import for other American communities. The need for a greater number of trained nurses is widespread, for many reasons. For one, insurance forms of medical payments have brought health care within the reach of greater numbers of people. For another, as medicine has acquired successful methods of attacking more disease conditions, a greater number of auxiliary medical personnel is required.

Headache Related to Low Back Pain

R. J. Dittrich, M.D.

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DIVERGENT views on the origin of some types of head pain are expressed in the following statements: ". . . Pains in the head have not been encountered as phenomena of reference from structures outside the head except when pain occurs in the jaw with angina pectoris"¹¹ and ". . . Meanwhile clinical observation of head pain relieved by physical therapy or local anesthesia of cervical structures led to the indictment of bony, fascial, muscular and nerve lesions in the neck as extracranial causes of head pain. That head pain may be heterotopic or referred is now an accepted clinical observation . . ."¹

Campbell and Parsons¹ carried out a large series of experiments on human volunteers for the purpose of studying the mechanism of pain reference from irritations produced in the tissues of the atlanto-occipital and cervical regions. They found that pain from these areas was referred to the head with great regularity; that the pain so referred was accompanied by equilibratory (giddiness, listing) and autonomic (pallor, nausea, sweating, alterations of pulse) manifestations in the large majority of instances; and that the subjective complaints and objective signs bore a marked resemblance to those of the post-traumatic "head" syndrome. They state further, "The radiation of pain from middle and lower cervical segments to the occipital region is explicable when the morphology and functions of the long, hypaxial, back muscles are considered. Irritation at any spinal segment, but the cervical ones in particular, may result in hypertension of these long muscles and traction on their collagenous attachments to the occipital cranium. In this way thoracic and even lumbo-sacral lesions such as luxations, postural malalignments and arthritis, or myofascitis from local or remote (visceral) causes, have been shown to produce cephalalgia and its concomitants."

The purpose of this presentation is to report a series of seven cases in whom a relationship could be established between headache and painful lesions of the lower part of the back. The cause of the back pain was, in all instances, a localized abnormality of the soft tissues in the lumbar and sacral regions. Injection of the painful sites in the back with procaine resulted in marked diminution or complete elimination of the pain. The location of the trigger-points was in every instance within the limits of the "basic fat pattern" outlined and charted by Copeman² and his associates³ and further studied by other investigators.^{5,6,7,9,10} As stated in a previous report,⁴ the most common location of abnormalities of the fat tissue, sufficient to provoke disabling manifestations, is the midsacral region lateral to the midline. The abnor-

malities encountered most frequently at that site consist of edema of the fat lobules, giving rise to pain as a result of tension of the tissues. Additional fields in which the tension syndrome may appear are the gluteal area below the rim of the iliac crest and the dorsal fat pad in the upper portion of the back. Another form of painful abnormality of fat tissue is herniation through defective portions of the lumbodorsal fascia at the lateral margin of the sacrospinalis muscle. From these primary algogenic regions, pain may be referred to other fields within the afferent distribution of the spinal sclerotome. Similarly, secondary areas of hyperalgesia, or referred tenderness, may result from the pain set up at the trigger point.

All the patients sought relief from orthopedic disabilities; the observation of the related headache was, in a large measure, accidental. Four were women. The ages varied from 20 to 57 years. Three were traumatic in origin; no definite cause could be established for the others. In six cases the trigger point of pain was located in the midsacral region; in one a bilateral herniation of fat in the ilio-lumbar region was present.

In two patients, prompt and prolonged relief from both the back pain and the headache was obtained by one injection of procaine into the trigger point. There has been no recurrence of the headache during the observation periods of ten and twelve months. In one a return of the back pain required an additional injection. One of these patients mentioned headache as a part of the clinical condition but had no apparent reason to suspect any relationship to the back pain; the other patient, after he had been relieved, stated that he had had headaches all his life.

In five cases, diagnostic injection of procaine into the sensitive areas resulted in a definite diminution or complete elimination of the pain and tenderness of the back, but only for the duration of the local anesthetic effects. In four of these, relief of the headache was complete during the period of anesthesia; in one, no mention was made of headache until he found that it had disappeared immediately after an operation performed for relief of the back pain. Three additional patients were subjected to operation—one for correction of a bilateral herniation of fat tissue in the ilio-lumbar region, two for removal of painful fat tissue in the sacral area. In six patients with painful lesions in the sacral level, two were bilateral.

One patient refused the operation which was advised. Four, subjected to operation, have been free from back pain and headache for periods varying from four to nine months.

The operation is performed under local anesthesia, in order to secure the cooperation of the patient for guidance. The abnormal tissues consist of edematous, smooth masses or lobules of fat tissue, oval or round, varying in size and creamy yellow in color. In the sacral region such tissues are found almost invariably underneath the deep fascia. In removing these it is necessary to include some portions of apparently normal fat tissue. Usually a considerable amount of this is resected due to variation in size of the lobules which makes it difficult to determine which is normal. Following extensive resection of tissue there is commonly a large cavity, with considerable oozing of blood. This bleeding becomes quite troublesome, forming a large hematoma if the incision is closed tightly. It is considered advisable, for that reason, to insert a soft rubber drain which is left in place for five to seven days until a sinus has formed. This sinus usually heals in three to four weeks.

Evaluation of the extent, location and nature of the headache was based on the statements of the patients. In most instances the pain was felt in the occipital region, although several stated that it was noted in the frontal and orbital areas. Five patients mentioned headache as a prominent symptom in connection with their affliction; four of these had reason to suspect that it was associated with a painful lesion of the lower part of the back; but only after preliminary injection of the back with local anesthetic. In one, immediate relief of the head pain and the back pain resulted after the first injection. In two, one treated by injection and the other by operation, the headache was not mentioned until it had disappeared.

Psychic manifestations, represented by irritability, depression, lack of judgment and impairment of memory were present in some degree in six cases. These features were noticeably diminished or completely eliminated after treatment.

The combination of several different manifestations in the same individual—in the cases under discussion the back pain, the head pain and the psychic features—can easily lead to a misinterpretation of the primary factor in setting up the entire clinical picture, thus resulting in confusion of cause and effect and ending, ultimately, in the erroneous diagnosis of neurosis. From the observations made in this series, it is considered justifiable to regard the painful back as the primary factor in the disability.

The mechanism of development of the head pain is not clear. The explanation offered by Campbell and Parsons¹ that pain from any portion of the spine may be transmitted to the occipital region through the long muscles of the back may be adequate to account for this feature. There is, however, no available knowledge of any nerve connections by which such long range transmission of pain can be accepted as a referred pain by way of the paraspinal muscles. Nevertheless, the entire

pain complex has some of the characteristics of a true referred pain. Under these conditions the impulses would probably be carried by other pathways. It is also necessary to consider the influence of the autonomic nervous system in provoking the head pain and possibly the psychic features noted here. The frequency with which autonomic concomitants were observed by Campbell and Parsons¹ and by other investigators would strongly suggest the participation of this division of the nervous system. This interpretation would receive support from the statement by Kuntz,² "Afferent impulses arising in any part of the body may elicit reflex reactions carried out through autonomic nerves . . ." In the final analysis, the important aspect of this problem is the recognition that certain types of headache, sometimes combined with varying degrees of psychic abnormality, are directly traceable to painful lesions of the lower part of the back.

SUMMARY

In a group of seven patients, it was possible to establish a relationship between headache and pain in the lower part of the back. The back pain was due to abnormalities of subfascial fat tissue in the sacral and the ilio-lumbar regions. In two cases, preliminary diagnostic injection of local anesthetic provided prompt and prolonged relief of the back pain and simultaneously the headache. In four patients it was necessary to undertake operation for resection of the fat tissues. This resulted in immediate and complete elimination of the back pain and the head pain, in all cases. One patient was not treated. The results have been maintained for periods of observation varying from four to 12 months.

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Genetics and Medical Practice

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LIVING CREATURES, including man, are the product of heredity and environment. This is a fundamental concept in biology and one that should be universally accepted. Only the matter of relative significance gives rise to argument. It follows that "normal" and "abnormal" development are end results of various heredity-environment combinations. The field of medicine concerns itself primarily with "abnormal" individuals, and has as its main function the transformation of "abnormal" states to those of "normalcy." Dobzhansky (1950)¹ has used the genetic terms "genotype" (genetic make-up of an individual) and "phenotype" (appearance of an individual), in defining the role of medicine as follows: "Medical treatment of hereditary disease, or indeed, of any other disease consists essentially in placing the patient in environments so contrived that his genotype reacts by engendering a phenotype which is regarded as desirable. Medicine and pedagogy are, from the standpoint of genetics, sciences of management of the human phenotype." Medical writers usually overlook genetics, however, and instead of describing the "hereditary clay," describe and emphasize the means of fashioning such "clay."

The purpose of this article is not to dwell on the neglect of human genetics in the past, but rather to point out the usefulness of such knowledge in the field of medicine. That human genetics is assuming increasing importance in the scientific world is evidenced by the establishment of a new society, The American Society of Human Genetics, with its own publication, *The American Journal of Human Genetics*. Likewise, the recent publication of such books as *Human Genetics*² by Curt Stern, and the introduction of courses in human genetics in more universities, have added impetus to the field.

Publications dealing with the practical applications of human genetics are relatively few in number. To many, "practical application" implies only the field of eugenics. It must be stressed that eugenics is only one, though the most controversial and publicized one, of the practical applications of human genetics. Perhaps the next best known is that of medico-legal genetics, which has sometimes found itself on page one of the daily newspaper. However, what the author wishes to emphasize is the practical application of human genetics to everyday medicine. This involves primarily two roles: (1) usefulness in handling the medical case, and (2) usefulness in counseling. These two aspects of human genetics will therefore be expanded in the following discussion.

I. HANDLING OF MEDICAL CASE

Hereditary diseases are often considered to be synonymous with rare diseases. In an attempt to evaluate the relative importance of genetic diseases, a limited survey was conducted on about 300 successive pediatric patients who were seen for the first time either in the outpatient or inpatient services of University Hospital during early 1950. Table I lists those diagnoses in which a genetic factor was considered to play a major or minor role. It must be admitted that a University hospital attracts more of the bizarre hereditary diseases, yet such diseases as atopic eczema, convulsive disorders, mental retardation, and rheumatic fever, are common ones in pediatric practice in any community.

This tabulation includes only those conditions in which genetic factors are well established as contributing factors in the disease. Without doubt, many of the other conditions (especially malformations) encountered also involve hereditary predisposing factors. Non-genetic diseases included 56 (17.1 per cent) infections and 18 (5.6 per cent) cases of burns and trauma. Such conditions as refractive error, behavior or speech problems (30 cases), and hemangiomas have not been included in the genetic group, although they are certainly not just "environmentally-induced."

The field of pediatrics is perhaps one of the "richest" sources of genetic material. However, internal medicine deals commonly with such strongly-hereditary diseases as diabetes and essential hypertension. Ophthalmology must contend with a host of genetic diseases, for the eye is perhaps heir to more known genetic diseases or defects than is any other organ of the body. Every specialty has its share, however, and would show a distribution somewhere approaching the above tabulation for hospital pediatrics.

Clinicians ask, "What if we do know that diseases are strongly hereditary? Of what use is this information in our handling of the patient?" With regard to this, it is fair to ask, "Why take a family history?" History taking, as far as the patient's pedigree is concerned, has become such a routine affair that the examiner forgets the purpose of the questions. Medical students are all encouraged to take careful histories, but are seldom advised on the usefulness of family information. It is in the taking of the family history that the physician can first utilize the field of human genetics. If he is acquainted with the genetics of the various medical conditions, then family information may aid him in the first medical step—that of diagnosis. If relatives are known to have had retinitis pigmentosa, congenital hemolytic jaundice, Friedreich's ataxia, intestinal polyps, Hunt-

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ington's chorea, etc., it often enables the clinician to make an earlier diagnosis when symptoms of one of these conditions are encountered in the patient. Strong family tendencies to allergy often aid in the evaluation of suspected allergic conditions in the patient. Information about height of relatives is useful in judging growth patterns of children.

The next question is this, "What if we do know that the disease is hereditary; what can we do about it?" It must be stressed that hereditary does not mean incurable, and that a hereditary disease is treated like any other disease. In other words, a harelip needs surgery, diabetes requires insulin, etc. It is true that for such hereditary diseases as achondroplasia and albinism there is little that can be accomplished therapeutically, but this is no different from some of the non-hereditary defects due to maternal rubella or toxoplasmosis. The word "hereditary" does not change the aspect of the disease, except as it may affect future generations. A knowledge of the genetic aspects of disease is of considerable value, however, in treating the family of the patient. We might call this the preventive medicine aspect. Thus, rheumatic fever in one child of the family should alert the physician to possibilities of future cases in other siblings. Alerting of the family to this possibility might result in their improvement of environmental conditions sufficient to ward off attacks in siblings. Physicians who deal with families in which congenital hip disease has been known to occur must be on the lookout for this disease in young infants, so that treatment can be instituted at an age when good results are the rule and not the exception. Likewise, it is worthwhile to anticipate

diabetes in the relatives of known diabetics. This use of human genetics in the field of preventive medicine has been well illustrated by Francis (1949).³

That a knowledge of human genetics is of unusual use at times is demonstrated by the following incident. A child was brought to the hospital clinic by the maternal grandmother because of behavior problems, and in the course of the routine examination was found to have clinodactyly (bent fingers). Knowing this to be a dominant genetic trait, the physician asked about the presence of the trait in the parents and grandparents. The mother was said to have the trait, but the maternal grandparents were free of it. The maternal grandmother was then asked directly if the child's mother was an adopted daughter. She answered yes, and then proceeded to add that this was the first time that it had been asked of her, even though she had consulted psychiatrists in the past. As it turned out, the patient's behavior problem was largely dependent upon the conflicts which concerned the adopted status of the child's mother.

II. COUNSELING WORK

Perhaps the least-publicized of the uses of human genetics is that of counseling. The physician has always been consulted by patients not only for diagnosis and treatment, but for advice and enlightenment. Long before formal genetics was developed, the family physician was aware of familial diseases as well as the fear that these sometimes gave rise to in the family. The physician has often been asked to explain genetic principles and to rule on the heritability of various diseases. Without formal training in the subject, and without easy references to consult, he has often failed in this role of counselor. Elementary genetics is often included as one of the prerequisites of medical school, but this brief introduction to the subject cannot be expected to make authorities of all those who pass the course. The general public, however, expects all physicians to know the answers to questions on heredity. They know that the physician has spent years studying the human body, and feel that he should understand the factors which underlie health and disease, be they genetic or environmental. The physician cannot be censured for this lack of knowledge. An adequate training in the subject is difficult to obtain, since the information on the subject is spread throughout the world's literature. Basic principles are clearly stated in any number of textbooks, but hereditary aspects of various diseases are nowhere assembled in a handy reference. There are books such as Gates' *Human Genetics*,¹ to which the physician may refer. However, this will give him a confusing array of references, often contradictory. Other compendiums exist in the German literature (such as *Handbuch der Erbbiologie des Menschen*),² but these also provide no ready solution. In fact, this inadequacy of source material often leads to serious error. Thus, diseases which have multiple types of inheritance, due to gene differences, are sometimes signified as having a single type of inheritance. The physician who reads this book will then use this as the basis of future explanations, and he may

TABLE I

Number of Cases of Diseases of Genetic Importance in Series of 328 Pediatric Cases

A. Genetic Factor a Major One		B. Genetic Factor a Minor One	
Diagnosis	No.	Diagnosis	No.
Atopic eczema	7	Rheumatic fever	11
Diabetes mellitus	4	Chorea (Sydenhams)	1
Allergic rhinitis	1	Rheumatoid arthritis	1
Asthma	1	Hans-Schüller-Christian's Disease	1
Hemophilia	2	Leukemia	3
Convulsive disorder	12	"Cerebral spastic"	9
Spastic paraplegia with idiocy	1	Congenital heart disease	20
Pelizæus-Merzbacher's disease	1	Inguinal hernia	3
Clubfoot	1	Congenital urethral obstruction	1
Congenital hip dislocation	1	Mongolism	2
Cleft palate	1	Congenital pyloric stenosis	4
Strabismus	4	Spina bifida with meningocele	3
Mental deficiency (intrinsic)	20	Hydrocephalus	1
Schizophrenia	1		
Microcephaly	2		
Congenital deafness	1		
Erythroblastosis*	6		
Totals	66		60
	(20.1%)		(18.3%)
Grand Total	126	(38.4%)	

*Not strictly a genetic disease, although genetically-determined blood groups underlie it.

well begin to question its accuracy. There is no easy path to genetic interpretation, and experience has shown that clinical genetics, like any phase of clinical medicine, allows few dogmatic statements. On the other hand, textbooks generally err in being too vague on the subject. Diseases are described as often familial, congenital, or hereditary, and that is all. By "familial," many authors mean that the disease is hereditary but it is present only among siblings (and hence recessive), and this was formerly its definition in the medical sciences. Dictionaries still ascribe genetic significance to the word, but strictly speaking, the word "familial" should be used only as a descriptive adjective referring to the greater than chance occurrence of a disease in more than one member of a family; it is a good word to use when etiology is unknown. Fortunately, the word "congenital" is now understood by most people as meaning only "present at birth," without regard to heredity or environment. "Hereditary" should be used only to mean dependency on units (genes) which are transmitted from generation to generation, and should be used in referring to either dominant or recessive types of inheritance.

On those occasions is the physician called upon for genetic advice? Without doubt, the most common one is that of birth of an abnormal infant. Parents invariably want to know the cause, as well as the likelihood of repetition. This is one of the most difficult questions to answer, and places the physician in a difficult position. The easiest road out is to call it "one of those things," "an accident in Nature," etc. This of course tells nothing, yet it apparently satisfies the majority of such parents. The etiology of malformations is slowly but surely being untangled, and much better answers are available for specific cases. Thus, the identification of maternal rubella or toxoplasmosis as underlying factors in some cases permits a more exact answer. Other abnormalities, with fairly definite genetic patterns, such as achondroplasia and harelip, can be interpreted in straightforward fashion. If it is impossible to find specific information on the malformation, then recourse can be made to a purely statistical approach. It is well known that malformations characterize about 1 per cent of births (probably closer to 1.5 per cent). Murphy (1947)⁶ has investigated families in which major malformations have occurred, and has published risk figures for such mothers. His work shows that once a woman has produced such an abnormal baby, her chances for producing another are 25 times greater than for other women. If another malformation does occur, the chances are 50-50 that it will be similar to the first. Subsequent work by other authors (such as Record and McKeown 1950)⁷ indicate a similar picture, although the risk figure for subsequent pregnancies is somewhat less (instead of the 1 in 9 chance cited by Murphy, a figure of 1 in 20 or thereabouts). To be sure, this statistical information is quite nonspecific, but the same thing applies to the use of statistics by insurance companies. Unfortunately, no large-scale study has been carried out with respect to risk figures for all the individual malformations. Risk figures are available for such abnormalities as harelip and cleft palate (Fogh-Andersen 1943,⁸ Reed 1949⁹), as well

as Mongolism (Böök and Reed 1950¹⁰), but these are in the minority. It is important to emphasize that risk figures can be developed irrespective of type of etiology. In many cases the risk figure is so small that the physician chooses to tell the mother to forget about it. Thus, mothers who have borne infants with spina bifida or anencephaly are usually told by physicians that the malformation is not due to heredity, and that there is no great likelihood of having additional malformed babies, even though actual figures show a risk figure of about 1 in 20. Although not discussed by these workers, the data of Murphy and Record and McKeown do indicate that women who have borne two abnormal babies have a gloomier outlook than do those who have borne only one. This is what one would expect when data relating to heterogeneous material are lumped together, for repeated pregnancies act as a biological test. Non-genetic malformations would not usually be expected to repeat.

It is pertinent to point out that malformations of similar outward appearance (such as microcephaly) may vary in etiology. Some cases may be genetically determined, whereas others may be due to radiation of the pregnant woman, etc. (such environmentally induced copies of genetic entities are called phenocopies, a term first used in fruit fly genetic studies).

That one cannot be strictly academic in dealing with patients is well understood, for the handling of patients is an art and not a science. Some patients are incapable of understanding even simple explanations of genetic mechanisms, and others bluntly refuse to believe in heredity. Nevertheless, the author has been surprised by the great number of patients who are aware of the hereditary nature of diseases and traits which "run in families." However, they are invariably completely ignorant of the manner in which heredity operates. Moreover, a patient may understand the situation after explanation on one occasion, but six months later will have no recollection about the discussion. Because of the morbid fear that patients have of "hereditary disease," it requires careful management of the individual, lest additional worry be thrust upon him. It is probably the desire to be "easy" on the patient that accounts largely for the frequent tendency of physicians to discount the genetic element in disease. The subject of abnormal babies can be best explained to the patient in terms of probabilities, emphasizing that all prospective parents run a risk with respect to having abnormal infants. By emphasizing the everpresent, though relatively small, risks in parenthood, the doctor can easily bring in the subject of relative risk, and thereby show that it is not a question of "Am I going to have an abnormal baby next time?" but rather, "How much more likely am I to have an abnormal baby than anyone else?" Many patients are actually relieved to hear that chances are 1 in 20 rather than the 1 in 2 or thereabouts that they feared. To others, of course, a 1-in-8 or 1-in-20 chance seems quite precarious, until they learn that women in general run a 1-in-50 to 1-in-100 chance for having an abnormal baby. However, in other cases, such as albinism and cystic fibrosis of the pancreas, the woman with an affected child is usually quite alarmed

to hear that her future chances are 1 in 4 that in each pregnancy a similarly affected or predisposed child will be born.

That even such a clear-cut genetic trait as albinism often is misunderstood by medical men is shown by the answers given to a woman who consulted three different medical authorities regarding the birth of an albino child. Three sources gave three different answers: (1) due to a mutation, (2) due to an accumulation of "blonde" factors in the family, and (3) "the trait is thought to be familial." By mutation, is meant change in a gene or chromosome. When one speaks of an individual's appearance as being due to a mutation, it is meant that one of the parental gonadal genes has changed, so that the new individual is unique with respect to one gene. All genes can be considered to have changed in the past, and therefore could be called mutated genes. It is easy to visualize the chain of circumstances involved in a dominant mutation, for the visible effect is immediate. However, for a recessive gene, the visible effect is not immediate, and the abnormal gene becomes "visible" only when it meets up with an identical partner gene, so that the bearer is homozygous (has two "doses" of the gene). Therefore, it is incorrect to attribute the sudden appearance of a recessive trait in a family to mutation, although the gene itself did originate sometime in the past by mutation. It is better to explain the appearance of a recessive trait as due to the coming together of "hidden" genes from each parent. As far as the "blonde" factors explanation is concerned, it seems quite unscientific to invoke such a complicated and unlikely interpretation for a typical case of albinism, when it can actually be explained in a simple and more logical manner. The third explanation, "thought to be familial," tells nothing, unless one is familiar with the medical conception of "familial" as indicating recessive inheritance. Actually, albinism is not a single entity, but can vary in degree, with certain cases dependent upon dominant genes and others on recessive genes. However, the usual "garden variety" of albinism is known to behave as a recessive trait. This lengthy reference to albinism is included only to demonstrate some of the pitfalls in counseling where the individual leans back on his elementary academic training or where he picks up his interpretations from popular magazines or from sketchy publications. He gives an explanation which is couched in genetic terms, and which pertains to true genetic phenomena, but which are unfortunately not applicable to the case in question.

Other occasions when the physician is called upon to give genetic advice include those of marriage counseling and adoption proceedings. In the former case, the physician is often asked to rule on the heritability of some trait possessed by one of the prospective mates or present in one of the families. In such a case it is vital to know the exact medical condition, as well as the distribution of cases in the family pedigree. It is surprising that such individuals are invariably less concerned about possibilities of genetic disease in themselves than in future chil-

dren. It would seem that a consideration of competency for parenthood should be made before parenthood is considered. With respect to adoption proceedings, it is often important to consider the heredity of the child before making placement, although illegitimacy often makes this difficult. If it is thought that future difficulties may arise in the child because of unfavorable heredity, then either the child should be considered non-adoptable, or else the foster parents should be told the details.

If the field of medical genetics is so dispersed at present, how can the physician obtain adequate information on specific questions? Recourse can be made to the various abstracting journals as well as the available books on human genetics. If the physician wishes to avoid combing the library, he can consult various agencies or individuals who are familiar with the subject. However, he must be careful in choosing an unbiased and capable authority. Even so, he will probably find some disagreement in thinking, due to the differences in experience of various authorities. Perhaps the most widely known source of information for physicians is that of "Queries and Minor Notes" in the *Journal of the American Medical Association*, although it is unfortunate that the names of the consultants are not given. The Eugenics Record Office, which was formerly directed by Charles Davenport at Cold Spring Harbor, has passed out of existence, and letters to it are now forwarded to the Dight Institute, which now contains the records formerly housed at Cold Spring Harbor. The Dight Institute for Human Genetics has as one of its main functions that of free counseling in human genetics, available to both professional and lay people.⁹ Other groups for the study of human genetics are located at a number of universities throughout the country, although their number is still small.

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Management of Difficult Labors*

Part I. Uterine Inertia†

Part II. Bony Dystocia

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DYSTOCIA PROBLEMS constitute one of the major complications in clinical obstetric practice. These matters, while not initially serious, may progress to levels dangerous to both mother and fetus, so intelligent and conscientious care is necessary to thwart such developments. It is the intent of this presentation to summarize accepted present-day methods of handling difficult labors.

We can classify the dystocia problems under the following five headings: (1) prolonged labor of inertia types, (2) bony dystocia, (3) soft tissue dystocia, (4) abnormalities of fetal presentation, and (5) fetal abnormalities.

I. PROLONGED LABOR, INERTIA TYPE

One common cause of dystocia is prolonged labor due to uterine inertia. Uterine contractions tend to be irregular both in intensity and duration, pain is disproportionately high, there often is a lack of progress in quality of contractions, and, consequently, dilatation and effacement of the cervix is slow.

There are two types of uterine inertia: primary inertia, in which poor labor is present from the onset, and secondary inertia, in which poor labor is preceded by initially good labor.

Premature rupture of the membranes, i. e., "dry labor," has been blamed in the past for uterine inertia. This is now known to be incorrect, if we exclude cases where membranes were artificially ruptured to induce labor. Likewise, intrapartum infection, emphasized as an etiologic factor, although it may aggravate the fundamental problem, probably is an effect rather than a cause of prolonged labor.

The problem often is due to emotional and physical tension on the part of the patient. Much of this apprehension can be allayed if time is taken to talk with her in the prenatal visits about labor, and also to acquaint her with the labor and delivery rooms beforehand. Patient and doctor will be well repaid for reading Grantly Dick Read's book, "Childbirth Without Fear."

Treatment:

Once uterine inertia with its prolonged labor has been established, protective and supportive measures should be started. After 24 hours of labor, or if membranes are ruptured and labor is desultory, it is a good rule to begin antibiotic or sulfonamide prophylaxis. Adminis-

tration of these drugs in adequate dosage is effective in preventing intrauterine infection and in increasing the fetal survival chances.

Best diet in long labor consists of easily digested liquids. By periodic check of urine for volume output and presence of acetone, one can determine fluid and food requirements. A minimum of 1,000 cc. urine excretion per day is desired. Because many patients with prolonged labor do not take adequate oral fluids, deficiencies in fluid requirement can best be met with intravenous glucose solution, the percentage of glucose depending on the presence and degree of acetoneuria.

When labor has progressed 24 hours and delivery does not appear imminent, it is wise to perform a sterile vaginal examination to ascertain if fetal or maternal abnormalities are present. Preservation of the unruptured bag of waters is desirable, save when the membranes are bulging through the partially dilated and well effaced cervical os.

After a prolonged period of labor (30 hours), if primary or secondary inertia has been established as the cause, then one or both of two diverse therapeutic measures may be employed, namely, rest and stimulation. The former is preferable, particularly when maternal exhaustion is indicated by rising pulse and progressively poor quality labor.

If rest is indicated, then it should be a good one. Morphine sulfate, grs. $\frac{1}{6}$ or $\frac{1}{4}$, plus Seconal, grs. iii, will in most cases produce an effective narcosis of four to six hours. The patient will likely awake refreshed and relaxed, her capacity for the work of labor revived, and progress may be expected from more effective contractions. It is not unusual to find that during such rest cervical dilatation has made considerable advance, due, undoubtedly, to release of muscle spasm during "painless" labor.

If such rest, however, is not followed by good labor, then is the time for medical stimulation. Our routine is as follows: 60 cc. castor oil, on an empty stomach; ergot powder, grs. iii, one-half hour later; ergot powder, grs. iii, one-half hour later; hot soap suds enema, one-half hour later.

Pituitrin in small amounts, e. g., one-half minim, may be given safely at 30-minute intervals for four to six times to supplement the above regimen. Initial reports on the use of dilute pituitrin solutions given by intravenous drip indicate it is an effective means of stimulation and probably without danger. However, one must caution against wholesale acceptance until experience is

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†Parts III, IV, and V of this presentation will appear in a subsequent issue.

gained from large series of cases. Quinine is no longer used since it has been shown, by Marchetti, Fitch and Kuder, to be ineffective. Such a program of rest and stimulation may be repeated, if necessary, providing that satisfactory progress is gained by such repetition.

When dilatation has reached about seven or eight cm., another therapeutic measure is available. The instillation of local pudendal block with one per cent procaine permits completion of the first stage of labor. The probable mechanism is through release of perineal and deep pelvic pain with attendant cervical and uterine spasm. Spinal and caudal anesthesia may also have similar effect, but are more dangerous. It is believed that pudendal block is superior to the use of a Voorhees bag and/or version extraction.

If a stalemate is reached at seven or eight cm. diameter of the cervix and if the head be at the level of the spines, delivery can be effected without serious risk by Dührssen's incisions and the use of forceps. Speedy delivery may be necessitated if there is evidence, by slow heart rate, of real fetal distress. The cervical incisions should be made deeply to the juncture of the vagina.

Two or three such incisions are preferred, with great care to avoid the bladder. Adequate exposure is necessary. (See figure 1.) It is the policy then to complete delivery with axis-traction forceps, usually the Tarnier's.

In nearly all cases of uterine inertia, labor should be terminated by low forceps delivery. The patient is undoubtedly tired and will be grateful for shortening the remaining hour or more of second stage labor.

There is an occasional patient whose progress is intolerably slow, with little response to various measures. If the prognosis of another day or two of labor without reaching completion is apparent, then a cesarean section is justified. Douglas and associates have shown that with antibacterial prophylaxis, the cesarean operation can be deferred safely 48 hours or longer. Thus the doubtful case with desultory labor can be given a fair trial without risking maternal or fetal mortality and without high postpartum morbidity. Furthermore, using such precautions, the low flap transperitoneal cesarean may be used with greater freedom; and extraperitoneal types of operation are reserved for those cases which have been mismanaged and definitely are infected.

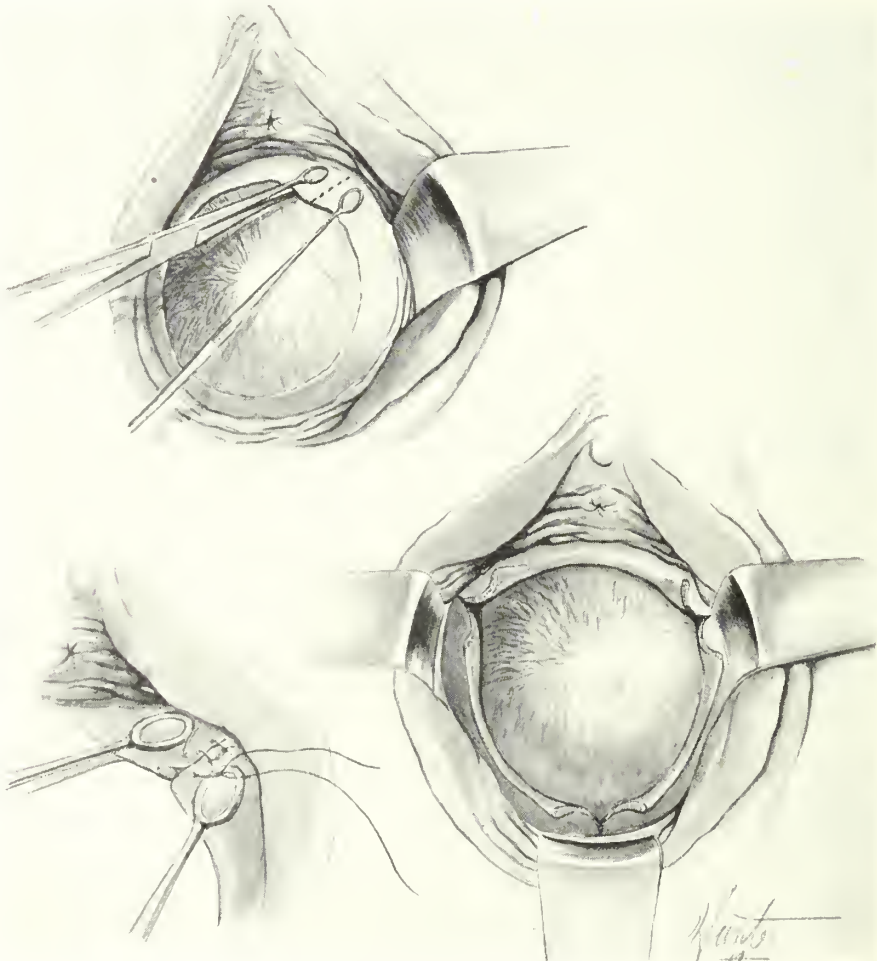


Fig. 1. Dührssen's incisions in cervix.

II. BONY DYSTOCIA

The problems to be met in dystocia labors with contracted pelves are in the handling of the so-called "borderline cases." Women whose pelves are markedly contracted present no difficulty, for elective cesarean section is the only feasible means of delivery. Borderline contractions should be recognized twice: once when the pelvic measurements are taken in the first prenatal visit, and again during early labor when engagement does not take place.

It will serve no useful purpose to repeat the normal pelvic measurements. But what, one may ask, are the critical or questionable measurements? By and large, small external ones do not reflect a contracted obstetric pelvis. When, however, the diagonal conjugate internal measurement is reached at 11.5 cm. or less, it is a warning sign. So, also, there is significance in prominence of the ischial spines. A bituberous diameter of the outlet of 8 cm. or less is distinctly narrow.*

All patients having such previous storm warnings of pelvic contraction will benefit from good x-ray pelvimetry in the last weeks of gestation. As further prophylaxis in handling dystocia problems, x-ray help also should be secured in the following conditions: primigravida at or near term with floating fetal head; elderly primigravida; primigravid breech, and all abnormal presentations. X-ray measurements are comparatively accurate. Together with opinion as to cephalo-pelvic relationship, the roentgenologist's report will be most valuable in helping to decide what cases will, or will not, deliver vaginally. Final decision in all cases, nevertheless, rests with the doctor in charge. The x-ray opinion must be considered advisory help based only on the bony structures.

With or without such assistance, many of the difficult labors in this category must be handled on a trial basis. Trial of labor is defined as: four to six hours of fairly active labor, the pains coming at least every ten minutes, lasting 40 to 60 seconds and of strong character. The term "test of labor" is reserved for those cases observed throughout the entire first stage until the cervix is completely dilated. This latter means of evaluation is dangerous and ill advised. Fortunately, in the management of these problems of bony dystocia the majority have inlet contractions. Prophylactic penicillin and sulfadiazine or aureomycin should be started as previously outlined. A word of warning should be given not to induce labor unless the patient is definitely overdue, for if a desultory labor results, it is almost impossible to obtain a satisfactory trial evaluation.

It is axiomatic that trial of labor should be restricted to vertex presentations only. No proper estimation can be made as to outcome per vaginam in breech and shoulder presentations, the obvious reason being that the largest part of the baby, i. e., the head, does not "try the pelvis" until the buttocks and lower extremities have been cleared. Failure at this point results in certain

death of the baby and grave danger to the mother, in destruction and delivery of the aftercoming head.

The patient should be admitted early in labor and followed carefully in the hospital through the elected trial period. With sufficient molding of the head in good labor, satisfactory descent will take place. Such hoped-for advance can be determined by abdominal and rectal examinations. When on rectal palpation the presenting vertex is at the plane of the ischial spines, the greatest diameter of the fetal head has passed through the inlet and the outcome for vaginal delivery is assured.

Where cephalo-pelvic disproportion is questionable, an estimate of the probability of engagement through the inlet is most important. Müller's impression method has been proven reliable as a means for such determination. Our modified technique is as follows: The obstetrician grasps with his left hand the brow and occiput of the fetal head through the abdominal wall and exerts firm pressure downward in the axis of the superior straight. At the same time strong fundal pressure is made by an assistant, also in the direction of the pelvic inlet. Through rectal or vaginal examination the operator will palpate, with the other hand, to ascertain if the head will engage. If there is no significant inlet disproportion the head will readily enter the pelvis. On the contrary, the fact the head cannot be brought into the inlet does not necessarily exclude delivery per vaginam. Additional trial labor may be needed to signal the direction of delivery.

When does one decide that a trial period has failed? With one exception there are no set rules. Six hours would seem reasonably fair in most cases; however a few additional hours may be desired if progress continues and if by Müller's impression method it seems likely the inlet dystocia can be surmounted. The one exception is the infrequent occurrence of a pathologic contraction ring. Its rising presence can be seen and palpated through the abdominal wall. Since the danger is rupture of the uterus, and since the cause is disproportion, prompt cesarean delivery is the only satisfactory treatment. Cesarean section must also be resorted to for those borderline cases where there is disappointing failure of descent after a reasonable period of labor.

Vaginal delivery may be planned for most cases of funnel pelvis, where the deformity is not great. The management problem of these is in the second stage. Spontaneous descent will bring the head at least to the level of the spines. And when cervical dilatation has been completed, forceps delivery will be in order. Axis traction with fenestrated blades, such as Tarnier or Dewees, is particularly useful, for these blades obtain a good grasp of the head, even with molding, and make the most out of strong forceps traction. When there is marked contraction of the outlet and mid-pelvis, trial labor should not be undertaken, the head will in a sense be stuck in the pelvis and may be retrieved only with considerable difficulty in delayed cesarean section. Accordingly, it will be advantageous to do elective operations in the comparatively rare cases where outlet dystocia is forecast.

(Continued on page 82)

*Plass has emphasized that such measurements are often inaccurately taken, but will be reliable if measured on the level of the anus.

Acrodynia Associated with Mercury Poisoning*

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IN 1949, after participating in the controversy over the etiology of acrodynia for more than thirty years, Zahorsky¹ was led to conclude: "Its cause is still obscure. The possible causes: vitamin deficiency, chronic infection, mineral poisoning, fungus intoxication, plant poisoning, virus infection; all of these and more have been discussed and the theories tested by therapeutic trials. We remain in the dark."

The literature of the last two years describing acrodynia associated with mercury ingestion and or the presence of mercury in the urine justifies the following report of a case in which the clinical syndrome developed in a child following the use of ammoniated mercury ointment on the skin and coincidental ingestion of large amounts of the same ointment.

CASE REPORT

L. L., a 15-months-old female, residing in South Sioux City, Nebraska, was admitted to the Lincoln General Hospital on December 26, 1949, with a note from the referring pediatrician, Dr. J. M. Lande of Sioux City, Iowa, that indicated his diagnosis of acrodynia.

The admitting complaints were extreme irritability, severe weight loss, weakness, anorexia, painful hands and feet, sore mouth, sore eyes with avoidance of light, disturbed sleep with almost incessant whining and crying.

The present illness was of gradual onset. The symptoms which first became apparent one month previously had steadily increased in severity and had not responded to any therapeutic measure.

Both parents are members of the teaching profession and have made more than the usual effort to provide adequately for this, their first and only child. The pregnancy was normal, the labor uncomplicated and the neonatal period satisfactory. An evaporated milk formula sweetened with dextrimaltose was employed for the first five months after which pasteurized whole milk was used. Five drops of *Oleum Percomorphum* and four ounces of orange juice were added at one month. A multi-vitamin preparation in adequate dosage was substituted for the oil at three months. Strained fruits were started at two months and a prepared infant cereal and strained meats at three months. At one year she was eating a diversified diet from the table. Dietary management as well as growth and development had been under regular pediatric observation and both had been considered satisfactory up to the onset of the present illness.

She had had none of the specific infectious diseases prior to the present illness. There had been few upper

respiratory infections and these had not been severe. Immunization to pertussis, diphtheria and tetanus had been accomplished and she had been successfully vaccinated for smallpox six months prior to the present illness.

Three months prior to her present illness she developed a localized impetigo for which ten per cent ammoniated mercury ointment was prescribed. The ointment seemed remarkably effective to the mother so it was used subsequently on several occasions for other minor eruptions. In the use of the ointment the uncovered jar was placed on the bathinette within easy reach of the child. While the mother was occupied, the child developed the practice of inserting a finger in the jar, and securing ointment which she transferred to her mouth. Believing it to be innocuous, the mother was not disturbed by the ingestion of considerable amounts of the ointment. In the period of three months, one ounce of ten per cent ammoniated mercury ointment was used, in application to small areas of the skin, and the rest ingested. The amount of the mercury salt ingested was less than three grams and probably more than one gram.

The physical examination revealed a very restless child, whimpering or crying constantly and presenting the appearance of extreme dejection. She was engaged in ceaseless activity in which she was occupied in holding or rubbing her hands and feet, or chewing her hands and fingers as though they were extremely painful. She sought the far corner of her crib and buried her face in the pillow to avoid light.

The conjunctiva were reddened and there was marked photophobia. A moderate mucopurulent discharge was present in the nares. The gingiva were reddened and the pharynx was moderately erythematous. The tonsils were small and but slightly inflamed. The heart was normal except for acceleration of the rate. The abdomen was scaphoid; no masses were palpated. The extremities were symmetrical and atrophic, with marked muscular atonicity. The skin was dry with moderate scaling and the hair dry and lacking luster. The skin of the palms and soles was moist, edematous, red, and exquisitely sensitive to pressure. The digits were swollen moderately and painful on movement.

The blood hemoglobin was found to be 14.4 gr. or 90 per cent, the erythrocytes 5,800,000, and the urine was negative for albumin and cells.

The history and physical findings supported the previous diagnosis of acrodynia. Being aware of the work of Warkany and associates,² a qualitative test for mercury was run and found to be positive.

*Read before the meeting of the Northwest Pediatrics Society at Bayport, Minnesota, on October 6, 1950.

TREATMENT

During the period of diagnostic study, the child was offered a soft diet supplemented with ten drops of *Oleum Percomorphum* and 100 mgms. of ascorbic acid daily. Crude liver extract, one cc., was given intramuscularly every other day. Penicillin, aqueous fortified, 300,000 units, was given daily to combat infection. On the fifth hospital day, the patient having shown no improvement, BAL therapy was initiated according to dosage recommended by "The Council on Pharmacology and Chemistry,"³ i. e., 2.5 mgms. per kilo body weight. The actual dosage was:

24 mg. I.M. every four hours for 12 doses.

24 mg. I.M. every six hours for four doses.

24 mg. I.M. every 12 hours for 20 doses.

Total dosage 1.152 grams.

The total period of BAL therapy was fifteen days. Prompt improvement was observed. Weight gain began in five days. The child was dismissed on the twentieth hospital day much improved.

DISCUSSION

In the past the ingestion of mercury has not been recognized as a common accident. Rubin and associates⁴ in a "survey of 250 cases of poison ingestion," admitted to the Children's Hospital of Washington, D. C., found but three cases in which mercury salts had been ingested. One of these had taken blue ointment (ten per cent), another Mercurochrome, and a third ammoniated mercury ointment (five per cent). All were acute problems in which there was anxiety over the observed ingestion of medication, but none developed symptoms of intoxication. The authors dismissed the problem of ointment ingestion with the statement that the mercury salts involved were relatively insoluble. They ignored the possible effects of continued ingestion of such salts, a problem which they had not encountered.

The effective suggestion that an etiologic relationship might exist between mercury ingestion and acrodynia came from Warkany and Hubbard,² who, in 1948, reported 22 cases of acrodynia in which they demonstrated mercury in the urine. Bivings⁵ in the same year reported a single case in which, at the suggestion of Warkany, he secured a history of mercury ingestion and demonstrated the metal in the urine.

That mercury poisoning might be involved in the etiology of acrodynia had occurred to earlier investigators.

Zahorsky, long an observer of acrodynia, as early as 1922 considered mercury poisoning but abandoned the theory because of inability to elicit histories of mercury ingestion. Davidson, in a personal communication to Bivings,⁶ indicated that, in 1934, Lesesne Smith believed that mercury poisoning was involved in the etiology of this disease.

Bivings,⁶ in 1949, presented a summary of all of the cases reported at that time in which tests for mercury had been done. Out of a total of 31 cases in which the urine had been examined, 28, or 90 per cent, were positive for mercury. In this group of cases, the sources of mercury were teething powders (calomel), calomel as such in a few, bichloride used as a diaper rinse in one, and ammoniated mercury in one case. On BAL therapy he found that all but two made very prompt recoveries.

The laboratory encountered some difficulty in the qualitative test for mercury. It was demonstrated that filtered urine specimens failed to give a positive test. Filtration apparently removes the mercury which is in the flocculent material. Using an unfiltered concentrate, a standard qualitative determination in which the mercury is converted to mercuric sulfide was found most satisfactory.

CONCLUSIONS

A case is reported of typical acrodynia in which ammoniated mercury ointment had been applied to the skin intermittently for three months. During this time the child ingested gross amounts of the ointment.

Mercury was demonstrated in the urine by qualitative tests.

BAL therapy was employed with remarkable improvement in fifteen days.

The case serves to support the recent literature suggesting a possible etiologic relationship of mercury poisoning to acrodynia.

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ACTH AND CORTISONE FOR RHEUMATIC FEVER

Plans for an international cooperative study of the effectiveness of the hormone substances ACTH and cortisone in the treatment of rheumatic fever and the prevention of rheumatic heart disease have been announced by the American Council on Rheumatic Fever of the American Heart Association. The long-term study, first of its kind ever undertaken in this field, will be conducted through a central coordinating center in New York City and at twelve cooperating research centers in the United States, Canada, and Great Britain. Under the study plan, patients treated during acute attacks of rheumatic fever during the next calendar year will be followed for at least three years.

Diagnosis and Treatment of Chronic Occlusive Disease of the Peripheral Arteries*

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THE diagnosis of chronic occlusive diseases of the peripheral arteries is based on objective findings and can usually be made after a relatively simple examination. Suggestive symptoms are intermittent claudication and nocturnal pain in toes or fingers. Ulceration, gangrene, abnormal coldness and abnormal discoloration of extremities are most commonly due to chronic ischemia and if they are present a careful appraisal of the arterial circulation is imperative.

In almost all patients who have chronic occlusive arterial disease there is absence or marked impairment of pulsation in arteries which are accessible to palpation, namely, the brachial, antecubital, radial, ulnar, femoral (in Scarpa's triangle), popliteal, posterior tibial (below and behind the internal malleolus) and dorsalis pedis. Absence or impairment of pulsations in ulnar or dorsalis pedis arteries alone is not necessarily of diagnostic significance since anomalies of these vessels are common, but absence of pulsation in radial and posterior tibial arteries and of the larger arterial trunks is practically always of diagnostic significance.

Ability to palpate and judge pulsations in peripheral arteries can be acquired by any physician with a little practice and experience. The use of the oscillometer may be of some value if experience is lacking, but the oscillometer is not a precision instrument since variations in readings among different patients with normal arteries and even in the same patient at different times may be encountered. In a few patients with thromboangiitis obliterans, when the disease is confined to digits or the distal portion of feet or hands, the pulsations may be normal. In such cases the presence of ischemic gangrene or ulceration, postural color changes in the involved digits or persistent coldness of involved digits may help establish the diagnosis. Without the presence of these findings it is impossible to establish the presence of the disease unless pathologic examinations of the arteries can be made.

If there is much obstruction of arterial blood flow to extremities, postural color changes are almost always noted. The simple test for postural color changes consists of elevation of the extremities for one minute followed by placing them in a dependent position. Abnormal pallor at the end of elevation, abnormal delay of color return and filling of superficial veins after dependency followed by a short period of abnormal rubor indicates arterial insufficiency. This test should be done

only after the patient has been placed in a warm environment, and the color changes are of more significance if confined to, or more noticeable in, one of two companion extremities.

For practical purposes, measurements of the skin temperature by instruments, plethysmography and arteriography following intra-arterial injection of radiopaque material are not necessary for the diagnosis of chronic occlusive peripheral arterial disease. The chief value of these procedures is in appraising therapy and estimation of degrees of associated arterial spasm or determination of the exact location of the arterial lesions after the diagnosis has been made. Determination of circulation time by intravascular injection of fluorescent or radioactive material may give information as to the degree of arterial insufficiency, but complicated apparatus is required for these tests and they are not necessary for diagnosis.

Approximately 90 per cent of cases of chronic occlusive disease of the peripheral arteries encountered in clinical practice result from either thromboangiitis obliterans (Buerger's disease), an inflammatory and proliferative lesion, or arteriosclerosis obliterans, a degenerative lesion. The only way that these two conditions can be distinguished with certainty is by histologic examination of a diseased vessel, but a high degree of accuracy in differential diagnosis may be achieved if the information in Table I is kept in mind.

The age of onset of symptoms will usually distinguish between the two conditions. The presence of, or a good history of, superficial thrombophlebitis and the presence of involvement of arteries of the upper extremities almost certainly indicates thromboangiitis obliterans but absence of these two manifestations does not exclude thromboangiitis. The presence of arterial calcification, diabetes mellitus, lipemia or hypertension almost certainly indicates arteriosclerosis obliterans but the absence of these conditions does not exclude arteriosclerosis.

Two less common occlusive arterial diseases of the extremities, arterial embolism and simple arterial thrombosis, are seen usually because of acute rather than chronic arterial occlusion, but they may be encountered later because of residual ischemia of limbs resulting from persistent arterial obstruction. Arterial embolism is usually associated with one of three serious heart diseases: chronic auricular fibrillation, recent acute myocardial infarction or vegetative endocarditis, or is associated with an aneurysm proximal to the site of occlusion. Simple arterial thrombosis is rare except in association with polycythemia vera and frequently the diagnosis can

*Read at the meeting of the North Dakota State Medical Association, Grand Forks, North Dakota, May 29, 1950.

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TABLE I
Differential Diagnosis of Arteriosclerosis Obliterans and
Thromboangiitis Obliterans

Distinguishing features	Thromboangiitis obliterans	Arteriosclerosis obliterans
Age at onset of symptoms, years	Almost always less than 50	Almost always more than 40
Sex	99 per cent males	83 per cent males
Involvement of upper extremities	40 per cent of cases	Rare
Presence or history of superficial thrombophlebitis	40 per cent of cases	Never
Roentgenographic calcification of arteries	Absent	Present in 70 per cent of males
Hypertension	Rare in early years of disease	Present in 35 per cent of cases
Diabetes mellitus	Rare in early years of disease	Present in 20 per cent of cases
Plasma lipoids	Usually normal	Frequently elevated, especially in younger patients

be made only by histologic examination of the affected vessels.

Arteriosclerosis may be complicated by occlusion of the digital arteries and even gangrene but in such cases the scleroderma which is not seen in other arterial disease is a distinguishing feature. A rare cause of chronic occlusive arterial disease is chronic occupational trauma. The dominant hand of farmers or mechanics may be the site of such occlusion when the hand is subject to much constant or vibrating pressure. One or more fingers may be affected by moderate to severe ischemia and frequently pulsations are absent in the ulnar or radial arteries. Occasionally thrombotic occlusion of arteries occurs in patients who have cervical ribs.

There should be no difficulty in distinguishing Raynaud's disease, other arteriospastic disturbances, erythromelalgia, venous insufficiency and lymphangitis, as well as gout, arthritis, mechanical derangements, primary neurologic conditions and other nonvascular disorders of extremities from occlusive arterial disease because none of these produce absence or impairment of arterial pulsations or postural color changes. In coarctation of the aorta pulsations are frequently absent in the arteries of the lower extremities but there are no symptoms or other manifestations of arterial insufficiency.

TREATMENT

During recent years so many methods of treatment have been proposed for chronic occlusive disease of the peripheral arteries that the general practitioner and even the specialist may be confused as to their relative value in any individual case. It is important to understand certain features of these diseases in appraising what may and what may not be accomplished by treatment. Throm-

boangiitis obliterans and arteriosclerosis obliterans are organic diseases. However, between episodes of arterial occlusion the collateral circulation often increases and compensates to some degree even if no treatment is given. Thus a particular method of treatment may get undeserved credit if it is used at the right time. A common denominator of many of the advocated methods of treatment is rest in bed in a warm environment. This may be more important than the specific procedures or drugs which are added.

Certain manifestations of chronic occlusive arterial disease are amenable to therapy. Although the chronic occlusive arterial diseases are organic, they are commonly complicated by spasm of the remaining intact arteries and particularly the arterioles. Even if these vessels are in normal tone, circulation can be improved by arterial and arteriolar dilatation. This principle is the basis for many of the methods of treatment which are used. Other important features in consideration of treatment are that ischemic tissue is very vulnerable to mechanical, thermal and chemical trauma, that gangrenous and ulcerative lesions are almost always secondarily infected and that pain is usually a prominent and stubborn symptom.

The general principles of treatment which apply to all types of chronic occlusive arterial disease are given in Table II. The best management is achieved through

TABLE II
Principles of Treatment of Peripheral Occlusive
Arterial Disease

Arrest the progress of the disease
Dilate uninvolved arteries and arterioles
Increase circulation mechanically
Relieve pain
Instruct in prophylaxis against injury of ischemic tissue
Treat ulceration and gangrene

the cooperation of the internist and the surgeon since medical and surgical methods of treatment are supplementary and not competitive. In general there is no essential difference in the treatment of thromboangiitis obliterans and arteriosclerotic obliterans. The tissues of the extremities in arteriosclerotic patients have less capacity to heal, ischemic neuropathy is more common and the prognosis as to life and after surgical treatment is poorer because of the frequent association of visceral arterial lesions and a greater tendency to progressive thrombosis in affected arteries. These factors may influence the choice of procedures to some extent and also the duration of conservative treatment in cases in which gangrene is present.

Procedures used to arrest the progress of the disease are given in Table III. While they may not always be effective, they represent the summation of our ability to attack this phase of the problem. Tobacco is certainly a vasospastic agent and also probably a basic etiologic factor in almost all cases of thromboangiitis obliterans. Abstinence from tobacco is imperative and there should

TABLE III

Procedures Used to Arrest the Progress of the Disease

Cessation of use of tobacco	Control of diabetes
Fungous control	Control of polycythemia
Control of lipemia	Anticoagulants

be no compromise on this point. The role of dermatophytosis as an etiologic factor in thromboangiitis is questionable but not entirely disproved. In addition lesions caused by the fungi may be the starting point for ulceration and gangrene in ischemic extremities. Hence fungous infections should be treated actively and prophylactically in susceptible individuals. However, strong fungicides and keratolytic agents are contraindicated.

Methods of treatment used for control of lipemia in arteriosclerosis obliterans are not very satisfactory at present. Low-fat, low-cholesterol diets are not always effective and are difficult to adhere to for long periods. Thyroid extract in subtoxic doses may be effective and choline chloride has been found of value by some investigators. It is hoped that better methods for control of disturbed lipid metabolism will be developed in the near future.

Heparin and dicumarol are usually not of practical value for prevention of thrombosis in chronic occlusive arterial disease because of the difficulty of administering the drugs safely and effectively for the long periods during which it is uncertain that thrombosis would have occurred anyway. These anticoagulants may be of value for short periods after acute arterial thrombosis.

Procedures used for vasodilatation are given in Table IV. For hospital patients an environmental temperature

TABLE IV

Procedures Used for Vasodilatation

Warm environmental temperature, general and local
Foreign protein (typhoid vaccine) by vein
Hypertonic solution of sodium chloride by vein
Ethyl alcohol by mouth
Anesthetization of sympathetic nerves or ganglia
Tetra-ethyl-ammonium chloride
Regional sympathetic ganglionectomy

of 80 to 85° F. produces considerable reflex vasodilatation. The use of heat cradles and heat boxes for affected extremities is of some value but the temperature of the air in these should be kept at less than 92° F., and the heating elements should be protected so that the patient cannot come in contact with them in any way. Parenthetically the use of cold packs or refrigeration has no place in the treatment of chronic occlusive vascular disease. Refrigeration anesthesia may be of value when a limb must be sacrificed, and then only if the risk of operation is great or if there is much infection or toxemia from gangrene. Foreign protein given intravenously which formerly was much used in thromboangiitis obliterans is being employed less often. Intravenous admin-

istration of hypertonic solution of sodium chloride is still being used in some eastern clinics, but has never been much favored in other parts of the country. Ethyl alcohol is a fairly good and simple vasodilator but its effect is somewhat transient. Local anesthetization of sympathetic nerves or ganglia and administration of tetra-ethyl-ammonium chloride are of little value in treatment because the effect is so transient, but they are of some value in testing for the degree of possible vasodilatation.

Regional sympathetic ganglionectomy has been gaining favor in the treatment for chronic occlusive disease of the peripheral arteries. This is partly because the vasodilatation produced by it is essentially permanent and partly because improvements in surgical technic have reduced the postoperative mortality rate and even the postoperative complications almost to zero. The effects of sympathectomy are maximum in the digits, somewhat less in the feet, hands and skin of legs and arms and probably absent in large muscles. Therefore, one should not expect relief of intermittent claudication in the calf or thigh from the operation. The immediate beneficial effects of sympathectomy are commonly relief of pain in digits and rapid healing of ulcers. There is a permanent lessening of the liability to subsequent ulceration and gangrene. Sympathectomy does not prevent arterial thrombosis. At present a combination of regional sympathetic ganglionectomy, cessation of smoking and careful protection of ischemic extremities against trauma is probably the best basic treatment in almost all cases of thromboangiitis obliterans. In arteriosclerosis obliterans sympathectomies are being done more frequently than formerly. However, the cases still should be selected carefully since in many instances the surgical risk is increased owing to visceral vascular lesions, and there is some risk of arterial thrombosis in extremities during the immediate postoperative period. Sympathectomy does not relieve pain caused by ischemic neuropathy of large nerve trunks.

Three types of apparatus have been used to increase the circulation by mechanical means, namely, the pavex alternating suction and pressure machine, the intermittent venous compression apparatus and the oscillating bed. At best these are only adjuncts to other methods of treatment. The first has been almost abandoned. The second is of doubtful rationale and is being used less and less. The oscillating bed seems to be helpful in some cases of severe ischemia and is still being used in most hospitals where it is available.

Most patients who have chronic occlusive disease of the peripheral arteries come to the physician seeking relief of pain which may be severe, constant and very difficult to control. There are essentially three types of pain: intermittent claudication, pain in terminal portions of the extremity due to severe ischemia, ulceration or gangrene, and pain of ischemic neuropathy. Intramuscular injections of tissue extracts, particularly pancreatic tissue extract, have been used for intermittent claudication. Their action is not well explained, but they seem to be of some value in about 50 per cent of cases, and

they are usually worth a trial when claudication is the chief or only symptom. Various combinations of the other drugs mentioned in Table V may be necessary when there is persistent pain, but the possibility of addiction to opiates, meperidine (Demerol) or alcohol must be kept in mind.

TABLE V
Control of Pain

Tissue extracts
Barbiturates
Salicylates
Opiates
Meperidine (Demerol)
Ethyl alcohol by mouth
Anesthetization of peripheral nerves or nerve roots with procaine or ammonium sulfate
Surgical section or crushing of peripheral nerves
Amputation

Ischemic neuropathy may produce severe pain which is difficult to control even with opiates and meperidine, and the pain may persist even after high amputation. Some relief of pain in cases of ischemic neuropathy has been obtained by injection of one to two per cent solution of ammonium sulfate into peripheral nerves or sensory nerve roots in a few cases. Injection of ethyl alcohol into nerve roots or peripheral nerves is not advisable. Surgical section or crushing of peripheral nerves in the lower third of the leg is a rational procedure for relief of severe pain in the foot or toes, but results have been rather disappointing, and there is always a risk of non-healing of the surgical wounds. Recently arteriectomy has been recommended for ischemic neuropathy by Freeman.

Procedures used in the treatment of ischemic ulceration and gangrene are given in Table VI. The best

TABLE VI
Treatment of Ulceration and Gangrene

Prophylaxis: avoidance of mechanical, thermal and chemical trauma
Fungous control
Warm soaks: bland solutions
Wet dressings: bland solutions
Tyrothricin locally
Sulfonamides orally
Penicillin parenterally
Powdered blood cells
Débridement of gangrenous tissue
Amputation of digit
Amputation of limb

treatment is prevention. It is still rather disquieting that more than 50 per cent of the ulceration and gangrene seen in chronic occlusive peripheral arterial disease is initiated by minor avoidable injury, burns from hot-

water bottles and electric pads or other well-intentioned but misguided local therapy. Application to ischemic extremities of strong antiseptics, corn cures, keratolytic agents, irritating ointments and solutions is strongly contraindicated. To remove surgically an ingrown toenail, corn or callus from an ischemic foot is to invite disaster. All patients with ischemic extremities should be instructed in the care of their feet and the avoidance of all minor, as well as major, injuries.

The patient who has gangrene or ulceration is best treated in a hospital. The extremity should be kept at a level with the hip and neither elevated nor dependent. Where gangrene or ulceration is present, infection is also present and use of antibiotics may be of considerable value. Wet dressings of tyrothricin solution (0.05 per cent) may be used on infected ulcers. The use of warm soaks in boric acid solution or 1 to 9,000 or weaker solution of potassium permanganate and the use of warm but never hot wet dressings may facilitate drainage and hasten sloughing. Ointments are usually of little value. When ulcers are clean but indolent, powdered blood cells may expedite healing. Gangrenous tissue may be debrided but only after it is well demarcated and has begun to separate spontaneously. In recent years more amputations of partially gangrenous toes have been carried out successfully. The surgeon should wait until signs of infection have disappeared from the site chosen for the incision and the wound should be closed loosely. Parenteral antibiotic therapy before and after amputation has been of considerable help in combating infection and promoting healing. However, there is always a risk of nonhealing, particularly in arteriosclerosis obliterans.

When gangrene extends into the foot, conservative treatment is of little value and amputation of the leg will be necessary. The transmetatarsal amputation rarely leaves a useful foot. The sites of election for amputation are through the midcalf region and through the lower third of the thigh. The best test for selection between these two sites from the standpoint of adequacy of circulation below the knee is to make the incision for amputation through the midcalf without a tourniquet. If free bleeding from muscles is encountered, the amputation can be completed at that site. If there is little bleeding and the muscle is pale, this site should be abandoned, and amputation should be done above the knee where healing will almost always occur even though the occlusion extends into the iliac artery.

In the last few years several new methods of medical treatment have been advocated enthusiastically for chronic occlusive peripheral arterial disease (Table VII).

TABLE VII
Newer Drugs of Questionable or Unproved Value

Ether given intravenously
Histidine and vitamin C
Priscol
Vitamin E
Histamine given intra-arterially

Unfortunately, the results described by the proponents of these methods have not been confirmed. At the Mayo Clinic we have failed to achieve subjective relief or objective evidence of increase in circulation from use of histidine and vitamin C, ether administered intravenously or intra-arterial injections of histamine. The good results reported for vitamin E could not be confirmed by a well-controlled study which was carried out at the New York Post-Graduate Medical School. Priscol or Priscoline (2-benzyl-4, 5-imidazoline hydrochloride) has been shown to be a vasodilating drug, but to date its value in the treatment of occlusive arterial disease is doubtful, and its administration is sometimes attended by disagreeable side reactions. However, it may be worthy of further study and evaluation.

Finally, I should like to make a plea for early diagnosis and institution of adequate active and prophylactic treatment in cases of chronic occlusive peripheral arterial disease. If this is done, much suffering, gangrene, disability and economic loss can be prevented.

SUMMARY

The diagnosis of chronic occlusive disease of the peripheral arteries is not difficult if the physician has a high threshold of suspicion for its presence when patients have pain, ulceration, gangrene, changes in temperature or discoloration in an extremity. The most important physical sign is impairment of pulsations in the peripheral arteries. Postural color changes are a good rough indication of the degree of ischemia. There are two important chronic occlusive peripheral arterial diseases, thromboangiitis obliterans and arteriosclerosis obliterans, and almost always they can be distinguished clinically. The general principles of treatment can be classified under the broad headings of: (1) efforts to arrest the progress of the disease, (2) procedures to produce dilatation of uninvolved arteries and arterioles, (3) efforts to increase circulation by mechanical means, (4) procedures for direct relief of pain, (5) instruction in prophylaxis against injury of ischemic tissues, and (6) treatment of ulceration and gangrene.

American College Health Association News

Are you planning to attend the annual conference of the American College Health Association in Chicago this spring? The dates are May 3, 4, and 5. The universities in the Chicago area are working together to make this one of the outstanding conferences of the Association. The program now in its final form was worked out by our president, Irvin W. Sander, M.D., and the local arrangements committee in a meeting during the Christmas holidays. The local committee members present at the December meeting were: Dr. Yeager, chairman, of Northwestern University; Dr. Ratner of Loyola; Dr. Erskine, chairman of publicity sub-committee, University of Illinois; Dr. Lendum of the professional schools, University of Illinois; Dr. Smazo of the University of Illinois, Urbana campus; Dr. Lauder of the University of Illinois, Urbana campus; Dr. Mihalak of the University of Illinois, Urbana campus.

It is hoped that many college health nurses will attend the meeting. Arrangements have been made for a special luncheon and program. Because of differences in health problems of large and small colleges and universities, two panel discussions have been planned, one for colleges with an enrollment under 2,500 students, and the other for colleges with an enrollment over 2,500 students.

An entire morning will be devoted to a symposium on mental health with the presentation of several papers followed by a general discussion of problems posed by these papers. In another session specific diseases limiting student performance will be presented by experts.

It is our expectation that you will receive a tentative program with a card for hotel reservations within a month.

* * * * *

The 27th annual meeting of the Ohio College Health Association will be held on April 6 and 7 at Columbus, Ohio. The Nurses' Section will meet at the same time. The officers are: president, Ted Allenbach, M.D., Ohio State University; vice-president, Max L. Durfee, M.D., Miami University; and secretary-treasurer, Wm. T. Palchanis, M.D., Ohio State University.

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Howard W. Reed, M.D., of the University of Florida has resigned as director of the Health Service and as a member of the university staff.

The Surgical Treatment of Convulsive Disorders*

Leonard A. Titrud, M.D.

Minneapolis, Minnesota

EPILEPSY is the symptom-complex produced by irritation of the brain. In some of the numerous convulsive states, there is no demonstrable defect in the cerebral tissue. Other individuals will have brain tumors, abscesses, or scars which serve as disturbing lesions. Medical management will prevent epileptic attacks in most patients, but surgical treatment should be considered for the uncontrollable seizures which begin in the region of cortical scars, as well as for intracranial tumor, hematomas and abscesses. If convulsions are permitted to continue, cerebral tissue injury from anoxia or petechial hemorrhages will result in gliosis. This constant destruction of brain tissue with cicatricial healing not only perpetuates the epileptic state but produces intellectual and personality deterioration.

There are a multitude of processes that account for focal epilepsy, such as: abscesses; calcified lesions; cortical cysts; cortical scars from injury, hemorrhage, anoxia, or healed infectious processes; depressed skull fractures; subdural hematomas or hydromas; tumors; and vascular anomalies. The epileptogenic foci are not in these areas which are devoid of nerve cells but are located in the adjacent viable cerebral tissue. Such an irritative focus tends to remain constant in position with the passage of time.

Transient epilepsy is not uncommon during the acute phase of a severe brain injury; and the convulsive state usually subsides during recovery. Most of the persisting posttraumatic seizures develop within two years of the head injury but attacks may begin to make their first appearance years later. Not infrequently, patients may recover satisfactorily from a severe brain trauma without symptoms although ventricular air x-ray studies demonstrate appreciable internal hydrocephalus because of brain atrophy. Similarly, after marked cerebral injury, the majority of individuals have abnormal electroencephalogram patterns although no epileptic attacks have occurred. Such persons possess a definite tendency to develop convulsions.

Focal epilepsy may usually be localized by historical description or clinical evidence derived from the physical and neurological examinations, electroencephalogram, and the skull and ventricular air x-ray studies. The aura of the attack serves as one of the best localizing factors. The electroencephalogram pattern tends to be that of slow waves and delta activity over the injured brain.

Paroxysmal sharp and spike waves appear over the epileptogenic focus. This focal activity may be accentuated by intravenous metrazol administration; hyperventilation; increased hydration of the patient with the aid of pitresin; or conducting the examination during sleep. It is desirable that the patient receive no anticonvulsant medication before the electroencephalogram examination or the craniotomy.

Cortical excision of the epileptogenic focus should be done when this area has been localized by the various examinations. The operation is carried out with use of local anesthesia and premedication of codeine or morphine sulphate so as not to dampen cortical excitation. Therefore, other sedatives should not be employed. The patient must be draped so that an experienced observer may have an adequate view of any convulsive or involuntary movements. If the physical and emotional state of the patient permits, the entire craniotomy is done during the one procedure. Otherwise, a preliminary operation for the reflection of the osteoplastic cranial flap may be done under general anesthesia; so that a number of days later, the cerebral exposure may be done quickly with the use of only local anesthesia.

The osteoplastic flap as well as the dura must be reflected carefully to protect the brain because of the occasional adherent meningocerebral scar. The dura about the middle meningeal arterial branches must be injected to reduce pain. The abnormal lesion of the cortex may be very apparent such as a definite scar; or perhaps areas of microgyria that may be infolded in the sulci and difficult to see. The suspected and exposed cortex must be systematically searched by the electrodes which are placed in contact with the brain so as to record the neuronal discharges. These electrodes are fixed in a holder during the electrocortigraphy. It may be necessary to apply weak electrical stimulation to activate the cortex. Metrazol is not especially desirable because a major seizure may be induced. After the cortex about the fissure of Rolando has been stimulated, greater current may be used elsewhere. During this period of time, the patient is observed for the development of an attack similar to one of those from which he suffered. When the responsible area has been located precisely, it is excised with sharp dissection down into the white matter. It is preferable not to enter the ventricle. Oxycel or fibrin foam will help in securing a completely dry field. The dura is sutured and the entire wound is closed. It is imperative that a complete dural closure be obtained and desirable that no large bone opening

*Presented before the Sixth International Congress of Pediatrics at Zurich, Switzerland, July 26, 1950.

remain. If the dura is insufficient, a satisfactory graft may be obtained from the pericranium; and a tantalum plate may be used to repair a bone defect. Postoperatively, the patient should be placed on anticonvulsant medication, phenobarbital or dilantin being ordinarily used.

More than half of the individuals having either the epileptogenic areas of meningocortical scar or cerebral cicatrix excised have obtained satisfactory relief from seizures. About half of the remaining patients are improved. Anticonvulsant medication such as phenobarbital must be administered for one or two years post-

operatively and then may be gradually withdrawn, if seizures do not recur.

Unfortunately, cicatrix and cortical excision is limited to those having focal epilepsy and does not offer benefit when cerebral disturbance is more widely distributed. However, there is no reason why cortical extirpation cannot be gainfully employed for each of a few distinctly epileptogenic foci in one individual. Surgical therapy has a definite place in the care of the epileptic patient, and each patient who suffers a convulsive disorder must be carefully studied as a candidate for this treatment.

Meet Our Contributors

RAY C. ANDERSON received his medical degree from the University of Minnesota in 1946, now serves as assistant director of the Dight Institute at the university and as a fellow in the department of pediatrics. He is a member of the Genetics Society of America, American Society of Human Genetics, Sigma Xi, Alpha Omega Alpha. He was with the Atomic Bomb Commission in Hiroshima and Nagasaki from 1947 to 1949 working with a group studying genetic effects of radiation on humans.

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PAUL M. BANCROFT, a graduate of the University of Nebraska medical school in 1935, specializes in pediatrics, is a staff member of the Memorial Hospital and Lincoln General Hospital of Lincoln, Nebraska, and the Children's Memorial Hospital of Omaha. He is a member of the A.M.A., county and state medical societies, Nebraska Pediatric Society, Northwestern Pediatric Society, the American Interprofessional Institute, Society of American Bacteriologists and the Lincoln Pathology Club.

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NELSON W. BARKER, University of Chicago medical school, 1925, specializes in internal medicine, heads the section in medicine at the Mayo Clinic, is associate professor of medicine at the Mayo Foundation graduate school. He is a fellow of the American College of Physicians, a diplomate of the American Board of Internal Medicine, and a member of the Minnesota Society for Internal Medicine, American Heart Association, Central Society for Clinical Research, American Society for Study of Arteriosclerosis, A.M.A., and the Minnesota State Medical Association.

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RAYMOND JOSEPH DITTRICH, a graduate of the University of Minnesota, 1922, specializes in orthopedic surgery in Duluth. He is a diplomate of the American Board of Orthopedic Surgery, and holds membership in the St. Louis County Medical Society, Minnesota State Medical Association, A.M.A., and the American Academy of Orthopedic Surgeons.

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FREDRIC B. FAUST was graduated from Temple University medical school in 1932, took an internship at Philadelphia General hospital, served on the staff of Methodist Hospital in Philadelphia from 1937 to 1948, is now associated with the Payne-

Shotwell Foundation in Littlefield, Texas, as a specialist in cardiology. He is a member of county and state medical societies, a fellow of the A.M.A., and an associate F.A.C.P. He is the author of a number of medical articles in state and national journals.

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ROBERT S. GRANT is a graduate of Marquette University medical school in 1943, and took graduate work at Washington University, at St. Louis Children's Hospital and at the University of Louisville. He specializes in pediatrics in Lincoln, Nebraska, and serves on the staffs of Bryan Memorial Hospital, Lincoln General Hospital, and St. Elizabeth's Hospital. He is a member of the Nebraska Pediatric Society and the Lancaster County Medical Society.

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WILLIAM BROWN STROMME was graduated from the University of Minnesota medical school in the class of 1939, took graduate work at Cornell University Medical Center in New York, now specializes in obstetrics and gynecology in Minneapolis and serves on the staff of Northwestern and Swedish hospitals. He is a fellow of the American College of Surgeons, and a member of county and state medical societies, Minnesota Society of Obstetricians and Gynecologists, Central Association of Obstetricians and Gynecologists, Alpha Omega Alpha, and the A.M.A.

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FRANK H. TANNER is a graduate of the University of Nebraska college of medicine in 1938, took graduate work in pathology at that school and at the Mayo Foundation in Rochester. He is pathologist and director of laboratories at the Lincoln Hospital, consultant in pathology at the V. A. hospital, assistant professor of pathology at the University of Nebraska college of dentistry, all in Lincoln, Nebraska. He is a member of county and state medical societies, A.M.A., Alpha Omega Alpha, College of American Pathologists, and American Society of Clinical Pathologists.

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OWEN HARDING WANGENSTEEN is well known to the readers of JOURNAL-LANCET for the several articles on surgery which have appeared on our pages. Dr. Wangenstein is a graduate of the University of Minnesota medical school, head of the department of surgery at that school, is a member of numerous surgical and medical societies and has won numerous honors and awards for his service to medicine.

Veratrum Viride in the Treatment of Essential Hypertension

A Report of 40 Cases

Fredric B. Faust, M.D.*

Littlefield, Texas

SEVERAL problems are at once apparent in seeking the evaluation of any drug therapy in essential hypertension.

Reduction of blood pressure. Medical authorities^{1,2,3} feel that reduction of blood pressure is the essential aim of treatment. An interpretation of such reductions in blood pressure, however, can be made only under controlled observations. Adequate provision must be made for the lability of blood pressure among hypertensive persons. Evaluation of single observations of blood pressure are subject to considerable error, since there may be fluctuations in blood pressure without therapy of any kind.

The blood pressure in our series of cases was determined by the methods advocated by the American Heart Association. No less than three separate readings were made with the patient at rest during any one recorded observation. By this means basal blood pressure levels were recorded in every case and such factors as emotional tension or disturbance were reduced to a tenable minimum.

Reversal or arrest of clinical signs and symptoms. The criteria of effectiveness of the hypotensive agent should reveal a reversal or arrest of clinical signs and symptoms. An interpretation of generalized symptomatic improvement of the patient may not suffice to establish a claim for successful treatment of essential hypertension since, in many cases, this can be obtained by suggestion or even placebos. Reduction of pulmonary congestion, as observed in roentgenograms of the chest, reversal of electrocardiographic inverted T waves toward normal, as well as improvement in the ocular findings, we believe to be definite evidence of symptomatic improvement.

Our knowledge of the action of veratrum viride on blood pressure was gained largely from the reports of Freis,⁴ Freis and Stanton,⁵ Wilkins and associates^{6,7} and Hite.⁸ These investigators noted a significant reduction in both systolic and diastolic blood pressure following intensive veratrum therapy, together with definite subjective improvement of the patient. In the study reported herewith, veratrum viride biologically standardized as the whole-powdered drug was administered to 40 patients and the total effects of the drug observed. The results, in general, confirm the observation of the original workers.

METHODS

Selection of patients. Forty ambulatory patients with sustained hypertension, ranging in age from 25 to 78 years, were observed. A diagnosis of essential hypertension, with a detailed history and complete physical examination in each case, was confirmed by two investigators. Urinalysis, urine concentrations and intravenous pyelography were used to evaluate renal function. Cardiac studies included electrocardiograms and roentgenologic examinations. Two patients previously digitalized were maintained on digitalis and mercurial diuretics during this study. In one patient (A.J.H.) a cold pressor test, according to the method of Hines and Brown,⁹ was done. For purposes of analysis, the results were divided into (1) patients exhibiting side-reactions, (2) patients under 50 years of age, (3) patients with high systolic blood pressures, (4) patients with high diastolic blood pressure, and (5) patients with cardiac decompensation.

Medication and adjustment of dosage. All of the patients received whole-powdered veratrum viride biologically standardized (Vertavis®),† each tablet containing 10 Craw Units. The Craw Unit is defined as the amount of Reference Standard veratrum viride that will cause cardiac arrest in the test animal, *Daphnia magna*.

In the earlier phases of our investigation we attempted to find the effective dose of Vertavis by administering the drug every two hours until a substantial fall in blood pressure was recorded. Five cases illustrate the effects obtained by administering Vertavis in such a manner (figure 1). The method, however, was abandoned in favor of the dosage schedule suggested by Freis and associates,^{5,6} since it was rather difficult to apply in general practice.

Due to the prolonged action of the drug, Vertavis should be administered during morning and evening hours, the first dose in the morning and the first dose in the evening separated by 12-hour intervals; not more than one tablet is given in any one hour. Thus the initial dose consists of 10 Craw Units twice daily, at 7 a.m. and 7 p.m., for one week. The response is observed and, if necessary, the dosage is increased at weekly intervals by adding 10 Craw Units to either the morning or evening dose; 30 Craw Units are given in the

*From the Payne-Shotwell Foundation, Littlefield, Texas.

†Manufactured by Irwin, Neisler & Company, Decatur, Illinois.

second week; 40 Craw Units in the third week, etc. For example, a dose of 40 Craw Units is obtained by giving 10 Craw Units at 7 and 8 a.m. and at 7 and 8 p.m. To avoid epigastric distress the patient is advised to avoid taking the tablets on an empty stomach.

As described by other investigators, the therapeutic dose of Vertavis is unrelated to the age of the patient, the severity of the disease, the elevation of blood pressure or the duration of the hypertension. In this series of patients, the dose varied from 20 to 60 Craw Units daily, most cases responding to a dose of 20 Craw Units daily. In all cases, dosage was given without interruption. In the beginning of our study, we found that insignificant responses were due, in a large measure, to failure of the patient to sustain the dosage prescribed. For this reason, as the study progressed, we individualized the dosage by giving strict instructions to each new patient to obviate this source of error.

RESULTS

Cold pressor test. We did not undertake a study of vascular hyperactivity in hypertension, as Postelli and Palmer¹⁰ have recently shown that pressor tests do not reveal particular types of hypertension, nor are they reliable guides to prognosis. One case (A.J.H.), however, seemed of interest since observation of the patient indicated a sustained hypertension with relatively fixed blood pressure. The elevation of blood pressure in this case was not particularly significant, although the basal diastolic blood pressure level was never recorded below

100 mm. of mercury. These observations were made with the patient at rest from 20 to 60 minutes. We employed the cold pressor test as described by Hines and Brown and noted the following changes:

Basal blood pressure level	174/100
Cold pressor response (immediate)	180/100
Cold pressor response (in 20 minutes)	180/110

Following therapy with Vertavis for one month:

Basal blood pressure level	144/90
Cold pressor response (immediate)	153/90
Cold pressor response (in 20 minutes)	130/78

This case illustrates the degree of variability to pressor tests since the response is far less than that commonly observed with normotensive individuals. Moreover, the existing vasomotor tone is impossible to evaluate since stimuli following veratrum therapy, instead of increasing blood pressure, actually lowered the blood pressure. This case demonstrates what is well known from innumerable observations: that the blood pressure of patients with essential hypertension, as well as the response to drug therapy, is quite variable.

Blood pressure response. Changes in blood pressure, together with length of treatment and dosage are given in the accompanying tables and charts. In general, blood pressure response was prompt in the youthful group and was notably slower in the group of patients with high diastolic pressure. As to be expected, the higher the initial systolic pressure, the greater the fall in blood pressure induced by Vertavis (figures 2 and 3).

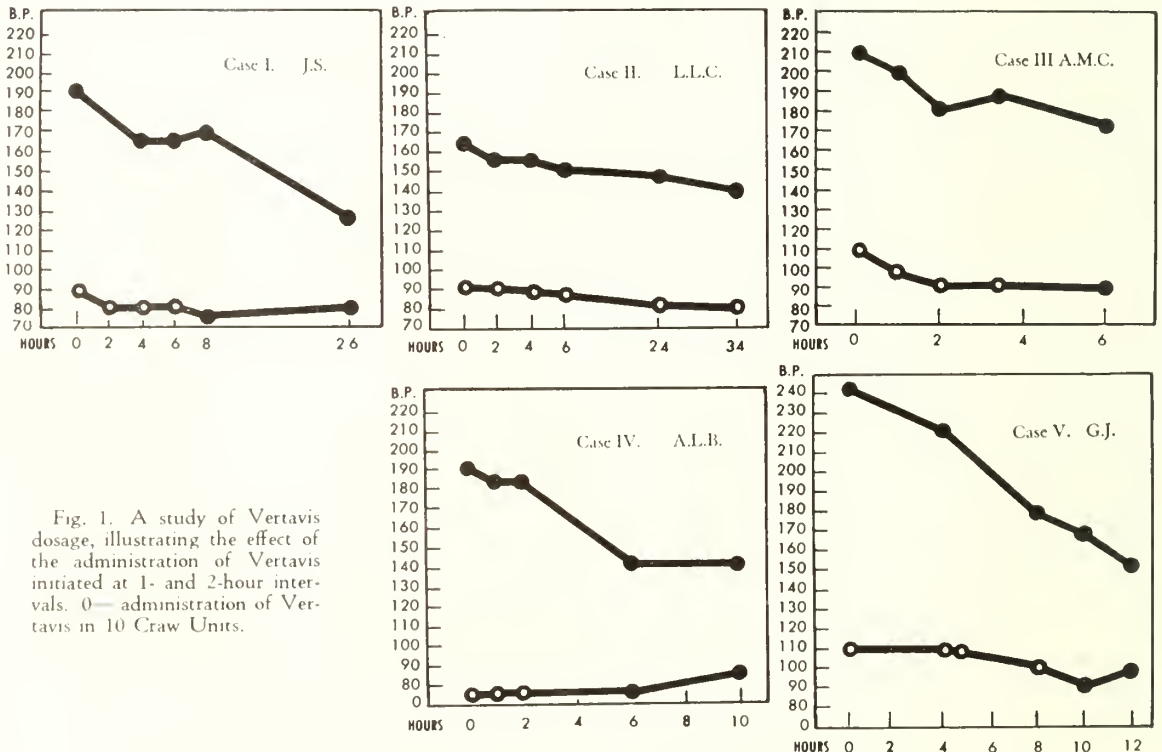


Fig. 1. A study of Vertavis dosage, illustrating the effect of the administration of Vertavis initiated at 1- and 2-hour intervals. 0—administration of Vertavis in 10 Craw Units.

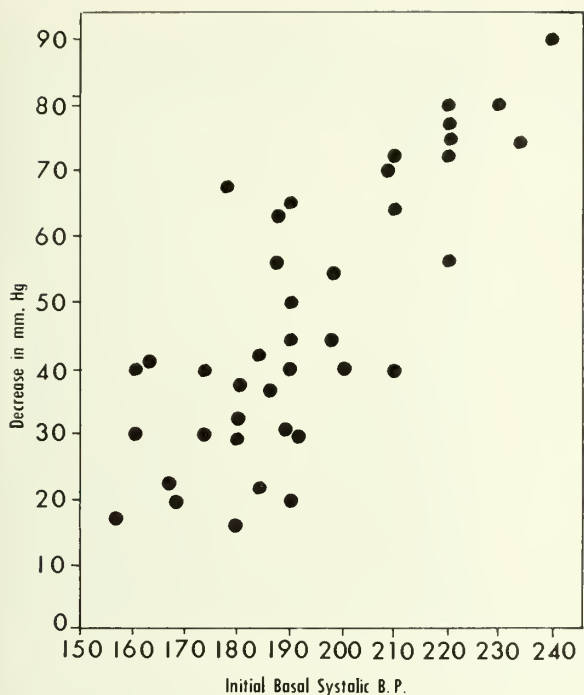


Fig. 2. Fall in blood pressure induced by Vertavis.

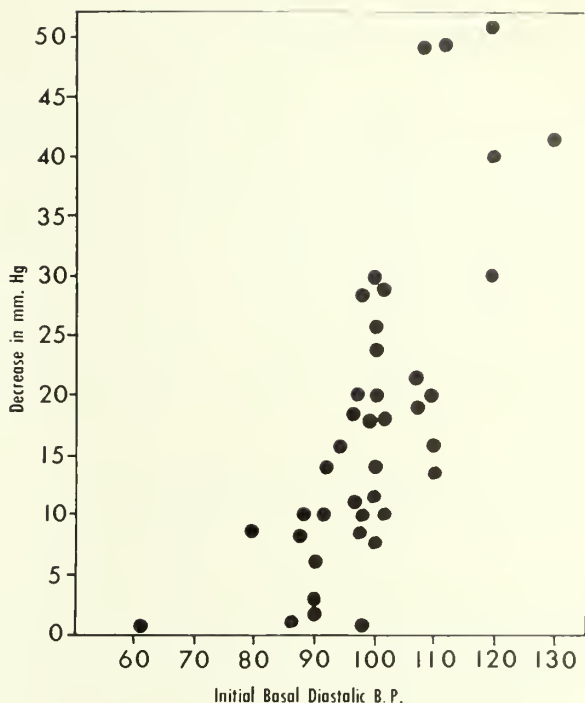


Fig. 3. Fall in blood pressure induced by Vertavis.

TABLE I
Group of Young Hypertensive Patients

Patient	Sex	Age	Basal blood pressure before therapy	Period observed	Daily dose (Craw Units)		Blood pressure after period of therapy
					Initial dose	Final dose	
G.W.G.	M	25	190/92	2 wks.	20	20	146/78
J.G.	M	39	180/90	1 wk.	20	40	148/88
R.D.N.	M	40	234/130	3 mo.	20	40	160/88
B.S.	F	46	230/120	3 mo.	20	40	159/90
A.F.H.	F	48	220/120	6 mo.	20	40	140/80
J.S.S.	F	49	174/100	3 mo.	20	20	134/90
B.	F	48	160/98	1 wk.	20	20	120/78

TABLE II
Patients with High Diastolic Blood Pressure

Patient	Sex	Age	Basal blood pressure before therapy	Period observed	Daily dose (Craw Units)		Blood pressure after period of therapy
					Initial dose	Final dose	
Mc	F	62	220/120	3 mo.	20	40	164/66
B.F.H.	M	64	220/110	5 mo.	20	30	145/90
T.M.Y.	M	65	186/110	2 wks.	20	20	164/94
G.W.G.	F	71	180/108	3 mo.	20	20	150/90
C.E.P.	M	72	168/108	8 mo.	20	60	148/86
K.L.	F	65	210/100	7 mo.	20	40	146/90
G.C.P.	F	61	200/100	3 mo.	20	20	160/82
C.F.W.	M	59	188/100	7 mo.	20	40	124/76
G.C.H.	F	55	180/100	5 mo.	20	40	140/82
J.T.C.	F	51	180/100	3 mo.	20	20	164/70

gram following Vertavis therapy. This is typical of those cases showing inverted T waves, as first described by Freis and Stanton (figure 4).

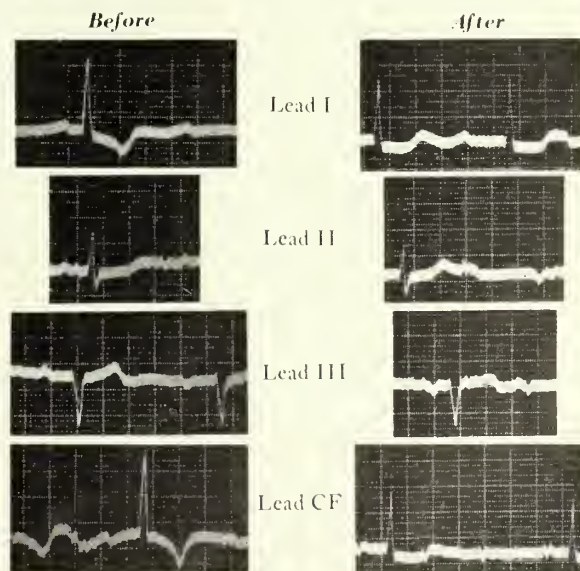


Fig. 4. Electrocardiograms taken before and after Vertavis therapy. J.M.P., aged 67, was first seen with a blood pressure of 220/120. After two months' treatment with Vertavis (40 Craw Units per day), the blood pressure fell to 148/98.

The accompanying tracing shows reversal of left ventricular strain pattern as observed in the electrocardio-

TABLE III
Patients with High Systolic Blood Pressure

Patient	Sex	Age	Basal blood pressure before therapy	Period observed	Daily dose (Craw Units)		Blood pressure after period of therapy
					Initial dose	Final dose	
O.O.B.	F	67	210/98	2 mo.	20	10	140/98
H.W.O.	F	66	198/98	1 mo.	10	10	154/88
M.E.W.	F	66	190/90	1 mo.	20	40	160/84
C.D.R.	M	62	188/88	4 mo.	30	30	130/80
I.T.S.	M	67	186/98	1 mo.	20	20	148/80
C.A.L.	F	59	184/94	6 mo.	20	30	142/78
T.D.	M	63	180/90	1 mo.	20	20	142/90
J.H.	M	75	168/80	1 mo.	20	10	146/72
A.F.J.	F	70	160/98	2 wks.	20	20	120/70
J.S.P.	M	78	180/90	4 mo.	20	40	150/88

TABLE IV
Cardiac Decompensation Associated with Hypertension

Patient	Sex	Age	Basal blood pressure before therapy	Period observed	Daily dose (Craw Units)		Blood pressure after period of therapy
					Initial dose	Final dose	
G.A.L.	M	50	158/100	5 mo.	20	20	140/86
A.L.W.	M	51	160/100	9 mo.	20	10	130/70

Side-reactions. In the following cases, nausea and/or vomiting were noted with Vertavis therapy.

TABLE V
Patients Exhibiting Side-Reactions

Patient	Sex	Age	Basal blood pressure before therapy	Period observed	Daily dose (Craw Units)		Blood pressure after period of therapy
					Initial dose	Final dose	
J.R.	M	68	198/100	1 mo.	20	10	144/90
R.A.C.	F	69	220/100	1 mo.	30	10	142/74
J.S.	M	67	210/110	1 mo.	20	20	138/60
R.A.K.	F	66	178/110	3 mo.	20	20	drug discontinued

Both patients J.R. and R.A.C. recovered from simple nausea and vomiting and continued with reduced dosage to display the results recorded. J.S. violated his dosage schedule, taking at times nearly twice the recommended dosage. Persistent vomiting was encountered; he was correctly informed and properly warned, after which he continued with 20 Craw Units daily, revealing good results. Patient R.A.K. developed marked nausea, even in the presence of subsequently adjusted dosage. This is the only case in our series in which we deemed the drug unsatisfactory and discontinued its use.

COMMENT

An essential part of treatment is a complete evaluation of the person with hypertension, including inquiry and study into personality and emotional problems of the patient. The relationship between blood pressure and the emotions has long been established. Unques-

tionably, the repression of chronic fear or rage eventually manifests itself in the circulatory system. Furthermore, in any one patient, environmental change or human tragedy in ordinary living may be reflected in millimeters of mercury.

The temptation is to seek a cardinal sign for each disease. In hypertension, however, more than blood pressure is involved; the problem is not entirely a matter of hemodynamics. For that reason, we are inclined to describe hypertension as "hyperpiesis," a term expressing increased tension including increased blood pressure, applied by Albutt at the turn of the century. We reintroduce this term, not to be pedantic, but to stress an important phase in our medical thinking. Increased arterial tension may be explained in terms of increased peripheral resistance. On the other hand, secondary anxiety and the continuing stress and strain of modern living are important factors which may defeat therapeutic attempts to reduce arterial tension. We have observed increases in blood pressure in some patients that can be directly attributable to emotional stress, in spite of good therapeutic results with Vertavis. In these patients, more than the blood pressure must be treated until the patient can be adequately compensated. In this particular, the general medical practitioner, with his insight into family and personality problems, may be eminently qualified.

As a therapeutic measure, we have found Veratrum Viride to be a useful hypotensive agent. The clinical response obtained in ambulatory patients with the careful administration of Vertavis is encouraging; in our hands the drug exhibits a wide margin of safety.

CONCLUSIONS

- Forty cases of essential hypertension were treated up to a period of nine months with veratrum viride biologically standardized as the whole-powdered drug.
- In the majority of cases, significant lowering of both systolic and diastolic blood pressure was observed.
- Side-reactions consisting of nausea and vomiting were noted in five cases. Fine adjustment and control of dosage minimized these reactions in four of the five cases; in one patient the drug had to be discontinued.
- In general, agreement was found with Freis that "veratrum viride has produced the most marked reduction of blood pressure in the greatest number of cases."

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Dr. George E. Fahr — Great Physician and Teacher Par Excellence

An address at a dinner at the Campus Club on Wednesday, June 14, 1950, honoring Dr. and Mrs. George E. Fahr on the occasion of Dr. Fahr's retirement from the faculty of the medical school of the University of Minnesota.

Owen H. Wangenstein, M.D.*
Minneapolis, Minnesota



LET US turn back the clock to 1921, the year Dr. Fahr became a member of the faculty of the Medical School. The late Dr. Lotus Delta Coffman was inaugurated as the University's president. He was a man of great capacity who grew with the University; his attitudes on education did much to bring increased recognition to state universities. Dr. Elias Potter Lyon was dean and I think it would be fair to label him the true founder of our school. He was a kindly man with unusual vision, flanked by a persistence of purpose which was not readily detectable on the surface. It is also probably correct to state that he was not as fully appreciated in his day, by the profession as well as the faculty, as he might have been. He was truly the patient, tolerant, far-seeing man of the school. Dr. Guy Stanton Ford was dean of the Graduate School, a man of unusual discernment who seemed to catch the scent of a promising scholar anywhere in the University. Neither Medical or Graduate School had then yet made any important impact upon education in this country.

The University Hospital had been built less than ten years before, and it had a total occupancy of less than 200 beds. Dr. Louis B. Baldwin, a red-faced dynamo of kinetic energy for rigid economy, was its superintendent. It has been said that he once attended a meeting of the American Hospital Association and announced that the *per diem* of the hospital was the lowest in the country. How times have changed since then! A veritable revolution in hospital care has been brought about in the intervening years, and today the *per diem* rate for care in the same hospital more likely belongs to a different category of institutions in the country—a circumstance which does not embarrass anyone anymore, for we have learned to appreciate that one never gets anything for nothing; moreover, we have come to know that the peo-

ple of Minnesota are proud of the University and its Medical School. They expect those who direct the destinies of its medical institutions to provide its students with a satisfactory and stimulating program of instruction, and to bring to every patient under the care of its staff the very best that medical science can offer. That attitude was not yet apparent in the clinical teaching of 1921 in the University's medical school. It remained for persons like George Fahr to make it so.

Dr. Leonard G. Rowntree, who had been the professor of medicine, had left to assume an important post at Rochester in the Mayo Foundation. In that new assignment he veritably blossomed with fertile ideas. Dr. S. Marx White, counsellor of many and master of the art of physical examination, was professor of medicine. Dean Harold S. Diehl was our hospital pathologist and already gave ample evidence of that breadth of view which has earned him national recognition for wise and capable medical leadership. I was a senior medical student in the first class that George Fahr taught at Minnesota.

In 1917 when President George Edgar Vincent left to head the educational program at the Rockefeller Institute, he urged investigation of the Medical School to see why it was in the doldrums. Under the presidency of Marion Leroy Burton, such a commission was appointed consisting of three well-known leaders in medicine of that day—Drs. Frank Billings of Chicago, Victor Vaughn of Ann Arbor, and J. M. T. Finney of Baltimore—who recommended improvement of the physical facilities of the Medical School, and the appointment of full-time teachers in the clinical years.

It perhaps is not out of place to remark here that it was the coming of President Vincent that marked the beginning of the upward swing of this University. He reorganized the University and brought to it within a few years a list of outstanding scholars whose names would have done honor to the faculty rolls of any uni-

*From the Department of Surgery of the University of Minnesota.

versity. Among others were Lotus Delta Coffman, Guy Stanton Ford, and Walter Castella Coffey, all of whom subsequently became presidents of this University, adding luster to its and their own names. And to the Medical School came Elias Potter Lyon, Clarence Martin Jackson, and Richard Everingham Scammon—men who helped build strongly for the future of the School. Elexious Thomas Bell, who too was to leave his mark upon the School, had come during the final year of President Northrop's administration (1910), first as an anatomist, later transferring to the Department of Pathology.

In addition, affiliation of the Mayo Foundation with the University was consummated during Vincent's presidency, a relationship which has been reciprocally important to both component parts of the Medical Graduate School. Nor have all the potential advantages to both of these divisions, the University or the commonwealth of Minnesota, been eked out yet through the affiliation. All good marriages are made in heaven but have to be lived on earth; some even descend to a lower level. There are few marriages, even those which are in effect in name only, in which there are not some benefits to both contracting parties. The only true gift, however, in marriage or in any other important relationship in life is a part of oneself, as every receiver learns to know.

When one reflects that President Vincent's tenure here was only six years, one may well ask: Has a development of equal magnitude ever been observed in so short a period of time in any American university? Vision, an appreciation of scholarship, as well as an ability to recognize scholars, courage, and a capacity to translate dreams into reality were a part of his intellectual equipment. President Vincent has left a record of accomplishment of which this University and the state of Minnesota will always be proud. In fact, the University and the commonwealth of Minnesota have been very fortunate in their choice of the presidents which have guided the destiny of the University. The University's list of presidents is a stately array of names: Folwell, Northrop, Vincent, Burton, Coffman, Ford, Coffey, and Morrill! American universities are singularly dependent upon leadership which emanates from the office of president. Minnesota's presidents have contributed importantly to the advancement of education here, and in turn too, on the national scene. The University of the erstwhile frontier Gopher Prairie State is no longer concerned solely with the dissemination of knowledge. It has begun to assume the responsible role of leadership on a few of the many frontiers in the conflict which knowledge is waging against ignorance.

Whereas some may think that any action of the Board of Regents in a state-supported University represents essentially merely approval of the wishes of the president, anyone, having any acquaintance with the time and thought devoted by regents to problems of the University, knows how contrary to fact such a suggestion is. Anyone who has known how much of the waking hours of Fred B. Snyder's life has been concerned with the University, knows that he has veritably lived for the

school for almost half a century. And when graduates of the Medical School think of regents, who have given liberally of their time and best thought to the University, they naturally think of Dr. William J. Mayo who served the University with distinction in that capacity for 32 years. One cannot scan the minutes of the meetings of the Board of Regents for the years covered by his tenure without feeling that Dr. Mayo entertained high hopes for the development of a great medical center on the campus of the University.

THE OUTLOOK OF THE TEACHER

The appointment of Dr. George Fahr may be interpreted, in part, as an attempt of the School to meet the injunction of the investigating committee suggested by President Vincent. And what a boon it was to the students of that day, of which I was one! We had been exposed to excellent teaching in anatomy and pathology by full-time teachers. We had contact with enthusiastic and experienced clinicians in medicine, obstetrics, and surgery. However, we had yet to learn first-hand that clinical medicine in a teaching position could be absorbing enough to occupy all the time of a seasoned clinician.

Here was a newcomer to the staff of the School who was completely absorbed in his subject, and who obviously found real pleasure in imparting information to undergraduates. Medical students, like other youngsters, emulate only that with which they have some personal familiarity. We are all mosaics of what we have admired in other men. No one can mirror that which he has not seen. How important it is, therefore, for medical schools to give considered concern to the choice of its teachers. The teacher must not look upon his assignment as only another task. Actually the students, who are the charges of teachers, are at least as important to the state and nation as are their treasuries. The attitude of the teacher toward his duties is all important.

It is the man who has his heart in what he is about, who gives himself over with all the devotion, energy, enthusiasm, and intelligence that he can muster—that man will succeed at his task. Yes, success at any important assignment demands maximal expenditure of effort, and when a talented person is willing to undergo the vigorous preparation necessary to master his field, and to devote his life, without counting the sacrifice, to enlargement of knowledge in that area—one may count that a well spent life. Yes, such a life is a good life. Does not achievement exact a vow of sacrifice? What if everyone devoted himself to his task with the patient, quiet spirit of resolution, yet of solemn dedication, that a good mother does in the rearing of her children? There will be those who will pity such a man, who has identified joy with labor and say how much of life he has missed. Let them reserve their compassion for someone who may need it, and remember: a consecrated life is a happy life. Joy in the effort is his recompense! Can any man point to a more enduring source of happiness? Let us learn always to ask what is the dominant thread or purpose of a life; the answer to that question will tell us

much concerning any individual. The only truth about a man is revealed by his habits.

As I read the Good Book, I am emboldened to believe that one may reasonably identify heaven with happiness and hell with unhappiness in this life, let alone whatever portent they may have for any life to come. Moreover, I would suggest that one who has found happiness is a good person. Can a man become a great physician or teacher who is not fundamentally a good person? I doubt it.

Many a man suffering from the thralldom of his own anger, jealousy, or pride, unable or unwilling to free himself from that bondage, while pointing an accusing finger at his neighbor, is in reality calling himself to judgment. Is it not the prerogative of every man to become in a measure the creature of his own making? Every man must learn to survive blame and criticism as well as praise. Into every life comes a succession of pleasure and pain, joy and sorrow, blame and praise, boredom and excitement, success and failure. Every man must learn to accept them all with equanimity. From every situation in life, one must go forward. The attainment of emotional maturity is just as important as intellectual growth. Wise is that man who has the fertile imagination and the shrewd sagacity to accept the vexations of disappointments, as well as unkindness or unfriendly acts, with a cool and resigned patience, knowing that another day, a happier mood and better tempers will alter the perspective. It takes a grim courage and a childlike submissiveness, at times, to stand unhurt and with seeming unruffled composure, before provoking irritations. And how often we all find it necessary to admit the weakness of those faithful servants, philosophy and high resolution before the passions and mad furies of life! What is there then to do or say? Each of us, on occasion, must learn to say to himself: stop posing before your small world; life is the great teacher; absorb her lessons and be satisfied; only meekness can show you the way to serenity. And the man who has established harmony within himself finds it easier to be at peace with others. The virtue of a man does not depend upon the nature of another; it comes from within. If amid the dissonant discords of life, one takes occasion frequently to recount those satisfying items which give it enjoyment and meaning in the manner that one rechants the refrain of a song, so too life can assume the quality of a melody.

A person who had suffered much from illness without whimpering said to me recently: "Rewarding experiences can come out of every situation." What a wise person that patient was. No wonder her face reflected the light of heaven.

Life is a stern disciplinarian which demands obedience from us all. The teacher, probably more frequently than others, retreats into the pleasant realm of meditative contemplation where his spirit is refreshed and an inner strength is built. Cultivation of reflection broadens the perspective and helps the teacher to understand better the problem of the student as well as his own.

Yes, I would say that George Fahr's life as a teacher has been a happy one. Look about you, and you will see several men here tonight who credit him with the stimulus that started them upon their own careers in medicine. Can there be greater satisfaction than to have attracted willing disciples anxious to carry on the best tradition of one's profession? Lucky that young man who was fortunate enough to have been George Fahr's house-officer!

Dr. Kerkhof has told us of Dr. Fahr's contributions to electrocardiography, hypertension and knowledge of heart disease. There is only one other item I might add, viz.: the importance of George Fahr's participation in conferences and seminars of those years. It would be fair to say that his fresh point of view and enlivening discussions brought as much enlightenment to some of those faculty interchanges as did his appearance in the school as an undergraduate teacher.

WHAT MAKES A GOOD TEACHER?

On an occasion such as this we might well ask ourselves: what makes a great teacher? The primary considerations are much the same as those that make a successful teacher. A person who is essentially a school-master in my opinion, is rarely a great teacher. The real teacher must have the instincts of a scholar; he must be willing and anxious to pursue knowledge for its own sake; in other words, the acquisition of knowledge becomes for him a pleasant, yes, even an exhilarating pursuit. Moreover, the real scholar is more impressed with how little he knows than puffed up by what he has learned. The true scholar, unlike the epicurean gourmet, never attains a sense of satiety. Hours of constant application may fatigue him, but presently he is refreshed and continues the chase. The true scholar is not a dilettante. He has a serious purpose; he is not merely amused by his occupation however much pleasure he derives from it. Like a good mother, he feels he has a duty as well as a mission in life. Moreover, he has the courage to be himself. No man was ever great by imitation.

Fullness of subject and all it implies in the manner of preparation; fascination with the relentless pushing back of the broad topography of ignorance within the field; willingness and anxiety to communicate all one knows, however little, to others combined with a zealous interest to enlist the aid of eager students and co-workers in the field—these are some of the qualities which stamp the true scholar and great teacher.

There are those who inquire what technique is employed by the successful teacher. There is a certain insincerity in that line of questioning. Successful teaching is not a technique. It is the man, his subject, and his outlook upon life. A good dinner must have its accessories. A good meat course alone would be monotonous, heavy, and unsatisfying to the appetite. So too, the scholar who professes to teach must have some ready interphase information which will lend meaning and understanding to the knowledge which he is trying to impart. Otherwise the instruction may stick in the gullets of the teacher's auditors and not be available for

digestion or assimilation. If the teacher succeeds in communicating something of his own enthusiasm for his subject—that is more important than all the techniques and methods which have been devised to catalyze teaching since the beginning of time. Enthusiasm cannot be feigned; it must be genuine. Even the novice can detect the presence of an alloy in its composition. Let universities be on the lookout for teachers who exhibit real warmth for their subject. They catch and hold the interest of students. Are we not all responsive to demonstrations of unaffected tenderness and sympathy? By such teachers all the best instincts of students are aroused, and the student is driven on to unrelenting study and to become a better man than he otherwise would have been.

All these primary requisites of the teacher, George Fahr has possessed in liberal measure. Fullness of, and warmth for his subject, obvious pleasure in the pursuit of knowledge as well as an eagerness to communicate it—all these and a colorful spontaneity are some of the qualities which have put the imprint of greatness upon George Fahr's teaching. They account in part for the moving influence his teaching has had upon the lives of many of his students, and particularly those who in graduate years had the opportunity to gather with him around the bedside of patients. There it was that we had the opportunity to observe how challenging questions stirred his imagination and how he applied his broad knowledge of physiology to the resolution of difficult clinical manifestations.

RELATIONSHIP BETWEEN TEACHER AND STUDENT

Let teachers remember that the echo of a word of encouragement spoken at the right moment may be heard in the next generation, and that much too often that word is never spoken! Why so sparing with praise or encouragement? If every young man awaited the approbation of his elders before expending the fervor and strength of his energies upon a new discovery, progress would be slowed to a snail-like pace. Men who feel they are on the threshold of a new idea must learn not to be discouraged by want of approval. They must learn to accept both indifference and active opposition without resentment. Bitterness consumes and enslaves; hope is ascendant and ever youthful. The sequential response of the world to a new idea often is: (1) "It is a wild idea"; (2) "It is no good," and (3) when it succeeds, "After all, it is nothing new." It is one of the great arts of life to know when one is on the threshold of a good idea or an unusual opportunity. The wise young man learns early that he must be his own daily source of encouragement. He must learn to know and appreciate whether he is on the scent of something worthwhile. If he has the faith, the self-reliance, and the spirit to believe it is good, what else matters? How much the spirit of a man can add to his stature!

The thoughtful teacher, who has the capacity and the discernment to observe that one of his students has a brilliant idea, and the warmth to unlock his own heart

and communicate encouragement, help, and a sympathetic understanding to the end that the student's work is accelerated, that man belongs to the highest hierarchy of the ministry of teachers and will not lack for graduate students. Nor did George Fahr.

A heart-warming experience comes from a contemplation of the relationship between teacher and student. How is it that the student, who has absorbed all his teacher knows, soon demonstrates the capacity to surpass him? It has and always will be so. Hope for the future of the world rests on this premise. Each succeeding generation clambers up the backs of its predecessors to a higher perspective and sees farther, not because of better vision, but because its lookouts are the peaks built by antecedents. If each generation absorbed all the wisdom of ages past, what a sage people we would be! But much of the lessons of the past is cast aside as having no pertinence for us, and the old precepts have to be relearned.

The admiring youngster listening attentively to his erudite teacher may say to himself: How can anyone know so much? That very same teacher probably says sadly to himself: How little we know; how much there is yet to learn, and how short the time is. The answer to the student's question is that a mixture of interest and work in proper proportions results in a palatable elixir which, when taken to the point of satiety, produces a dream-like state in which all burdens are light and toil becomes pleasure. What anodyne is superior to work? What sedative or soporific can equal it? Has it not been recommended by the Scriptures since Adam and Eve were driven out of the Garden of Eden?

The answer to the teacher's lament over the enormity of our ignorance is, in part of course, the magic compound which he himself has been brewing these many years. But the answer, more satisfying to our understanding, is that his students are seized with the contagion of his own malady: persistent labor at the task of enlarging the sphere of knowledge within their province.

A university is a great deal more than a collection of books as Carlyle defined it. Particularly in the earlier, immature years of a student's life, stimulating and inspiring teachers, who open strange vistas and alert students to new and larger possibilities—such teachers are worth many alcoves of books. Students, teachers, books, laboratories, and buildings to house them—these in proper proportion build the true university. If any is missing, or if there be any serious defect in any of the component ingredients, the university is not the institution it might have been. An institution in which teachers and students create about themselves an atmosphere in which a real interest in productive scholarship is palpable—that institution merits the proud name of *university*. Cultivation of a kindred spirit and interest between faculty and students is necessary to bring about the pervading influence of scholarship in the life of a university. The medieval ideal of a university—*Universitas Magistrorum et Studentium*—was a corporation of teachers and students. In a large university such as ours, I am

certain it is difficult for students at times to escape the impression that their chief functions are to pay tuition fees and pass the examinations! Scholarship dies in a cold atmosphere of indifference and neglect, driving some students to seek predigested intellectual food in sugar-coated pills, even though the medicinal content is only a homeopathic dose; others are repelled by such an atmosphere to the extent that they return to infantile traits and will accept only whatever information can be squeezed through a nipple; some will hold their own heads up and take feedings from a bottle; others exhibit a desire to be completely supine and to be suckled like a babe at his mother's breast. Yes, and others rebel by affecting a catatonic attitude toward learning, and appear to be beating a retreat from life in which they seek the blissful security of prenatal life. Society certainly would be the gainer if those exhibiting such aberrant behavior were fortunate enough to have their wish granted.

Not spoonfeeding, but the tender, warm care of the hothouse is necessary for the cultivation of scholarship. Scholarship is not something that can be grown by the acre. Citizens or proud fathers can not be assured by any university that their sons will become creative scholars. Citizens, commonwealths, and universities must combine, cooperate, and league together to bring about in the various colleges of a university an atmosphere congenial for the development of scholarship. From there on, it is all in the laps of the gods. And as in planting, seed, soil, cultivation, and climate determine what the yield will be.

Universities must respond to the needs and aspirations of the people. For centuries they have been the nursery of the liberal arts and the mother of the sciences and the professions. When provincial universities come to dot the strategic geographic areas of the world, as one day they must if internationalism is to supersede nationalism, let it be hoped that all its inhabitants will see that their fundamental desires are very much the same; that their collective security will be greater through agreement and cooperation than through conflict and war. In whose world is there peace and security now? Certainly in none known to any of us.

International universities can become important agents of good-will. Sympathy, understanding, and goodwill constitute effective instruments in any negotiations, whether between nations or individuals. A few international universities located in strategic geographic areas throughout the world with free interchange of scholars could make an important contribution to the maintenance of peace throughout the world. Individuals, states and nations need to consider the importance of that little word, *if*. It is the basis of every good contractual arrangement. As Shakespeare said: "If, is the only Peacemaker."

THE LECTURE HALL REVISITED

A few days ago, Dr. Fahr and I drove to Hastings to see the laboratories which his new boss, Dr. Ralph Rossen, Commissioner of Mental Health, has installed there. It was a delightful warm Saturday afternoon, and as George Fahr waxed eloquent in delineating some of his recent research interests, the calendar of years rolled quickly backward in my mind. We were both young again. Yes, the ghost of earlier years follows us through life. Such absorption in his subject! Such eager enthusiasm to tell all, accompanied by periodic energetic gesticulations familiar to all of you, which caused me occasionally to have some concern over whether the steering wheel was being properly supervised—oh, it was enchanting! I was back in the classroom on an afternoon in the late summer of 1921. It was the same ebullient George Fahr literally effervescing with the fullness of his subject—yes, oozing information from every pore, emphasizing the great importance of understanding disturbances in function in order to comprehend the manifestations of disease. It was the echo of the voice of Krehl from an earlier day.

After making the rounds of classroom lectures, from one department to another as was the custom of that day, it was refreshing to hear George Fahr. It was like opening the windows in a small smoke-filled room. Yes, he captivated us; over some he threw a spell and transported them to the magic Island of Diligent Inquiry where restive souls appease their hunger by ceaseless labor in the quarry of Precise and Hard-Found Information, hoping that someday they too may find a gem.

It would be nice to continue in this reverie, but I must return to reality. A university is fortunate which contains on its faculty-rolls a few teachers of the stamp of George Fahr. Yes, there should be more of them, but how? The way to have a rich harvest is to have a full heart. Let us express gratitude for *one* George Fahr, and the complex pattern of composite antecedents, internal drives, associates and environment which made him as he is—also for the circumstances which brought him to us.

It is my pleasure to announce that former interns, fellows, colleagues, and friends of George Fahr have come forward with a substantial gift to the Minnesota Medical Foundation to sponsor an annual George E. Fahr Lectureship in Cardiology in the Medical School in perpetuity, to typify the broad interests of Dr. Fahr in this large, interesting, and exciting domain of medicine. And as students gather, in years to come on this campus, to hear of exploits in cardiology, under the aegis of this lectureship, let them reflect for a moment upon the work of George E. Fahr, great physician and teacher *par excellence*. He has left his mark upon our School.

Book Reviews

Chemistry, Visualized and Applied, by ARMAND JOSEPH COURCHAINE. 687 pages. New York: G. P. Putnam Sons, 1950. \$5.50.

This is a textbook written primarily for a course in chemistry for students of nursing. There are three general topics taken up, inorganic chemistry, organic chemistry, and biological chemistry, and each of these is covered in a remarkably comprehensive manner. The material is visualized as much as possible by the liberal use of pictures, diagrams, and clearly written formulas and equations. In addition nearly every new concept is substantiated with practical examples with which the student may already be familiar. In this way the author achieves one of his chief aims "to demonstrate that chemistry is not as difficult a science as many students are inclined to believe."

This book should make an excellent text for a course varying in length from 40 to 100 hours. Also it can be used not only for courses in which there is no chemistry prerequisite but for courses in which the student has already had some inorganic chemistry. Although its emphasis is on chemistry as applied to health and disease, the book can also be recommended as a text for a general introductory or survey course in undergraduate college chemistry.

C. W. C.

Immortal Magyar, by FRANK G. SLAUGHTER, M.D. New York, N. Y.: Henry Schuman, 1950. 211 pages. \$3.50.

Immortal Magyar, the story of Ignaz Semmelweis, is the latest volume in the Life of Science Library, a series of books dealing with those scientists whose ideas and discoveries have contributed most to the advancement of man and society.

In 1847, nearly two decades before Joseph Lister made his historic address to the British Medical Association on the antiseptic practice of surgery, Ignaz Semmelweis, as a brilliant but obscure physician in Vienna, announced that the dread child-bed fever was spread by the obstetricians themselves, proceeding with unwashed hands from one infected patient to another. This concept was denounced in theory by his professional colleagues and in practice by the students and interns who objected to Semmelweis's regimen of washing the hands in a solution of chlorinated lime between examinations. In the end, of course, his concepts were accepted and his determination vindicated in the sharp drop in maternal mortality in Viennese hospitals.

Semmelweis's struggle for acceptance, his private life as a scientist and practitioner of medicine, the happiness he found in marriage and the sorrow caused by the tragic loss of his children are told dramatically and sympathetically.

V. L. D.

Transactions of the American Goiter Association, 1949. Springfield, Illinois: Charles C. Thomas, 1950. \$10.50.

The proceedings of the meeting in 1949 held in Madison, Wisconsin, surveys recent advances, both biochemical and clinical, and includes reports of original work by Jefferies on the relationship of the thyrotropic, exophthalmic and fat-mobilizing principles of pituitary extract. Of interest from the standpoint of diet and simple goiter was the report of the finding of a naturally occurring goitrogen of the thiocarbamide series in turnip and rutabaga root. The statement of Cattell that surgery is the most satisfactory method of treatment for most patients with hyperthyroidism, and the statement of Pemberton that thyroidectomy must still be considered in most cases of hyperthyroidism, are in keeping with the experience of many surgeons and internists. The remarkable results being obtained by radioiodine, however, lead one to inquire how soon its use will be the treatment of choice.

This volume is full of good material on goiter and is well printed and well illustrated.

C. A. McK.

Brucellosis, Clinical and Subclinical, by HAROLD J. HARRIS, M.D. Second edition, 617 pages. New York: Paul B. Hoeber, Inc., 1950. \$10.00.

This is the second edition of a book which, when it first appeared in 1941, was received with no small amount of adverse criticism. The new edition will be just as severely criticized for the author has expanded those parts that many readers found objectionable.

The author's essential thesis is that brucellosis is a very common, widespread infection in the United States, responsible for much vague, misdiagnosed illness. Much of this occurs as a chronic brucellosis, protean in its manifestations, causing prolonged ill health. Because of the vagueness of the symptoms and findings, the underlying brucella infection is overlooked and the patient dismissed as a case of neurasthenia or with some equally vague and unsatisfactory diagnosis. Many of the cases show psychosomatic manifestations. The new edition of this book has a special and not too convincing chapter about such cases. The author considers brucellosis so common an infection and so difficult to diagnose that "the diagnosis and treatment of brucellosis have become as proper a specialty as is syphilology or phthisiology. It is deserving of devotion of full time to its study and of greater attention in the curriculum of schools of medicine."

While none will deny the existence of many unrecognized cases of brucella infection, many readers will find Dr. Harris's volume very unconvincing. His thesis is built essentially on "personal experience of over 700 cases of brucellosis, largely of the low grade chronic variety." Unfortunately, however, many will question the accuracy of the diagnosis which is based too heavily on a positive skin test and favorable response (though often temporary) to injection of brucella vaccine. There is a singular lack of convincing proof that brucella infection was the underlying cause. The book contains strange inconsistencies, for in one section the author cautions against basing diagnosis on the very criteria which he later uses as a basis for most of his cases. The author's entire thesis rests on foundations which he himself recognizes to be not too sound. Unfortunately the caution that should be observed in drawing deductions under such circumstances is singularly lacking, for the author has few doubts as to his conclusions.

The reader will find many other aspects of the book that are surprising and open to question. He will wonder that so much attention is given to vaccine therapy, a debatable subject at best, while the important recent work on certain antibiotics is relegated to an addendum, a strange arrangement for a 1950 volume. The epidemiologist will wonder at the virtual neglect of the role of swine as a source of infection of man and cattle and a limiting factor upon the effectiveness of most programs for control of brucellosis in cattle. He will also wonder at the sketchiness of the chapter on prophylaxis, including the very inadequate section on vaccination of cattle.

G. W. A.

Breast Deformities and Their Repair, by JACQUES W. MALINIAC, M.D. 193 pages. New York: Grune and Stratton, 1949. \$10.00.

In concise form the various anomalies of the breast are outlined and the safe operative procedures for their correction are discussed. There is a chapter devoted to a review of the anatomy, embryology and physiological development as it applies to the abnormal breast, especially the blood supply which would influence the choice of surgical procedure. The text is well illustrated with photographs and drawings of almost every type of mammoplasty operation known with an evaluation by the author of each of the procedures. Throughout this discussion, the author stresses preservation of function of the breast as well as restoration of its form. The benefits of his long experience in this field are ably incorporated in this text.

S. G. B.

(Continued on page 82)



The
JOURNAL
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*Official Journal of the American College Health Association
Great Northern Railway Surgeons' Association, Minneapolis Academy of Medicine, North Dakota State
Medical Association, Northwestern Pediatric Society, South Dakota Public Health Association,
North Dakota Society of Obstetrics and Gynecology and North Dakota Pediatrics Society*

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Editorials

HEREDITY, ENVIRONMENT AND POLITICS

The Lysenko Controversy

Physicians interested in a sober appraisal of the so-called Lysenko controversy in Russia should read the paper by T. M. Sonneborn in *Science* (May 19, 1950, vol. 111, p. 529). Writing as a reliable expert in genetics Sonneborn treats the scientific and the political aspects of the situation. On the scientific side he finds Lysenko and the Michurin school generally to be careless, prejudiced and unsound. On the score of the relation of science to political ideology he finds a situation unparalleled in recent times as regards blatant disregard for intellectual honesty and integrity. The conclusion seems inescapable that in Russia today a "higher" set of principles than devotion to scientific truth has acquired dominance.

The seriousness of this situation can scarcely be exaggerated because Soviet ideology dominates a large fraction of the population of the globe today and its expansion has not yet stopped. The future may easily see extensions of Lysenkoism into medicine and other fields of science. The principle of freedom of thought is nowhere more directly challenged than in this blind adherence to political dogma as a sort of revealed religion. The medieval controversy between Science and the Church is being re-enacted in this twentieth century inquisition into thought. This new threat to reason deserves the attention of every person interested in preserving the integrity of the human intellect.

M. B. V.

MAPPING RURAL MEDICINE

The country doctor began to vanish in the early decades of the century, but the country lane down which he disappeared may have a turning. There is still a shortage of physicians in many rural areas of the nation, but a combination of factors is operating to reverse the trend of doctors away from the countryside. The medical colleges are encouraging students to enter general practice without discouraging their continuation of study and research.

Under an experimental plan now well advanced in Virginia, the University of Virginia School of Medicine and the Medical College of Virginia are rotating their interns through small hospitals serving the rural areas of the state. The medical schools follow the young doctors on their rounds. Their professors visit the small-town hospitals, reviewing cases with the interns and participating in staff meetings. After a tour of duty in the rural hospital that may last several months one of these interns may return to the college hospital to continue

training that is pointing his career in the direction where the need for physicians is greatest.

This program illustrates a pattern that in Virginia and in other states is becoming increasingly important as more rural hospitals and health centers are built with Government aid under the Hill-Burton Act. In these new medical facilities the graduates of modern medical schools practice with the clinical and laboratory facilities that are now required and are used in the training of every medical student.

—Reprinted from the *New York Times*

PRE-MEDICAL STUDENTS AND LIBERAL ARTS

For a long time it has been the practice of students planning to enter the medical or dental fields to "overload" their undergraduate programs with basic science courses, often to the neglect of liberal arts work. They do this in the belief that it will give them a better foundation for professional studies.

In the past few years, however, there has been a growing objection in education circles to this kind of "pre-professional straitjacketing." The contention is that students lose out on many richly cultural subjects and acquire a narrow, restricted education.

At present a subcommittee of the National Survey Committee is conducting a fifteen-month study of liberal arts education for the professions. The survey committee was set up by the American medical colleges and the Committee on Medical Education of the American Medical Association.

Recently some harsh words about pre-professional education as it is now came from Dr. Willard C. Rappleye, dean of Columbia University's faculty of medicine. In calling for the abolition of such highly specialized undergraduate programs, the dean asserted that college preparation for medical, dental and public health fields should not be professional in nature but should provide a broad cultural background.

"It should be preparation not for medicine or dentistry or public health," he said, "but preparation for life."

Dr. Rappleye's theory that medical students should have a liberal arts background so that they may later take their places as leaders in the community as well as in their profession, has been carried out in practice at Columbia for several years. Columbia College, the university's undergraduate men's division, advises its students that the minimum requirements for admission to medical school are three full years of college work, including basic liberal arts courses, two years of chemistry, one year of physics, one year of zoology and evidence of proficiency in French or German.

—Reprinted from the *New York Times*

CENTENNIAL YEAR AT THE UNIVERSITY OF MINNESOTA

The University of Minnesota, this month celebrating the 100th anniversary of the signing of its charter, will hold a special Charter Day program February 15 at Northrop Memorial Auditorium on the Minneapolis campus, highlighting the University's centennial year celebration.

University of Minnesota Week, proclaimed by Governor Youngdahl for February 11-18, will carry out this theme with a series of exhibits, speeches, open houses on the campuses and other special events. Speakers will be staff members representing many phases of study and research being carried out at the institution. Thirteen documentary radio programs have been prepared by KUOM, the University's radio station, for release to local stations throughout the state. A 30-minute motion picture, "Minnesota Profile," has also been released and is available for showing to all interested groups in Minnesota.



University Centennial posters (see cut) are also available for display purposes and will be mailed anywhere in Minnesota, free of charge, from the Department of University Relations, 213 Administrations building, upon request.

Coming Issues

In March, JOURNAL-LANCET will feature the first article in a new series entitled *Medical Science Reviews*, designed to give our readers comprehensive surveys in brief form of the latest advances in the various fields of medicine. Each article will be especially prepared by an authority in that field.

Following the tradition of previous years, the three spring numbers will be special issues, with April devoted to articles on Diseases of the Chest, May to Pediatrics, and June to Obstetrics and Gynecology.

Notices

The *National Gastroenterological Association* has announced its annual cash prize award contest for 1951. One hundred dollars and a certificate of merit will be given for the best unpublished contribution on gastroenterology of allied subjects. All entries for the 1951 prize should be limited to 5,000 words, be typewritten in English, prepared in manuscript form, submitted in five copies accompanied by an entry letter, and must be received not later than June 1. Entries should be addressed to the National Gastroenterological Association, 1819 Broadway, New York 23, N. Y.

* * *

The fourth annual postgraduate course in *diseases of the chest* sponsored by the American College of Chest Physicians, Pennsylvania Chapter, and the Laennec Society of Philadelphia, will be presented at the Hotel Warwick, Philadelphia, Pennsylvania, March 26-30, 1951. The course is open to all physicians; however, the number of registrants will be limited. Applications should be sent to the American College of Chest Physicians, 500 North Dearborn Street, Chicago 10, Illinois.

* * *

Minnesota hospitals and pathologists have been asked to temporarily discontinue the reporting of cancer cases to the Minnesota Department of Health. During the three years of the study of reports of cancer patients hospitalized in Minnesota, there has developed a cooperative spirit between hospitals, medical profession and the Minnesota Department of Health as evidenced by the fact that every hospital and all pathologists have sent reports of cancer cases. The staff of the Minnesota Department of Health working on this project is deeply grateful for the fine cooperation of all those who supplied material for the study.

* * *

A new medical motion picture "Gastrointestinal Cancer: The Problem of Early Diagnosis," is now available for public showing according to Dr. Arthur H. Wells of Duluth, president of the Minnesota Division of the American Cancer Society. This film, like its predecessors in the cancer series, uses sound, color and animation to underscore the importance of early diagnosis and treatment and is rich in clinical material.

* * *

University of Minnesota Postgraduate Courses

Dr. Emile Holman, professor of surgery, Stanford University School of Medicine, San Francisco, will be the visiting faculty member for the course in *cardiovascular diseases* to be held on February 15 to 17, 1951. Dr. Holman will also deliver the annual E. Starr Judd lecture in surgery on the evening of Thursday, February 15. His subject will be "Experimental and Clinical Observations on Constrictive Pericarditis."

A course in *fractures and the surgery of trauma* will be presented March 1 to 3. Dr. Carl E. Badgley, professor of surgery in charge of orthopedic surgery, University of Michigan, will be the visiting faculty member for the course and will also present the annual Clarence M. Jackson Lecture sponsored by the Phi Beta Pi medical fraternity. The subject of the Jackson lecture will be, "Fractures About the Hip—Early and Late Therapy."

A course in *pediatrics* will be held March 26 to 28, and will be devoted to the fields of infectious diseases and common orthopedic problems in infants and children. Visiting faculty members for the course will be Dr. Ralph V. Platou, professor and head of the department of pediatrics, Tulane University of Louisiana, New Orleans, and Dr. William L. Bradford, associate professor of pediatrics, University of Rochester, New York.

* * *

Dr. Paul Klemperer of Mt. Sinai Hospital, New York, will deliver the annual *Phi Delta Epsilon lecture* at the Museum of Natural History, University of Minnesota Campus, at 8:15 P. M. April 5, 1951. His subject will be "The Concept of Collagen Diseases."

News Briefs

North Dakota

LICENSES to practice medicine in North Dakota were granted 20 doctors following completion of four days of written, oral and practical examinations in Grand Forks. Dr. C. J. Glaspel of Grafton, secretary of the state board of medical examiners, announced the names of the successful applicants.

The doctors and intended place of practice in the state include Warren H. Randall, Grand Forks; Isadore L. Lazareck, Langdon; Conner A. Corbett, Devils Lake; William L. Fennell, Cooperstown; Jaroslav Terlecki, Minnewaukan; Robert A. Beck, Sharon; William O. Starks, Minot; Blaine F. Amidon, William O. Webster, Jack T. Spier and Albert G. J. Cullun, Fargo; Harry A. Fandrich, Kulm; Robert Strobel and Douglas T. Lindsay, Bismarck; Bohdan L. Hordinsky, Drake; Hans Kuisk, Rutland; Karl F. Oja, Ashley; Henry E. Waydeman, Hunter; Ellis Oster, Mandan; and Kalman J. Kruack, Wahpeton.

* * *

ABOUT 500 DOCTORS, dentists and veterinarians who did not register for military service October 16 were expected to register with local North Dakota draft boards on January 15. Registration was for those in the third and fourth priorities—those under 50 years of age who are not members of the armed forces or its reserve components and certain aliens.

* * *

TWO NEW ENLISTMENTS in the medical company of the 164th infantry regiment at Grand Forks on January 9 brought the total to 21 since the national guard unit was activated December 26. Enlistments in the medical company at the University of North Dakota have increased the unit's strength to 71.

* * *

ADDITION of laboratory equipment and more office space for the Upper Missouri district health unit at Williston was announced at a district quarterly meeting on December 23, 1950. Dr. Alan K. Johnson, district health officer, reported that new equipment for the unit is expected in the near future which will enable the laboratory to conduct routine milk, food and water analysis. Dr. Johnson also reported that the district diabetes clinics held last month had a large turnout of persons throughout the district.

* * *

DR. JOHN WILLIAMS was elected president of the medical staff of St. Alexius hospital in Bismarck in December. Dr. T. W. Buckingham was elected vice president and Dr. Myron Goughnour, secretary. Dr. R. H. Waldschmidt is the retiring president.

* * *

DR. W. A. WRIGHT, Williston, presided over the meeting of the North Central Conference held at the Radisson Hotel in Minneapolis in November. The Conference is made up of representatives of officers of medical associations in Minnesota, South Dakota, Iowa, North Dakota, Nebraska and Wisconsin.

A SERIES of professional seminars sponsored by the University of Minnesota medical school for the doctors, dentists and nurses of the Fargo-Moorhead area opened in Fargo on January 3. Topics to be discussed in the series include cancer control, heart disease and psychiatry.

* * *

PRIZES by Grand Forks physicians for medical students are among those recently established at the University of North Dakota. Dr. R. D. Campbell has turned over bank stock which will produce a minimum of \$80 annually for the student with the highest aggregate mark in the medical school. The prize also will include a gold medal.

A second cash prize of \$50, with a memorial prize certificate, has been provided by Dr. and Mrs. R. O. Goehl of Grand Forks for the medical student making the highest aggregate mark in physiological chemistry. The award was established in memory of J. W. Colglazier, a nephew who was killed September 16, 1945, on Okinawa.

* * *

DR. H. G. RICE will replace Dr. E. K. Ingebrigtsen as chairman of the medical preparations committee in Moorhead's civil defense program, it was announced at a meeting on January 18. Dr. Ingebrigtsen left Moorhead in December to accept a temporary appointment to the staff of the Big Springs, Texas, Veterans hospital. A discussion was held on the integration of the defense plan's nine committees.

* * *

THE SEMI-ANNUAL MEETING of the advisory council of the North Dakota medical center, provided by law, was held January 31 at the medical school of the university, to discuss problems relative to the medical program in the state.

* * *

New locations and appointments . . .

DR. HANS KUISK, formerly of St. Luke's hospital in Fargo, has opened an office in Rutland. The Rutland Community Health association has provided equipment for a rural clinic to be served by the new doctor.

* * *

DR. H. B. WAYDEMAN recently arrived in Hunter where he will take over the practice of Dr. E. H. Richter. Dr. Waydeman comes from California where he has spent the past two years in general surgery at the Los Angeles County Harbor General hospital.

* * *

DR. W. L. WALLBANK has resigned as superintendent of the North Dakota Sanatorium at Dunseith and will assume a new position in Ohio. Dr. George L. Loab, assistant superintendent, will serve as acting head of the institution.

* * *

DR. JAROSLAV TERLECKI, who has lived in Devils Lake for the past two years while serving his internship at Mercy hospital, has opened a practice in Minnewaukan.

Minnesota

A DEDICATION PROGRAM for the Renville County Hospital was held Sunday afternoon, January 21. An address of welcome was given by H. R. Pfeiffer, chairman of the hospital board. The principal speaker was Dr. John Lundy, head of the department of anesthesiology at the Mayo Clinic in Rochester.

* * *

DR. RUSSELL M. WILDER, who retired January 1 as head of the Mayo Foundation's department of medicine at Rochester, has been named director of the recently established national institute of arthritis and metabolic diseases. The institute of arthritis and metabolic diseases was authorized by congress to intensify research in arthritis, rheumatism and such diseases as diabetes, goiter and peptic ulcer.

* * *

TAXPAYERS and professional groups of St. Louis County, Minnesota, have developed a plan for better institutional medical and nursing care of long term patients. Patients will be hospitalized in three new infirmaries which are being built adjacent to general hospitals. The county pays for construction and furnishing and then leases the buildings to non-profit associations for operation. An infirmary of 125 beds was recently completed in Virginia, and the first of two planned 150 bed institutions is nearing completion in Duluth.

* * *

THE UNITED NATIONS has designated the University of Minnesota as a key world research center for brucellosis and Dr. Wesley W. Spink of the University medical school has been named as head of the center. The university's part in the international research network will be to train brucellosis workers and exchange with cooperating nations the latest information on diagnosis, human therapy, and control of the disease in animals.

* * *

MINNESOTA was expected to list approximately 5,000 doctors, dentists and veterinarians in the January 15 registration. The normal registration is expected to be ten times that of the first medical registration in October when 369 were registered.

* * *

DR. GEORGE E. MOORE, of the University of Minnesota department of surgery, was named winner of the Samuel D. Gross prize awarded every five years by the Philadelphia Academy of Surgeons. The prize was given Dr. Moore for his work in devising a test for brain or spinal cord tumors. This is the second time a University of Minnesota staff member has won the award—in 1935 it was given to Dr. Owen H. Wangenstein, head of the department of surgery.

Dr. Moore was recently designated as the recipient of a \$15,058 award by the National Cancer Institute for research in the use of fluorescein dyes in the detection of malignant tissues with special reference to the diagnosis of brain tumors.

* * *

AFTER spending a year at the Rockefeller Institute for Medical Research, Dr. Robert A. Good has returned to the medical school and is continuing his research under the five-year Markle Scholarship in the medical sciences which he was recently awarded.

DR. JOSEPH JORGENS of the University of Minnesota has received one of the research fellowships offered by the American Heart Association. Dr. Jorgen's research project is concerned with the electrokymographic study of vascular disease.

* * *

DR. CARRIE E. CHAPMAN was sworn in as a lieutenant commander in the navy at a ceremony held in Minneapolis January 16. Dr. Chapman, formerly in private practice at Manchester, New Hampshire, served as a captain in the United States public health service during World War II.

* * *

DR. OWEN H. WANGENSTEEN, chief of surgery at the University of Minnesota school of medicine, was honored at the annual dinner of the St. Paul Surgical society on January 16. Dr. Alfred Blalock, chief of the surgery department of Johns Hopkins School of Medicine, was the speaker at the dinner.

* * *

DR. HAROLD M. GRANING, a graduate of the University of Minnesota medical school in 1937, has been appointed regional medical director of the public health service for the area including the states of Minnesota, Illinois, Indiana and Wisconsin.

* * *

DR. JOHN C. SEED, formerly chief of the aerosol section at the army chemical center in Edgewood, Maryland, has been appointed executive assistant at the Sterling-Winthrop Research Institute in New York. A native of Rochester, Dr. Seed received his M.D. degree from Harvard medical school in 1945.

* * *

DR. A. M. WATSON, Royalton, is the new part-time medical director of the eighth district of the Minnesota Department of Health. He succeeds Dr. E. J. Simons, formerly of Swanville, who is now living in Minneapolis.

* * *

Minneapolis staff elections . . .

ABBOTT HOSPITAL announces the following medical staff officers for 1951: president, Wellington W. Rieke; vice president, John J. Boehrer; and secretary, Everett C. Perlman.

AT ASBURY HOSPITAL the new staff officers are: president, Harlan A. Alexander; vice president, Robert B. Potter; and secretary, Robert E. Nord.

AT MOUNT SINAI HOSPITAL the following officers were elected: president, Moses Barron; vice president, Max Seham; secretary-treasurer, Samuel G. Balkin; and executive committee, Reuben Berman, William C. Bernstein, Malcolm C. Pfunder, Roy E. Swanson, David M. Siperstein and Oswald S. Wyatt.

South Dakota

APPOINTMENT of a committee of the South Dakota State Medical association to hear grievances against members of the medical profession in the state has been announced. In the planning stage for nearly a year, the committee, made up of five past presidents of the association, will accept grievances from anyone desiring such services.

DR. G. E. VAN DEMARK, who has practiced in Sioux Falls for the past 43 years, was presented with the Distinguished Service Award for 1950 by the members of the local Cosmopolitan club at their 27th annual banquet on January 4. Dr. Van Demark was given his award for his many years of caring for crippled children without compensation.

* * *

DR. J. F. BRECKLE of Mellette was honored at a meeting of the Aberdeen Medical society on December 15 in recognition of his more than half century in the practice of medicine. Dr. Breckle is 75 and still active in practice.

* * *

THREE Rapid City doctors were elected to head the Black Hills Medical association at their meeting on December 14. Dr. Arthur Lampert was named president; Dr. F. L. Williams, vice president; and Dr. Harold Grau, secretary-treasurer.

* * *

DR. WRAY TOMLINSON was elected president of the staff of St. Joseph's hospital, Mitchell, at the annual meeting January 8. Dr. R. B. Skogmo was elected vice president and Dr. C. Moran, secretary.

* * *

DR. PAUL MERRETT was elected to the presidency of the Sheyenne Valley medical society at a meeting in Valley City on January 17. Also elected to offices were Dr. Neil McDonald, vice president; Dr. C. J. Meredith, secretary-treasurer; Dr. W. H. Gilsdorf, state convention delegate, and Dr. Paul Cook.

* * *

AN ACADEMIC SOCIETY of the American Medical association will be organized shortly at the University of South Dakota. Dave Buchanan, a second year student at the University of South Dakota medical school, was elected treasurer of the newly formed national Student American Medical association at the organizational convention in Chicago last month.

Objectives of the national organization are the advancement of medicine, contribution to the welfare and education of medical students, familiarization of its members with the purposes and ideals of the medical profession and the preparation of its members to meet the social, moral and ethical obligations of the profession.

* * *

DR. MARVIN HUREWITZ, who has been living at Estelline, will return to Flandreau, where he will resume the practice of medicine.

* * *

DR. EDWARD A. JOHNSON, who has been associated with the Bratrud clinic at Thief River Falls, Minnesota, since 1947, has opened a practice in Milbank in association with Dr. D. A. Gregory. A graduate of the University of Minnesota medical school, Dr. Johnson served an internship at the Seattle naval hospital and a residency at the General hospital at Lincoln, Nebraska.

* * *

DR. DONALD ALBERS, formerly of Presho, is now associated with the Oklahoma City clinic in the urology department. A graduate of the Northwestern medical school, Dr. Albers served his internship at the naval hospital at Norman, Oklahoma, and a fellowship in urology at the Mayo clinic.

Deaths

DR. ASA M. JOHNSON, a practicing physician in St. Paul for 54 years, died November 19 following a short illness. A graduate of the University of Minnesota's medical school in 1896, he received a medal three years ago from the Minnesota Medical Association, honoring him for 50 years of continuous practice.

★

DR. MARSHALL J. MELIUS of St. Charles, Minnesota, was killed in a traffic accident November 22. Dr. Melius, who joined the Henry clinic at Milaca on August 7, 1950, was returning to his St. Charles home for the holiday.

★

DR. A. W. MACDONALD, pioneer Valley City physician for over 50 years, died Sunday, November 26, at Mercy hospital in Valley City. Born in Nova Scotia, he took his medical degree at Loyola university, Chicago, practiced at Courtenay, and later at Valley City.

★

DR. GEORGE H. FREEMAN, who was superintendent of the state hospital at St. Peter, Minnesota, for 23 years, died December 2 at Butte, Montana. A graduate of the school of medicine at the University of Minnesota, Dr. Freeman joined the staff at St. Peter in 1906.

★

DR. FRED MCPHERSON NEWMAN, 45-year resident of Mitchell, South Dakota, died December 4. A graduate of Northwestern University medical school, Dr. Newman had practiced in Mitchell for 45 years.

★

DR. O. G. BENSON, physician and surgeon in Plentywood, North Dakota, for the past 14 years, died early in December following several months' illness. A native of Antler, North Dakota, Dr. Benson attended Creighton University school of medicine, took his internship at Santa Fe hospital in Los Angeles, and opened a practice in Plentywood in 1936.

★

DR. OTTO W. STERNER, St. Paul, died December 7 after an extended illness. A native of Sweden, Dr. Sterner was graduated from the University of Minnesota, practiced medicine in Cambridge until 1915, when he returned to St. Paul.

★

DR. CLARENCE W. TAYLOR, epidemiologist with the Duluth city health department since 1921, died Friday, December 15, following a lingering illness. His father, Dr. Ashur C. Taylor, was one of Duluth's early medical practitioners. Dr. Taylor, a graduate of Northwestern University medical school, was licensed to practice medicine in Minnesota in 1900, was first appointed to the public health post in 1921 and remained in similar posts until the present.

★

DR. OSCAR OWRE, Minneapolis surgeon, died December 21. Entering the medical profession in 1905, he became an instructor at Minneapolis College of Physicians and Surgeons and practiced in Minneapolis most of his life.



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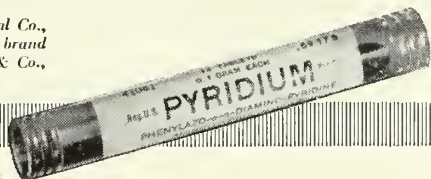
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BOOK REVIEWS—(Continued from page 74)

B.C.G. Vaccination in Theory and Practice, NEVILLE IRVINE, D.M., M.A., M.R.C.S. Eng., L.R.C.P. Lond. 130 pages. Springfield, Illinois: Charles C. Thomas, 1950. \$3.00.

The author has attempted to resolve the continuing controversy regarding the use of vaccination with B.C.G. by a comprehensive review of the literature. The author resides in Great Britain where B.C.G. vaccination has not been used experimentally or clinically and the writer has had no personal experience with vaccination.

The history of the growth and production of attenuated living tubercle bacilli by Calmette and Guérin is reviewed. The conditions to be met by vaccination include the development of acquired resistance by substituting a weakly virulent infection which always regresses in place of the more virulent, naturally occurring primary infection, which also produces resistance, but which may progress to clinical tuberculosis. The vaccine should not be so avirulent that it fails to produce resistance nor so rapidly destroyed that the acquired resistance lasts too short a time.

The reported variations in the virulence of B.C.G. are explained on the basis that the vaccine was grown by a method deviating from the standards set up by Calmette and Guérin. The author states that it has not been possible, since 1930, to produce B.C.G. of dangerous virulence. He concludes that there is no evidence to doubt the safety of B.C.G. for human vaccination.

It is difficult, if not impossible, to measure exactly the increase in resistance to tuberculosis produced by B.C.G. and it is necessary to depend upon clinical studies. The various techniques of vaccination with their advantages and disadvantages are discussed. A full program of segregation, tuberculin-testing, vaccination and follow-up requires a complicated organization and satisfactory simplification has not yet been developed.

The author favors general vaccination but believes selective vaccination should be practiced at the onset of any program. Nurses, medical students, newborn infants of tuberculous mothers and negative reactors in tuberculous households should be vaccinated first. The conclusion is drawn that at long last vaccination with B.C.G. has been accepted universally as a valuable weapon in the fight against tuberculosis.

The reviewer feels that it is only fair to point out that vaccination with B.C.G. is not a settled or standardized procedure. Controversial issues still unresolved include (1) the best means of preparing the vaccine; (2) the ideal method of vaccination; (3) the measurement and duration of a successful vaccination; (4) the variations and loss of potency of the vaccine; and (5) the problem of limiting vaccination to special groups as against general vaccination. The reduction in the value of the tuberculin test, if large segments of the population are vaccinated, should be considered.

This interesting monograph should be of interest to all doctors interested in the complete control of tuberculosis.

S. S. C.

Chemical Developments in Thyroidology, by WILLIAM T. SALTER. Springfield, Ill.: Charles C. Thomas, 1950. \$2.00.

While this monograph, which deals with chemical developments in thyroidology, should be reviewed by a pharmacologist, in this notation clinical implications will be of chief concern. The "metabolic circuit of the thyroid hormone" is discussed whereby iodine atoms change from the free state (IF) to a colloidal bound state (IB) and steps are shown whereby, unless a toxic thyroid blocking agent is present to inhibit the essential enzyme systems, ultimately thyroxine is formed. The application of radio-iodine is discussed and the standard method of using the eight-day isotope ^{131}I . The author states that the evidence suggests that over 90 per cent of hyperthyroid patients might be successfully treated with radioactive iodide; with regard to various malignant tumors of the thyroid, it is not known to what extent they will yield to this treatment.

C. A. McK.

Primer of Allergy, by WARREN T. VAUGHAN, M.D. (deceased), Third edition, revised by J. HARVEY BLACK, M.D. 175 pages, illustrated. St. Louis: C. V. Mosby Company, 1950. \$3.50.

The first edition was offered to the medical profession back in 1939. It became quite popular not only because physicians were interested in the simple way in which Dr. Vaughan presented the subject, but because lay people also were attracted by it. Advances in the management of the allergic patient required revision and soon a second edition was published. Now the third has appeared, and it was hoped further changes would be made. There are some but not enough. Nevertheless, the monograph can still be recommended as "a guidebook for those who must find their way through the mazes of this strange and tantalizing state," namely allergy. A. V. S.

Rorschach Introductory Manual, by GEORGE ULETT.

This *Manual* for psychiatrists, or physicians with special psychiatric training, is of primary importance in helping them utilize to better advantage a significant tool of psychology, either through their own use or through better comprehension and evaluation of psychologists' reports.

The Rorschach perhaps comes closest to filling the need for a test of hidden factors in personality, in a way somewhat analogous to the x-ray in physical diagnosis and as contrasted with the descriptive diagnosis facilitated by question and answer tests. But because the Rorschach test is so intangible, so cumbersome to administer, and so complex to evaluate, there have been many attempts since Rorschach's time for a simplification of the test. This *Manual* presents an ingenious, although, perhaps necessarily, oversimplified diagnostic approach which obviates many of the difficulties present in previous similar attempts. However, as in x-ray, the more experienced the administrator and interpreter, the less likely he is to arrive at erroneous conclusions and the more likely he is to produce helpful assistance.

If this is kept in mind as well as the author's observation that the personality picture must be a synthesis rather than a "group of disarticulately combined categorical measurements," and over-enthusiastic conclusions from inadequate data are eschewed, this *Manual* may well serve its avowed purpose.

C. K. A.

MANAGEMENT OF DIFFICULT LABOR

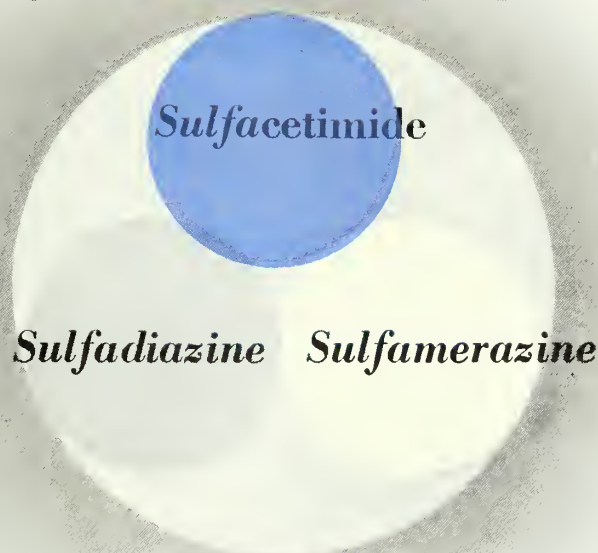
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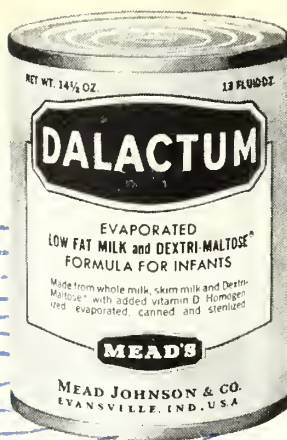
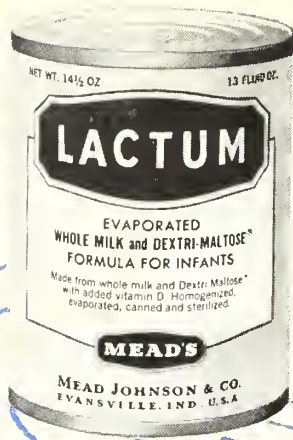
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PREPARATION OF MANUSCRIPTS

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Manuscripts are to be typed on one side of the paper, double spaced. Illustrations must be in the form of glossy prints or drawings in black ink. Statistical tables and charts should be set up according to the style used in this journal and should be presented on separate sheets rather than within the text material. Please do not attach legends to the pictures. A rea-

sonable number (two or three) illustrations are published free of cost; special arrangements must be made for more numerous or highly finished illustrations or tables.

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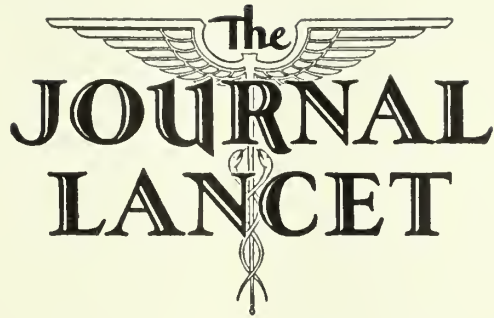
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Allergy in Children and the Antihistamines*

ALBERT V. STOESSER, M.D., Ph.D.
Minneapolis, Minnesota

NO ONE in the practice of medicine can escape the treatment of allergic diseases, and in that treatment the use of antihistamines plays an essential role. Since the introduction of Benadryl and Pyribenzamine about five years ago, many compounds have been examined, both in the laboratory and clinically. Up to the present time fifteen have reached the market and there may be more. All of these drugs are supposed to interfere with the action of the histamine which is believed to be released by the union of antigen and antibody. There have been many reports in the literature, some dealing with pharmacological studies emphasizing toxicity and dosage, others revealing the influence of the antihistamines on the various allergic manifestations. Most physicians have been greatly impressed with the wonders of the drug, but a few have found faults with the writings of the clinical investigators. Each has tried to establish the antihistamine under observation as the best therapeutic agent, thus permitting the sponsors to produce literature with claims too good to be true. All the cases with some relief have often been classified under the heading which reads "mild to marked improvement." Thereby a wide range is covered leaving only a few instances in which there is no help from the compound. As a result, clinicians have become greatly confused.

Therefore, a study starting in 1945 with a clinical appraisal of Benadryl and Pyribenzamine in allergic

diseases of infancy and childhood was extended to the present time so that all drugs made available could be compared. The children who were studied ranged from six months to sixteen years in age. They were seen at the allergy clinics of the University Hospital and the Minneapolis General Hospital and in private practice. A complete history was obtained by repeated questioning of parents or guardians. Thorough examinations were made, including the necessary laboratory procedures and roentgenograms. All cases had the cutaneous allergy tests.

At first, the antihistamines were administered to the children without any attention being given to the known sensitivities. In the majority of the cases the response was too inconsistent, and later, therefore, the drugs were offered with the parents carrying out as far as practical the recommendations based on either the routine trial or elimination diets and the removal or reduction of potent allergens in the environment or the results of the skin tests. However, during periods of observation, none of the children received any specific therapy in the form of inoculations of animals dander, dust, pollen or mold extracts. Return visits were made throughout the year, thereby including all seasons. In addition to questioning the parents of the younger children, and the older ones themselves, complete examinations were recorded. Photographs (Kodachrome) of the nasal passages in some cases of allergic rhinitis were obtained before and after periods of drug therapy. These became a part of the records.

Infants and preschool children were given the syrups or elixirs of the various antihistamines furnished in the liquid form. The dose ranged from one-fourth to twice

*Presented at the sixty-third annual meeting of the North Dakota State Medical Association, Grand Forks, North Dakota, May 29, 1950.

From the allergy clinics of the Department of Pediatrics, Medical School, University of Minnesota, and Division of Pediatrics, Minneapolis General Hospital.

the recommended amount. Older children received capsules or tablets beginning with a small dosage and increasing to tolerance but never over twice the average dose for a twenty-four hour period. This was done in order to observe the side effects as well as to discover whether larger amounts of the drugs offered more in the way of relief than smaller quantities. All of the procedures were considered more or less a clinical experiment rather than a regular treatment.

Data was collected on 4714 cases and before it was analyzed a thorough review was made of the literature. Selection of any outstanding clinical papers as good references was difficult, and limited space does not permit discussion of a complete bibliography. However, the review by Dr. Ethan Allan Brown entitled "Antihistaminic Agents" appearing in the March-April and May-June numbers of *Annals of Allergy* (1950) is worthy of examination.

The clinical material of this study revealed that a beneficial response was obtained with all of the drugs—sometimes the results were good, at other periods they were not of much value in spite of precautions as to exposure to potent allergens. However, when the antihistamines were offered in rotation in an orderly fashion, the over-all figure in percentage for satisfactory results was approximately 48 per cent. There were 153 children, chiefly in the younger age groups, who could not take the drugs, leaving 4561 cases distributed as is revealed in Table I.

TABLE I
Response of Various Allergic Diseases to All of the Antihistamines

Disease	No. of Cases	Satisfactory Number	Results Per cent
Atopic eczema	255	71	28
Allergic rhinitis	2436	1632	67
Hay fever	964	511	53
Asthma	526	95	18
Urticaria-angio-edema	204	179	88
Gastrointestinal allergy	31	13	42
Migraine	71	22	31
Conjunctivitis	74	42	57

The mere presentation of the number and per cent of cases receiving worthwhile benefits from the antihistamines does not give the practicing physician enough information for the best use of the drugs. However, this may be accomplished by discussing the compounds by means of a classification shown in Table II and based on the chemical characteristics, potencies, and side effects which did not require discontinuance of the drugs. Recognition was given to the fact that there are individual differences in the therapeutic and toxic responsiveness to the antihistamines in general and to specific compounds. Nevertheless the ethylenediamines with the benzyl ring should first be considered. They have moderate side reactions. Neo-hetramine (thonzylamine hydrochloride) was found to have a very low incidence of undesirable effects. However, in a little over four per

TABLE II
Classification of Antihistamines

Group I—ethylenediamines with benzyl ring		
1. Neo-hetramine	}	moderate side reactions
2. Neo-antergan		
3. Pyribenzamine		
Group II—ethylenediamines with thenyl ring		
1. Thenylene	}	little drowsiness
2. Diatrine		
3. Histadyl		
4. Tagathen		
5. Chlorothen		
Group III—chlorcyclizine with piperazine ring		
1. Di-paralene	}	prolonged action
2. Perazil		
Group IV—miscellaneous formulas		
1. Antistine—some wakefulness		
2. Thephorin—may stimulate		
3. Chlor-trimeton—less stimulating		
4. Trimeton—little drowsiness		
5. Pyrrolazote—more drowsiness		
Group V—ethanolamines		
1. Hydrillin	}	sedative effect
2. Decapryn		
3. Benadryl		

cent of the children there was some drowsiness, nervousness, insomnia and nausea. Neo-antergan (pyranisamine maleate) was definitely more potent but this feature was accompanied by an increase in side reactions. Approximately nine per cent of the cases receiving the drug have a moderate amount of drowsiness, dizziness, nervousness, headache, epigastric pain, palpitation, nausea, diarrhea, and syncope. Pyribenzamine (tripeleppamine hydrochloride) was the most effective agent of the first group although around twenty-five per cent of the children experienced some form of side effects. Most prominent were drowsiness, dizziness, nervousness, headache, nausea and epigastric pain. In a few cases, a great reduction in dosage had to be made, thereby sacrificing a part of the good clinical response.

The second group includes the ethylenediamines with the thenyl ring. Thenylene (methapyrilene hydrochloride), Diatrine, and Histadyl (thenylpyramine hydrochloride) are similar and their potency was offset to a certain extent by the fact that a little drowsiness was a predominate side reaction. It was just enough to disturb many of the parents. Other effects were dizziness, nervousness, palpitation, vomiting, diarrhea, pruritus, and frequency. Tagathen (chlorothen hydrochloride) was more valuable chiefly because the side effects were less pronounced.

Group three is made up of a compound prepared by two pharmaceutical companies. The one calls it Di-paralene, the other Perazil. The drug is chlorcyclizine hydrochloride with a piperazine ring. Its clinical action was observed to be relatively long. Instead of the characteristic four to eight hour period of effectiveness of the many antihistamines, Di-paralene or Perazil gave a satisfactory response for eight to twelve hours. This was

associated with a low toxicity since no child had to discontinue the use of the drug. Side reactions were found in twelve per cent of the cases and they consisted of a little drowsiness, fatigue, epigastric pain and dermatitis.

The fourth group is comprised of preparations which have more or less unrelated structural formulas. The changes which have been made in the chemical composition of these drugs have led to shifts in the clinical characteristics and toxicities. Antistine (phenazoline hydrochloride) had in this extensive study the least clinical value associated with less than three per cent side effects. None were marked and most commonly reported were insomnia, nausea and epigastric pain. Thephorin (phenindamine of Roche) was considerably more effective but side reactions were up to eight per cent. Irritability, insomnia, and dryness of the mouth were present. Occasionally a young child was found to have drowsiness. Chlor-trimeton (chlorprophenpyridamine maleate) appeared to give better results than Thephorin along with a little less than seven per cent side effects. Some children had a mild to moderate amount of irritability. Others complained of headache, especially at the onset of the use of the drug. Dermatitis of the face and hands was observed. Trimeton (prophenpyridamine maleate) was less effective than Chlor-trimeton. However, irritability was gone, but side reactions were up over ten per cent with drowsiness leading the list of dizziness, nervousness, insomnia, palpitation, dryness of the mouth, and nausea. Pyrrolazote (pyrathiazine) would be the most valuable compound of group four were it not for the fact that the drug was found to have a rather high incidence of side effects. The average range was from 11 per cent of the moderate ones to 23 per cent of the mild reactions with drowsiness most pronounced. There was also some dizziness, irritability, dryness of mouth and nausea.

Group five includes Hydryllin, Decapryl, and Benadryl referred to as the ethanolamines. Decapryl (doxylamine succinate) was observed to have a moderate amount of clinical activity with a little sedative effect in practically every case. More definite side effects were noted in 30 per cent of the children but none of them had to stop taking the medication. Reported rather frequently was drowsiness, fatigue, muscular weakness, anorexia, and nausea. Adjustments could be made for most of these. Benadryl (diphenhydramine hydrochloride) presented a similar picture. A marked increase in potency was associated with a more sedative effect in the majority of the cases. The compound may be the most potent of the antihistamines but unfortunately its value can be depreciated by the rather high incidence of side reactions, which were as much as 39 per cent in this study. Most common were drowsiness, nervousness, restlessness, fatigue, dryness of mouth, and nausea. Some of the extremely difficult allergic problems in childhood such as bad cases of atopic eczema, allergic rhinitis or urticaria were controlled with the drug but side effects forced a reduction in the dosage leading to a drop in clinical effectiveness. For this reason, aminophylline with its stimulating effect on the central nervous system

was combined with Benadryl in the final ratio of four to one to produce the preparation called Hydryllin. Side reactions were reduced about one-half with only a moderate fall in clinical potency. However, drowsiness, dizziness, nervousness and muscular weakness were still apparent. There was the additional complaint of nausea, sometimes quite severe. Further investigations revealed that the aminophyllin was the cause of this trouble.

When all of the side effects were added up, quite a long list was obtained as is revealed in Table III. The most common ones were placed at the beginning. Drowsiness did help to sedate the active allergic child, it also promoted sleep in some of them. On the other hand, the tired child felt better after the administration of the more or less stimulating antihistamines. However, gastro-intestinal disturbances were hard to control. They required very small initial doses of the drugs with a gradual increase to tolerance. Furthermore, the development of a cough was annoying and in a few children it required a temporary discontinuance of the antihistamines.

TABLE III
Side Effects of Antihistamines

1. Drowsiness	15. Vomiting
2. Dizziness	16. Diarrhea
3. Nervousness	17. Constipation
4. Restlessness	18. Dermatitis
5. Irritability	19. Pruritus
6. Insomnia	20. Ataxia
7. Headache	21. Tinnitus
8. Fatigue	22. Syncope
9. Muscular weakness	23. Blurred vision
10. Palpitation	24. Cough
11. Anorexia	25. Dyspnea
12. Dryness of mouth	26. Frequency
13. Nausea	27. Dysuria
14. Epigastric pain	28. Leucopenia

There may be others—*anemia*, etc.

In spite of the side reactions, repeated rotations of the drugs within a group or from group to group was made in the 4561 children in order to obtain maximum efficiency. This led to valuable information concerning the relative activity of the antihistamines. Several communications in the literature regarding the subject have not been clear enough to avoid confusion in the mind of the practitioner. The order finally established is presented in Table IV with full knowledge of the fact that a drug generally considered to be quite active is not necessarily the most effective one for a particular child. Further observations will make changes and incidentally in this connection the new antihistamine called Foralamin (methafurylene fumarate) has found a place between Neo-hetramine and Neo-antergan.

Antistine appeared to be the weakest drug and Benadryl the strongest. Mild to moderate allergic manifestations were treated with the antihistamines at the top of the list. Antistine, Neo-hetramine, and especially Neo-antergan gave satisfactory results as daytime medications since side effects were low. Some of the children could not sleep well, and in these cases the drugs of the

TABLE IV

Clinical Activity of Antihistamines Without Consideration of Side Effects

1. Antistine	8. Trimeton
2. Neo-hetramine	9. Thephorin
3. Neo-antergan*	10. Pyrrolazote
4. Thenylene, Diatrine, Histadyl	11. Chlor-trimeton
5. Tagathen, Chlorothen	12. Hydryllin
6. Di-paralene, Perazil	13. Pyribenzamine
7. Decapryn	14. Benadryl

*Foralamin may be placed here.

thenylene family, Tagathen (chlorothen) or Decapryn were employed in the evening and at night. The same antihistamines were used with success during the day in very active children. However, in some cases the allergic symptoms were most marked in the morning and help was often obtained by the bedtime administration of Di-paralene or Perazil.

Moderate to severe allergic diseases required the more potent drugs. Thephorin, Chlor-trimeton and Pyribenzamine did help, often satisfactorily. The response in the severe cases was best soon after the introduction of the antihistamine. After a while progress was only fair. Most of the difficulty was at night with the child becoming quite miserable by morning. In such instances, Pyrrolazote, Hydryllin or Benadryl administered at bedtime was helpful and the use of any one of these drugs could be extended into the day as necessary regardless of side effects.

With fifteen antihistamines available and at least eight allergic conditions to treat in infancy and childhood, orientation with the thought of simplicity was in order. Reference may be made to Table V. Atopic or allergic eczema (dermatitis) was helped by drugs of the thenylene family. If necessary, more relief could be obtained with Pyrrolazote, Decapryn, or Benadryl or any combination of the compounds. Whether the beneficial response was due to an anti-allergy phenomenon or to the sedative effect of the antihistamines was difficult to determine. Some of these children responded just as well to barbiturates, others did not. The latter may represent the cases in which there is a true histamine release and the antihistaminic agents are indicated.

Allergic rhinitis — perennial and seasonal (hay fever or pollinosis) — was well controlled by a majority of the drugs in the absence of specific therapy. If the symptoms were mild and consisted of sneezing and watery excretion with some swelling of a pale nasal mucosa, Neo-hetramine was the first compound eventually employed. It could be paired with members of the thenylene family which were especially helpful in the evening or during the night. Moderate manifestations with more sneezing or discharge and greater edema of the turbinates could be favorably influenced by Neo-antergan or Thephorin, and if these antihistamines failed, a move to Chlor-trimeton or Pyribenzamine was made. Further support could be obtained from Decapryn, Pyrrolazote, Hydryllin or Benadryl. However, the children with a deep red swollen nasal mucosa and those with a marked obstruction due to much edema did not respond satis-

TABLE V

Use of Antihistamines in Various Allergic Diseases

I. Atopic or allergic eczema (dermatitis)	
1. Thenylene family	} sedative effect
2. Pyrrolazote	
3. Decapryn	
4. Benadryl	
II. Allergic rhinitis—perennial and seasonal (hay fever)	
1. Neo-hetramine	} daytime medication
2. Neo-antergan	
3. Thephorin	
4. Chlor-trimeton	
5. Pyribenzamine	
6. Thenylene family	} evening and night
7. Decapryn	
8. Pyrrolazote	
9. Hydryllin	
10. Benadryl	
III. Bronchial asthma in infant and young child	
1. Thephorin	
2. Decapryn	
3. Hydryllin	
4. Benadryl	
IV. Urticaria and angio-edema	
1. Thenylene family	
2. Di-paralene and perazil	
3. Benadryl	
V. Gastro-intestinal allergy	
1. Chlor-trimeton	
2. Pyribenzamine	
VI. Migraine	
1. Thephorin	
2. Decapryn	
VII. Allergic conjunctivitis	
1. Chlor-trimeton	
2. Pyribenzamine	

factorily. The former group gave negative family histories for allergic diseases and the skin tests were usually negative. They may have been cases of bacterial allergy. On the other hand, the latter group revealed allergic illnesses in the families and the cutaneous tests yielded positive reactions in the form of wheals. The edematous nasal mucosa was very pale and quite moist. The disease was usually of long standing and some of the cases had their origin with a bad hay fever due to high pollen counts during severe seasons. The preferred treatment for these children had to be specific hyposensitization therapy.

Bronchial asthma occasionally was helped a little. The antihistamines of choice were Thephorin, Decapryn, Hydryllin and Benadryl. Infants and very young children in whom specific sensitivities had been established, and attacks appeared soon after exposure to the allergens, gave the best results. These children were absolutely free of symptoms between episodes of asthma. Older individuals with fairly long periods of wheezing due to multiple sensitivities, infection, sudden changes in the weather, or emotional upsets were not influenced by the drugs. In fact, some of them were made worse. Pollen asthmatics did show some relief especially if allergic rhinitis was present. The improvement usually was more in the nasal symptoms than in the asthma.

Urticaria and angio-edema may be acute or chronic. The acute attacks responded most favorably to all of the antihistamines, the chronic ones often failed to do this. The compounds of the thenylene family with their sedative effect were helpful. However, the urticarial swellings broke through periodically. Di-paralene or Perazil did fit in satisfactorily. The long period of action of these drugs kept the mild to moderate urticaria and/or angio-edema under control. Sometimes it was necessary to combine the Thenylene and Di-paralene therapy. The combination of a relatively short acting antihistamine with one of prolonged action appeared to be the solution in the average case of chronic urticaria but not in the more severe flare-ups especially of angio-edema. Benadryl without or with propadrine hydrochloride or Ephedrine sulfate had to be employed. Sometimes it became necessary to give Epinephrine.

Gastro-intestinal allergy manifested itself in the form of nausea, vomiting, diarrhea, or constipation. Abdominal distention could be present. Some of the children had pain but there was no muscle rigidity or spasm. The leucocyte count of peripheral blood often revealed a rather high percentage of eosinophiles. Antihistamines did not give too much relief. Chlor-trimeton and Pyribenzamine appeared to be the least upsetting and did help in relieving symptoms in approximately two-fifths of the cases.

Headaches in children may be due to allergy. All the cases of this study were checked for eye disturbances, sinus disease, and constitutional disorders through consultations. When all examinations were negative and there was a positive family history of allergy in the family, migraine was considered. Food sensitivities were found. The elimination of all of the offending allergens from the diet was highly recommended. However, when this was not practical or the response was not satisfactory, antihistamines were prescribed. Thephorin and Decapryn were favored. The dull rather sluggish child at puberty was improved by the use of Thephorin while the high-strung individual required the Decapryn. Sometimes Thephorin was employed during the day and Decapryn at night.

Allergic conjunctivitis may be associated with allergic rhinitis. These children were treated by controlling the nasal allergy. However, eye irritations without any visible changes in the nostrils were difficult to treat. The

causative agent in the form of a food or foods, animal emanations, dusts, pollens or molds was not always a certainty. Therefore therapeutic help was obtained by employing some of the antihistamines. Chlor-trimeton and Pyribenzamine were found to be of special value.

SUMMARY

There have been many pharmacological studies concerning the antihistamines. The toxicity and dosage of the compounds has been well established.

Clinical presentations also have been made. The majority of these have over-rated the value of the drugs in allergic diseases leading to confusion and the necessity for more investigations.

Therefore a study including children with allergic manifestations and ranging in age from six months to sixteen years was made with the antihistamines as they became available over the past five years. The drugs were offered in rotation under controlled conditions as to diet and environment over long periods of time in order to cover the seasons of the year. No specific immunization procedures were permitted while observations were being conducted.

Information was obtained on 4714 children but 153 of them could not tolerate the medication, leaving 4561 for final appraisal. Satisfactory results were found in 48 per cent of the cases.

Constant employment of the antihistamines led to a working classification based on chemical characteristics and side reactions. Some of these were given clinical significance, others required a careful manipulation of dosages and a rotation of the compounds in order to allow a continuation of the drug therapy.

A schedule of clinical activity for the antihistamines was developed. This should correct the perplexity in the minds of the clinicians. The weakest drugs for the milder allergic diseases were first in order, the stronger ones for the more severe illnesses were last.

Furthermore, the comparative use of the compounds in the various allergic manifestations of childhood was studied. Certain drugs gained preference in the treatment of each disease, thereby simplifying their clinical application. This should increase the efficiency in the handling of the antihistamines by the practitioner.

Since this study was completed another drug called Thenfadil is available. It apparently belongs to the thenylene family.

"It is a harsh fact that the heart diseases cause one out of every two deaths over the age of 45. This fact is reflected in the obituary columns of our nation's business. It takes years of experience, skill and training to develop top leadership. These men are irreplaceable—whether they be in business or government."—HOWARD A. RUSK, M.D.

The Use of Antibiotics in General Practice*

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THE DEVELOPMENT of several new antibiotic agents in the last few years has made possible the cure of many infections and infectious diseases which, heretofore, were extremely serious and often fatal. However, this rapid increase in the number of antibacterial agents has caused much confusion regarding the most effective plan of treatment. Which antibiotic agent should be used against a specific infection? Should a combination of chemotherapeutic agents be used? Is it worth while to attempt to prevent infections?

The correct choice of an antibacterial agent to be used in a specific disease is a matter of considerable importance if the disease is to be treated effectively and economically. The antibiotic agents now commonly available are: (1) penicillin, (2) streptomycin and dihydrostreptomycin, (3) Aureomycin, (4) Terramycin, (5) Chloromycetin, (6) tyrothricin and (7) Bacitracin.

PENICILLIN

In spite of the introduction of several new antibiotic agents, penicillin still has a wide range of usefulness. Its effectiveness in the treatment of certain types of infections still surpasses the effectiveness of the more recently available antibiotic agents. Fortunately, most organisms do not develop resistance to penicillin very readily and, therefore, penicillin is just as effective in the treatment of most infections as it was four or five years ago. There is one definite exception to this. An increasing number of infections are being caused by strains of *Staphylococcus aureus* (*Micrococcus pyogenes aureus*) which are resistant to penicillin.¹ Prior to 1944, only a very few strains of penicillin-resistant staphylococci were encountered at the Mayo Clinic. During several periods within the past two years, 50 to 68 per cent of the staphylococci examined were found to be relatively resistant to penicillin (that is, required more than 1.6 units of penicillin per cubic centimeter of culture medium to inhibit growth). These studies were carried out primarily on hospitalized patients, and they do not reflect the actual incidence of penicillin-resistant staphylococci in normal individuals or in outpatients. The incidence of penicillin-resistant staphylococci found in these latter groups undoubtedly is considerably less.

Furthermore, it should be emphasized again that this increase in resistance has been demonstrated only in infections caused by staphylococci. Organisms such as gonococci and streptococci, which have always been sensitive to the action of penicillin, are still sensitive, and the

use of penicillin in infections caused by these organisms usually will be attended with satisfactory clinical results.

STREPTOMYCIN AND DIHYDROSTREPTOMYCIN

Streptomycin still appears to be the most effective anti-tuberculosis drug available. The use of streptomycin or dihydrostreptomycin in infections other than tuberculosis is limited primarily to serious situations in which the maximal effectiveness of these drugs is achieved by combining them with other antibiotics, for example, in the treatment of fulminating peritonitis or severe culturally proved brucellosis. With the exception of the tubercle bacillus, most organisms which are sensitive to streptomycin also are sensitive to Aureomycin, Terramycin or chloramphenicol (Chloromycetin). These latter drugs do not produce the serious toxic reactions which streptomycin may produce and, furthermore, organisms do not develop resistance to these drugs as rapidly as they do to streptomycin.

AUREOMYCIN

Aureomycin is an exceedingly important antibiotic agent. It has a wide range of usefulness, and is effective against a great variety of organisms, including a number of gram-positive and gram-negative microbes, most of the Rickettsia, certain viruses and the spirochetes.

Aureomycin is well absorbed from the gastrointestinal tract, and satisfactory clinical results can be obtained when this substance is given orally. It can be injected into the veins of the upper extremities when necessary. Aureomycin should not be injected into the veins of the lower extremities because the venous irritation which it may produce could lead to embolic phenomena.

When the oral route of administration is used, nausea, vomiting and diarrhea may result. The administration of a small glass of milk with the Aureomycin decreases the nausea and vomiting in many patients and does not interfere with absorption of the drug. Preparations of aluminum hydroxide should not be administered with Aureomycin, for they impair the absorption of this agent.

Other toxic reactions to Aureomycin are infrequent, and no serious reactions have been reported thus far. Dermatitis and stomatitis do occur occasionally. Both of these reactions generally subside after administration of the drug has been stopped.

TERRAMYCIN

Terramycin^{2,3} is the newest addition to the list of effective and safe antibiotic agents. This substance is very similar to, although not identical with, Aureomycin. On the basis of preliminary observations, it appears that

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the sensitivity of organisms to Terramycin is comparable to their sensitivity to Aureomycin, although there may be slight variations in sensitivity. If this therapeutic effectiveness is born out by further observations, Terramycin and Aureomycin, for all practical purposes, could be used interchangeably. Terramycin is well absorbed from the gastrointestinal tract, and satisfactory clinical results are obtained when the substance is administered orally. Preparations of Terramycin for intravenous administration are available and can be used when it is impossible to use the oral route. Gastrointestinal irritation similar to that produced by Aureomycin is caused when Terramycin is administered orally, although the irritation does not appear to be so marked as that caused by Aureomycin. The administration of milk with the Terramycin reduces the nausea and vomiting in many individuals. Other toxic reactions have not been reported as yet.

CHLORAMPHENICOL (Chloromycetin)

This antibiotic agent has been prepared synthetically. It does not have as wide a range of usefulness as Aureomycin or Terramycin, but in the treatment of certain infections, for example, typhoid fever, it is superior to all other chemotherapeutic agents. Moreover, it is an effective although not necessarily superior therapeutic agent in the treatment of rickettsial infections, spirochetal infections, certain virus infections and infections caused by certain gram-negative microbes. No serious toxic reactions from chloramphenicol have been encountered. Nausea and vomiting occur occasionally, but have not been a serious problem. Reversible granulopenia in the blood and granulocytic hyperplasia in the bone marrow in three patients receiving chloramphenicol have been reported.⁴ However, no hemopoietic changes of clinical significance have been noted.

BACITRACIN

Bacitracin is an antibiotic agent which is very effective against certain gram-positive organisms; for example, the *Staphylococcus*. Therefore, infections of the skin and wounds infected with this organism often respond well to local treatment with this substance. Unfortunately, much of the Bacitracin which has been produced commercially has had a toxic effect on the kidneys, and therefore has been unsatisfactory for systemic use.

TYROTHRIN

Tyrothricin was the first antibiotic agent produced commercially. It is useful when used locally in a few infections, but it cannot be administered systemically.

ANTIBIOTIC THERAPY OF COMMON INFECTIONS

The selection of an antibiotic agent to use in a particular infection no longer is a simple matter. Each of the antibacterial agents is effective against certain specific infections, and is ineffective against others. Some infections will respond to any one of several chemotherapeutic agents. The physician must choose wisely, so that an effective form of therapy is used and yet one which will not cause needless expense. A review of current trends in the treatment of some of the more common infections

encountered by the general practitioner may be helpful. The correct dose of each of the antibiotic agents has been carefully worked out and is well outlined in the folders accompanying each commercial preparation. Unfortunately, it is the tendency of many physicians to administer too small amounts of an antibiotic agent for too short periods. If a disease is serious enough to warrant the use of an antibiotic agent, adequate amounts of the agent should be administered frequently and for sufficient periods of time.

Infections of the ears, nose and throat. In most cases, tonsillitis, sinusitis or otitis media (such as are caused by streptococci) respond well to penicillin. Rarely, infections in these organs are due to gram-negative organisms, against which Aureomycin, chloramphenicol (Chloromycetin) or Terramycin should be used in preference to penicillin. None of the antibiotic agents are of value in the treatment of the common cold.

Pulmonary infections, such as pneumonia. In most cases, penicillin very effectively controls pneumococcal pneumonia, especially in patients less than 50 years old. Aureomycin has been shown to be at least as effective as penicillin in pneumococcal pneumonia and may be even more effective. Aureomycin has the additional advantage of exerting a beneficial effect on patients who have primary atypical pneumonia. Therefore, in situations in which the type of pneumonia is not readily apparent, Aureomycin probably is the drug of choice, inasmuch as it is effective in most types of pneumonia. Terramycin probably will be equally effective, although further clinical studies are necessary. Chloramphenicol (Chloromycetin) also may be effective, although there have not as yet been any published reports of a large series of treated patients.

If adequate amounts of these antibiotic agents are administered early in the course of pneumonia, empyema usually does not develop. Even when empyema does occur, it often responds to further treatment with these agents.

Meningitis. In all cases of meningitis, a specimen of cerebrospinal fluid should be obtained immediately for culture. In most instances, however, it is advisable to start treatment before the results of the culture are known. For this initial therapy, a combination of penicillin administered intramuscularly and intrathecally and either sulfadiazine or Gantrisin administered orally or intravenously seems the best form of therapy. If meningococci or hemolytic streptococci are recovered by culture, the meningitis generally will respond satisfactorily to this combination of drugs. If it is found that the meningitis is caused by staphylococci or pneumococci, clinical results will not be so good, but no more effective combination of drugs than this one has yet been reported. Meningitis caused by *Hemophilus influenzae* usually responds well to Aureomycin, Chloromycetin or streptomycin. When this type of meningitis is severe, sulfadiazine should be administered in combination with one of these antibiotics. For tuberculous meningitis, a combination of streptomycin and para-aminosalicylic acid should be administered for several months.

Infections of the genito-urinary tract. Small doses of sulfadiazine often are effective in eradicating sensitive organisms from the urinary tract. The administration of 300,000 units of procaine penicillin intramuscularly daily, in addition to the oral use of 7½ grains of sulfadiazine or Gantrisin three times daily as a rule will control most infections of the urinary tract. Gram staining of the urine is a simple and very helpful method of determining the most desirable form of therapy. In infections caused by gram-negative bacilli, against which a combination of sulfadiazine and penicillin is not efficacious, Chloromycetin or Terramycin would appear to be the drug of choice. The use of streptomycin can be considered when the infection is resistant to the other antibiotics. For infections of the urinary tract caused by gram-positive cocci, penicillin is the antibiotic agent of choice. In view of the fact that many strains of staphylococci are resistant to penicillin, the use of Aureomycin or Terramycin may be indicated. No matter which one of the chemotherapeutic agents or what combination of drugs is used, poor results usually will be obtained if a foreign body or obstruction is present in the urinary tract.

Peritonitis. At present a combination of Aureomycin and dihydrostreptomycin appears to be the therapy of choice for peritonitis. However, further investigation of Terramycin and of Chloromycetin may change this concept. If culture of organisms obtained from the peritoneal cavity produces positive results, the chemotherapeutic agent most effective against the organism in question should be incorporated in the plan of treatment. For severely ill patients, Aureomycin should be administered intravenously and dihydrostreptomycin intramuscularly for the first day, at least. Later, the Aureomycin may be administered orally if the patient's condition has improved sufficiently.

Infections of the skin and soft tissues. Furuncles, carbuncles and extensive cellulitis have responded well to penicillin. Because of the increasing numbers of penicillin-resistant staphylococci in certain hospital populations, it is well to consider the use of Aureomycin or Terramycin for those patients who do not respond to penicillin within 48 hours. Aureomycin and Chloromycetin have been used in the treatment of herpes zoster (shingles), with encouraging results in a limited number of cases. However, further study will be necessary before final opinion can be given concerning the efficacy of these drugs in the treatment of herpes zoster.

Osteomyelitis. Penicillin still appears to be the drug of choice in the usual instance of osteomyelitis. Aureomycin or Terramycin, however, should be used for those patients whose condition does not rapidly respond to penicillin and for those from whom penicillin-resistant organisms are obtained by culture.

Miscellaneous. In the treatment of syphilis, penicillin still is the drug of choice, although Aureomycin and Chloromycetin have been shown to be effective in the acute form. Results obtained in the treatment of typhoid fever with Chloromycetin have been very satisfactory.

None of the other antibiotic agents have had any significant effect on typhoid fever.

Only a few of the more common infections which the general practitioner encounters have been discussed. Chemotherapy also is of value in some of the less common infections.

COMBINATIONS OF CHEMOTHERAPEUTIC AGENTS

The combining of two chemotherapeutic agents is necessary in certain infections if the most effective method of therapy is to be attained. Several examples of this have been mentioned in the preceding discussion. Penicillin and the sulfonamides, penicillin and dihydrostreptomycin, Aureomycin (or Terramycin) and dihydrostreptomycin—each of these combinations is exceedingly effective against certain organisms, and the two agents should be used together in infections caused by these organisms, unless there are contraindications. No evidence has been presented that combinations of penicillin with Aureomycin, Terramycin or Chloromycetin are of value. Use of such combinations should be avoided until further investigation has been carried out.

PROPHYLACTIC USE OF CHEMOTHERAPEUTIC AGENTS

The indiscriminate use of chemotherapeutic agents is a grave error. There are certain instances, however, in which the prophylactic use of the drugs is definitely indicated. First, the use of the sulfonamides or penicillin to prevent recurrences of rheumatic fever is well known. Second, patients who have rheumatic or congenital heart disease should be given penicillin or Aureomycin before and after any surgical procedure or dental extraction. Third, Aureomycin or one of the sulfonamides should be administered to all patients before surgical operations on the bowel. Fourth, penicillin or Aureomycin should be administered when operations on the thorax or heart are to be carried out.

CONCLUSIONS

The development of several new antibiotic agents in the last few years has made possible the abatement or eradication of many infections which heretofore have been extremely serious and often fatal. The correct choice of an antibacterial agent or combinations of antibacterial agents to be used in a specific disease is a matter of considerable importance if the disease is to be treated effectively and economically.

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Fractures Requiring Open Reduction*

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IN any fracture treatment, the goal must be complete restoration of function in the shortest possible time. If open reduction is necessary to achieve this or will facilitate its achievement, it should be utilized. This is especially true since sepsis and other complications which were formerly encountered have been largely eliminated.

In some fractures open reduction is absolutely required, such as those in which there is *interposition of soft tissues*, a *complicating nerve injury* or in *irreducible fractures*. Interposition of soft tissues is self-explanatory, as is the irreducible fracture which cannot be reduced by closed methods. Complicating nerve injuries require early exploration to determine the nature of the pathology, as valuable time can be wasted while waiting for the possibility of spontaneous recovery. The fracture should be reduced and fixed during the exploration.

Other fractures in which restoration of function depends upon open reduction include:

Fractures of the olecranon process of the ulna, with separation or comminution. Residual separation will result in loss of or weakness of extension at the elbow. Comminution involves the articular surface and if accurate reduction is not obtained, traumatic arthritis will result. If the proximal third is comminuted, excision of the fragments with triceps repair is the method of choice.

Fractures of the patella with separation, either transverse or comminuted. Loss of function of the quadriceps apparatus usually results unless open reduction is done; and in the case of comminution, the small fragments must be removed to prevent post-traumatic changes. Accurate replacement of these "jig-saw puzzle" pieces is usually impossible. The entire patella may have to be removed if the comminution involves both poles.

Fractures of the head of the radius with displacement, especially of the medial portion, tend to result in loss of pronation and supination. The head and a portion of the neck should be removed early. Late removal often does not restore motion. Accurate replacement is necessary in children, however, because removal produces a growth disturbance.

Fractures of the upper third of the ulna with dislocation of the head of the radius—the Monteggia fractures—require fixation of the ulnar fragments for maintenance of the radial head in proper position. There is usually over-riding of the ulnar fracture.

Fractures of the shafts of both bones of the forearm, if complete, are almost always difficult to manage. This is true also in oblique fractures of one bone only, and in fractures of the ulna alone in its upper half or the

radius alone in its lower half. The pronators and supinators rotate the fragments. At least 50 per cent apposition must be obtained and maintained or open reduction is necessary. Supination and pronation are too important to the function of the upper extremity to be limited by disturbance of the interosseous space.

Fractures of the neck of the femur need little discussion because it has been well established that internal fixation is the method of choice.

In trimalleolar fractures of the ankle, if more than one-fourth of the tibial articular surface is involved with the "posterior malleolar" fragment, accurate replacement with internal fixation is essential. A flap of ligament and periosteum is often interposed between the medial malleolus and the shaft fragment, making union impossible; and this, too, must be dealt with openly.

Improperly used traction occasionally makes open reduction imperative. When *distraction or over-pull* occurs, open reduction should be performed because distraction even for a short period often results in delayed or non-union. *Persistent over-riding* does not preclude union but it will cause delay and alter function. It should be corrected by early open reduction and fixation.

There are some fractures which may be treated by other methods with fairly satisfactory results; but, all things being equal, better results can be expected by open reduction. Morbidity, comfort and economy also may dictate the use of open reduction. Its use in *inter-trochanteric fractures of the femur* in elderly persons parallels its use in femoral neck fractures.

Fractures of the upper two-thirds of the femoral shaft are difficult to treat by closed methods, and when comminution is minimal, open reduction is indicated. Intramedullary nailing is excellent for these.

Fractures of the lower third of the femur present the real problem of angulation; reduction and maintenance are difficult. Any deformity adversely affects knee joint function. Open reduction will simplify this problem.

Tibial plateau fractures with marked comminution and depression may require open reduction, although manipulation, compression and traction will often be adequate for the less severe fractures of this type.

In *spiral and oblique fractures of both bones of the leg*, open reduction will usually decrease the healing time, eliminate shortening and prevent angulation—which alters knee and ankle function.

SUMMARY

A number of fractures have been presented in which open reduction is required or desirable in attaining the
(Continued on page 124)

*Presented at the annual meeting of the North Dakota State Medical Association.



Fig. 1 A. Fractured olecranon. 1 B. Postoperative fractured olecranon.

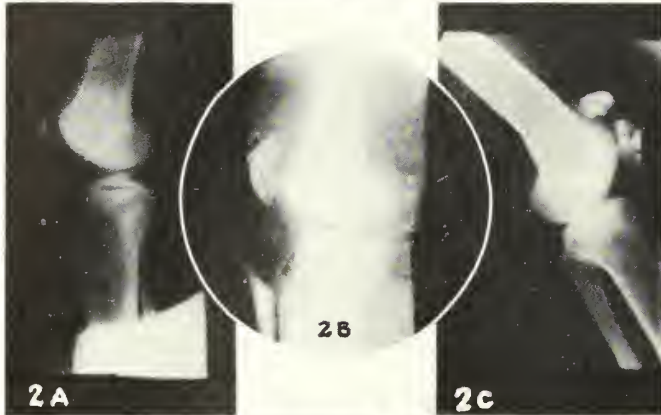


Fig. 2 A. Patellar fracture with separation. 2 B. Same after open reduction and wiring. 2 C. Comminuted fracture of the patella (entire patella excised).

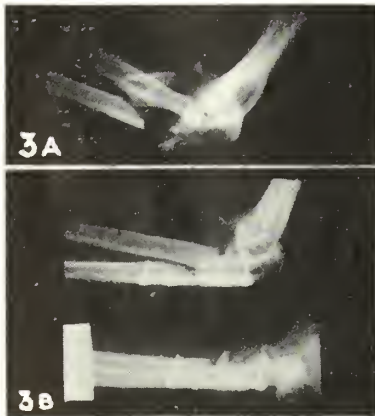


Fig. 3 A. Atypical Monteggia fracture. 3 B. After plating of ulna and excision of head of radius.

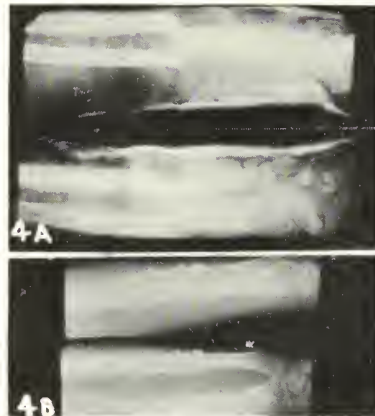


Fig. 4 A. Fracture of both bones of the forearm after attempted closed reduction. 4 B. After plating.



Fig. 5 A. Intracapsular fracture of the neck of the femur. 5 B. After Smith-Petersen nailing.

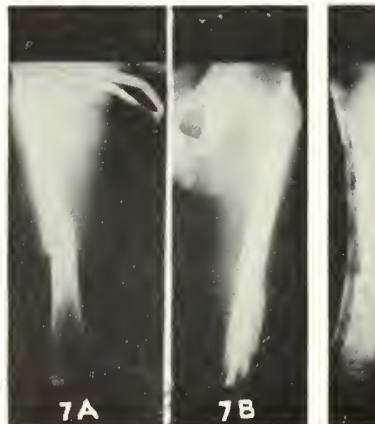


Fig. 6 A. Trimalleolar fracture of the ankle. 6 B. After open reduction. Internal fixation required for posterior malleolus only.



Fig. 7 A. Fracture, middle third of femur. 7 B. After intramedullary nailing or pinning.



Fig. 8 A. Oblique fracture of the tibia. 2 B. After internal fixation.

Rheumatism—Unitary Conception and Control by Modern Methods*

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THE PROBLEM of rheumatism will be discussed under two main headings: (1) non-articular or common rheumatism, and (2) articular forms. In contrast to the present trend of describing more and more forms and syndromes of rheumatic disease—more than 200 have already been described¹—a unitary conception of that widespread malady will be advanced.

OBJECTIVE DIAGNOSIS OF PAIN

It must be realized that rheumatism is the prototype of a great number of maladies, the cardinal symptom of which is *pain*. It is true that it is frequently associated with disturbances of movements and locomotion, but these complaints are due solely to pain. If we are able to relieve the pain, such as may be done temporarily by cortisone, the patient appears almost normal in every respect. Unfortunately pain is a purely subjective phenomenon. It varies a great deal from slight discomfort and tiredness to the highest degree of suffering, rarely associated with a feeling of anguish. In addition sensitivity to pain appears to vary considerably in different individuals. They may be *hypersensitive*, *normosensitive*, or *hyposensitive* to pain, probably owing to an individually differing threshold of pain. That such a subjective phenomenon does not satisfy the requirements of a scientific diagnosis becomes apparent by a comparison with "fever," the exact diagnosis of which can by no means be based on the sensation of the examiner, but requires the objective finding of a thermometer.

The study of objective criteria of pain on many hundreds of patients has led to a most remarkable finding: in rheumatism as well as in some other functional maladies the pain complained of is of *muscular* origin. It arises from anatomically defined muscular areas, called "myalgic spots."

Definition: Myalgic spots are small muscular areas localized in the origin, insertion, border, or course of a muscle or its continuation, such as the ligaments, which cause referred pain and on pressure elicit a reflex-like jerking in any part of the body and a grimace.

RHEUMATIC MYOPATHY (MYALGIA) AS THE BASIS OF NON-ARTICULAR RHEUMATISM

Definition: Myalgia is a muscular disease, probably of a functional nature, characterized by "myalgic spots" which give rise to the triad: referred pain of a dermat-

ome-like delineation, temporary weakness and loss of power in the affected muscle, and neuralgiform symptoms (paresthesia, etc.).

It is to be noted that the myalgic spot is the fixed pole in the ever changing phenomena of rheumatism, and the *conditio sine qua non* for the diagnosis. Sore spots or trigger points, mostly referred to in the literature, are neither indicative nor the real root of rheumatic myalgia.

Pain phenomena in rheumatism. These consist of two types—(1) a deeply felt pain of a more or less agonizing or annoying character, often called "ache" by patients, which mostly cannot be properly localized by the sufferer, and (2) a superficial kind which can be approximately delineated. From the point of view of practical diagnosis the fact is very significant that the pain is elicited and aggravated by contraction and diminished by relaxation of the affected muscle or muscles.²

Rule of dermatomes. The examination of more than a thousand patients has established the fact that the relationship between the areas of pain mapped out by patients themselves and the individual muscle or muscles responsible for or causing them, is determined by the rule of dermatomes: pain is referred to skin areas, approximately dermatome-like in delineation, which are mostly supplied by spinal nerves or roots innervating the muscles causing it. For anatomical reasons pain may also be referred to dermatomes which are the direct neighbors of the main root.²

TECHNIQUE FOR LOCATING MYALGIC SPOTS

1. The patient is asked to map out on a chart, front and back, as exactly as possible, the painful skin areas from which he suffers at present, as well as those he has felt in the last three months. After some experience the physician learns soon to correlate these areas of pain with the responsible myalgic areas localized in muscles innervated by the same spinal nerves. Actually the painful skin areas are mostly very characteristic in shape and distribution and recur with almost monotonous regularity. Lumbago patients, for instance, delineate an oval or circular symmetrical area in the lower part of the back; in shoulder pain the skin area corresponds to that shown in the diagrams.

2. The best clue as to which movement brings on or aggravates the pain is elicited by questioning the patient or by passive movements. In this way one is led to examine thoroughly the muscle or muscle group taking part in pain-producing contraction.

*Read at the first International Congress of Internal Medicine, at Paris, September 11 to 14, 1950. The technique of diagnosis and treatment was demonstrated at the Beaujon Hospital, Paris-Clichy, (Professor R. Fauvert).

3. The suspected muscle is palpated lightly with the finger tips. Small areas are often found which are harder to the touch than the surrounding area. Pressure is exercised on these and on the origin, insertion and course of the muscle. The presence of a myalgic spot must be diagnosed only if the patient shows, as mentioned above, a reflex like jerking, or if he makes a face. This sign is pathognomonic and most reliable. It is of the utmost importance to distinguish the objectively located myalgic spot from "sore spots" or "trigger points," the localization of which depends on the subjective sensation of the patient. Unfortunately the literature contains incorrect or no descriptions of myalgic spots, leading to great confusion. Despite repeated stress on the objective character of the latter, it is often or mostly said to be identical with trigger points or nodules. Actually, the latter are of no diagnostic significance, and are in most cases conspicuous by their absence. The confusion seems to have arisen from the fact that a myalgic spot is often harder to the touch than the surrounding tissue, because the diseased area is in a state of tonic or spastic contraction. It may be mentioned parenthetically that the muscle spasm disappears within 30 to 50 seconds, on appropriate injection of procaine.

DYNAMIC PATHOLOGY

There is consensus of opinion that with the methods available at present no histological changes are ascertainable. This fact, however, does not justify the conclusion that non-articular rheumatism, because it has no pathology, is an "imaginary" or psychogenic malady. On the other hand the theory, propounded in 1938² by the writer, that the disease consists in a disturbed circulation—diminished blood flow leading to a relative hypoxia, mostly by vasoconstriction in the myalgic areas—appears best to account for the triad of pain, disturbed muscular function and paresthesia. The functional pathological condition may be brought about by many "causes": infections; toxic conditions; allergy; autonomic imbalance affecting the local capillary tonus (blood flow); psychological factors such as mental strain, long continued worries, and trauma. An injury, mostly of an indirect nature, is in my experience a most frequent factor, possibly in the form of a "microtrauma" escaping the memory of the patient, to which the malady can be traced. For instance, among 500 cases studied in the British Army during the last War about 25 to 30 per cent could with certainty be traced to a recent or previous injury—traumatic myalgia.² One has also to keep in mind the great significance of the K:Ca ratio, which is intimately connected with the function of both divisions of the autonomic nervous system and hence influences, like some hormones such as adrenalin and acetylcholin, metabolites (histamin, adenyphosphoric acid, lactic acid) and endocrines, the local capillary tonus and blood flow and oxygen supply.

THERAPY

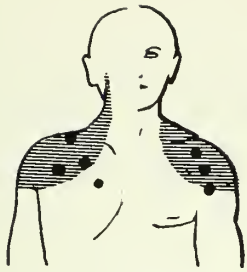
The most efficacious treatment consists in injection of a small quantity (1 to 2 ml. of a 2 per cent solution) of procaine intramuscularly and accurately into each myalgic spot. The therapeutic results are most gratify-

ing and spectacular. Few occurrences in clinical medicine could be more dramatic than the rapid relief obtained, for instance, in a case of acute lumbago by injection of 5 to 10 ml. of procaine into the borders of both quadrati lumborum. In my experience the treatment leads to a rapid relief of pain and restoration of function of the diseased muscles in a short time.² The beneficial and permanent therapeutic results could not easily be equalled or surpassed by any other method available at present. Among British rheumatologists Warren Crow (1949)³ was the first to confirm the extreme importance of the myalgic spot (MS). He reports the injection of procaine "is the most valuable of all weapons for the treatment of the individual rheumatic."

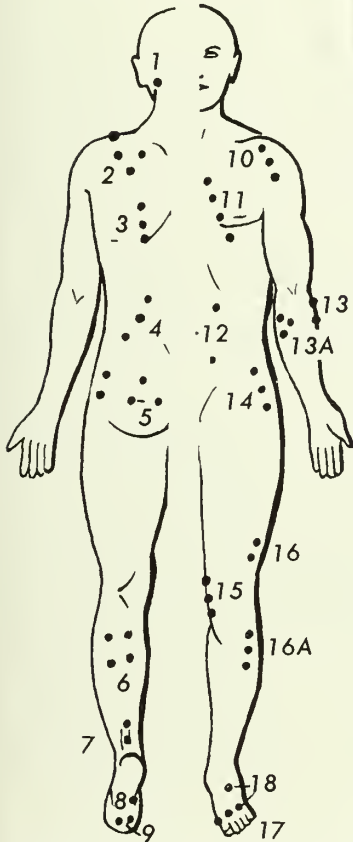
ARTICULAR RHEUMATISM

The thorough study of rheumatic, traumatic and idiopathic myalgias in the last 15 years resulted in a very unexpected and surprising finding, viz., that rheumatoid as well as osteo-arthritis are frequently associated with *objectively* ascertainable myalgic areas in the neighboring muscles of the affected joints. But what is even more unusual is the observation that the myalgic spots found in cases of arthritis were partly, or sometimes to a large extent *identical* with those characteristic of non-articular rheumatic. These recurrent observations led the writer to put forward as a working hypothesis a daring and perhaps revolutionary conception: arthritis, rheumatoid or otherwise, is primarily a muscular disease, viz., a *peri- and para-articular myopathy*, which leads *secondarily* to the well known morbid changes in the bones, synovial membrane and other joint structures. Obviously it was incumbent upon me to subject the hypothesis to a most rigorous and searching scientific test. This has been done on a great number of cases: in the past two years about 120 cases, mostly rheumatoid arthritis, were thoroughly investigated, with the result that the myalgic spots in muscles, tendons and ligaments of the diseased joints could be ascertained, in every case, by objective criteria, which are specific and characteristic for every individual joint. The diagrams will serve as illustrations, showing the typical myalgic areas in arthritis of hip, knee, shoulder and wrist, respectively. A most remarkable finding is that the myalgic spots are almost the same in rheumatoid (atrophic), in osteo-arthritis (hypertrophic) and in traumatic arthritis. This makes it appear likely that the conception of a peri- and para-articular myopathy is of a *general* nature, applicable to any form of arthritis, e. g., infective, toxic and others. If this theory is correct the designation *myo-arthropathy* or *myopathic arthritis* of rheumatoid, osteitic and traumatic type would appear to be appropriate.²

The discovery of specific myalgic areas objectively ascertainable in arthritis obviously opened a new avenue to a rational and promising therapy. Procaine injection of the myalgic spots appeared the method of choice, as in non-articular rheumatism. Regarding the technique it should be mentioned that the two per cent solution was injected only intramuscularly, into the tendons and ligaments, avoiding the subcutaneous structures, and never into the joint (intra-articularly).

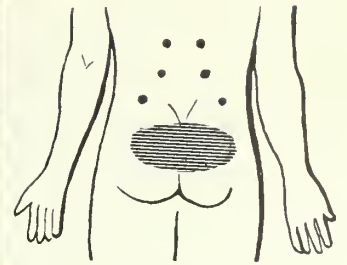


Painful shoulder

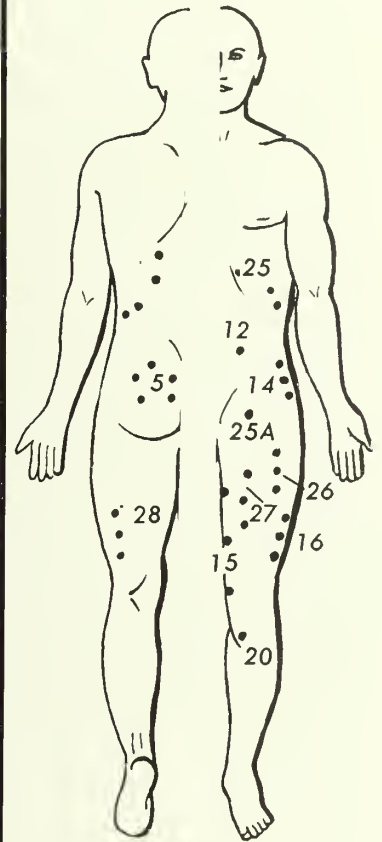


Myalgic spots
Areas of pain as mapped by patients

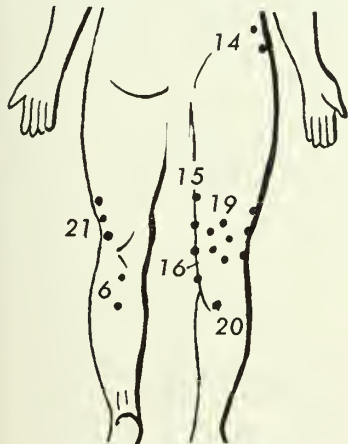
1. M. sternocleidomastoid
2. M. trapezius
3. M. sacrospinalis
4. M. quadratus lumborum
5. Mm. glutei
6. Mm. gastrocnemii
7. Tendo Achilles
8. M. tibialis posterior
9. Mm. flexor & abductor obliquus hallucis
10. Tendo M. bicipitis
11. M. pectoralis major
12. M. rectus abdominis
13. Mm. extensores manus
- 13A. Mm. flexores manus
14. M. tensor fasciae latae
15. M. semimembranosus tendinosis
16. M. vastus lateralis
- 16A. Mm. perinei
17. M. extensor hallucis brevis
18. M. interosseus dorsalis
19. Ligamentum patellare
20. Pens anserinus
21. M. biceps femoris, ligamentum collaterale fibulare
22. M. deltoideus
23. Mm. flexores carpi radialis, ulnaris, palmaris longus
24. Mm. extensores carpi radialis longus, ulnaris, palmaris longus
25. M. obliquus abdominis
- 25A. M. ileopsoas
26. M. rectus femoris
27. M. adductor magnus
28. M. biceps femoris



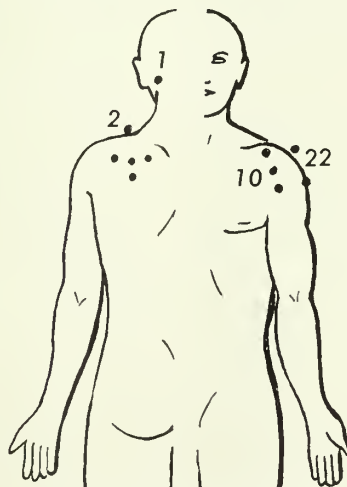
Lumbago



Distribution of myalgic spots in different parts of the body

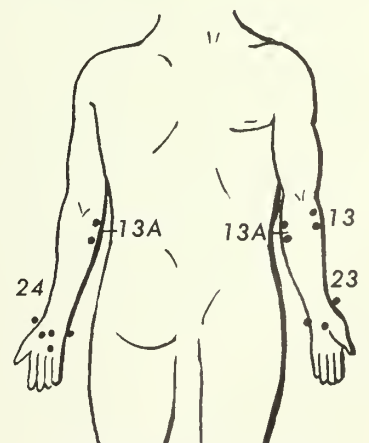


Arthritis of the knee



Arthritis of the shoulder

Arthritis of the hip



Arthritis of the wrist

RESULTS OF PROCAINE THERAPY

Of the 120 cases examined during the last two years, 80 have received the procaine treatment. The results obtained show definitely that the method gives satisfactory and most gratifying therapeutic success and it has proved possible to *control pain permanently*. In not far advanced stages of the disease, without severe and gross x-ray changes, the affected joint can be restored to a normal range of movements. But even in cases of many years' standing, up to 20 years, with severely damaged and wasted muscles, it has proved feasible to restore the function and range of movement without pain to a large extent. Joints which have been fixed for years with not the slightest movement possible, actively or passively, so that they appeared ankylosed, can be made to move again to a certain extent, which enables the patient to use the formerly crippled joint sufficiently for many practical purposes. Among my patients are a number treated up to two years ago, who have had no recurrence of pain or other complaints in the joints treated. It may not appear superfluous to emphasize that no intra-articular injection was ever made, but only the objectively located myalgic areas treated. As a rule, every spot need be injected only once. In exceptional cases, if the area was not thoroughly and accurately treated, a second injection may be necessary to obtain a total relief. In the early stages of the disease it is possible to relieve pain fully and restore the full range of movement by three to four treatments. It is noteworthy that the edematous swelling often present in arthritis slowly disappears, so that the diseased joints soon regain their normal contours, in wrist, knuckles, knee, and ankles. Often the treatment is accompanied by a remarkable loss of weight, probably due to excretion of accumulated fluid in the peri-articular and subcutaneous tissue spaces. Another result worth stressing is the great improvement in general health and improved mood. Patients who have been in pain and incapacitated for years look extremely depressed, with dull eyes, are extremely self-centered and not in the least interested in anything but the enumeration of their unceasing complaints. But after a few weeks' treatment the eyes are clear, the look straight; they are more cheerful and start taking an interest again in their surroundings and fellow creatures.²

Physicians rarely think of the fact that the skeletal muscles are the largest organ of the body, containing about one-third of the total blood volume, and are subject to great wear and tear during waking hours.² It is therefore hardly surprising that recent research has proved that the musculature plays a frequent and significant role in the pathogenesis of many functional mala-

dies, and also in the rheumatic diseases. Retrospectively, it appears probable that the outstanding importance of the skeletal muscles in both pathology and medicine was not sufficiently appreciated in the past, because of the lack of objective criteria of the rheumatic and idiopathic myopathy, which is often of a functional nature. Its main pathogenetic mechanism is most likely hypoxia in the myalgic areas, brought about by a blood flow relatively deficient in relation to the momentary function of the contracting muscle. It is well known (Sir T. Lewis, 1938)⁴ that a muscle made to contract under ischemia, i. e., total lack of oxygen or anoxia, causes severe agonizing pains, and is very soon paralyzed. It is reasonable to assume that many causes such as trauma, infections, toxic conditions, allergy, climatic changes, especially those of a sudden nature, an imbalance of the autonomic nervous system, emotional strain by acting on the local capillary tonus, may lead to the same functional pathology in the myalgic areas. Only after such a morbid condition has been going on for a longer period, such as frequent vasospasms of long duration, may histopathological changes of a secondary nature develop in joint structures, the muscles themselves, Heberden nodules and related anomalies in the subcutaneous tissues.

Leaving rheumatic fever out of the picture, for the present, we thus arrive at a *unitary conception of rheumatic disease*. Instead of hundreds of syndromes, lately indulged in by some writers, we believe that fundamentally there exists one disease only, a rheumatic myopathy, or myalgia simplex, responsible for non-articular rheumatism, which is as well the primary pathology of the articular forms. The latter are essentially a peri- and para-articular myopathy, which, owing to the severity and long duration of impaired blood supply, probably aided and aggravated by many other conditions, such as imbalance of endocrines, emotional strain and other psychological factors, leads secondarily to histological changes in muscle, tendon and bony structures.

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*The physician looks with other eyes on the medicinal herb
than the grazing ox which swoops it in with the common
grass.*

—JOSEPH GLANVILL

Diagnosis and Treatment of Usual and Unusual Anorectal Abscess*

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ABSCCESS of the anorectal region is a rather frequent occurrence that seems to have no particular predilection for being first detected or first treated by the proctologist. Since these abscesses are frequently quite insidious and damaging in their course and since the general concept of treatment has changed considerably in the past decade, a review of this subject should be in order.

Anorectal abscesses differ from abscesses elsewhere in the body because of their inherent danger to the anal sphincter mechanism, their tendency to recur, and their predisposition to develop fistulae in ano. Abscesses in this region seldom warrant conservative, non-surgical treatment. They should be recognized early and treated radically enough to eradicate the primary fistulous tract in one stage, if possible.

ETIOLOGY

The etiologic factors predisposing to anorectal abscess are multiple. The chief causes of infection in this area, however, may be listed as follows:

1. Infection in the anal crypts, ducts, and glands (most common cause).
2. Abrasions, excoriations and ulcers of the mucous membrane and peri-anal skin; as for example, fissure in ano.⁴
3. Postoperative infections following surgical procedures of the anal canal or rectum; as may occur, for example, with improper drainage following hemorrhoidectomy.
4. Infections of perianal or perirectal hematomas.
5. Ulcerative colitis, amebic dysentery, lymphopathia venereum, osteomyelitis, and actinomycosis, etc.
6. Trauma, as with puncture wounds, foreign bodies, etc.
7. Chemicals, as in the treatment of pruritus ani, injection of hemorrhoids and rectal prolapse.

Some of these merit further explanation. Cryptitis has long been accepted as a forerunner of anorectal abscess. Since Tucker and Hellwig⁵ emphasized the role of the anal ducts and glands in anorectal abscess formation, other workers have further confirmed the importance of these structures in predisposing patients to abscess of the anorectal region.

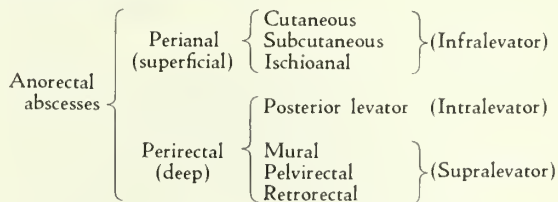
It is generally thought that trauma to the anal crypts, as may occur with stool making its impact on this area, may frequently represent the forerunner to anorectal

abscess. However, it is entirely possible that pyogenic bacteria may gain access to the anal ducts and glands and be funneled into their ostia by the anal crypts, as Nesselrod⁵ has pointed out, and there incubate and spread to the perianal and perirectal areas.

The anal glands have their duct openings just behind the valve-like anal crypts. Hill³ and his co-workers made detailed microscopic studies of the anal canals of 49 fetuses and observed that varying numbers of anal glands were present in 53 per cent of the specimens. These glands in many instances followed quite complex and tortuous courses. It was their feeling that those persons who possess a large number of anal glands were more susceptible to anorectal abscess formation than those possessing few or no glands.

CLASSIFICATION

Abscesses of the perianal or perirectal regions are distinct entities depending upon the potential anatomic spaces that they occupy. As they progress in size it is entirely possible for them to extend or rupture into adjacent anatomic spaces. They are generally classified for the purpose of clarity into those below, those within, and those above the levator ani muscles; as is shown in the accompanying diagram.



SYMPTOMS AND DIAGNOSIS

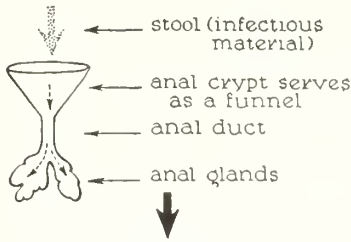
The superficial abscess presents the usual symptoms of an abscess elsewhere in the body. The initial symptom is an uneasiness or discomfort in the tissues beside the anus and is frequently ushered in by constitutional reactions, as chills and fever. The local discomfort increases in intensity, takes on the character of a dull ache and finally becomes throbbing. Usually the pain is exquisite and is aggravated by bowel movements; in addition, the patient is unable to walk, sit, or lie down in comfort. Difficult or painful urination is not uncommon, due to pressure or irritability of the nerves to the bladder neck.

Inspection usually reveals redness and swelling; local temperature, acute tenderness and fluctuation may be detected with palpation. Cutaneous and subcutaneous

*Read before the Swedish Hospital (Minneapolis) Staff Meeting, December 11, 1950.

**DIAGRAM OF ANAL INFECTION
STAGE - I.**

Role of anal crypt



STAGE - II.

Invasion of perianal (and perirectal) tissues :

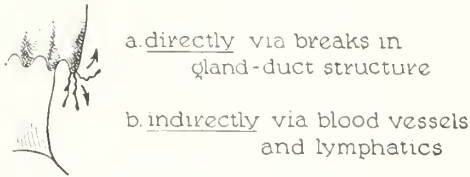


Fig. 1. Diagrammatic representation of anal infection. Nesselrod—Proctology in General Practice, pp. 65.

abscesses always follow this pattern. Ischioanal abscesses are generally manifest externally, but occasionally the examiner may not be able to discern external evidence of infection. This may be particularly true in dark-skinned persons and individuals with rather thick integument. External evidence of infection may not be present in an early abscess located high in the ischioanal fossa and with some anterior ischioanal collections.

If the boundaries of the ischioanal fossa are kept in mind, however, little difficulty will be encountered in making a diagnosis of abscess in this area. Digital examination of the rectum frequently reveals a fluctuant mass presenting into the lower rectal lumen. Careful

palpation of the anal canal and the area adjacent to the abscess may reveal the primary fistulous tract. Anoscopic examination and inspection of the anal canal with a crypt hook may divulge the offending crypt or the internal opening of the primary tract. Generally, however, the patient has too much localized tenderness to tolerate a great deal of hooking or probing, preoperatively, and the examiner may have to reserve this procedure for the operating room.

Deep abscesses are more insidious and they usually present no external evidence of suspected infection. In addition to the previously mentioned systemic symptoms of infection, these patients usually complain of a sensation of weight and pressure in the rectum. Usually considerable pain accompanies defecation and constipation or obstipation is the rule; however, this pain is in no way comparable to that encountered in the acute type of ischioanal abscess. Pressure over the tip of the coccyx or the anus usually elicits severe pain.

The diagnosis of mural and deep perirectal abscess depends chiefly upon the findings of digital and proctoscopic examination. The mural abscess presents itself as an ovoid, fluctuating mass in the wall of the rectum and bulging into the lumen is felt. In addition, it is tender and boggy. Through the proctoscope the smooth and regular contour may be noted.²

Pelviorectal abscesses may be palpated bulging into the rectal lumen laterally and above the levator ani muscles. Extensive abscesses in the pelviorectal spaces have not infrequently been mistaken for episodes of acute appendicitis or diverticulitis, due to the peritoneal inflammation and irritation. The diagnosis has been confirmed only by a judiciously placed finger in the rectum.

In posterior levator and retrorectal abscesses, the circumscribed bulge of the abscess into the rectum is readily

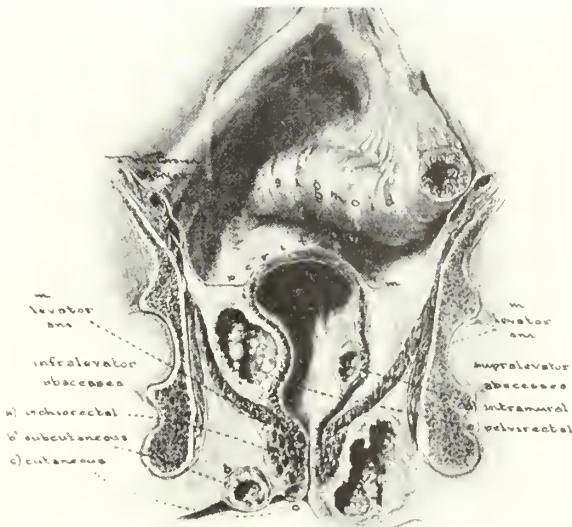


Fig. 2. Abscesses of the anorectal region: supralevator and infralevator. Bacon—Anus, Rectum and Sigmoid Colon, pp. 151.

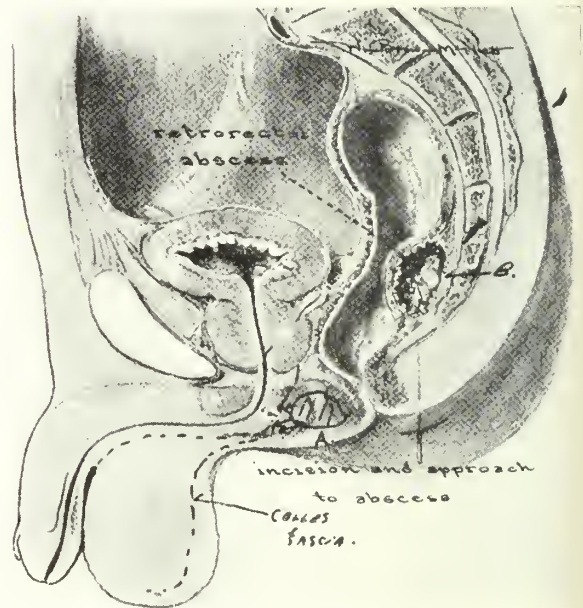


Fig. 3. Anterior ischioanal (a), and retrorectal (b) abscesses.

palpated in the posterior midline. Digital examination often reveals the abscess to be under marked tension and protruding into the rectum, like a large walnut. Occasionally, it is difficult to ascertain whether one or both of these spaces is involved and the question has to be settled at the time of operation. When the retrorectal space alone is involved, the bulging indurated area occurs above the level of the levator muscle and extends up for several inches into the pelvis between the rectum and sacrum. In abscess of the posterior levator space, the bulge is usually smaller, about the size of a large walnut and often under more tension than in retrorectal abscess. These abscesses erode the rectal wall rather frequently and because of this tendency have been frequently misdiagnosed as mural abscesses.

TREATMENT

As soon as the diagnosis of anorectal abscess is confirmed, plans should be made to institute drainage without delay. Any attempt to treat these abscesses conservatively will only result in a more complicated course for the patient.

It is felt that infralelevator abscesses should not merely be incised and drained, but rather uncapped and saucerized to insure more adequate drainage and to avoid indolent sinus tracts. It is always advisable to explore the anal canal carefully under anesthesia in an attempt to locate the offending crypt and internal opening of the primary fistulous tract. If the primary tract is fairly superficial, that is, if it does not transect more of the anal musculature than the subcutaneous bundle, it is felt that ablation of the offending crypt and the primary tract is justified if carried out at the same time that the abscess cavity is uncapped. However, if the tract transects more than the caudal one-third of the anorectal muscular ring, it is preferable to delay the fistulectomy until a later date. Antibiotics, particularly penicillin, are important adjuncts for an uncomplicated course following a one stage procedure.

A rather uncommon but devastating complication of an anterior ischioanal abscess in the male patient is its extension through Colles fascia. Once the abscess breaks through the protective barrier of Colles fascia it extends rapidly to produce marked edema of the scrotum and penis with subsequent gangrene. Clinically, the patient may appear to have a picture similar to that produced by rupture of the urethra with urinary extravasation. Subsequent necrosis and sloughing of the urethra is rather common with this complication of anorectal abscess.

Any abscess that indicates, by signs of swelling, local temperature and tenderness over the perineum, so that it might be predisposed to anterior extension should be drained immediately. Where anterior extension through Colles fascia has developed, the abscess including the area of scrotum and penis must be laid open and drained extensively. A retention catheter or metal sound should be placed in the urethra before instituting drainage in an attempt to avoid damage to the urethra. The

catheter should be left in place postoperatively if the operator suspects necrosis of the urethra.

The deep perirectal or supralelevator abscesses are best operated in stages. The first stage should include drainage by unroofing and saucerization similar to that recommended for infralelevator abscesses and the location of the primary crypt and tract through which the infection originated. The pelvirectal abscess should be approached by unroofing the ischioanal fossa on the involved side until the levator ani muscle is reached. At this point the abscess cavity is broken into by separating the levator muscle fibers with a long hemostat. The abscess cavity should be drained adequately with several Penrose drains that should be removed in 48 hours. Wound packing is generally unnecessary if the ischioanal fossa is adequately saucerized. If gauze packing is used in the wound it should be removed in 24 to 48 hours. Postoperatively, the wound should be wiped gently with applicator sticks or explored with a gloved finger at least every two or three days to insure granulation from the base and to avoid indolent sinuses.

Posterior levator and retrorectal space abscesses are best opened and explored through a posterior midline incision. This separates, rather than severs, the fibers of the external sphincter and the coccygeal muscular raphe.² It also places the anal end of the incision in close proximity to the usual posterior location of the primary opening. The incision is extended from the anorectal wall to the tip of the coccyx. A curvilinear counter-drainage incision may be made lateral to the external sphincter if the lateral extensions of the posterior levator space or the pelvirectal spaces are involved. These abscesses should be given adequate drainage and followed closely postoperatively, as with the pelvirectal abscesses.

Although it is not within the scope of this paper to elaborate on the treatment of fistula in ano, several salient facts must be mentioned as they are encountered in the treatment of anorectal abscess. There are two schools of thought as to the management of the fistulae that occur with deep anorectal abscesses. Some proctologists favor the use of setons of heavy silk or silver wire to mark all deep fistulous tracts at the time the abscess is drained, while others prefer to record carefully the nature and the location of the primary tract at the time the anorectal abscess is drained. The latter policy is preferable in most instances, reserving the use of setons for those cases that have complicated tracts that would be difficult to locate at a second stage procedure.

SUMMARY

1. The role of the anal ducts and glands is an important factor in the etiology of anorectal abscess. Other etiologic factors may be multiple.
2. Abscesses of the perianal or perirectal regions are distinct entities, depending upon the potential anatomic spaces that they occupy.
3. Diagnostic features of the various abscesses are reviewed.

4. Anorectal abscesses should be diagnosed early and unroofed surgically as soon as possible with due regard for the anal sphincter mechanism. Frequently, ablation of the offending crypt and primary tract may be performed at the time the abscess is drained.

5. Treatment of some of the unusual anorectal abscesses is discussed.

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Carcinoma of the Gallbladder and Extrahepatic Bile Ducts

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CARCINOMA of the gallbladder was believed to be rare until about 1850. The apparently increased frequency parallels the increased number of operations on the gallbladder. Between 1840 and 1870, observations accumulated and clinical signs were compared. Between 1870 and 1880, several reports appeared on the surgical treatment. Since that time, the etiology and pathogenesis have been studied and the relationship of carcinoma to infection and stones has been stressed.

INCIDENCE

One of the largest series of cases of gallbladder carcinoma was that of Kirshbaum. In 13,300 consecutive postmortem examinations at Cook County Hospital, there were 1808 malignancies of all kinds. Fifty-five cases of gallbladder and 62 cases of extrahepatic bile duct carcinoma were present. Thus, gallbladder carcinoma was found in 0.41 per cent of all examinations and 3 per cent of all malignancies. Carcinoma of the ducts comprised 0.46 per cent of all examinations and 3.4 per cent of all carcinoma.³² Willis found 26 cases of carcinoma of the gallbladder in 1060 autopsies, or 2.04 per cent.⁶²

That carcinoma of the bile ducts is at least as frequent as that of the gallbladder, is now generally recognized. Willis states that the idea of rarity originated in the fact that carcinoma of the ducts was often called carcinoma of the head of the pancreas.⁶² Tumors of the lower end of the common bile duct are intimately related to neoplasms of the papilla of Vater and head of the pancreas. Carcinomas of the common bile duct in the papillary area are said to be four times as frequent as those from the pancreatic duct.³⁵

AGE AND SEX

Kirshbaum, in reviewing his series of cases of gallbladder carcinoma, found that 76.4 per cent occurred in females and 23.5 per cent occurred in males. Sixty-six per cent of patients were white, 34 per cent were Negro. The youngest patient was 42, the oldest, 86. The age incidence was as follows: 41 to 50 years of age, seven patients; 51 to 60 years of age, 18; 61 to 70 years of age, 20; 71 to 80 years of age, seven; 81 to 90 years of age, three.

In Kirshbaum's cases of carcinoma of the extrahepatic bile ducts, 55 per cent of patients were male and 45 per cent were female. Seventy-seven per cent were white, 11 per cent were Negro, and 2.6 per cent were yellow.

The youngest patient was 31; the oldest was 86. The age incidence was: 31 to 40 years of age, five patients; 41 to 50 years, nine patients; 51 to 60 years of age, 15 patients; 61 to 70 years of age, 21 patients; 71 to 80 years of age, 11 patients; 81 to 90 years of age, one patient. Although carcinoma of the extrahepatic bile ducts occurred at an earlier age than carcinoma of the gallbladder, most patients were in the sixth and seventh decades.³² Eighty-nine per cent of Sainburg's cases of carcinoma of the gallbladder were between the ages of 40 and 60.⁴⁹

PATHOLOGY

At operation or autopsy the presence of a malignant growth often is immediately apparent but the primary site is a problem. With generalized invasion of the gallbladder, no matter how extensive the invasion into the surrounding tissues may be, it is usually plain that the gallbladder is the primary site.

In order of frequency, infiltrating adenocarcinoma, papillary adenocarcinoma, and mucus-producing adenocarcinoma are the most frequent malignancies of the gallbladder. Sarcoma, melanoblastoma and carcinoid have also been reported.^{2,32} Carcinoma of the extrahepatic bile ducts, in order of frequency, are infiltrating adenocarcinoma, papillary adenocarcinoma, mucus-producing adenocarcinoma, medullary carcinoma and squamous carcinoma.³² Carcinoma of the ducts may involve the common bile duct, the cystic duct, the hepatic ducts or their confluence.

Adenocarcinoma is by far the most common type. The same varieties of growth are found as in the stomach and intestines, namely, the papillomatous form and the diffuse infiltrating form. The latter is more common and gives rise to great thickening of the wall from a scirrhous growth. The liver is invaded early and jaundice is one of the most constant features in late cases. (Boyd). The tumor invades all layers of the gallbladder or bile ducts, producing a contracted organ. An ulcerated thickened plaque overlies and replaces the mucous membrane. The gallbladder is often shrunken and the bile duct stenotic. This carcinoma invades early, producing widespread metastases. It is more malignant than papillary adenocarcinoma. The degree of fibrous tissue reaction varies.³² These tumors show extraordinarily good differentiation and when they metastasize they may appear almost like aberrant biliary ducts. Their excellent differentiation is misleading, however, as they are invasive and malignant.

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Infiltrative carcinoma is composed of short strands or cords of cells infiltrating a dense proliferation of fibrous tissue. Sometimes it isn't readily detected and at first glance the whole process may be regarded as inflammation.⁴ Infiltrative carcinoma is composed of a typical alveoli of tumor cells which invade all layers of the gallbladder and bile ducts.³² One must be careful in interpreting slides from old inflamed gallbladders. Glands may be displaced in the reactive process and may become detached from the mucosa.

Papillary adenocarcinoma is thought by some to arise from benign papillomas of the mucosa of the gallbladder or ducts; benign papillomas occur in 10 per cent of surgically removed gallbladders.³¹ Papillary adenocarcinoma is a fungating mass which projects into the lumen; in the bile ducts it is often pedunculated.³²

Next to the stomach, the gallbladder is the most frequent site of mucus-producing carcinoma. This is a degenerative change expressive of an overactivity of mucus-producing activity of gallbladder mucosal glands. Mucous carcinoma is most likely to result in spontaneous perforation of the gallbladder into a nearby viscus. This type can give rise to Krukenberg tumors of the ovary.³² Normally there are no goblet cells in the lining epithelium of the bile ducts. Possibly simple adenocarcinoma arises from surface epithelium or parietal sacculi while colloidal carcinoma arises from mucous glands which open into the sacculi. Shapiro⁵⁰ believes that the tendency to colloid degeneration with numerous goblet cells is an expression of the original intestinal character of the bile duct epithelium. In the papillomatous form of adenocarcinoma the gallbladder is filled with a soft mass which may on occasion be converted into a colloid carcinoma.³ Colloid tumors are especially prone to invade surrounding tissues and produce globular masses.²⁵

The origin of the squamous carcinoma is not entirely clear. Some believe that it arises from a metaplasia of columnar to squamous epithelium. Squamous carcinoma is well known to pathologists as it was chiefly in the gallbladder that metaplasia of epithelium from glandular to an epidermoid type was first noted and studied. This also can occur in the kidney pelvis, ureter, and urinary bladder, breast and many other organs.¹⁹ This metaplasia may be a response to chronic inflammatory change.³² Squamous carcinoma of the gallbladder has often been reported but few are described in the bile ducts. Neither during the development from primitive gut nor in the adult form is there a vestige of squamous epithelium in the gallbladder. The theories to explain the origin of squamous carcinoma are: (1) embryonic rests. Since the gallbladder at no period has squamous membrane, this is unsound. (2) metaplasia. (3) theory of germinal layer. Different types of tissue may be derived from a common parent cell.⁴⁰

Carcinoma of the gallbladder may begin in any part but the most commonly affected portions are the fundus and the commencement of the cystic duct.³ The dome or neck is the origin in 80 per cent of cases; the lateral walls, in 20 per cent.¹⁹ The neck and fundus are more affected than intermediate parts.⁶²

Stewart⁵² made a rather extensive review of the literature. He found 56 cases reported in the hepatic duct, only 32 of which were acceptable, and added three new cases. All were glandular carcinoma. In most, the atypical epithelial cells were cylindrical or cuboidal. Twenty-seven cases were reported in the cystic duct, none with indisputable evidence of primary cancer of the cystic duct. He notes that one must exclude cancer of the gallbladder, pancreas, stomach, duodenum and rectum. Stewart collected 140 cases of carcinoma of the confluence of the extrahepatic bile ducts, 46 of which were acceptable and two new cases were added. They were of two types, single low nodular types projecting above the mucous membrane and the annular constricting type with wall thickening. He collected 86 cases of carcinoma of the bile duct, 20 being acceptable (exclusive of those arising in the ampulla of Vater). One new case was added.

Bile obstruction is produced by an annular stricture of a rigid carcinomatous duct, plugging of the lumen by projecting polypoid mass, or pressure of enlarged metastatic peribiliary lymph nodes. The spasms of smooth muscle structures and the low pressure of the bile within the biliary tract, inflammatory changes from stones, and edema of the mucosa frequently associated with neoplasm, are additional factors.³²

Several changes may occur in the liver in carcinoma of the gallbladder or bile ducts: (1) obstructive biliary cirrhosis; (2) ascending cholangitis; (3) liver abscess; (4) massive metastases. In biliary cirrhosis the liver is usually enlarged, very firm with a dark green hue and on section the markedly dilated extrahepatic bile ducts are prominent. Histologically, there is a marked inhibition of bile pigments by parenchymal bile casts in the dilated biliary capillaries, and a marked proliferation of fibrous tissue and lymphocytes within the portal triads. Occasionally zonal necrosis of the liver lobules is present.

Cholangitis results in a softer than normal liver with pus on section. Histologically, there is thickening of the portal triads, not only from an increase in fibrous tissue but also an acute inflammatory exudate of polymorphonuclear cells and pus cells which tend to surround the proliferating bile ducts. Although the sinusoids contain large numbers of leukocytes the parenchyma is uninvaded unless the process has developed to abscess formation. Liver abscesses tend to be small and scattered throughout the parenchyma. They are filled with light green, purulent material. Abscesses produce a local necrosis with compression atrophy of the surrounding parenchyma.

In 62 cases of extrahepatic bile duct carcinoma there were four cases of biliary peritonitis. No evidence of mechanical leak was found in any case. Transudation through the distended edematous wall probably occurred. Ascites was frequent. This resulted from carcinomatosis of peritoneum and mesentery, portal vein obstruction, by pressure of metastatic lymph nodes, intrahepatic tumor masses, or liver cirrhosis.

Cholemia produces a deposition of bile in the tubular epithelium and formation of bile casts in the kidneys.

This is known as "icteric nephrosis" and is a form of tubular nephrosis. Frequently albuminuria and nitrogenous retention are present. In 16 of 55 gallbladder carcinomas and 24 of 62 bile duct carcinomas, icteric nephrosis was a postmortem finding. The kidneys were swollen, icteric and very soft.³²

Lymphatic plexuses are present beneath both the mucosa and the serosa of the gallbladder. Short communicating vessels through the muscular layer connect the two plexuses. The main lymphatic vessels drain to the sentinel lymph node which is usually located at the cystic duct. This node receives afferent lymphatics from the common bile duct, duodenum and pancreas. The efferent lymphatics from this lymph node pass along the biliary tract and portal vein into the liver hilum. Gallbladder carcinoma therefore metastasizes to the liver by direct extension and through the lymphatics. Bile duct carcinoma, on the other hand, usually extends first by lymphatics. However, because of the closeness of the hepatic ducts to the liver, early direct extension can occur.

These lymphatics then may involve adjacent organs. The lymph nodes involved are the cystic nodes, peribiliary, peripancreatic and periaortic lymph nodes. Carcinoma can spread to mediastinal nodes, to the tracheobronchial nodes, and then to the supraclavicular lymph nodes. Thus Virchow's node may be involved from carcinomas arising in sites other than the stomach.

Metastases from gallbladder carcinoma are widespread and occur early; this is not so with extrahepatic bile duct carcinoma (Kirshbaum). However, 76.7 per cent of extrahepatic bile duct carcinoma showed definite metastases and a listing of the sites shows a diversity second only to carcinoma of the gallbladder.

ETIOLOGY

Gallstones have long been indicted as being causative in carcinoma of the gallbladder. This idea arises mainly because of the frequent clinical association of cholelithiasis and gallbladder carcinoma and experimental work in which irritants placed in the gallbladder of laboratory animals have apparently resulted in cancer.

The incidence of calculosis in cancerous gallbladder has been given from 65 to 100 per cent. The incidence of cancer of the gallbladder in cases of stones has been given between one and 15 per cent, usually four to five per cent.

Stones are not associated with carcinoma of the bile ducts as frequently as with gallbladder carcinoma. The percentage has been reported from 21 per cent to 55 per cent.^{38,52,32} These percentages are somewhat above those of persons without carcinoma, although they are not as striking as in patients with carcinoma of the gallbladder.

Willis⁶² believes the multiple pigmented type usually is responsible. That stones might cause carcinoma has been explained by the theories that chronic irritation predisposes to carcinoma, that some radioactive substance may be present, or that stones contain a carcinogen.³² Methylcholanthrene, one of the most powerful chem-

ical carcinogens, is derived from cholic acid in the bile, and has been suggested as a factor.³

That cholecystostomy does not prevent the later development of cancer is indicated by reports of carcinoma developing subsequent to cholecystostomy,⁴⁹ even as long as 24 years later.⁶² Finney reported two cases in which carcinoma of the gallbladder presented itself in the old drainage tract. The mere removal of the gallstones does not satisfy the moral obligation of the surgeon; the removal of the gallbladder is necessary where possible.

Hager²⁴ reported a case of carcinoma of the gallbladder in a patient with congenital hemolytic jaundice. The sequence of events probably was congenital hemolytic jaundice with resultant gallstones at an early age, and subsequent development of primary carcinoma of the gallbladder with death at 36 years of age. The incidence of gallstones in congenital hemolytic jaundice is 60 to 70 per cent.

Multiple papillomas have been considered as precancerous.⁴⁰ Vadheim⁵⁴ reports that in 75 cases of carcinoma of the gallbladder, there were three instances of malignant degeneration in papilloma and one in an adenoma.

Mohardt⁴⁰ points out that a pathological change more common than stones is infection. In early carcinoma with only a small portion of the mucosa invaded, varying degrees of subacute and chronic infection exist. Fibrous thickening of a free portion of the organ indicates a chronic inflammatory process.

Warren's⁵⁷ viewpoint seems logical. He believes it is not possible to decide whether gallstones are the direct cause of carcinoma of the gallbladder, or whether both the stones and the tumor are the result of some common irritation or predisposing factor. It can be affirmed, however, that a gallbladder with stones has a greater chance of developing carcinoma than one without stones.

EXPERIMENTAL WORK

Kazama in 1922 inserted gallstones, sutures, mucous membrane and pitch into guinea pig gallbladders. The average postoperative survival was five and one-half months; 72 animals were free of carcinoma, 26 had cancer and nine had metastases. Leitch in 1924 produced eight carcinomas in 35 guinea pigs (none with metastases) by inserting gallstones, pebbles and pith balls into the gallbladder. The average survival was 12 months.

The diagnosis of carcinoma in experimental work in animals requires further proof than that supplied by microscope. The tumor should infiltrate and destroy neighboring structures, should be amenable to transfer by autografts or heterografts, should form metastases and, unless treated, should progress to kill the host.

Among the 268 animals into whose gallbladders foreign bodies have been introduced by various workers, not one was recorded as having died of cancer. Malignant tumors were brought about in three to six months by Kazama and Leitch; it is difficult to explain why none died of carcinoma since many lived much over six months.⁸

Petrov's⁴³ original work was criticized in that he published only drawings, but no photographs of the metastases which were produced in his experimental animals. Recently he published an addition to his previous work and included photographs of metastases.

CLINICAL PICTURE

Malignancies of the gallbladder are often insidious in onset and produce no symptoms until the gallbladder outlet is obstructed or neighboring tissues are invaded. Many cases give antecedent histories of repeated gallstone attacks. These attacks are commonly followed by local irritation, pain and epigastric disturbance. The final stage, extension beyond the gallbladder, is characterized by more or less severe, constant, or intermittent, pain.

In tumors of the bile ducts, more or less gradually developing jaundice, without other symptoms, is usual. Attacks of pain, chills, and fevers are a rare precedent unless the ducts are infected. In cases with infection, stones usually are present and a terminal cholangitis is superimposed. Death usually is from intense persistent jaundice, or from attempts to relieve it.²⁵

One of the most difficult concepts to alter is that carcinoma of the head of the pancreas is the most frequent cause of progressive jaundice associated with a distended gallbladder and generalized cachexia. Both carcinoma of the extrahepatic bile ducts and carcinoma of the gallbladder more frequently cause obstruction of the biliary tract than carcinoma of the head of the pancreas. Pain is more frequently associated with the jaundice of all three of the above conditions than has been recognized.³²

Vadheim⁵⁴ has divided gallbladder carcinoma into five groups on the basis of their symptoms.

- I. Colicky attacks for many years with superimposed symptoms suggestive of malignancy: 47 per cent of patients.
- II. Colicky attacks for many years without any recent change in symptoms: 12 per cent of patients.
- III. Gaseous dyspepsia for many years with superimposed symptoms suggestive of malignancy: 17 per cent of patients.
- IV. Gaseous dyspepsia for many years without recent changes: four per cent of patients.
- V. No symptoms referable to the gallbladder prior to present illness: 21 per cent of patients.

Kirshbaum³² usually found the duration of symptoms in gallbladder carcinoma to be three to six months; that of carcinoma of the extrahepatic bile ducts was definitely shorter—two to four months.

Pain is one of the most frequent presenting symptoms of gallbladder carcinoma. Pain is present in from 61.8 per cent to 88 per cent of cases.^{32,33,36} Most frequent in the right upper quadrant, pain also occurs in the epigastrium and in the right lower quadrant of the abdomen. The pain is seldom severe enough to require the use of morphine, and usually is chronic, recurrent and dull. Pain is present in about 40 per cent of cases of extrahepatic bile duct carcinoma. It is dull and usual-

ly located in the mid-epigastrium. Occasionally it is located in the right upper quadrant or the right lower quadrant of the abdomen.³²

Jaundice is present at some time during the course in from 38 per cent to 61 per cent of gallbladder carcinoma.^{32,49,36} Slightly over one-half of Kirshbaum's cases with jaundice had associated pain. The jaundice is usually found on admission, being persistent, progressive, and associated with clay-colored stools in about a third of the cases. The icterus index with jaundice ranges from 65 to 250, but is usually under 100. The Van den Bergh is direct immediate. Jaundice is present in an even higher percentage of cases of carcinoma of the ducts: 92 per cent. Jaundice usually occurs fairly early in the course and it is considered the most reliable symptom. Stools are acholic in about half of jaundiced cases. Pruritus is frequent. Once established, the jaundice is almost invariably unremitting; early, however, it may result from temporary edema or spasm of the common bile duct and be transient. The non-protein-nitrogen and creatinine are elevated, depending upon the jaundice activity. Biluria is persistent and usually marked.

Gastro-intestinal symptoms are present in over half of cases of gallbladder carcinoma. These symptoms consist of vague dyspepsia, anorexia, nausea, and occasional vomiting. As a result, gastric carcinoma is often suspected, but the mildness, characteristic pain, with or without jaundice, usually militate against this diagnosis. Diarrhea, constipation and melena are infrequent. Over half the patients are cachectic on admission, sometimes having lost as many as sixty pounds in six months. Profound anemia occurs in from 15 per cent to 33 per cent of cases. A definite weight loss is found in from 41 to 57 per cent.^{49,36}

A nonfilling gallbladder, with or without positive stone shadows, is to be expected in carcinoma of the gallbladder.^{32,33} Rothenberg⁴⁸ reported eight cases in which acute cholecystitis occurred during the early course of neoplastic common bile duct obstruction. One can trace the origin of the acute exacerbation of cholecystitis and can appreciate the factors which led to its development. The underlying malignant lesion was overlooked in every case because of the acuteness of the gallbladder inflammation. Several acute attacks, from one to 25 years previously, had occurred in six of the eight. Seven had characteristic biliary colic.

One-fourth to two-thirds of patients with gallbladder carcinoma have a palpable liver, one-fourth to one-third have a palpable gallbladder and a few have a palpable extrahepatic mass.^{32,33,49} The fact that only about one-fourth have a palpable gallbladder places considerable doubt on the value of this finding, despite its frequent emphasis by earlier writers. In carcinoma of the ducts a palpable liver is found in over one-half of the cases, a palpable gallbladder in nearly a third. Thus, Courvoisier's law is verified to a much greater extent by laparotomy and autopsies than by physical examination.³²

A fluid wave suggestive of ascites is present in about one-third.³²

A small proportion of gallbladder and extrahepatic bile duct carcinomas are "silent" with no symptoms or physical findings that would warrant the diagnosis.

PHYSIOLOGICAL ALTERATIONS

Obstruction from carcinoma of the bile ducts results in dilatation of the biliary tree and the bile radicles of the liver. Icterus and the frequently concomitant infection cause necrosis of liver lobules. Inflammatory cells infiltrate the periportal areas. The icterus index rises, the Van den Bergh test becomes promptly positive, and the body tissues become stained with the biliary pigments. Liver function tests reveal hepatic impairment. Stools are light-colored as a result of their decreased bile content and impaired fat absorption. The biliary tract disturbance results in anorexia and pain. The pain varies from nausea and mild epigastric distress to severe biliary colic.

CAUSE OF DEATH

Cholemia with cachexia and carcinomatosis are the most common causes of death. Death often is precipitated by bronchopneumonia. Less frequent causes of death are carcinomatosis and cachexia without cholemia, peritonitis from various causes, bronchopneumonia, post-operative shock, and spontaneous hemorrhage.

DIAGNOSIS

The fact that many carcinomas of the gallbladder are overlooked in routine cholecystectomies and exploratory laparotomies early in their course emphasizes the difficulties of diagnosis. A diffuse carcinomatous infiltration may be mistaken for an inflammatory thickening, especially if the gallbladder contains stones.²⁵

Moynihan's much quoted dictum aptly applies: "No man living is infallible in the diagnosis of jaundice."

Kirshbaum³² noted a correct diagnosis in 20.9 per cent of his series of extrahepatic bile duct carcinoma. The clinical diagnoses in 62 cases of extrahepatic bile duct carcinoma were: carcinoma of the pancreas in 20, carcinoma of the gastrointestinal tract in 12, carcinoma of the extrahepatic ducts in 11, carcinoma of gallbladder in three, portal cirrhosis in four, primary carcinoma of liver in two, cyst and stones in three, obstructive jaundice of unknown cause in three, peritonitis in one, perforated peptic ulcer in one.

Garlock²⁰ emphasized the fact that too great reliance should not be placed on laboratory tests in differentiating obstructive jaundice from jaundice of hematogenic origin. He reported one case of carcinoma at the confluence of the common hepatic bile duct in which the tests indicated that the jaundice was from liver damage rather than obstruction.

Watson has found that in 90 per cent of cases of extrahepatic biliary tract cancer which are producing obstruction, the feces urobilinogen is less than five mgm. per day and the urine urobilinogen is less than 0.3 mgm. per day.⁵⁸

At surgery, gallbladder carcinoma usually is evidenced by thickening of the gallbladder. It may be of cancer hardness. This density is demonstrable even in early

carcinoma. Sometimes a moment's confusion may be caused when the wall is uniformly thickened by inflammatory exudate and the new growth occludes the cystic duct. This is especially true when the neck of the gallbladder is the site of the malignant growth and also harbors a stone. In some cases an invasion, notably into the regional lymph nodes, declares the nature of the growth.

Direct invasion of the liver is common, but extension by metastases is not frequent.²⁵

The accurate location of the primary ductal tumors at operation is difficult. In five cases reported by Kirshbaum, capable surgeons failed to find previously suspected carcinoma of the head of the pancreas and post-mortem examination revealed carcinoma of the extrahepatic bile ducts. The error lies in the popular misconception of the relative frequency of these two lesions, and the fact that a normal pancreas frequently feels exceedingly hard. Carcinoma of the head of the pancreas, as the cause of malignant obstruction of the biliary tract, is a poor third. The tendency for obstructive jaundice to produce fibrotic changes in the pancreas further complicates the diagnosis.³²

The pathologist's report usually reaches the surgeon several days after surgery. Pack⁴² believes that little remains to be done at that time when gallbladder carcinoma is accidentally found. Therefore it is his routine practice to slit open and examine every gallbladder directly on removal. Whenever a suspicious nodule is detected, a frozen section is immediately obtained.

TREATMENT

In discussing gallbladder carcinoma in 1936, Hertzler²⁵ wrote: "Resection of a part of the liver in order to achieve the removal of a cancer that has escaped its wall is an act approaching surgical stunts, or at least it is not obligatory for the conservative surgeon." This is still a generally accepted concept, although more and more surgeons are becoming more radical in their approach to the cancer problem.

One reason for operating is that stones or inflammatory lesions always are possible causes of the symptoms and signs which, in all probability, are due to inoperable carcinoma. As better means of antisepsis and better control of the major complications (hemorrhage, hepatic and renal insufficiency) come into use, more patients can be given the one chance which may prolong or save their lives.⁴⁷

Pack's⁴² treatment of carcinoma of the gallbladder is as follows: when carcinoma is discovered, the abdominal incision is enlarged to give access to the hepaticoduodenal fold. By careful methodical inspection and palpation, a thorough search is made for any enlarged lymph nodes. Any such lymph nodes found are either dissected free and removed or destroyed by piercing them with the electrocautery current. Coming in this fashion to the bed of the gallbladder in the hepatic tissue, the whole area is thoroughly seared with the dull charring heat of an actual cautery. When possible to determine from relative position of the neoplasm in the gallbladder, its

correlative position in the liver bed is given a second and deeper charring. Pack then places strips of iodoform gauze against the charred surface, leaving an opened flat rubber strip between this surface and the medially adjacent viscera. After extensive procedures, a rubber drainage tube also is placed between the rubber strip and the gauze, as in some instances the sloughing off of the charred tissues is accompanied by a slight leakage of bile.

In advanced cases of malignant neoplasm of the gallbladder, Pack usually does little more than take a biopsy. Occasionally a chronically inflamed thick-walled gallbladder, with a suspicious lump spreading into the adjacent hepatic tissue, is found. Instead of proceeding with cholecystectomy in the hope that the suspicious area is inflammatory, he advocates: first empty the gallbladder with a cannula and trochar if it is distended. A slit is made and the gallbladder is opened. If a biopsy proves the lesion to be carcinoma, the gallbladder is closed with a running suture of heavy silk, leaving long ends for traction. Control of the common hepatic artery is maintained by either an assistant's fingers or a tourniquet. The field is then injected with procaine. Using actual cautery point, or preferably the knife with the mixed electrocoagulation and cutting current, the hepatic tissue and the gallbladder are excised en masse.

Because the usual surgical treatment of cancer of the gallbladder and bile ducts is generally unsuccessful, many surgeons have become very radical. Brunschwig⁵ performed a cholangiocholecystocholedochectomy on seven patients. One of these patients carried on normal activities for one year. When localized growth produce obstructive symptoms, segmental resection of the involved structure with an end to end anastomosis has afforded prolonged survival. In some instances, this period of relief has been as long as several years.

The purpose of Brunschwig's operation on the above seven patients was to determine whether, by a surgical removal of most or all of the macroscopic neoplasm, palliation would be afforded. Drainage by simple insertion of a catheter high in the extrahepatic bile tract was the only alternative in these cases. This procedure did not appear plausible since incision and drainage into dense tumor tissue would have been necessary. This would have been difficult since ducts high in the porta were involved by dense contracted tissue.

Four patients of the seven survived the operation, giving a 43 per cent mortality. The average survival of those succumbing was 13 days. One patient lived one year with several months of normal activity without jaundice. One lived five months with jaundice. One lived three months, with the jaundice but partially relieved. However, this patient's pruritus was relieved. One lived five months. His jaundice disappeared but his general condition deteriorated. Thus, the survival period probably was not appreciably lengthened, although the icterus was ameliorated.

When metastases from extrahepatic bile duct carcinoma are extensive and when the hepatic ducts are patent

over the growth, insertion of catheters into the ducts for drainage to the exterior may be palliative by relieving the icterus. Excision of the upper portion of the common bile duct, the lower common hepatic duct, the cystic duct or the gallbladder isn't difficult when the growth is of limited size and may be accomplished by resection of a segment of the ducts or by cholecystostomy if the growth is near the gallbladder fundus. Continuity may be reestablished by end to end anastomosis over a rubber "T" tube after mobilization of the duodenum and head of the pancreas. Vitallium tubes, introduced by Pearse, may be employed.

Ransom⁴⁵ considers cholecystogastrostomy the best palliative operative treatment in carcinoma of the head of the pancreas and the extrahepatic bile ducts.

Cattell¹⁰ reported a case of carcinoma of the common bile duct just distal to the confluence of this duct with the cystic and common hepatic ducts in which he mobilized the head of the pancreas and duodenal tissue and brought the ducts together. A rubber "T" tube was inserted at the line of suture. This was removed in six months because the rubber deteriorated. It had been planned to leave the tube in place one or two years. The patient was well seven months later. Preoperatively the author had expected to use external drainage.

Garlock²⁰ reported a case at the confluence of the cystic and common bile duct which he resected with end to end anastomosis. He emphasized that a wide resection of the common bile duct may be performed, and an end to end anastomosis accomplished if an adequate mobilization of the remaining portion is carried out. Initial repair of the common bile duct injuries does not as a rule produce strictures such as after late secondary repairs.

A case of gallbladder carcinoma, in which the gallbladder and contiguous extensions to the liver were removed, was reported by Hochberg.²⁶ The patient was living and well 14 months postoperatively.

X-ray and radium have not been extensively used in the treatment of carcinoma of the gallbladder and extrahepatic bile ducts. From the deep-seated nature of the lesion, analogy with other gastrointestinal carcinoma, its proximity to the liver and pancreas, effectiveness against the lesion and tolerance of irradiation by the patient is unlikely.⁵⁷ Brunschwig notes that irradiation has little to offer.

PROGNOSIS

Gallbladder: Kirshbaum³² reported only nine of 55 patients living more than six months after their initial complaint. Sainburg found that one of 65 patients operated upon was alive after 13½ years, the rest having died within 35 months after the operation. Thus he had a one and one-half percent five year survival rate. He grouped his cases according to the surgery which could be done:

- Group I. Inoperable. Biopsy taken.
- Group II. Palliative hepaticoduodenostomy, with cholecystostomy, partial cholecystectomy en bloc, excision of liver and gallbladder, simple cholecystostomy.

Group III. All visible disease extirpated. Possibly curative operation performed.

Group IV. Carcinoma not suspected at operation.

His results were:

	Number of Cases	Months of Survival
Group I.	22	2.3
Group II.	27	3.4
Group III.	8	6.7
Group IV.	7	30.5

Of these, one patient lived 13½ years. She was 53 years of age, with a three week history indicative of cholecystitis. This was also the postoperative diagnosis, but microscopic examination revealed early adenocarcinoma, gallbladder stones and cholecystitis. If this patient is excluded from the series, the survival of group IV would be 11½ months. This author therefore concludes that the disease is virtually incurable. Early diagnosis is not a material aid, for once the disease manifests itself by symptoms, it is already beyond the localized stage. Radical and palliative procedures add only a few months to the survival period. The average post-operative survival of all 65 cases was 44 months.

Warren,⁵⁷ however, believes that if the carcinoma is limited to the cavity of the gallbladder and is found accidentally at or after cholecystectomy for gallstones, the end result is much better. Thorek reports five of 11 patients living two to ten years after operation. H. Finsterer reports one of his three such cases (treated by combined liver resection with cholecystectomy to remove all of the tumor) as living six and one-half years. Of Warren's 40 cases, 35 were operated upon. Only four left the hospital with any possibility of all the tumor having been removed. Of these, two were living and apparently without recurrence 12 and two and two and one-third years after operation, thus giving a two and one-half per cent five year survival.

Finney¹⁸ reported two cases of very early carcinoma of the gallbladder, found only on microscopic examination but not suspected at operation. One lived 16½ months; one, 25 months. Both died of a recurrence of the malignancy.

Magoun³⁷ reported seven patients, on whom cholecystectomy was performed, as living and well after five years, giving an 8.3 per cent five year survival rate.

Steinfeld⁵¹ reviewed 417 cases in the literature and found 16 five-year cures (3.8 per cent). He concluded that liver resection was of definite palliative value.

Extrahepatic Bile Ducts: The average duration of life in carcinoma of the bile ducts was two to four months, only one having survived over one year in Kirshbaum's series.³²

Despite the facts that tumors of the common bile duct produce early symptoms and the primary supposedly metastasizes late, the ultimate prognosis is grave in spite of early surgery. Most patients eventually succumb to recurrences and those who survive ultimately die as a result of repeated attacks of cholangitis. The avoidance of ascending liver infection, which so commonly follows plastic procedures and reimplantation of the common

bile duct, is an important surgical problem yet to be solved (Leiter).

SUMMARY

In summary it may be stated that carcinoma of the gallbladder constitutes about three per cent of all malignancies; carcinoma of the bile ducts, about three and one-half per cent. In the female carcinoma of the gallbladder may constitute eight to ten per cent of all malignancies. Both types of carcinoma tend to occur in the older age groups. Adenocarcinoma is the most common pathological type. It may be papillomatous or diffusely infiltrating in form. Mucus-producing and squamous carcinoma also occur. Whether the squamous type is the result of inflammation is still unsettled.

Pathological changes in the liver and biliary tract, kidneys and pancreas are frequently found. Gallstones are found in 80 to 100 per cent of cases of gallbladder carcinoma and in a somewhat lesser percentage of cases of duct carcinoma. From four to five per cent of patients with gallstones eventually develop carcinoma of the gallbladder. Although the experimental evidence is highly suggestive, it is not established that the stones are the direct cause of the carcinoma. They may both be the result of a basic metabolic abnormality of the biliary tract.

The clinical picture of carcinomas of the gallbladder and ducts is extremely variable and the patient may or may not have a long history suggestive of benign biliary tract disease.

The treatment of these lesions is very disappointing once they have become established and the salvage rate is extremely low. It has been postulated that the prognosis of gallbladder carcinoma which is very small and incidentally found at the time of cholecystectomy is good. However, there is considerable evidence to cast doubt on this view. Recent advances in surgery of the biliary tract suggest that radical procedures may give some palliation.

At present, the only hope for decreasing the deaths from carcinoma of the gallbladder is by cholecystectomy before carcinoma develops in patients with gallstones. Some advocate this in all patients with stones in the absence of definite contraindications to surgery.

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ANCIENT EGYPTIAN CURE-ALL DRUG BEING TESTED AT UNIVERSITY OF MINNESOTA

Damscisa, an ancient Egyptian drug, is being "put through the wringer" by University of Minnesota pharmacists. For centuries Egyptian housewives have been brewing damscisa "tea", using it as a cure-all for various aches and pains. Now, two University scientists—Taito Some, professor of pharmaceutical chemistry, and Hamed Abushady, Egyptian graduate student in the same field—are busy refining the damscisa drug, giving it the first, so far as is known, modern scientific analysis. They are breaking it down into crystalline compounds and planning tests to determine its medicinal value.

The "wringer" they're using is the University's new \$1500 Lloyd's extractor, a device resembling a plumber's nightmare, which reduces the crude drug to two basic compounds. With this machine they are able to step-up production of the refined drug 10 to 12 times over previous methods.

Inaugurating the Medical Sciences Review . . .

FOR some time past the editors of THE JOURNAL-LANCET have been planning to incorporate in the journal a section which would be devoted to presentations of scientifically and educationally valuable reviews of recent progress in important areas and problems of medicine. The editors believe that the medical public served by THE JOURNAL-LANCET will welcome an opportunity to obtain authoritative, readable accounts of important progress in scientific medicine, both in the fundamental and the clinical fields. There are, to be sure, special journals devoted to such reviews and there are many books which provide comprehensive treatment of special medical science problems. In our opinion there is nevertheless a special place for such material in such a periodical as ours.

Specialty review journals are in general available only in the larger libraries and are rarely seen by the majority of physicians, or even unfortunately by medical students, interns and residents. The review monographs are frequently so exhaustive and comprehensive that they frighten away potentially interested readers. As a consequence the physician is frequently thirsty for knowledge presented in such a way that he can have ready access to it, in spite of the fact that if he were able to do the necessary hunting he could actually quench his thirst in many excellent publications.

The editors of THE JOURNAL-LANCET consider that it is their obligation to contribute to the continuing education, so to speak, of their medical readers. This journal wishes to be a vital factor in the promotion of medicine in the great mid-continental regions of the country and believes that it sees in a new section devoted to Medical Science Review a method of working toward that end. The editors propose to define medical sciences very broadly and realize that in all probability certain subjects covered will not interest all readers equally but it is their hope that each subject treated will be of sufficient interest and importance to tempt every reader to delve into it in order to broaden and to deepen his basic knowledge in medicine as a whole.

Medicine is unique among the classical learned professions. Unlike the law and theology, medicine is a profession the practice of which rests upon scientific knowledge. Since scientific knowledge is increasing day by day, even hour by hour, it is imperative that the physician have available to him or her the mechanism for frequent additions to such knowledge. A physician who practices medicine on the basis of ten year old knowledge is not a good physician. Ten years ago no single antibiotic was known. Twenty years ago a thousand and one elements of everyday medical practice were absolutely unknown. It is not too great a risk to predict that the medical practice of twenty years from now will be equally greatly changed, simply on account of increased knowledge. It is not easy in any case to keep abreast of scientific advance in medicine. It is in order to lighten the burden for its medical public that THE JOURNAL-LANCET inaugurates this new section.

MAURICE B. VISSCHER, M.D.

MEDICAL SCIENCES REVIEW

Anesthesiology and Its Relation to the Basic Sciences*

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IN a recent comprehensive review of the theories of narcosis and anesthesia,¹ it is made evident that the changes occurring in cells, enzyme systems, and homeostatic mechanisms during the state known as anesthesia do not present a sufficiently consistent pattern to permit a definitive analysis of the process of anesthesia. These changes, such as interference with oxidative mechanisms, alterations in the cortical potential, and the absorption of the various drugs by lipoid tissue have varying degrees of correlation with the state of anesthesia. However,

it has not been conclusively demonstrated whether or not these alterations in physiologic activity produce anesthesia or appear as a result of the abnormal state.

As a consequence of this ignorance regarding the fundamental nature of narcosis, the anesthesiologist practices his specialty with a high degree of empiricism. Predictability of action for any drug, whether it be gas, vapor or non-volatile, is at a low level for the several species or within any one species. This lack of knowledge exasperates and frustrates the technician anesthetist whether physician or nurse. On the other hand, it intrigues the anesthesiologist, who in employing scientific method, is constantly searching for factors leading to

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the clarification of the process by which he is able to induce the disruption of the physiologic balances present in the conscious state, maintain this disorganization with a minimum of derangement of vital physiologic mechanisms and predict with reasonable certainty a reversal of the abnormal state upon the discontinuance of the drug.

Not knowing the basic action of the anesthetic drug employed, it is imperative that the anesthetist make critical and constant observations of the patient's reactions to the drug. This is necessary in order to determine the side effects of the drug with particular respect to those effects which may directly or indirectly, early or late, result in increased morbidity or mortality. In order to be prepared to recognize the incipient deleterious influences and institute immediate remedial measures, the anesthetist must be thoroughly familiar with respiratory and circulatory physiology, the pharmacology of the drugs employed, and the pathologic processes associated with the disorder for which the patient is being treated.

The anesthetist cannot help but be interested in any development in the basic sciences which will help him better to understand the phenomena encountered in his daily practice. Through the clinical application of the developments in the basic sciences he can assess more accurately the changes that occur and implement more rational therapy. Developments in recent years have been associated with a re-evaluation of the homeostatic mechanisms of respiration and circulation, a revamping of the concept of the mode of action of drugs, and a better insight into the pathologic processes accompanying disease. Pronounced advances in the technics of measurement of physiologic and biochemical activity allow for the formulation of new hypotheses and the revision or abandoning of old concepts. These technics, assisted materially by the use of intricate biophysical instruments, are being employed to obtain dynamic measurements both in the laboratory animal and the human being. This approach to the study of physiologic processes is a distinct improvement over static measurement and study of the isolated organ. The collection of data of a dynamic nature in the intact organism promises to speed the determination of the phenomenon of anesthesia because it may be a highly integrated process not recognizable from relatively isolated observations, particularly upon organs or tissues separated from their normal environment.

It will be impractical to review all the developments in physiology that have influenced the concept and conduct of anesthesia. An attempt will be made to outline some of the developments and it will be seen that most of these have to do with early recognition, therapy and prophylaxis for the derangements in physiologic processes associated with the state of anesthesia. This is, of course, desirable and efforts in this direction should be extended. However, there is a regrettable absolute minimum of information leading to a more complete understanding of the phenomenon of anesthesia.

OxIMETRY

Oximetry has reached a point at which it is a useful clinical and research tool. It is a technic by means of which the saturation of the hemoglobin with oxygen can be detected and recorded continuously. This is accomplished by making use of the fact that hemoglobin absorbs light in the red portion of the spectrum depending upon its oxygen saturation. Incandescent lamps provide the light source and by the use of filters appropriate wave lengths are transmitted through tissue to a photocell. The output from the photocell can be amplified to operate a galvanometer for indicating or recording. The recording can be done on ink writers or on photographic film.

Absorption of light in the red portion of the spectrum is influenced in addition to the saturation of the hemoglobin with oxygen by the interposed tissue, the degree and pattern of vascularization of the tissue, and the amount of hemoglobin. However, technics have been developed which by taking these influences into account permit reliable calibration of the instrument. To accomplish uniform vascularization and to avoid vacillation in the caliber of vessels in the light path, it is common practice to either heat the ear by means of the light source or induce histamine by electrophoresis. In either instance (heat or histamine) the dilation of the vessels results essentially in arterialization of the venous blood. The variable effect of interposed tissue on colored and white patients is eliminated by compression of the ear by means of an inflatable balloon to exclude blood from the light path. The ear is a convenient appendage to which the unit of the oximeter containing the light source, filters and photocell can be attached. Because the absolute amount of hemoglobin also influences the transmission of light, the absorption in the red region may be used to measure oxygen saturation only if the amount of blood in the light path is also determined. Control of the factors mentioned permits the reproduction of reasonably reliable information with respect to the oxygenation of the hemoglobin. Oximetry has been developed to the point at which it is possible to obtain absolute as well as relative values even if the amount of blood does vary. In this development the infrared portion of the spectrum is used in addition to the measurements in the red portion. The measurement in the infrared section is independent of the saturation of the hemoglobin with oxygen and gives an indication of the amount of blood in the light path. With the exception of instruments which are in the process of development, absolute values (within ± 5 per cent) can be obtained with the various standard oximeters only after calibration of the instrument by analyses of blood oxygen content and capacity in the Van Slyke apparatus. With the known reference points the variations in absorption can be interpreted in terms of specific oxygen saturation values.²

From a practical standpoint in the clinical conduct of anesthesia the standard oximeters using the red pattern of the spectrum can be used simply for the determination of relative changes in saturation. Within reasonable ranges of normal saturation a scale can be adjusted for

each patient so that relative degrees of unsaturation can be detected. A recently described simplified instrument³ known as the Hypoxia Warning Device, actuates a relay at a predetermined degree of unsaturation (level of light transmission). The relay lights a red light or similar signal to inform the anesthetist of significant oxygen want in the patient. For those anesthetists who have not familiarized themselves with the physiologic responses to hypoxia such as elevated pulse rate, tachypnoea, hypertension, and cyanosis or for those who have become calloused to these warning signs, such an instrument would be useful. Under the influence of depressant drugs, some of the signs of hypoxia may be obscured, and under these circumstances such an instrument would be of value.

It is relatively common practice in anesthesia to premedicate the patient with nonvolatile depressant drugs such as morphine and scopolamine. These drugs, particularly morphine or its substitutes, influence the cells or the integration of cellular units (vasomotor center, respiratory center, etc.) to such an extent that normal responses to oxygen deprivation are obliterated or considerably diminished. In addition the anesthetic drugs, especially when moderate to pronounced degrees of depression are produced, either intentionally or unintentionally, obscure even more the usual signs of oxygen want. In these circumstances, an instrument to aid in the detection of oxygen lack would be useful. Oximetry has been applied to patients under anesthesia with pentothal and clinically unrecognizable hypoxia has been demonstrated. Pentothal has a pronounced tendency to produce respiratory depression and the dangers of hypoxia associated with the depression may be made more apparent with the use of the oximeter. Similar degrees of hypoxia can be obtained with all anesthetic agents. Too many times, for example, hypoxia accompanies the administration of open drop ether especially when thick non-porous masks are used with heavy draping of towels about the mask. This hypoxia often goes unrecognized because it is assumed that the signs of it are the usual signs of open drop ether anesthesia. An oximeter would make it readily obvious that these patients were being subjected to dangerous levels of oxygen want. An interesting and revealing study has been reported⁴ on the changes in oxygen saturation of hemoglobin under spinal anesthesia in which it was shown by oximetry that significant hypoxia developed. Observations have been made also on the degree of hypoxia often associated with induction of anesthesia.⁵

It has been demonstrated under controlled conditions that recognition of cyanosis, particularly of minor degree, is often missed or delayed by experienced physicians.⁶ A physician is often unwilling to admit that he is incapable of detecting cyanosis in mild to moderate degrees. As a consequence, many patients are unwittingly permitted to suffer significant levels of hypoxia. Oximetry would help to eliminate this deficiency in human judgment. The literature is replete with reports of sudden deaths with or without anesthesia. It can be reasonably assumed that many of these deaths are the

result of long continued hypoxic states that were unrecognized and that the deaths were not sudden but rather the result of the culmination of the physiologic changes associated with oxygen deprivation.

A significant drawback to the use of the warning device in patients under anesthesia and during operative procedures is the change in base or reference values occasioned by changes in the capacity of the blood due to hemorrhage or transfusion or to changes in blood flow as a result of shock or hypertensive episodes. One cannot avoid, in addition, an apprehension that with the introduction of instruments into clinical practice there will be deterioration in the development and refinement of the ability to make critical observations with the eyes, ears, nose and hands of the anesthetist. If machines are used to supplant these observations, their use should be discouraged. If machines are used to assist and amplify clinical acumen, they will undoubtedly prove useful in clinical medicine.

CARDIAC AND BLOOD VESSEL CATHETERIZATION

Catheterization of blood vessels including the various chambers of the heart in the intact animal or human being has led to the accumulation of much interesting data and a different understanding of the patterns of blood flow, tensions, and tissue oxygen supply. This technic was accelerated in its development by the interest in the rehabilitation of patients with congenital and traumatic cardiac abnormalities. By determination of saturation values, time relationships of circulation and pressure gradients and with a knowledge of the anatomical possibilities, the history and physical examination and radiographic studies (with or without contrast media), it is possible to predict with good accuracy the type of defect, its location and its extent. Surgery then can be recommended if indicated and an approach made which would facilitate the procedure.

Cardiac catheterization or the catheterization of vessels has not been employed to the extent that it might be in assessing the influence of anesthetic drugs and technics upon the circulation. Some preliminary studies have been made to determine the influence of anesthetic drugs upon the coronary circulation. By catheterization of the coronary sinus and the right ventricle, samples of blood can be obtained simultaneously with arterial samples. With the determination of blood flow by the nitrous oxide technic and appropriate gas analyses and the application of the Fick principle, calculation can be made of the coronary flow.⁷ With catheterization one also may secure information on the influence of anesthesia upon blood flow to the kidney and the liver. Used in conjunction with catheterization, precise and dynamic recording can be made of pressure changes in the circulatory system by means of strain gauges or the Lilly Capacitance Manometer.⁸ For many years knowledge of the effect of anesthesia upon the heart and peripheral circulation has been impeded by the technical limitations of the Riva-Rocci method of obtaining blood pressure, the restriction (except in isolated organs) to peripheral vessel pressure measurements, the difficulties

inherent in transferring to the intact animal or human being of information obtained by perfusion experiments, and many other similar procedures which nevertheless were unquestionably valuable in adding to our knowledge through the past years.

One is intrigued with the possibilities offered by the new technics for securing needed information. For example, it is known that cardiac irregularities appear under anesthesia with several different agents. The mechanism for the production of these aberrations in rhythm has not been satisfactorily explained. It is possible that data relating to blood flow in the coronary vessels and the oxygenation of the heart muscle may help to elucidate this problem. In addition it is well known that gross alterations in distribution of circulating blood occur during spinal anesthesia. Some information with respect to the extent of this redistribution, the rate at which it occurs, the factors influencing it, etc., could be obtained by the more precise dynamic measuring instruments mentioned. It may be possible also to secure data concerning the alterations in blood flow in the cerebrum associated with spinal anesthesia which changes may account for the nausea and occasional abducens paralysis. It is common practice to use vaso-pressor drugs to counteract the hypotension accompanying spinal anesthesia. With precise and well localized pressure and flow determinations one can determine if perhaps the influence of these drugs on the kidney is sufficiently deleterious to outweigh the advantage of restoration of a normal arterial tension as measured peripherally. Other examples, among a host of those not mentioned, would be the need for a knowledge of the influence on the circulation of changes in position under anesthesia. The increasing use of the transthoracic approach to surgery in the chest and abdomen makes it mandatory that a better appreciation be secured of the influence of various methods of ventilation upon oxygenation, carbon dioxide elimination and circulation. Application of the catheterization technics will materially assist in amplifying and clarifying knowledge of these factors.

PULMONARY VENTILATION

Ventilation of the patient under anesthesia is a constant problem. Methods for the assistance or artificial maintenance of ventilation have been devised which according to current standards improve the oxygenation of the blood, the elimination of carbon dioxide, and minimize the interference with circulation. Many of the devices are so arranged that positive pressure is applied intermittently for inflation of the lungs and negative pressure applied in the deflation phase with the result that there is no elevation in the mean pressure throughout the respiratory cycle. Most devices are fitted with limiting pressure valves to avoid excessive intrapulmonic pressures. In addition they are designed to be actuated either by changes in pressure (pressure sensitive) or by changes in flow (flow sensitive) with the result that the patient can cycle the instrument according to his own respiratory rhythm with minimal changes in either pressure or flow. It is interesting to note that after many

years of condemnation of the principle of negative pressure in ventilating devices, more recent evidence reinstates the use of negative pressure on the basis of improved circulatory efficiency. Hypotensive states have been repeatedly found in patients in whom ventilation was being accomplished by assistance to the patient's efforts at air movement or by artificial ventilation. In these patients it is frequently possible to demonstrate that the method of ventilation seriously interferes with venous return and subsequent cardiac output and with cessation of assistance or artificial ventilation the circulation improves. Improvement in the type of assisted or controlled respiration with particular respect to avoiding a high mean intrapulmonic pressure during the respiratory cycle eliminates the hypotension. Other patients with hypotensive states are appreciably benefited by the institution of artificial ventilation with a significant degree of negative pressure in the exhalation phase. One should therefore be careful in employing only positive pressure ventilation and should in some patients deliberately include negative pressure. One should be especially cautious in the moribund patient or in the emergency situation to avoid the usually excessive positive pressures employed and add negative pressure to the ventilation cycle. By so doing, an improvement in the deficient circulation is often demonstrable.

Because the anesthetist is intimately concerned with the problem of ventilation and is obligated to provide adequate oxygenation and carbon dioxide elimination, there is need for him to have a reasonably accurate assessment of the patient's ventilatory capabilities prior to anesthesia and surgery. A number of tests have been devised to permit determination of these capabilities so that a reasonable prediction can be made of the tolerance of the patient for diminution of his capacity by surgery and/or anesthesia. In spite of the tremendous advances that have been made in measuring instruments, it appears at the moment that one of the most reliable assays of ventilatory capacity and reserve can be made by a careful history of the patient's response to exercise. This assessment of capacity can be augmented by the maximal breathing test in which the patient breathes at maximum rate and depth for 15 seconds and the amount of air moved is measured. It is becoming increasingly evident that the "vital capacity" measuring device in use for so many years gives a poor indication of the patient's ventilatory capacity and reserve. This is particularly true of the patient with emphysema, lung cysts, etc.

Bronchspirometry has promise in determining the relative effectiveness of the two lungs. The technic depends upon the catheterization of the respective bronchi and sampling measurements of gas exchange. The principal disadvantage of this approach to ventilatory measurements is the interference to normal flow of air that the catheters impose. There is an appreciable resistance to air flow through the small catheters which resistance necessarily results in deviations in data. The percentage deviation in the accumulated data can be estimated only and may account for significant errors in interpretation of the data. Other ventilatory and gas exchange tests have been devised most of which give reasonably reliable

results but are usually sufficiently intricate that they as yet have little clinical application. However, the basic approach these methods use (such as the time relationships of appearance of concentrations of nitrogen in expired air) may ultimately provide a practical method of evaluation of ventilatory and gas exchange capabilities.⁹

One of the most promising instruments for the study of ventilation is the pneumotachograph.¹⁰ This is an instrument interposed into the air stream which is designed to record rate of flow in both phases of respiration. When suitably recorded on film or by ink writer, calculation can be made of the volume of air moved with inspiration and expiration. The instrument may measure the flow by utilization of the pressure differential occurring on both sides of a screen and the transmission of that differential to a chamber to which is attached a mirror reflecting a light to moving film. It also may measure the flow by the use of various transducers. The output of the transducer tube is amplified to drive an ink writing recorder. The pneumotachograph gives direct information on the influence of anesthesia, position, surgery, etc., on the volume of air moved. Patients under anesthesia often exhibit abnormal respiratory patterns. These abnormal patterns may be irregular rhythm, rapid shallow respirations, slow deep respirations, etc. Clinical observations give only a crude calculation of the efficiency of these abnormal patterns. The pneumotachograph would give a reliable indication of the tidal exchange and the minute volume exchange and make it possible to effect appropriate adjustments in the ventilation. As pointed out earlier there has been an extension of the use of depressant drugs in anesthesia particularly of the non-volatile type. Clinical observations have led many anesthetists to believe that there is a minimum of interference with ventilation associated with the use of these drugs. The pneumotachograph has demonstrated that exchange in patients so medicated is often seriously impaired.

CARBON DIOXIDE MEASUREMENT

There is increasing realization that inadequate attention has been paid in the past to the accumulation of carbon dioxide during anesthesia. With the extension of surgery to the lung and heart and particularly with the widespread use of depressant drugs and muscle relaxants such as curare, significant degrees of hypoventilation often are present. Preliminary evidence indicates that astounding accumulations of carbon dioxide may occur in situations in which the anesthetist felt that ventilation was adequate from clinical signs.¹¹ It must be remembered that although tachycardia, hypertension and increased depth of respiration are usually reliable signs of carbon dioxide retention, the influence of anesthetic drugs may be such that these clinical signs are obscured to the extent that depressant levels of carbon dioxide may be attained and go unrecognized.

Gas analyses of blood samples are not practical in clinical situations and, in addition, give static representations of the state of affairs. Dynamic measurements

of concentrations of carbon dioxide in the expired air can be determined by means of an instrument which depends upon the absorption of infrared light of a specific wave length by the carbon dioxide.¹² Fortunately, carbon dioxide has a reasonably limited absorption band and by the use of a reference cell a recording can be made of the output of the detector cell which will give consistent readings. Once the instrument is calibrated it can be used in all patients for direct data. Its frequency of response is such that individual breath measurements can be made even with reasonably fast respiration. Attempts to detect accumulation of carbon dioxide in anesthetic systems have resulted in the development of soda lime that changes in color when it becomes inefficient and in the development of a solution in the breathing circuit which will reflect the level of carbon dioxide in the inspired air. Carbon dioxide may be detected also by an instrument using the principle of differential pressures between cells one of which contains soda lime and the other no absorbing agent. None of these developments give a dynamic measurement of carbon dioxide exchange. The interposition of the analyzer in the breathing circuit will make it possible to recognize changes in carbon dioxide concentration in the respired atmosphere at any moment.

Cardiac irregularities, hypo and hypertensive states, inadequate muscular relaxation, depressed ventilation, etc., can often be traced to accumulation of carbon dioxide. This accumulation is often insidious and unrecognized until severe deterioration in the patient's condition occurs. Even then it is frequently ascribed to other causes and carbon dioxide used for therapy with consequent highly undesirable results. The analyzer would help to eliminate this difficulty.

As indicated earlier, and as will be evident from the foregoing discussion, the vast majority of contributions of the basic sciences in recent years have been the introduction of instruments which give a more precise interpretation of the changes that occur during anesthesia as a result of the abnormal state. This is important information and permits us to institute prophylactic measures, recognize undesirable changes earlier, and effect corrective therapy promptly. In addition, a better evaluation of the different anesthetic drugs and technics is possible and the opportunity is presented to improve the application of drugs and technics. However, a minimum of evidence has been introduced which permits a better insight into the understanding of the mechanism of anesthesia.

Recently it has been determined that the rare and chemically inert gas, Xenon, is capable of producing anesthesia and analgesia in the presence of atmospheric tensions of oxygen.¹³ This intriguing observation has prompted a study into the effect of this gas upon oxidative processes as determined in the Warburg apparatus. The gas is particularly soluble in lipid material. It becomes imperative to learn not only the influence of the gas upon oxidative mechanisms in different tissues, particularly brain, and with different substrates but also to learn the relative solubilities in the different lipid frac-

tions. Furthermore, it will be necessary to determine the influence of total concentration of the gas in lipid material. From the information thus secured there may be another clue as to the process by which anesthesia is accomplished. A distressingly clear exposition of our abysmal ignorance of anesthesia is made evident by the demonstration of anesthesia production by means of a totally inert gas.

CONCLUSION

An attempt has been made to delineate the intimate relationship of the practice of anesthesia and the basic sciences. It is obvious that questions arising from clinical practice will have to be answered by investigation of a fundamental nature in physiology and that hypotheses formulated from observations made in fundamental research will require testing in the clinic. It is essential that work in both areas be closely integrated. Cooperation of the clinician and the physiologist will accelerate the extension of knowledge of the process of anesthesia itself and the physiologic alterations associated with the anesthetic state.

Enumeration of some of the contributions made by the basic sciences during recent years serves only to give us a better understanding of the enormous amount of work yet to be done.

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STEROID HORMONES FROM TOMATOES

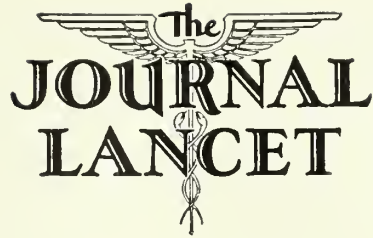
Scientists of the National Institutes of Health have made it possible through relatively simple chemical procedures to synthesize progesterone, testosterone and other important steroid hormones from leaves of various common tomato plants.

Progesterone is widely used for various menstrual disturbances, to prevent spontaneous abortion and for the relief of cervical cancer. Testosterone also is widely prescribed for menstrual disturbances as well as for eunuchoidism and for the relief of breast cancer. Three steps are needed to convert tomatidine into a pregnene derivative—a compound which, in turn, can readily be transformed into progesterone and testosterone.

Tomatidine, a chemical compound derived from the roots and leaves of the tomato plant, was first isolated in 1948 by Dr. Thomas Fontaine and associates at the Bureau of Agricultural and Industrial Chemistry of the Department of Agriculture.

Progesterone and testosterone are normally prepared from three compounds: cholesterol, isolated from animal nerve tissue, such as the brain; stigmasterol from soy bean, and diosgenin from Mexican yams.

Synthesis from these sources, however, demands either more chemical steps than the conversion of tomatidine, or, as in the case of diosgenin, where synthesis is relatively simple, the source—the Mexican yam—does not grow widely in the United States. Tomatidine, derived from the leaves of a hardy garden plant, normally wasted in the commercial process of tomato canning or tomato juice manufacture, promises to be the most available and least expensive method for producing these steroid hormones.



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Editorials . . .

DOCTORS FACE THE FUTURE

Everyone recognizes that within a few short years this country has drifted or been led into a situation full of peril. I think most honest minded persons will agree that our leadership during this time has been sadly deficient in judgment, even if we grant that their motives have been of the highest. What is not generally realized even yet by the American public, is that all this tremendously dangerous situation in which we now find ourselves, did not come about as a result of accident, nor as a result solely of the inept and unthinking type of leaders we have been so foolish as to elect to office during this period. The facts of the matter are that it was planned that way and it was planned by the Communist party in its very early stages, as a part of the world revolution. Hence, we have the sorry spectacle of the gradual infiltration into not only the government, but into all mass media, influencing the thinking of our people and leaders, of a motley assortment of inveterate Communists, traitors, Russian agents, Communist sympathizers, Pinkos, deluded intellectuals, so-called "advanced liberals," social uplifters and all sorts of people, who, during the years, have been deluded by the Red mirage. These people have become influential in forming opinions in our country to a degree which few Americans realize or, knowing, care to admit. They are located strategically in the press, in book publishers' offices, in radio, in the moving picture industry, in labor unions and everywhere. It is no accident that so many articles and book reviews tended to be critical of those who opposed the Chinese Communists and praised books by those who were against the Nationalist government and in favor of the Communists. It is no accident that Professor James Howard Means of Harvard University, where many Red sympathizers seem to be at home, can publish an article in the *Atlantic Monthly* criticizing the A.M.A. for, among other things, our stand on Federal aid to medical education. Because, according to a recent article in the January issue of the *American Legion Magazine* by Irene Carbally Kuhn, the editor-in-chief of Little Brown and Company, publishers of the *Atlantic Monthly*, is Angus Cameron, known since 1938 as an active worker for Communist causes. Also, on his staff is one Edwin Seaver, formerly employed by the Communist *Daily Worker*. To illustrate how these subversive elements are tied in with each other, here is an excerpt from a letter written by Frederick E. Robin, education director of the Committee for the Nation's Health, and I quote: "Have you seen the wonderful article in the October issue of the *Atlantic Monthly* entitled "The Doctors Lobby"? It was written by the very distinguished professor of clinical medicine at Harvard University, Dr. James Howard Means. Dr. Means, although a conservative, is ready to lead a 'Young Turks' movement within the A.M.A. to liberalize it." This committee is, of course, the creature of Michael M. Davis,

the ardent medical socializer, and lists among many others Mrs. Franklin D. Roosevelt, Channing Frothingham, William Green, Philip Murray, Robert E. Sherwood and John Gunther as vice-chairmen and members of the board of directors. Now, no one would actually accuse these people of being Communists, but it is equally apparent that they may be found linked up with Communist sponsored and directed projects. In fact, 92 of the 166 charter members of the Committee for the Nation's Health have subversive records, according to the House Un-American Activities committee.

It is extremely unfortunate that much of the opposition to Communist fellow travelers and sympathizers has been misdirected by what one might call "Joe McCarthyism." It is a mistake to label all people who are furthering the cause of the Soviet Union and of the Stalinist party as Communists. Actually, very few of them are Communist party members and when they are accused of Communism they are able to raise a vociferous outcry. This rallies to their support all the muddle-headed converts besides many honest well-meaning people who are rightly concerned about the abuse of civil liberties. Such attacks completely miss the point, which is that there are people in the federal government, in many newspapers, publishing houses, radio, theatres and moving pictures and other media by which the mind of the American people can be reached, planting insidious propaganda.

It seems incredible that we can much longer endure the presence in high office of men who have tolerated, if not encouraged, this situation. How can we be anything but fearful that they will use the vast emergency powers granted to them for the purpose of further socializing the nation rather than to protect us from aggressive communism? Surely and certainly the American people are willing to make great sacrifices. It is little enough to ask that we should, at least, have leadership in which we can place faith.

In this time of national crisis, doctors can be proud that their own organization, the American Medical Association, is now providing positive, constructive leadership for the profession and the nation.

Readers of the *JOURNAL-LANCET* are well aware of the tremendous accomplishments of this our own organization. We are familiar with the fact that the present high standard of medical education is due in large part to years of constructive effort, chiefly through the untiring work of the Council on Medical Education and Hospitals. We are now called upon to protect this, the best system of medical education in the world today, from the inevitable degeneration which could be expected to follow from federal control exercised through the well known device of federal grants. Realizing the inherent dangers of federal control, we oppose it vigorously and advocate instead the democratic American way of meet-

ing the need for further funds by providing them from local tax sources and by private philanthropy.

The American Medical Association recently gave public and convincing testimony that we doctors recognize our debt to the doctors of the future and to the public, who furnished some of the funds, at least for our education. As, of course, all educated people are obligated to the taxpayers. As an evidence in a small way that we are going to repay that debt and that we are concerned about the education of future doctors, the Board of Trustees with the approval of the House of Delegates, recently set aside a fund of a half a million dollars to be used for the advancement of medical education. This fund, it is hoped, will be the nucleus of a much larger fund, to which civic-minded people will donate. By this method, the American people, the American doctors, and this nation as a whole, can demonstrate that voluntarily our problems may be solved. That we do not need the domination of a big federal government for this purpose and that it is not necessary for the federal government to collect large sums of money for educational purposes. Certainly, there is no evidence whatever that the federal government can do any job better than any other organization in the country. The pitiful plight to which we have been led is evidence enough of the inability of those in control to effectively make use of the power which they already have. Further federal control and domination will only make our present plight worse.

The action of the Board of Trustees of the American Medical Association points up our obligation to medical students and to graduates who are establishing themselves in practice. It is our duty to maintain an active interest in them, to see that they are advised wisely and that they are made to feel welcome in the medical family. As evidence of recognition of this obligation there has now been formed the Student American Medical Association. The new organization will have representation in the House of Delegates as soon as the constitution can be amended.

The American Medical Association's highly effective educational campaign has clearly demonstrated the need and usefulness of a proper public relations program. It is apparently true that despite the fact that our ability to aid the sick has increased enormously in the past few decades, our prestige with the public has deteriorated. The mere fact that we are able to do so much more for so many people, has led to a belief by many that we are capable of even greater things, if we only would do so. No doubt, spectacular achievements lie ahead of us, even though those already accomplished are tremendous in their scope, compared to conditions at the turn of the century. As pointed out to this writer by Frank Dickinson, director of the Bureau of Economics of the American Medical Association, the high regard in which the practitioner of an earlier year was held depended not so much on the fact that he was able to help his patients, but on the very opposite fact that he was comparatively helpless. Although unable to remedy effectively so many illnesses, he participated intimately with

the family in a common sorrow and evoked not particularly the respect, but the sympathy of patients and relatives, because they themselves realized that the doctor was not able to help. Thus there was built up between the doctor and his families one of the strongest of all human bonds, the sharing of a common sorrow. The fact that the doctor of the present day, with his many efficient tools and methods, can go in and quickly help a patient get well, results in respect for his scientific efficiency, but does not produce the deep affection evoked by the practitioner of the earlier days. This is a situation which must be faced and seems to call for the use of modern public relations techniques. The older practitioner would have looked with horror on the use of such a device he had no need for, but it seems that we of the present day do have such a need and that we would be well advised to use it intelligently. There is much that can be done by our local, state and national organizations but we must, of course, still remember that public relations begin in the relation between any individual doctor and his patient, and in the relation of one doctor with another.

W. A. WRIGHT, M.D.,
Williston, North Dakota

THE KING'S PHYSICIAN, LORD DAWSON OF PENN

A biography has recently appeared of Lord Dawson of Penn. Few doctors have been fortunate enough to attend as many famous personages as Lord Dawson, or to have been called in on as many interesting cases. It will be remembered that he treated the late King George V in his illness of 1928-29, as well as during the days of his last fatal illness. The King's physician was much loved by all his patients, great and small, in palaces as well as hospitals, guiding them through illness and adversity, with the help of a skillfully selected team. It is said that his secret remedy was undoubtedly his gift for making a patient, or anyone who consulted him, feel that for a period nothing else and nobody else mattered. He had the supreme gift of making an easy and firm contact at an early stage; from this contact confidence grew and became strong.

Reading his biography, we are reminded of his appearance on the program of the Postgraduate Assembly in St. Paul during our prohibition days. He discussed heart disease including its treatment with digitalis and strophanthus. He said these patients should not include in their diet meat that had been in the "larder over night." He brought out a hushed murmur in the auditorium with: "And when it comes to liquor, I believe that a little good old liquor, and I lay considerable stress on the age, is good for such a person when he comes home from his day's work—it helps to dispel the gloom." The last words, in a dignified, didactic voice, brought forth a rafter-ringing response which was better understood by the audience than the speaker, no doubt.

AXEL E. HEDBACK, M.D.
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Book Reviews . . .

A Textbook of X-ray Diagnosis by British Authors (Four Volumes) Volume IV; by S. C. SHANKS and P. KERLEY. Second edition, 1950. Philadelphia and London: W. B. Saunders Co. 592 pages, 553 illustrations.

This book is one of four volumes on x-ray diagnosis compiled by a group of seventeen British authors and edited by the directors of the radiology departments of the University College and Westminster hospitals of London.

The first edition, consisting of three volumes, was published in 1938-39. A fourth volume has been added to the second edition. Volume I covers the central nervous system, the teeth and jaws, the eye, the accessory nasal sinuses and the ear and temporal bone; volume II the cardiovascular and respiratory systems; volume III the alimentary, biliary and urinary tracts, abdomen, and obstetrics and gynecology; and volume IV is devoted to the bones, joints, and soft tissues.

The contents of Volume IV include the standard subjects of bone and joint textbooks such as congenital deformities, inflammatory diseases, tumors and cysts, etc. In addition there are chapters on intervertebral disc disease, the soft tissues and localization of foreign bodies. The material on fractures and dislocations is inclusive and well presented.

The book covers the field of bone and joint pathology; there are few entities which are not discussed at least in brief. A good review of the current literature has been made and is incorporated in the text. There are numerous well produced illustrations which follow the subject material. Roentgenograms are reproduced as positives.

The book is well written and should be a good source book for those engaged in the diagnosis of bone and joint disease.

G. M. H.

Handbook of Obstetrics and Diagnostic Gynecology, by LEO DOYLE, 1950. Palo Alto, California: University Medical Publishers. \$2.00.

This little pocketbook fills a real need. It is much more than a synopsis of any textbook; it gives details of diagnosis and treatment concisely and completely. Possibly the classification of pelvis is not the most acceptable today but it is clinically sufficient. To the remedies suggested for leg cramps in pregnancy might be added the empirical use of quinine. Also ascorbic acid seems of more value than vitamin K for bleeding gums. In general the advice is excellent. The chapter on prenatal care and advice is outstanding for good common sense.

This handy book should be in the glove compartment of the car of all those practicing obstetrics and thus readily available for perusal during the hours of waiting.

C. H. M.

Selected Studies on Arteriosclerosis, by RUDOLPH ALTSCHUL, M.D., 1950. Springfield: Charles C. Thomas Company. 182 pages. \$5.50.

This book is a collection of various studies on some aspects of human and of experimental arteriosclerosis. It deals mainly with an analysis of cellular pathology in the various types of arteriosclerosis.

It is not a primer on arteriosclerosis and would not be of great interest to physicians engaged in clinical practice. It should, however, appeal to teachers of clinical medicine and research workers concerned with the study of peripheral vascular disorders.

T. Z.

Sir Thomas Browne, A Doctor's Life of Science & Faith, by JEREMIAH S. FINCH, Assistant Dean of the College, Princeton University, 1951. New York: Henry Schuman. 319 pages. \$3.50.

Sir Thomas Browne, the scholar-physician whose creed is proclaimed so magnificently in the great *Religio Medici*, lived and worked in times as troublous as our own. His life, from 1605 to 1682, spanned the tumultuous years of the Commonwealth, in which England was divided against itself, both spiritually and politically. Yet in that age of dogman, controversy and persecution, Brown voiced one of the first great pleas for religious tolerance. While Europe seethed with partisanship and nationalism, he was able to remark calmly that "those National repugnancies do not touch me." Aware of the danger in the struggle between science and faith, in *Religio Medici* he tried to work out his own reconciliation.

For too long we have known Browne only as the author of this great book, familiar to every student of English literature. It is a delight to find in these pages Browne the man, who enjoyed dancing till four in the morning, the eager scientist, the conscientious physician, the head of a family, enjoying the companionship and accomplishments of his children. He had, according to his biographer, a flair for the unusual and bizarre. He experimented with narcotics or magnets; the next moment he prays devotedly before entering the house of a patient. He proposed digging the Panama Canal, and wrote a magnificent prose poem on death and burial. He enjoyed his life to the full, and in mid course, pronounced it "a miracle of thirty years."

V. L. D.

Therapeutic Radiology, by GEORGE WINSLOW HOLMES, M.D., clinical professor of roentgenology, emeritus, Harvard Medical School, and MILFORD D. SCHULZ, M.D., instructor in radiology, Harvard Medical School. 1949. Philadelphia: Lee & Febiger. 347 pages, 121 illustrations, 10 in color. \$7.50.

This book is written mainly for radiologists who do not specialize in therapy, as well as for physicians and medical students who want to familiarize themselves with the field of radiation therapy and acceptable roentgen therapy technique. The authors have made it brief by avoiding controversial issues and limiting the description of technique to their own methods.

The radiation therapist may find a few useful suggestions and find it interesting to compare the authors' methods with his own. He undoubtedly will object to statements that this or that method *should* be used when other techniques may seem more desirable.

A brief history of radiation therapy stressing the American contributions is followed by a short chapter on physics giving the theories and facts essential to an understanding of the application of radiation. Biological effects are discussed, with warning against excessive radiation. Consideration is given to selection of types of radiation, dose and techniques, and to selection, preparation and care of patients.

The methods of treatment for all the different diseases and conditions which they treat are described in 13 chapters. The uses of radium and radioactive isotopes are mentioned briefly, but the book is devoted mainly to roentgen ray therapy and radium technique is omitted except for its use in treatment of carcinoma of the uterus and the uterine cervix. Chapters on protection and legal problems are included.

The authors have succeeded, by being didactic and brief, to cover the entire therapeutic field in 334 pages. They have, however, at the end of each chapter attached a number of references for "suggested reading."

K. W. S.

Notices . . .

The American College of Physicians announces a postgraduate course in Diseases Due to Allergic and Immune Mechanisms, to be held at the Hotel Roosevelt, Pittsburgh, Pennsylvania, April 24-28, 1951.

* * *

The American Gopher Association will hold its 1951 meeting at the Deshler Wallick Hotel, Columbus, Ohio, May 24, 25, and 26, 1951.

* * *

Minnesota Regional Postgraduate Seminars: The Minnesota State Medical Association and the University of Minnesota Medical School will present a second series of regional postgraduate seminars for physicians beginning the week of March 19, 1951. Each postgraduate course or seminar series will consist of eight weekly evening meetings, each of approximately two hours' duration.

The titles of the courses and the Minnesota cities in which each will be presented are as follows: dermatology, St. Cloud; electrocardiography, Mankato; fractures and traumatic surgery, Rochester; gynecology, Alexandria; obstetrics, Bemidji; and pediatrics, Duluth.

Tuition for the courses will be \$25.00.

In addition, the Minnesota State Medical Association and the University of Minnesota Medical School will again participate with the Minnesota Department of Health, the Minnesota Cancer Society, and the Minnesota Heart Association in presenting postgraduate seminars in cancer, cardiovascular diseases, and psychosomatic medicine for physicians in the areas surrounding Slayton and Albert Lea. There is no tuition fee for these seminars, since they are given with the financial support of the Minnesota Department of Health Cancer and Heart Disease Control Divisions.

* * *

University of Minnesota Continuation Courses:

A course in urology will be presented at the Center for Continuation Study on April 2-6, under the sponsorship of the North Central Section of the American Urological Association, and under the direction of Dr. C. D. Creevy. The faculty will include Dr. Hugh J. Jewett, Baltimore, Maryland; Dr. Lloyd G. Lewis, Georgetown University Medical School, Washington, D. C.; Dr. Reed M. Nesbit, University of Michigan Medical School, Ann Arbor; and Dr. Parke G. Smith, Department of Urology, University of Cincinnati, Cincinnati, Ohio.

A postgraduate symposium on *lupus erythematosus* will be presented April 5 and 6, 1951. Visiting physicians who will participate include: Dr. John R. Haserick, Cleveland, Ohio; Dr. Paul Klempner, Mount Sinai Hospital, New York; and Dr. Louis J. Soffer, Department of Medicine, Columbia University, New York City. The course is given under the direction of Dr. Henry E. Michelson.

Doctors William Dameshek, Tufts University School of Medicine; Clement A. Finch, University of Washington School of Medicine, Seattle, Washington, and Robert W. Heinle, Western Reserve University School of Medicine, Cleveland, Ohio, will participate in a continuation course on *diseases of the blood in infancy and childhood* to be presented April 16-18, 1951. The course is given under the direction of Doctors Irvine McQuarrie and Charles D. May, Department of Pediatrics, University of Minnesota.

A course in proctology will be presented on April 16 to 21, 1951. Dr. Robert A. Scarborough, Department of Surgery, Stanford University Medical School, San Francisco, California, will be the visiting faculty member for the course.

A course in *electrocardiography* will be presented on May 7 to 11, 1951. Dr. George E. Burch, Professor, Department of Medicine, Tulane University of Louisiana, and Dr. Harry E. Ungerleider, Medical Director of Research, The Equitable Life Assurance Society, New York City, will be the visiting faculty members for the course. In addition, Dr. Burch will give the first annual George E. Fahr Lecture on May 8.

A course on the *Minnesota multiphasic personality inventory* will be presented on May 14, 1951. The mechanism, interpretation, and clinical use of the test will be discussed.

University of Manitoba, Faculty of Medicine REFRESHER COURSE PROGRAM

Arranged by the Committee on Post Graduate Studies
Winnipeg, March 26, 27, 28, 29, 30, 1951

GUEST SPEAKERS

Dr. Gaylor W. Anderson, Mayo Professor and Director of School of Public Health, University of Minnesota. President-elect, American Public Health Association.

Dr. Douglas E. Cannell, Professor of Obstetrics and Gynecology, University of Toronto.

Dr. Ray F. Farquharson, Professor of Medicine, University of Toronto.

Dr. Walter C. MacKenzie, Professor of Surgery, University of Alberta.

Monday, March 26

Morning—Health Officers' Association program. Registration for refresher course at Fort Garry hotel.

Noon (12:30)—Luncheon, Fort Garry hotel. Chairman—Dean L. G. Bell; Guests—Hon. Ivan Schultz, Minister of Health and Public Welfare; President Gillson, University of Manitoba. Speaker—Dr. Gaylor Anderson, University of Minnesota.

Afternoon—2:15—Fort Garry hotel. Chairman—Dr. F. G. McGuinness. (1) Obstetrical topic—Dr. Douglas E. Cannell, University of Toronto. (2) Management of the Menopause—Round Table Conference. Chairman—Dr. Elinor Black.

Tuesday, March 27

Morning—St. Boniface hospital. 9:00—Clinical program: X-ray Conference. Management of Renal Disease. Cough—as a Symptom. Geriatric Topics. Management of Diabetes.

Noon (12:15)—Luncheon, St. Boniface hospital. Chairman, Dr. W. F. Abbott. Speaker—Dr. Douglas E. Cannell, Professor of Obstetrics and Gynecology, University of Toronto.

Afternoon—St. Boniface hospital. Chairman—Dr. D. S. McEwen. 2:15—Hemorrhage in Obstetrical Practice—Dr. A. W. Andison. Management of Thyroid Disease—Round Table Conference. Chairman—Dr. A. Hollenberg.

Wednesday, March 28

Morning—Winnipeg General Hospital. 9:00—The Rational Use of Quinidine—Dr. A. B. Houston. Fatigue as a Symptom—Dr. G. L. Adamson. The Management of Anuria—Dr. Ruben Cherniack. The Sprue Syndrome, a Discussion of Its Early Recognition—Dr. D. L. Kippen. 10:40—Surgical Topics—Dr. C. W. Burns and Staff.

Noon (12:15) — Luncheon, Winnipeg General hospital, Nurses' Residence. Speaker—Dr. Ray Farquharson, Professor of Medicine, University of Toronto. Diagnosis and Treatment of Anemias.

Afternoon—Medical College, Theatre "A". Chairman—Dr. C. W. Burns. 2:15—(1) Palliation in Tumor Treatment—Dr. Walter C. MacKenzie, University of Alberta. (2) ACTH and Cortisone in Clinical Medicine—Round Table Conference. Chairman—Dean L. G. Bell. (3) Colles fracture (illustrated by film)—Dr. F. Robert Tucker.

Thursday, March 29

Morning—Deer Lodge hospital. 9:00—Clinico-Pathological Conference—Dr. J. D. Adamson, Dr. T. H. Williams and Staff. Peripheral Vascular Disease—Dr. C. E. Corrigan and Dr. L. R. Coke. Modern Methods of Treatment of Hemiplegia—Dr. W. M. Musgrove and Dr. John Matas.

Noon (12:15)—Luncheon, Deer Lodge hospital. Chairman—Dr. W. R. Dunlop, Senior Treatment Medical Officer, Deer Lodge hospital. Speaker—Col. John N. Crawford, M.B.E., E.D., Medical Directorate, Army Headquarters, Ottawa. The General Practitioner and Civil Defense.

Afternoon—Deer Lodge hospital. 2:15 (1) The New Problems in Modern Warfare—Col. J. N. Crawford, M.B.E., E.D., Medical Directorate, Army Headquarters, Ottawa. (2) The Management of Gall Bladder Disease and Its Complications—Round Table Conference. Chairman—Dr. J. Wendell Macleod.

Evening—8:15—Medical College. (1) Intestinal Obstruction—Dr. W. C. MacKenzie, Professor of Surgery, University of Alberta. (2) Medical Diseases of Bone—Dr. Ray Farquharson, Professor of Medicine, University of Toronto.

Friday, March 30

Morning—Children's Hospital. 9:00—Clinical program.
Noon (12:15)—Luncheon, Children's hospital. Chairman—Dr.

Bruce Chown. "Information Please." A battery of experts will answer questions on any subject in pediatrics.

Afternoon—Children's hospital. 2:00 (1) The Treatment of Some Common Skin Disorders in Children—Dr. Arthur R. Birt. (2) Abdominal Surgical Emergencies in Children—Round Table Conference. Chairman—Dr. H. Medovy.

Evening—Dinner—Speaker to be announced.

Enroll early. The accepted registration is limited. Should you plan to attend, early enrollment is recommended. Applications for registration will be accepted in the order in which they are received.

American College Health Association News . . .

The New England Section met at Vassar College December 2, 1950. A total of twenty-two representatives from twelve institutions were present. The meeting opened with a very cordial and informal welcome by President Planding of Vassar. Discussion of common problems and what little business there was to transact followed. There was some discussion as to whether or not the name of the section should be changed to "Northeastern" Section so that it may include New York State since the New York Section is not active. No action was taken.

Following the morning session, a tour was made of the Vassar infirmary and Student Health offices.

During the afternoon session, Dr. Carl Binger, director of the Mellon Program at Vassar, presented a general outline of the program as it is being instituted at Vassar. In the informal discussion numerous questions were asked and answered (if possible). Dr. Harrison Eddy, the college psychiatrist, discussed many problems.

Before adjournment, Dr. Thomas Urmey of Williams College was unanimously designated as the new chairman of the Section.

* * *

Cortland State Teachers College, Cortland, New York, is seeking a qualified physician to serve as director of the college health service. Anyone interested should contact Dr. John E. Eckel, Director of Health Service. Information concerning the position is as follows:

The position, which will be open as of July 1, 1951, comes under the State University of New York and has all of the advantages equivalent to those of full professorship on the college faculty, including salary, retirement, etc.

The base salary is \$5,400 with five annual increments of \$240 each, reaching a maximum of \$6,600 at the end of five years. This salary is for a period of ten months service; that is, September 1st to June 30th each academic year. In addition, a variable summer school stipend of at least \$800 for an eight week session is available.

The health service at present consists of one physician (who is the director); two nurse instructors, who spend approximately one-third time each in health instruction; one athletic trainer, who spends approximately one-half time in health instruction; and one full time secretary.

At the present time this staff provides health service for approximately 1,350 students. However, with new dormitories and a new health and physical education building already under construction, a new health service suite containing five major rooms and four smaller auxiliary rooms will be available in early 1952 to serve a student population of approximately 1,600 students. This health service will be fully equipped with the most modern facilities.

The director of health service has the responsibility of administering the entire program, consisting of treatment of those able to be cared for in the health service during regular office hours, conducting routine sports physical examinations, and other physical examinations as required, and teaching one physical education course known as "physical inspection."

Because of the rather intensive intercollegiate athletic program conducted, it would be most desirable for the director to be a male; however, applications will be accepted from both sexes. Applications, giving full details as to age, experience, and full academic training, should be sent to Dr. Eckel.

* * *

New directors of the Student Health Service of member institutions are as follows:

Percy Vivian, M.D.—McGill University, Montreal.

S. J. P. Turco, M.D.—Rhode Island State College, Kingston.

Alexander Freed, M.D.—Yeshiva University, New York.

J. Roswell Gallagher, M.D.—Wesleyan University, Middleton.

C. J. Holland, M.D.—Michigan State College, East Lansing.

E. Bryan Quarles, M.D.—Indiana University, Bloomington.

Marion A. Boyd, M.D.—Women's Medical College of Pennsylvania, Philadelphia.

* * *

On an exchange with the Association's Proceedings, the secretary's office has just received a copy of the 1949 and 1950 "Lavori Dell'Istituto Di Anatomia Patologica Di Perugia" (listed in Index Medicus), which contains the results of research carried on during 1949 in the Institute. If any person wishes to read these publications (all in Italian) write the secretary.

News Briefs . . .

North Dakota

REPORTS on various aspects of the medical program in North Dakota were given at the semi-annual meeting of the state medical center advisory council, which was held at Grand Forks on January 31. Dean W. F. Potter reported on the medical school; Dr. M. Duane Sommer-ness, state psychiatrist, and A. L. Lincoln, on the mental health program; Melvin E. Koons, on the location of a blood bank at the University; Miss Beatrice Horsey, on the division of nursing; and Dr. Robert Fischer on the medical technology program.

Council members present were W. W. Murrey of Fargo, Dr. A. D. McCannel of Minot, Dr. R. O. Sax-vik, state health officer of Bismarck, Mrs. Fred Giffey of Garrison; Dean Potter, and F. A. Foley of Bismarck.

Among its resolutions the council:

Recommended that a 200,000 cubic feet addition, esti-mated to cost \$200,000, be built to the medical school.

Decided to recommend to the president and board of higher education that the freshmen classes in the med-ical school be increased by four to make a total of 40 by the fall of 1951.

Moved that the center continue to work with the dental association on cancer detection and other types of clinics and work that will benefit the people of the state.

Recommended that the advisory group contin-ue to cooperate with doctors, nurses and technicians of the state and establish clinics and refresher courses for them in various parts of the state.

Commended officials of the medical school for bring-ing the two-year medical course up to standard and urged that accrediting agencies be informed of progress made.

* * *

The new \$450,000 Griggs county Community hospi-tal was opened at Cooperstown on February 15. The hospital with accommodations for 26 patients will be under the direction of Dr. K. M. Wakefield and Dr. W. L. Fennell, both formerly of Winnipeg.

* * *

THE North Dakota Radiological Society held a two-day meeting at Fargo on February 3 and 4. Attending the meeting were Drs. H. M. Berg, A. J. Skjelset and J. R. Williams, of Bismarck; Dr. P. H. Woutat, Grand Forks; Dr. Willard Wall, Minot; Dr. George S. Boyer, Crookston; Dr. E. M. Anderson, St. Cloud; and Drs. Theodore Donat, Dr. Richard Storrs and Charles Heil-man of Fargo.

* * *

FINISHING TOUCHES are being put on the new \$245,000 hospital at Watford City, which will open with a dedi-cation program on May 1. During the first months of operation the hospital will have 12 beds, later to be in-creased to a capacity of 20 beds.

A new \$640,000 hospital with a capacity of 130 beds is now being completed at the State School at Grafton. Dr. John G. Lamont is medical director of the Grafton School.

* * *

DR. E. J. HAGAN was elected president at the annual meeting of the Kotana Medical society held at Williston on January 24. Dr. Duane Pile, Crosby, was elected vice-president, and Dr. D. E. Skjei, secretary-treasurer.

Minnesota

A GRANT of \$72,954 has been made to the University of Minnesota by the U. S. Public Health service for research with ACTH and cortisone. The money has been allotted as follows:

Studies of the effectiveness of ACTH and cortisone in the treatment of rheumatic fever and the prevention of rheumatic heart disease, \$32,400, Dr. Morse J. Shapiro, researcher.

Studies on the pathogenesis of rheumatic fever, \$24,000, Dr. Lewis Thomas, researcher.

Studies on the conjugated steroids, \$8,385, Dr. Saul L. Cohen.

Influence of cancer on the steroidal conjugation mech-anisms, \$8,169, Dr. Cohen.

Other gifts to the University for medical research include a bequest of \$15,000 for cancer research from the Damon Runyon memorial fund; \$5,197 for malig-nant disease research from the Minnesota Medical Foun-dation and an anonymous donor; \$5,000 from the Helen Hay Whitney foundation for research in rheumatic fever; \$4,500 from St. Barnabas hospital, Minneapolis, for research fellowships in surgery, pediatrics and medi-cine; \$2,250 from Massachusetts General hospital for fellowships; \$3,000 from the Minnesota Medical foun-dation for surgical research; \$2,650 from Northwestern hospital, Minneapolis, for fellowships; and \$1,500 from the Charles T. Miller hospital, St. Paul, for fellowships.

* * *

THE first mental health clinic for children in Minne-apolis, known as the Washburn Memorial clinic, was opened at St. Barnabas hospital on February 9, with Dr. Harold B. Hanson as director. Dr. Donald W. Has-tings, Dr. Irvine McQuarrie, and Dr. Reynold A. Jen-sen of the University of Minnesota medical school, supervise the professional staff.

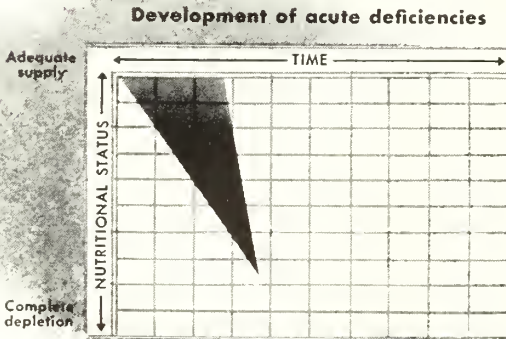
Minnesota children up to 16 will be treated on referral from other physicians. The clinic will provide training and teaching for medical men specializing in psychiatry and graduate students in social work and psychology.

* * *

Dr. Charles W. Mayo of Rochester was unanimously elected to the board of regents of the University of Minnesota at a meeting on February 20.

acute vitamin deficiencies

A sudden drop from adequate to grossly inadequate vitamin intake results in fast tissue depletion and functional changes. Ordinarily, physical lesions do not appear. If tissue depletion is rapid enough, death may ensue with slight or no morphologic variation.



Treatment of acute deficiencies

Fully therapeutic dosages of all the vitamins indicated in mixed vitamin therapy should be given. Under intensive therapy recovery from acute vitamin deficiencies usually is made in a comparatively short time.

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Vitamin A	25,000 U.S.P. Units
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Thiamine HCl	10 mg.
Riboflavin	5 mg.
Niacinamide	150 mg.
Ascorbic Acid	150 mg.

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When the deficiency is acute specify Theragran and correct the patient's diet

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AN AWARD for distinguished community service was made to Dr. S. Marx White on January 31 by the Community Chest and Council of Hennepin county.

* * *

DR. EDWARD C. KENDALL, professor of physiologic chemistry at the Mayo foundation and head of the Mayo clinic biochemistry laboratory and Nobel prize winner in 1950, will retire from his post at the foundation on May 1.

* * *

DR. RUTH E. BOYNTON, director of the student health service at the University of Minnesota, left the first part of February for six months study in England. As a holder of a Fulbright Fellowship Dr. Boynton will visit university and college health services and serve as consultant to university and college administrative officials concerning health service problems.

* * *

DR. LEO G. RIGLER, professor of radiology, and Dr. C. J. Watson, professor of medicine at the University of Minnesota, served as visiting professors at the University of Colorado Medical school from February 5 to 9.

* * *

THREE University of Minnesota men—Henry M. Cavert, Francis J. Haddy, and George C. Snively—were named recipients of new research fellowships from the American Heart Association. Joseph Jorgens, also of the University, received a renewal research fellowship.

* * *

DR. GORDON R. KAMMAN of St. Paul spoke before the Cerro Gordo County medical society in Mason City, Iowa, on February 13 on the subject, "Psychotherapy and Psychosomatics."

* * *

Alpha Epsilon Iota, national medical sorority, met February 21 at the Town and Country Club, in St. Paul, to celebrate the golden anniversary of the University of Minnesota chapter. Alumnae on the arrangements committee included Dr. Catherine Corson (Mrs. Donald West), chairman; Dr. Eva Jane Ostergren (Mrs. Bert Larson), Dr. Olga Hansen (Mrs. Jennings Litzenberg), Dr. Helen Peik (Mrs. James Dahl), Dr. Eleanor Iversen (Mrs. F. G. Gunlaugson) and Mrs. Leo W. Fink.

Elections and appointments . . .

WALTER M. BOOTHBY, professor emeritus of the Mayo Foundation, has joined the staff of the School of Aviation Medicine, Randolph AFB, as research advisor. Dr. Boothby has been advisor on research in aviation medicine and physiology to the Swedish Aviation Medicine Council at the University of Lund for the past two years.

* * *

DR. JOHN A. HAUGEN was elected president of the Minneapolis Academy of Medicine at the annual meeting recently. Other officers include Dr. Donald C. MacKinnon, vice president; Dr. Chauncey N. Borman, secretary; and Dr. U. Schuyler Anderson, recorder.

* * *

NEW OFFICERS of the Ramsey County Medical society are Dr. F. G. Hederstrom, president; Dr. Laurence Hilger, secretary-treasurer; and Dr. J. P. Medelman, president-elect.

DR. WILLIAM R. JONES has been elected president of the Hennepin County Medical society. He will take office in October, succeeding Dr. Reuben F. Erickson, who will become chairman of the board of directors. Other officers elected are Drs. Reuben A. Johnson and James B. Carey, vice-presidents; Robert F. McGandy and Silas C. Andersen, board of directors; Claude J. Ehrenberg and Moses Barron, board of censors; George N. Aagaard and Lawrence F. Richdorf, board of ethics; Walter H. Ude and Olga S. Hansen, board of trustees, and Douglas P. Head, Wesley W. Spink, Russell W. Morse, John A. Haugen, Ann W. Arnold, Harry B. Hall, Rudolph W. Koucky and Alfred N. Bessen, delegates to the Minnesota state medical association.

* * *

DR. JOSEPH M. RYAN has been named chief of staff of St. Joseph's hospital, St. Paul. Dr. J. P. Medelman is the new secretary and Dr. Jerome A. Hilger, vice-president.

* * *

DR. HAROLD T. GUSTASON has been elected chief of staff of Swedish hospital, Minneapolis. New vice president is Dr. A. N. Russeth.

* * *

THE new chief of staff at St. Barnabas hospital is Dr. E. J. Lillehei, with Dr. Robert J. Tenner vice chief of staff, and Dr. Edgar A. Webb, secretary-treasurer.

* * *

NEW STAFF OFFICERS for St. Andrew's hospital, Minneapolis, are: chief of staff, Dr. R. T. Soderlind; vice president, Dr. F. A. Zinter; and secretary-treasurer, Dr. I. A. Preine.

South Dakota

THE BOARD OF DIRECTORS of the South Dakota Medical School Endowment association has announced the acceptance of a bequest made by Dr. and Mrs. E. M. Stansbury of Vermillion. The bequest, in the form of real estate which has a replacement value in excess of \$25,000, is the first contribution of its kind to the endowment association, and will be used later to provide funds for loans and scholarships to medical students and nurses.

DR. WILLIAM SAXTON, of Huron, is chairman of the board of directors, and Dean Donald Slaughter of the University School of Medicine, Vermillion, is secretary-treasurer, and Dr. George T. Jordan, also of Vermillion, is an associate director of the Endowment association.

* * *

New locations . . .

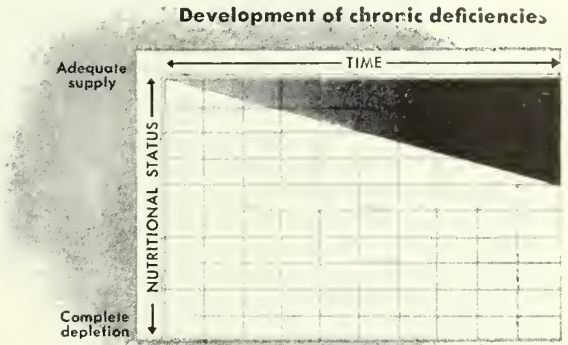
DR. O. P. ERICKSON, formerly of Turtle Lake, North Dakota, has established a practice in Lemmon.

DR. C. BINDER has joined the staff of the new Chamberlain Clinic in association with Dr. L. W. Holland.

DR. MILLARD R. SHAW will open offices in Tripp for the practice of medicine and obstetrics. Dr. Shaw is a

chronic vitamin deficiencies

When vitamin intake is just below the adequate, deficiencies develop slowly. As time goes on lesions appear. They are insidious in onset and slow in regression, even under intensive therapy. Many chronic lesions progress uneventfully. The patient accepts his ill-health as normal.



Treatment of chronic deficiencies

Chronic deficiencies require prolonged therapy. At first treatment should be intensive. A much longer period of complete but less intensive treatment should follow. For a year after apparent recovery the patient should be given fully protective amounts of the essential nutrients.

THERAGRAN supplies all of the vitamins indicated in mixed vitamin therapy in clinically proved, truly therapeutic dosages.

Each Theragran Capsule contains:

Vitamin A	25,000 U.S.P. Units
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Relationship of Stress to Autonomic Lability

Studies in psychosomatics have shown that functional disorders often are a result of the patient's inability to adjust to emotionally stressful situations (stressor factors).

Nervous tension and chronic anxiety, discharged through a labile Autonomic Nervous System, can cause somatic disturbance.^{1,2} Such states may involve any one of the organ systems or several at one time.^{1,3} The outline below relates gastrointestinal and cardiovascular symptomatology to the exaggerated response of the autonomic nervous system.

	Physiologic Effects of Autonomic Discharge	
	Sympathetic	Parasympathetic
Gastro-intestinal	Hypomotility Intestinal Atony Hyposecretion Reduced salivation	Hypermotility Gastrointestinal spasm Hypersecretion
Cardio-vascular	Rapid heart rate Peripheral vaso-constriction	Slow heart rate Vasodilatation
Functional Manifestations	Palpitation Tachycardia Elevated B. P. Dry mouth—throat	Heartburn Nausea-vomiting Low B. P. Colonic spasm

Data here tabulated is from references 3, 4, 5, 6, 7, given below.

Diagnosis of functional disorder is supported by the following indications of autonomic lability:

- Variable Blood Pressure
- Body Temperature Variations
- Changing pulse rate
- Deviations in B. M. R.
- Exaggerated Cold Pressure Reflex
- Glucose Tolerance Alterations

Therapy in these cases is directed toward: 1) relief of symptoms by drug therapy (so making the patient more amenable to psychotherapy); 2) psychotherapeutic guidance in making adjustment to stressful situations and correction of unhealthy attitudes.

Clinicians who have studied these disorders, including those of the menopause, report that good therapeutic results are produced by combined adrenergic (ergotamine) and cholinergic blockade (Bellafoline) with central sedation (phenobarbital)^{8,9,10}. A convenient preparation of this nature is available in the form of Bellergal Tablets. Functional disorders are long-term therapeutic problems; therefore, drug treatment by the following method is recommended: 5 or 6 tabs. per day for the 1st week; then gradually reduce to the smallest dose effective in maintaining the patient symptom free (average: 3 tabs. daily). Interrupt for 1 week out of every month to assess results.

1. Ebaugh, F.: *Postgrad. Med.* 4: 208, 1948. 2. Wilbur, D.: *J.A.M.A.* 141: 1199, 1949. 3. Williams, E. and Carmichael, C.: *J. Nat'l. Med. Assoc.* 42: 32, 1950. 4. Goodman, L. and Gilman, A.: *The Pharmacological Basis of Therapeutics*, The Macmillan Co., 1941. 5. Katz, L. et al: *Ann. Int. Med.* 27: 261, 1947. 6. Weiss, E. et al: *Am. J. Psychiat.* 107: 264, 1950. 7. Alvarez, W.: *Chicago Med. Soc. Bulletin*, 581, 1950. 8. Rakoff, A.: *A Course in Practical Therapeutics*, Williams and Wilkins, 1948. 9. Karnosh, L. and Zucker, E.: *A Handbook of Psychiatry*, C. V. Mosby Co., 1945. 10. Harris, L.: *Canad. M.A.J.* 58: 251, 1948.

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graduate of the University of Utah medical school and has since specialized in internal medicine at the University of Louisville in Kentucky.

DR. C. R. LAMBERT, formerly of Ashland, Kentucky, has established a practice at Buffalo, with an office in the Harding County hospital.

DR. R. W. FREIBURG of Mitchell, for many years an Aberdeen physician, has retired after 56 years of practice in South Dakota. Among the highlights of his long career in South Dakota was the successful control of an epidemic of black diphtheria south of Bridgewater. Dr. and Mrs. Freiburg will live in Sacramento, Calif.

Deaths . . .

DR. GUSTAV SCHYZER, Minneapolis surgeon, died February 2 at Biloxi, Mississippi. Born in Zurich, Switzerland, Dr. Schyzer was chief of staff at Northwestern hospital for many years. He was a founding member of the American College of Surgeons, a member of the Western Surgical association, the Academy of Medicine and Hennepin county and Minnesota medical societies.

* * *

DR. M. M. LOUCKS of Kelliher, Minnesota, died Monday, January 29. He formerly practiced medicine at Flandreau, South Dakota.

* * *

DR. R. L. BEEGLY, of Kimball, South Dakota, died February 6 at a Mitchell hospital after a long illness. He has been a resident of Kimball for six years, coming there from Winner.

FRACTURES REQUIRING OPEN REDUCTION

(Continued from page 91)

goal of complete restoration of function in the shortest possible time. Because of lack of time, many problems have not been considered, such as compound fractures, delayed union, non-union, etc. Successful open reduction still depends upon adequate facilities, equipment and ability.

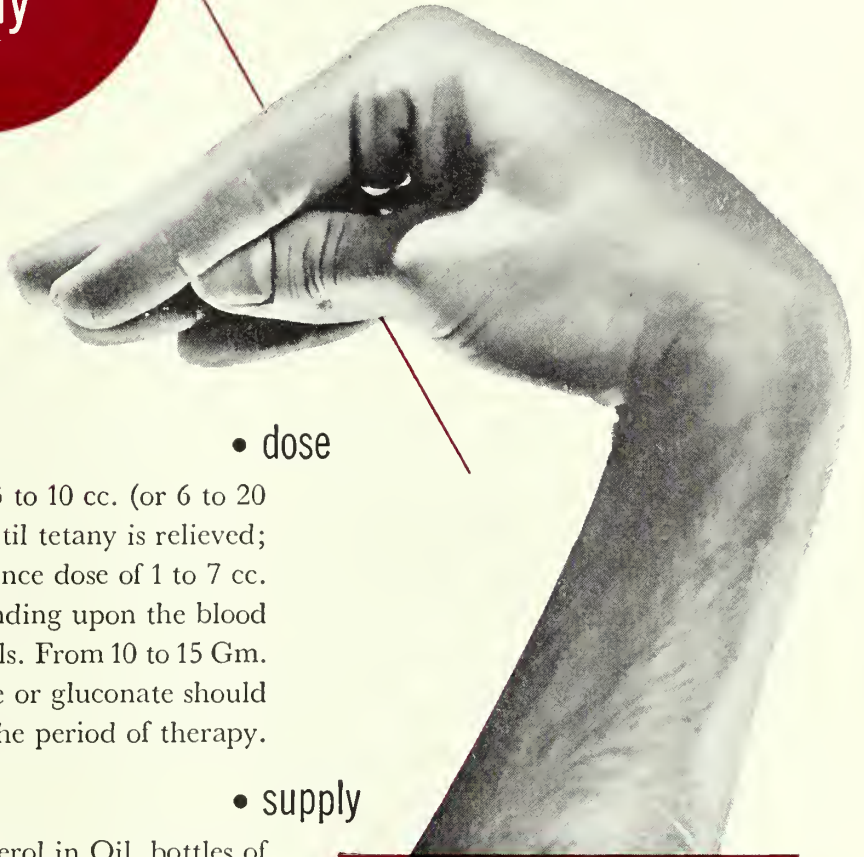
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Correction. In the January, 1951 issue of THE JOURNAL-LANCET, the second sentence in the third footnote at the bottom of page 23 should read: "At the 1950 meeting of the North Dakota State Medical Association held in Grand Forks in May, the Board of Medical Examiners, through their president, awarded Dr. Lundy an honorary license to practice medicine in North Dakota, in recognition of his own achievements as a physician, and the fact that he was the son of one of North Dakota's pioneer doctors."

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hypocalcemic
tetany**

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is swiftly controlled by
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Orally 3 to 10 cc. (or 6 to 20 capsules) daily until tetany is relieved; weekly maintenance dose of 1 to 7 cc. or 2 to 14 capsules depending upon the blood and urine calcium levels. From 10 to 15 Gm. calcium lactate or gluconate should be given daily through the period of therapy.

• supply

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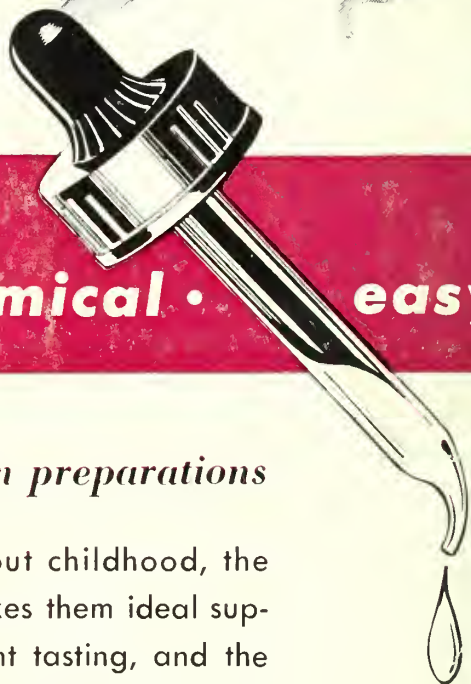
As vitamin needs vary throughout childhood, the versatility of the *three Vi-Sols* makes them ideal supplements. The Vi-Sols are pleasant tasting, and the calibrated droppers make dosage measurement easy.

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TRI-VI-SOL 0.6 cc. supplies:	5000 units	1000 units	50 mg.			
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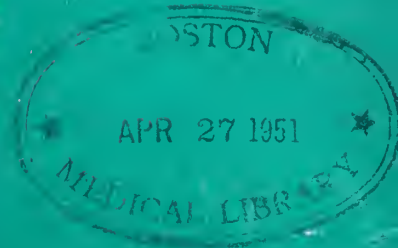
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The
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APRIL 1951 — Volume LXXI, No. 4

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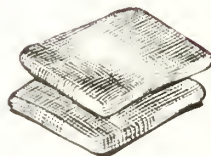
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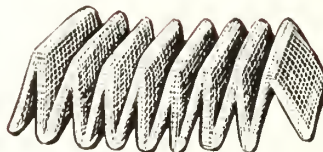
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The JOURNAL LANCET

Introduction

IT IS APPROPRIATE and encouraging that the JOURNAL-LANCET continues to devote the major portion of one of its issues each year to the subject of tuberculosis.

It is particularly appropriate at this time because there has developed a tendency to assume that the tuberculosis problem is a thing of the past, which it definitely is not. The decline in the tuberculosis mortality rate is indeed encouraging, but through the extension and improvement of our casefinding procedures, we actually know of more cases today than in the past. Furthermore, there is good reason to believe that the morbidity rate for tuberculosis (that is, the number of cases of tuberculosis developing each year per one hundred thousand population) is not declining at the same rate the mortality rate has declined. Those who are living and ill with tuberculosis form the public health problem; not those who are gone and beyond our help.

Furthermore, in view of the international situation and the mobilization and defense production program being put into effect in the United States, it is particularly important that all those interested in the control of tuberculosis—which is every physician, and, indeed, every citizen—need to be particularly watchful lest our gains in the fight against tuberculosis slacken or be reversed. The trend of affairs is resulting in various situations which are conducive to increasing the prevalence of tuberculosis: the sending of large numbers of our people to foreign countries where the prevalence of tuberculosis is extremely high; the shifting and mixing of our own population in the United States in response to mobilization and increased demands for workers in industrial plants involved in defense production; the prolonged and excessive strain involved in military training, in overtime employment in industrial plants, and in administrative supervision of civil defense plans and defense production; the curtailment of construction of needed housing because of the greater urgency for the use of materials in defense production, which will result in the doubling-up of families and overcrowding; the diversion of physicians and nurses from health departments and tuberculosis hospitals to military service, resulting in possible curtailment of supervision and adequate treatment of tuberculous patients.

I am sure that the papers on tuberculosis in this issue will be of interest to the readers of the JOURNAL-LANCET and will stimulate their continued watchfulness and help in the control of tuberculosis. The general practitioner of medicine is one of the key men, if not the key man, in the tuberculosis control program. An increasing number of physicians in private practice are routinely taking chest x-ray films of all patients who consult them, since the number of unsuspected cases of active tuberculosis among such individuals is much greater than in the general population. Where practicable, such a routine procedure is valuable to the physician in helping him avoid some misses in diagnosis, and helpful as well to the community in its tuberculosis control program.

JAMES E. PERKINS, M.D.,
Managing Director, National Tuberculosis Association

Tuberculosis at the Mid-Century*

RUSSELL H. FROST, M.D.†
Oak Terrace, Minnesota

IT seems to me that any consideration of "Tuberculosis at the Mid-Century" would be grievously incomplete which failed to describe, however briefly, and to pay tribute to the highly important role which the voluntary tuberculosis associations are continuing to play in the tuberculosis control programs of this country.

Since 1904 these voluntary tuberculosis associations have been organized on a state-wide basis in every state of the union, the District of Columbia, and all our possessions. Within the several states they have been organized on a county or community basis, until today there are some three thousand such associations affiliated with the National Tuberculosis Association. These associations are designated as "voluntary" to distinguish them from "official" tax-supported health departments and other public agencies. Under an elected board of directors their work is carried on by volunteers, aided, to the extent finances permit, by a more or less complete professional staff.

The leadership in the campaign against tuberculosis today which is being provided by the medical profession, official health agencies at all levels, and the voluntary association, all working in cooperation, has evolved an offensive which is being waged on five broad fronts: education, case-finding or early diagnosis, the provision of adequate facilities for isolation and treatment, rehabilitation and post-hospital follow-up, and medical research. Each of these is an essential part of the complete, well-rounded tuberculosis control program for any community. In the development of each of these parts of that program the Christmas Seal has made a significant contribution, usually and preferably in the financing of demonstration, pilot projects until some public agency was ready and able to take these over.

Education has remained primarily, and fortunately, the responsibility of the Christmas Seal-financed tuberculosis association. The Minnesota Public Health Association and its affiliated associations have, through the years, done a magnificent job in creating that first essential in our control program—a citizenry well-informed, interested and cooperative in all things pertaining to tuberculosis.

Case-finding or early diagnosis, while it is the joint responsibility of all groups engaged in the fight against tuberculosis, has for many years benefitted from the funds and efforts which our Christmas seal organizations have devoted to it. Since 1900 there has been an increasingly successful effort to find, isolate and treat the

really early and often asymptomatic case of tuberculosis. The first groups studied were school children because of the belief that the disease usually started early in life and the mistaken belief that treatment given in childhood would prevent the development of serious disease in later life. Then followed emphasis upon the examination of the contacts of known cases, of special groups with industrial hazards such as exposure to silica dust, and finally the "mass x-ray surveys" of the supposedly well. This search for unknown active cases is extremely important because it is estimated that only half of the 500,000 active cases of tuberculosis in the United States are known to health authorities today, and because there is some evidence which indicates that, while tuberculosis death rates continue to fall to new lows, tuberculosis morbidity and attack rates may actually be rising.

To name but a few firsts in this field: Minneapolis and St. Paul were the first large American cities to conduct city-wide chest x-ray surveys; and St. Louis County, Minnesota, is to my knowledge the first sizable American community to have conducted two successive x-ray surveys and thus to have exhausted, for the present at least, the possibilities of this method of tuberculosis case-finding.

Treatment of tuberculosis remains primarily the responsibility of official governmental units. There are, of course, two good reasons why this has and should continue to be so: (1) Tuberculosis is a communicable disease, and the community has an obligation not only to provide care for its tuberculous residents for the sake of the ill but, even more important, it must do so for the protection of the other members of the community; and (2) treatment of tuberculosis ordinarily requires months or even years, and its cost is simply too great to be borne privately. Christmas Seal funds are not used for this purpose since all the funds of all the voluntary associations would provide no more than two weeks care for our presently known tuberculous patients.

The familiar triad of "rest, fresh air and good food" (to be used, of course, under proper medical supervision in a hospital or sanatorium) is still a good basic formula for the treatment of tuberculosis—but much that is new and helpful has been added by 1950. Bed rest may be supplemented by drugs or by surgery or by both in the treatment of tuberculosis. When Waksman and his co-workers announced the isolation in 1944 of streptomycin, it became apparent that for the first time in medical history a drug was available which could truly influence favorably the course of tuberculous infections in man by interfering with the growth and multiplication of the infecting bacilli. Streptomycin is emphatically not a cure for tuberculosis, nor is its routine use in all cases necessary or advisable. It is distinctly an

*Presented at the annual dinner of the Minnesota Public Health Association, Minneapolis, Minnesota, October 24, 1950.

†Superintendent and Medical Director, Glen Lake Sanatorium, Oak Terrace, Minnesota.

adjunct to our other, hitherto standard methods of treatment, but it is a valuable aid in treating certain types of the disease. It is a "must" in tuberculous meningitis and generalized or miliary tuberculosis, forms of the disease which were almost always fatal prior to streptomycin but which in some instances now respond to this drug. The most serious disadvantage to the widespread and prolonged use of streptomycin and related drugs has been the marked tendency of strains of tubercle bacilli to develop or emerge which are completely resistant to the drug. This handicap has been overcome, at least in part, by giving streptomycin in combination with another drug. The one most commonly used in this connection is para-aminosalicylic acid (PAS), which has the ability to delay the emergence of streptomycin-resistant strains of tubercle bacilli. PAS has some therapeutic value in its own right and is sometimes used without streptomycin. While streptomycin is undoubtedly the best of the anti-tuberculosis substances presently available, no drug has as yet proved ideal. A tremendous search for better substances of this type is currently under way and will undoubtedly succeed. The possibilities in this field of chemotherapy are, as a matter of fact, almost limitless.

The surgical procedures which have been developed over the past twenty-five years in the treatment of pulmonary tuberculosis are becoming constantly more audacious and definitive in scope, and are being successfully applied in an increasingly large percentage of patients. In addition to the older and simpler collapse measures such as pneumothorax, pneumoperitoneum and phrenic nerve paralysis, and thoracoplasty, all of which are still useful, more radical types of surgery are being developed. These, which include lobectomy, segmental resection, pneumonectomy and decortication, are being performed with greater safety and effectiveness today than ever before, thanks to improved surgical and anesthesia techniques and to the protection afforded by streptomycin. As in the case of drugs, surgery in the treatment of tuberculosis is always an adjunct to and not a substitute for bed rest. In short, the whole picture of the treatment of tuberculosis is changing dynamically and dramatically; and we are today discharging from our hospitals and sanatoria, in good condition, many patients who only a few years ago would have been doomed to death or a life of invalidism.

Rehabilitation and post-hospital follow-up are parts of our modern tuberculosis control program which are universally admitted to be important but which all too often receive little more than lip-service. Broadly speaking, everything which is a part of the treatment of the tuberculous, everything that is done from the time of diagnosis until the patient has been re-absorbed into his community, constitutes rehabilitation.

A tremendous amount of *medical research* in the field of tuberculosis is being sponsored by the U. S. Public Health Service and other governmental agencies, by our voluntary associations, by universities and hospitals, by industry and by private foundations. Some of the most practical and effective research projects have been

sponsored by the American Trudeau Society, medical section of the National Tuberculosis Association, and paid for by our Christmas Seal dollars.

Some mention of *immunization* against tuberculosis would seem to be in order. The best of the immunizing agents available is BCG (Bacillus Calmette-Guerin), a vaccine made from a strain of live bovine tubercle bacilli which after culturing and sub-culturing in the laboratory for many years has completely lost its virulence or its ability to produce progressive tuberculous disease in susceptible animals or in humans. BCG is given only to persons who react negatively to tuberculin, since a positive tuberculin skin test means prior tuberculous infection. This vaccine is definitely harmless and it does appear to offer some protection against subsequent tuberculous infections, although the extent and the duration of that protection are not yet accurately known. Further controlled studies are therefore necessary and are being carried out to determine more exactly the true value of BCG. Meanwhile the U.S. Public Health Service has authorized, and the American Trudeau Society has recommended, BCG vaccination of negative tuberculin reactors among certain special groups whose work or whose associations will almost certainly result in exposure to tuberculous infection, such as medical students, nurses, interns, laboratory workers and the like, but neither recommends its use at the present time among the general population. All authorities emphasize that, even though BCG or some other similar agent eventually proves to afford safe and effective protection against tuberculosis, there must be no relaxation in carrying out all the accepted methods of tuberculosis control on the broadest possible scale.

As this review indicates, the many-faceted tuberculosis control program which has evolved over the past half-century has played an important part in a truly remarkable decrease in our tuberculosis mortality rate. The leading cause of death in 1900, tuberculosis now ranks a poor seventh, far behind the so-called degenerative diseases and even accidental deaths. If the tuberculosis mortality rates of 1900 had continued unchanged to the mid-century point, some five million additional Americans would have died of tuberculosis during those fifty years who did not die of tuberculosis. The saving of five million lives is surely an impressive feat. However, despite these accomplishments we have only skimmed the cream of tuberculosis control in this country and the hardest part of our job lies ahead.

What are the facts, and the figures behind the facts? To cite only a few, tuberculosis is still our major public health problem, is still the most formidable disease caused by a germ because:

It still kills more people, and kills them needlessly, than any other infectious disease.

About 500,000 living Americans have active pulmonary tuberculosis of whom about a thousand are still dying *each week* from tuberculosis.

It still leads all diseases as a cause of death between the ages of 15 and 35 years, the most productive and in many ways the most important years of our lives.

In 1947, for example, it killed over 13,000 persons in this age group, while heart diseases killed 7,000 and cancer 5,000.

Tuberculosis can, and does, kill at any age, from infancy to extreme old age. Moreover, the median age at which it kills has advanced in the past ten years from 39 to 46. Putting it another way, it is now apparent that the great reservoir of tuberculosis in this country today is in our *older* age groups, particularly in middle-aged and elderly males.

Tuberculosis is not particular about selecting its victims. No one is immune, but the mortality rate is seven times as high among unskilled workers as professional people.

Tuberculosis robs this nation alone of one million working years and one and one-half million potential years of life annually—years lost by those who die of tuberculosis.

Tuberculosis costs the United States more than \$3,500,000,000 a year in direct charges alone. Not included in this figure are the cost of hospital construction nor the tremendous losses in wages and lowered production—nor the tragic cost of homes broken up by this disease.

Tuberculosis still attains almost epidemic proportions in many less fortunate countries all around the world, producing even today death rates far higher than anything ever known in America. Can any part of the world remain safe from tuberculosis so long as this continues to be true?

It is apparent, finally, that while the death rates from tuberculosis continue to fall, the number of new cases reported is actually increasing. This does not necessarily mean that tuberculosis is more prevalent than in the immediate past, although many persons, including myself, believe it is. This phenomenon is not too well understood, but at least two factors are operating: better care (and hence longer life) for tuberculosis patients, and better and more widely used case-finding methods.

It is our duty, as tuberculosis workers, to make it clear that by any standard—medical, social, economic or humanitarian—tuberculosis is still a tremendous problem. We must intensify, strengthen and expand our programs of education and case-finding. We should make much more extensive use of the tuberculin skin test as a diagnostic aid, with an intensive "follow-back" into the families of all positive reactors. In our home communities we should press for the adoption of the National Tuberculosis Association's program to have routine admission chest x-ray films made on *all* hospital and clinic admissions—this for the protection of other patients as well

as hospital personnel, because it is now clear that the all-too-common unrecognized case of tuberculosis on the open wards of a general hospital constitutes a grave menace to everyone who works there or enters as a patient.

We should continue to press for more and better facilities for the isolation and treatment of the cases of active tuberculosis thus found. In Minnesota this means vigorous support, in the 1951 session of the legislature, of various measures which will probably be introduced in a long-overdue attempt to modernize and streamline, on a state-wide basis, all of our tuberculosis facilities. These envisage (a) more liberal state aid to a county or groups of counties maintaining the several county tuberculosis sanatoria; (b) concentrating treatment facilities in a smaller number of better and, if necessary, bigger county sanatoria, closing or converting to other uses certain of the smallest sanatoria throughout the state which have out-lived their usefulness; (c) provision, at the state level, of properly designed, staffed and administered facilities in which it will be possible actually (not theoretically) to quarantine, forcibly if necessary, those few truly incorrigible patients with positive sputum who are public health menaces and who care nothing for their own welfare or that of their associates; and (d) a general re-codification and clarification of our state laws pertaining to tuberculosis (some of them nearly forty years old) in the light of changed conditions and our vastly increased knowledge. A corollary proposal which deserves the support of all of us will be to increase the funds, personnel and facilities of the Division of Vocational Rehabilitation of the State Department of Education. This excellent division is doing an outstanding piece of work but is spread far too thin. Minnesota's handicapped, including our tuberculous, deserve all the help this fine state agency can give them.

It is often stated that, in spite of the great advances in our knowledge of tuberculosis within the past few decades, there still exist large gaps in that knowledge—particularly with respect to the epidemiology of the disease. This is quite true; and I suspect, moreover, that we may never fill some of those gaps, may never know the answers to some of the questions which puzzle us today. I believe this because I am convinced that even if we never learned another fact about tuberculosis (which, of course, we shall), we already possess an amply sufficient knowledge about this disease so that, if our present knowledge is simply applied and used widely enough, we can, for all practical purposes, eradicate human tuberculosis from our midst within the space of one or two generations. It is obvious, therefore, that this is at once our challenge and our opportunity.

A large shipment of drugs for testing a million Korean civilians for tuberculosis was dispatched to Pusan, Korea, in response to an appeal from a Philadelphia, Pennsylvania, doctor. The physician, Lt. Guilo Barbero, is attached to the 12th medical dispensary in Pusan.

—News dispatch, March 31, 1951

Controlling Tuberculosis in a New Nation

1950 Journal-Lancet Lecture*

J. ARTHUR MYERS, M.D.
Minneapolis, Minnesota

PUBLISHER'S NOTE: In 1941 the JOURNAL-LANCET inaugurated a series of lectures by outstanding authorities in the various fields of medicine, open to all doctors in the region, and presented on the University of Minnesota campus. This year, when an invitation came to Dr. J. A. Myers, chairman of the JOURNAL-LANCET board of editors, to give a lecture at the Hadassah Medical school of the Hebrew University at Jerusalem on the subject of tuberculosis control, it was decided to transfer the JOURNAL-LANCET lecture for 1951 to the new country of Israel. Accordingly, this address by Dr. Myers, sponsored by the Twin Cities Chapter, American Friends of the Hebrew University, was given at the medical school in Jerusalem on September 15, 1950.

IT is a genuine honor to present the first JOURNAL-LANCET Lecture in your School of Medicine. Since tuberculosis has long been one of my main interests, since of all diseases it still ranks first as the cause of incapacity and death, and since in sizable areas of the world it is so well controlled that workers now have eradication as their goal, I have decided to discuss the methods by which any nation can control and ultimately eradicate tuberculosis if its people have the will to do so.

As a new nation you have the advantage of including in your tuberculosis control program everything that has been found of true value from all parts of the earth. At the same time you can omit everything which is based on theory, speculations and personal opinion and whose efficacy is still unproved. Whether tuberculosis is promptly controlled and remains a minor cause of illness and death until it is ultimately eradicated from Israel depends upon the program developed by the medical profession and its allies. If a fundamental program is adopted and adhered to rigidly through the decades, tuberculosis will not be an extensive destroyer of health and life in Israel. The efficacy of such a program has been demonstrated so conclusively in several places that there remains no doubt of its definitiveness when properly executed.

In some respects the tuberculosis situation in Israel today closely resembles that of Minnesota in the latter half of the 19th century. There the population grew rapidly, from less than 5000 in 1849 to 1,750,000 in 1900. In Israel the population has rapidly increased from 500,000 to 1,200,000 and immigrants are still arriving at the rate of 200,000 per year.

Those who settled in Minnesota in the 19th century were largely from Europe, particularly Germany and the Scandinavian countries, where tuberculosis was rife. Many also migrated from the New England states where there was also much tuberculosis. Among both groups many came to Minnesota because one or more members of their families were suffering from tuberculosis. The

climate had been held out as a lure to sufferers of this disease and many were already consumptive when they arrived. Probably nearly all other persons who settled in Minnesota in the 19th century, even though they were in apparent good health, had been infected with tubercle bacilli which had taken refuge in primary lesions. In sizable numbers of them clinical lesions later evolved and became contagious. These persons, together with those who had already entered as consumptives, spread tubercle bacilli to human associates and animal contacts. Even after Koch made his announcement of the discovery of the tubercle bacillus in 1882 there was controversy among Minnesota physicians as to whether this organism was truly the cause of clinical tuberculosis. There was no tuberculin test until 1890 and the controversy concerning its value greatly limited its use for the remainder of the century. There was no x-ray until 1896 and the century ended without much being known about it. There was no sanatorium or hospital for the tuberculous until after the opening of the 20th century.

In Israel, many immigrants have arrived in the last two years and more are scheduled to come from Europe and other areas where tuberculosis still abounds. Doubtless those coming from such places have already been infected with tubercle bacilli and many who do not now have demonstrable lesions will develop them as the years and decades pass.

I have seen many of the fine cattle you have imported and have been told that some of them were purchased in countries where the bovine type of tuberculosis is still prevalent. I hope those in charge of animal industry in this nation have insisted that each imported animal should be absolutely free from tuberculosis.

The population of Israel today is approximately the same as that of Minnesota at the beginning of the 20th century. However, the medical profession of today has an armamentarium and a store of information about this disease which was undreamed of in 1900.

In the United States there are nine states which hold better records of accomplishment as shown in low tuber-

*See announcement on page 135.

culosis mortality than Minnesota. They have all used essentially the same tuberculosis control measures. Because I have lived in Minnesota for 36 years and am more familiar with its program than that of any other state, I shall present a brief outline of the method of tuberculosis control employed there since 1900.

In 1900 the tuberculosis mortality rate in Minnesota was 106.4 per 100,000 population, when 1864 persons were reported to the health department as having died from this disease. The rate rose to a peak of 119.7 per 100,000 in 1911, when 2522 died.

In 1900 and for several years thereafter nearly all victims of tuberculosis died in their homes. Thus they disseminated tubercle bacilli to members of their families and other human associates as well as to domestic animals, including pets such as dogs. By 1900 most physicians regarded the tubercle bacillus as the cause of all tuberculosis and therefore recognized the disease as contagious. They knew about leprosy which had long been the common chronic contagious disease in such places as western Europe, England and Palestine. It was not until leprosariums were built in the 13th and 14th centuries for the compulsory isolation of lepers that the disease began to come under control. In western Europe alone 20,000 such institutions, and more than 200 in England were used, and by the end of the 16th century leprosy had been eradicated from England and most of western Europe. This was accomplished long before the bacillus of leprosy was discovered in 1874.

In the last half of the 19th century some sanatoriums for the tuberculous were established in Europe and a few in the United States. In Minnesota with a beginning of a few beds in one hospital in 1903, a small private sanatorium in 1905, a small state sanatorium in 1907 the project gained momentum until in 1918, in addition to the state sanatorium, there were 14 county sanatoriums as well as a few small private institutions. After 1918 no new sanatorium was built, except a unit for veterans in 1927, but in several the capacity for patients was increased. From the date of their opening to January 1, 1948 the one state and 14 county sanatoriums admitted 52,877 of whom 7,476 were readmissions. Over the same period 11,264 persons died in these institutions.

In the early years of the existence of the sanatoriums the vast majority of tuberculous patients had advanced and contagious disease before it was detected. When it was learned that chronic pulmonary tuberculosis frequently passes through a period of months and even years before symptoms appear, a campaign was instituted for mass examinations of apparently normal people. The first *mass x-ray survey* was offered in 1922. It was not popular because so many physicians still believed that beginning clinical tuberculosis was always accompanied by symptoms, easily elicited physical signs and presence of tubercle bacilli in the sputum. However, this belief was later abandoned and x-ray inspection of the chest was extensively employed in mass surveys as well as in the offices of private physicians, hospitals and clinics.

When it was demonstrated that the *tuberculin reaction* is only a test for sensitivity of tissues to tuberculo-protein and does not indicate the presence of dependable immunity, this test became the sheet anchor of the tuberculosis control movement. Since, as far as is known, only tubercle bacilli cause sensitivity to tuberculo-protein, a characteristic tuberculin reaction indicates their presence in the body. Inasmuch as tubercle bacilli cause tuberculous lesions, every person in whose body they exist is a potential case of clinical tuberculosis. When it was found that only tuberculin reactors develop clinical disease it was clear only such reactors need be examined further and that as many reactors as possible should be found. Reactors whose examination does not reveal the presence of clinical disease should be re-examined at least once a year in order that any later development be detected before symptoms and contagion are present.

The tuberculin test also proved to be our best epidemiological agent. It is certain that whenever a child or young adult reacts there has been contact with a contagious case of tuberculosis, usually an adult. Often such cases can be found among parents, grandparents and other adult associates of tuberculin reactors. This proved to be one of our best case-finding methods.

Periodic tuberculin testing of children proved to be the only accurate method of determining the success of a tuberculosis control program. If as many reactors appear among the children born after the control movement is instituted as among those of the same age before, it is obvious that contagious cases are being left in their environment.

With this threefold value of the tuberculin test clearly demonstrated, mass testing was instituted in schools, colleges and universities and in later years among adults to ferret out those infected with tubercle bacilli, find the source of infection when possible and keep the reactors, children and adults alike, under close surveillance.

Much emphasis was placed upon *accuracy in diagnosis*. This meant obtaining specific information. Only the tuberculin reaction and the recovery of tubercle bacilli are specific in the diagnosis of tuberculosis. Symptoms, abnormal signs elicited by the conventional physical examination and x-ray shadows are not pathognomonic. No matter how severe or extensive these may be, if the individual does not react to tuberculin or tubercle bacilli are not recovered one is never justified in making a diagnosis of tuberculosis.

It was long thought that if *tubercle bacilli* could not be found in smears of sputum they were not being eliminated. Later it was demonstrated that there may be as many as 10,000 to 100,000 tubercle bacilli per cubic centimeter of sputum before they are found by direct smears. Thus methods of concentrating the sputum, culturing, and best of all inoculating animals, were introduced. In a good many persons with demonstrable lesions there was no cough or sputum and therefore gastric washings were studied by culture and inoculation. It now seems probable that bronchial lavage may replace gastric lavage because it is less disturbing to patients and apparently is more accurate.

Only by the *bronchoscope* is it possible in some cases to explain the presence of tubercle bacilli in the sputum when other phases of the examination reveal no abnormality of the chest. Moreover, it is only by the bronchoscope that one can accurately diagnose tuberculous lesions within the trachea and bronchi. Obviously the chief reason for demanding such accuracy in diagnosis is to control and prevent contagion and to institute treatment promptly.

Tuberculosis among animals, particularly cattle, was recognized as a serious problem and in the 1890's efforts were made in Minnesota to protect people against the bovine type of tubercle bacillus. There were no cattle in what is now the United States when Leif Erickson and Christopher Columbus first arrived, but when dairy cattle, such as Jerseys and Holsteins, and beef cattle, such as Durhams and Herefords, were imported, bovine tuberculosis also appeared. When tuberculin became available, United States veterinarians were stationed at European ports of embarkation to prevent any animal which reacted to tuberculin from being sent to this country. To make doubly sure that no tuberculin reactor was introduced, quarantine stations were established near the United States ports of entry and all cattle were detained for 60 days. Then they were retested. The occasional reactor was eliminated and only the nonreactors were shipped to the farms. It then became necessary to control tuberculosis among the cattle that had previously been introduced. By 1916 this disease was costing the owners of cattle \$30,000,000 annually. A demonstration in the District of Columbia revealed that by testing all cattle with tuberculin, destroying the reactors and preventing the introduction of outside sources of infection the disease could be eradicated. In 1917 the United States Bureau of Animal Industry, in cooperation with state veterinary organizations, sponsored a nationwide tuberculosis eradication program among cattle. Whenever a county met specified qualifications it was designated as a modified accredited area. As the project progressed county after county qualified and then whole states. Finally, in November 1940, every county and state in the nation had met the requirements and the entire country was designated a modified accredited area. From 1917 through the fiscal year ending June, 1950, 322,474,607 tuberculin tests were administered and 3,978,763 reactors were slaughtered. The testing of 9,439,811 cattle during the fiscal year ending June 1950, revealed only 0.187 per cent reactors.

In the State of Minnesota countywide tuberculin testing of cattle was under way in 1923, and all counties had been accredited by 1935. Testing in 1949 revealed only 0.09 per cent reactors. Now, rarely does a person become infected either by contact or from food products obtained from cattle.

With control of tuberculosis among cattle herds, there was a rapid tumbling of tuberculosis mortality, morbidity and infection attack rates among people. At one time it was believed that the bovine type of tubercle bacillus has low virulence when growing in human tissues and that this type of organism produced immunity in chil-

dren to the more virulent human type. The fact was later established, however, that the bovine type is just as destructive as the human type when growing in human bodies. In England, where it is reported that about 18 to 20 per cent of cattle have tuberculous lesions as manifested by the tuberculin reactions and as seen in abattoirs, the bovine type of tubercle bacillus results in a serious public health problem. In 1937, Griffith (England) stated that 50 per cent or more of tuberculosis of the peripheral lymph nodes and the skin, 20 per cent of those of the genito-urinary tract and of bones and joints, 1 to 6 per cent of pulmonary disease and 25 per cent of fatal meningitis and generalized miliary tuberculosis were due to the bovine type of tubercle bacillus.

This type of tubercle bacillus may be more harmful to a nation than the human type because it not only results in great destruction among cattle, but also attacks nearly every other domestic animal, including pets such as dogs and cats. Moreover, it causes a large volume of tuberculosis in people. It is transmissible from animals to people, from one person to another and from people to animals. Although the human type of tubercle bacillus produces tubercles resulting in sensitivity to tuberculin in cattle it rarely results in destructive or contagious disease. It would be futile to attempt tuberculosis control in a new nation unless the program includes both humans and animals.

Minnesota's tuberculosis control program has consisted of ferreting out the tubercle bacillus wherever it lurks in the bodies of people and animals, destroying it whenever possible and preventing it from perpetuating itself in the bodies of others. The tuberculin test has proved the finest detector of persons and animals who harbor tubercle bacilli. Other phases of the examination, including x-ray inspection of the chest, have detected the location of gross pulmonary lesions, often as soon as they are large enough and dense enough to cast visible shadows. Bacteriological studies have determined the contagiousness of lesions. Treatment and isolation have prevented the dissemination of bacilli to others. Veterinarians have also prevented animals from spreading tubercle bacilli to other animals and to humans. This fundamental program has already been productive of phenomenal results. Tuberculosis mortality rates decreased from 119.7 (2522 deaths) in 1911 (population 2,106,850) to 13.6 (410 deaths) with a population of approximately 3,000,000 in 1949. In fact, in 1949 only 15 deaths occurred among persons from birth to 19 years. Of the total, 410 deaths among persons of all ages in 1949, 214, (or 52.6 per cent), were 55 years or older.

There has been a corresponding decrease in morbidity rates. Only 15 years ago there were many patients on the sanatoriums' waiting lists. For the past few years there have been several hundred vacant beds in these same institutions and there is already a movement to begin closing some of the smaller sanatoriums.

Tuberculosis among the *American Indians* of Minnesota was long neglected. No modern sanatorium was available to them until the fall of 1934, when a building was opened with a capacity of 117. This with funda-

mental case finding methods, etc., resulted in a rapid decrease in tuberculosis among Indians, from a mortality rate of 529 per 100,000 in 1937, to a rate of 71.8 in 1949. Tuberculosis among *Negroes* was controlled in the same manner. Thus tuberculosis among so-called *primitive races* responds to control measures as it does among Caucasians.

Tuberculosis among *hospital personnel*, including students of nursing and medicine, was long a serious problem in Minnesota. Among the medical students of the university, control was effected by preventing infection and reinfection of students. Entrance examinations of all students, including the tuberculin test, x-ray film inspection of the chests of reactors and periodic examinations, at least annually, detected primary infections early as well as the reinfection type of lesions if and when they occurred. Pre-employment and periodic examinations of all hospital personnel, and admission examination of all patients with the proper disposition of those found to have contagious tuberculosis created a relatively safe environment for students.

It was found that when patients are treated in single rooms and wards, contagious disease technique protects students admirably. Among the students of medicine who graduated in 1936, approximately 65 per cent of those who had entered school uninfected with tubercle bacilli had become reactors to tuberculin by the time of graduation; whereas among graduates in 1947, only 3.2 per cent of those who entered school uninfected reacted to tuberculin on graduation. In former years, 4 to 10 per cent of medical students developed demonstrable tuberculous lesions before graduation. In the past eight years only one student has had a pulmonary lesion evolve to such size as to be detected by x-ray film inspection and he was a tuberculin reactor on admission to school.

In a school of nursing which infected and reinfected all of its students 20 to 30 years ago, there were 172 who graduated from 1943 to 1946, inclusive. Of the entire group, 20 reacted to tuberculin on admission to the school and only 26 on graduation. Twenty to thirty years ago, from 12 to 19 per cent of the students in this school developed demonstrable tuberculous lesions before graduation. In the past seven years only one student has had a lesion evolve to such size as to cast a demonstrable x-ray shadow, and she was a reactor to tuberculin on entrance to school.

The Committee on Tuberculosis of our State Medical Association was so impressed with the veterinarians' method of accrediting counties for meeting certain qualifications in tuberculosis control among cattle that it decided to institute a *county accreditation* program for achievement in tuberculosis control among people. The qualifications adopted for accreditation of a county consisted of (1) an average tuberculosis mortality rate over the past five years of 10 or less per 100,000 population. (2) Administering the tuberculin test to at least 80 per cent of the senior students in high schools and finding not more than 15 per cent reactors. Four counties were found qualified in 1941, and the first *accreditation certificate* was granted to Lincoln county on December 11,

1941. By the end of 1950, 20 counties had met these qualifications and had accreditation certificates on display. If the present rate of progress continues, we anticipate that within five years approximately one-half of our counties will be accredited.

Certification of schools with reference to tuberculosis control work in progress under the sponsorship of the American School Health Association was initiated in 1945. Qualifications for certification include periodic examination of all personnel, including teachers, bus drivers, janitors, etc., as well as periodic examinations of children. When a child is found to react to the tuberculin test, a search is made among his adult associates for the source of the infection. All high school students who do not react to tuberculin are retested periodically and those who do react initially or subsequently have annual x-ray inspection of their chests. Approximately 1100 schools have already been certified and many others are about to qualify.

Accreditation of counties and certification of schools has stimulated a tremendous amount of interest in the tuberculosis control program which has been translated into markedly increased activity.

Education has played a large role. This has consisted of offering students of nursing, medical social work, veterinary medicine and human medicine the most modern information about all phases of tuberculosis. Graduates in these fields have been offered short courses in various parts of the state and particularly at the Continuation Center of the State University.

A continuous educational program is conducted through schools, churches, clubs and other organizations through the State Public Health Association. Every known means of communication is used. Huge numbers of pamphlets and books are distributed monthly, a health magazine goes into all schools, most physicians' offices and many other places, and frequent radio broadcasts are presented.

In addition to the most delicate diagnostic procedures, everything of proved value in *treatment* has been used. With the advent of antibiotics, particularly streptomycin, extensive studies have been conducted to determine their efficacy and a serious effort has been made to avoid issuing extravagant statements concerning them. The public has been informed that whenever any drug or other method of treatment is found to be harmless and at the same time beneficial, it will be prescribed as indicated. Thus when scientifically conducted, well controlled studies of such drugs as streptomycin and para-aminosalicylic acid (PAS) revealed that they do not constitute a panacea for tuberculosis but are valuable adjuncts to the standard methods of treating some tuberculous conditions, the public was not shocked but was most cooperative. Under these conditions the people wait patiently and support scientists and physicians who are seeking still better drugs and are hoping to find one or more which will destroy tubercle bacilli in the human and animal body.

Despite numerous efforts to prevent tuberculosis by *artificial immunization* since 1883, none has been proved

to have significantly influenced morbidity and mortality from this disease in any nation. Tuberculosis differs significantly from diseases such as smallpox whose surviving hosts usually are dependably immunized. Only when one observes over many years large groups of persons whose tissues are sensitized to tuberculo-protein is the true situation revealed, namely, that a sizable number of persons who are apparently well but react to tuberculin subsequently develop clinical tuberculosis. For six decades one so-called immunizing agent after another has been produced and tried. Those which resulted in tuberculin sensitivity of tissues of recipients, whether animals or people, have been loudly acclaimed. Rich conducted studies from which he concluded that there is no parallelism between hypersensitivity to tuberculo-protein and resistance to the disease, tuberculosis. Thus allergy is not a criterion of dependable immunity. As yet, no test has been devised to determine the presence or absence of immunity in humans or animals. On many occasions since 1920 we have been urged to use so-called immunizing agents among children and young

adults. We have always refrained from doing so because (1) we have seen no premise for their use since one or more attacks of the disease by virulent tubercle bacilli do not result in dependable immunity. (2) No immunizing agent yet employed singly or as an adjunct to other methods of controlling the disease has resulted in accomplishments which we desired to attain. (3) Our achievements to date without the use of immunizing agents have been far superior to those reported from any place in the world where they have been used.

The methods of controlling tuberculosis briefly described in this paper have served so well that they can be recommended to you above all others. They are fundamental and their efficacy has been thoroughly proved. By their judicious use tuberculosis can be controlled and ultimately eradicated from Israel or any other nation.

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The opportunity to present this lecture and to observe the tuberculosis work in Israel was made possible through the kindness and generosity of the publishers of JOURNAL-LANCET and is deeply appreciated by the author.

NEW HEART HOSPITAL DEDICATED AT THE UNIVERSITY OF MINNESOTA



The new \$1,500,000 University of Minnesota Heart Hospital was dedicated on March 20 with dinner ceremonies at the Coffman Memorial Union on the university campus. Sponsored by the Variety Club of the Northwest, the hospital is the only institution in the United States devoted exclusively to the study and treatment of heart ailments. Situated on the edge of the campus, with large windows looking out on the river, the hospital accommodates 80 bed patients, half of them children.

About one third of the \$1,500,000 cost of the building was provided by the Variety Club. More than \$600,000 in federal funds has been applied to the cost through the Hill-Burton hospital construction act and the National Heart Institute. Miscellaneous gifts, appropriations from various University funds and a \$100,000 bank loan make up the balance.

The first floor of the hospital is occupied by the lobby, administrative offices, out-patient department, occupational therapy rooms and social work offices, with the

x-ray department in the east wing. On the second floor are thirty-eight beds for adult patients and a patient's lounge. In some of these rooms are built-in oxygen supplies for patients in critical condition. On both sides of the long corridor are special handrailings to facilitate walking.

The third floor is for children, with special step-down bath tubs, a school room, an outdoor play deck, and a theater to provide entertainment for convalescent patients. The entire fourth floor is devoted to research into the causes and treatment of heart ailments. A fund of over \$500,000 has been contributed by the American Legion for the endowment of a research professorship for the study of rheumatic fever and heart disease especially as they affect children.

The hospital is operated by staff members of the University of Minnesota as an integral part of the university medical center. Director of the hospital is Dr. Morse J. Shapiro, associate professor of medicine and pediatrics.

Development of the Upright Balanced Fluoroscopic Unit in Minnesota

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WHEN I returned from Europe in 1912, after spending the better part of a year on the continent and in England, I brought back from Vienna a load of imperishable memories, some books and equipment and a Platino-barium-cyanide fluorescent screen such as I had seen used in Dr. Kreisfuchs's Clinic in Vienna. One way to find out whether you have priority in any field or enterprise is to publish something and then let your critics rise up and condemn you. That is part of my intention at this time. Another purpose is to emphasize from the standpoint of an internist, the decisive influence which this diagnostic discipline has brought to the routine of inspection.

The late Dr. R. D. Carman came to the Mayo Clinic from St. Louis January 1, 1913. In a personal communication, his successor, Dr. B. R. Kirklin, in answer to my inquiry relative to when the first upright fluoroscope was installed at the Mayo Clinic, replied as follows: "Immediately upon Dr. Carman's arrival from St. Louis he ordered the equipment which Dr. Selby had been using dismantled, and by reasonably early spring, he had his own fluoroscopic outfit installed and in use." A similar inquiry sent to Dr. Leo Rigler at the University of Minnesota brought the pleasing information that his associate, Dr. John Walker MacDonald, "was working on the history of x-ray at the university." This report will be awaited with unusual interest because there has been in America no one in the field of roentgenology with better clinical balance and adjustment than Leo Rigler. He has brought to the general field of medicine that basic correlation that has brought the various offerings of x-ray into direct clinical focus, so that it is no longer a mechanical technique but an appropriate and component part of the build-up of proper and adequate diagnostic therapy. In a personal communication from Dr. MacDonald he tells me that, "I assume that you are referring to the upright or permanent units. By 1897 the static machine had been entirely supplanted by the twenty inch induction coil with a mechanical interrupter. The first mention of the fluoroscope occurs in 1914 and is described as 'the old make-shift vertical fluoroscope,' utilizing the cross arm rectification. This was still in existence up to 1919." Dr. MacDonald adds further that it is possible that Dr. Bisell had made certain fluoroscopic reports on stomach examinations as early as 1912. We shall await with unusual interest Dr. MacDonald's formal report.

The workable fluoroscopic unit which I developed here in Duluth, I think antedated that of Dr. Carman's at Rochester by probably two months. At least I am able to maintain that I was among the first of the medical internists (certainly not a professional roentgenologist) to have a workable unit as a part of my office and examining suite. This is how it came about. The time I spent in Vienna, apart from immensely enjoying the place, the opera, the environment and my fellow American doctors, foregathered in the environs of the old *Allgemeine Krankenhaus*, was spent chiefly in pathology, the usual series of courses in internal medicine and allied specialties.

I was asked one day by Dr. Roger Vaughan of Chicago, long an addict in course taking in Vienna, to accompany him to a crowded room in one of the *abteilungen* where Drs. Kreisfuchs and Kienbeck were fluoroscoping chests and the upper gastrointestinal tract. Never shall I forget what I saw there for the first time that morning. The place was a bedlam of flashing lights, shouts of command to turn the current on, to turn it off, keep out of the way, the while the equipment crackled and sputtered like an oversized Fourth of July celebration. By peering over the shoulders of some eight or ten others, I witnessed for the first time the heart in action, the diaphragm moving up and down, the bismuth preparation slipping down the esophagus, and lo and behold, we saw the Steer-horn stomach! Then and there did I resolve that this machinery, if it could be reproduced or purchased, must come back with me. Ultimately I settled for the fluorescent screen. Like Paul on the road to Damascus, I had seen the light; and at least mentally I stood transfixed. I relate this in some detail because I foresaw what a revolutionary change this development, if practical, would bring about in our standard methods of physical diagnosis. Here in Vienna was one of the places where percussion, palpation and auscultation had brought about the greatest precision in diagnosis; and certainly the men whom I had seen were apt disciples and followers of the greatest of them all: Skoda, Wechselbaum, and others, but a miracle was about to take place within the well known and disciplined field of diagnosis, and that field was *inspection*.

When, in October 1912, after my return to Duluth, I made inquiries as to where such equipment might be purchased, I was wisely directed to visit Dr. James T. Case of Battle Creek, Michigan. He had come to Chicago and was giving part time to Northwestern University where he rapidly expedited fluoroscopy in the

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Chicago area. He most kindly invited me out to Battle Creek where I spent some time and soon learned that his equipment and development were far advanced over what I had seen in Vienna. Let it be understood at once that I never became proficient in the use of the fluoroscope, but through the advice of Dr. Case, I found a manufacturer in Chicago who provided us with the unit to which I introduced my late great friend and associate, Dr. Thomas R. Martin. Beginning with the greatest trepidation and concern as to the potencies, as well as the potential dangers of the machine, "Tommie" Martin went on to a high degree of proficiency. Our equipment included my fluorescent screen which we had mounted and hung in front of the Chicago apparatus.

It was before the day of the Coolidge tube, and we went through the heart-breaking period of break-downs of air and water cooled tubes, and later with the cross circuiting and failure of the various coils. The first apparatus was mediated through a noisy mercury interrupter. The tubes were ever on the point of being too soft or too hard, and those acquainted with that period of fluoroscopic development will never be able to thank Coolidge and the General Electric Corporation adequately. Merciful providence was with us on the whole because no one associated either as a technician, doctor, or patient, suffered serious accident or sequelae from contact with this rather poorly protected machine. It is true that on one occasion some fiendish cross current literally tore a man's pants off of his person, slitting one leg as neatly as it could be done with a knife. How that happened has remained as mysterious to me as has the entire innerworkings of the electron bombardment that has made Roentgen and his host of successors and followers, not only justly famous, but useful as well.

From this observation, as well as confession, it will be seen that my prime purpose, aside from mentioning this development of the use of the fluoroscope by a clinician and internist, is to dramatize the unusual change that came over the field of internal medicine by the advent of the fluoroscope. A remark made by Dr. Case when I was his guest at Battle Creek, brings into focus the situation I am trying to describe and portray. Dr. Case was a very busy man. The institution developed by Dr. Kellogg had on its staff a coterie of unusually distinguished men. The Battle Creek Sanatorium catered to a better class of people who could well afford a period of rest, dietetic control and a systematic study of their health status. One morning a dowager of opulent type (a leader no doubt in her home town), came into Dr. Case's laboratory where I was watching the proceedings. Patronizingly she said to Dr. Case: "I hear you make the most marvelous pictures of people's hearts, stomachs, and in fact of all their concealed thoughts; I certainly want you to make a picture of my stomach." To this, the genial doctor responded, "Madam, you are wrong, I am a surgeon. I am not a picture taker, but I sometimes do use the x-ray as a part of my *inspection*. If, in the course of your examination, it seems proper that we should inspect and adjudge your interior, I am at your service." This very sane comment and observa-

tion has never lost its effect on me. In the course of the years I have been a witness to the extraordinary use of most of the technical mechanical diagnostic instruments. None have suffered more humiliating abuse than the wonderful dark room magic that still gives something of the thrill that I first experienced in the cluttered clinic just off the Alzerstrasse in Old Vienna. Just as the French Revolution following our own escape from England started a series of upsets that are still in progress, so this fluoroscopic expansion of inspection did strange things to its former associates—percussion and auscultation—perhaps also to a lesser degree, palpation. Fancy yourselves in a course as I was, under the very great Dr. Neumann, in chest diagnosis, or with Dr. Kovatz, with his meticulous physical examinations. It sometimes took three full periods of one hour each for his demonstration. His meticulous mapping out of areas of percussion, and correlated with auscultation, gave astoundingly accurate diagnoses, proved by post mortem certification. Only two men of my acquaintance in Minnesota brought this same type of diagnostic precision to their work. One was the late Dr. Lewis A. Nippert of Minneapolis; and the other was Dr. Walter Sheldon, formerly of Minneapolis, later of the Mayo Clinic, and now retired. Obviously these men had had European training and were superb disciples of Auenbrugger and Laennec. Just consider for a moment what roentgenoscopic inspection was destined to do, especially in machinery minded America.

The manufacture of apparatus with the well known American skill at mass production exploited the medium to the utmost. As good an illustration as any, is to witness the mass roentgen inspection of chests as exemplified in the tuberculosis surveys. And there are many who hold that this type of survey should be extended to include the gastrointestinal tract for the detection of early cancer and associated lesions. The great art of percussion, while it has not fallen into disuse, has lost most of its finesse, as it was avidly exploited after Auenbrugger, by Skoda, his contemporaries, and successors.

In like manner, auscultation suffered notable eclipse; and much of that displacement may be likewise traced to the advent of x-ray and available fluoroscopy in particular. What intern or resident of today will take the time to give the same studious attention to percussion and auscultation of the chest, including the heart and lungs, as was the routine taught by Osler and followed by Baldwin and all of Trudeau's successors at Saranac Lake? Other situations have come into the diagnostic field to further lessen the need for unusual skill, both in percussion and auscultation. The size of the heart can be much better measured roentgenoscopically. At the same time the particular zone of the cardiac outline can be studied, not only as to position, but as to relationships with the lungs and with the diaphragm.

I could labor this analysis endlessly but this outline should be adequate to acquaint the reader with the purposes of this paper as stated in the reasons given for writing it. I feel free in speaking in terms of these generalizations because I never became especially proficient in the personal use of the fluoroscopic unit. Other

men associated with me did develop great proficiency. By the time of the beginning of the First World War, "Tommie" Martin had begun turning out well established diagnoses of gastrointestinal malignancy and lung shadowing, that directed our attention early to situations formerly considered rare (bronchiectases, intrathoracic tumors and accumulations, aortic aneurysm, esophageal dilatations, new growths, etc.). We fluoroscoped all patients as a matter of routine and have continued doing this, learning as time went on, not to rely on it alone, but to add the use of adequate x-ray films. It is a pleasure to emphasize everything mentioned by Percy Brown* in the Russell Carman Memorial Lecture of 1935 with regard to the gracious way that Carman met all visitors. Countless surgical visitors to the Mayo Clinic have carried back with them surgical techniques, after availing themselves of the facilities so freely provided for observation in the surgical amphitheaters. Dr. Martin, among countless others, profited to an equal degree, "in looking over Dr. Carman's shoulder" the while he taught and demonstrated. Carman's willingness to teach others all he knew gives me an opportunity to comment on one of my most gratifying life experiences. There is much no one can glean or learn from a book; and disciplines and techniques such as fluoroscopy as we now have it is certainly one good example. Such apprenticeship teaching is sometimes called "acquiring the art"; but there is much more to it than skill and exemplary conduct. Soon "Tommie" Martin was passing on to our more recent associate in the Duluth Clinic, Dr. Paul G. Boman, what he had learned and knew. It is best to let Paul tell of his apprenticeship in his own words, for in time he also became a masterful fluoroscopist, and for nearly twenty-five years before Dr. Henry Moehring joined our clinic in the capacity of head of the roentgenologic department, Paul combined the grueling assignment of a heavy gastrointestinal roentgen service with an active section on internal medicine. In response to my request that he put down a simple statement of something of his own experience in fluoroscopy here and abroad, he gave me an outline from which I am excerpting in summary.

"Well do I remember my introduction to gastrointestinal and chest fluoroscopy under the tutelage of Dr. Martin. From January 1922 until the untimely death of Dr. Martin in November 1925, following coronary thrombosis, I spent a great deal of time with him in the fluoroscopy room, at first observing him and listening to his conversation with the patient, and the comments made to me regarding the fluoroscopic findings; later on, actually doing fluoroscopy under his direction."

It is evident that a very deep feeling of friendship and mutual trust grew up between these young, alert, well-disciplined minds, that needed only exposure to the daily grind of treating patients to put them in possession of that sense of certainty and self-reliance, without which clinicians are apt to be as vacillating as the wind.

*Brown, Percy: The inception and development of fluoroscopy: the influence of Carman on its status in America. *Radiology* 38:414, 425, 1942.

Obviously the constant checking of diagnoses at operation or at autopsy, as with all group conference practices, was as invulnerable to criticism as their modesty in the accepting of praise. This contributed greatly to the accuracy of their findings and interpretation.

Dr. Boman continues, "When I went to Vienna in 1928 I had the privilege of meeting some of the men who have made history in medicine, and especially in roentgenology. Professor Haudek, the man who first described the niche which is diagnostic of duodenal ulcer; Professor Schüller, whose contribution in the field of roentgenology of the skull was outstanding; Professor Neumann, in the field of tuberculosis and the roentgen diagnosis of diseases of the lungs and chest; Professor Zdansky, in gastrointestinal roentgenology; Dr. Rösler, in fluoroscopy of the heart and blood vessels; Professor Winterberg, who correlated so beautifully the clinical history, physical findings and the roentgen study of diseases of the heart. All of these made a very distinct contribution. They were leaders in their field, and I believe that many of these men were ahead of their times as compared with America. From them I learned of the compression technique, the use of opaque and air mixtures in the study of the colon, a technique which was popularized in this country two or three years after my return. In Vienna I was introduced to the Metallix line-focus tube, the forerunner of the modern x-ray tube.

"Then in Berlin, in the clinic of Dr. Berg, I had further opportunity of studying compression technique in gastrointestinal disease. At that time Professor Berg and Dr. Akerlund of Stockholm, were considered the foremost exponents of this type of roentgen study. It was particularly in Stockholm where Dr. Akerlund gave me an opportunity of seeing the most advanced roentgen technique and equipment; in my opinion some of the most advanced knowledge of roentgenology that I had known. Dr. Akerlund had developed compression technique to a high degree, using not only compression, but also a circular bucky diaphragm, incorporated in the compression device. In addition to this, he had developed the mucosal technique for study of the stomach, duodenum, etc.

"These ideas I brought back to Minnesota with me and developed a modified instrument for the compression technique which has for years been most helpful, and which is still in use. Professor Forsell, of Stockholm, was at that time the head of the Cancer Institute, and was making invaluable contributions in the application of radium in this disease. I note that he died just recently at the age of eighty-four."

It may well be asked why many of us were not badly burned through the incautious use of the fluoroscope. Brown has clearly written up the general history of fluoroscopy, portraying the calamitous period that followed the early experiments of Edison and later of Pfahler, Skinner, and the many others who learned the hard way that they had not provided for themselves adequate protection. "It is breath-taking to recall that Francis Williams, of Boston, as early as 1898 (about two years after Roentgen's discovery) had discussed the application of

x-rays to the diagnosis of thoracic aneurysm, pericardial effusion, cardiac hypertrophy, cardiac transposition, amphsema, pleurisy, with large or slight effusion, pneumothorax, hypothorax, and pulmonary tuberculosis," as quoted by Brown in the Carman lecture. This gives us a clear idea of the eagerness of novices to display this novel miracle of inspection.

When I came to Duluth in 1905, the late Dr. A. A. Deslaurier practiced here for a number of years before he went to Florida where he later died. Whether his death was caused by the burns that badly disfigured his hands, I am unable to say. The manner in which he got these burns is symbolic of that period of ill-advised trifling with x-rays. While still a student at the University of Minnesota, his father, either to please or to gratify a wish of his enterprising son, bought him an upright static machine, which one used with a hood over the eyes, such as was commonly used in those days for stereoscopic slides. The young budding doctor saw a chance to teach the public and possibly pick up a little on the side; and during the traditional week of the Minnesota State Fair, he set his apparatus up in one of the busy downtown streets in St. Paul. To an enquiring public, he told me he first presented a view of his own hands! Most of the others who suffered in like manner, including one of Edison's assistants, acquired this trauma in more logical and better grounded research.

It may well be asked, how may we bring to the average general practitioner, or to the small hospitals here and there throughout our state, the advantages of modern fluoroscopy? I have indicated in a manner how I helped to bring it to this group clinic, even before we had comparable facilities in either of our Duluth hospitals. Not for years will there be available a sufficient number of certified roentgenologists capable of delivering modern service to individuals or to smaller groups and hospitals,—unless some "doubling in brass," (an expression borrowed from orchestras and bands) is ventured and developed. To those who decry this suggestion, I point out that the alternative of putting in charge of high powered, expensive roentgen apparatus, men or women who are virtual technicians only, is not a satisfactory answer to the problem. The time may come, when, for the purposes I have indicated, there should be a place for some adequately trained roentgenologists, as well as pathologists, to serve a relatively large area on a basis of visits made at suitable times, and with the time spacing, so that groups of patients needing such diagnostic therapeutic facilities should be assembled for the purpose. Whatever method is developed, I feel certain that the type of association as developed in Minnesota by the late Dr. Russell Carman, and the living and dynamic Dr. Leo Rigler, offer us the prototypes which we should encourage and cultivate.

1951 JOURNAL-LANCET LECTURE ANNOUNCED

The JOURNAL-LANCET Lectureship Committee has announced that the 1951 lecture will be given by Dr. Heinrich Klüver at 8:00 P.M. on May 16 at the Medical Sciences Amphitheater on the University of Minnesota campus. Dr. Klüver is professor of physiological psychology in the Division of Biological Sciences at the University of Chicago. His subject will be "Brain Mechanisms and Behavior."

As part of his discussion he will show an excellent motion picture study of behavioral changes in monkeys subjected to extirpation of parts of the brain. Because of the current emphasis on psychiatry in nervous and mental diseases it is felt that his lecture will be of great interest to the general practitioner as well as the doctor specializing in other areas of medicine. The lecture is open to the public.

The JOURNAL-LANCET Lectureship was established in 1941 as a means of bringing to the campus men who have made outstanding and original contributions to medicine. The first JOURNAL-LANCET lecture was given April 21, 1941 by Dr. Rene V. Dubois of Rockefeller Foundation, who spoke on "Vulnerable Structures of the Bacterial Cell." The last lecture, which was given by Dr. J. Arthur Myers on September 15, 1950 at the Hebrew University in Jerusalem appears on page 127 of this issue.

Continuity of Program— A Necessity in Tuberculosis Control Among American Indians*

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Washington, D. C.

CONTINUITY of program has been lacking in tuberculosis control among American Indians and has had a definite effect on reduction in the morbidity and mortality from this disease. Morbidity and mortality rates in this one segment of the population far in excess of those in others have a dangerous impact on the whole health economy. It is necessary to speak of segments of the population in the treatment of the subject of tuberculosis control as it relates to American Indians since presently this artificial and unwarranted separation of the total population in tuberculosis control differentiates or segments the Indian from the general population. This blind approach to control a preventable disease necessarily is responsible for the high morbidity and mortality rates among Indians when compared with contiguous or adjacent segments of the general population.

Tuberculosis on reservations can be likened to foci of infection within the nation's total population or metastatic lesions resulting from the original introduction of this cancerous disease. The individual case is superseded by the massive community aggregate of infection with tuberculosis. The individual case loses its identity as does a drop of water in a large reservoir when the total community morbidity rate is considered or related to overall control measures. One has only to look at the distribution of the reservations on a map of the United States to understand the necessity of integrating tuberculosis control programs among the Indians intimately with those of contiguous non-Indian communities, and with those of the state and the nation.

It is not necessary for us to review or discuss elementary case finding techniques or control measures since the group here assembled is recognized for its contributions in the fields of tuberculosis prevention, control and treatment. It is germane to concentrate on the problem of developing means and methods of producing continuity of program to control tuberculosis. All the resources to begin a continuous all-out attack on tuberculosis are now available in the state of Minnesota. This state with its great supply of natural resources and health-minded progressive people, the State Board of Health ably directed by Dr. Chesley, the nationally-recognized state and county sanatoriums, outstanding teachers and scientific investigators, and public officials

of the caliber of those representing Minnesota have demonstrated through aggressive action interest in eradicating tuberculosis among Indians even as has so ably been done among the general population.

That continuity of program has been lacking in the past in the total Bureau of Indian Affairs tuberculosis control activity is demonstrated in three widely separated areas. In the year prior to World War II with an inadequate field health program, 3,000 cases of tuberculosis were discovered, and on two reservations every known case was hospitalized. The following year, 50 per cent of the medical officers left the Indian Service, and the public health program collapsed. That year only 500 cases of tuberculosis were discovered, and for practical purposes 2,500 significant cases were left to reside in the community or enter defense or other occupational fields.

In the second area, the funds appropriated for health purposes among Indians were so sharply limited that admissions to hospitals and sanatoriums had to be restricted. What happened at Ah-gwah-ching, the 117-bed addition to the Minnesota State Sanatorium constructed in 1935 from Public Works Administration funds exemplifies how continuity of program evaporates when funds are cut. In 1948 and 1949, with a large backlog of cases of tuberculosis discovered by the State Department of Health mass x-ray surveys, it was possible only to utilize a daily average of 63 beds. This meant that 54 beds were unused and 200 or more individuals with significant tuberculosis were left in the community to spread the disease.

The accompanying tabulation of expenditures at Ah-gwah-ching Sanatorium with other pertinent data from fiscal year 1936 through 1950 and estimated for 1951 is brutally frank in demonstrating what happens to continuity of patient load where funds are inadequate.

Interpretation of the data is difficult since many factors have an impact on the patient load, but it is obvious that if funds are lacking, beds cannot be utilized. It is equally obvious that personnel cannot be recruited without difficulty and much time and effort is needed to hospitalize new patients or readmit involuntarily discharged patients, all of which affect continuity of the tuberculosis control program. Similarly, only one-third of the 99 beds constructed by the Federal Government at Weimar and Wish-i-ah Sanatoriums, California, are occupied by Indian beneficiaries because of lack of operating funds.

*Presented before the Committee on Tuberculosis, Minnesota State Medical Association, St. Paul, January 5, 1951.

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EXPENDITURES, AH-GWAH-CHING SANATORIUM

A 117-bed unit constructed as an addition to State Sanatorium at Walker, Minnesota. The Chippewa wing of the State Sanatorium at Walker, Minnesota, was constructed with Federal funds on land ceded to the Federal Government by authority of the 1935 session of the Minnesota legislature to be operated by state authorities under contract with the Bureau of Indian Affairs for the care and treatment of tuberculous Indian patients. Funds provided by Public Works Administration in amount of \$250,000 from "National Industrial Recovery, Interior, Indians, 1933-1939." Opened for admission of patients in August, 1935. It was specified that the cost of care was to be reimbursed on an actual per diem cost basis.

Fiscal Year	Ave. No. Available Beds	Ave. Daily Patient Load	Per Diem Cost per Patient	Total Funds Allotted	Total Funds Expended
1936	118	64.3	2.556	64,000	60,000.38
1937	118	72.4	2.551	70,000	67,426.00
1938	118	65.1	2.550	70,000	60,613.92
1939	118	75.0	2.548	70,000	69,766.05
1940	118	82.7	2.555	80,000	77,145.15
1941	118	94.2	2.550	90,000	87,689.40
1942	118	84.2	2.651	90,000	81,484.85
1943	118	83.7	2.868	90,000	87,650.40
1944	118	79.5	2.869	90,000	83,258.70
1945	118	79.8	3.269	100,000	95,238.75
1946	118	82.7	3.487	110,000	105,283.83
1947	118	81.3	4.029	121,000	119,578.16
1948	118	63.7	4.533	110,000	105,412.00
1949	118	63.6	4.363	110,000	101,384.00
1950	118	84.6*	6.570	325,000	243,357.80*
1951	118	72.9†	7.740	330,142	205,954.00†
					1,651,243.39

*Note: This amount includes \$5,041.96 for hospitalization and treatment at St. Mary's Hospital, also approximately \$35,303.14 expended for three ambulances and x-ray equipment at White Earth and Cass Lake. Of total, \$174,134.60 was expended at Ah-Gwah-Ching, balance for hospitalization in other Minnesota sanatoria.

†Note: Projected totals based on first three months' operation of fiscal year 1951.

(Prepared by Minneapolis Area Office, U. S. Indian Service, in cooperation with U. S. Bureau of Indian Affairs, Washington, D. C., December 26, 1950.)

That these beds are needed is demonstrated by the finding of 510 cases of significant tuberculosis in the 25,495 Indians examined with usual techniques in 1949 or a rate of 20 per 1,000 examinations compared to 3 to 5 per 1,000 in general surveys. The group was heavily weighted with individuals of school age.

A survey of exceedingly great interest was made by the Montana State Division of Tuberculosis Control of the Northern Cheyenne Indians in 1949. Of the total population numbering 1,902, 84.7 per cent had x-ray films of the chest. The 1,611 examined produced 57 cases of tuberculosis, or a rate of 35.4 cases of significant tuberculosis per 1,000 examinations. Thirty-eight of these cases were found in the first 1,475 examined and 19 cases in 136 individuals x-rayed who were previously missed. In other words, 2.5 per cent were found to have tuberculosis in the first group examined while 13.9 per cent of the follow-up segment had clinically significant tuberculosis.

Mortality rates among the Alaska natives, and the Navajos are in excess of 300 per 100,000 population.

To reduce the immediate problem to Minnesota the time is now here to intensify the integration of the tuberculosis control activities so as to cross reservation lines and treat the problem where it is most real. Dr. Chesley and his staff have a workable program in effect, the Bureau of Indian Affairs has money to pay for occupied beds in Minnesota sanatoriums, the Indians are anxious to have tuberculosis eradicated from among them, the State Public Health Association is interested and active, the state officials are back of better health for Indians, and the distinguished group here assembled is known for its activity in the field of tuberculosis control. It is apparent that all the tools needed as well as resources are immediately available. This is the optimum moment to begin the all-out attack on tuberculosis in Minnesota. Why not make Red Lake Reservation the first accredited area according to the standards first established by the state medical association? This group can be both the catalyst to activate and the compound to provide the continuing reaction to give continuity to the program of tuberculosis control among the Indians of Minnesota.

Specifically, a continuous program of tuberculosis control requires the realization of the following objectives:

1. Continuity of funds to operate beds now available at sanatoriums in Minnesota.
2. Increase in staff to find new cases.
3. Necessary staff for tuberculosis sanatoriums.
4. Strong health education program among the Indians.
5. Continuing evaluation of program by recognized leaders in the field of tuberculosis control.
6. Unification of tuberculosis control program in one body such as the State Board of Health.
7. Objective study of actual program in effect and that needed.
8. Improved socio-economic condition of Indians.
9. Rehabilitation and placement program for Indians including job opportunities.
10. Development of standards of accreditation that can be applied to the reservations of Minnesota until such time as the morbidity and mortality rates among Indians are no greater than those of the general population.
11. Complete participation of the Indians in the formulation, development and execution of the tuberculosis control program.
12. Continued expressed backing of any accepted program of tuberculosis control by groups such as the state medical association.

In conclusion, there are now 540 Indian cases of tuberculosis on the active central registry of the Minnesota Department of Health. The challenge to reduce this number through elimination of tuberculosis as a significant communicable disease is given you by all the great workers of the past in the field of tuberculosis control.

Animal Infections in Man*

PAUL S. DODD, D.V.M.
Danville, Illinois

ACCORDING to an authoritative report compiled in 1947 by Thomas G. Hull, director of the Scientific Exhibit Section, American Medical Association, there are over 170 diseases transmitted from animals and fowls to man. However, several different species transmit the same diseases, there being only about 80 *different* diseases involved in the total. Some 30 species of so-called wild animals as a group, are responsible for the transmission of more diseases than any particular specie, dogs and cattle follow with 25 each, the rat 18, sheep 16, the cat 14, swine and poultry 12 each, goats 11, the horse 10, and rabbits 4.

Tuberculosis is transmitted by at least 7 different species, brucellosis by 8, rabies by 6, including wild animals, anthrax 6, and so on down the list.

The majority of these diseases are of bacterial or virus origin while some are parasitic in nature wherein the animal acts as the intermediate host. Several are rare or practically unknown in the United States and deserve little attention in a paper of this nature.

Tuberculosis and brucellosis are, no doubt, the two most important present day infections because of their relation to human health and wide-spread prevalence. Rabies probably ranks third. Anthrax, Actinomycosis, glanders, cowpox, erysipelas, Leptospirosis, milk sickness, tularemia, septic throat, trichinosis, parasitism, spotted fever, and the Salmonella group of food infections occur endemically, and while they are serious when they do appear, require little general consideration.

Tuberculosis appeals to me as the most important communicable disease facing us today. Since the most of my professional career has been devoted to the bovine tuberculosis campaign, I feel at liberty to speak with more or less authority on that subject. In some circles we county veterinarians are called experts in our field, an expert, as you know, being an ordinary fellow away from home. I do not claim any such distinction, but after more than 20 years of work in the field, one can hardly deny the fact that some knowledge may have been gained through experience and observation.

The campaign against bovine tuberculosis originated for two obvious reasons, the first and probably more forceful was the economic, the second and yet more important was the public health or human element. I repeat, the economic angle was most forceful because the loss of meat and meat products incurred by the packers and producers was the driving force behind the inauguration of the campaign. To be sure, medical men and public health authorities were cognizant of the fact

that milk from tuberculous cattle was causing appreciable human infection and loss of life, especially in infants. Thirty years ago it was estimated that 11 per cent of all infant tuberculosis was of bovine origin.

The meat packers through their meat inspection service were being forced to condemn and destroy about 10 per cent of their swine and beef carcasses. This loss could not be wholly sustained by the packers, as they either had to buy cheaper from the producer or buy subject to inspection, which naturally displeased the producer. A plan was worked out whereby the cattle would be tested on the farm, infected cattle sold and slaughtered as reactors, with indemnity being paid to the farmer by the state and federal governments to assist him in sustaining the losses incurred. It was assumed at that time that the loss of swine carcasses would automatically be reduced as the bovine infection was eliminated, but this assumption has not been wholly realized. The proportionate elimination of bovine and swine infection is definitely inconsistent. The percentage of bovine infection in our county is now 0.187, while the results of a swine and poultry survey made in the area in 1948 showed that about 10 per cent of our swine were infected. This fact brings out two important points: (1) That persistent and continual testing of cattle will eradicate the disease *only* if other infectors can be simultaneously eradicated. (2) That swine infection is being sustained by infectors other than cattle, poultry no doubt being the most important.

The results of the above mentioned survey conducted on swine and poultry on the same premises revealed that swine infection occurred on only one farm where poultry infection did not exist, and that particular case was readily explainable. The percentage of avian infection revealed by the survey was 7.4 per cent. These percentages are no doubt higher than the county average would be, since the flocks and herds tested were more or less selected as infected or suspicious. We do not know the definite relationship between the various types of tuberculosis but our experience leads us to believe that under certain favorable conditions all types are interchangeable.

Isolation of the tubercle bacillus does not complete a diagnosis as the type is quite important epidemiologically. The interchange of bovine and human species is not a free for all, but is significant. European studies have revealed that the bovine type is sometimes responsible for open pulmonary tuberculosis in man and such persons spread the infection to cows they milk and care for.

Dogs and cats have never been considered of importance in the tuberculosis picture in the United States

*Excerpt from a paper read before the Mississippi Valley Conference on Tuberculosis, Columbus, Ohio, September 23, 1950.

but reports from France showed that out of 592 dogs tested 389 had human type tuberculosis, 189 bovine and 2 avian, and the disease in general had shown an increase during and following the war.

The practical contributions which veterinarians have made to tuberculosis control are indicated by the following statement: "In human tuberculosis, many problems which are today considered controversial have already been solved by the veterinary profession." I am not certain to which of the many problems the author refers but I am quite sure the veterinarian engaged in tuberculosis control has a pretty broad picture of the *whole* tuberculosis problem although his activities may have been somewhat limited.

Bovine tuberculosis is no doubt on the increase due to general lack of understanding of the insidiousness of the disease and a too complacent attitude on the part of so many people responsible for its control. In recent weeks I have read two different articles pertaining to tuberculosis control and in neither was the bovine nor animal angle even mentioned. Either the authors did not realize the facts or merely assumed that these other factors no longer exist.

The last small percentage of infection is the most difficult to find. Just when we need experienced person-

nel for the most difficult job, they are leaving the active scene for various reasons and replacements as well as funds are increasingly hard to obtain.

I do not wish to be an alarmist but the facts are evident and unless prompt action is taken, much that has been accomplished will be lost in the near future.

In the final analysis I do not believe that bovine tuberculosis will ever be eradicated until all the other types of the disease are brought under more rigid control and I surely do not exclude the human type. In fact, we are definitely stymied in our bovine program until such action is accomplished. I think we here can learn something from the bovine campaign, since every feature of this well established program could be adapted for an all-out eradication program for every type of this disease. Isn't it ironical that you cannot ship a cow across a state line or sell her intrastate without a negative tuberculin test, but thousands of human carriers roam with reckless abandon, and nothing is done about it.

It seems high time that this and every other public health agency take more positive and aggressive action against this disease about which we know so much but have done so little. If tuberculosis were half as dramatic and spectacular as polio it would have been eradicated years ago.

American College Health Association News . . .

The next time you hear about the activities of the American College Health Association it will be in a more personal way for most of you, for we are expecting to see a large attendance at the annual meeting in Chicago on May 3, 4 and 5. Preliminary programs were mailed a number of weeks ago, and it is hoped that they were passed around so that all members of the staff, including nurses, will be encouraged to attend. The Edgewater Beach Hotel will be headquarters; hotel reservations should be made immediately.

The program will begin promptly at 9:30 A.M. on Thursday, May the third, with an address by our president, Irvin W. Sander, Wayne University. Dr. Sander and the program committee have spent many hours organizing a program to meet the interests and needs of every member. They have succeeded in formulating an outstanding program and deserve to be congratulated.

For complete schedule of the meeting refer to page 162 of this issue of the *JOURNAL-LANCET*.

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The treasurer appreciates the excellent response in payment of dues for the year 1951. Payment has been received from approximately two-thirds of the member institutions. How about 100 per cent before the annual meeting!

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A woman physician, graduate of A.M.A. approved medical school, approved rotating internship, approved residency work, three years experience in Student Health at large midwestern university, presently engaged in own general practice, desires to return to student health work in West or Northwest. Available on short notice. If interested, please contact the secretary, School of Public Health, University of California, Berkeley, California. She will in turn get in touch with the physician.

The Forgotten Test

JOHN FRANCIS BRIGGS, M.D., F.A.C.P., F.A.C.C.P.*
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MANY YEARS ago Dr. Koch found that the material or medium in which he grew tubercle bacilli contained a substance which, when administered to a patient or a person already infected with tuberculosis, produced a toxic type of reaction. It was found later that this toxic effect was the result of either a tuberculo-protein material in the medium or a degradation product of such a protein material. When this material was administered to a patient with tuberculous infection it produced a reaction which was in the nature of a hypersensitive response because the individual, already suffering or infected by tuberculosis, had become sensitized to the products of the tubercle bacillus. This material was called *tuberculin*. Although there have been many preparations, today tuberculin as ordinarily used by clinicians is either old tuberculin (OT) or a purified protein derivative known as PPD.

Original injections of tuberculin in 1891 were made subcutaneously and produced a very severe reaction in the patient. In 1907 Pirquet suggested the cutaneous tuberculin scratch test as an effective means of applying tuberculin material. This later was supplanted by the intracutaneous tuberculin test suggested by Mantoux. A patch test has been developed with the application of tuberculin to the skin, but its ease of administration is many times offset by the danger of false negative reactions.

The tuberculin test, like all tests, is only valid if it is applied properly. The material to be used must be potent, and must also be applied in proper dosage. The dilutions for routine testing are one minim of 1/1000th strength injected intradermally; and if this is negative, a second injection is made intradermally of 1/100th strength. The reading is made within 48 to 72 hours after the application of the material. The interpretation is made by the degree of induration present and not the degree of erythema. It is not necessary from a practical standpoint to judge the degree of reaction, but only to know that the reaction is positive or negative. The presence of a positive tuberculin reaction is absolute proof that the individual so tested has an infection by the tubercle bacillus. This positive reaction does not in any way tell us when the infection occurred nor in what part of the body it exists. Furthermore, the presence of a positive reaction does not mean clinical tuberculosis, but a negative tuberculin test, except under very unusual circumstances, does preclude the diagnosis of tuberculosis.

In the epidemiology of tuberculosis, the tuberculin test still remains the only valid means of study. It was

the routine mass tuberculin testing in children and adults that led to the discovery of those with positive reactions, and these people with positive reactions were those who were infected with the tubercle bacillus. X-ray examination and clinical study of these patients led to finding individuals who had either healed or active types of clinical tuberculosis. Once an infectious case was found, the patient was isolated and given sanatorium treatment with the result that the infected person in the community was isolated and at the same time the patient had been placed in a position to regain health.

Originally the number of positive reactors in the general population was exceedingly great. As tuberculosis control measures became more common, the incidence of positive reactors began to decrease until today we have communities in which large numbers of people are now negative reactors. This means that in these areas there are many people who have never been infected by the tubercle bacillus. There is no other method that can assure us as to the rate of infection by tuberculosis in any given community than the tuberculin test, yet today we find fewer and fewer physicians using this test routinely. Perhaps in our enthusiasm for mass chest x-ray surveys we have forgotten that the x-ray film so obtained is only a screening method. Perhaps, also, we have forgotten that such films should only be a stimulus to the further clinical and physical evaluation of the patient. Perhaps we have also forgotten that despite the accuracy of the roentgenologist's interpretation of such film he still is unable to make a bacteriological or histological diagnosis from the film. The ultimate diagnosis, particularly in diseases of the chest, is the responsibility of the clinician. It is true that the mass chest x-ray survey will frequently reveal many other diseases than tuberculosis among those who have been surveyed. It is also true in these surveys many non-tuberculous diseases and disorders of the cardiovascular system as well as tumors within the chest will be found.

Unfortunately, however, no matter how extensive the survey may be by x-ray it cannot tell us the incidence of tuberculosis in the people who have been surveyed, nor will it be able to establish the community incidence of infection by tuberculosis. Such information can only come through the routine use of tuberculin testing. It may be well for us, as well as for the community, if we should establish concomitantly with the x-ray survey the routine mass tuberculin survey.

Before the advent of the photofluorographic x-ray survey, the tuberculin test gave information in any given survey as to what people were infected by tuberculosis. These individuals were then examined clinically and by x-ray. Frequently such examination revealed that the individual suffered from open communicable form of

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tuberculosis. It was the use of the tuberculin test in conjunction with the x-ray of the chest, in addition to the clinical evaluation of the patient that led to the ultimate diagnosis of tuberculosis. Neither an x-ray film nor a positive Mantoux test along with an abnormal chest x-ray shadow will in any way constitute a diagnosis of tuberculosis. The ultimate proof of the diagnosis of tuberculosis is in the demonstration of the tubercle bacillus. Until the bacillus is so demonstrated the diagnosis remains presumptively tuberculosis. Too often the report of "possible tuberculosis" or "rule out tuberculosis" or "suspected tuberculosis" made by the roentgenologist is accepted in toto by the physician as a diagnosis in fact. The result of acceptance of such roentgenological diagnosis is rather a steep increase in the tuberculous infection rate in many communities. The rate of the increase often is in proportion to the degree of acceptance by the practicing physician of the roentgenologist's diagnosis from the x-ray film.

The clinician must recognize that the x-ray report is a presumptive diagnosis and that it becomes the responsibility of the clinician to either establish or negate the interpretation of the film by the roentgenologist. This may be done very simply if the physician will only remember that when he receives such a diagnosis from the roentgenologist that he apply to his patient the *forgotten test*. The correct application of the tuberculin test is a very rapid screening method by which we can determine which persons have been infected by the tubercle bacillus. Should the individual whose chest x-ray suggested tuberculosis to the roentgenologist have a negative tuberculin reaction, we can then be certain that we can exclude the diagnosis of tuberculosis. Should, however, the test be positive, then such means as clinical, laboratory and further x-ray investigation should be instituted to establish or exclude the diagnosis of tuberculosis.

As a result of the marvelous tuberculosis control in Minnesota and its neighboring states, today the incidence of positive reactors to tuberculin material is so low that the tuberculin test has become one of the most important single diagnostic procedures in the study of clinical tuberculosis. It has changed from a procedure to determine who is infected with tuberculosis in mass surveys to being a test of diagnostic import from the standpoint of the individual and the practicing physician.

So valuable has the tuberculin test become as a diagnostic procedure rather than a control measure, that every physician regardless of his specialty should feel obligated to apply the test on every new patient that he examines. Further, because of the tremendous value of the routine chest x-ray, he should also feel obliged to have an x-ray film of the chest on every new patient. Should the Mantoux test be positive, it is then necessary for him to establish or exclude the existence of open, active, infective or communicable tuberculosis. Should his patient not have clinical tuberculosis under

these circumstances, then the physician is duty bound to see that this individual is re-examined and re-x-rayed periodically. On the other hand, if the patient is a negative reactor, the tuberculin test should be re-applied at regular intervals, for should the test convert to positive, it is evidence that the individual has been infected by the tubercle bacillus since the previous tuberculin test. With this information we can probably find the source of this contagion and thus bring to the patient so infected proper treatment. We can also extend our case-finding for tuberculosis to those known contacts that will be developed in the history when we find a conversion of a negative to a positive tuberculin reaction.

Although this, off-hand, may seem to be a Utopian ideal, it still remains that the best tuberculosis control officer is still the family physician practicing public health measures in his own office on his own private patients.

The mass chest x-ray survey of a community is, of course, a tremendous advance in the recognition of chest diseases during their silent period. It must be remembered, however, that such surveys are only screening procedures, and that as a result of the abnormal shadows seen by the roentgenologist patients with such shadows are then referred to their family physicians.

The important disease of the chest from the public health aspect is pulmonary tuberculosis. A single x-ray film cannot tell us whether a patient has tuberculosis, and certainly a single film is not criteria for the diagnosis of the extent and activity of the tuberculous lesion. These facts still remain the responsibility of the clinician. He can determine the existence of a tuberculous infection in a patient with an abnormal chest x-ray by the application of the tuberculin test, and should the test be negative, he can for practical purposes exclude an infection by tuberculosis. The emphasis on the chest x-ray film over recent years has unfortunately de-emphasized the value of the tuberculin test as a diagnostic means. The x-ray film cannot tell us whether a patient has tuberculosis. It cannot tell us as to what extent tuberculosis exists in the patient so x-rayed. It still remains the *forgotten test* that will give us this information. Such knowledge as we desire concerning the presence or absence of a tuberculous infection in an individual, such information as we desire as to the rate of tuberculosis infection in a community can only be obtained from the tuberculin test. It is the use of the tuberculin test, the chest x-ray, the physical examination and the laboratory, each complimenting and supplementing the other that leads to the accurate diagnosis of tuberculosis. Because of the importance of these tests let us constantly preach the value of a routine chest x-ray examination and constantly preach the value of the tuberculin test with the result that the tuberculin test shall become the *routine* and not the *forgotten test*.

Diaphragm: a muscular partition separating disorders of the chest from disorders of the bowel.

—AMBROSE BIERCE

Tuberculosis Problems in Kent County, Michigan

H. D. IRELAND, M.D.*
Grand Rapids, Michigan

PERMIT me to emphasize once more that tuberculosis is not hereditary. It is a contagious, communicable disease. Being such, it is preventable. The knowledge of ways and means to prevent tuberculosis has been available for many years and has been used to some degree. The incidence and death rate have been reduced. However, it is estimated that there are still approximately 500,000 cases of tuberculosis in the United States, causing some 50,000 deaths per year. Tuberculosis is still the greatest cause of death and disability in the most productive years of life. It is, perhaps, an exaggeration to state that in the year 1950 tuberculosis is an unnecessary disease. The above figures indicate, however, that the knowledge of epidemiology and prevention has been very incompletely applied.

The first step in tuberculosis control is case-finding. Neither the incidence of the disease nor the death rate can be effectively reduced unless new cases are found and isolated early. The reasons are two. (1) The new cases, the open, active cases with tubercle bacilli in their sputa must be discovered and removed from contact with the family and the public. They must be isolated before the germs have been passed on to others, some of whom will then develop manifest tuberculosis after a few weeks or not until after several years. (2) Tuberculosis is like many other diseases, cancer, for instance, in that it is treatable and curable providing it is diagnosed and treated in its early stages.

Our case-finding work is set up in the following manner. The Kent County Tuberculosis Society carries on an extensive program of tuberculin testing and x-raying of positive reactors in schools, industries, business houses and the general population. Approximately 25,000 tuberculin tests are done yearly and about 12,000 x-ray films are made. Cases of obvious or suspicious tuberculosis are referred to Sunshine Sanatorium Tuesday afternoon diagnostic clinic for detailed study. Those with evidence of significant non-tuberculous disease of the chest, heart and lungs are referred to their family physician. By these means many cases of tuberculosis are discovered that would ordinarily not be diagnosed until family and fellow workmen had been exposed for many months. These examinations also reveal many people with heart disease, cancer of the lungs, bronchial diseases, and so on that once known are still early enough to treat.

The next department in the case-finding program is the County Tuberculosis Clinic held in the basement of

City Hall each Monday night, Wednesday morning and Friday afternoon. It is financed by the county through the sanatorium budget and is operated by the public health nurses and the sanatorium physicians. These clinics are used primarily for examination and follow-up of people who are known to have been in contact with open cases of tuberculosis, individuals referred by private physicians and by the various health and social agencies. Approximately 10,000 examinations are done yearly.

These clinics are intended mainly for screening. Those individuals who show no evidence of important chest disease are advised to return for a check-up in one year. The check-up consists of a tuberculin test, if the previous one was negative, or a chest x-ray film, if the previous tuberculin was positive. We can save individuals a great deal of time and trouble and the county a great deal of expense if everyone will have such check-ups once each year.

The sanatorium is the third part in the program. The building and grounds are city-owned but are leased to the county. The county assumes the administrative and financial responsibility. Each Tuesday afternoon we hold what we call our Out-Patient Diagnostic Clinic, where we see and examine those individuals referred by the County Tuberculosis Society Mobile Unit, the County Tuberculosis Clinic, and by private physicians. The work-up includes standard size x-ray films, history, physical examinations, and laboratory procedures as indicated. Follow-up examinations are also done for former sanatorium patients and others who have evidence of inactive, reinfection type of tuberculosis. The County Tuberculosis Clinic and the Sanatorium Diagnostic Clinic each keep a card file and reminders are sent or the public health nurse visits those individuals who have not voluntarily returned for follow-up examination on the date recommended.

We find one persisting, erroneous idea. The idea that an individual does not have tuberculosis because he does not have a racking cough, is not thin, weak and emaciated, is not spitting up blood or complaining of chest pain, is a hang-over from the old days when tuberculosis was rarely diagnosed until it was in the preterminal stages. We have in the sanatorium many people who look perfectly healthy, who weigh more than they ever did before, without cough, no blood-spitting or no chest pain. They have no symptoms. They do have tuberculosis, however with tubercle bacilli germs in their sputa. These people will get well and they are not infecting anyone in the meantime. I cannot help mentioning the fact that the lung is now recognized as the third most common place to have cancer. It appears that cancer

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Read before the Kent County Public Health Institute, Grand Rapids, Michigan, November 13, 1950.

of the lung is becoming more and more frequent. Early cancer of the lung does not cause symptoms. Advanced cancer of the lung produces symptoms very similar to tuberculosis. By the time there is cough, weight loss, blood spitting and chest pain it is very late to start treatment. By that time cancer has frequently spread beyond the lungs. It is for that reason that to date the treatment of this type of cancer has been unsatisfactory. Early cancer of the lung can be completely removed and a permanent cure expected. I know of no practical way to detect pulmonary or bronchial cancer in its pre-symptomatic stage without large-scale routine chest x-ray films.

THE PRESENT STATUS OF CONTROL

Those of you who heard Dr. J. A. Myers last January may recall his statement to the effect that we are no longer talking about tuberculosis control. We are talking about its eradication. There are some who think it is not possible to eradicate tuberculosis with our present methods. I personally am firmly convinced that eradication of tuberculosis or, at least, its elimination from the list of important causes of death and disability is possible within the next several years, providing, of course, there are no major political or economic upheavals.

All are aware of the steady decline in the tuberculosis mortality rate in the first half of the present century. It has fallen from nearly 300 deaths per 100,000 population in 1900 to 70 in 1930, to 41 in 1945 and to 26 in 1949. There is no good reason why Grand Rapids should not be first on the list of cities having more than 100,000 population with a low death rate from tuberculosis. In fact, there is no good reason why Grand Rapids and Kent county should not be the first community of comparable size to go through a year without a death from tuberculosis. There are few communities of this size in this country, or the world, with more wealth per capita, a higher standard of living, a more stable population; that is, with such a low percentage of itinerant laborers and migratory people. Likewise, there must be few cities of this size in the country with a smaller percentage of non-Caucasian people. I am told that in Grand Rapids the non-Caucasian population is less than 3 per cent. All of these points are important in anti-tuberculosis work. The incidence of tuberculosis is usually high among Negroes and Indians. Also, the incidence is high and extremely difficult to control in those centers with large slum areas and large itinerant populations.

It may be we are talking too much about tuberculosis mortality rates. Edwards and Drolet in an article published in the January, 1950 issue of the *American Review of Tuberculosis* showed the decline in the number of new cases reported is not keeping pace with the decline in the death rate. Since 1930 the case rate has fallen only about 10 per cent, compared with a 50 per cent decrease in the mortality rate. There are a number of factors to be considered in explanation. (1) Increasing use of x-ray. Undoubtedly a larger number of cases are being diagnosed in the minimal and moderately

advanced stages. However, last year 10 per cent of the deaths from tuberculosis in Michigan were first reported by death certificate. One-third of the new admissions to Sunshine Sanatorium had far advanced disease. (2) There was a considerable shift of rural populations to urban centers during the war years, with its attendant increase in the opportunity for infection. (3) There has been more complete case reporting in the past few years. (4) Improved methods of treatment, with particular reference to treatment with drugs and surgery have undoubtedly preserved a number of people who formerly would have added to the death rate.

I would like to call your attention to the shifting emphasis on age groups. Formerly tuberculosis was considered to be a disease of the young. It still is the greatest killer and disabler in the most productive years of life—that is, the years from 20 to 45. However, we are seeing more and more cases in people beyond 40 and 50 years of age. The public health reports of 1949 show that the majority of patients in sanatoria are over 45 years of age. On August first of this year the youngest patient in Sunshine Sanatorium was 16. The oldest was 84. The average age was 44. Those of us who work at the clinic constantly hear statements to the effect that Mr. So-and-so cannot have tuberculosis because he is too old. The truth is that many elderly individuals who have had for years what they call a cigarette cough, bronchitis, asthma, etc., actually have chronic tuberculosis and are frequent sources of contact.

The Kent County Tuberculosis Registry shows 67 cases of active tuberculosis with known positive sputum outside the sanatorium. Thirty-one of these fall into a group of questionable public health hazards, since many are not known to be putting out more than a few germs. That is, their sputum is known to be positive by culture method only. There are 36 people outside the sanatorium with definitely progressive pulmonary tuberculosis and grossly positive sputum. When last checked, 14 of them were known to be living at home with small or teen-age children. That situation is not conducive to continuously lowering morbidity and mortality rates. Many of these people have refused admission to the sanatorium or have absconded from the hospital with active disease after being admitted. Some have been in and out of this or other sanatoria four or five times. That sort of thing has been going on in this community for many years and I fear has come to be accepted as a normal situation. Many of these individuals are chronic alcoholics. Some are definitely psychopathic personalities. Many have serious domestic difficulties. A few are just plain irresponsible. Those people are, to my mind, more serious public health menaces than the more respectable, responsible individuals. The latter might at least be expected to give their families or neighbors the protection of covering their mouths while coughing. My contacts with these recalcitrant persons in the clinic and outside the sanatorium make it obvious that it would be naive to expect many of them to do so. They will be the source of future cases of tuberculosis and consequently the source of unnecessary deaths and public expense.

The matter of quarantine of recalcitrant patients is not well understood. Michigan has a public health law that defines tuberculosis as a communicable disease and is adequate to force the isolation of those judged to be menaces to the public health. Unfortunately, the facilities for the detention of these people are not adequate. One of the state sanatoria and one of the other city sanatoria have a few beds in barred and locked wards where uncooperative individuals can be detained. However, these are entirely inadequate for the needs in those particular localities. Sunshine Sanatorium is now full. We have 178 beds and 178 patients. We would not be able to hospitalize all of that 67 now out in the community even if they would voluntarily accept the service. It is, of course, absurd to force someone who is obviously spreading tuberculosis into the hospital while, at the same time, refusing admission to another contagious case who wishes treatment.

There are no facilities in the county for the hospitalization of tuberculous children except as they can be occasionally gotten into the general hospitals. I have a list of 12 children with active tuberculosis who are in

need of treatment. Two others have died in the county this year. It is interesting to me that of the 12 living children with important primary tuberculosis, nine need never have had the disease. Had there been adequate facilities for the isolation of all known infectious cases of tuberculosis and for the quarantine of those uncooperative individuals, nine of the 12 need not have been exposed to the infection. As far as I can tell, three probably could not have avoided exposure. The same pertains to at least one of the two children who have already died.

In closing, I will repeat that with the present knowledge of tuberculosis epidemiology and control we are near the point where the disease is an unnecessary waste of human life and public funds. It is possible to eradicate tuberculosis in this community. We will not attain that goal unless (1) we continue and intensify the case-finding work, (2) we provide sufficient facilities for isolation and treatment of all known active cases, and (3) we provide facilities for the forcible isolation of recalcitrant individuals with communicable cases.

MOTION PICTURES ON DISEASES OF THE CHEST

A Bronchoscopic Clinic in Kodachrome. 16 mm., color, silent, 1,100 feet (1 reel), showing time 30 minutes (run at 24 frames per second). Prepared in 1949 under the auspices of the Jacques Holinger Memorial Fund by Paul H. Holinger, M.D., Kenneth C. Johnston, M.D., and Frank J. Novak, III, M.D., Departments of Otolaryngology and Broncho-esophagology, St. Luke's Hospital and the University of Illinois, College of Medicine, Chicago. Procurable on loan (service charge \$5) from the Committee on Medical Motion Pictures, American Medical Association, 535 North Dearborn Street, Chicago 10.

This film portrays the value of, and the indications for, bronchoscopy in the study of diseases involving the tracheobronchial tree. It clearly and beautifully demonstrates the bronchoscopic appearance of a variety of such lesions. A short abstract of the clinical history of each patient, presented in association with roentgenograms of the thorax and the pathological findings, adds greatly to the teaching value of the film. The technic employed for the performance of intratracheal and intrabronchial photography is demonstrated and, in the hands of the authors, appears to be relatively simple. The film clearly shows that skill and infinite and painstaking care must have been extended to obtain such excellent photography.

This is a motion picture that should be studied by all physicians interested in diseases of the chest and in bronchoscopy and should be available to all medical schools for student teaching, for it demonstrates visually factors that otherwise are hard to grasp. It is certainly suitable for any type of medical meeting and should be of interest to all physicians. The photography is outstanding.

Return to Life. 16 mm., black and white, sound, showing time 15 minutes. Produced in 1949 by Felix Films and the Disabled Ex-Service Men's Association in Finland. Procurable from (service charge \$1) Boston School of Occupational Therapy, 7 Harcourt Street, Boston 16.

This report type film portrays the experiences of an ex-service man of the Finnish army who has tuberculosis and who, on his return to civilian life, has not been able to find any work other than heavy labor. Physical examinations show that his condition is not improving, and he accepts the advice that he go to the trade school that has been set up in a rural area. For a year, in the company of many others with similar problems, he undertakes a program of vocational instruction. The scenery, photography and personalities at this point are extremely attractive, and it is evident that the program is carried out with commendable skill. The final summary contrasts the unhappy situation of the young unskilled worker in the beginning with his good fortune in having learned a trade and having been inspired by a sojourn among the lakes and forests of his country.

The effect of this nontechnical film is to show the need of vocational rehabilitation and to illustrate some of the technics. It is effective in setting forth the possibilities in an attractive and convincing manner. It is not intended for use in specialized instruction and could be understood and appreciated by most lay audiences. The photography and narration are very well done.

Diagnosis and Surgical Treatment of Congenital Heart Disease*

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CONGENITAL heart disease has become of interest to surgeons as well as to pediatricians since the first successful operation was performed by Robert Gross¹ for a patent ductus arteriosus in 1938. Although attempts had been made at correction of congenital deformities of the heart previously, it was not until this time that surgery of congenital heart disease actually began. Since then various types of deformities have been attacked successfully. In this resume of congenital cardiac deformities which can be corrected successfully a few of the cardinal points in diagnosis and treatment will be emphasized.

PATENT DUCTUS ARTERIOSUS

Before birth the ductus arteriosus is a shunt for blood from the pulmonary artery to the aorta, but after birth this channel has fulfilled its function and should normally close. Many ducti do not close promptly at birth but shortly thereafter. Christi has shown that approximately 44 per cent are still open at one month of age. One per cent are still open at one year of age. It is assumed that if a ductus has not closed by age two years it probably will remain open permanently. Why a patent ductus should close spontaneously has never been explained. It must be assumed until further evidence is at hand that there is innate in the tissue in the ductus the tendency to close normally.

Diagnosis

The diagnosis in any typical case of patent ductus arteriosus is relatively simple because of one outstanding finding which is universally present—the “humming top” or “machinery” murmur. This murmur is continuous and goes all the way through systole and diastole. Unless the murmur is continuous it is in general not wise to make a diagnosis of patent ductus arteriosus. While it is possible to have a patent ductus in a patient in whom there is no diastolic murmur, yet those instances are so few that one will be in far safer territory if he refuses to make such a diagnosis in the absence of a diastolic murmur. Other symptoms of interest are: a palpable thrill over the pulmonic area at the site of the murmur; the systolic blood pressure will be normal but the diastolic pressure will be from 30 to 50 mm. of mercury. Not infrequently one will be able to feel a “pistol shot” over the femoral arteries. The capillary pulse can often be found in the finger tips or in the lip if pressed down firmly with a glass slide. If the ductus

is large it is not unusual to find that the child is retarded physically, the height and especially the weight being subnormal. X-ray examination of the chest will reveal normal lung fields and usually a somewhat enlarged heart, especially in the region of the left pulmonary segment. Other findings are more or less insignificant. The electrocardiogram is normal and it is very important to bear in mind that a child with a patent ductus is never blue.

Indications for operation

If a child above two years of age has all of the typical findings of a patent ductus arteriosus it is now generally agreed that the child should be operated upon. We do not advise operation below two years of age because in rare instances such a ductus will close spontaneously. If one has a choice one would prefer to do the operation sometime between the ages of four and seven years. As the child grows older the operation becomes increasingly more difficult. A child of seven is far more easily operated upon than a child of 17, and a child of 17 far more than an adult of 27. As the patient grows older the ductus becomes shorter, is covered with denser adhesions, and consequently is more difficult to expose. The longer the heart has been struggling with its extra load of work the lower will be its reserve power.

The operation

Cardiologists in general advise surgical treatment but surgeons are still not entirely agreed as to the type of surgical procedure which should be employed. Some advise multiple ligation with transfixation of the ductus and others advise division and suture. One of the reasons for delay in acceptance of the division and suture method has been the fear of a slipping clamp and hemorrhage. For a number of years we have employed a new type of clamp which has previously been described in a number of publications.^{2,3} It consists of a forceps in the apposing jaws of which there are multiple tiny teeth, approximately forty to an inch. These tiny teeth, less than a millimeter long, appose but do not interdigitate when the clamp is closed. These teeth embed themselves in the adventitia and will hold the ends of the ductus even though it is very short, and will allow leisurely suture of the divided ductus without fear of hemorrhage. We have hesitated for some time to advise the use of these clamps, but since we have now used them in approximately 104 cases without untoward in-

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cident it seems appropriate to recommend their use for the division and suture of patent ducti.

The technique of operation may be briefly reviewed. We universally use a posterolateral incision with the patient lying on its right side. The most important step in the operation is to free completely the ductus of all surrounding tissue. The lapper of pericardium overlying the ductus must be dissected well off from the ductus and the edge of the pulmonary artery. Likewise, the loose tissue over the aorta must be removed. In making the dissection of the ductus it is important to follow the line of adventitia which overlies the wall of the vessel. This dissection should be done with a sharp scissors. There is far more danger of injuring the ductus when using a blunt instrument than when using sharp dissection. After the ductus has been completely freed, not only on the anterior surface, but also on the posterior surface, a ductus clamp is applied on the aortic side, crowding the clamp well up on to the base of the ductus even grasping a bit of the aortic wall if the ductus is short. Then a similar clamp is put on the pulmonary side of the ductus, leaving preferably 4 mm. between the two clamps. With a straight scissors the ductus is cut and the ends are sutured with a double row of continuous 00000 Deknatel silk on a swaged-on needle. If the sutures have been well placed there is little danger of more than very little bleeding from puncture wounds of the needle. After the clamps have been removed it is routine to put a piece of Gelfoam between the cut ends of the ductus merely to insure firm healing and prevent minimal hemorrhage from the suture line itself. The posterior parietal pleura is closed and the chest is closed in layers. Every chest is drained and after the patient is returned to the room the drain is connected with an under-water seal bottle.

Discussion

Results in general have been very gratifying. Operative and postoperative complications have occurred in a few patients and have not been of a serious nature.

The size of the patent ductus averaged from four to 18 mm. in diameter. The average was 7.4 mm. These were the outside measurements of the ductus made with a caliper.

Almost without exception these children have gained some weight following operation. One child, age 14 years, weighed only 65 pounds at the time of operation and gained 22 pounds the first two months following surgery.

Mortality in this operation should be low. While it is a perilous subject to discuss, we are pleased to report that in this continuous series of 142 patients there has been no mortality. Surgery of patent ductus has become an established procedure which gives very satisfactory results.

CONGENITAL PULMONARY STENOSIS

Up to 1945 tetralogy of Fallot, or as it is more popularly called, congenital pulmonary stenosis, was a disease which was of academic interest only because nothing could be done for children with this affliction. At that

time Blalock and Taussig¹ were the first to relieve successfully the cyanosis due to congenital pulmonary stenosis by making anastomoses of the proximal end of the large branch of the aorta to the pulmonary artery. Shunting systemic blood to the lungs for greater oxygenation has become an acceptable surgical procedure for the relief of congenital pulmonary stenosis.

Diagnosis

The diagnosis of tetralogy of Fallot, that is, of the typical cases, can be made with relative ease. The child is usually blue. The cyanosis may be severe or it may be mild. There is usually more or less exercise intolerance. Some children are completely incapacitated and will go into unconsciousness upon the slightest exertion. Others are moderately incapacitated and can walk as much as a mile if they go slowly. The average case can walk probably a block or two. Children are brought in because of cyanosis and exercise intolerance. When these children are examined one will find in the typical case cyanosis of the lips and fingers, and if the child is above two to four years of age, usually some clubbing of the fingers and toes. On physical examination one will find a heart that is normal or near normal in size. A systolic murmur will be heard usually in the second or third interspace to the left of the sternum. In these patients there is not a diastolic murmur, in fact, if there is a diastolic murmur the chances are relatively good that the child does not have an uncomplicated tetralogy of Fallot.

Laboratory examination is important. The red blood count will usually be well above normal. In our series of cases we have found the average red count to be $7\frac{1}{2}$ million cells per cubic millimeter. The hemoglobin is correspondingly elevated. X-ray examination of the chest will reveal a typical boot-shaped heart. Occasionally a child will have an almost normal shaped heart, but usually there is a concavity in the region of the left pulmonary segment giving the appearance of the usual boot-shaped heart. The lung fields are clear. X-ray pictures taken in the oblique position will show a dark space on the roentgenogram, that is, an open space where the normal pulmonary artery should be. The space is called the pulmonary window. The electrocardiogram in these patients almost invariably shows a deviation of the axis to the right. In fact, if there is not axis deviation to the right the chances are extremely good that this child does not have a classical tetralogy of Fallot.

Indications for operation

The choice of patients for operation is always difficult. Unfortunately only about 60 per cent of the cyanotic children which are seen in the cardiac clinic fall into the operable group. The 40 per cent have all sorts of cardiac and large vessel anomalies, many of which are not remediable by any surgical procedure known at present.

The diagnosis in these cases and the selection of patients for operation is made by Dr. Stanley Gibson and his associates. It has been our policy to refuse operation to no child in whom it can be demonstrated that

there is diminished blood flow to the lungs. It has often been surprising to find that some children in such desperate condition that operation seems out of question have gone through surgery very successfully. It is our policy to explain to parents before operation that each case must be considered an exploratory procedure because occasionally a seemingly typical case may have abnormalities which preclude surgical relief. If it is felt that the child with tetralogy of Fallot is definitely handicapped, surgery is advised.

Preoperative care

After the diagnosis has been completed the child is still kept in the hospital for at least a day or two for observation for any signs of upper respiratory infection. Penicillin in 100,000 unit doses is given twice daily for at least twenty-four hours before operation. Anesthesia is extremely important in these patients. The already hypoxic patient must be carried through a still more severe period of oxygen deprivation occasioned by opening the chest and occluding for a time one of the pulmonary arteries. Dr. McQuiston, who has given the anesthesia for most of these patients, advises intratracheal anesthesia using cyclopropane and a bit of ether during induction, then later cyclopropane and oxygen only. During the entire operation respirations are controlled by the anesthetist's "breathing for the patient." This furnishes a quiet field and makes the operative procedure far simpler. During recent years we have controlled the child's temperature during operation. We have felt that the consumption of oxygen could be lessened considerably if the patient's temperature were reduced. The especially cyanotic patients have had their temperatures lowered to 93° and 94° F. This is accomplished by placing the child on a water mattress into which ice-cold or tepid water can be run as circumstances demand. A record of the temperature is made by a thermocouple inserted into the rectum so that the child's temperature can be read at any moment. We feel sure that a number of patients deeply cyanotic have survived operation because of marked lowering of the temperature who would not have survived had the temperature been allowed to go up to 102° or 103°, as is relatively common in these patients.

Operation

The surgical technique is as follows: The child is laid on its right side and a posterolateral incision is made on the left side. If the child has an aortic arch on the left, an aortic-pulmonary anastomosis is done between the aorta and the left pulmonary artery. If (as has occurred in our experience in approximately 23 per cent of cases) the arch of the aorta curves to the right, the incision is still made on the left side and a subclavian-pulmonary anastomosis is made. However, if the child is below approximately one year of age an aortic-pulmonary anastomosis is always done. Whether a subclavian-pulmonary or an aortic-pulmonary anastomosis is made, is a matter of judgment to the operator. We have preferred aortic-pulmonary anastomoses because the opening can be made of whatever size seems proper. In general

the cuts in the aorta and the pulmonary artery have been made one-fourth of an inch or 6.3 mm. long. This gives a final opening approximately four mm. in diameter. Such an opening is large enough to carry enough blood to the lungs to relieve cyanosis but is not large enough to cause an undue strain on the heart. The technical procedure of an aortic-pulmonary anastomosis has been described⁵ and is based upon the use of the Potts-Smith clamp which encircles the aorta and pinches off a small segment of the vessel to which the pulmonary artery can be sutured in a bloodless field. In case a subclavian-pulmonary anastomosis is done the technique as described by Blalock is used. Approximately 275 patients have been operated upon for congenital pulmonary stenosis. We have divided them into two groups: those below four years of age, and those above four years of age. In the children below four years of age, that is, youngsters from ten days to their fourth birthday, approximately 95 patients, there has been a mortality of 22 per cent. In the older age group, those from the fourth to the seventeenth birthday, there have been approximately 180 patients, and in this group there have been only four deaths, or a mortality of 2.7 per cent. It is apparent at a glance that if a child can live beyond its third year, its chances for a recovery are exceedingly good. If the child must be operated upon in the early days the mortality is going to be high. Naturally one advises waiting until the children are three years of age if possible. The only reason for operating on little children is a condition such that without surgery life is impossible. Therefore the high mortality in the low age group.

Results

Those patients who have survived surgery have been relieved of their cyanosis and their parents have been freed from the torture of watching their unfortunate children gasp for breath. These children are not normal, but they can run and play and do most of the other things that little children do. For older children we advise strongly against competitive athletics. The pathology in the heart has not been corrected. Furthermore, an added burden has been put upon the heart by a shunt operation. It is important that the heart muscle be reasonably protected.

CONGENITAL PULMONARY STENOSIS WITH INTACT INTERVENTRICULAR SEPTUM

Diagnosis

The symptoms in general of congenital pulmonary stenosis with an intact ventricular septum are rather similar to those of a patient with tetralogy of Fallot. However, the cyanosis is usually not as extensive and the degree of incapacity is greater than in the tetralogy of Fallot. In fact, some of the patients with rather mild cyanosis are greatly incapacitated because the opening in the pulmonary valve is so small as to allow relatively little blood to go to the lungs. The symptoms and signs vary considerably from those encountered in the tetralogy of Fallot. There may be dyspnea and marked

decrease in exercise tolerance and relatively little cyanosis. In these patients the heart is apt to be enlarged.

There is always a systolic murmur often accompanied by a thrill heard at the base of the heart. Not infrequently there is pulsation of the liver and practically always there is enlargement of the liver due to back pressure of the blood in the right ventricle, the right auricle and the superior and inferior vena cava. Roentgenogram and fluoroscopic examination reveal that the heart is enlarged and that instead of a concavity in the region of the left pulmonary segment there is convexity. There is almost invariably extensive enlargement of the right ventricle. The lung fields are clear. The electrocardiogram invariably shows right ventricular hypertrophy with high sharp P waves, especially in lead II. Cardiac catheterization will show increased pressure in the right ventricle with abnormally low pressure in the pulmonary artery. The angiocardiogram fails to show the overriding of the aorta as seen in the tetralogy of Fallot, that is, the dye remains long in the right ventricle.

Treatment

Sellers⁶ and Brock⁷ of England are responsible for introducing a new type of treatment for these patients. It is obvious that a shunting operation in a patient with intact interventricular septum or a "pure pulmonary stenosis" as it is frequently called, will not be successful because it will put an increased strain on the heart. The only logical treatment is to attack the stenotic valve itself. This Sellers and Brock have done by the use of a valvulotome inserted through the wall of the right ventricle and through the fused stenotic valve. The Brock valvulotome consists of a diamond-shaped blade on the end of which is a small blunt probe. The advancing edges are sharp. Since the valvulotome must be introduced through the right ventricle it is obvious that the wound in the muscle will be as large as these diamond-shaped cutting blades. With the idea of decreasing the size of the wound in the heart, a simple valvulotome was devised.⁸ It consists of a sharp cataract knife blade which was fashioned on a round shaft of steel which in turn was attached to an ordinary knife handle for easy manipulation. The round shaft of the knife is of such size that it will snugly fill the hole in the wall of the right ventricle made by the blade and thus prevent hemorrhage. This valvulotome was used successfully on four patients previously reported. The results were entirely satisfactory. However, it was felt that probably in older patients the stenotic area might be rather tough and not yield easily to cutting with a fine blade. Therefore a new type of expanding valvulotome was devised. It consists of a shaft on which there are two blades which can be retracted. While the valvulotome is being inserted through the wall of the ventricle the blades are retracted and as soon as it is in the right ventricle the knife blades are expanded to the proper size as shown by an indicator on the handle of the instrument. This valvulotome is then thrust through the stenotic valve. In order that one may be sure that the valve has been opened to its complete diameter we have also devised a dilator on the same principle. The

closed dilator is introduced through the ventricle through the same opening made by the valvulotome. It consists of a sort of basket-like arrangement similar to esophageal dilators. It is opened to the proper size and is thrust through the stenotic pulmonary valve. It is not considered safe to cut the valve completely with the valvulotome for fear of injuring the pulmonary artery itself. Therefore, the dilatation is completed by the use of the expanding valvulotome. These instruments have been used successfully on fourteen patients.

Operation

A left subpectoral incision is made and the chest opened through the third interspace. The second, third and fourth ribs are cut at the costosternal junction and the pericardium is widely opened. Approximately five cc. of one per cent procaine is injected into the pericardial sac. It is then widely opened. About two cc. of procaine is injected into the wall of the right ventricle. Two stitches of Deknatel silk are put into the ventricle to steady it. One will see in these patients that the left ventricle is much dilated. Over the pulmonary valve a typical thrill can be felt. Actually one can feel the thrust of blood against one's finger as it comes through the tiny opening in the fused pulmonary valve. There is usually some constriction of the pulmonary artery at the valve itself, and distal to this constriction there is marked distention of the pulmonary artery called poststenotic dilatation of the pulmonary artery. The valvulotome is now introduced into the right ventricle and thrust through the stenotic area, closed and withdrawn. This is followed by the dilator in the same manner. As soon as this has been done one promptly feels a gush of blood now pouring through the pulmonary artery and at the same time the patient's color changes from cyanotic to definitely pink. The opening in the wall of the right ventricle is closed as the instrument is withdrawn. The pericardium is loosely closed to allow for drainage. The chest is drained and closed in layers in the usual manner. While it is not too proper to speak of results following surgery as spectacular, it is true that the results in this small group of patients with pure pulmonary stenosis are exceptionally good. Fourteen patients have been operated upon for this condition and there has been one death. In one boy, age ten, who had been almost completely incapacitated, there was marked improvement immediately following surgery. The size of his heart diminished markedly within two months following surgery and he now engages in all athletic activities with other youngsters of his age without dyspnea and without cyanosis. This in general has been true of the other patients who have been operated upon for this condition. Undoubtedly in the past many patients with so-called pure pulmonary stenosis had been overlooked. It is very important to separate these patients from those with a tetralogy of Fallot. Whereas in the tetralogy of Fallot a shunting operation yields excellent results in these patients with an intact interventricular septum the good results will be obtained only by opening the pulmonary valve. It is frequently difficult to differentiate one group from the other, but it is

extremely important to use every possible method to pick out these patients in order that they may be given the benefit of an extremely satisfactory procedure.

COARCTATION OF THE AORTA

Coarctation or constriction of the aorta is a congenital deformity appearing in two types, adult and infantile. The adult type of coarctation which will be discussed here is that which occurs immediately distal to the origin of the ductus. Infantile coarctation usually occurs proximal to the origin of the ductus arteriosus and is apt to be associated with other cardiac anomalies fatal in the early months of life. The adult type of coarctation which is limited to a very small segment of the aorta is now remediable by surgery. The operation was performed by Crafoord and Nylin⁹ and Gross and Hufnagel¹⁰ at almost the same time.

Diagnosis

Coarctation of the aorta is a relatively infrequent anomaly, but undoubtedly is far more common than is realized because often it produces no symptoms for many years. If one bears in mind the possibility of coarctation of the aorta it can be easily diagnosed by palpating the femoral artery during any general physical examination. Any patient who has a high blood pressure should be suspected of having a coarctation. If the blood pressure in the arms is above normal, palpation of the femoral arteries is in order. If the pulse is weak, pressure should be taken in the legs. Normally the pressure in the legs is higher than in the arms. If the reverse is found the patient probably has a coarctation of the aorta. The only finding in the heart itself may be that of slight enlargement and probably a systolic murmur. The electrocardiogram will probably show deviation of the axis to the left. X-ray examination of the chest will probably show some enlargement, and if the patient is above five or seven years may show some notching of the ribs. However, notching of the ribs usually appears a bit later.

There is a tremendous variation in the degree of coarctation and according to the degree of coarctation the symptoms will be either slight or severe. The patient with a severe coarctation will early show a high blood pressure, that is, a pressure of approximately 200 to 240 systolic in the arms and probably 80 to 100 in the legs. These patients not infrequently have headaches, palpitation, dizzy spells and occasionally nosebleeds, occasionally fainting spells and are apt to complain of weakness in the legs or a feeling of chilliness in the legs. It is always a bit difficult to know when one should advise surgery. If the blood pressure is persistently higher in the arms than in the legs we believe that surgery should be advised. If, however, the pressure is practically the same, but the femoral pulses are slightly weak and the patient has no symptoms, it is safe in the early years to wait and see whether or not symptoms will later justify operative procedure. One must bear in mind that coarctation of the aorta is eventually a serious disease. While the patient may go along thirty to forty-five years with relatively few symptoms except

high blood pressure and some headache, there is constant danger of a number of complications such as: cerebral hemorrhage, endocarditis, rupture of the aorta proximal to the coarctation, etc. We now have a number of patients under observation—children between three and five years of age who undoubtedly have coarctation of the aorta, who have mild femoral pulses, slightly decreased blood pressure in the legs, but no symptoms whatsoever. These children will be observed for a number of years and if the differential in blood pressure between the arms and legs continues and becomes greater, operation will be advised. The most suitable age for operative correction of coarctation of the aorta is between the ages of seven and eleven. At this time sclerosis of the vessels has not occurred. Pliable vessels are more easily coapted and the chances of satisfactory healing are far greater. Whereas the operation is a relatively difficult and tedious one and not without danger, it is generally believed that the majority of patients with a demonstrable coarctation should be operated upon in the early years rather than let them wait until they are in their twenties when the mortality is far higher than in children.

Operation

Fear of hemorrhage haunts every surgeon who is about to resect a coarctation of the aorta. To lessen this worry new coarctation clamps and a vise to hold them have been devised and have recently been described.¹¹ These instruments have been tested on laboratory animals and have been used on 12 patients with very satisfactory results. The clamp utilizes the same principle as the ductus clamp previously described. In the apposing jaws of the clamp are many fine teeth, 40 to an inch. These teeth embed themselves in the adventitia of the vessel and hold it, will not let it slip and will not injure the vessel. A certain amount of judgment must be exercised in applying these clamps. If the wall is very thick, it may be that the clamp needs to be closed only to the second notch. In the average patient the clamp can be closed the entire distance to the third notch. Further worries of the surgeon include the hazard that the assistant holding the clamps may inadvertently unlock one or that his muscles may become fatigued and during the middle of the anastomosis he may allow them to slip. To overcome these hazards a vise has been made which fits on the coarctation clamps, holding each firmly and allowing proper adjustment for unhurried suture.

With a long posterolateral incision and resection of the fourth or fifth rib, the chest is opened and the posterior parietal pleura is opened. The coarctation is dissected free and the aorta above it and below it are very carefully freed from surrounding structures and held up by tapes. Usually it is necessary to ligate and cut only approximately one intercostal artery on the distal segment near the end of the vessel which is to be sutured. If the ductus still remains it is doubly clamped and cut. The coarcted portion of the aorta is now elevated and the serrated clamps are applied above and below and the constricted portion is excised. The question now arises of whether the suture should be done by end-to-end

apposition or whether the edges of the aorta should be everted. There has been considerable controversy on this subject. Some advise eversion; some advise anatomical approximation of the edges. We have tried both methods on dogs and on human beings and at present prefer anatomical coaptation. Actually, it is doubtful if it makes much difference whether one does an eversion type of suture or an anatomical apposition. After the clamps have been applied the vise is attached to the handles of the clamps and the clamps are brought together to such a point that the ends of the aorta lie in close apposition. Suture then is done with 00000 Deknatel silk on a curved, swaged-on needle. It is very important in doing this anastomosis that the suture constantly be held snugly, so that the edges of the aorta are closely apposed. After the anastomosis has been completed the distal clamp is released and blood allowed to fill the aorta. There will be a small amount of bleeding for a few minutes until the needle holes have been plugged by clots. If the suture has been properly done there will be very little tendency to bleed. The proximal clamp is now slowly released. Since the clamp is small and since there has been no occlusion of the subclavian artery there is not much danger of a sudden drop in blood pressure from release of the proximal clamp. If there is any persistent bleeding of any consequence an extra stitch may be placed in the proper position. A piece of Gelfoam is laid over the anastomosis and the posterior parietal pleura is carefully closed. The chest is drained and closed in the usual way with running catgut sutures and silk for the skin.

Results

Twelve patients have been operated upon by the technique described. Their ages have varied from seven to 16. There have been no complications, operative or postoperative, of any consequence and there has been no mortality.

It has been fairly well established that the operative correction of coarctation of the aorta is an acceptable and desirable procedure to prevent, in later years, the untoward and irreversible complications of a constant constriction of the aorta.

ANOMALIES OF THE AORTIC ARCH OR VASCULAR RING

In 1945 Gross¹² published the first report of a child with a double aortic arch successfully treated surgically. Since that time a number of cases have appeared in the literature. Previous to Dr. Gross's report an occasional case was described pathologically, but there was no interest in the disease because nothing could be done for these children surgically. Since it has been demonstrated that the constricting vascular ring can be satisfactorily treated surgically, interest has grown in this rather unusual congenital anomaly. The most common anomaly of the aortic arch consists of a large posterior segment going behind the esophagus and an anterior segment going in front of the trachea. At the region of the ascending aorta the anterior segment arises. In the region of the descending aorta the two segments unite,

thus the vascular ring is formed around the trachea and the esophagus and because of the constriction produced by this ring the symptoms are produced.

Diagnosis

Symptoms of this condition usually manifest themselves in the early weeks of life. When the child is being fed it is apt to have choking spells and may occasionally have attacks of severe cyanosis. This is usually accompanied by a rather rough, rasping cough resembling the bark of a sea lion. These children will occasionally have attacks of dyspnea which are so severe as to require oxygen. Breathing is noisy and usually there is some suprasternal retraction,—that is, the child seemingly is breathing against some obstruction. Upper respiratory infections are common. The child with these symptoms is usually sent to a roentgenologist for x-ray therapy for an enlarged thymus. Obviously, x-ray therapy will do such a patient no good. The diagnosis is easily made if the condition is borne in mind. Any child who has a rough, wheezing respiration, has choking spells, and who swallows poorly should be given a swallow of barium. An indentation in the posterior wall of the esophagus seen in the lateral position at the level of the arch of the aorta makes the diagnosis of constriction by some anomaly of the aortic arch. Bronchoscopic examination may reveal some constriction of the trachea anteriorly.

There are a number of types of vascular ring which may occur. Usually the posterior segment is large and the anterior segment is small. However, the reverse may be the case, the anterior segment being large and the posterior small. A fairly common cause of notching of the posterior wall of the esophagus seen roentgenographically in patients with congenital heart disease is an anomalous subclavian artery. The right subclavian arises from the descending aorta on the left and passes posterior to the esophagus to the right arm. This anomaly is not an uncommon finding during operation of patients for congenital heart disease. Although it produces notching of the posterior wall of the esophagus it is rarely the cause of symptoms. Very rarely such an anomalous subclavian artery causes severe dysphagia, referred to as dysphagia lusoria. The condition is easily corrected surgically by ligating and severing the offending vessel and drawing it from its position between the esophagus and vertebrae.

An incomplete vascular ring may be formed by the ductus arteriosus arising from the aorta, descending on the right side, coursing behind the esophagus, winding around the left side of the trachea and attaching itself to the pulmonary artery. Respiratory distress in these patients is apt to be very severe. There are other anomalies of the arch and its vessels. If it can be demonstrated that an anomalous vessel is the cause of the symptom complex of dysphagia, dyspnea, stridor, choking, attacks of cyanosis, and occasional unconsciousness, surgery offers the only means of relieving the patient. However, the operation should not be undertaken lightly because it is a trying and hazardous procedure. Considerable time is needed for rather extensive dissection

of the arch of the aorta and its large branches. It is often difficult to keep these poor-risk patients properly oxygenated during operation. However, if the diagnosis is correct and the pathology is properly exposed, it is usually possible to release the constriction and obtain very satisfactory results. We have operated upon eight patients with vascular ring and there have been three deaths. Two of these deaths occurred on the operating table because it was impossible to oxygenate the child while the operation was being done. In a third case, death occurred approximately five days after the operation because the pathology was not properly understood. This has been explained in a previous report.¹³ It is important to remember that all sorts of anomalies of the arch and the great vessels may occur and very tedious and careful dissection will be necessary to outline the type of deformity and allow for its proper correction.

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(Continued on page 164)

Controlling Tuberculosis on the College Campus

This program, with speakers representing four Southwestern medical schools, was presented at the Southwest Chapter meeting of the American College Health Association in Austin, Texas, November 19, 1950. The following abstracts of these discussions were prepared by the Committee on Student Health of the Texas Tuberculosis Association, for distribution to member colleges.

Panel Discussion Program

- 1. Reducing the Burden of the College Control Program:**
DR. LEWIS J. MOORMAN, Emeritus Professor of Medicine
University of Oklahoma Medical School, Oklahoma City, Oklahoma
- 2. The Use of the Tuberculin Skin Test in the College Control Program:**
DR. JOHN W. MIDDLETON, Associate Professor of Medicine and Director, Student Health Service
Medical Branch, University of Texas, Galveston, Texas
- 3. Importance of Control of Faculty and Non-Teaching Personnel:**
DR. HARDY KEMP, Professor of Preventive Medicine
Chairman, Department of Public Health and Preventive Medicine
Baylor University Medical School, Houston, Texas
- 4. Importance and Control of Tuberculosis in the College Community Outside the Campus:**
DR. ELIAS STRAUSS, Associate Professor of Medicine and Director, Student Health Service
Southwestern Medical School of the University of Texas, Dallas, Texas

* * *

Reducing the Burden of the College Tuberculosis Control Program

LEWIS J. MOORMAN, M.D.

OUR American forebears landed at Jamestown with four primary objectives: to extend the Church of England, to establish a representative government, to convert the Indians and finally to establish free schools and institutions of higher learning. Unfortunately with reading, writing and arithmetic they unwittingly introduced tuberculosis into the American school. Three hundred and forty-three years later we gather at a great American university with the hope of bringing about further control of the tuberculosis problem among college and university students.

For the past fifty years we have known enough about the cause and control of tuberculosis to have wiped it from the face of the earth if our knowledge had been intelligently applied. Today we ask—where can we look for intelligent application and cooperation if not in our colleges and universities? In this connection it is interesting to note that of all geographic areas we have in the United States the lowest percentage of reactors to the tuberculin test. This should encourage us to go forward with a new hope.

Unfortunately, people are not willing to pay for college health what they pay for athletics and, we might add, for cigarettes and cosmetics. Looking at this problem from an idealistic viewpoint, I would say that the best way to bring about the desired control would be through a broad program of health education and prevention of disease from the cradle to the grave.

However, since we must accept conditions as they are and work with what we have at hand, I think the best way to lighten immediately the load of the college control program with reference to tuberculosis would be to prepare a pre-admission health examination blank to be

executed by the family physician. The examination should include careful inquiry about contact with tuberculosis, a tuberculin test and an x-ray film of the chest in all reactors, also a sputum examination in all cases where cough and expectoration are present. Through these diagnostic measures all those suffering from manifest tuberculosis may be eliminated. Where doubt exists the consultation of a chest specialist should be sought or in case this service is not available, the x-ray film should become a part of the application for admission in order that there may be further screening by the physician in charge of the control program.

This would relieve the control program of an initial load which otherwise would lead to recurring problems throughout the succeeding school years as a result of contact. Such a plan would help to place the college health on the minds and hearts of family physicians, where it would have a wholesome effect and would materially lighten the tuberculosis load of the control agencies and safeguard the total school population. All suspicious or arrested cases admitted should be x-rayed every three to six months. All non-reactors should be tuberculin tested annually and all reactors x-rayed immediately and every six to twelve months thereafter. Of course, there must be prompt elimination of all communicable cases as soon as discovered.

In addition, all members of the teaching and administrative staffs and all campus employees should be examined for the purpose of eliminating tuberculosis. Tuberculin testing and x-raying of all college personnel should be repeated every six to twelve months with expert interpretations and prompt action when evidence of disease appears. The student's chest x-ray films should be a part of his health record, and they should be transmitted to his family physician when he graduates, or in case there is no family medical adviser, they should be preserved for future reference if occasion arises.

The Use of the Tuberculin Skin Test in the College Control Program

JOHN W. MIDDLETON, M.D.

THE tuberculin skin test identifies infected individuals but does not indicate whether the infection is active or dormant.* Since all active cases that develop among students during their college career will come from the tuberculin positive group, the test may be used to screen out those individuals who require close supervision from those who need only annual examinations.

The microfilm does not identify all infected individuals, but screens out those with gross structural changes in their lungs. Most active cases of disease will be found in this group. Thus it may be said that the skin test labels the infected group, and the microfilm points out the individuals most likely to have active disease.

Control programs can effectively utilize either of these screening devices, or may use them to advantage in combination. Both must be followed up by other studies before diagnosis of active disease can be established (see diagram).

Advantages favoring the skin test are its low cost and its accuracy in identifying infected individuals. Disadvantages are the necessity of returning for reading the tests, for retesting and again returning for reading negative reactors before they can be recorded. The lower the rate of positive reactors the fewer the number of x-ray films that must be taken, but the larger the number who must be retested.

We have no recent figures showing the incidence of positive tuberculin reactions in Texas high school or

**Diagnostic Standards and Classification of Tuberculosis*, 1950 edition, pages 20 and 41, published by the National Tuberculosis Association, 1790 Broadway, New York 19, N. Y.

college students, but reports from other states indicate that it might run from 10 to 15 per cent.† Some pilot studies should be made in Texas to guide school health services in the most efficient and economical use of the skin test in control efforts.

Arguments for the x-ray survey control method are its simplicity in requiring only one brief visit for the majority of students who will show normal chests. Only about one in two hundred will be required to make a second trip, and if the microfilm technique is used, the unit cost is low. Disadvantages of the x-ray method are the fact that it does not locate all of the group needing close supervision and that, considering the few active cases found, the cost per case is quite high. It is true also that a few active cases will develop between surveys who showed absolutely nothing in their last film, thus pointing up the fact that the x-ray alone is not highly efficient in controlling the disease.

* * *

Importance of Control of Faculty and Non-Teaching Personnel

HARDY A. KEMP, M.D.

RECENT surveys have shown that the incidence of active tuberculosis is higher in middle and old age groups than in college students. The figures obtained from our own Texas college surveys show more than three times as many cases in non-teaching personnel, and four times as many in faculty, as in student body. This means that students who have never been exposed to tuberculosis have considerable opportunity to come in close contact with the disease for the first time on the college campus or in the classroom, unless the active

†*The Tuberculin Test; Vital Factor in Tuberculosis Control*, Diseases of the Chest 14:739, 1948, by S. L. Cox.

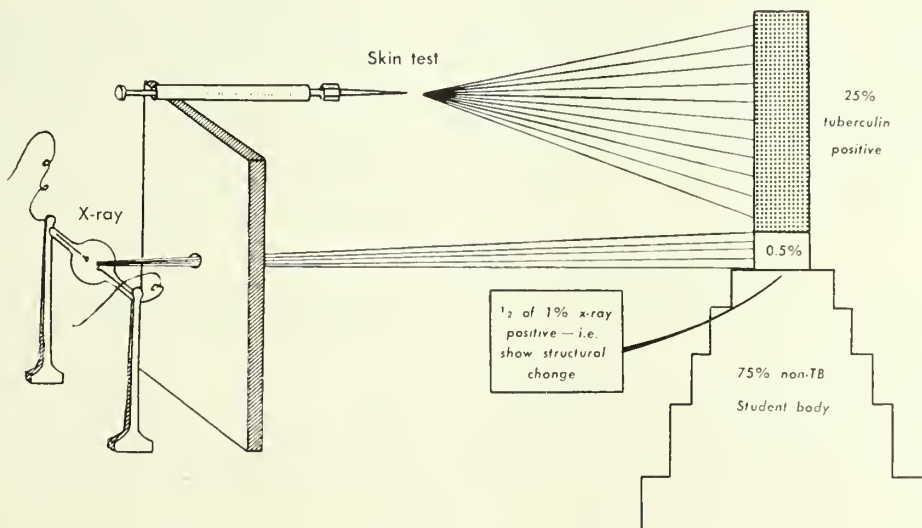


Diagram illustrating graphically the coverage of the infected group that can be expected of these two screening devices. The tuberculin test detects all who have tubercle bacilli in their bodies while the x-ray only screens out those with gross lesions.

cases in faculty and employees—as well as student body—are discovered and eliminated.

University of Texas and College X-ray Findings
(November 1946 through October 1947)

	No. X-rays	Percentages		
		Total TB	Non-TB Pathology	All Findings
Students	28,880	0.5	0.4	0.9
Faculty	661	2.1	1.3	3.4
Staff	251	1.9	0.7	2.7
Employees	979	1.8	2.7	4.5
	30,771			

Although professional people are usually cooperative in public health efforts to protect them from contagious disease, experience in surveys has shown that a fair number of teachers, as well as other employees, will fail to respond even though services are offered free. It is thought that two factors are involved in the attitude of those failing to cooperate: (1) Indifference because of insufficient education regarding the need; (2) Fear that something might be discovered that would cause retirement from a position. It is reported that a third factor has been met in some college communities in the objections of collective bargaining agencies among groups who have been organized by labor unions. The answer to the first obstacle is obvious—more intensive education. The second is more troublesome, but when it is made clear to the employed personnel that no one will be restricted in his employment unless his disease is active, —and even in that case, only so long as there is danger to himself or others—most objections are resolved. The third factor can also be successfully met by the following assurances: (1) “The right to work” is not denied any employee except where his own health is in jeopardy or he is a public health menace to his fellow workers; (2) he is retired from his job,—or he is refused employment, only so long as his disease is active and, as soon as he is physically able to return to the job, he can be re-employed. In addition to this, if his old job is unsuited because of his disease handicap, he is placed in a rehabilitation program and taught a new skill in which he can be restored to a self-supporting status.

Details of the control program for these employed groups should be worked out by each individual college according to its size, available facilities, and general ability to cope with the situation.

SUMMARY

1. The faculty and employed personnel of the Texas colleges show from three to four times as much tuberculosis per unit of population as do the students.
2. Failure to control the disease in these groups means defeat of the student control program.
3. Methods should be worked out in each school to make an effective supervision and control of this disease in the faculty and non-teaching personnel a vital part of the college health program.

Importance and Control of Tuberculosis in the College Community Outside the Campus

ELIAS STRAUSS, M.D.

STUDENTS are not isolated on the campus; therefore, any tuberculosis control program must consider also the contacts they have off the campus.

What is the likelihood of contact with open cases of tuberculosis?

On the campus: Majority are young, healthy adults in reasonably good nutritional status. Incidence of tuberculosis is low.

Off the campus: A larger proportion of population is in middle and older age groups, including many in substandard housing and in poor nutritional state. Incidence of tuberculosis is high.

How can colleges control the contacts of students off campus?

Program requires cooperation between college authorities and local health agencies. Features of tuberculosis control program may include these:

1. Local health agency requires health cards for all food handlers and rooming house or dormitory workers. Local health ordinance may be needed to implement this. The requirements for health cards include x-ray inspection of chest annually. (Provision required for final diagnosis and subsequent care in all suspicious cases.)
2. Colleges should keep register of “approved” eating places and rooming houses, one criterion for approval being that all persons working on premises have health cards. Failure to comply removes establishment from list. Students may be urged not to patronize such establishments. (An educational program necessary to gain student cooperation.)
3. A parallel program of community tuberculosis education by local chapter of tuberculosis association and health department and a tuberculosis control program for the community by the local health department is required to make the college program most effective.
4. Cost of the entire program should not be levied, primarily, against those requiring health cards, although a nominal charge would be appropriate.
5. In a community where no local health agency exists which can undertake such a program, the college itself may have to conduct such examinations and issue health cards in order to allow such establishments to qualify for its approved list.

Fundamentally, a college tuberculosis control program, to be of maximum effectiveness, requires a parallel program in the community.

Tuberculosis Control in Our Colleges Academic Year 1947-48

18th Annual Report of the Committee on Tuberculosis American College Health Association

WE ARE PLEASED to report that we are gaining ground in our efforts to have a tuberculosis control program on the campus of every American college and university. There has been, with few exceptions, a steady increase in the number of colleges having such programs. In 1932, in response to a questionnaire, six colleges reported having tuberculosis control programs. For the school year 1947-48, a new high of 374 colleges reported programs.

The status of tuberculosis programs since 1940 is shown in Table I.

In 1947 fewer colleges reported programs than in the previous year. It is difficult to explain this drop, but it is thought to be the result of the many post-war adjustments (increase in student body) occurring in colleges during the year 1946-47.

Table II indicates the number of cases of tuberculosis found through the case-finding programs. Combining the first three columns, we find that in the 374 colleges reporting some type of tuberculosis control program, with a total enrollment of 979,595, there were 968 cases of tuberculosis found in the student body. This is ap-

TABLE I

Number and Percentage of American Colleges and Universities Which Answered Questionnaire and Percentage of Those Answering Which Reported Programs, Classified by Academic Year.

Academic Year Ending June 30	Colleges Sent Questionnaires	Replies Received		Colleges Which Reported Programs	
		Number	Percent of Colleges Sent Questionnaires	Number	Percent of Replies Received
1948	889	438	49.3	374	85.4
1947	885	311	35.1	259	83.2
1946	883	507	57.4	362	71.4
1945	885	461	52.1	312	67.7
1944	886	400	45.1	286	71.5
1943	879	398	45.3	267	67.1
1942	850	488	56.7	311	63.7
1941	854	483	56.6	304	62.9

proximately 99 cases per 100,000 enrollment or one case per 1000.

Generally speaking, among every 1,000 apparently healthy adults x-rayed in our general population, an average of 3 to 5 persons is found to have active tuberculosis. The proportion of cases of tuberculosis found among college students, then, is less than that in the

general population. None the less, tuberculosis continues to be a special problem of the college age group. It is still the leading cause of death from disease among persons in the age group 15-34 which includes the college student. College students, essentially a healthy group, will soon return to their respective communities as leaders. They include among their ranks our prospec-

TABLE II

Cases of Tuberculosis Found in Colleges with Various Case-Finding Programs.
Academic Year Ending June 30, 1948

College Group and Disposition of Cases	Cases found in 71 colleges with tuberculin-testing programs (enrollment 233,561)	Cases found in 265 colleges with basic x-ray programs (enrollment 627,483)	Cases found in 38 colleges with combined x-ray and testing programs (enrollment 118,551)	Cases found in 64 colleges with no tuberculosis programs (enrollment 122,629)
Cases found in student body	374	512	82	2
Faculty and administrative staff	4	16	4	—
College food handlers	26	14	2	1
Other college employees	4	23	2	—
Students now back in college with arrested disease	236	545	126	53

tive physicians, nurses, teachers, public health workers, home makers, business men and others who will have much to contribute to community life.

In the 64 colleges reporting no tuberculosis control programs with a total enrollment of 122,629, there were only two cases of tuberculosis found in the student body. This is approximately 1.6 cases per 100,000 enrollment.

A total of 24 cases of tuberculosis were found among the faculty and administrative staffs in the colleges reporting some type of tuberculosis case-finding program, while in the colleges with no programs, no cases were discovered in this group. A total of 71 cases of tuberculosis were discovered among food handlers and other employees in colleges reporting some type of tuberculosis control programs. Only one case was discovered in this group among the colleges where no effort was made to find tuberculosis.

It is heartening to report that a total of 960 students, former cases of tuberculosis now arrested, have returned to their college careers.

As seen in Table III, colleges in every geographical division and in all but three states reported programs. In those colleges which were sent questionnaires, the New England and East North Central geographic areas reported the highest percentages, 51 and 52 per cent respectively, of tuberculosis control programs.

Table IV shows the incidence of tuberculous infection among young people of college age. We are gratified to report that for this year, the percentage of reactors to the tuberculin test is 15.8, compared with 18.6 for the previous year.

From Table V, we see that 109 colleges depend primarily on the tuberculin test for their initial screening method. Of the techniques used, the Mantoux intradermal is by far the most widely used.

In Table VI, we see that out of the 265 colleges having chest x-ray programs, 60 x-ray all students annually, and 44 x-ray new students.

Table VII shows that, in general, the colleges with larger student enrollment have better facilities for tuberculosis control. We must do what we can to stimulate the colleges with smaller enrollments to develop an organized program for tuberculosis control.

Table VIII shows that the West North Central geographic area includes more colleges with combined programs of tuberculin testing and chest x-ray films than any other area. Minnesota leads the states with a total of 10 colleges reporting this combined type of program.

The Tuberculosis Committee at the 1947 Conference on Health in Colleges set forth an ideal program for tuberculosis control and suggested two modifications of this program. In the words of the committee, "The ideal program of tuberculosis control for a college calls for tuberculin testing of all new students with annual retesting of non-reactors; for the chest x-raying of all new students regardless of their reaction to tuberculin and for the annual chest x-raying of all tuberculin reactors."

TABLE III
Colleges Sent Questionnaires, Replies Received and Programs Reported, Classified by Geographic Division and State, Academic Year Ending June 30, 1948.

Division and State	Colleges sent Questionnaires	Replies Received	Programs Reported	Annual Increase (+) Annual Decrease (-) in Programs Reported
UNITED STATES	889	438	374	+115
New England	88	47	45	+13
Maine	8	4	4	+1
New Hampshire	7	3	2	-1
Vermont	9	4	4	—
Massachusetts	46	25	25	+12
Rhode Island	6	4	4	—
Connecticut	12	7	6	+1
Middle Atlantic	152	75	67	+17
New York	69	32	28	+10
New Jersey	20	13	13	+4
Pennsylvania	63	30	26	+3
East North Central	171	99	90	+28
Ohio	46	25	23	+9
Indiana	27	16	14	+3
Illinois	45	23	22	+10
Michigan	24	14	13	+3
Wisconsin	29	21	18	+3
West North Central	128	69	56	+16
Minnesota	24	19	19	+9
Iowa	25	10	9	+3
Missouri	25	15	10	—
North Dakota	9	3	3	—
South Dakota	8	3	0	-2
Nebraska	16	9	7	+3
Kansas	21	10	8	+3
South Atlantic	118	47	40	+19
Delaware	1	1	1	+1
Maryland	16	10	8	+6
District of Columbia	9	3	3	+2
Virginia	18	8	7	+3
West Virginia	14	8	6	+2
North Carolina	22	8	7	+2
South Carolina	15	4	3	—
Georgia	16	3	3	+1
Florida	7	2	2	+2
East South Central	65	24	18	+10
Kentucky	17	7	4	+2
Tennessee	26	11	9	+7
Alabama	13	3	2	-1
Mississippi	9	3	3	+2
West South Central	71	28	19	+7
Arkansas	11	5	4	+1
Louisiana	12	4	2	—
Oklahoma	16	6	4	+1
Texas	32	13	9	+5
Mountain	32	15	11	+3
Montana	6	2	2	—
Idaho	3	2	2	+1
Wyoming	1	1	1	—
Colorado	9	5	4	+2
New Mexico	5	3	1	+1
Arizona	3	0	0	-1
Utah	4	2	1	+1
Nevada	1	0	0	-1
Pacific	64	34	28	+2
Washington	16	6	5	+2
Oregon	14	8	6	-1
California	34	20	17	+1

For modifications of this ideal program, the committee recommended either of the following procedures:

1. Tuberculin testing with chest x-ray films of all reactors. The procedure in this type of program is iden-

TABLE IV

Male and Female Students Tested in 94 Colleges, and the Number of Reactors Classified by Geographical Division, Academic Year Ending June 30, 1948*

Geographical Division	Students Tested			Reactors					
	Both Sexes	Male	Female	Number			Percent of Total		
				Both Sexes	Male	Female	Both Sexes	Male	Female
UNITED STATES	128,757	75,129	35,452	20,373	11,933	3,297	15.8	15.9	9.3
New England	877	525	352	102	51	51	11.6	9.7	14.5
Middle Atlantic	18,794	14,371	4,423	3,831	3,241	590	20.4	22.6	13.3
East North Central	39,226	21,275	12,807	6,308	2,445	926	16.1	11.5	7.2
West North Central	40,234	20,515	10,629	5,985	3,375	953	14.9	16.5	9.0
South Atlantic	6,607	4,340	997	701	383	76	10.6	8.8	7.6
East South Central	1,780	784	996	400	248	152	22.5	31.6	15.3
West South Central	8,696	4,603	2,202	1,087	652	255	12.5	14.2	11.6
Mountain	10,423	7,869	2,554	1,529	1,300	229	14.7	16.5	9.0
Pacific	2,120	847	487	431	238	65	20.3	28.1	13.3

*Of the 109 colleges reporting testing programs, the number receiving tests was reported for only 94 of the institutions.

tical with that of the ideal program, except that it provides for chest x-ray films of tuberculin reactors only. Non-reactors are retested annually and reactors are x-rayed annually.

2. Routine chest x-ray films without tuberculin testing. The committee pointed out that "the number of students infected with tuberculosis cannot be determined without using the tuberculin test."*

*A Health Program for Colleges, Report of the Third National Conference on Health in Colleges. 152 pp., 1948, National Tuberculosis Association.

TABLE V

Techniques Used in Tuberculin Testing in 109 Colleges, Showing Number of Cases Using Each Technique, Academic Year Ending June 30, 1948

TESTING METHOD:	Total 109 Colleges
Mantoux Intradermal	81
Vollmer Patch Test	15
Combination Mantoux or Vollmer	4
Not reported	9
TESTING MATERIAL:	
Purified Protein Derivative	41
Old Tuberculin	42
Not specified	2
TESTING DOSAGE:	
Two Dose Technique	13
Single Dose	58
Not specified	10

TABLE VII

Number and Percentage of American Colleges and Universities Which Answered the Questionnaire, and Which Reported Programs Classified by Student Enrollment, Academic Years Ending June 30, 1946-47 and 1947-48

Student Enrollment	Colleges Reporting 1946-47			Colleges Reporting 1947-48		
	Total	With Programs		Total	With Programs	
		Number	Percent of Total		Number	Percent of Total
All Colleges	311	259	83.2	438	374	85.4
Colleges with Enrollment of:						
Fewer than 500	71	56	78.9	89	74	83.1
500 but less than 1000	87	70	80.5	132	112	84.8
1000 but less than 2000	62	51	82.3	94	80	85.1
2000 but less than 4000	39	34	87.2	55	46	83.6
4000 and over	52	48	92.3	68	62	91.2

TABLE VI

Techniques Used in Chest X-ray Programs, Showing Number of Colleges Using Each Technique, Academic Year Ending June 30, 1948

X-ray routines reported:	No. of Colleges
Total	265
X-ray reported, but routine not reported	66
New students	44
New Students and seniors	5
New students and reactors	2
New students and staff	3
New students, seniors and staff	5
All students every two years	2
All students annually	60
*All students and staff	78

*Staff in many instances on voluntary basis.

A tuberculosis program in college should not be an isolated one. It should be an integral part of the total college health program. Provision for case-finding and follow-up should be part of the health services. Problems relating to guidance, recreation, nutrition, sanitation and housing should be carefully considered in the plan for healthful living. Health instruction, including a study of tuberculosis, should be "part and parcel" of courses or instructional units considering personal and community health problems.

TABLE VIII

Programs Reported by Type of Program and Geographical Distribution. Academic Year Ending June 30, 1948

Division and State	Programs Reported				Division and State	Programs Reported			
	Total	X-ray	Tuberculin Testing	Combined Program		Total	X-ray	Tuberculin Testing	Combined Program
UNITED STATES	374	265	71	38	South Atlantic	40	31	7	2
New England	45	41	3	1	Delaware	1	1	—	—
Maine	4	4	—	—	Maryland	8	6	2	—
New Hampshire	2	2	—	—	District of Columbia	3	3	—	—
Vermont	4	2	2	—	Virginia	7	6	1	—
Massachusetts	25	23	1	1	West Virginia	6	3	2	1
Rhode Island	4	4	—	—	North Carolina	7	4	2	1
Connecticut	6	6	—	—	South Carolina	3	3	—	—
Middle Atlantic	67	49	13	5	Georgia	3	3	—	—
New York	28	19	6	3	Florida	2	2	—	—
New Jersey	13	9	4	—	East South Atlantic	18	14	2	2
Pennsylvania	26	21	3	2	Kentucky	4	2	2	—
East North Central	90	58	25	—	Tennessee	9	9	—	—
Ohio	23	16	4	3	Alabama	2	2	—	—
Indiana	14	10	2	2	Mississippi	3	1	—	2
Illinois	22	16	6	—	West South Central	19	15	1	3
Michigan	13	12	—	1	Arkansas	4	4	—	—
Wisconsin	18	4	13	1	Louisiana	2	2	—	—
West North Central	56	28	16	12	Oklahoma	4	1	1	2
Minnesota	19	6	3	10	Texas	9	8	—	1
Iowa	9	4	5	—	Mountain	11	8	1	2
Missouri	10	6	4	—	Montana	2	1	—	1
North Dakota	3	2	—	1	Idaho	2	2	—	—
South Dakota	—	—	—	—	Wyoming	1	1	—	—
Nebraska	7	7	—	—	Colorado	4	2	1	1
Kansas	8	3	4	1	New Mexico	1	1	—	—
					Arizona	—	—	—	—
					Utah	1	1	—	—
					Nevada	—	1	—	—
					Pacific	28	21	3	4
					Washington	5	4	1	—
					Oregon	6	3	1	2
					California	17	14	1	2

In conclusion, we wish to thank the National Tuberculosis Association for providing stenographic and clerical service in connection with mailing the questionnaire forms, as well as meeting the cost of mailing. We are indebted to Professor J. Belden Dennison, Director, Bureau of Business Research, Miami University, Oxford, Ohio, for summarizing and tabulating the data.

Respectfully submitted,

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NORTH DAKOTA ADVANCE REGISTRATION
INCREASES X-RAY COVERAGE

Organized house-to-house advance registration campaigns in ten North Dakota counties have resulted in an approximate 50 per cent increase in the number of persons screened in mobile chest x-rays, reports the State Department of Health. The ten counties screened only 30 per cent of their population in 1947; x-ray coverage was increased to 49 per cent when advance registration was used in 1950. Canvassing for the advance registration is being done by volunteers and the cost of the 41 to 100 hours salaried services of the clerk needed to process registration cards is paid in each county from Christmas Seal funds.



The
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*Official Journal of the American College Health Association
Great Northern Railway Surgeons' Association, Minneapolis Academy of Medicine, North Dakota State
Medical Association, Northwestern Pediatric Society, South Dakota Public Health Association,
North Dakota Society of Obstetrics and Gynecology and North Dakota Pediatrics Society*

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Editorial . . .

SHARPENING THE FOCUS OF SANITATION MEASURES*

The pages of public health history abound in facts and figures showing the beneficial effects of general sanitation. Within the past 50 to 75 years, disease problems once thought unconquerable have succumbed readily to broad frontal attack by improved environmental sanitation. Outstanding reductions in morbidity and mortality are associated with the enteric diseases. For example, in 1900 there were 350,000 or more cases of typhoid fever in the United States; approximately 35,000 resulted in death. By 1946 typhoid morbidity was reduced to such a low level that teaching material was not available for many medical schools. There have been similar reductions in other infections such as diphtheria and streptococcal disease for which much credit is due to those who have fostered, developed, and applied the techniques of general environmental sanitation. These include the sanitary engineer, the sanitarian, the laboratorian, the health administrator, and others.

A number of communicable disease problems still face us. An evaluation of current environmental sanitation measures should be made to determine those which, in terms of control, are the most effective and feasible. The ineffective ones should be abandoned even though their practice has been sanctified by tradition. The control of typhoid fever is an example. It was once thought that this disease was spread no less by contact than by water and milk, but new knowledge indicates that contact infections are relatively infrequent. In a recent outbreak of typhoid in Maryland, there was no record of any infection originating from the first 100 cases. The examination of food handlers in eating establishments has long been recommended and practiced by health departments as a measure of typhoid prevention. Among the millions of food handlers tested in New York City, less than ten typhoid carriers were detected, demonstrating the inadvisability of continuing this costly practice.

For years the house fly was ascribed a major role in the spread of enteric infections. The original evidence for this belief was incomplete and the importance of these insects as disseminators of disease was never accurately assayed until the Communicable Disease Center and the National Institutes of Health cooperated in determining the effect of fly control on the incidence of diarrheal disease. These studies revealed that high grade community-wide fly control can reduce infant sickness and death due to *Shigella* infections by one-third to one-half. Endemic *Salmonella* rates showed no correlation with the presence or absence of fly control. These conclusions show that we must probe along new

lines in order to learn more about these diseases and subsequently to sharpen the attack against them.

The improvement of general sanitation measures regarding food, including water and milk, has greatly reduced the incidence of food-borne disease. The more widespread use of refrigeration has doubtless been another major factor. Can further reduction be expected from pushing general sanitation, dishwashing, and related procedures? Epidemiological studies of recent outbreaks show that many of them are due to accidental contamination, perhaps by rats, fingers, and/or flies. The conquest of food-borne infections would be hastened materially if the specific causes of outbreaks were determined routinely so that appropriate corrective measures could be instituted.

Preventive measures for the streptococcal group of infections are sorely needed. No lasting immunity to these diseases has been demonstrated, although transient resistance to specific strains of streptococcus may be manifested. Perhaps the solution to the streptococcal disease problem depends on the control of environmental factors. During World War II, crowded barracks provided ideal conditions for the rapid transmission of respiratory streptococcal infections. As a result, large numbers of personnel were incapacitated simultaneously. This circumstance might have been prevented by sanitary control of the air. This measure will not eliminate the transmission of disease, but by reducing the number of infectious organisms in the air will diffuse the case incidence over a longer period of time.

Other diseases in which air sterilization might be utilized on a selective basis include mumps, measles, and chicken pox—under certain conditions. These diseases which normally produce no ill effects in children and usually confer a lifetime immunity, may result in serious consequences when contracted by adults. Therefore, complete protection or prevention against measles, mumps, or chicken pox would be inadvisable; rather it would be of value in cases where it is necessary to avoid infection in children debilitated by other illnesses, or during the hazardous period following a surgical episode.

Studies on the common cold have not revealed the establishment of any significant immunity. Surveys conducted in comparable age groups—university students—throughout the country have shown that people have an average of about three colds per year. Very little is known about the actual mechanism of "catching a cold." No definitive information is now available as to whether more colds are contracted in crowds or in the home, or whether indoors or outdoors. Therefore, glycol vapor sprays as a cold prevention measure in offices or factories would serve no useful purpose since it is likely that colds are caught just as readily on the streets or in public conveyances.

Possibly no communicable disease attracts more attention from the man on the street than poliomyelitis.

*Presented at the sixth annual meeting of the North Dakota Public Health Association, Grand Forks, North Dakota, November 10, 11, and 12, 1949.

There have been more cases of this dread disease reported in the past 10 years than in any previous decade. Part of this increase is due to better recognition of the disease and to the reporting of more nonparalytic polio. However, the National Foundation for Infantile Paralysis revealed recently that an actual increase in the disease has occurred. When polio strikes, health and medical authorities and the public alike are baffled. The mode of transmission is not known, and therefore, effective control measures cannot be applied. During recent years better sewage disposal, improved water purification, milk pasteurization, and fly control have been demanded by so-called experts in an effort to curb the rising tide of infantile paralysis. The public may accept these innovations briefly, but there will be no whole-hearted acceptance and support of any polio prevention measures until the means of transmission has been established. This challenge to health authorities has stimulated new and more varied investigation in this field.

The need for sharpening the focus in our public health concepts reaches into fields other than sanitation. Isolation and quarantine have come down to us from antiquity as measures for controlling communicable diseases. People fled from the plague-devastated cities of Europe only to be rejected by other communities. Observations in recent years have shown that isolation and quarantine are not effective in certain diseases. For example, during the early part of this century scarlet fever cases were isolated for 35 to 42 days, or until the termination of desquamation. Most modern students of this disease are impressed with the lack of success in controlling and preventing it by isolation.

There is no argument as to whether general sanitary measures have or have not proved effective. The favor-

able record of the effect of improved environment on communicable disease prevalence is clear and unmistakable. The point which has been developed concerns the current desirability of examining the validity of our concepts of environmental sanitation and the justification for attempting to advance all their aspects simultaneously. Dr. Saxvik, North Dakota health officer, pointed out in a recent issue of the Official Bulletin of the Water and Sewage Works Conference, that: "Public health, in a general way, is a sale commodity, highly desirous but expensive. It must be offered for its intrinsic value based upon its ability to reduce sickness and death." From the standpoint of availability of funds, trained manpower, and specialized facilities, it appears highly desirable for us to examine critically our methods and procedures with the view of making them more specific. The APHA Committee on Research and Standards stated in a recent report, "In many instances a frank approach by the experimental method will result in the testing of impressions and the establishment of data which cannot be obtained by philosophic agreement, compromised opinions, and the weight of authority. Just as the field of social sciences suffers from an unwillingness to apply scientific methods because of the scope of the problem, so may many problems in public health be delayed from reaching proper conclusions by reluctance to undertake sizable experiments." This is what I have attempted to illustrate as sharpening the focus of environmental sanitation.

WESLEY E. GILBERTSON,
Executive Officer, Communicable
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Notices . . .

PROGRAM OF THE NORTH DAKOTA STATE MEDICAL ASSOCIATION

Sixty-fourth Annual Session

Bismarck, North Dakota

May 19, 20, 21 and 22, 1951

The 64th Annual Session of the North Dakota State Medical Association will be held in Bismarck, May 19, 20, 21 and 22. Meetings of the Council and the House of Delegates will occupy Saturday the 19th and Sunday the 20th. The scientific program will be held on the 21st and the 22nd. Both the scientific meetings and the exhibits will be housed in the Bismarck World War Memorial Building. Meetings of the Women's Auxiliary will take place at the same time. A joint banquet for both the Association and the Auxiliary will take place Monday evening, May the 21st at which time George F. Lull, M.D., Secretary and General Manager of the American Medical Association will appear as the principal speaker.

TENTATIVE SCIENTIFIC PROGRAM

Monday, May 21, 1951

9:30 A.M.—Dr. Budd Corbus, Fargo, North Dakota: Early Diagnosis of Malignant Lesions of the Genito-urinary System. 10:00—Dr. Robert M. Kark, Professor of Medicine, University of Illinois: (Title yet to be selected, but probably on jaundice). 10:30—11:00—Intermission.

11:00—11:30—Dr. John P. Wendland, Department of Oph-

thalmology, University of Minnesota: Management of Ocular Injuries. 11:30—12:00—Dr. Harold W. Dargeon, Chairman of Pediatric Tumor Registry, Memorial Hospital, New York: (Title yet to be determined, but some aspect of pediatric malignancy).

2:00—3:30 P.M.—A panel discussion on ACTH and Cortisone. Panel to consist of Dr. Kark, Dr. Dargeon, Dr. Grimson and possibly Dr. Macauley of Fargo. 3:30—4:00—Intermission.

4:00—4:30—Dr. Keith Grimson, Professor of Surgery, Duke University, will speak on the surgical and medical management of duodenal gastric ulcer, including the discussion of Banthine.

4:30—5:00—Dr. W. L. Macauley, Fargo, North Dakota: Seasonal Dermatoses (Spring and Summer).

Tuesday, May 22, 1951

9:00 A.M.—Dr. William Ball, Minot, North Dakota: Immunizations. 9:30—10:00—Dr. L. E. Prickman, Mayo Clinic, Rochester, Minnesota: The Use of Anti-histamine Drugs. 10:00—10:30 is open at the present time, but Dr. Haunz of Grand Forks is attempting to arrange an outstanding speaker on some subject on diabetes. 10:30—11:00—Intermission.

11:00—Dr. Carl Huber, Chief, Department of Obstetrics and Gynecology, University of Indiana: Management of Prolonged Labor. 11:30—12:00—Dr. Dabney Kerr, Professor of Radiology, University of Iowa: Gynecological Malignancies.

2:00—2:30 P.M.—Dr. John Moe, Orthopedist, Minneapolis: Forearm Fractures. 2:30—2:45—Panel discussion on Toxemias of Pregnancy.

PRELIMINARY PROGRAM

Twenty-ninth Annual Meeting

AMERICAN COLLEGE HEALTH ASSOCIATION

Thursday, Friday and Saturday, May 3, 4, 5, 1951

Edgewater Beach Hotel, Chicago, Illinois

REGULAR SESSIONS

Wednesday, May 2, 1951

Council Dinner, 6:30 P.M.—Berwyn Room

Thursday, May 3, 1951

Morning Session—Michigan Room. 9:00—Registration. 9:30—Call to Order; President's Address—Irvin W. Sander, M.D., Wayne University; 10:15—Address—Dr. Richard H. Young, Dean, Northwestern University; 11:00—Address—Dr. Robert M. Strozier, Dean of Students, University of Chicago; 12:00—Associated Nurses Organization Luncheon; Function of the Nurse in the College Health Program—Chairman: Mrs. Raidie Poole Mitchell, R.N., Roosevelt College, Chicago.

Afternoon Session—American Room. 2:00—Two Panel Discussions: Administration in College Health Services. Chairman: George Blydenburgh, M.D., Ohio Wesleyan University. Large Universities—Michigan Room. Small Universities—American Room. 5:00—Get-acquainted party—Illinois Section—West Lounge.

Friday, May 4, 1951

8:00 A.M.—Breakfast tables may be reserved for Sectional groups or others for business and pleasure—Marine Dining Room.

9:00—Symposium on Mental Hygiene. Chairman: Dana L. Farnsworth, M.D., Massachusetts Institute of Technology. The Relationship of the Psychiatrist to the College and the Community—Louis Barbato, M.D., University of Denver. Group Psychotherapy Among College Students—Bryant Wedge, M.D., University of Chicago. The Psychiatric Social Worker in the College Mental Hygiene Program—Mr. Vernon E. Keye, Wayne University. A Proposed Plan for Follow-up Studies for Students Who Become Psychotic—Annette C. Washburne, M.D., University of Wisconsin.

12:30 P.M.—Association Luncheon—South Terrace Room. Guest Speaker: Raymond B. Allen, M.D., President, University of Washington.

2:00—Reports of Committees of the American College Health Association. (1) Health and Physical Activities—Chairman, Ruth M. Collings, M.D., University of North Carolina; Standards for Health Services—F. O. Robertson, M.D., University of Denver. (2) Tuberculosis—Chairman, Max L. Durfee, M.D., Miami University. (3) Health Education—Chairman, A. O. DeWeese, M.D., Kent State University. (4) Local Sections—Chairman, S. I. Fuenning, M.D., University of Nebraska. (5) Research—Chairman, Ramona Todd, M.D., University of Minnesota. (6) Environmental Health—Chairman, Walter S. Mangold, B.S., University of California. (7) Eye Health—Chairman, John D. Schonwald, M.D., Miami University. Report on the two panel discussions conducted by Dr. Blydenburgh's committee which were held on Thursday afternoon—George T. Blydenburgh, M.D., Ohio Wesleyan University.

4:30—Business meeting. Election of officers.

6:30—Council Dinner—American Room.

Saturday, May 5, 1951

8:00 A.M. Breakfast tables may again be reserved by any Sections or other groups desiring them—Marine Dining Room.

9:00—The Problems of Fatigue in College Students—Arnold Cronk, M.D., Syracuse University.

10:00—Panel Discussion: Specific Ills Limiting Student Performance. Chairman: Arnold L. Wagner, M.D. Organic Heart Disease—Ernest G. McEwen, M.D., Evanston Hospital Association; Hepatitis—Richard Capps, M.D., St. Luke's Hospital, Chicago; Infectious Mononucleosis—Martin Seifert, M.D., Evanston Hospital Association; Epilepsy—Meyer Brown, M.D.,

Evanston Hospital Association; Diabetes—Arthur Colwell, M.D., Passavant Memorial Hospital; Allergies—Theron G. Randolph, M.D., Wesley Memorial Hospital.

11:30—Council Report. 12:00—Adjournment.

Afternoon Session. There are various possibilities for entertainment. Trips and so on may be arranged by the Local Committee under the chairmanship of Dr. Herbert Ratner. Specific arrangements are also being made for the entertainment of the wives of the delegates during the meetings.

UNIVERSITY OF MINNESOTA CONTINUATION COURSES

A course in *gynecology* will be presented April 9, 10, and 11, 1951. The course is intended for general physicians and will emphasize problems of the menopause, uterine myomas, and benign ovarian tumors. Dr. H. C. Hesselstine, Professor of Obstetrics and Gynecology, University of Chicago, will be the visiting faculty member for the course.

A course in *proctology* will be presented April 16 through 21, 1951. Emphasis will be placed upon those anorectal and colonic lesions most frequently seen by practicing physicians. Guest faculty member for the course will be Dr. Robert A. Scarborough, associate professor of surgery, Stanford University Medical School, San Francisco, California.

A continuation course in *general surgery* will be given May 17, 18, and 19, 1951. Dr. Walter G. Maddock, Professor, Department of Surgery, Northwestern University Medical School, Chicago, Illinois, will be the guest faculty member for the course, which will stress gastro-intestinal surgery.

A continuation course in *atomic medicine* will be given April 26, 27, and 28, 1951. Dr. George M. Lyon, chief of the radioisotope section of the Veterans Administration, Washington, D. C., will be the guest speaker.

Dr. George E. Burch, professor and chairman, department of medicine, Tulane University of Louisiana, New Orleans, will deliver the first George E. Fahr Lecture on May 8, 1951. Dr. Burch will also participate in a continuation course in *electrocardiography* for general physicians on May 7 to 11, 1951, at the Center for Continuation Study.

NATIONAL MEETINGS

The *American College of Physicians* will hold its thirty-second annual session at St. Louis, Missouri, April 9 to 13, 1951, with general headquarters at the Kiel Auditorium.

* * *

The *American Association of the History of Medicine* will hold its 1951 annual meeting in Baltimore, Maryland, with headquarters at the Institute of the History of Medicine of The Johns Hopkins University. The meeting will begin on Thursday, May 3, at 8:00 P.M. and will run through noon, Saturday, May 5, 1951. Inquiries relative to the meeting may be addressed to the secretary of the association, Dr. Iago Galdston, 2 East 103 Street, N. Y. 29, N. Y.

* * *

A postgraduate course in allergy will be offered by the *American Academy of Allergy* on June 14, 15, and 16 in Montreal, Canada. It will be sponsored by the Faculty of Medicine, McGill University, and will be held at the Royal Victoria Hospital in Montreal. Any interested physician in the United States or Canada may attend. Fee for the course is \$40. Applications can be sent to Bram Rose, M.D., Royal Victoria Hospital, Montreal 2, Canada.

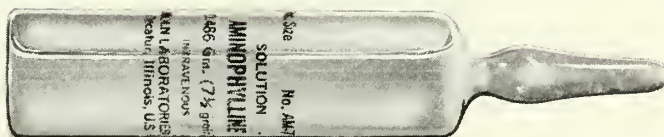
* * *

The Seventeenth Annual Meeting of the *American College of Chest Physicians* will be held at the Ambassador Hotel, Atlantic City, New Jersey, June 7 through 10, 1951. The Board of Examiners of the College has announced that the next oral and written examinations for fellowship will be held in Atlantic City on June 7. Candidates who would like to take the examinations should contact the *Executive Secretary, American College of Chest Physicians*, 500 North Dearborn Street, Chicago 10, Illinois.

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Book Reviews . . .

Water and Salt Depletion, by H. L. MARRIOTT, M.D., 1950. Springfield, Illinois: Charles C. Thomas Co., 80 pages. \$2.00.

Dr. Marriott, a British practitioner and not a research physiologist or biochemist, has attempted to translate into terms useful and understandable for the clinician, the more complex monograph by James L. Gamble on *Extracellular Water*. Dr. Marriott endeavors to correlate clinical experience with laboratory studies and data. There can be little doubt that a need for such a manual exists.

The author is obviously a keen and observing clinician and his description of the various morbid states of dehydration (both with respect to water and electrolyte) makes good reading, but it seems possible to be critical of his interpretations on several grounds.

First, the insistence of the impermeability of the cellular membrane to sodium; inextricably associated with this is the assumption of the intra and extra cellular fluid compartments, as autonomous, independent, and unrelated. That neither is true has been firmly established in the past five years.

A second limitation applies to the attempt by the author to select clinical material in terms of whether water or salt has been lost in excess. While this distinction may be not only accurate but necessary in tropical India from where Marriott draws his examples, it is probably not useful in considering patients in temperate climes. Undoubtedly simplicity of management in our environment would suggest an omission of this distinction, for it has been frequently demonstrated that most patients suffer a loss of both water and salt and can be treated effectively basing therapy upon this assumption.

A plea for the use of dilute saline solutions, one-half or even one-third normal, is to be commended. Dr. Marriott appreciates how unphysiological is so-called physiological saline. His familiarity with the extensive European and particularly English literature on dehydration supplies a bibliography of unusually useful references. The careful and generous application of a number of infrequently remembered physiological concepts make Dr. Marriott's monograph worthwhile reading.

Although certainly not an essential volume for the practitioner, there is so much that is well stated, and there are so many of the physiological discussions unique among books written exclusively for physicians, it seems well worth a place in the doctor's library. C.U.L.

A Dictionary of the Fungi, by G. C. AINSWORTH, B.Sc., Ph.D., University College, Exeter, Devon, and G. R. BISBY, M.A., Ph.D., Commonwealth Mycological Institute, Kew, Surrey. 447 pages, illustrated, cloth. The Commonwealth Mycological Institute, Kew, Surrey, 1950. \$3.00.

Though titled a dictionary, this volume takes on a broader responsibility than a mere definition of mycological terms. The dictionary proper lists alphabetically the names of the various classes, orders, families and genera of fungi found throughout the world; also descriptive terms, as well as a number of helpful tables and more extended discussions of certain subjects of which the following are typical: agaricaceae, antibiotics, bacteria, classification, collection and preservation of fungi, history of mycology, etc. Unfortunately for the physician or other casual inquirer in the realm of fungi, the data listed under the average term (the name of the genus, for example), are so condensed and terse as to be somewhat baffling until the system of reference is ferreted out piece by piece. For the true mycologist (to which rarefied genus the reviewer decidedly does not belong), the terseness may well be an advantage rather than a disadvantage.

While a key to the families of fungi is appended, also a systematic arrangement of the genera of Myxothallophyta (slime thallophytes, and Eumycetes [fungi]), no attempt is made to list individual species of fungi, numbering some 37,500. Neither is any key given for identification of species of fungi, an endeavor which of itself would require a volume much larger than the present one.

It is obvious that the book is written for the mycological stu-

dent, the scientist, rather than the hobbyist, the amateur collector of mushrooms, or the chance wanderer among the fungi. For the professional inquirer, it is a scholarly work, and should be an excellent reference. R.W.B.

Saw-Ge-Mah (Medicine Man), by LOUIS J. GARIEPY, M.D., 1950. St. Paul: Northland Press. \$3.00.

Saw-Ge-Mah is a novel containing the philosophy, ethics, and way of life which the author, who is a doctor, feels every physician should have if he is to be considered successful. It is, essentially, the story of Hal Adams, who works his way up from the son of a sawyer in the lumber mills to become a successful physician and surgeon.

Interspersed in the fast moving account are interesting bits of philosophy which any individual who works with and for other people can well read, ponder and note. These bits of descriptive ethics are sometimes lost sight of in living today, and a gentle reminder in such a book as this is not amiss. E.B.B.

Physiology of the Eye, by FRANCIS HEED ADLER, M.D., F.A.C.S. St. Louis: The C. V. Mosby Co., 1950. \$12.00.

This new book on physiology of the eye is not a revision of the author's original publication of twenty years ago. For instance, he has brought up to date the dynamics of the aqueous humor formation; the chemistry of muscular action; and the photo-chemistry of the retina.

Any practicing ophthalmologist could read and study this book with a great deal of profit. It is clearly written and has numerous illustrations of good quality.

The discussion of permeability of the cornea, the circulation of the avascular cornea, and the pharmacodynamics of the sphincter and dilator muscles of the pupils makes this book worth its price. It is highly recommended. K.A.P.

CONTRIBUTORS—(Continued from page 151)

JAMES E. PERKINS, a graduate of the University of Minnesota medical school in 1930, took graduate work at the Johns Hopkins School of Hygiene and Public Health and has served as managing director of the National Tuberculosis Association since January 1, 1948.

★

WILLIS J. POTTS, a graduate of Rush Medical School in 1923, took a year of graduate work in Germany, now specializes in children's surgery in Chicago. He is surgeon-in-chief of the Children's Memorial Hospital and associate professor of surgery at Northwestern University. He is a member of the American Surgical Society, American Society for Thoracic Surgery, Central Surgical Society and others, and in 1950 served as president of the Chicago Surgical Society. He has contributed to many textbooks of medicine and is the author of numerous medical articles.

★

ELIAS STRAUSS, a graduate of Columbia University College of Physicians and Surgeons in 1937, is associate professor of medicine and director of the Student Health Service at the Southwestern Medical School of the University of Texas. He holds membership in the American Board of Internal Medicine and the American Society for Clinical Investigation.

★

EDWARD L. TUOHY, a graduate of the University of Minnesota medical school, specializes in internal medicine in Duluth. He is a past president of the Minnesota Society of Internal Medicine and the Minnesota State Medical Association. He is a member of county and state medical societies, A.M.A., Minnesota Heart Society, Minnesota Society of Internal Medicine, Central Society of Clinical Research, American Geriatrics Society, Inturban Academy of Medicine, and Sigma Xi.

* * *

Erratum: This column, January 1951 Re: Dr. Harley E. French. It should not have been said that he is a past president of the American Association of Anatomists.

In the selection of an antibiotic
for **URINARY ANTISEPSIS**

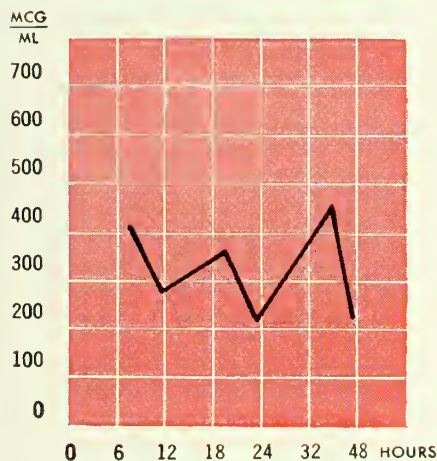
high urinary levels
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CRYSTALLINE Terramycin

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concentration of Terramycin in the urine following divided oral doses: 0.5 Gm. q 6 h.³



1. Schaubach, E. B.; Bryer, M. S., and Lang, P. H.: Ann. New York Acad. Sc. 53:245 (Sept. 15) 1950.

2. Welch, H.; Hendricks, F. D.; Price, C. W., and Randall, W. A.: J. A. Ph. A. (Sc. Ed.) 39:185 (Apr.) 1950.

3. Welch, H.: Ann. New York Acad. Sc. 53:253 (Sept. 15) 1950.

This newest of the broad-spectrum antibiotics is stable and active in the urine. High levels are rapidly achieved and easily maintained by oral administration. Within one-half hour after a single 2 Gm. dose, detectable amounts have appeared in the urine,¹ and a single 0.5 Gm. dose has been shown to produce high concentrations lasting twenty-four hours.² When multiple doses are given, continuous urinary concentrations of Terramycin in the range of 300-400 mcg./ml. are obtained, as shown in the accompanying chart.³

These observations are given added significance by the highly satisfactory clinical experience and the prompt response obtained with Terramycin in a wide range of infections of the urinary tract.

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News Briefs . . .

North Dakota

PHYSICIANS and other persons in the fields of health and medicine in North Dakota may receive books on loan as a new service of the medical library at the University of North Dakota at Grand Forks. The library, named for Dean Emeritus Harley E. French, was established in the fall of 1949 on the floor of the new medical science building. Since that time, a collection of 6,000 books, monographs and bound journals for state-wide as well as student use has been built up.

The library has a good collection of medical journals available for loan, as well as a number of recent technical publications in the medical fields. Books or other publications may be kept for two weeks by paying the cost of postage.

* * *

ORGANIZED PRACTICAL WORK of study of patients in the Deaconess and St. Michael's hospitals at Grand Forks has been started for students in the university school of medicine in the second semester. The work is part of the course in physical diagnosis and is comparable in method and subject matter to the seminar courses offered by other medical schools.

* * *

DR. GEORGE SCATCHARD, professor of physical chemistry at the Massachusetts Institute of Technology, Cambridge, spoke before the Sigma Xi group at the University of North Dakota at Grand Forks on March 5 on the subject of research in blood plasma.

* * *

An annual award of twenty-five dollars in memory of Dr. Ruth Mahon, for a junior girl in medical technology at the University of North Dakota, has been established by the Grand Forks Business and Professional Women's Club. Dr. Mahon, a native of Langdon and a graduate of Rush Medical college, was associated with the Campbell-Williamson clinic in Grand Forks from 1925 to 1937.

* * *

MRS. E. T. KELLER, Rugby, state president of the North Dakota medical women's auxiliary, spoke February 19 at a dinner meeting of the Sixth District medical society women's auxiliary at Bismarck. Plans were made for the annual meeting of the state auxiliary in Bismarck May 19-22, in conjunction with the annual meeting of the North Dakota medical association.

* * *

DR. CLAYTON H. KLAKEG has resigned from the medical staff of the Veterans hospital, Fargo, to accept an appointment to the staff of the Mayo foundation at Rochester. He will begin his work there March 1 as a fellow in internal medicine.

* * *

DR. CARL E. ELOFSON, commander in the naval reserve, has returned from active duty in the naval medical corps at Great Lakes, Illinois, and will resume private practice at Fargo.

(Continued on page 167)

Minnesota

A GRANT of \$10,284 has been awarded Dr. J. Francis Hartmann, of the University of Minnesota, by the National Institute of Mental Health for investigation of the effects which extremely high altitudes may have on the brain and other nerve cells of flyers. Dr. Hartmann's particular project will be directed toward determining whether temporary lack of oxygen may cause permanent damage to nerve tissues.

* * *

A \$27,300 AWARD by the Rockefeller foundation to the University of Minnesota's Dight Institute for research in human genetics has been announced. The grant, to become available July 1 for a three year period, will be used to develop better methods of aiding people with problems in human genetics.

* * *

MOUNT SINAI HOSPITAL, located at Chicago and East Twenty-second street in Minneapolis, was opened February 19 after a six-week delay caused by equipment shortages. Dr. Moses Barron is chief of staff and chief of medical service, Dr. Stanley Maxeiner is chief of surgical service, and Dr. Milton Abramson, chief of obstetrical service.

Section chiefs are: Dr. Benjamin Gingold, general surgery; Dr. Virgil Schwartz, eye, ear, nose and throat; Dr. Meyer Goldner, orthopedic surgery; Dr. Oswald Wyatt, pediatric surgery; Dr. Samuel Dierstein, urology; Dr. William Bernstein, proctology; Dr. Samuel J. Balkin, plastic surgery.

Also, Dr. Louis R. Weiss, oral surgery and dentistry; Dr. Reuben Berman, internal medicine; Dr. Isadore Fisher, dermatology; Dr. Nathaniel Berkwitz, neuropsychiatry; Dr. Max Seham, pediatrics; Dr. W. Sawyer Eisenstadt, allergy; Dr. Isadore Goldberg, general practice; and Dr. Louis Friedman, assistant chief of obstetrics and gynecology.

* * *

DR. ANCEL KEYS, professor and director of the laboratory of physiological hygiene, University of Minnesota, will participate in a conference on nutrition sponsored by WHO at Rome from April 10 to 17.

* * *

DR. AUSTIN HENSCHEL, associate professor of the laboratory of physiological hygiene, has accepted a post as scientific director of the army's climatic research laboratory in Lawrence, Massachusetts.

* * *

THE ACTIVITIES of the University of Minnesota's department of psychiatry were dramatized in a KUOM production as a part of the University of Minnesota Centennial celebration. The one-hour production, which is entitled "Station 60" is based upon a case history of one of the hospital's psychiatric patients. Dr. Roger Howell, associate professor of psychiatry, acts as narrator for the presentation.

(Continued on page 168)

Multiple Vitamin Therapy

"... Patients fare much better when [the deficiencies] are treated simultaneously... Convalescence is delayed when one gives only one vitamin at a time..." (Spies & Butt in Duncan, G. G.: Diseases of Metabolism, ed. 2, Philadelphia, Saunders, 1947, p. 504.)

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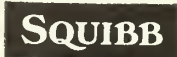


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Head Pain as a Diagnostic Aid

Frequently the presence of head pain is overlooked. The physician learns of it only if he has made an effort to elicit the information. Etiology is the key to rational management. The patient should be warned against taking medication before diagnosis.

Friedman deplors the regrettable tendency to call any chronic recurring headache migraine. Thoroughgoing history-taking and full physical and neurological examination are essential for accurate diagnosis. The following chart gives briefly the primary diagnostic leads and therapy for some common types of headaches.

Etiology of Headache	Primary Diagnostic Data	Primary Therapy
Inflammatory e.g., Meningitis Abscess	Inflammation of intracranial structures; fever; leucocytosis; bacteriologic diag.	Specific: sulfonamides and antibiotics. Symptomatic: analgesics.
Tumor	Pain varies as spinal press. changes; skull X-ray.	Specific: surgery. Symptomatic, analgesics, &/or hypnotics.
Sinusitis	Sinus congestion and infection; cloudy X-ray.	Specific: antibiotics and drainage. Symptomatic: analgesics.
Hypertensive	Hypertension present but pain not related to b. p. level; Dihydroergotamine relieves pain.	General hypertention therapy; sedation. Symptomatic: analgesics.
Migraine & other vascular headaches	Headache: recurrent, intense, throbbing. No organic causation; migraine in family; patient: energetic, perfectionist. Visual prodromata; g-i. upset during headache.	To abort attack: oral ergotamine plus caffeine — (Cafergot (dosage given below) General: adjustment to minimize nervous stress.

Data tabulated is from: Wolf, G. Jr.: *Pennsylvania M. J.* 54: 25, 1951. Friedman, A. P., in *Conn. H. T.: Current Therapy*, 1950, Phila., Saunders Co., 1950, p. 363.

Acute Migraine Attack Therapy: Numerous clinical studies have reported effective oral treatment with Cafergot® tablets (ergotamine tartrate 1 mg. plus caffeine 100 mg.). Reeves says Cafergot affords "... predictable response, economy, flexibility, oral administration and absence of notable side effects." Proper dosage procedure is important. Failures in true migraine result from inadequate or delayed dosage.

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NEWS BRIEFS—(Continued from page 167)

THE CHRONIC ILLNESS Committee of the Minnesota State Medical Society, headed by Dr. E. L. Tuohy of Duluth, has drafted a working program with five different objectives in providing care for the chronically ill of Minnesota. They are: (1) the development of infirmary beds in connection with already existing institutions; (2) supervision of nursing homes and development of medical care at reasonable expense; (3) working in closer relationship to local boards and the state board of health; (4) extending facilities and further training of practical nurses to man these homes and infirmaries; and (5) securing a wider laymen interest in the movement.

* * *

DR. DAVID T. SMITH, president of the National Tuberculosis Association, gave the 15th annual Dr. John W. Bell lecture before the Hennepin County Medical society on March 5.

* * *

DR. EDWARD DYER ANDERSON was one of five directors chosen recently to fill expired and unexpired seats on the board of the Minnesota Mental Hygiene society.

* * *

DR. EZRA V. BRIDGE has been appointed medical director and superintendent of the Mineral Springs Sanatorium at Cannon Falls. Dr. Bridge, a graduate of the Cornell University medical school, comes from Perrysburg, N. Y., where he was supervising tuberculosis physician of the J. N. Adam Memorial hospital.

* * *

DR. MYRON LYSNE is the newly elected president of Fairview hospital medical staff, with Dr. Donald B. Frane vice president, Dr. Gordon Watson, secretary, and Dr. Julian Petit, treasurer. Dr. G. M. Kelby, Dr. Glenn L. Petersen, Dr. Arthur Skjold and Dr. L. J. Roberts were elected to the executive board.

* * *

DR. JOHN F. POHL, Minneapolis orthopedic surgeon, left the first of April to begin work under a three-month World Health organization fellowship. He will study treatment, care, management and employment of crippled people in England, Germany, France and Austria.

Deaths . . .

DR. R. L. BEEGLY, physician at Kimball, South Dakota, died at the Methodist State hospital in Mitchell February 6. Dr. Beeghly, a graduate of the Kirksville College of Physicians and Surgeons, first practiced at Winner from 1938 until 1943 when he moved to Kimball.

★

DR. FRED G. BENN, former Minneapolis physician and surgeon, died on March 12, in La Mesa, California. He was formerly a staff member of St. Barnabas hospital.

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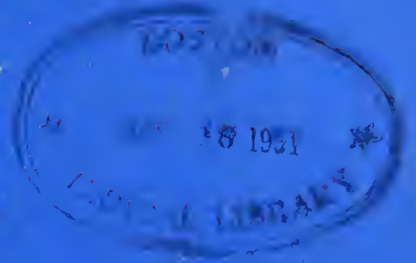
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Niacinamide	8.0 mg.
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*Class, S. J., and Rosenblum, G.: J. Clin. Endocrinol. 3:95 (Feb.) 1943



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The
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MAY 1951 — Volume LXXI, No. 5

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PREPARATION OF MANUSCRIPTS

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Congenital Atresia of the Esophagus and Intestine*

With Report of Cases

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COMPLETE atresia of the esophagus or intestine is uniformly fatal unless promptly recognized and appropriate treatment instituted. Constant progress in their surgical management has dissipated the previous dismal outlook so that at present active correction is mandatory. Admittedly, these congenital defects are uncommon, yet they probably occur more frequently than are recognized, or are discovered when these tiny patients are moribund. We are reporting three representative cases, one each of the esophagus, duodenum, and jejunum, all with recovery.

ATRESIA OF THE ESOPHAGUS

The pathology of esophageal atresia is subject to wide variation, but in approximately 95 per cent of cases a tracheo-esophageal fistula is present with the atresia. These patients present the upper esophagus ending in a blind, dilated sac at the level of the second dorsal vertebra, while the narrow lower segment of the esophagus communicates in a fistulous tract with the posterior wall of the trachea about 1 cm. above its bifurcation. The distance between the esophageal segments varies from 0 to 8 cm.—usually about 1 cm. apart.¹ Other pathologic variations are the upper esophagus ending in a blind pouch and the lower esophageal segment appearing as a blind pouch above the diaphragm (3 per cent); tracheo-esophageal fistulas to both upper and lower segments (1 per cent) or tracheo-esophageal fistula present without atresia (1 per cent).

The anomaly occurs about once in 2500 births. Its inception is during the fifth or sixth week of fetal life.

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About three-fourths of these patients show associated anomalies, the most common being anal atresias, and defects in development of the urogenital tubercle, or of the heart and great vessels.² Swenson reports thirty-two cases in which four had imperforate anus, two congenital heart disease, and one atresia of the ileum.³ There is a significant association of this condition with maternal hydramnios.²

The diagnosis can and should be established within the first twelve hours after birth. The early recognition of this condition determines the success of surgical treatment. Suspicion of this anomaly is aroused with any newborn showing excessive amounts of frothy mucus, associated with frequent attacks of cyanosis and dyspnea. All feedings are promptly regurgitated and the respiratory embarrassment is accentuated at this time. With these signs one should next attempt to pass a soft rubber catheter into the esophagus. If an obstruction to the catheter is encountered at about 10 cm. from the lips, the diagnosis is certain. If the patient is then taken to the x-ray room, the esophagus aspirated, and 1.0 cc. of lipiodol instilled into the catheter under fluoroscopic guidance, the blind upper esophageal segment will be outlined (figure 1). The oil must then be removed through the catheter so as to prevent aspiration into the lungs. Roentgenograms of the chest and abdomen taken at this time will give further information, as air in the stomach and intestine proves the presence of a lower esophageal segment having a fistulous connection with the trachea through which the air enters.

Preoperative care is extremely important. This begins immediately upon establishing a diagnosis of esophageal



Fig. 1. Esophageal atresia with lipiodol filling the blind upper esophageal segment. Gas in the stomach and intestine confirms presence of tracheal fistula communicating with lower esophageal segment.

atresia. The pharynx must be aspirated with a soft rubber catheter every half hour. The infant is preferably kept on the side to be operated upon, which is usually the right. Hydration must be maintained, but fluids, especially saline, must be given sparingly lest pulmonary edema develop. The average infant requires about 70 cc. of fluid per pound of body weight in twenty-four hours. In contrast, the tracheo-esophageal fistula case should be limited to 40 cc. of fluid per pound of body weight. The infant should be kept in oxygen.

Treatment of this condition is surgical. The method of choice is direct ligation of the tracheo-esophageal fistula and end-to-end anastomosis of the esophageal segments, first successfully performed by Haight in 1941.¹ Fortunately, this is possible in the majority of cases. If the lower esophageal segment is completely atretic, then the upper esophageal segment is exteriorized on the left side of the neck and a gastrostomy done for feeding purposes. At a later time, transthoracic transplantation of the stomach and anastomosis to the proximal esophageal segment is performed as suggested by Sweet.² This interval should be a year as otherwise there is too much disproportion between the infant's stomach and the thoracic cavity.

One point cannot be overemphasized; namely, that gastrostomy has no place as a primary procedure in treating tracheo-esophageal fistula with esophageal atresia. The condition of the infant will not be improved as attempts with gastrostomy feedings will only increase regurgitation through the tracheal fistula.

CASE REPORT

The following case report details the management, surgical technic, and required liaison teamwork of the pediatrician, surgeon, and roentgenologist:

M. G., a three day old white girl, was admitted to St. Luke's Hospital at 10:00 P.M. on January 1, 1951, having been referred by Dr. John Jansonius of Jamestown, North Dakota, with a diagnosis of esophageal atresia. The child had been delivered at term, spontaneously of a normal pregnancy. The birth weight was 6 pounds, 11 ounces. Within a few hours after birth the child was noted to have attacks of dyspnea and excessive mucus in the throat. Atresia of the esophagus was suspected, and roentgenograms taken after instilling lipiodol in the esophagus confirmed this diagnosis. The presence of gas in the stomach on the roentgenogram was proof of a tracheo-esophageal fistula. At the time of admission, the patient was placed on the right side in an oxygen tent, 90 cc. of 5 per cent glucose in distilled water administered through a scalp vein to combat dehydration present. The pharynx was aspirated every half hour. It was not believed the patient would be ready for surgery until the following morning. In the meantime a cut-down for continuous intravenous drip was done. On January 2, the patient was taken to surgery, operated upon by one of us (G.A.D.). Anesthesia was induced using open mask ether (a tight fitting face mask for administration of positive pressure from the anesthesia machine being available. The patient was placed in a prone position, draped and through a right parascapular incision a subperiosteal resection of the third rib, as suggested by Potts and Levin,⁶ was performed carrying the resection well anteriorly. The extra-pleural plane was then located and the upper portion of the right lung and its parietal pleura stripped from the chest wall. The azygos vein was retracted out of the way and thus an excellent exposure of the pathology present was afforded.

The findings were a lower esophageal segment 4 mm. in diameter having fistulous connection with the trachea 1 cm. above the carina and separated from the upper esophageal segment by 0.5 cm. This upper segment was 1.5 cm. in diameter. The fistulous connection with trachea was transected and ligated with 000 silk and then oversewn with 00000 silk. The blind upper end of the esophagus was opened and a two layer end-to-end anastomosis using 00000 silk sutures was made in such a manner that the lower segment was telescoped into the larger

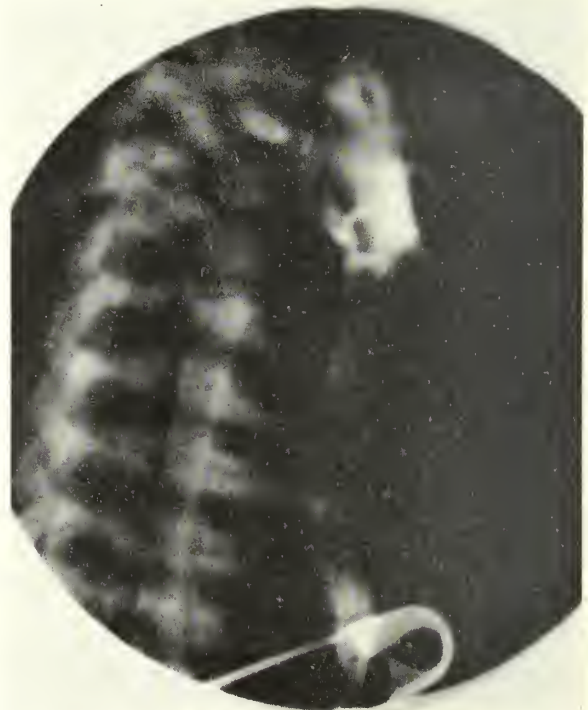


Fig. 2. Spot film, case 1, showing functioning postoperative esophagus and site of anastomosis.

upper segment. No clamps or indwelling catheter splint were used. A no. 10 French catheter was placed close to the anastomosis and brought out through a separate stab wound. The face mask was applied, the lung expanded, and the incision closed in layers with interrupted 0000 chromic catgut sutures. The skin was closed with silk. During surgery, the patient received 30 cc. of citrated blood. The patient was returned from surgery in good condition. Continuous suction was started on the catheter draining the extrapleural space, and the infant placed in an incubator through which oxygen was administered. The day following surgery, temperature was 101.2° F. by rectum, and mucous accumulation in the throat was no longer troublesome. Penicillin 20,000 units every four hours and dihydrostreptomycin 0.15 mg. every twelve hours, which had been started immediately upon admission, was continued postoperatively.

Fluids were supplied as indicated. On January 6th, 8 cc. of sterile water every three hours was started by mouth—this was well tolerated, and the following day the child had two stools. Oral feeding of formula was started and everything was progressing too well. On January 8th, our optimism dropped as formula in increasing amounts began to appear in the extrapleural suction tube. At this point the patient was returned to surgery and a Witzel type gastrostomy was done through a left rectus incision. Progress from here on was uneventful and leakage from the anastomosis ceased nine days later at which time the gastrostomy tube was removed, as was the extrapleural suction. On January 27th, an atelectasis of the upper right lobe developed which cleared in forty-eight hours. Roentgenograms of the esophagus on February 12, 1951, showed a well functioning esophagus (figure 2). However, because the child tended to cough after nursing an esophagoscopy was done on February 13, 1951. This showed the upper esophageal segment still dilated, perfect healing of the anastomosis, but with some narrowing, a No. 14 French dilator was passed. Progress continued uneventful. The weight on February 16, 1951, was 8 pounds, 12 ounces, and the patient was taking three ounces of formula every three hours. The infant was discharged April 3, 1951.

ATRESIA OF THE INTESTINE

The following remarks pertain only to complete intrinsic obstruction of the bowel as this is the only type seen in the immediate neonatal period. While atresia of the intestine is uncommon, increasingly successful case reports in the literature point to the value of early recognition and surgical correction. The condition has been reported as occurring about once in twenty-one thousand births.⁷ More recent estimates, and probably more nearly correct, place the incidence at one case in approximately forty-two hundred births.⁸ Associated congenital anomalies are uncommon in contrast to esophageal atresia. From his own standpoint, the surgeon should be cognizant of the fact that about 15 per cent of the cases have multiple sites of atresia. This fact makes complete examination of the entire intestinal tract mandatory at the time of surgery. The duodenum is the most common site and this involvement is distal to the ampulla of Vater in the majority of instances.

The primary symptom of intestinal atresia is persistent vomiting starting within forty-eight hours after birth. As the obstruction is usually distal to the ampulla, the vomitus is bile-stained. Therefore, it can be assumed that any newborn having bile-stained vomitus has intestinal obstruction until proven otherwise. Roentgen examination of the abdomen establishes the diagnosis. Gas is passed along to the ileum in the first two hours of life, and disturbance of this pattern is obviously present in obstruction. Aside from duodenal atresia the dilated segment of intestine may be difficult to differentiate

from colon. We advocate therefore the instillation of lipiodol into the rectum under fluoroscopic guidance to outline the colon as the presence or absence of a primary or associated atresia of the colon should be known before surgery. Contrary to the views expressed by some authors barium sulfate has no place in the diagnosis of intestinal atresia. We believe that duodenal atresia, where use of barium has been advocated, can be readily diagnosed on an upright roentgenogram of the abdomen.

Upon establishing diagnosis, and before these infants are rushed to the operating room, time is profitably taken to meet two requirements. First, fluid and electrolyte balance is restored; secondly, the stomach is emptied through a no. 10 French catheter inserted through the nose or mouth. The catheter is left in place for postoperative Wangenstein suction.

The literature is replete with case reports of intestinal atresia, but the number of successful attempts at surgical correction has not been impressive until the past few years. In 1948, O'Neill et al⁸ was able to collect thirty-six cases of recovery, including two of his own, plus thirteen stenosis of the intestine, making a total of forty-nine cases. Since this time the authors have found an additional thirty-two successfully treated cases in the literature bringing the total to eighty-one.⁹⁻¹⁶

Primary anastomosis is the procedure of choice in these cases. In duodenal atresia below the ampulla, a duodenojejunostomy is done if feasible, otherwise either an anterior or posterior gastrojejunostomy. In low atresias a short circuiting entero-enterostomy is preformed.



Fig. 3. Atresia third portion of duodenum (Case R.B.). Roentgenogram shows dilated stomach and first portion of duodenum.

If perforation is present then resection and lateral anastomosis is required. Multiple ileal atresias have been successfully treated by a short circuiting ileocolostomy.⁹ Enterostomy has no place in treating this condition.

CASE REPORTS

*Duodenal atresia**

R.B., a male twin, born December 9, 1950, weighing 4 pounds, 5½ ounces, was in good general condition and normal to physical examination at the time of birth. Feedings with formula and expressed breast milk were started and retained at twenty-four hours. Seventy-two hours after birth, the infant had an emesis of bile-stained material. This emesis again occurred the following morning and at this time examination by the pediatrician showed the infant to be listless, dehydrated and moderately jaundiced. The epigastrium was distended and peristaltic waves were visible traveling from left to right across the upper abdomen. Blood count taken at this time showed R.B.C.'s 4.89 million, W.B.C.'s 12,000, differential normal, and hemoglobin 19 gm. Bleeding time was 2 minutes 30 seconds and coagulation time 4 minutes. A roentgenogram taken of the abdomen (figure 3) showed marked dilatation of the stomach and first portion of the duodenum with absence of gas in the intestinal tract below this level. A diagnosis of duodenal atresia was made and the patient was prepared for surgery. Wangenstein gastric suction was started and an ankle vein was utilized for a cut-down and continuous intravenous drip. As soon as the baby was adequately hydrated, the patient was taken to surgery and operated upon by one of us (V.G.B.).

Drop ether was used for anesthesia, the abdomen prepared, and the peritoneal cavity opened through a transverse upper abdominal incision. A moderate amount of bile-stained fluid was present on opening the abdomen. This brought up the possibility of a perforation; however, none could be demonstrated. Though the stomach was decompressed, some dilatation was still present in the first and second portions of the duodenum, and on examination the area of atresia was present in the third portion of the duodenum at the point where the superior mesenteric vessels cross over the duodenum. The gall-bladder was not distended. A loop of jejunum was brought up in front of the colon to the most dependent portion of the stomach and a gastro-jejunostomy performed, using an open anastomosis. The posterior layer of the anastomosis was a single suture line of interrupted 00000 catgut, these sutures being tied within the stomach. The anterior row of sutures was made with interrupted silk and the angles further strengthened with interrupted silk sutures. The anastomosis upon completion was of sufficient caliber to admit the operator's thumb. Post-operative condition was fair.

The baby was returned to the incubator where oxygen and body heat were maintained. Intravenous drip was continued until the fourth postoperative day. Fluids consisted of glucose, plasma, Ringer's and lactate Ringer's solution, and Butler's solution. Gastric suction was continued for three days after surgery. Feedings were then started cautiously and were well tolerated. The baby's condition improved steadily although he required two blood transfusions late in his convalescence because of a blood hemoglobin below 9 gm. He was sent home on January 22, 1951. He was seen again on February 6, 1951, weighing 8 pounds and doing well.

*Jejunal atresia:**

M.D., a two day old white female infant, was admitted to St. Luke's Hospital July 19, 1950, having been referred by Dr. W. H. Gilsdorf of Valley City, North Dakota. The infant's birth weight was 5 pounds, 7 ounces. Delivery had been spontaneous and the baby was apparently normal at birth. The history revealed that shortly after the first feeding, she began to have projectile emesis of bile-stained material. At the end of forty-eight hours, these symptoms had continued and her referring physician made the diagnosis of a bowel obstruction. At the time of admission, the child was acutely ill and moderately

* (The two cases of R.B. and M.D. of duodenal and jejunal atresia are being originally reported by us elsewhere in conjunction with a third successfully treated jejunal atresia.)



Fig. 4. Jejunal atresia (Case M.D.). Roentgenogram shows dilated gas filled loops of bowel. Obviously, a bowel obstruction is present. In infants small bowel cannot be distinguished from colon. Differentiation was made in this case by instillation of lipiodol in the rectum and colon.

dehydrated. The weight was 4 pounds, 11 ounces. Physical examination was negative except for the findings referable to dehydration and a moderately distended abdomen. No bowel sounds were heard. No masses were palpable. There was no stool or meconium in the rectum at the time of digital examination. A roentgenogram of the abdomen revealed marked distention of the stomach and intestine (figure 4). The appearance of the distended bowel was such that it could be confused with colon so that a lipiodol enema was administered under fluoroscopic guidance. The colon was found to fill readily and presented no areas of atresia. Hemoglobin on admission was 16.5 gm., leukocyte count 7,900 with a normal differential. A urine specimen could not be obtained but one taken the following day was reported as negative. The above findings confirmed the diagnosis of bowel obstruction and a preoperative diagnosis of atresia of the intestine was made, the site being either in the jejunum or ileum. Wangenstein gastric suction was started. The patient was hydrated with parenteral fluids. She was then taken to surgery approximately one hour and forty-five minutes after admission, and operated upon by one of us (G.A.D.).

The peritoneal cavity was opened through a right rectus muscle splitting incision and immediately upon opening the abdomen dilated loops of jejunum presented into the incision. These were removed from the peritoneal cavity for purposes of rapid orientation. It was found that the dilated jejunum extended from the ligament of Treitz to a distance approximately 14 cm. distal. The distended bowel abruptly ended and there was an atresia in the jejunum, approximately 0.5 cm. in length. Before proceeding with the correction of this condition, the remainder of the jejunum and ileum was inspected to the ileocecal valve. There was no evidence of other atresia. The colon appeared normal and there was no evidence of malrotation. The proximal loop of dilated jejunum was then aspirated of its gas and liquid contents with a 20 gauge needle and an enterostomy was performed between the proximal and distal bowel by-passing the area of atresia. This was an open type of anastomosis. The patency of the anastomosis was tested by in-

jecting normal saline solution from the jejunum above into the distal collapsed bowel. The infant was returned from surgery in good condition. She was placed in an incubator and oxygen administered. Hydration was maintained with parenteral fluids, both subcutaneously and intravenously. The fluids obtained from nasal suction were replaced volume for volume with Darrow's potassium solution. The remainder of the fluid consisted of 5 per cent glucose in distilled water or one-half strength saline solution in 2½ per cent glucose.

The postoperative course was uneventful. The infant had two small meconium stools on the third postoperative day. It was necessary to continue nasal suction for eight days postoperatively to prevent abdominal distention. Daily enemas of normal saline were given to the infant in order to increase the lumen of the colon and adapt it to the intestinal contents. Vitamins B and C were administered parenterally and prophylactic penicillin and streptomycin were given for the first four postoperative days. Initial feedings were instituted first with 5 per cent glucose and distilled water and subsequently with controlled diluted milk feedings. After the eighth postoperative day, the patient had an uneventful recovery. The patient was discharged August 19, 1950.

SUMMARY

Three illustrative cases of atresias of the esophagus, duodenum, and jejunum have been presented, each with recovery. The diagnosis and management have been described in detail. The management of these cases of atresia requires the coordination of pediatrician, roentgenologist, and surgeon.

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1951 JOURNAL-LANCET LECTURE ANNOUNCED

The JOURNAL-LANCET Lectureship Committee has announced that the 1951 lecture will be given by Dr. Heinrich Klüver at 8:00 P.M. on May 16 at the Medical Sciences Amphitheater on the University of Minnesota campus. Dr. Klüver is professor of physiological psychology in the Division of Biological Sciences at the University of Chicago. His subject will be "Brain Mechanisms and Behavior."

As part of his discussion he will show an excellent motion picture study of behavioral changes in monkeys subjected to extirpation of parts of the brain. Because of the current emphasis on psychiatry in nervous and mental diseases it is felt that his lecture will be of great interest to the general practitioner as well as the doctor specializing in other areas of medicine. The lecture is open to the public.

The JOURNAL-LANCET Lectureship was established in 1941 as a means of bringing to the campus men who have made outstanding and original contributions to medicine. The first JOURNAL-LANCET lecture was given April 21, 1941 by Dr. Rene V. Dubois of Rockefeller Foundation, who spoke on "Vulnerable Structures of the Bacterial Cell." The last lecture, which was given by Dr. J. Arthur Myers on September 15, 1950 at the Hebrew University in Jerusalem appeared on page 127 of the April issue.

Congenital Duodenal Obstruction*

With a Report of Two Cases

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CALDER, in 1752, was the first to describe a case of duodenal obstruction in an infant. The first writer in the United States to report on this subject at length was Louise Cordes, in 1901; she collected 57 cases. Spriggs,¹ in 1912, concluded that 28 per cent of obstructions in newborns occurred in the duodenum.

The first successful operation was reported in 1916 by Ernst.² He performed a gastrojejunostomy on an eleven-day-old male infant. Webb and Wangenstein³ stated in a report in 1931 that only nine cases had been treated successfully by surgery up to that time. Twenty cases of duodenal obstruction in the newborn due to faulty intestinal rotation were reported in 1939 by McIntosh and Donovan.⁴ Twelve of the eighteen operated upon recovered. Ladd and Gross⁵ in their book on *Abdominal Surgery of Infancy and Childhood* record operative results in 74 cases with intrinsic obstruction—either atresia or stenosis of the intestine or colon—the end result being 57 deaths and 17 recoveries. Their mortality rate was 50 per cent when the obstruction was either in the duodenum or jejunum, and 88 per cent in the 41 cases in which the obstruction was in the ileum. In those cases in which the obstruction was at the ileocecal valve, colon or occurred as multiple lesions, the operative mortality was 100 per cent.

Congenital intestinal obstructions are commonly classified as intrinsic or extrinsic. The intrinsic obstructions may be caused by:⁶ (1) a complete discontinuity of the duodenum; (2) a condition in which the dilated proximal duodenum is joined to the collapsed distal duodenum by a fibrous cord; (3) a narrowing of the duodenal lumen for a variable length; (4) a condition in which a diaphragm, either complete or incomplete, is present in the lumen of the bowel.

The most likely etiology of an intrinsic obstruction is arrested embryologic development when the intestine passes through a solid stage with the formation of vacuoles in the epithelial cells. If development is arrested at this stage, the stomach will fail to communicate with the small intestine or a complete or incomplete diaphragm may occur within the lumen at any level from the pylorus to the rectum.

In Ladd's series of 22 cases of congenital stenosis of the intestine and colon, one-half occurred in the duodenum and about one-third in the ileum.

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Garvin⁷ in 1928 reported that in 113 cases, 34 occurred proximal to the level of the papilla of Vater, 25 distal to it, 19 at the same level and in 16 the exact location was not recorded.

Extrinsic obstructions are more common than the intrinsic type in a ratio of about three to two. The site of obstruction in most cases is in the distal duodenum or at the duodeno-jejunal junction.

A variety of conditions may bring about this kind of obstruction. Faulty rotation of the gut is the most frequent etiologic factor. If the return of the midgut loop from the umbilical cord fails to take place, the result is exomphalos, or congenital umbilical hernia, with the accompanying failure of the normal counter-clockwise intestinal rotation beyond the first stage of ninety degrees, the component parts of the midgut loop occupying the relative positions obtained at about the tenth week of gestation.

Failure of rotation during the second stage may occur independently of exomphalos. The coils returning from the umbilical cord to the abdominal cavity retain their primitive arrangement, with the jejunum and ileum on the right side, the entire large bowel on the left and the ileum entering the cecum from right to left. Usually there is an associated sharp duodenal kink at the junction of the second and third portions or at the duodeno-jejunal flexure.

When failure of rotation is incomplete as is more commonly the case, so that the intestines have a pattern intermediate between non-rotation and the normal post-natal position, the condition is spoken of as malrotation.

If the caudal segment of the midgut precedes the cephalad segment in its return from the umbilical cord to the abdominal cavity, reversed rotation is the usual outcome. The cecal portion of the midgut, taking the lead, passes behind the superior mesenteric artery from left to right in leaving the umbilical cord so that the normal counter-clockwise rotation is unwound and replaced by a clockwise rotation of 90 degrees, the transverse colon coming to lie behind the duodenum.

Other much more uncommon errors have been observed such as coils of the jejunum and upper portion of the ileum being caught in a pouch of the mesentery of the lower portion of the ileum, or the herniation of coils of small intestine through an opening in the mesentery or into the lesser peritoneal cavity.

Other less frequent causes of extrinsic obstruction are due to abnormalities of the pancreas, especially annular

pancreas, tumors and cysts of surrounding organs, and fetal peritonitis causing constricting bands.

The most outstanding symptom is vomiting, which usually occurs in the first or second day of life when the first feeding is given. The vomiting is forceful at first and soon becomes projectile in type. When the obstruction is distal to the ampulla of Vater, which is the rule in extrinsic obstructions and occurs in about half of the intrinsic cases, or a total of 80 per cent of all cases, there will be bile in the vomitus. Even if feedings are discontinued, these babies will vomit large amounts of bile-stained mucus. Meconium is passed normally at first, but in cases of complete obstruction the stools become smaller and consist of only clear mucus. In cases of partial obstruction small infrequent stools containing milk curds may be passed.

It should be pointed out that bile in the stool or bile in the vomitus is not an absolute indication of the position of the obstruction above or below the ampulla of Vater as accessory bile ducts may be present. In some cases when volvulus is present the patient may pass blood per rectum. Dehydration and loss of weight are usually rapid and these patients tend to be listless and apathetic.

In untreated cases, there is a progression of dehydration and anathy; ketosis develops and the infant succumbs or he may die of starvation or aspiration pneumonia. The more complete the obstruction the earlier the exitus. Occasionally these infants seem to withstand a severe degree of obstruction for a long time. There are cases recorded where the child lived several years with a duodenal lumen of only a few millimeters. Sidlin⁸ in 1925 reported a case of a child two and one-half years of age with a duodenal obstruction who died after eating canned corn. Occasionally the symptoms are intermittent. They occur in cases with intermittent volvulus.

On physical examination a fullness of the epigastrium is observed while the lower abdomen is usually scaphoid. Gastric waves may be seen traveling from left to right but this sign is difficult to elicit and not always present. If the obstruction is in the distal duodenum, peristalsis may appear below the stomach traveling from right to left. No tumor is palpable, but in some cases the dilated duodenum may be felt through a relaxed abdominal wall. Dehydration and malnutrition are very evident when the child is seen late in its course.

X-ray examination is of the utmost aid in making the diagnosis. A plain film of the abdomen may give valuable information especially in cases of complete obstruction or faulty rotation of the intestinal tract. In the former, gas will be present only in that portion of the digestive tract proximal to the obstruction. Some writers feel that the use of barium studies is very dangerous and even unnecessary, but we feel that a thin barium mixture is very advantageous in locating the point of obstruction. When there is not complete obstruction, a small amount of barium will, after several hours, be found beyond the point of obstruction. A barium enema will determine if faulty rotation of the bowel is present.

Preoperative care of these infants is very essential. Replacing the loss of fluids, both intra- and extra-cellular, is extremely important and should be carried out before any x-ray studies are made. This is best done by inserting and securing a plastic catheter in an ankle vein. Normal saline, 5 per cent glucose, or Hartman's solutions are given as indicated. A small blood transfusion may be given if the baby is anemic, after being fully hydrated. The catheter is left in place when the patient goes to surgery so fluids and/or blood may be given if needed during the operation.

The stomach should be lavaged one hour prior to surgery and the tube left in the stomach attached to a nasal suction apparatus. This serves a two-fold purpose, to allow the escape of bile and gastric secretions and to prevent gaseous distention of the stomach.

The anesthetic of choice is drop ether which secures greater relaxation and reduces straining, both of which are of paramount importance to the surgeon.

A right rectus incision, adequate in length, affords the best abdominal exposure. If due to an extrinsic obstruction, the factors causing the lesion are corrected. In case of an annular pancreas, it is felt that by-passing the obstruction is the treatment of choice. If peritoneal bands or adhesions are the etiologic factor, freeing these will often suffice to relieve the obstruction.

In patients with intrinsic obstructions, there are several choices of operative procedure. One consists of opening the bowel at the site of obstruction and destroying the diaphragm-like structure with electrocautery. For the most part, anastomosing operations, by which the obstruction is short-circuited, have been the method most successful. When the obstruction occurs proximal to the ampulla of Vater, a gastrojejunostomy is the easiest to perform and is satisfactory. If the obstruction is distal to the ampulla, the anastomosis should be side-to-side between the dilated duodenum and proximal jejunum. Ladd, one of the country's outstanding authorities on this subject, considers this the operation of choice.

Postoperatively fluids should be given slowly by continuous drip method as the infant must be kept well hydrated. Nothing is given by mouth for 96 hours. It is usually advantageous to continue with nasal suction for two or three days to keep the stomach decompressed and to remove mucus and bile. After the fourth postoperative day water or glucose solution may be given by mouth in small amounts; ten to fifteen cubic centimeters are given at first and gradually increased by five or ten cubic centimeters each feeding. On the fifth day, breast milk if available or a very dilute formula is begun. It is to be expected that emesis will occur and usually bile will be present in the vomitus for the first four or five days postoperatively, the reason being that the stoma is naturally and necessarily small and edema at the operative site makes it even smaller temporarily. With the subsidence of edema, the stoma begins to function properly. It usually takes a week or more for the patient to reach an adequate intake in volume and calories.

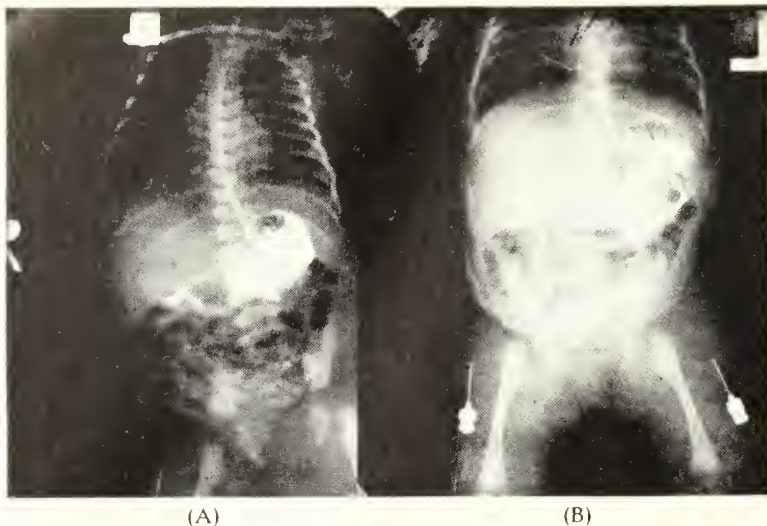


Fig. 1. Preoperative x-ray studies. Case 1, R.R. (A) Immediately after installation of barium showing barium in stomach and first portion of duodenum. (B) Three hours after installation of barium showing no barium in small bowel, but the presence of gas in small and large bowel.

The appearance of milk curds in the stool around the fifth or sixth day is indicative of a functioning anastomosis.

CASE REPORTS

Case 1. Renee R. This full term female was delivered by outlet forceps by Dr. R. B. Woodhull on December 29, 1949. The birth weight was six pounds, ten ounces. On December 30, 1949, when the baby was given glucose solution by mouth, emesis occurred which contained bile.

On physical examination the upper abdomen was distended. No gastric waves were seen nor any pyloric mass palpated. The tentative diagnosis was duodenal obstruction distal to the ampulla of Vater.

A plain x-ray of the abdomen showed gas present in the small and large bowel which ruled out an atresia. A thin barium mixture was given by gavage which remained in the stomach for one and one-half hours except for a few flecks that appeared in the small bowel. No malrotation of the large bowel was found.

The baby was operated upon by Dr. A. L. Cameron on December 31, 1949, at the age of two days. Thorough exploration of the stomach, small and large intestines revealed no evidence of obstruction. The large bowel was filled with meconium. Nothing further was done at this time.

The patient continued to have green emesis, retaining little if any formula. On January 2, 1950, a nasal suction tube was

fed into the stomach an inch at a time with the baby on her right side. The tip of the tube, under fluoroscopic examination, was seen to go through the pylorus and stop in the first portion of the duodenum. From this evidence we felt the obstruction was intrinsic and distal to the first portion of the duodenum. The baby was taken to the operating room on January 3, 1950, where an anastomosis between the duodenum and jejunum was carried out.

Postoperatively, the infant continued to vomit bile but after about two weeks most of the feedings were retained. Six days after the anastomosis, curds began to appear in the stools. She began to gain weight slowly after January 19, 1950, without subcutaneous fluids. When discharged on February 5, 1950, the thirty-eighth day of life, her weight was seven pounds, 14 ounces, and she was taking four ounces of formula every three hours.

Two days after discharge, she was brought back to the hospital with a history of frequent watery stools and fever for the past twenty-four hours. She was markedly dehydrated, ashen-colored, very limp, and listless. Respirations were very rapid, 80 per minute, and the temperature 107.4° rectally. The only positive findings on admission were dehydration and a red, thick right ear drum. The patient was obviously in acidosis and had lost one pound and four ounces in the two days at home. The carbon dioxide combining power was found to be 14.7 volumes per cent and the chlorides 700 milligrams per cent. Intravenous Ringer lactate solution was given at once which markedly improved her general condition. Sodium lactate

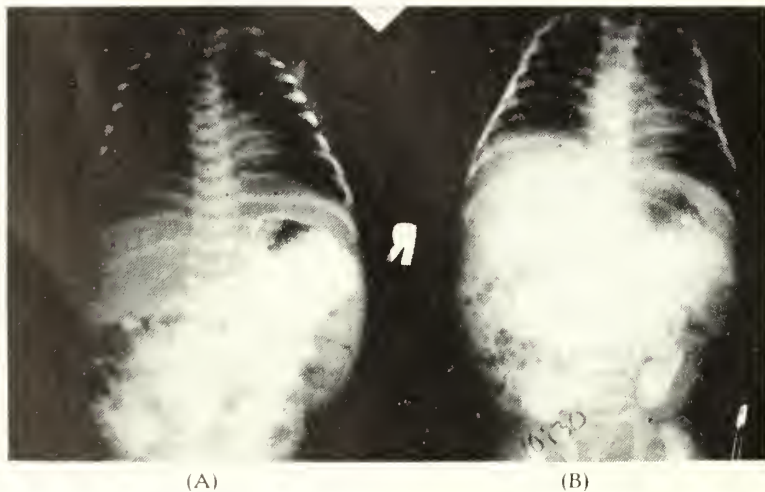
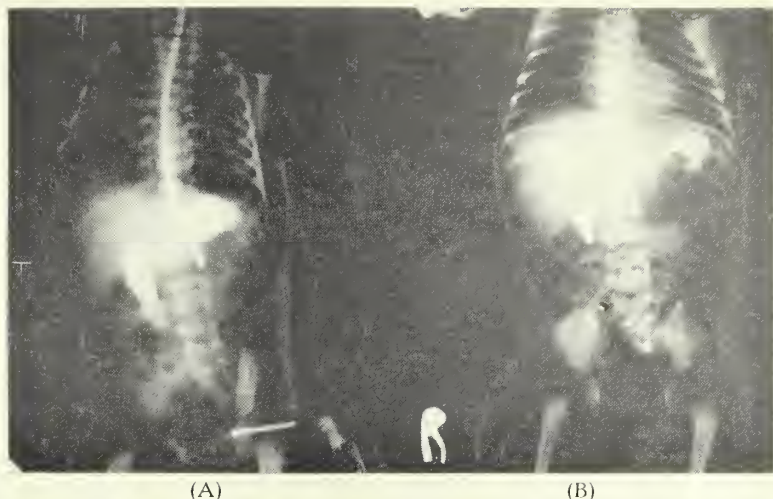


Fig. 2. X-ray studies seven weeks post-operatively. Case 1, R.R. (A) Immediately after ingestion of barium showing immediate passage into small bowel. (B) One and one-half hours after ingestion of barium showing normal progression of media in the small bowel.

Fig. 3. Case 2, S. F. (A) Immediately after installation of barium showing barium in stomach and dilated duodenum stopping abruptly at about the junction of the second and third portions of the duodenum. (B) Two and one-half hours after installation of barium showing a small amount in stomach and the dilated duodenum with only traces of barium visualized in the small bowel.



1/6 molar and 5 per cent glucose was given subcutaneously. The following day the highest temperature was 102.2° by rectum and the lowest 99.4°. Respirations had slowed down to 30 per minute. The carbon dioxide combining power was 28 volumes per cent. An x-ray of the chest revealed a pneumonia of the right upper lobe. This responded well to therapy; by the fourth day the temperature was normal.

On February 20, after complete recovery from the pneumonia, a thin barium mixture was given by mouth; it was seen to pass freely from the stomach into the small bowel. A film made one hour later showed most of it to be in the small bowel. She was dismissed from the hospital on February 22, 1950, weighing eight pounds, ten ounces.

I have seen this patient regularly each month. She has progressed very satisfactorily as regards weight and height gain and physical development.

Case 2. Susan F. This full term female infant was born August 26, 1950, weighing seven pounds, 15 ounces.

The patient was referred to me by the local doctor on September 12, 1950, because of vomiting. The mother stated that the infant had vomited since the third day of life. At first this was forceful and later projectile in type. She had noted the emesis to be green. The baby was taken off the breast and several formulae tried without improvement. When a week old, white spots were noted in the mouth.

On physical examination this 17-day-old infant weighed six pounds, 12 ounces. On inspection, evidence of weight loss was very evident. A marked amount of thrush was present in the

buccal cavity. The remainder of the examination was negative. Laboratory data revealed a hemoglobin of 129 per cent, red blood count of 5,720,000, and a white blood count of 12,150. The urine was negative.

On September 13, a few feeble gastric waves were seen but no pyloric tumor palpated. After taking two ounces of formula, the baby had projectile emesis which was bile stained. The baby was then given a mixture of barium and formula by tube and examined by fluoroscopy. The opaque media went through the pylorus at once and continued around the duodenal loop. There it stopped abruptly at about the junction of the second and third portions of the duodenum. That portion of the duodenum was dilated; peristalsis and reverse peristalsis were plainly seen. A film taken two and one-half hours later showed that a very small amount of barium had passed into the small intestine. A barium enema showed the large bowel to be in normal position.

A diagnosis was made of duodenal obstruction and preparations were made for operation the following day. This was performed by Dr. A. L. Cameron. On exploring the abdomen, no extrinsic cause for the obstruction was found. The first and second portions of the duodenum were greatly dilated. It was felt that an intrinsic obstruction was present so the operation of choice, namely a duodenojejunostomy, was carried out. The patient had a very smooth postoperative course. Fluids were given by continuous drip through a plastic catheter in an ankle vein for five days. During this time nothing was given by mouth. Feedings were gradually started then and there was

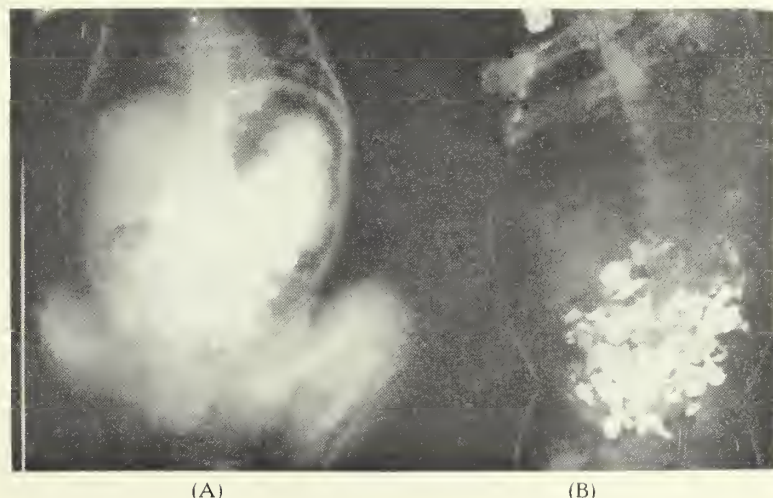


Fig. 4. X-ray studies three weeks post-operatively. Case 2, S. F. (A) After ingestion of barium showing immediate passage into small bowel. (B) Three hours after ingestion of barium, showing only traces in stomach and normal progression in the small bowel.

only occasional emesis. She was discharged September 29, on her seventeenth hospital day, weighing eight pounds.

The thrush was treated by painting the mouth T.I.D. with 10 per cent Naprylate Solution, and was eradicated in a few days.

On October 4, 1950, the patient returned to the Northwest Clinic. While at home she had taken four ounces of evaporated milk formulae every three hours with no vomiting.

A mixture of barium and milk was given by bottle which, under fluoroscopy, was seen to pass out of the stomach at a normal rate. Part of the second portion of the duodenum was slightly dilated.

Re-examination after two and one-half hours showed only traces of barium in the stomach. The remainder was distributed throughout the small bowel, indicating a normally functioning anastomosis between the dilated duodenum and jejunum.

COMMENT

It is extremely important to restore fluids adequately in these depleted infants before surgical therapy is instituted. Successful operative procedures depend greatly upon such preoperative preparations. These babies must be in the best possible condition to survive the major bowel surgery which their ailment requires.

The operation calls for accurate and gentle handling of viscera which at all times should be protected against chilling and drying by the application of warm moist

compresses. The anastomosis itself is a technical procedure which must be performed in an exact and faultless way to insure success.

Postoperative care consists mainly of supplying sufficient amounts of fluids intravenously or subcutaneously until feeding per os is both tolerated and adequate.

SUMMARY

The literature on congenital duodenal obstruction has been reviewed briefly and two cases reported of congenital intrinsic duodenal obstruction. Both were treated successfully. In each instance an anastomosis was performed between the dilated duodenum and the proximal jejunum.

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ACCIDENTS TO CHILDREN ARE PREVENTABLE

SEVENTY to 75 per cent of all accidents which kill, cripple or disfigure children are preventable, according to Dr. Tague C. Chisholm, Minneapolis pediatric surgeon. In a recent Health Day program in Minneapolis, he reported that 12,500 children were killed by accidents in the United States in 1949 and an estimated 50,000 suffered permanent injuries. Minnesota state health department records show that 320 children died from accidents in that state in 1949.

Accidents in homes are responsible for 40 per cent of the deaths and motor vehicles for 34 per cent. Of the home accidents, nearly 26 per cent occurred in bedrooms, 12 per cent in yards, 10 per cent in kitchens and 7 per cent on stairs.

Common types of accidents include:

Burns—scalds and burns from pots, pans, mangles, irons and grills; leaves and rubbish; careless cigarettes, pipes and matches, and exposed and worn electric cords.

Drownings—in bathtubs, swimming pools, on ice and in wells.

Motor vehicles—in alleyways, garage driveways and street crossings.

Falls—from porches, ladders, construction scaffolding, foundations and playground equipment.

Penetrating injuries—from playing with guns, especially during hunting season; scissors, knives, screwdrivers, ice-picks and chisels.

Poisons—chemicals stored under the sink, in medicine cabinets and fuel oil on the back porch.

Lawnmowers—particularly power motors without guards.

Various types of accidents, of course, vary with the age of growing children. "Accident prevention must start in the home, Dr. Chisholm advised. "There must be an individual awareness of situations leading to accidents."

Surgical Relief of Atelectasis in the Newborn*

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ATELECTASIS of the newborn infant is a condition frequently seen by the general practitioner, obstetrician, and pediatrician. It is a common cause of death in the neonatal period. Beck¹ has listed intermittent cyanosis and atelectasis as the mechanism of 41.5 per cent of all neonatal deaths in his material. This paper is a report of our experience with a method of therapy for the relief of congenital atelectasis.

In 1933, Farber and Wilson² reviewed the literature and reported their experimental work on the pathology and pathogenesis of congenital atelectasis. They made a distinction between initial atelectasis, that is atelectasis of a lung which had never been expanded, and resorption atelectasis, atelectasis of a lung which has been expanded but subsequently collapsed. They attributed the primary pathogenesis of initial atelectasis to a cohesion of the moist surfaces of the air passages in the collapsed lung. Subsequent work, particularly that of MacMahon³ and of Potter⁴ makes further distinction between atelectasis and so-called alveolar dysplasia. The latter term refers to a state of incomplete development or arrested development of pulmonary tissue. Pathologically the alveoli appear incapable of expansion; they appear as cords of cells rather than as alveoli. Recently, Miller⁵ has emphasized the importance of hyaline membrane formation as a possible etiological factor in the atelectasis of newborn infants.

Congenital atelectasis, alveolar dysplasia, and hyaline membrane formation occur in full term as well as premature infants, although with greater frequency in the latter. The cause of any one of the conditions is still a matter for speculation. The aspiration of amniotic fluid is hardly an adequate explanation for the development of atelectasis, nor could it exert an influence on a developmental anomaly such as alveolar dysplasia. Miller's work would indicate that aspiration of amniotic contents does not account for the development of the hyaline membrane. To us, the three conditions have been indistinguishable from one another preoperatively, but at operation we have predicted the existence of alveolar dysplasia or hyaline membrane formation in three of the four infants who died and have predicted the successful outcome, i. e., the existence of atelectasis in four of the five infants who have survived. The differences were apparent in the appearance of the lung and in the response of the lung to the application of

positive pressure. If the lung was diffusely atelectatic, the alveoli would expand in segmental fashion upon the application of positive pressure and remain expanded when the pressure was released. These babies survived. If the condition of alveolar dysplasia or hyaline membrane was present, the lung would show some generalized expansion and improvement in color upon the application of positive pressure but would resume its former appearance when the pressure was released. These babies, with the exception of one, died subsequently. Autopsied sections of the lungs in every instance showed pathology which was interpreted as alveolar dysplasia or hyaline membrane formation. In the one exception, the presence of alveolar dysplasia was predicted at operation but the baby survived.

In a previous article,⁶ the clinical appearance of a baby with atelectasis (or alveolar dysplasia), the diagnostic criteria, the criteria for operation, and the technique of the surgery performed was outlined. In brief, the babies operated upon have been newborn infants who have developed cyanosis when removed from oxygen and who were quickly relieved of cyanosis by the reapplication of oxygen; they have had moderate to marked supra and infra sternal retractions; their course was progressively downhill during the period observed (usually about two days following birth) and who, in the opinion of the attending pediatricians, would not have survived without operative interference. Congenital heart disease, brain damage, diaphragmatic hernia and other conditions which might simulate the picture of atelectasis (or alveolar dysplasia) were excluded by appropriate clinical and x-ray examination. (In all of the autopsied cases, nothing but pulmonary pathology was found. The surviving infants showed no abnormalities after recovery from the atelectasis.)

The surgery itself, which is simple and quickly performed by the experienced operator, requires the close cooperation of the pediatrician, the surgeon, and the anesthesiologist. The trachea is first suctioned by bronchoscope or catheter to remove any possible accumulation of secretions or mucous plugs (no mucous plugs and very little moisture in the respiratory tract has been found in any of our own surgery patients. The chest is entered through an incision in the 4th or 5th inter-space, anterolaterally, while the anesthesiologist maintains a positive pressure of 6 to 8 cm. of H₂O through a tight-fitting face mask. The ribs are retracted, the lung visualized, and the anesthesiologist then applies pressure as needed to expand the un-aerated lung. The pressure required may be as little as 15 cm. of H₂O or

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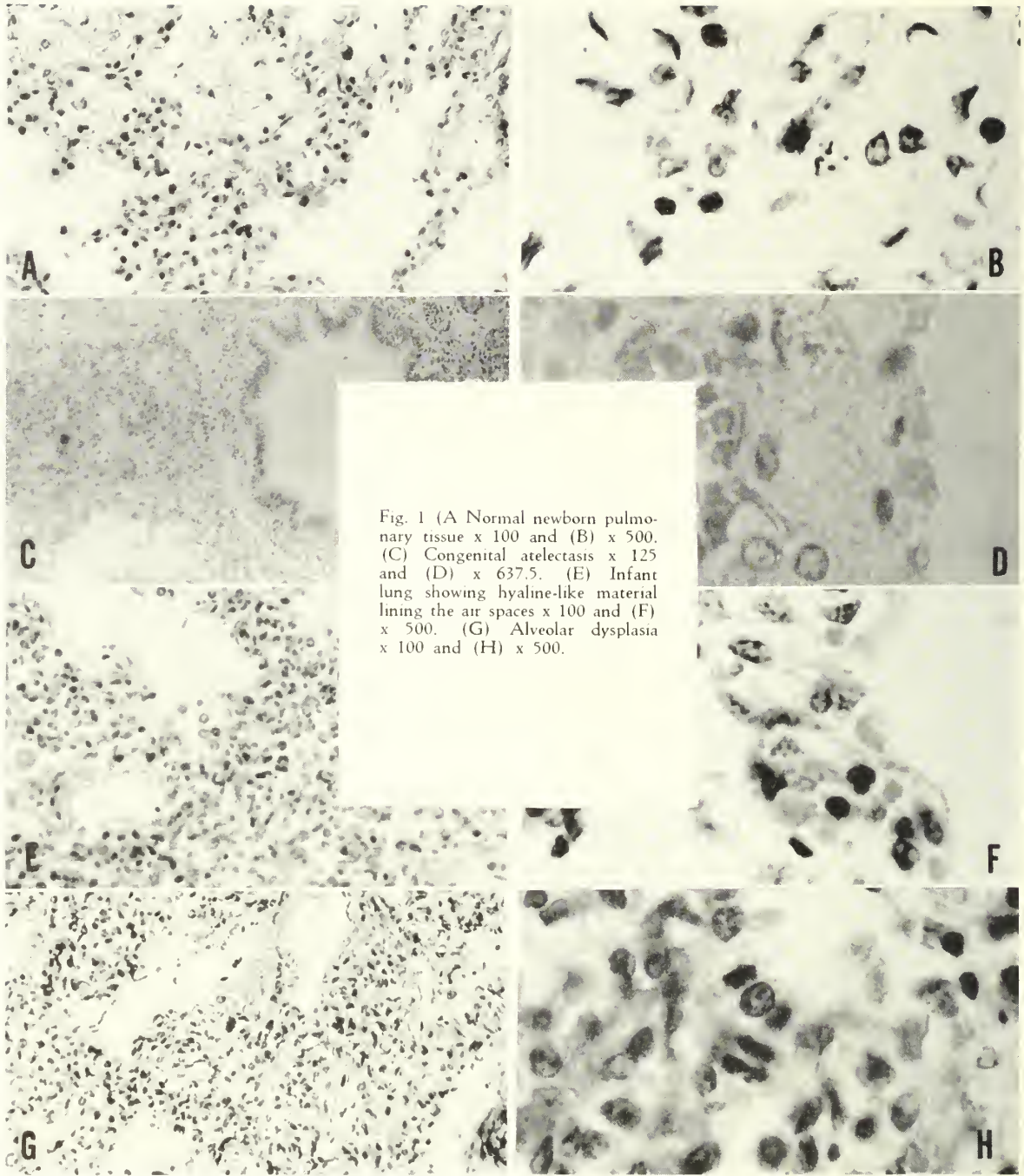


Fig. 1 (A) Normal newborn pulmonary tissue x 100 and (B) x 500. (C) Congenital atelectasis x 125 and (D) x 637.5. (E) Infant lung showing hyaline-like material lining the air spaces x 100 and (F) x 500. (G) Alveolar dysplasia x 100 and (H) x 500.

as much as 30 cm. of H_2O . If expansion does not take place at the higher pressure, the lung is considered unexpandable and the procedure is terminated. The pressure is applied rhythmically and is continued until all visible portions of the lung have been aerated or until it has been decided that aeration is not possible. Only local anesthesia is used.

To date, we have operated upon nine babies* Five of these survived, four died. All of them had the clin-

*Including one operated upon by Dr. Dean Crystal of Seattle, Washington who originally suggested the procedure.

ical appearance of congenital atelectasis as described above. We knew of no way then and know of no way now to distinguish preoperatively between those with atelectasis and those with alveolar dysplasia. We believed that none of these babies would survive without surgery. The crux of the matter lies in the prognosis. It might well be contended that the babies who survived did so despite the surgery, not because of it. We do not feel this to be true because (1) the condition of the infants steadily worsened during the period of preoperative observation, (2) there was a definite change in the



Fig. 2. The marked "diaphragmatic tug" of congenital atelectasis.



Fig. 4. The thoracotomy incision and exposure obtained. The view is from the infant's left side.

appearance of the lung during the surgical procedure, (3) the infants' clinical condition was improved immediately following surgery and continued to improve to full recovery, and (4) pre and postoperative x-rays showed improvement in the aeration of the lungs following surgery. The case of one of the surviving infants was an exception to some of these statements. This child was operated upon only 12 hours after birth, because of his rapidly deteriorating condition. His lung did not show the striking changes with the application of positive pressure that was seen in the other surviving infants. Postoperatively, he continued to show marked retraction and quick development of cyanosis when removed from oxygen. On the third postoperative day he began to improve; by the fourth postoperative day he appeared well, and has remained well since. Surgery may or may not have been of benefit in this instance.

The application of positive pressure prior to thoracotomy was tried on two of the infants who survived without beneficial effect in relieving the atelectasis. When the chests were subsequently opened, the lungs were

found to be collapsed. With the chest open the lungs were then readily expanded with positive pressures below 30 cm. of H_2O . Smith and Chisholm⁷ determined that newborn infants were able to exert pressures as high as 50 cm. of H_2O on inspiration. The vigor of the inspiratory efforts of the infants in this series indicates that they were able to attain pressures which should have expanded their lungs if that were the only factor involved. The closed compartment effect of the intact thorax appears to be the other factor preventing expansion. When the thorax is open, the lung can be fully expanded. Another obvious advantage of the thoracotomy is that the lung may be visualized during the application of the positive pressure and the duration and degree of pressure necessary can be accurately determined. Unilateral thoracotomy appears to be well tolerated by even the premature infant. Bilateral thoracotomy is not well tolerated. Two of the infants in our series who died, died during or shortly after surgery in which bilateral thoracotomies were done. These were done in an attempt to expand lungs which were unexpandable. Premature infants below the weight of 1500 grams are poor candidates for this procedure because of the probability of immature lung development.

SUMMARY

1. The pathogenesis and diagnosis of congenital atelectasis and related conditions are reviewed.
2. A surgical method of treatment is discussed and the results of operation upon nine infants are presented.

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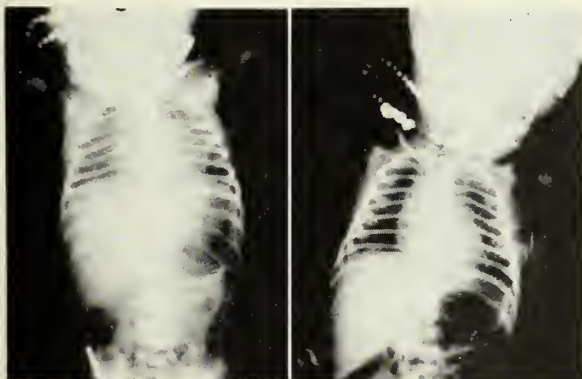


Fig. 3. (Left) Preoperative and (right) postoperative x-rays of a patient successfully treated with thoracotomy. The x-rays were taken just before and just after the surgical procedure.

Hydronephrosis in Children

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THE hydronephroses which are encountered in children fall into two categories, congenital and acquired, with those of congenital origin outnumbering the acquired. Meredith Campbell¹ has stated that about 12 per cent of all individuals are born with some type of malformation of the genito-urinary tract, and that of these approximately one in six has congenital obstruction in the upper urinary tract. With the exception of certain rather rare instances of neuromuscular dysplasia, congenital dilatation of the renal pelvis or ureter, or both, results from obstruction. The obstruction may be at any level, from the renal calyx down to the prepuce. In the absence of infection, hydronephrosis is less marked the more remote the obstruction is from the kidney.

Renal excretion begins between the fifth and sixth months of fetal life and, for this reason, when obstruction then exists advanced hydronephrosis may exist at birth.²

Strictures are the commonest congenital urinary obstruction and may occur in one form or another at any level in the urinary tract. These include congenital contractures and valve-like flaps in the region of the vesical outlet. Secondary ureteral kinks and an altered angle of ureteral insertion into the renal pelvis are frequent and may singly, or in combination, increase the degree of obstruction. Aberrant renal or other vessels sometimes compress the ureter either primarily or secondarily. Occasionally the ureter is compressed by congenital bands or by periureteral fibrous tissue following inflammation. Urinary calculi, though rarely present at birth, are acquired and not congenital.

Hydronephrosis results from continued urinary obstruction and when the blockage is below the renal pelvis there is hydro-ureter as well. In the development of hydronephrosis the earliest gross pelvic changes are noted in the minor calices. As the pelvis and calices dilate, the parenchyma is increasingly compressed against the non-elastic fibrous renal capsule. The volume of the vascular supply, and particularly of the capillary bed of the organ, is then correspondingly reduced. Space does not permit a detailed description of the pathological and physiological changes which occur during the course of renal destruction, but excellent descriptions may be found in the work of Hinman.³ It suffices to say that the radial vessels in the renal parenchyma are shortened and crinkled or angulated while the circumferential vessels, those which parallel the surface of the organ, are stretched and narrowed. As a result, trophic changes in the parenchyma occur, due to anoxia and anemia, and there is progressive tubular dilatation and atrophy to-

gether with parenchymal thinning, sclerosis and diminution of function. Unrelieved, the organ becomes a dilated sack, consisting of a thin sclerotic rim of parenchyma, which has little or no functional value. In many instances renal infection intervenes. This infection is probably most often hematogenous in origin. The advent of infection accelerates the destructive process. The end-result of this process is pyonephrosis—not "chronic pyelitis" as one might suppose if the only investigation made were a urinalysis.

In the earlier stages of hydronephrosis the renal changes, said to be due to a "compression nephritis," are reversible; elimination of obstruction and any co-existing infection is commonly followed by a return of essentially normal kidney function. When the obstruction is unrelieved, or if severe or therapeutically resistant infection has the upper hand, renal changes become irreversible and frequently nephrectomy is required. The renal lesion is readily identified by complete urologic investigation. Persistent pyuria, pain or tumor along the course of the upper urinary tract is the usual indication for this investigation. Not infrequently hematuria may occur and may be the only presenting symptom. The pain may simulate intra-abdominal disease such as appendicitis, intestinal obstruction, cholecystitis, etc., and lead to a needless laparotomy. This merits serious consideration because in one-fourth of the cases of congenital supra-vesical obstruction the lesion is bilateral.

Congenital obstruction in the ureter occurs most often in the upper and lower thirds of the ureter. The most common cause of such obstruction in the upper third of the ureter is angulation, or compression, of the ureteropelvic juncture by anomalous vessels passing to or from the lower pole of the kidney. More commonly a congenital stricture occurs in the upper third of the ureter. Congenital strictures occur most often in the lower third of the ureter.

Obstruction due to aberrant vessels commonly manifests itself in the young by persistent pyuria, or pain on the side of the obstruction, or both. About 25 per cent of all kidneys have an anomalous blood supply with aberrant arteries or veins, or both, passing to or from all parts of the kidney, including the anterior and posterior surfaces of the lower pole. In a discussion of this type of hydronephrosis we are concerned with the last group because they often cause primary or secondary obstruction of the upper ureter which they traverse. Transverse compression of the ureter by the anomalous vessel, together with the obstructive changes produced thereby, are frequently recognizable in well made pyelograms. In Campbell's experience half of such cases of vascular

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ureteral blockage in children require nephrectomy because of advanced renal damage. In most of the others, compressing vessels may be divided with impunity. If a compressing artery supplies more than one-fourth of a kidney, and therefore should not be cut, some form of a plastic operation on the pelvis should be done in order to alter the level of the ureteropelvic juncture sufficiently so it cannot be compressed by the anomalous vessels. Surgical treatment of existing hydronephrosis is preferably conservative and is directed at providing normal urinary drainage. This is usually accomplished by some form of plastic operation on the renal pelvis or ureteropelvic juncture—when the damage is within the limits of reversibility. The Foley³ type of plastic operation has been used with considerable success in cases of this sort. Unfortunately about half of the cases of upper ureteral stricture demand nephrectomy because of the ravages of infection. When such a kidney is a solitary one, and a plastic operation is technically impracticable, nephrostomy may be used to advantage.

Congenital stricture in the upper ureter occurs most often at or near the ureteropelvic juncture. This lesion, like congenital stricture in other ducts, such as the biliary and intestinal tracts, is simply an anomalous narrowing of the lumen and without induration or fibrosis except when subsequent inflammation or infection has occurred. These strictures usually involve only a short segment of the ureter, not over two or three millimeters in length, but may be considerably longer.⁴ Usually the correct diagnosis is readily made by complete urological examination, but in some cases only exploration will demonstrate whether the obstruction is due to such a stricture, aberrant vessel blockage at the ureteropelvic juncture, ureteral compression by fibrous bands, enlarged lymph nodes, or purulent collections.

Stricture *below* the ureteropelvic juncture occurs predominantly in the lower third of the ureter where it is bilateral in about one-third of the cases. As a rule the ureteral dilation is greatest just above the stricture and often this dilatation acts as a buffer to spare the kidney the full harmful effects of urinary back-pressure so that, where infection has not complicated the situation, renal damage due to hydronephrosis may not be great. Where ureteral dilatation and renal damage are not advanced, such strictures will usually respond satisfactorily to periodic progressive cystoscopic dilatation. In dense strictures involving the ureteral meatus cystoscopic division of the stricture may be possible. In others, transplantation of the ureter to a new site may be done. Plastic operations on the body of the ureter are frequently unsatisfactory. When renal damage is beyond repair, as is the case in about 15 per cent of the cases, complete nephro-ureterectomy should be done. If the kidney is a solitary one, or when the opposite kidney is incapable of supporting life, the most conservative treatment is demanded and it is usually best to provide some form of permanent diversion of the urine such as nephrostomy or cutaneous ureterostomy.

For the sake of completeness one should mention hydronephrosis due to ureteral kinking caused by renal

ptosis—although in many such cases an anomalous blood supply, and other factors, doubtless play an important role. A search of textbooks suggests that these cases are rare in children, if they occur at all—despite the fact that they are relatively common in adult females of slender build. They are probably congenital in the sense that a defect in Gerota's fascia permits their development; and acquired in the sense that various changes in the process of growth encourage their development.

We have mentioned two forms of hydronephrosis which are not commonly seen in children. The first is the so-called acquired type of hydronephrosis. The most common cause of this condition are stones, tumors along the urinary tract, prostatic enlargement, and extra-renal tumors or other pathological conditions. Since these conditions are not commonly encountered in children the condition will not be discussed in detail here. The second type of hydronephrosis, also rarely seen, has no demonstrable obstructive basis and has been ascribed by numerous writers to neuromuscular dysplasia or some form of abnormality of the nerve supply of the ureter. We have seen two such cases. In both cases the entire ureter was freed of adhesions, straightened, excess ureter removed (50 per cent), and the ends united over a large T-tube. In both cases there has been marked improvement in renal function, and marked diminution (but not elimination) of urinary infection. Development of both children is proceeding normally.

Not infrequently patients who have unexplainable symptoms referable to the upper abdomen or flank will be found to have hydronephrosis if intravenous pyelograms are made. In the absence of infection symptoms may be vague and ill-defined.

Symptoms due to congenital hydronephrosis may appear at any age. If infection or bleeding do not occur the condition may escape detection for years, as was the case in a patient of O'Connor,⁵ and in one of our own, reported elsewhere.²

The classical symptoms of hydronephrosis are pain and tumor. The pain may be dull and achy in type or may be sharp and knife-like. It is usually located in the corresponding flank, and may or may not radiate along the course of the ureter. A mass may or may not be palpable in the loin. Such masses are more readily palpable in children because of their thinner musculature. Hematuria may be an associated symptom. Pyuria, chills or fever, may or may not be present. As in other forms of renal disease, misleading gastrointestinal symptoms frequently occur. A urinary infection which resists ordinary methods of treatment demands an explanation, and pyelograms should be made without further delay. It is axiomatic that infections in the urinary tract are difficult or impossible to eradicate in the presence of obstruction. Therefore all such persistent infections should have the benefit of complete urological investigation.

Urological investigation of hydronephrosis in children presents few problems not encountered in similar investigations in adults, other than the size of the structures

(Continued on page 213)

Herpes Zoster with Motor Involvement

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HERPES ZOSTER,¹ or zona, is probably caused by a filterable virus similar to if not identical with that of chickenpox. This virus may involve a peripheral nerve, spinal root ganglion, cranial nerve ganglion, the meninges, the spinal cord, or the brain. The ganglionitis is marked by necrosis of all or part of the ganglion, at the level of the vesicular eruption. The poliomyelitis is unilateral, segmental, and always more marked in the posterior horn, root, and spinal ganglion, though the anterior horn cells are also commonly affected. Transverse myelitis² is rare. A complete paraplegia has been described. Evidence of damage^{2,3,6} to the brain following herpes zoster is uncommon, but may involve, first, a localized lesion similar to the lesions in the spinal cord, usually resulting in a hemiplegia, and second, a generalized encephalitis. Cranial nerve involvement^{1,2,7} may cause facial palsy (Ramsey Hunt syndrome), trigeminal herpes, oculomotor palsy, or combinations of these. It is thought by some that idiopathic Bell's palsy may be geniculate zoster sine herpette.

Approximately^{2,5,7,8,9} 52 cases of herpes zoster with motor involvement have been reported. Most of these are in middle-aged to older people. Paralysis of the muscles of the upper extremity has occurred in about 45 per cent of these, the trunk muscles have been affected in 40 per cent, and only seven cases have been reported involving muscles of the lower extremity. The zoster eruption precedes the paralysis in three-fourths of the cases and follows the paralysis in one-fourth. The time interval between the eruption and the paralysis varies from one day to two months. In a series⁹ of 44 cases, 81.7 per cent had not recovered fully after a year. The¹ relationship to trauma is unknown. Because of the infrequency of herpes zoster with motor involvement in childhood, the following case is reported.

J. W. was an eleven-year-old white female with no previous illness. On March 11, 1950, she fell on some ice sustaining a contused wound of her left knee. Soon after the injury, the knee began to ache. On March 13, 1950, she found that she was unable to stand because of weakness in the left leg. At about this time the pain disappeared, and red spots which soon changed to blisters appeared on the inner side of the left thigh. Headache had been present for two days. There was no fever, vomiting, or diarrhea, and no recent exposure to acute illness.

Examination disclosed a well-nourished child who was unable to move the left leg well or to support her weight on it. There were numerous red papules and vesicles extending in a linear fashion along the medial surface of the left thigh in the distribution of the anterior femoral cutaneous nerve. She was able to move the leg weakly though there seemed to be some weakness in all the muscle groups. She could flex the leg on the body and could also flex the knee weakly. She was able to move the foot in both flexion and extension fairly well. The left leg did not seem swollen and the joints were normal, and there was no change in sensation in the leg. The right leg and

the arms were normal neurologically. The neck and spine were not stiff. All reflexes were absent in the left leg. There was no clonus. The plantar reflex was normal. There was no general glandular enlargement.

Examination of all other systems was normal. Accessory clinical findings were: temperature 100°(R) and weight 66 pounds. A lumbar puncture was done with clear cerebrospinal fluid. The protein was 10 mg. per cent; the sugar was normal; the cell count was 171, with 10 per cent PMN's, 90 per cent lymphocytes, and two red blood cells. No organism was seen on smear or culture. The spinal fluid Kolmer was negative. Urine showed 2 plus white blood cells and 1 plus albumin on admission, but the next day a catheterized specimen was normal. Hemoglobin was 86 percent. The white blood count was 7,600 with a normal differential. The sedimentation rate was 32 mm. per hour. The serum amylase was 120 mg. per cent. No neutralizing antibodies were found in the blood against Western equine encephalitis, St. Louis type encephalitis, or LCM viruses. Mumps complement fixation test was positive in a dilution of 1:16. The Kahn and Mazzini were negative. X-rays of the chest and dorsal and lumbosacral spines were negative.

Aureomycin therapy was started, 250 mg. every six hours. The knee jerk reappeared on the left on March 19, 1950, and she then felt strong enough to take a few steps. The herpes began to disappear on March 20, 1950. The left ankle jerk appeared on March 21, 1950. At this time she was walking without much difficulty. Discharge was on ninth hospital day.

She was seen again on April 1, 1950, when she still had dry vesicles on the left thigh and was complaining of weakness in the left leg, especially when climbing stairs. The weakness disappeared approximately July 1, 1950, three and one-half months after the onset. She was last seen on January 22, 1951. There was no demonstrable weakness or limitation of motion in the left leg. Both legs were the same length and circumference, and there were no reflex changes. Mumps complement fixation test was again positive in a dilution of 1:16.

SUMMARY

The case has been reported of an eleven-year-old white female who two days after an injury developed herpes zoster along the peripheral distribution of the left second and third lumbar nerves simultaneously with meningitis and transient paralysis of all the muscles of the left leg.

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Social Isolation and Feral Behavior in a Child of Three

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THE problem of feral man has excited the interest of mankind for many hundreds of years. Mythology, folklore, and common gossip contain a wealth of quasi-knowledge about children reared by wild animals in isolation from parents and fellow men. Kaspar Hauser, the Wild Boy of Aveyron, and the Wolf-Children of Midnapore are only a few of the most famous cases whose histories have been reported in detail.^{1,8,10,11} Although a number of reports of supposedly feral children have been discredited^{4,5} and many of the early cases cannot be authenticated, the question of what such individuals would be like is of great popular interest and theoretical importance. Social scientists have pointed out the implications with respect to the impact of culture on individual development.

This is a report of the case of John, a three year old boy who has been observed over a period of two years. John's behavior when he was first seen was that of a feral creature; his history was of relatively complete social isolation from birth. The details of John's development and early life during the period of isolation are admittedly sketchy. Speculations are so indicated in the text of the report. The circumstances of John's early life and the use made by his relatives of the agency which assumed his care were such that additional information was not available. The identity of the family has been disguised without distortion of the dynamic significance of the facts. Together with the description of the boy and the background from which he came, we have summarized the clinical study and treatment of the child during the two years that he has been known to us. Some aspects of personality development and growth as related to the question of social isolation are discussed.

John was delivered to the nursery unit of a children's home at the age of three years, seven months. The responsible agency knew only that the boy had been living with his mother, his elderly maternal grandmother, and a maternal uncle in fairly complete isolation from the world. His father had never lived with his mother and did not know of the child's existence. The mother was said to have an I.Q. of 46; she accepted the separation from her son as inevitable after the death of the maternal grandmother. The uncle was described as "odd, inadequate, and a recluse." A maternal aunt and another uncle took the initiative in removing John from this situation. They had known of his existence and had seen him on rare occasions, but they reported that

they had been unable to do anything about John's isolation as long as the grandmother was alive.

In the nursery John wept inconsolably for almost a week. He repeated one phrase over and over in a wailing chant. This was finally understood as, "I want my Mommy." He did not stand erect nor attempt to move about the room but threw himself on the floor with such force that it was necessary at first to restrain him (by one hand) in his crib until he fell asleep at night. It was necessary to spoon feed him as when left to himself he placed the dish of food on the floor and ate, without use of his hands, directly from the plate. He wet and soiled himself constantly. There was marked perseveration in his behavior and the noises which seemed to be an attempt at speech. One observer described this as "like the whine of a sick pup." Within a few days he began to move about the room on his hands and knees but actively resisted when asked to join other children as they moved about the building. He paid no attention to the other children in the nursery group but did respond to one older boy by directing his attention to him whenever the older boy entered the room. He slept well at night but would not remain quiet during the afternoon rest period. His food intake was three or four times that of the other children of the same age. His maternal aunt visited him during this first period of about a month but he paid no attention to her and gave no indication that he had ever seen her before. His speech was now understood by the staff but he spoke rarely and only to make some demand of the environment. He would sit for long periods with a wheeled toy which he ran back and forth or he turned it over and spun the wheels.

During the second and third months of residence John contracted one upper respiratory infection after another and was necessarily in the hospital room a good deal of the time. Speech improved and it was noted that he used complete sentences when he spoke though his vocabulary was limited. His preferred mode of locomotion was on hands and knees though he did walk at times. He insisted on dressing himself with stubborn persistence and would not accept help with even difficult buttons and fastenings. He began to acquire some control of his bladder but often soiled himself during the day. He voluntarily began to eat less and began to accept some of the routine of the institution. He recognized the various adults and there were some non-verbal interchanges with the other children. Generally John was passive and withdrawn but when aggressed upon he had learned to retaliate by kicking and biting.

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From this time on his progress was steady. At the end of the first six months he had acquired bowel and bladder control except for occasional enuresis. He was beginning to participate in group play and had formed a particular relationship with a girl of about his own age. He no longer appeared obese as he had grown two or three inches in height. Along with improvement in social relationships to both children and adults John expressed an increasing interest in his surroundings. His speech became readily understandable and he was learning new words. He now walked by choice, climbed well, but ran awkwardly.

During the latter half of the year that John lived at the children's home he became less withdrawn and passive. While at first he was unable to hold his own with the other children, towards the end of his stay he could and did challenge those who became aggressive towards him. Ultimately he was victorious in physical encounters with his peers.

At the end of a year John was moved to an adoptive home from the group life at the children's center. John had been consulted about this move and he settled into the family easily and happily. A report from the agency a year after leaving the children's home and two years after separation from his mother was that the boy was doing very well in spite of recurrent upper respiratory infections. He was in kindergarten, could print his own name, and the foster parents considered him to be "very bright."

Physical examinations: No abnormalities noted at any time except for evidence of chronic upper respiratory infection. Tonsillectomy after leaving the children's home.

Psychological examinations: Six months after separation from his mother John achieved an I.Q. rating of 84. Chronological age at this time was 4 years, 1 month. The examiner believed this to be a valid estimate of John's mental capacity. The test was given as the Stanford-Binet, Form L.

He was retested with the same test at the age of 4 years, 5 months, by another examiner who found the I.Q. to be 87 but this time the psychologist concluded that this score was not indicative of the child's potential ability.

Four months after placement, at the age of 4 years, 11 months, the I.Q. had jumped to 98. The same test form was used.

Psychiatric interviews: The initial relationship was a very impersonal one. John accepted nothing from the therapist, treated him as an inanimate object. He did not verbalize easily and not at all for several months. Play materials were used to work through to gaining control of himself, e.g., to control enuresis. In a sense he "borrowed" the therapist's strength to cope with his environment. Eventually he became very warm and friendly and worked out separation from the therapist as he became settled in the foster home.

DISCUSSION

John's isolation was, we believe, fairly complete except for the presence of three people: his mentally deficient

mother who in turn was totally dependent on her mother, the grandmother, who was 75 when John was born, and an eccentric and possibly psychotic uncle. In so far as we can determine, the boy's relationship with his mother was a warm and permissive one which enabled the boy to grow and mature to the extent that the mother could contribute to his growth. The aunt reported that the mother was devoted to the boy, and "did everything for him." The aunt also "believed" that John was toilet-trained and said that he did walk upright before the separation. We do not know the extent of his speech as the aunt said that she had never heard him talk very much. He was reported to be shy.

Davis^{2,3} has reported the case of a girl, Anna, who was isolated and neglected for most of the first six years of her life. Anna later succumbed and there is a possibility that she was mentally deficient in the sense that she could never have learned. The girl, Isabelle, reported to Zingg by Maxfield⁴ was similarly isolated and neglected but survived and Maxfield states that she had "normal mentality." He states further, "Nor do I see any reason to suppose that Isabelle has suffered any permanent arrest of mental development due to her isolation."

Maxfield does not discuss Isabelle's behavior in any detail but what little information is given coincides with Davis' summary of the common characteristics of isolated and feral children. He notes particularly the absence of speech, sensory abnormalities, a feeble-minded appearance, and locomotor difficulties, particularly the inability to run. Kamala, the Wolf-Girl, cited by Gesell⁷ and by Zingg,¹¹ Kaspar Hauser, and other feral children described by Singh and Zingg¹⁰ all had difficulties with upright locomotion. Anna and Kaspar Hauser seem to have had disuse atrophy and perhaps nutritional deficiencies which may have contributed to the locomotor problem. This seems to have been the case also in a boy seen by Gardner.⁶ Isabelle had gross bony deformities which were corrected surgically. John was not malnourished, had no deformities, and had no nutritional disease that could be detected clinically but in spite of this he could not run easily for nearly a year after he was removed from isolation.

Of the three children: Anna, Isabelle, and John, the latter had the least trouble with speech. All gave the appearance of mental deficiency at first. All three resembled feral children in their immediate post-isolation behavior.

In an effort to construct an hypothesis concerning John we have noted that most, if not all, of his behavior could be explained on the basis of the phenomenon of regression. If the information as to speech, toilet training, and locomotion given by the aunt is correct, then John lost modes of behavior which he had once possessed. In addition to isolation he suffered the specific and wrenching trauma of separation. Was his animal-like feral behavior a regression to a very primitive level? Though not equivalent, his behavior and symptoms were not unlike that manifested by the catatonic schizophrenic.

The affection and care that John's mother invested in him may help to explain his dramatic recovery and

progress far beyond what might be expected of him under the circumstances. We postulate that while his psychological strengths were not sufficient to meet the stresses of separation and a foreign environment without severe disturbance, the essentially strong mother-child relationship did facilitate his recovery. We suggest that isolation from social contacts *without* separation from a giving mother who gratified his early oral and dependent needs, as she understood them, epitomizes the difference between John and the isolated and feral children whose cases have been reviewed in preparation of this report.

SUMMARY

The case of John, an isolated child of 3 who presented feral behavior, has been reported. His progress and treatment in a children's home is summarized. The case is compared with similar cases reported in the literature. It is suggested that John's behavior may be explained as regression, and it is postulated that a strong mother-child relationship facilitated recovery.

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American College Health Association News . . .

THIS ARTICLE goes to press previous to the twenty-ninth annual meeting of the Association, which is scheduled to be held at the Edgewater Beach Hotel, Chicago, on May 3, 4 and 5. The next issue of JOURNAL-LANCET will report some of the highlights of the meeting.

* * *

The American College Health Association has lost a valued member with the death of Dr. George M. Decherd, Jr., on March 5th. Dr. Decherd was director of Student Health Service of the University of Texas and a member of the Council of this Association. Dr. Paul L. White has been appointed acting director.

* * *

Dr. Wm. T. Palchanis, secretary-treasurer of the Ohio College Health Association, reports that this Section held its 27th Annual Meeting in conjunction with the Ohio College Association April 6 and 7, 1951, at the Deshler-Wallick Hotel, Columbus, Ohio. Fifty-four persons representing the Health Services of 23 Ohio colleges and universities registered for the meeting.

The program included speeches and discussions on: various problems of the health services; medical aspects of atomic bomb explosions and of civil defense; and problems related to athletic injuries.

Officers for the year 1951-52 will be: Ted Allenbach, M.D., Ohio State University, president (second term); Max L. Durfee, M.D., Miami University, vice-president

(second term); Wm. T. Palchanis, M.D., Ohio State University, secretary-treasurer (third term).

The constitution was amended to include the chairman of the Nurses Section to membership on the Executive Committee.

The Nurses' Section held their second annual meeting and elected Mildred C. Rouse, R.N., University of Toledo, chairman (second term); Mildred Crane, R.N., Otterbein College, chairman-elect; and Hazel DeTrude, R.N., Baldwin-Wallace College, secretary. Their program consisted of round table discussions of the various problems of a student health service nurse. An exhibit of the various forms used in student health services was on display in the meeting room of the Nurses' Section.

The next annual meeting will be held at Wittenberg College in Springfield, Ohio. Dates of meeting will be announced later.

* * *

New directors of health service have been appointed as follows:

University of Toronto—G. E. Wodehouse, M.D., M.R.C.P., Director of Student Health Service.

University of Wyoming—Winifred Ingersoll, M.D., Director of Student Health Service.

Missouri Northeast State Teachers College—Alma K. Zoller, R.N.

University of Florida—E. E. Howard, M.D., Director of Student Health Service.

Central Nervous System Sequellae Following Injections of Pertussis Vaccine

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SINCE 1947 many observers have noted that the injection of pertussis vaccine either alone or combined with other immunological agents may be followed by serious neurological sequellae.

Brody and Sorley, of New York, reported the first case in 1947.¹ Their child received three doses of pertussis vaccine, each of which was followed by a severe reaction, ranging from drowsiness to flaccid and then spastic paralysis. The child finally died of pneumonia.

Byers and Moll, of Boston, were the next to report on this condition.² In 1948 they reported on fifteen children who developed acute cerebral symptoms within a period of hours following the administration of pertussis vaccine. These reactions began as soon as twenty minutes and as long as seventy-two hours after the inoculations. The outstanding symptom was convulsions. All but one of these fifteen children later had evidence of impairment of the nervous system.

Globus and Kohn, of New York, in 1949 reported two more cases.³ Their children were aged eight and nine months. In one instance the reaction was partly reversible, but in the other it terminated fatally. One infant's symptoms followed the second injection of fluid vaccine. The other's symptoms followed the second injection of pertussis antigen. The first injection had been given six weeks earlier, after which there had been a rise in temperature and development of irritability which lasted for two weeks. A second injection was given one month later. He died a month later in stupor.

It is the purpose of this paper to present a case of this type and to draw attention to some of the hazards in the use of pertussis vaccine.

CASE REPORT

S. B., a six months old white girl, was given a third inoculation of tri-immunol the day before admission to the hospital.

About 4:30 in the morning, approximately eight to ten hours after the inoculation, she developed a generalized convulsion. She had another at 7:30 of the same morning. The child's physician could find no immediate cause for the convulsions, such as an infection, so the writer was called in for consultation.

Shortly after admission, at 1:40 P.M., she had another generalized convulsion, with clonic movements, after which she went into a deep sleep. Physical examination was entirely negative. Lumbar puncture, dural taps, blood sugar, urine, blood culture, etc., were all negative. An E.E.G. revealed a diffuse cerebral dysrhythmia. At the present time she is being given sodium dilantin, one-half grain b.i.d., and has had no convulsions since. It has now been about three weeks since the first convulsion.

There is no history of convulsions in the family background. This is undoubtedly a case of extreme sensitivity to pertussis vaccine. The mother stated that following the second inocula-

tion with the tri-immunol, the baby was fussy and irritable for about two weeks.

I believe that there is now enough evidence to at least suggest that the administration of pertussis vaccine to some children may be a hazardous procedure. Whatever the reaction is, between the vaccine and the central nervous system, it is a severe one.

First of all, one should select each child carefully in the administration of pertussis vaccine. I would suggest a careful history of each child's background, especially for central nervous system disease. Any previous convulsions should be a deterrent to the giving of the vaccine. One should withhold further injections from any child who has had a convulsion or an encephalitic reaction following a previous dose of pertussis vaccine. I would, further, not give the usual dose of pertussis vaccine to the very small premature infant, whose central nervous system we know is not too well protected, but do one of two things: either wait until the child has matured enough so that it is apparent that he is developing normally, or decrease the dosage of the vaccine. This last, of course, one cannot do with a multiple vaccine without compromising the diphtheria and tetanus immunity, therefore it is suggested that multiple vaccines should not be given to children with central nervous system disease or convulsions in the family background. The child in the extremely allergic family or the child with an allergy himself should also be watched carefully. The child with cerebral palsy had better not be immunized with pertussis vaccine.

Another important reason for not trying to impose the pertussis vaccine on everyone is that the treatment of pertussis is no longer the problem it used to be. Even with the large number of children in Minneapolis who had pertussis last year, I do not believe there was a single death.

If this problem is approached rationally, it should be no cause for concern; however, we as doctors are going to have to spend a little more time with our small patients in order to weed out those children to whom it is dangerous to give pertussis vaccine. Inoculation with pertussis vaccine may be a dangerous procedure and we should proceed cautiously.

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Progressive Diaphyseal Dysplasia*

With Report of a Case

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PROGRESSIVE diaphyseal dysplasia is a term suggested by Neuhauser to describe a rare congenital dystrophy with thickening and sclerosis of bone. The first case, in an eight-year-old boy, was reported by Engelmann in 1929.¹ Riley and Schwachman² published reports of two apparently similar cases in 1933, and Neuhauser et al³ reported their observations over a seven-year period with four patients ranging in age from four to ten years, including those reported by Riley and Schwachman. Sear⁴ added a sixth case in a ten-year-old boy in 1948. Michaelis⁵ reported this disease in a twenty-four-year-old female in 1949 and Stronge and McDowell⁶ added an eighth case in reporting a twenty-four-year-old male in 1950. The syndrome is characterized by bilateral, symmetrical and progressive sclerotic involvement of the diaphyses of the long bones. Sear⁴ also reported involvement of the skull, cervical spine, scapulae and bones of the pelvis. The earliest onset of symptoms noted appeared to be about one year.

The cases reported showed evidence of growth failure, disproportionately long extremities, diffuse muscular dystrophy involving mostly the lower extremities, waddling type gait, and altered neurological signs varying from hyperactive to hypoactive deep reflexes and inconstant ankle clonus. All usual laboratory studies were normal. Neuhauser et al³ reported that the pathological findings consisted of marked thickening of the bony cortex with some thickening of periosteum. There was an increase in the fibrous component of periosteum and marked osteoblastic as well as osteoclastic activity. The cortex showed gradual transformation into a cancellous structure. The eight reported cases presented almost identical roentgen findings, varying with degree of involvement according to the duration of the disease. The changes were symmetrical in distribution with cylindrical involvement of the diaphyses of long bones. The skull, cervical spine, scapulae, clavicles, and pelvic bones were variously involved. There were marked sclerotic changes in the cortices with loss of the normal bone trabecular pattern. The lesions were abruptly demarcated and tended to progress along the long axis of the bone both proximally and distally. The metaphyses and epiphyses were not involved.

CASE REPORT

J. A., a twenty-month-old white female, was admitted on September 29, 1949, for a diagnostic study. The par-

*Engelmann's disease.

†Presented at the annual fall meeting of the Northwestern Pediatric Society, at Bayport, Minnesota, October 6, 1950.

†From the Departments of Pediatrics and Radiology, Fargo Clinic, Fargo, North Dakota.

ents sought medical attention because they were concerned about the child's inability to turn her head without turning her entire body. They also noted that she was slow in development when compared to her two siblings. The child was born at term, and delivery was spontaneous. The birth weight was 7½ pounds and neonatal history was uneventful. Her subsequent history was characterized by a delay in motor development and the occurrence of frequent, severe and prolonged upper respiratory infections. She did not sit alone until after nine months of age and at twenty months was still unable to walk, although she was capable of standing alone with aid of a chair. There was also some apparent delay in speech development. A normal diet was supplemented with an average dose of a multiple vitamin preparation. There was no significant family history. Her mother and father were born in Minnesota and were of German extraction. Two siblings, 7 and 5, were living and well.

Physical examination

On admission, the child's weight was 18 pounds, six ounces, and her height was 28 inches. She was very irritable. She sat up poorly but was able to stand with support. Examination of the head revealed a cranial circumference of 49 cm. There was a prominent metopic suture line. The fontanelles were closed. There was a suggestion of hypertelorism. The nasal bridge was depressed. Examination of the nose and throat revealed a severe mucopurulent rhinitis with a copious postnasal discharge. The hard palate appeared to be arched and somewhat narrow. The teeth were irregularly spaced and carious. Examination of the eyes, including a fundoscopic examination, was negative. The neck was thick and rather full at the base and the cervical spine was wide and thickened when palpated. She was unable to turn her head from side to side. Examination of the chest, heart, and abdomen were negative. The genitalia were normal. Examination of the extremities revealed marked thickening of all of the long bones. They appeared to be larger in diameter rather than in length. No flaring of the epiphyses was noted. The skin was unusually moist. The skin and subcutaneous tissues over the extremities, palms and the soles felt thick and woody and had a consistency similar to that present in scleroderma. The neurological examination was negative except for the presence of hyperactive knee jerks and a positive Babinski sign on the left.

Laboratory data

The hemoglobin level was 11.8 gm. The white blood cell count was 7,800 cells per cubic millimeter with a normal differential count. The cells looked normal.

Examination of the urine was negative. A tuberculin test was negative. Serological tests for syphilis on the infant, mother, and father were negative. The blood urea nitrogen was 10 mg. per cent; the blood cholesterol was 96 mg. per cent; the blood calcium was 10.9 mg. per cent; and the phosphorus was 4.5 mg. per cent. Total proteins were 8.24 gm. per hundred cc., the albumin was 5.4 gm. and the A.G. ratio was 1.9/1. The alkaline phosphatase was 2.3 Bodansky units. Histologic studies of the bone marrow revealed a profound degree of granulocytic hyperplasia. The picture did not appear to be specific for any disease.

Roentgen examination

The radiographic findings in the skeleton were gross and dramatic and similar to those described by Engelmann and later by others who have reported cases of this rare disease. The skeletal involvement was symmetrical in distribution and involved the diaphyses of all of the long bones, skull, upper cervical vertebrae, clavicles, and metatarsal bones. In the calvarium there were large sclerotic patches in both frontal and parietal bones and in the base of the skull there was an amorphous increase in density most notable in those bones which form the floor of the anterior and middle cranial fossae and roofs of the orbits. Structures at the base of the skull appeared both abnormally thick and dense. The first two cervical vertebrae were also thick and sclerotic (figure 1A). The remaining vertebrae appeared normal. The humerus, radius, and ulna in both upper extremities (figure 1B) and the femur, tibia, and fibula of both lower extremities (figure 1C) showed fusiform enlargement of the diaphyses with marked thickening of the cortex by endosteal and periosteal growth of mottled new bone which was irregularly dense but without recognizable trabecular pattern. In all of these long bones the periosteal overgrowth of bone was exhibited by layering in the familiar onion skin pattern. The epiphyses and metaphyses were normal. The joints appeared normal. The mid-portions of both clavicles were densely sclerotic. The ribs and scapulae appeared rather large and bulky as compared with those of the average child of this age but there was no alteration in density. The bones of the hands were not involved but the second, third, and fourth metatarsals of both feet displayed the same cortical thickening in the midportion of their shafts (figure 1D) as was noted in the long bones of the extremities. Films of the pelvis were not made.

All of these skeletal findings have been described among the eight cases of this disease previously reported. When compared with the illustrations of x-rays of other patients, however, ours seems to have more marked periosteal layering in the long bones than have most other cases reported.

Pathology

Sections of the biopsy* taken from the tibia were made in the laboratory of Dr. W. V. Knoll at St.

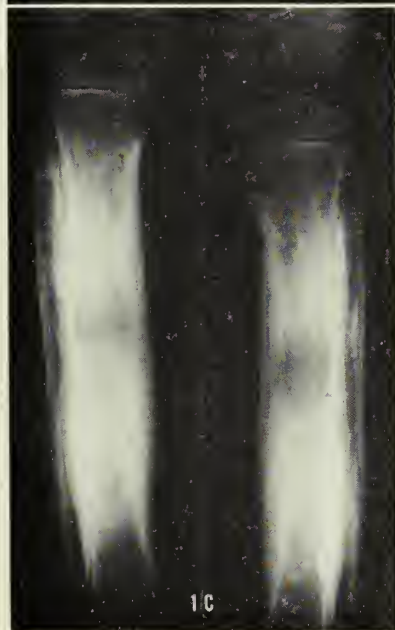
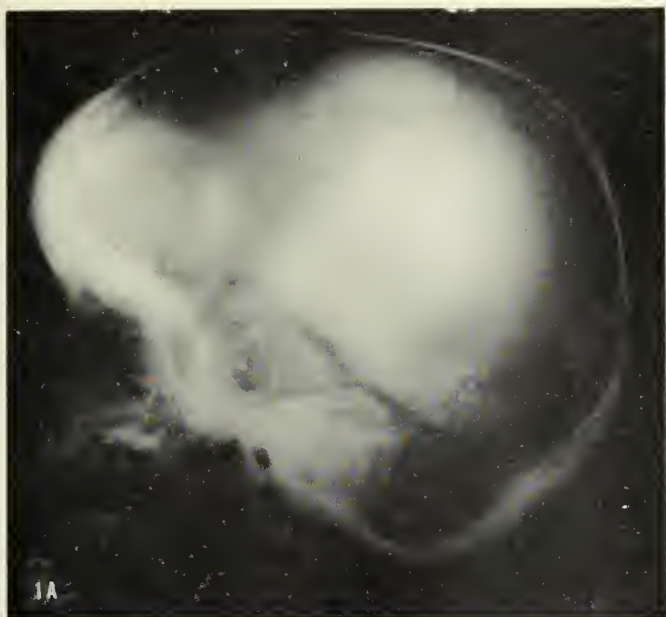
*The biopsy was performed by Dr. S. Houkom of Duluth, Minnesota, and we wish to express appreciation for his permission to use this material.

Mary's Hospital, Duluth, Minnesota. His report is as follows: "Sections of the osseous tissue show bone trabeculae which are surrounded by a considerable amount of fibrous tissue, the latter being highly vascular. Some of the small trabeculae are very angular at their extremities, whereas others are well-rounded. The smooth surface of the biopsy fragment, which apparently represents the cortex of the bone, is covered with a highly vascular, loose fibroconnective tissue with some evidence of collagen fibers at the junction of this covering with the osseous tissue fragments. There is no evidence of compact bone forming a cortex but there are small fragments of bone trabeculae surrounded by dense fibroconnective tissue. Many of these bone trabeculae show margins covered with osteoblasts, indicating definite bone formation. A few of the trabeculae show an occasional osteoclast along the margin which is irregular in outline. The haversian canals are filled with fibroconnective tissue similar to that surrounding the bone fragments. This fibroconnective tissue is a loosely arranged structure sometimes similar to mesenchymal tissue. The bone trabeculae, themselves, are usually average in appearance. However, in a few fragments, a mosaic pattern is suggested."

A slide was furnished by Dr. Knoll and was reviewed by Dr. John LeMar of the Department of Pathology, Fargo Clinic. He had the following additional comments: "Vascularity of the loose connective tissue is certainly marked. In addition, marked thickening of the walls of some arterioles is noted, particularly in the area in which the club-like trabeculae replace the normal cortex and in the thickened fibrous periosteum due to proliferation of the cells of the media and adventitia. The intimal cells in these are not increased in number but are swollen and project into the lumen. A rather marked degree of lamination is seen in some of the trabeculae. Several areas were found in which spicules of laminated bone were enclosed in dense bone, presenting few osteocytes as though new bone formation occurred about pre-existing trabeculae and the presence of a layer of active osteoblasts about the periphery supports this impression. At points of periosteal contact, an inner band of proliferating, loosely knit fibrous tissue lies between the trabeculae and an outer shell of collagenized periosteum. This loose vascular tissue is continuous with identical tissue lying deep within the bone. There are areas in which osteoblastic proliferation is prominent with apparent new dense bone formation, and others showing no neo-osteogenesis. One is impressed by the frequent occurrence of square-cut bizarre trabeculae associated with active osteogenesis, the absence of hematopoietic tissue, the absence of a true cortex, thickening of periosteal arterioles and irregular occurrence of the previously mentioned loose connective tissue surrounding all trabeculae and lying beneath the periosteum" (figure 2).

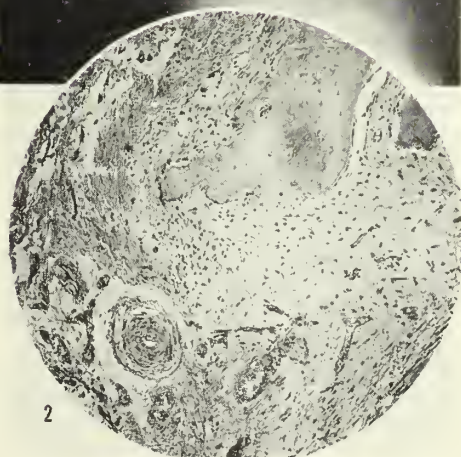
COMMENT

Progressive diaphyseal dysplasia is one of the rarest of the sclerotic bone diseases. The diagnosis is suggested by roentgen study. The difficulty in diagnosis lies pri-



Roentgenograms showing (1A) sclerotic patches in the skull; (1B) diaphyseal thickening; (1C) sclerosis; and (1D) periosteal layering in the bones of the extremities.

2. Section of bone biopsy showing fibrous replacement of marrow and proliferation of new bone. Marked vascularity of the loose-knit connective tissue and thickening of the wall of a small arteriole are also well demonstrated.



marily in its rarity, only eight cases having been previously reported. It is to be differentiated from scurvy, melorheostosis (Leri), osteopetrosis, infantile cortical hyperostosis of Caffey and Silverman,⁷ the familial metaphyseal dysplasia reported by Bakwin and Krida,⁸ hypervitaminosis A, polyostotic fibrous dysplasia, congenital syphilis, and possibly Pyle's disease⁹ and bone changes with blood diseases.

CONCLUSION

A case of progressive diaphyseal dysplasia (Engelmann's disease) is presented with a complete roentgenological and pathological description.

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(Continued on page 213)

Polyostotic Fibrous Dysplasia

With Report of a Case

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CYSTIC lesions of bone, single or multiple, present a difficult diagnostic problem for the roentgenologist, especially when they occur in young persons who show no evidence of hyperparathyroidism. Should the pathologist report fibrocystic disease following biopsy of such a lesion, then the clinician handling the case has a bewildering array of diseases that might satisfy these criteria. Some order has been brought to this confusion in recent years by the studies of Dr. F. Albright and his coworkers in 1937 and of Dr. Louis Lichtenstein in 1938. Until 1945, 90 cases of this condition had been reported under 33 different diagnoses.

This disease occurs predominantly in childhood and early adult life and more frequently in females. The average age at onset of symptoms is 10 years. Pain is the predominant symptom and deformity, limp and pathological fracture are the most common signs produced by the lesion. Occasionally the disease is asymptomatic and found only incidentally during x-ray examination. The affected bone shows a rarefying lesion that is generally called a cyst. There may be thinning of the cortex, broadening or expansion of the bone, or secondary deformities such as bowing or pathologic fracture. Fine spotty calcification may give a trabeculated appearance to the lesion.

Of the extra-skeletal features, 32 of 90 cases showed cutaneous pigmentation. Evidence of endocrine dysfunction, largely a matter of precocious sexual maturation, have been shown in 20 of the 90 patients. A combination of these features is called Albright's syndrome. Blood chemistry has been essentially normal, with serum phosphatase being elevated in proportion to the skeletal involvement and the activity of the process.

PATHOLOGY

Gross examination of the affected bone shows a replacement of spongy bone and a filling of the marrow cavity by grayish-white, rubbery tissue, sometimes described as gritty, and frequently likened to cartilage because of its consistency. Histologically it is seen that the medulla and bone have been replaced by fibrous tissue through which are scattered trabeculae of poorly formed primitive bone. The connective tissue is composed of a loose, whorled arrangement of small spindle cells with an occasional area of collagen or myxomatous tissue. Rarely foci of thin-walled blood vessels or islands of hyaline cartilage are seen. The trabeculae are of varying size and shape, have no mature lamellation, and

are atypically calcified, metaplastic fiber bone. They show very few osteoclasts. No lesion has been reported showing malignant changes.

It is to be emphasized, as Jaffe and Lichtenstein have, that although the lesions are called "cystic" because of their absence of bone and resulting radiolucency, they are not true cysts and are actually composed of fibrous tissue which completely occupies the area.

ETIOLOGY

Many theories have been extant but that of Albright seems most acceptable. Albright^{3,4} feels that the tendency toward unilaterality of the bone and cutaneous lesions precludes any primary endocrine or metabolic disorder as their cause. He suggests the possibility of a neurologic or embryologic defect, e.g., a neurologic lesion disturbing the afferent impulses to the anterior lobe of the pituitary gland.

It is not inconceivable, therefore, that the sequence of events in polyostotic fibrous dysplasia is somewhat as follows: Some hypothalamic lesion in the region of the third ventricle produces secondary disturbances in the anterior lobe of the pituitary, resulting in abnormal stimulation of its various component tropic hormones. This hypothesis, in addition to explaining the usual findings in polyostotic fibrous dysplasia, would also account for the occasional occurrence of concomitant hyperthyroidism in some cases.

CASE REPORT

H. B. B., white, male, born May 14, 1928, was first seen by us at the time of his college entrance physical examination on September 23, 1947. No complaints or disabilities were noted during this examination. His medical history recorded whooping cough, chickenpox, and measles between the ages of five to seven, a broken leg with a bone cyst at the age of 12, and a broken arm, which healed normally, at the age of 16. His physical examination was entirely normal. He was negative to histoplasmin and two strength PPD. Inspection of a 70 mm. chest photofluorogram gave negative findings. He was not seen again medically until March 19, 1948 when he was given a permit to participate in intramural wrestling.

On March 31, 1948 a communication was received from the U. S. Navy Officer Procurement branch office that their routine chest x-ray film on March 29, 1948 showed multiple cystic areas involving most of the ribs. On a call at the college dispensary, the patient told of having *ostitis fibrosa cystica* since the age of 12. At the time of an x-ray inspection in the summer of 1946 for admission to the U. S. Naval Academy, the cystic condition of the ribs was also noted.

On October 15, 1948 he came in fearing that he had developed left inguinal hernia, a condition which was not found on examination. On October 21 he was treated for non-febrile rhino-pharyngitis and on November 10 and 11 for a slightly febrile rhino-pharyngitis. On November 30 he was refused a permit to participate in intramural boxing, because of the previous findings.

*From the College Health Service, the Pennsylvania State College, State College, Pennsylvania.



Fig. 1. X-ray films of chest and wrist bones.

Author's note. The patient was restudied in January, 1951 and found to be in excellent general health with a five pound weight gain in the past year and x-ray films identical with those in upper and lower left and upper and lower right.



On December 8, 1948 he reported to the dispensary with pain, swelling and limitation of motion of the right wrist, and a temperature of 99.4° F. He was hospitalized with a generic diagnosis of arthritis. During his nine days' confinement in the infirmary he was uncomfortable with fever and pain. Laboratory studies, including blood counts, sedimentation rates, urinalysis, blood phosphorus, blood calcium and serum phosphatases, were normal as were repeated Sulkawitch and Bence-Jones protein tests on the urine.

Examination of numerous x-ray films revealed many scattered cystic areas in the skeleton, with the area in the right carpal bones most important in relation to his present illness. It was believed that virtual collapse of these was responsible for his clinical condition. He did not improve much and was discharged to an orthopedic surgeon in another state where a diagnosis of septic arthritis was made, although all laboratory

procedures were negative. No aspiration was done. He was given large doses of penicillin with application of a sugar tong splint, was afebrile within a week and was discharged from the orthopedist's care on January 3, 1949.

When he returned to school in January 1949 he had some residual pain and stiffness which has been treated intermittently until the present date, February 1950, with wax baths. These have given progressive slight improvement particularly as regards the pain. The wrist continues to be moderately stiff without any particular disablement. In March 1949 he was ill for two days with rhino-conjunctivitis and two months later he was ill for eight days with chickenpox.

After studying all the evidence, including repeated x-ray films, it seems conclusive that this patient has polystotic fibrous dysplasia.

Chemical and Pharmacologic Investigations on Cardiac Glycosides*

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THE importance of the cardiac glycosides for the treatment of heart disease is well known and their use for this purpose dates far back into antiquity, the ancient Egyptians having employed squill bulbs to combat dropsy, one of the striking symptoms of cardiac failure. However, it was not until the end of the 18th century, after the publication of a detailed description of the curative properties of the foxglove by William Withering in 1785, that the administration of cardiac glycosides began to be an accepted medical practice.

There were many attempts during the course of the 19th century to isolate the active principles of digitalis and related drugs and to make them available for chemical and pharmacologic investigation. Digitaline crystallisée, discovered by the French pharmacist Nativelle in 1869 and later given the name digitoxin by the pharmacologist Schmiedeberg, was the only pure crystalline cardioactive drug until the French chemist Arnaud isolated ouabain in 1888.

The successful chemical and pharmacologic examination of the cardiac glycosides is in reality confined to the last three decades. Biochemical research in related fields had by then become sufficiently advanced to provide suitable methods for the investigation of this class of compounds and to enable conclusions regarding their structures to be drawn from observations on related substances.

As the name indicates, a characteristic of the cardiac glycosides is that they are sugar-containing compounds; they are built up from a so-called aglycone and a sugar portion. For the differentiation of the pharmacologic and therapeutic properties of the cardiac glycosides, a precise knowledge of the sugar fraction is just as important as an understanding of the aglycone portion.

The chemical investigations which, in the last 30 years, have extended not only to the main representatives of the cardioactive drugs, digitalis, strophanthus and squill, but also to numerous other species of plants, have resulted in a tremendous volume of literature. In this review it is only possible to give a general survey of the work and to pick out a few examples to illustrate the method of working in this field and the manner in which deductions are made from the experimental results. First, we shall consider the aglycones and later the sugar fractions.

Research work on the aglycones took a decisive step forward when it was shown 20 years ago that the substances belong to the large class of steroids, which contains—in addition to the sterols—the bile acids, the sex hormones, the hormones of the adrenal cortex and many saponins. In the following figure 1, a number of representatives of this important class of compounds is shown, together with their chemical formulae:

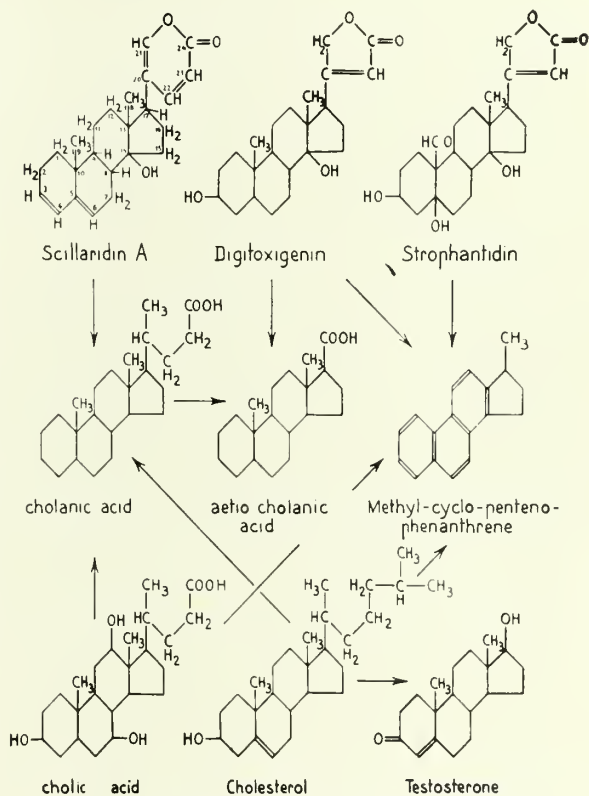


Fig. 1. Structural formulas of some of the steroids.

The compounds shown all derive from the basic hydrocarbon cyclopentano-perhydrophenanthrene. They represent the results of many years of research in which the laboratories of Windaus and Wieland, who elucidated the structures of the bile acids by their fundamental investigations, played a principal part. Further valuable contributions have been made by Jacobs and his co-workers in New York, by Elderfield and Tschesche and

*Presented as a lecture at the University of Minnesota School of Medicine on May 25, 1950.

recently by T. Reichstein in Basle. The arrows indicate that a series of transformations has been carried out by partial chemical degradation of complicated natural substances into more simple compounds of known constitution. Before considering some of these transformations in greater detail the chemical characteristics of the aglycones of the cardiac glycosides will be mentioned with reference to the figure.

The first line shows three of these aglycones. They all carry hydroxyl groups at positions 3 and 14, a peculiarity shared by all the aglycones of the cardiac glycosides. (In the figure Scillaridin A is shown in the dehydro form at carbons 3 and 4.) The sugar component is invariably attached to the hydroxyl group at C₃. The characteristic feature of the aglycones is an unsaturated lactone ring at position 17. In scillaren A, it is 6-membered and has two double bonds, while it is 5-membered with one double bond in by far the majority of the remaining aglycones. The action on the heart depends to a very large extent upon this lactone ring. If it is opened by treatment with alkali for example, the cardiac activity is completely lost. Even saturation of the double bonds with hydrogen reduces the activity to a few per cent. The remaining substituents on the aglycone, such as other hydroxyl groups or an aldehyde group at C₁₀ instrophanthidin, cause gradual differences between the actions of the cardiac glycosides, and naturally the nature of the sugar chain also exerts an influence. All the same, we know that all the cardiac glycosides possess fundamentally similar action. We shall return to the subject of the differences in their actions.

Our own researches on cardiac glycosides were begun almost 30 years ago with an investigation on squill.¹ From this plant we isolated, first of all, the principal glycoside, scillaren A, and subsequently a series of other glycosides which accompany scillaren A in small quantities. Scillaren A is built up from the aglycone and a sugar chain consisting of glucose and rhamnose. Starting with this glycoside, we achieved the simplest transformation of an aglycone of vegetable origin into a derivative of animal origin, as shown in figure 2.²

Treatment of scillaren A with methyl alcoholic hydrochloric acid splits off the sugar residue and at the same time brings about the removal of the hydroxyl groups at positions 3 and 14 with the formation of two new double bonds from 3 to 4 and 14 to 15. On catalytic hydrogenation of the resulting compound, anhydro-scillaridin A, all the double bonds are saturated and, at the same time, reductive opening of the lactone ring takes place with the formation of allocholanolic acid. This is a proof of the fact that the lactone ring in scillaren A is 6-membered. This simple chemical operation is performed without loss of any of the carbon atoms and without any of them changing position. From the known constitution of allocholanolic acid, definite conclusions may therefore be drawn regarding the hydrocarbon skeleton of scillaren A.

A somewhat more difficult method of proof has to be adopted in order to determine the position and orienta-

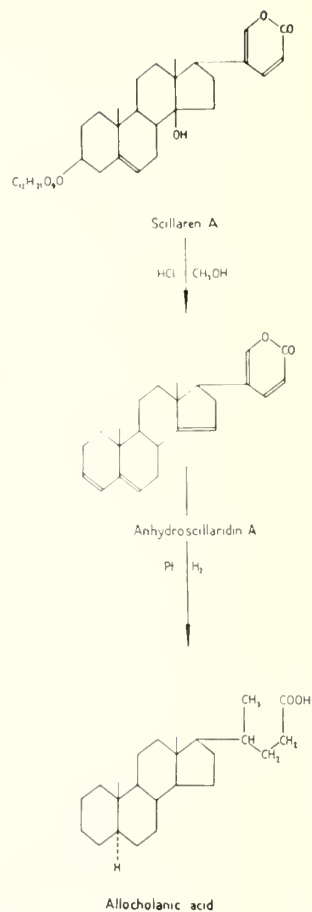


Fig. 2. Conversion of scillaren A into allocholanolic acid.

tion of a functional group, e.g. the sugar-carrying hydroxyl group in scillaren A³ (figure 3).

Catalytic hydrogenation of the unhydrolyzed glycoside of scillaren A itself, led to the saturation of three adjacent double bonds with the formation of a monobasic acid, hexahydro-desoxy-scillaren A acid, and a neutral lactone, hexahydro-scillaren A. The treatment of the acid with absolute alcoholic hydrochloric acid resulted in the loss of the sugar and one molecule of water derived from the tertiary hydroxyl group at C₁₄. The simple unsaturated acid thus obtained was hydrogenated using a platinum catalyst. From the mixture of stereo-isomeric acids resulting from the reduction, it was possible to isolate epi-allo-cholanolic acid (3 β -hydroxy-allocholanolic acid).

The conversion of scillaren A into 3 β -hydroxy-allocholanolic acid determines not only the position of the sugar-carrying hydroxyl group in the aglycone but, at the same time, its orientation in space. It is on the same side as the methyl group attached to the carbon atom 10 and therefore has a cis-orientation. In a similar manner, it has so far been possible to determine the position and spatial arrangement of the functional groups attached to the skeleton in a large number of

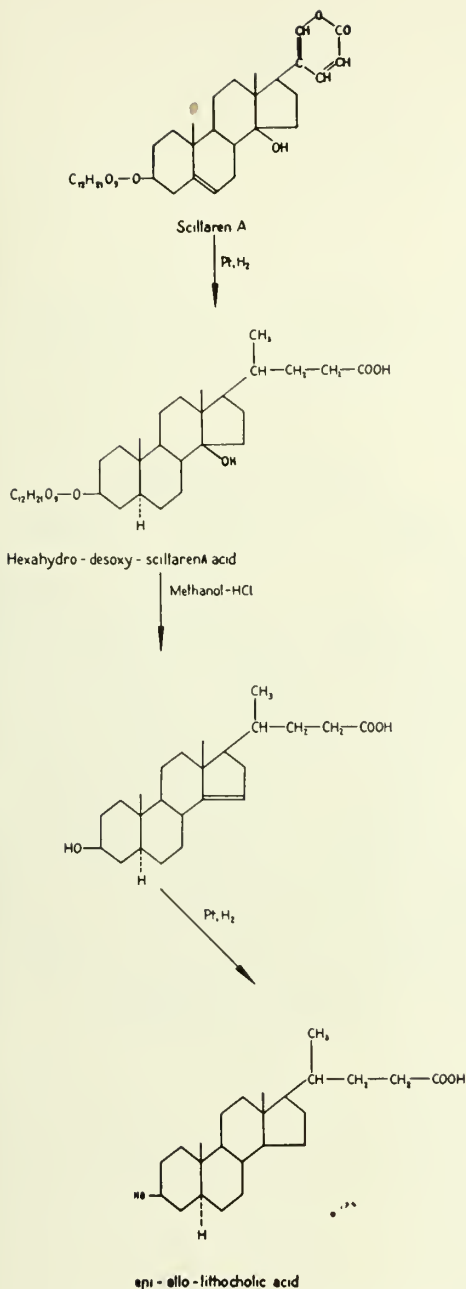


Fig. 3. Conversion of scillaren A to epi-allo-lithocholic acid.

other aglycones of cardiac glycosides. Such functional groups include the hydroxyl and aldehyde groups, the unsaturated lactone rings, which are always in position 17, and the double bonds in the nucleus, should any be present.

Thus the characteristic portion of the cardiac glycosides, the aglycone, has now been investigated down to the finest details of its structure and both aglycones and glycosides have been built up by partial synthesis from cyclo-pentano-perhydro-phenanthrene derivatives. Time will not permit, however, a thorough discussion of these

important investigations, some of which have been carried out by Elderfield in New York. Some of the partially synthetic glycosides prepared from natural aglycones and sugars exhibit an extremely high activity but as yet no definite verdict is available regarding their therapeutic usefulness.

Although it has been established beyond doubt that the action upon the heart is inherent in the aglycones, an important role has also to be attributed to the sugar fraction, especially with regard to the therapeutic application of the cardiac glycosides. In particular, the sugar chain, which may consist of as many as 4 sugar molecules joined together, determines certain physical properties of the glycosides, e.g., its solubility in water, its power of fixation to the heart muscle, the readiness with which it is absorbed, etc. We shall return to a discussion of these points later.

So far the following sugars have been found as constituents in heart glycosides.

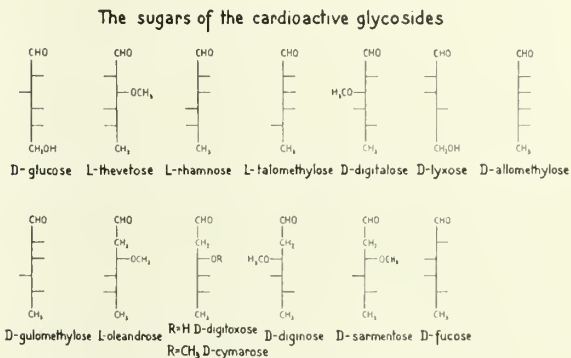


Fig. 4. The sugars of the active glycosides.

With the exception of D-glucose and D-fucose, they are all desoxy sugars, i.e., they contain 1 to 2 oxygen atoms less than a carbohydrate with 6 C-atoms. Apart from glucose and rhamnose, these sugars have so far only been found as constituents of cardiac glycosides. The sugar which is directly attached to the aglycone at position 3 is usually a desoxy sugar, which, in some cases, is connected to further desoxy sugars, the terminal molecule being usually glucose. The latter is readily split off by enzymes and, for this reason, the cardiac glycosides isolated prior to 1930, digitoxin, gitoxin, and also digoxin, lacked the terminal glucose. They were produced by enzymatic degradation of the genuine glycosides originally present in the plants. We investigated this enzymatic degradation at an early stage in our research and applied it in our preparative work.⁴

By excluding the action of enzymes we were able to isolate a series of such genuine glycosides not only from squill, to which the process was first applied, but also from different varieties of digitalis and from Strophanthus kombé. The following is a list of the genuine glycosides isolated in our laboratory, arranged in chronological order:

From squill: *Scillaren A*¹ and recently several very active cardiac glycosides which accompany the main glycoside scillaren A in small quantities.

From *Digitalis lanata*: *Digilanid*,^{4,5} consisting of three isomorphous glycosides, *lanatosides A, B and C* which have been isolated singly and examined.

From *Digitalis purpurea*:⁶ *Purpurea glycosides A and B* which are derived from lanatosides A and B but differ from them in that they do not possess the acetyl group attached to the outer molecule of digitoxose.

From the seeds of *Strophanthus kombé*:⁷ The principal glycoside, *k-strophanthoside*, in crystalline form.

From red squill: *Scillioside* which, in addition to a powerful action on the heart, is highly toxic to rodents. This toxic action is very probably due to the presence of an acetyl group in the lactone ring, which is 6-membered and has two double bonds.

While, on the one hand, the prevention of enzyme action enables the glycosides to be extracted and made available for therapeutic use in their genuine form, it is also possible to employ the enzymes for systematic step-wise degradation of the sugar chains of the glycosides, an aim which cannot be achieved by any other means. In this way, the relationships to already known glycosides of lower sugar content could be determined and at the same time an insight obtained into the fine structure of the sugar fraction. The following two examples in figures 5 and 6 will illustrate this.

Lanatoside A is built up from the aglycone digitoxigenin and a sugar chain which is composed of three molecules of digitoxose and a terminal glucose.^{4,6,9} On acid hydrolysis, the linkages between the individual members of the sugar chain are broken unselectively as well as the linkage between the sugar chain and the aglycone at position 3. From the mixture obtained, it was, however, possible to isolate digilanidobiose, composed of glucose and digitoxose. The enzyme digilani-dase which accompanies the glycosides in the leaves of *Digitalis lanata* splits off the terminal glucose from lanatoside A leading to the formation of acetyl digitoxin which can be de-acetylated and converted into the well-known glycoside digitoxin. If the acetyl group is split off first from the lanatosides, two amorphous de-acetylated products are obtained from lanatosides A and B and these have been shown to be identical with the genuine *purpurea* glycosides A and B which are likewise amorphous. Subsequent enzymatic removal of the terminal glucose yields digitoxin from the A-glycoside and gitoxin from the B-glycoside.

Lanatoside C (*Cedilanid*), which has attained particular importance from the therapeutic point of view, can be broken down step-wise in a precisely similar manner, but the C-component of *Digilanid* finds no analogous derivative among the *purpurea* glycosides.

By means of these investigations, the relationships between the cardiac glycosides so far isolated from the two varieties of *digitalis* could be completely elucidated.

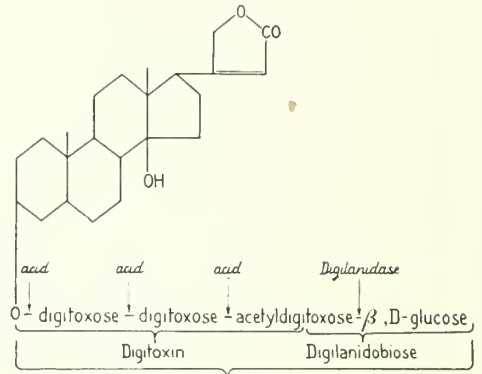


Fig. 5.

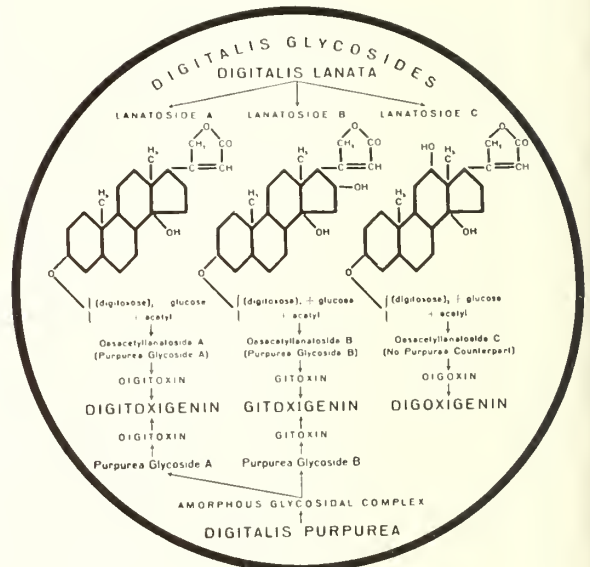


Fig. 6.

A particularly interesting case of step-wise degradation is presented by *k-strophanthoside*, the genuine principal glycoside from the seeds of *Strophanthus kombé*. Although we were the first to isolate this glycoside in crystalline form and to subject it to chemical examination, Jacobs and Hoffmann¹⁰ had already observed in 1926 that the 2 glycosides *k-strophanthin-β* and *cymarin* which they isolated from *strophanthus* seeds were produced by enzymatic degradation from compounds richer in sugar. As is well-known, it is principally to Jacobs and his co-workers that we owe the elucidation of the structure of *strophanthidin*, their study of which constituted a piece of pioneer research on the structure of the aglycones of the cardiac glycosides. In the case of *k-strophanthoside*, the enzymatic degradation could be completely explained by means of the scheme⁷ shown in figure 7.

In addition to the hydroxyl groups at C₃ and C₁₄, present in all the aglycones, *strophanthidin* also possesses a hydroxyl group at C₅, and an aldehyde group at C₁₀, while the sugar chain, which consists of a molecule of

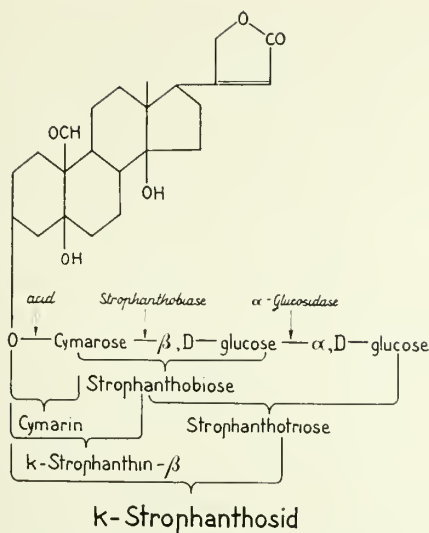


Fig. 7. Enzymatic degradation of k-strophanthoside.

cymarose and two molecules of glucose, is attached to C_3 . Step-wise enzymatic degradation with the specific enzyme system strophanthobiase yields k-strophanthin- β and finally cymarin. Treatment with acids breaks the linkage between strophanthidin and the sugar chain and splits off strophanthotriose from k-strophanthoside, strophanthobiose from k-strophanthin- β and cymarose from cymarin.

The following experiments allow an insight to be obtained into the fine structure of the sugar linkages. By the action of the α -glucosidase from yeast, the outer molecule of glucose may be split off, thus proving the α -glucosidal nature of the linkage between the two molecules of glucose. On the other hand, the linkage between cymarose and glucose could only be split by means of the specific enzyme strophanthobiase, while the cleavage of free strophanthobiose could be effected by means of the β -glucosidase from emulsin. The linkage between cymarose and glucose must therefore be β -glucosidal and the specific enzyme, strophanthobiase, must accordingly be classed among the β -glucosidases. In an analogous manner it could be shown that the other specific glycoside-splitting enzymes, scillarenase, digilanidase and digipurpidase are also β -glucosidases.¹¹

We have very recently discovered a new type of enzymatic cleavage of glycosides. Previously the linkage between the aglycones and the sugar chain had generally proved resistant to enzymatic cleavage and could only be broken by means of acids. Even then, however, glycosides in which the aglycone is connected directly to glucose or rhamnose were either very difficult to saponify or the aglycone decomposed in the process. We have now found, however, that the cardiac glycosides of the seeds of *Coronilla glauca*,¹² which are composed of aglycones and glucose, are broken down by an accompanying enzyme to sugar-free aglycones. The rat poison scilliroside which, as already mentioned, is obtained from red squill and which consists of the aglycone scillirosidin combined with one molecule of glucose, had not previously been split except with acids which destroyed the

aglycone. On treatment with *Coronilla* enzyme, however, smooth cleavage takes place.¹³ A surprising fact is that this liberation of the intact scillirosidin is accompanied by a considerable increase in cardiac activity, although the aglycones are almost invariably less active than the corresponding glycosides. In the following table are summarized the toxicities of a few glycosides and their aglycones as determined by the Hatcher method. It may be clearly seen that scillirosidin is the most toxic of all cardiac drugs so far known.

Toxicities of some glycosides and aglycones

Substance	Formula	M W	Toxicity (Hatcher method) mg/kg	Toxicity (Hatcher method) 10^{-3} millimol/kg
Scilliroside	$C_{32}H_{44}O_{12}$	620	0.120	0.194
Scillirosidin	$C_{16}H_{24}O_7$	458	0.057	0.124
Acetyl-scillirosidin	$C_{18}H_{24}O_8$	500	0.152	0.304
Hellebrin	$C_{24}H_{32}O_{10}$	734	0.104	0.142
Desglucohellebrin	$C_{16}H_{22}O_{10}$	562	0.087	0.155
Hellebrigenin	$C_{26}H_{32}O_8$	416	0.077	0.185
Acetyl-hellebrigenin	$C_{28}H_{34}O_9$	458	0.064	0.140
k-Strophanthoside	$C_{44}H_{64}O_{16}$	872	0.126	0.144
Cymarin	$C_{30}H_{44}O_7$	548	0.111	0.202
Strophanthidin	$C_{22}H_{32}O_6$	404	0.285	0.705

Fig. 8. Toxicities of some glycosides and their aglycones.

This comparison of toxicities has already brought us into the field of pharmacology of the cardiac glycosides. The following account of their pharmacological properties is based largely on information supplied to me by Dr. Rothlin and his team of research workers in Basle.

The action exerted by a cardioactive glycoside depends upon: (1) the inherent activity of the glycoside; (2) the concentration of glycoside reached in the myocardium in a unit of time; and (3) the responsiveness of the heart.

The activity of cardiac glycosides is nowadays determined biologically and is standardized according to the effect produced upon the heart or the amount required to produce cardiac arrest. The results are expressed in terms of frog, cat, guinea pig, pigeon or dog units, by which is meant the quantity needed to kill 1 g. of frog or 1 kg. of cat, guinea pig, pigeon or dog.

According to the intensity of their action, the cardiac glycosides may be divided into the following three groups:

1. Digitoxin and substances with a digitoxin-like action. This group, which has relatively the smallest activity or the highest Hatcher dose, also includes the somewhat less active, total Digilanid preparation and lanatoside A, from which, as we have already seen, digitoxin is derived.
2. The lanatoside C and digoxin group having an intermediate Hatcher dose.
3. The strophanthus and squill glycosides which have the smallest Hatcher dose.

The following figure^{14,9} shows the changes which take place in the electrocardiogram during the determination of the toxicity of lanatoside C by the Hatcher method.

During the *first phase* of uninterrupted infusion of cardioactive glycosides in cats, no characteristic changes in the electrocardiogram are produced. The behavior of the frequency varies greatly in different experiments. No changes occur in the PQ, QRS or QT intervals while alterations in the ST segment and in the T-wave occur only occasionally and in very varying forms. The first toxic symptoms become apparent in the electrocardiogram during the *second phase*. In the case of lanatoside A and k-strophanthoside, this commences after infusion of, on the average, 50 per cent of the lethal dose, while in the case of digitoxin toxic symptoms only appear after 70 per cent of the Hatcher dose has been given, as previously observed by Krueger and Unna.¹⁵ This toxic phase may be manifest in the form of ventricular or of atrioventricular extrasystoles, as dissociation by interference between sinus rhythm and heterotopic rhythm or as supraventricular or ventricular arrhythm. The final phase which begins at 58 to 95 per cent of the lethal dose is characterized by fluctuating ventricular tachycardia.

The visible toxic changes in the electrocardiogram appear later with digitoxin than with lanatoside C or with Strophanthosid, but are followed more rapidly by fatal cardiac arrest. In clinical experiments, therefore, electro-

cardiographic changes due to digitoxin do not provide a sufficiently early warning of overdose.

The activity of a cardioactive glycoside is dependent, however, not merely upon the intensity of action of the glycoside molecule per se, as determined from the Hatcher dose, but also upon the concentration of glycoside which is reached in the myocardium in unit time. This, in turn, is influenced by: (a) absorption, (b) binding by serum albumin, (c) hemodynamic distribution and specific biochemical distribution (affinity and selective storage, and (d) power of fixation and reversibility of action.

The *absorption* is naturally dependent to a large extent upon the route of administration. Experiments by Rothlin¹⁶ and by Weese¹⁷ have shown that, in warm-blooded animals, it makes practically no difference to the action of the glycosides whether they are administered subcutaneously or intravenously. Even when given orally, the glycosides are capable of producing characteristic cardiac arrest, although in this case the necessary doses are greater than when intravenous administration is used. Moreover, the slower absorption results in a delayed action so that the latent period is longer. The ratio of the oral dose necessary to bring about cardiac arrest in the cat within 24 hours to the intravenous in-

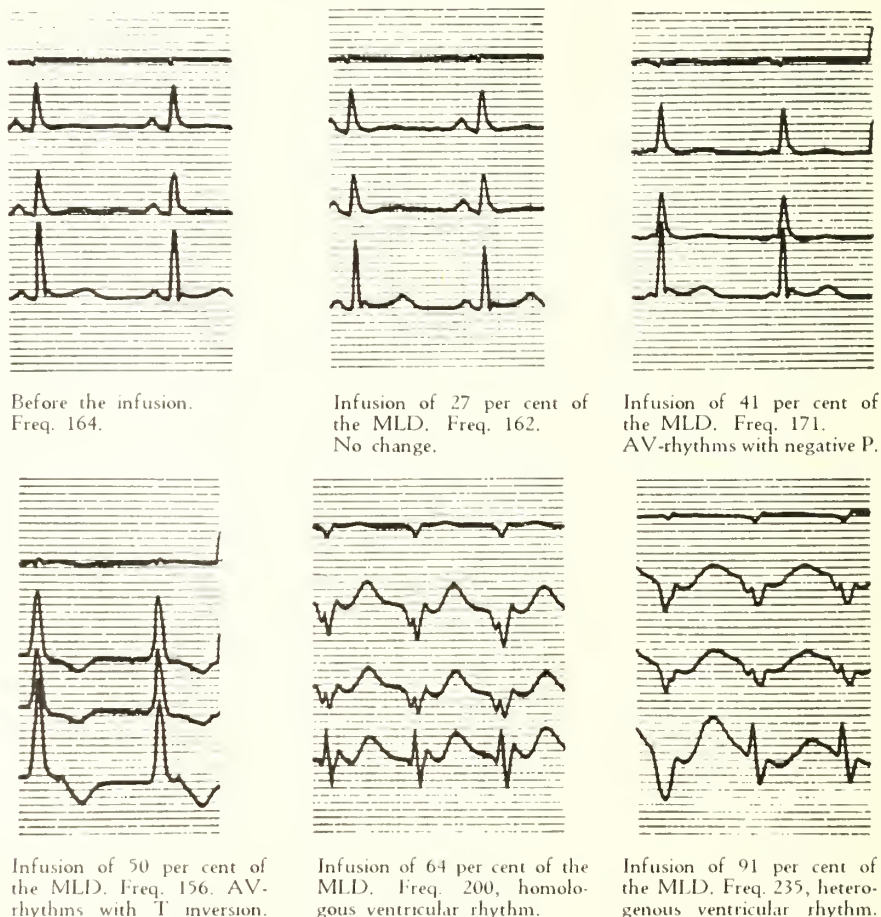


Fig. 9 Administration of lanatoside C to a cat in urethane narcosis (Hatcher, Magnus).

fusion dose required to produce the same effect is 5:1 for a crude total extract of *Digitalis purpurea*, 2:1 for digoxin, Digilanid and lanatoside C and as much as 40:1 for the strophanthus glycosides.¹⁸

As far as is known, Yernaux¹⁹ was the first to draw attention to the binding of heart glycosides by serum proteins. Since then, this problem has been studied by many authors, particularly by Hoekstra,²⁰ Lendle and Pusch,²¹ by Haarmann, Hagemeyer and Lendle,²² and by Haarmann, Korfmacher and Lendle.²³ Working with frog and cat hearts, Rothlin and Suter²⁴ have determined the concentrations of glycosides in Ringer's solution, on the one hand, and in serum, on the other, necessary to bring about cardiac arrest in the same period of time.²⁵ In contrast to Hoekstra, these authors have found that the binding of the glycoside in the serum is qualitatively the same whether this serum is derived from the same species of animal as the test preparation or from a different one. The differences are only of a quantitative nature, human serum and heparinized blood binding more glycoside than serum from frogs, dogs or cats (tested on isolated frog hearts). Many glycosides, such as lanatoside A and digitoxin, are very strongly bound and a 5 to 10 times greater quantity is therefore needed to produce cardiac arrest when they are dissolved in serum than when they are dissolved in Ringer's solution. Other glycosides, such as lanatoside B, digitoxin and scillaren A, are more weakly bound while k-strophanthoside and lanatoside C are not bound at all by serum proteins. These findings on frog hearts could be confirmed by experiments on isolated cat hearts using Langendorff's preparation.

As would be expected, the binding to serum albumin influences the *latent period* which elapses before the onset of action of the cardiac glycosides. The glycosides which are not bound by serum albumin act rapidly. Thus, in cases of uncompensated cardiac failure, Cedilanid increases the systolic power of the heart within 10 minutes after intravenous administration. Strongly bound glycosides like digitoxin act only after a longer latent period, e.g., after 40 minutes when given intravenously.²⁶

HEMODYNAMIC AND SPECIFIC BIOCHEMICAL DISTRIBUTION

The glycosides are of course carried by the blood stream to all parts of the body in accordance with the magnitude of the blood flow through the various organs. In this way, a *hemodynamic distribution* is achieved. On the other hand, the ability of the heart to bind the glycosides is weight for weight much greater than that of other organs. This leads to a *specific biochemical distribution*.

As may be seen from figure 10, the heart takes up 8 times as much glycoside per unit of weight as the abdominal organs, which, in turn, take up 4.5 times as much as the eviscerated animal. The concentration of glycoside in the heart is as much as 37 times as great as in the brain, the muscle, the skin, the skeleton, the lungs and the blood.²⁷ This specific biochemical distribution is evidence of the high affinity of the cardioactive

The distribution of the cardiac glycosides in the heart and other organs of the body.

	Heart	Abdominal organs	Eviscerated animal minus heart	Brain Muscle Skin Skeleton Lungs Blood
% of body weight	0.45	15	85	
Take-up of glycoside in % of quantity administered	10	40	50	
Relative take-up of glycoside per unit of weight of organ	37	4.5	1	

Fig. 10. The distribution of the cardiac glycosides in the heart and other organs of the body.

glycosides for the myocardium, a property which does not differ either qualitatively or quantitatively from one glycoside to another.

FIXATION POWER AND REVERSIBILITY

Quite different conditions are encountered when we examine the *fixation power* of the glycosides. This property determines, on the one hand, the *reversibility of action* shown by the glycoside and, on the other, its storage in the heart muscle and hence its toxic cumulation. According to experiments performed by Rothlin, the power of fixation determined on frog and cat hearts is greatest for digitoxin, while the glycosides Digilanid, Cedilanid, scillaren A and strophosid show decreasing fixation power in that order.

Our pharmacological research group, under the leadership of Dr. Rothlin,²⁸ has carried out experiments on cats to determine the average number of single doses of different glycosides which lead to death when given by chronic, subcutaneous administration. In one series of experiments, they used large doses, exceeding 20 per cent of the Hatcher dose, while in another series medium doses, between 10 and 20 per cent of the Hatcher dose, were employed. Although the absolute activity of Cedilanid and Strophosid is greater than that of digitoxin, as evidenced by the much smaller LD 100 or Hatcher dose, the former glycosides had to be administered in considerably greater and more frequently administered doses in order to cause death of the animals. A similar difference exists between digitoxin on the one hand and lanatoside A or Digilanid on the other. The Hatcher dose shows only a very slight difference, being 0.370 mg./kg. for lanatoside A and Digilanid and 0.392 mg./kg. for digitoxin. In contrast, the total lethal dose on chronic administration is more than twice as great for lanatoside A and Digilanid as it is in the case of digitoxin.

These differences which are observed, depending upon whether the activities and toxicities of the glycosides are determined by acute or by chronic administration, indicate that Strophosid is the most rapidly dissipated glycoside while digitoxin has the longest dissipation time and

therefore causes the most marked symptoms of toxic cumulation. Lanatoside A, Digilanid and Cedilanid occupy intermediate positions, but are somewhat nearer to Strophosid than to digitoxin. It should be noted that cats were chosen for these experiments because their sensitivity towards glycosides closely resembles that of man.

This comparison between the activities of the cardiac glycosides determined in acute infusion tests and the activities found by the method of chronic injection illustrates how the pharmacodynamic action depends both on the activity of the glycoside per se and the molecular concentration reached in unit time at the effector organ.

Another factor of importance in connection with the biological activity of the cardiac glycosides is the individual susceptibility. In the course of chronic experiments on cats, using moderate doses of glycosides, a phase of intoxication may sometimes be succeeded by a recovery phase, despite continued administration. The symptoms of intoxication, such as vomiting, loss in weight and decrease in the cardiac rate, may disappear. In such cases, an increase apparently takes place in the resistance towards glycosides. On further administration, however, the resistance again decreases and death of the animal follows.

From these considerations, the following conclusions may be drawn:

The cardinal actions of the cardiac glycosides upon the systolic power and rhythm of the heart and upon the conduction of impulses and the response of the myocardium (the so-called inotropic, chronotropic, dromotropic and bathmotropic effects) are dependent upon the intensity of action per se, as measured by the Hatcher dose, and upon the molecular concentration reached in unit time in the myocardium. Hence, they are also dependent upon the absorption, the binding to serum albumin, the specific biochemical distribution, the fixation power and reversibility of action of the glycoside, as well as upon the degree of response of the effector organ, i.e., of the heart itself. Thus, digitoxin is almost entirely absorbed from the intestinal tract and is strongly bound by serum albumin and by the myocardium; its action is only slowly reversed. On oral and intravenous administration, *digitoxin* therefore has a delayed onset of action but the effect then persists for several days. It possesses a characteristic slowing action on the pulse rate, which is stronger than that of other glycosides. In acute and in chronic test experiments, its toxicity is greater than that of all other glycosides. Similar properties are possessed by *Digilanid* (lanatosides A, B and C), although it has the advantage that it is better tolerated.

Cedilanid occupies a special position among the digitalis glycosides since, in consequence of the absence of any binding to serum albumin, of its low power of fixation to the heart, of the rapid reversibility of its action and of the fact that it is well tolerated, it bears many resemblances to the strophanthus glycosides. It has, however, the practical advantage that it is also effective when administered orally or rectally and that it can be given intramuscularly. Fundamental pharmacologic and

clinical research on Cedilanid was carried out at the University of Minnesota by Moe and Visscher²⁹ and Fahr and LaDue.^{30,31}

Although many authors have maintained that they found a single glycoside sufficient for the treatment of all the various forms of cardiac insufficiency, there is increasing acceptance of the view that not only must the dosage be adjusted to the individual patient, but that the desired result is reached with greater certainty if the most appropriate glycoside is selected from the variety available. Moreover, experience has frequently shown that some patients who do not respond to a particular cardiotonic or who have ceased to respond to it, become fully compensated when treated with another. Thus, it sometimes happens that galenical preparations of the purpurea glycosides cease to be effective even when administered in saturation doses, but that the full therapeutic effect becomes visible when the patient is changed over to another glycoside such as lanatoside C.^{32,33,34}

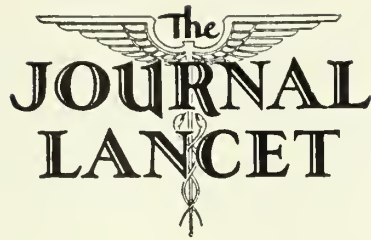
Comparisons between pure glycosides have also shown that Cedilanid in a dose of 1.6 mg. intravenously possesses a wider spectrum of action than the other glycosides. Evans, Dick and Evans³⁵ have found that Cedilanid given intravenously was the only glycoside examined which was capable of lowering the pulse rate in all their patients. From this, two conclusions may be drawn: (a) The different forms of cardiac insufficiency do not respond equally well to all cardiac drugs. (b) In comparison with galenical preparations and other pure glycosides, Cedilanid possesses the advantage of a broader spectrum of action.

In principle, rapid digitalization should be carried out with glycosides possessing a rapid action of short duration, i.e., with strophanthus or squill glycosides or with lanatoside C. Not only do these glycosides act quickly, but any side effects which they may cause disappear rapidly.

In carrying out *maintenance treatment*, attention must be paid to the cardiac rate. In cases of heart failure in which there is a tendency to tachycardia in the compensated phase, digitoxin and preparations with a digitoxin-like action are indicated. The lanata preparation Digilanid, however, should in our opinion be given preference since, in comparison with digitoxin, it is better tolerated on chronic administration. In cases where the pulse rate is normal or lowered, glycosides having a more pronounced systolic action, such as lanatoside C, k-strophanthoside and Scillaren, are more suitable.

With regard to the dosage, it should be said that a single high dose has been shown to be more toxic than moderate doses given repeatedly, even in healthy cats. The question therefore arises whether it would not be preferable to carry out even rapid digitalization with moderate doses repeated more often instead of with a single large dose. This procedure would also have the advantage that it would enable the quantity of glycoside administered to be adjusted to the actual need in accordance with variations in the sensitivity of the patient and in the route of application.

(Continued on page 212)



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Editorial . . .

PRINCIPLES OF PARENTERAL FLUID ADMINISTRATION IN DEHYDRATION

SYSTEMATIC study of the normal composition of the several fluid compartments of the body by Gamble and his associates, Butler, Darrow and others and determination by these and other investigators of the morbid changes that occur in different disease states has led to the formulation of a number of general principles which serve as valuable guides for rational therapy during dehydration. The substances which can be administered most advantageously in replacement therapy include water, electrolytes, and glucose. Each of these is provided to the patient according to principles unique for that substance, but the total amounts administered can be gauged most advantageously by employing the surface area of the individual patient as a guide. This permits use of one set of simple rules which are valid for infants as well as for older children and adults.

Roughly seventy per cent by weight of the normal human organism is water. Approximately twenty per cent of the body weight is interstitial fluid and five per cent is plasma. The largest compartment of the body water is that within the cells, constituting 50 per cent of the body weight. Water loss in healthy individuals under ordinary conditions occurs by way of the skin and lungs (insensible water loss; approximately 500 cc. per square meter per twenty-four hours); through the intestinal tract (feces usually contain less than ten per cent of the total water intake); and by way of the kidneys. The ideal urine volume under average conditions is about one per cent of the glomerular filtrate, which is approximately 100 liters per square meter of body surface per twenty-four hours. In disease states, water may be lost in excess through any or all of these normal avenues, and in abnormal ways, such as vomiting. With increased muscular activity or high environmental temperatures water loss from the skin as sensible sweat tends to be excessive.

In a state of health, the urine volume required for the excretion of any amount of dissolved waste product is approximately expressed as a simple exponential function of the concentration of solute in the urine. This is limited by the ability of the kidney to do antiosmotic work. This work limit of the kidneys is expressed as the maximum concentrating ability which is normally 1.4 milliosmoles per cc. corresponding to a specific gravity of 1.035; or as their maximum diluting ability which is normally 0.01 milliosmoles per cc. giving a specific gravity of 1.001. While presumably the relationship between obligatory urine volume and solute concentration holds in disease states, the ability of the kidney tubule to concentrate may be impaired, in which case the obligatory urine volume for any load increases. The total osmolar concentration of intracellular fluid is very nearly 310 milliosmoles per liter. This figure does not

include the 500 milliosmoles of urea that results from catabolism of the 144 grams of protein normally associated with one kilogram of muscle. When body protoplasm is being sacrificed to obtain calories, the obligatory urine volume increases by an amount which is related to the added load of osmoles resulting from this tissue destruction.

The principal cations present in intracellular water are potassium and magnesium; the principal anions are phosphate, bicarbonate and protein. Extracellular fluid contains sodium as its principal cation, and chloride and bicarbonate as its anions. During periods of dehydration both water and electrolyte are lost, but the osmolar equivalence of extracellular and intracellular fluids must be maintained as long as life is to persist. While theoretically proportionately more electrolyte than water may be lost, it is fair to use as a working assumption that in most clinical conditions these are lost in approximately equivalent amounts. Since the water lost by perspiration and respiration is hypotonic with respect to plasma, and urine is usually hypotonic with respect to either the sodium and chloride of extracellular fluid or the potassium of intracellular fluid, replacement therapy with solutions isotonic with respect to any of these components or compartments is not ideal. Furthermore, should either body water compartment be more greatly depleted in water than in electrolyte, the administration of isotonic solutions will not permit the expansion of that compartment to its normal volume without that compartment first becoming hypertonic with respect to normal electrolyte concentrations.

In most morbid states encountered, it has been demonstrated that both intracellular and extracellular fluid are lost. This fact demands that the water used for parenteral therapy contain those electrolytes which have been lost from both of these, including sodium, chloride, potassium and perhaps magnesium and phosphorus as well. A reciprocal relationship seems to exist between the concentrations of sodium and potassium within the cells. During acute dehydration, whether this condition is accompanied by acidosis or by alkalosis, potassium tends to leave the cells and sodium appears in the intracellular fluid in concentration several times the normal amount. When this new equilibrium is established, the concentration of the chloride ion in the plasma decreases while that of the bicarbonate ion increases. This concept emphasizes the difficulties to be encountered when one attempts to restore only the extracellular fluid to normal volume and electrolyte concentration. The futility of administering replacement fluid not containing potassium is equally apparent. Any rationale seems lacking for the use of ammonium chloride, as advocated by some, in those conditions associated with a decrease in the chloride concentration of extracellular fluid, when its origin is a loss of intracellular potassium.

The normal ratio between the concentration of sodium and chloride in the extracellular fluid is approximately 1.30:1. The administration of parenteral fluids with a ratio of sodium to chloride of 1:1 is therefore manifestly unwise, since with such concentrations the body is faced with the extra work of disposing of 50 meq. of surplus chloride for every liter of isotonic saline (150 meq. of sodium chloride/liter) retained. Some of the sodium in the repair solution to be administered should for this reason be supplied as an organic salt, such as sodium lactate.

Rational supportive parenteral therapy demands that calories be supplied along with water and electrolytes. In the course of studies made during the recent war, the daily administration of only 100 grams of glucose to starving male volunteers was shown to reduce the excretion of metabolic waste products in the urine from 800 to 400 milliosmoles per day. Concomitantly, the obligatory urine volume was reduced proportionally. The reduction in output of waste products as a result of glucose administration, reflected a decrease in tissue catabolism. Increasing the amount of glucose twofold, however, produced but little additional decrease in osmole excretion.

The administration of protein, whether hydrolyzed to amino acids or given whole, to either normal or ill sub-

jects, receiving less than basal caloric requirements, results only in the excretion of nitrogen in the urine. Until approximately basal caloric needs are met from non-protein sources, there is little evidence that administered protein is retained. The urinary excretion of the end products of protein catabolism results in an increase in obligatory urine volume, since these substances are all osmotically active. It seems doubtful in short term starvation that the advantage of the small saving of body protein which can be achieved by even heroic administration of protein by vein is great enough to counterbalance the difficulties posed by new demands for urinary water, if the caloric needs are not met from non-protein sources.

Full appreciation of the principles of physiological adjustment to anhydremia and electrolyte loss points the way toward rational fluid therapy. In the future, more complete measurement of the body losses which occur in electrolyte depletion may suggest additional components for constructing a more nearly ideal fluid than we now possess for replacement or maintenance therapy.

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Notices . . .

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Bismarck, North Dakota
May 19, 20, 21 and 22, 1951

The 64th Annual Session of the North Dakota State Medical Association will be held in Bismarck, May 19, 20, 21 and 22. Meetings of the Council and the House of Delegates will occupy Saturday the 19th and Sunday the 20th. The scientific program will be held on the 21st and the 22nd. Both the scientific meetings and the exhibits will be housed in the Bismarck World War Memorial Building. Meetings of the Women's Auxiliary will take place at the same time. A joint banquet for both the Association and the Auxiliary will take place Monday evening, May the 21st at which time George F. Lull, M.D., Secretary and General Manager of the American Medical Association will appear as the principal speaker.

There will be a special society luncheon meeting on Monday, including the membership of the North Dakota State Pediatric Society, North Dakota Urological Society, and the North Dakota Academy of Ophthalmology and Otolaryngology.

On Tuesday, May 22, there will be meetings of the North Dakota Society of Obstetricians and Gynecologists, North Dakota Society of Roentgenology, and the North Dakota Diabetes Association.

The Women's Auxiliary will hold a noon luncheon May 21, at which Mrs. Lawson, national third vice-president, will be the speaker. On Tuesday a tea will be given at the home of Mrs. Reuben Waldschmidt.

SCIENTIFIC PROGRAM Monday, May 21, 1951

9:30 to 10:00 A.M.—Budd Clark Corbus, Jr., M.D., Fargo: "Early Diagnosis of Malignant Lesions in the Genito-Urinary System."

10:00 to 10:30—John P. Wendland, M.D., University of Minnesota: "Management of Ocular Injuries."

11:00 to 11:30—Robert M. Kark, M.D., University of Illinois: "The Problem of Jaundice."

11:30 to 12:00—Harold W. Dargeon, M.D., New York City: "Cancer in Children."

2:00 to 3:30 P.M.—Harold W. Dargeon, M.D., New York City; Robert M. Kark, M.D., University of Illinois; Keith S. Grimson, M.D., Duke University; John P. Wendland, M.D., University of Minnesota: Panel Discussion on "ACTH and Cortisone."

4:00 to 4:30—Keith S. Grimson, M.D., Duke University: "Management of Duodenal and Gastric Ulcer from the Surgical and Medical Standpoint."

4:30 to 5:00—W. L. Macauley, M.D., Fargo, North Dakota: "Seasonal Dermatoses (spring and summer)."

Tuesday, May 22, 1951

9:30 to 10:00 A.M.—L. E. Prickman, M.D., Mayo Clinic, Rochester: "Recent Experience in the Use of Antihistaminics, Cortisone and ACTH in Respiratory Allergy."

10:00 to 10:30—Herman O. Mosenthal, M.D., New York City: "Problems in the Management of Severe Diabetes Mellitus."

11:00 to 11:30—Carl P. Huber, University of Indiana: "Prolonged Labor."

11:30 to 12:00—H. Rabney Kerr, M.D., University of Iowa: "The Diagnosis and Treatment of Carcinoma of the Body and Cervix of the Uterus."

2:00 to 2:30 P.M.—John H. Moe, M.D., Minneapolis: "Problems in Treating Fractures of the Elbow, Forearm and Wrist."

2:45 to 4:00—Carl P. Huber, M.D., University of Indiana; Herman O. Mosenthal, M.D., New York City; H. W. Hawn, M.D., Fargo: Panel Discussion on "The Toxemias of Pregnancy."

4:00 to 4:30—Kenneth Landauer, M.D., New York City: "Recent Developments in the Study of Poliomyelitis."

Book Reviews . . .

A History of Medicine, Volume I, Primitive and Archaic Medicine, by HENRY E. SIGERIST, M.D., research associate in the history of medicine at Yale University, 1951. New York: Oxford University Press. 564 pages, 104 illustrations. \$8.50.

The history of medicine may be regarded as one of those delightful categories of professional work which may be pursued either as a hobby or as a full-time career. It may be pursued seriously with thoroughness and scientific objective, or followed lightly, for the pleasure and entertainment it affords. The serious student as well as the casual reader will delight in this volume, for it is at once a meticulous history and a fascinating account of ancient medical practice.

This is the first book in a series of eight, which when completed will be the most comprehensive book of its kind ever written. In this first volume the author defines medical history and discusses its problems, its methods of research, its relation to the social sciences, and why a new account needs to be written today. He also considers the history and geography of diseases and especially the ancient evidence of disease.

The major part of the book is devoted to a treatise on primitive medicine, which seems to have a common pattern in various parts of the world, and medicine as practiced in ancient Egypt and Mesopotamia. Both of these countries had complex and well developed systems of medical practice, which is recorded on tablets and papyri and illustrated in paintings and sculpture. There are a large number of illustrations which are well chosen and well reproduced.

Dr. Sigerist, the author, taught medical history at the University of Zurich and at the University of Leipzig. He came to the United States in 1931 and a year later was made professor and director of the Institute of the History of Medicine of Johns Hopkins University. He is now a non-resident research associate of Yale University and is living in Switzerland.

V. L. D.

Diabetes Guide Book for the Physician, by the Committee on Education, American Diabetic Association, Incorporated, 1950, 79 pages.

Every physician who treats diabetes should be familiar with the factual data of this compendium which is a concise and authoritative summary of acceptable procedures met with in sound medical practice. Prepared in almost outline form by the Committee on Education of the American Diabetes Association of particular value is the description of basic diets, methods of calculation, and tables of food exchanges. This part of the booklet will also be of value in the education of the diabetic patient.

C. A. McK.

The Gland and Sex Dilemma, by MAX R. RUBINSTEIN, M.D., 1st Edition, 1951. Los Angeles: American Book Institute, 223 pages. \$3.00.

This book is written for the lay reader, explaining endocrine functions in simple terms. It is well written, thoroughly scientific and ethical, without any taint of sensational or pornographic attempts to stir reader interest.

The author repeatedly advises the reader to seek investigation and treatment by his physician, and in a persuasive way appeals to the reader to avoid pitfalls of self-administered or "quack" hormone therapy. Discussion of diagnosis and treatment are complete enough to permit a patient to criticize inadequacies of his own doctor's management of endocrine problems.

An outstanding portion of the book includes the discussion of endocrine factors, therapy of abnormal rates of growth, fertility, obesity and glandular psychopathies. Numerous case reports are used to explain endocrine diseases of all types which add greatly to the readers' interest of what might otherwise be difficult to comprehend.

The subjects of recent development such as radioactive iodine, ACTH and cortisone are discussed briefly. Controversial phases of endocrinology are presented with the opinions of both the author and other authorities.

This book may be recommended to patients by the physician. It will be of value in explaining the necessity for adequate and sometimes extensive laboratory studies in many cases. Most important is the emphasis which has been placed on correct diagnosis and evaluation of the individual problem before instituting treatment, rather than the use of stereotyped therapeutic tests of treatment to prove shotgun diagnosis. The physician, himself, can find useful methods of explaining more adequately the various findings and procedures in endocrine disease.

J. W.

Hypertension, edited by E. T. Bell, M.D., 1951. Minneapolis: University of Minnesota Press. \$7.50.

This volume is a compilation of the proceedings of a symposium on hypertension held at the University of Minnesota in the fall of 1950 in honor of Drs. Elextious T. Bell, Benjamin J. Clawson and George E. Fahr.

Thirty papers by 24 distinguished physicians representing every section of the United States and three foreign countries are presented. Existing knowledge with regard to the problems of hypertension and its therapy are summarized and brought up to date.

The book is superbly edited by Dr. Bell and is a most worthy contribution to the literature on hypertension. It should prove of great interest not only to research workers but to all practitioners of medicine interested in the field of hypertension.

Booklet on Tuberculin Test

All Minneapolis and suburban Hennepin County parents of pupils entering school for the first time next fall are receiving a pamphlet entitled "Ready for School?" emphasizing the importance of having their physician include a tuberculin skin test in all pre-school medical examinations. The test is emphasized at this time because a positive reaction in a five-year-old child may point to some previously unsuspected case of tuberculosis among the adults in the family.

It is estimated that 8,200 Minneapolis children and 6,000 Hennepin County children will enter school next fall. Pre-school medical examinations for these children is part of the "Summer Round-up" plan sponsored by the National Congress of Parents and Teachers and, locally, by many Hennepin County P.T.A.'s.

Booklet from National Conference on Children and Youth

"Children and Youth at the Mid-Century" is a new booklet developed from material presented at the Midcentury White House Conference on Children and Youth, held in Washington, D.C., December 3 to 7. There are 75 excellent charts, each with a statement on the opposite page explaining and adding to the information on the chart or pointing up its relationship to the central theme of the Conference—the development of healthy personality in children and youth.

Child Welfare Films

Columbia University Educational Films, a division of Columbia University Press, offers a growing list of carefully selected films on child welfare, emotional health, public health, and medical subjects. Its library is a recognized source for sale and rental of many films listed in the United States or in the Canadian and United Kingdom sections of the Child Welfare Films index. The address: Columbia University Educational Films, Communications Material Center, 413 West 117 Street, New York 27, New York.



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News Briefs . . .

North Dakota

RADIOLOGISTS from Minneapolis, Aberdeen, and Bismarck were featured speakers at the state meeting of the North Dakota x-ray technicians at Bismarck on April 21 and 22. They were Dr. L. G. Idstrom from Swedish hospital, Minneapolis; Dr. Paul V. McCarthy from Aberdeen; and Drs. H. M. Berg and J. R. Williams of Bismarck.

* * *
A NUMBER of North Dakota physicians attended the fourteenth annual meeting of the New Orleans Graduate Medical Assembly which was held March 5 to 8. They included Dr. J. P. Craven, Williston; Dr. W. H. Gilsdorf, Valley City; Dr. C. J. Glaspel, Grafton; Dr. B. M. Urenn, Fargo; Dr. George R. Waldren, Cavalier; and Dr. R. H. Waldschmidt, Bismarck.

* * *
SEVEN North Dakota doctors who have completed 50 years of practice in the past year will be honored at the annual convention of the North Dakota Medical association at Bismarck, May 19 to 22. Doctors who qualify for membership in the 50-year club this year include J. A. Johnson of Bottineau, D. G. Hanson of Minot, K. O. Knudson of Glenbur, M. W. Roen of Bismarck, C. C. Smith of Mandan, Nels Tronnes of Fargo, and J. S. Stickelberger of Oberon.

* * *
DR. L. G. PRAY of the Fargo clinic read a paper at the recent meeting of the American Academy of Pediatrics in Cincinnati. Dr. Pray was appointed a member of the committee on geographical distribution of the academy. Functions of the committee are to assist communities throughout the country to obtain pediatricians and to help pediatricians find locations for practice.

* * *
REDUCED FUNDS for the state public health department authorized by the legislature will result in some curtailment of services, according to Dr. R. O. Saxvik, state health officer. Some personnel in the health department may have to be dismissed and one of the state's mobile x-ray units will have to come off the road.

* * *
DR. NATHAN GLAUBACH, now at the veterans administration center in Los Angeles, has been named chief of medical services at John Moses Veterans Memorial hospital at Minot. Dr. Glaubach's appointment raises the hospital's medical staff to five. Because of the doctor shortage, only two floors, containing 89 beds, have been opened in the 162-bed institution.

* * *
DR. B. T. BOTTOLESON, eye, ear, nose and throat specialist, has moved his offices to Moorhead from Fargo, where he had been practicing for about five years.

* * *
DR. BOHDAN Z. HORDINSKI, who has opened a medical practice in Drake, was honored by an area-wide reception April 11, planned by the Drake Commercial club. Dr. Hordinsky, who recently completed a required one-year internship in North Dakota serving at St. Andrews hospital in Bottineau, received his medical diploma in 1935 in Poland.

DR. LEE A. CHRISTOPHERSON, neurosurgeon who until recently was with the Mayo foundation at Rochester, Minnesota, has established offices in Fargo. Dr. Christopherson is a graduate of the University of Minnesota medical school and took his internship at the Cleveland Clinic foundation from 1944 to 1945, and practiced for a time in Bagley, Minnesota.

Minnesota

SEVENTY physicians will report on medical treatments from cancer to frostbite at the 98th annual meeting of the Minnesota State Medical Association at Rochester, April 30, May 1 and 2. The two governing bodies, the council and the house of delegates, will meet April 28. Other medical groups which will meet at the same time include the Minnesota chapter, American College of Chest Physicians; Minnesota Society of Clinical Pathologists; Minnesota Academy of Ophthalmology and Otolaryngology; Northwest Pediatric society; Minnesota chapter, American Medical Women's association; American Academy of General Practice; Minnesota Medical Foundation and Minnesota Medical Alumni, Nu Sigma Nu, Medical Veterans Society of Minnesota and Minnesota Radiological Society.

* * *
A MEDICAL SCHOOL COMMITTEE headed by Dr. Gaylord W. Anderson, reported to the University of Minnesota board of regents on the needs for medical expansion in the next few years. Other members of the committee include Raymond M. Amberg, hospitals superintendent; Dr. Donald W. Hastings, Dr. Maurice B. Visscher, Dr. Owen H. Wangensteen and Dr. Cecil J. Watson.

They recommend in their "long-range" needs: a research institute, more space for research in physiology and related fields, setting aside several blocks for possible hospital development, facilities for convalescent care, expanded facilities for rehabilitation work, a "hospital-hotel" for out-patients, relocation of the state health department building, housing facilities in the neighborhood for medical students and others.

* * *
ST. PAUL needs three 50-bed chronic-care hospital units and an additional public nursing home providing between 350 and 400 beds. These were the findings of a committee on chronic and convalescent care whose report was approved March 21 by the St. Paul Area Public Health council.

The committee, headed by Dr. Ralph L. Olson, estimates there are 4,230 chronically ill persons in St. Paul in a year—69 per cent of them over 65 years old and two-thirds of them needing hospital or nursing-home care.

* * *
DR. EZRA V. BRIDGE, formerly supervising physician of the J. N. Adam Memorial hospital at Perrysburg, New York, has been appointed medical director and superintendent of Mineral Springs sanatorium in Cannon Falls. A graduate of Cornell university medical college, Dr. Bridge was instructor in medicine at the University of Michigan in 1943 and was elected a research fellow at the University of California in 1944 for his study of high altitude flying.

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*T.M.

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THREE MEMBERS of the Mayo clinic staff have been made Knights of St. Gregory the Great by Pope Pius XII. They are: Dr. Francis J. Braceland, head of the section of psychiatry; Dr. Louis J. Kennedy, professor of pediatrics at Mayo foundation and head of the pediatrics section, and Dr. Edward J. Baldes, head of the bio-physics section.

* * *

FOUR senior medical students from Minnesota have been selected among 132 in the Fifth army area for officer appointment under the military intern program. They are Francis E. Demarais, Minneapolis, Howard G. Mortenson, Pequot Lakes; Eugene L. White, Duluth, and Freeman P. Fountain, Moorhead.

South Dakota

FAULK COUNTY dedicated its new Memorial hospital at Faulkton early in April. Actual occupancy of the new 28-bed hospital will take place at a later date. It replaces the present structure, which will become a nurses' home and home for the aged.

* * *

THE Medical Arts clinic at Watertown has been installed in a new home in the third floor of the old Midland building. Besides a waiting room, the new clinic contains 12 examination rooms besides an x-ray laboratory and other special offices. Dr. John W. Gridley, formerly of Glencoe, is a new member of the staff.

* * *

A NEW UNIT at St. Joseph's hospital, Deadwood, was opened April 8. The hospital is operated by the Sisters of the Benedictine Order who began the operation of St. Joseph's more than 50 years ago. Construction of the new unit was begun in 1949.

* * *

THE new Skogmo Medical clinic at Mitchell was opened for patients April 2. An open house for visitors to the new building was held April 7. The clinic, which has been under construction for seven months, includes separate departments for x-ray, minor surgery and examination, and a modern laboratory.

* * *

DR. F. C. DEVAIL, Garretson, was honored with a community celebration Sunday, April 8. Townspeople as well as doctors of neighboring cities were invited to attend. Dr. DeVail has been practicing in Garretson since 1905.

* * *

A SMALL AIRPLANE equipped with skis rescued an expectant mother stranded on a farm near Tunerville on March 20, in time for her to have her twin boys in Memorial hospital in Watertown. Unable to get their car out of the yard, Luverne Schafer, father of the babies, saddled a horse and rode four miles to Watertown for Dr. C. Rodney Stoltz. Dr. Stoltz, a pilot himself, accompanied the regular pilot for the flight.

DR. IAN BROWN, neurologist from the University of Minnesota and the veterans administration hospital, Minneapolis, gave a lecture at Fort Meade March 19 on the subject of muscular dystrophies and atrophies. All physicians of the Black Hills area were invited to attend.

* * *

THE *Farm Journal* for April carried a feature story entitled "How to Get a Doctor" which was based on the arrival of Dr. and Mrs. K. R. Keisch at Philip last July. The *Journal* sent a photographer to Philip last summer to make a camera record of the arrival of the new doctor.

* * *

New locations and appointments . . .

DR. J. J. JESTADT, formerly of Winnipeg, has arrived in Lemmon where he will be associated with Drs. F. C. Totten and Peter K. Steiner in the Lemmon clinic.

* * *

DR. BERNARD BATT of Brooklyn, N. Y. has opened an office in Dupree. Dr. Batt is a graduate of the New York Medical College and took his internship at Kings County Hospital, Brooklyn.

* * *

DR. ANDREAS HESZ, Hungarian-born displaced person, will set up a practice in Hill City, after taking a required six months internship at a Rapid City hospital.

Deaths . . .

DR. EDWARD T. SANDERSON, former mayor of Minnesota, died March 16 at his home at Alexandria, Minnesota. A graduate of Loyola University medical School, Dr. Sanderson practiced at Minnesota for more than 40 years until his retirement in 1945. He served on the State Board of Medical Examiners from 1922 to 1932.

* * *

DR. F. C. DOLDER, a veteran doctor of Eyota, Minnesota, died at Rochester March 19 following a short illness. Before starting practice in Eyota 37 years ago, he practiced in Hastings for a short time.

* * *

DR. EDWIN J. G. BLOEMENDAAL of Lake Park died April 2 in a Detroit Lakes hospital. Dr. Bloemendaal was a graduate of the University of Iowa medical school and served six years in the army medical corps. He had practiced in Lake Park for five years.

* * *

DR. B. B. LEONARD, eye, nose and throat specialist, died April 4 at Yankton, South Dakota.

* * *

DR. DAVID B. DAVIS, former Minneapolis resident, died April 12 at Los Angeles, where he had practiced since 1939. At the time of his death Dr. Davis was chief of the pediatric staff of Cedars of Lebanon hospital and was also on the staff of the College of Medical Evangelists and Los Angeles county hospital.

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CHEMICAL AND PHARMACOLOGICAL INVESTIGATIONS ON CARDIAC GLYCOSIDES

(Continued from page 202)

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SURGICAL RELIEF OF ATELECTASIS IN THE NEWBORN—(Continued from page 181)

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HYDRONEPHROSIS IN CHILDREN (Continued from page 183)

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MEET OUR CONTRIBUTORS (Continued from page 192)

RICHARD B. TUDOR is a graduate of the University of Minnesota medical school, took graduate work at Duke Hospital and Bellevue Hospital, practices pediatrics in Minneapolis, where he is staff member at several hospitals. He is a member of the A.M.A., the Northwestern Pediatric Society, Minneapolis Academy of Medicine.

★

ROBERT BRUCE TUDOR is a graduate of the University of Minnesota, specializes in pediatrics in Bismarck, where he is on the staff of St. Alexius hospital. He is a member of the North Dakota Pediatrics Society, Northwestern Pediatric Society, A.M.A., North Dakota Medical Association, North Dakota Diabetic Society, and the American Board of Pediatrics.

★

ARTHUR STOLL, a graduate of the Kaiser-Wilhelm Institute in Berlin, now heads the Sandoz pharmaceutical department in Basle, Switzerland. He has done research studies in the analysis of vegetable drugs and their application, including the alkaloids ergot of rye and the cardioactive glycosides. He has received honorary doctorates from several European universities.

★

SWALD S. WYATT is a graduate of the University of Minnesota medical school in 1919, specializes in pediatric surgery in Minneapolis, where he is clinical associate professor of pediatrics and surgery at the University. He is a member of the Hennepin County Medical Society and Northwest Pediatric Society.

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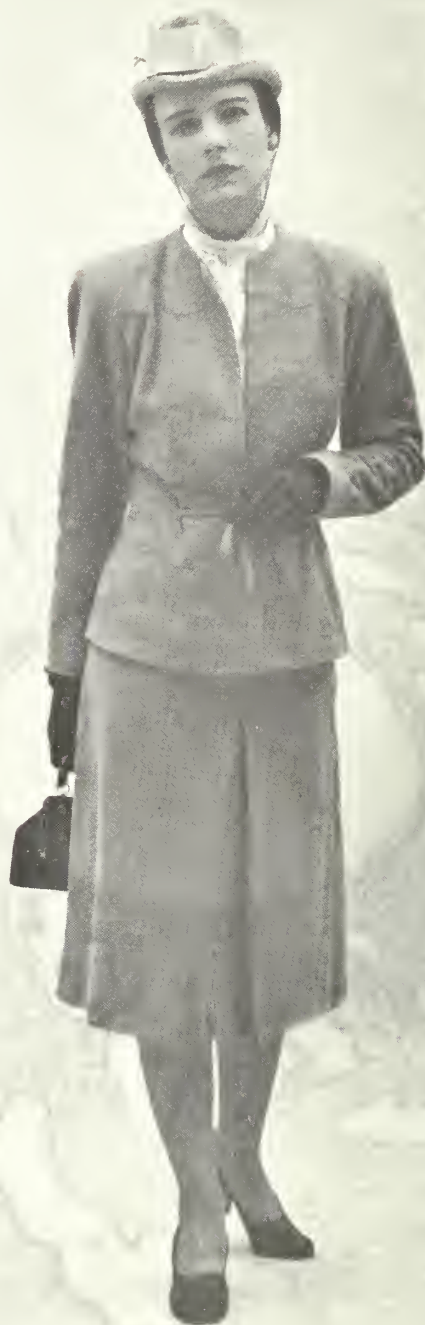
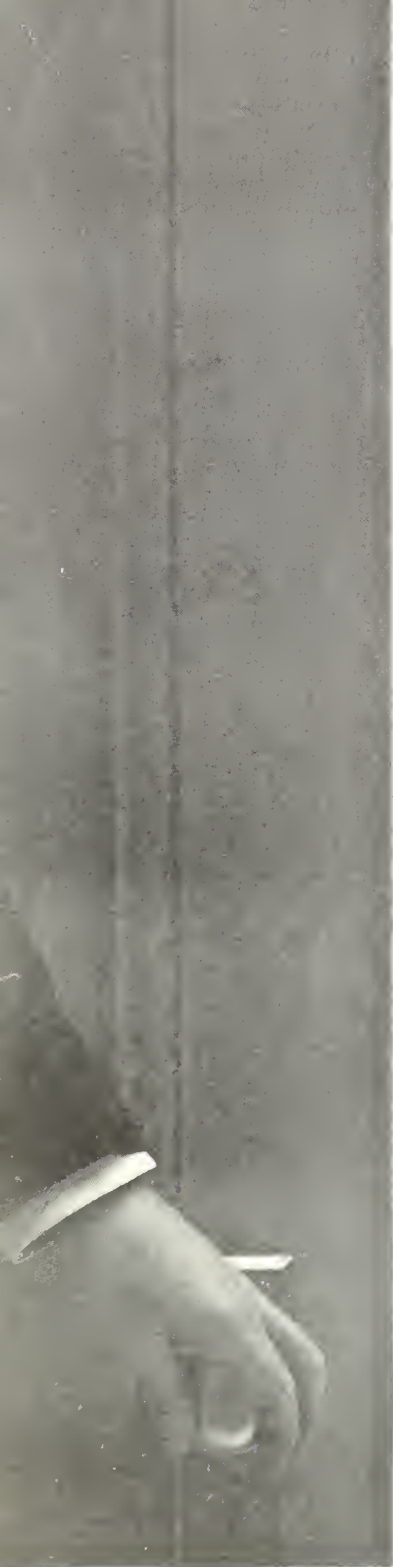
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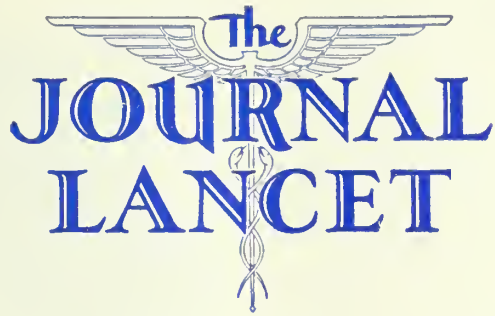
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The JOURNAL LANCET

Practice of Medicine in Sweden*

E. J. TANQUIST, M.D.

Alexandria, Minnesota

SWEDEN, with an area of 170,000 square miles, is quite a bit larger than Minnesota and North Dakota combined and has twice the population of these two states. Sweden has shown remarkable progress in transportation, manufacturing and farming. The people are thrifty, hard working and, as a rule, make a good living. Contrasted with the American citizen, a very small percentage have their own homes, with perhaps 80 per cent of the city population living in apartments.

The present political complexion has developed gradually over many years. Many Swedes feel that the Swedish socialism is their best weapon against communism, and socialism is an essential part of the government. The medical profession feel that they are not as yet caught in the meshes of socialism, but they do fear the current trend of the government toward some form of forced insurance program.

*Most of the background material and statistics for this article for THE JOURNAL-LANCET were obtained by the author on a tour of Sweden in the summer of 1950.

CARE OF THE SICK

Sweden is divided into twenty-four districts, each with a local government similar to that of our states. The districts are responsible for the care of the sick and must not only provide hospital facilities but staff the hospitals with workers and professional personnel. The annual report of one of the districts shows the inclusiveness of the illness and welfare services with eight types of hospitals and homes (see table I). The contribution of the state is insignificant. The care of the insane is a direct responsibility of the state and it is reported that the handling of the insane is very poor—a fact that is used as an argument against the state's attempt at some forced program for illness insurance.

In addition to hospitals the districts provide homes for the aged and large homes for the care of mild mental cases. The greatest field of public ownership and cost is in the care of the sick and aged, and the greatest item in the budget of the district is for the care of the sick. It is quite obvious that this humanitarian program,

TABLE I

From the Annual Report for 1948 of Kopparberg District Hospitalization and Welfare program. The population of this district in 1940 was 250,000. Kopparberg district (län) is one of the 24 similar subdivisions of Sweden.

	Bed Capacity	Average Beds	Total Hosp. Days	Total Cost	Cost Patient day	Dis- trict	Amount paid by Private and Insurance	State
5 Large hospitals	771	660	241,419	6,009,256	21.89	16.64	5.00	.24
12 Small hospital homes	195	171	39,315	1,201,720	17.68	13.44	4.00	.24
6 Tuberculosis sanatoriums	341	241	104,536	1,666,454	14.74	10.36	2.78	1.60
6 Small hospitals—chronic disease	172	159	56,660	523,394	10.04	6.57	1.49	1.50
7 Hospitals for contagion	198	31	10,535	406,310	34.33	25.30	7.19	1.84
2 Small hospital, minor nursing and medical	156	127	46,552	328,667	6.93	3.29	2.39	1.25
1 Asylum	175	138	50,707	530,488	10.46	4.45	2.76	3.25
1 Children's home	204	140	51,172	458,360	8.96	4.73	2.74	1.49

excellent as it does appear, takes money to operate, so that many doctors and observing citizens feel that it is too extensive and costly, resulting in burdensome taxation.

Increased facilities require increased manpower, especially among the nurses, and this goes far beyond the currently available pool of 20-year-olds, from which nurses must be recruited. It is quite evident that the doctors and many citizens feel satisfied as long as the care of the sick remain under the control and supervision of the respective districts, but they object violently to any attempt made by the state to take over such care. The legislature has under consideration some plan of forced insurance program.

it is merely sufficient to pay for the ward bed. The report of one hospital shows that the cost of operation was 26 kronas per patient per day, and the hospital recovered through insurance and from private patients 4 kronas per patient per day. This district had to pay the difference of 22 kronas for each patient hospital day, or in other words, 85 per cent of the operating costs of that hospital were paid by the district through taxation.

The hospital insurance, provided by health insurance association, cooperative association or by state or districts is planned to cover merely the ward charge. Where the insurance does not cover fully the hospital as well as the medical cost the individual patient must pay. Consequently, the sick prefer to choose the inconvenience

TABLE II
Summary of Personnel of Six Large Hospitals

Hospital	Doctors Chief	Asst.	R.N.	Student Nurse	Mid- wife	Bather	Others	Office	Total	Bed Capacity	Average Bed	Total Hosp. days	Total Cost
A	6	14	73	51		5	105	7	263	387	340	124,229	3,231,748 kronas*
B	1	3	20		2	1	42	1	70	116	91	33,042	862,380 "
C	1	3	14		3	1	49	1	72	123	117	42,848	860,614 "
D	1	2	14		2	1	45	1	66	107	79	28,999	818,802 "
E	1		5				11		17	38	34	12,301	236,010 "
	10	22	126	51	7	8	253	10	488	771	661	241,419	6,009,256 "
F	2	4	20			1	83	1	110	119	116	38,832	1,051,699 "

COST OF HOSPITALIZATION

There is considerable variation in the hospital costs to the patients. The ward bed (allmänna salen) is 3 kronas per day, a two-bed room 15 kronas, and a private room 25 kronas or more. Ward rates not only include the usual hospital charge but also surgical and medical care. Double and private room rates often include medical service. However, not all the hospitals operate under that plan. Some districts permit the chief surgeon and his first assistant to make charges for a limited number of private patients when they are hospitalized. The great difference between the ward cost and that of a private room makes it understandable why so few choose the private rooms.

It is interesting to note that 5 operating hospitals with an average total of 661 patients requires 32 doctors, 126 registered nurses, 51 student nurses, and 8 bathers. This is one nurse for about 4 patients and one doctor for every 21 patients. The average income of the doctors at two different hospitals is 16,400 kronas per year and that of the nurses is 5000 kronas per year.

HOSPITAL INSURANCE

The illness or hospital insurance (sjukkassan) is much like our own. However, most persons carry just enough insurance to pay the ward rate. A workman with an average income of 6000 to 8000 kronas per year, carries hospital insurance the annual cost of which is 80 to 100 kronas. Although this compensates the individual and his family with about 4 kronas per day when hospitalized,

of the ward service without pay rather than the private rooms with the greatly increased cost.

The cost of hospital insurance depends somewhat upon the income of the individual—apparently less for the low income group and a bit higher for the man in the higher income bracket. The return on any policy does not seem to be much over 5 to 8 kronas per day to the holder. The ward bed, then, would carry no charge, whereas for a private room there would be a charge of 20 kronas per day or the difference between 25 and 5 kronas. Then in many of the hospitals there is a charge for medical and surgical care, making quite a sizable item in the event that a surgical patient is hospitalized for two weeks. As stated before, the same doctor is in charge, whether the patient chooses a ward or private room.

Now compare this with a good hospital and medical and surgical insurance plan in the United States. Such a policy, costing \$80 to \$100 per year, and covering a holder with a wife and two children, will pay all the hospital charges and nearly all the charges of the private doctor. This would represent six to eight dollars a month for a man making \$200 to \$250 a month, or 3 to 4 per cent of his income. In Sweden a man making a similar amount, 800 to 1000 kronas per month, would pay 2 per cent for whatever hospital insurance he does get, namely, 5 kronas per day when hospitalized. Were he to pay for the entire cost of the hospital it would be four or five times that amount. In Sweden the tax on such income

would be 10 per cent of the gross while in the United States there would be no tax on an income of \$2400 earned by a man with a family of two children. The American plan is that of the private insurance program and the Swedish the socialized community plan. The American plan permits use of private room service and private medical attention. The Swedish plan gives ward room service and hospital doctor service. It should also be remembered that most of the income tax paid by this man in Sweden is for the maintenance of the hospitals.

MEDICAL EDUCATION

The basic education in Sweden is as time-consuming and costly for a doctor as in America.

A medical student enters one of the medical schools at about 19. There are three medical schools in Sweden—Upsala, Lund and Carolina Medical Institute of Stockholm—admitting a total of 200 students annually. This makes for keen competition among entrance students. Each student spends two and one-half to three years in preclinical, and three and one-half to four years in clinical studies.

Whereas in the United States after one year of hospital internship the graduate can enter private practice, in Sweden he must spend three to five years as assistant surgeon at one of the hospitals. Swedish medical men frown upon the young graduate who attempts to go out in general practice without this period of assistantship. After he has served his assistantship he is eligible for an appointment as assistant chief surgeon, city doctor or district (provincial) doctor, or he can establish himself as a general practitioner. The assistant chief surgeon's position, and city or district positions are much sought after and only the men with best training have an opportunity of obtaining such jobs.

It is not at all uncommon for a doctor to serve as assistant surgeon for a period of ten years before he obtains a position as assistant chief surgeon, and then he may continue another five to ten year period before he gets an appointment as chief surgeon at one of the hospitals. Many a chief surgeon has worked as such for a period of ten years and is still paying on his school debt, and then at fifty, usually has the heavy financial burden of educating his children. Reference has already been made to the fact that the average income of the doctors at two hospitals was 16,400 kronas per year. Not long ago the assistant surgeons could not live on their incomes so had to borrow and further increase their school debt. Fortunately, they have recently received a pay boost, so that they receive at least 800 to 1000 kronas per month. The assistant chief surgeon

can make up to 1500 kronas or more a month and the chief surgeon up to 2400 kronas or more.

According to the *Swedish Medical Journal* there are now about 5600 physicians and surgeons in Sweden, an average of one per 1300 population, and with the percentage of ratings about as follows:

Chief surgeons and assistant chief surgeons	15%
Assistant surgeons	40%
City and district doctors	15%
Military doctors	5%
Others, such as railroad surgeons, instructors, professors, etc.	10 to 15%
General practitioners, estimated	5 to 10%

The income tax rate, approximately, as applying to doctors, is as follows:

6,000 to 8,000 kronas	18%	40,000 to 60,000 kronas	60%
15,000 to 30,000 "	30%	80,000 kronas and up	80%
30,000 to 40,000 "	40%		

These are approximate figures and apply to the gross income after the direct expenses have been deducted.

One chief surgeon told me that at the age of fifty, having served at this rank for ten years, and after paying for his children's education, he was unable to reduce appreciably his school debt of 20,000 kronas. A specialist in one of the large cities, who has a gross income of 55,000 kronas, informed me that after paying an income tax of 15,000 kronas, for the usual medical expenses, the education of his children, and the interest and amortization of his school debt, he found that he and his wife did not have enough to live on. He also found it nearly impossible to increase his gross income sufficiently to net an amount adequate for a decent living for himself and family.

SPECIALIST'S INCOME

Gross income		55,000 kronas
Office expense	15,000 kronas	
Income taxes	14,000 "	
Interest debt	500 "	
9 room apartment	7,800	
less office	2,800	5,000 "
Payment on debt	3,000 "	
Life insurance	4,500 "	42,000 "
		13,000 "
Education 4 children		10,000 "
		3,000 "

This stresses the fact that the doctors in Sweden find themselves in a very difficult financial position, while

TABLE III
Analysis of Salaries

Hospital	Number of Doctors	Doctor's Salary	Average doctor's Income	Number of Nurses	Nurse's Salary	Total Payroll
F	6	99,821 kronas*	16,637 kronas*	70	348,930 kronas*	1,051,699 kronas*
A	20	322,925 kronas*	16,146 kronas*	235	1,164,220 kronas*	3,231,748 kronas*

*5.15 kronas equal \$1.00

most of the laity are of the opinion that the doctors are amassing great wealth notwithstanding.

MEDICAL ORGANIZATION

Exploring the medical situation further, it is interesting to observe the well-knit organization of the Swedish Medical Society and to note that it is the primary reason why the medical men are still somewhat "free to act."

The Society, composed of 90 per cent of all Swedish doctors, has done much to improve their financial position. The executive committee meets weekly and measures taken by this committee are examined by the board of the association, which meets four times a year. No agreements are settled and no appointments applied for without the consent of the board or executive committee of the board. The assembly of the association meets once a year.

Membership in the association costs 100 kronas a year. The different categories of doctors are united into professional associations within the large association, such as the one for young doctors, mostly assistant surgeons, who comprise half of the Swedish medical men. These smaller associations all meet at stated times during the year. There are two principal journals: *The Journal of the Swedish Medical Association*, *Nordiska Medicine*, and the *Upsala Lakarenforenings Forhandlingar*.

The Medical Society dictates the working conditions and establishes minimum salary scale of the doctors employed at the hospitals, as well as the wage scale, working conditions, living quarters and office facilities of city and district doctors. In fact, no eligible doctor can apply at a hospital which does not meet with the approval of the Society. All vacancies, or new positions, must pass the inspection of the Society before such jobs can be advertised in the medical journal. Failure of any doctor to comply with the rules of the Society usually means expulsion. When a member is once expelled he finds it hard to obtain any of the desired positions, and even the few that enter private practice find it difficult to practice without membership in the Society.

Were it not for the control the Medical Society has upon its members and the fact that the Society speaks for all doctors, it could not have been such powerful influence and the doctors would be hopelessly lost in the meshes of socialism. The organization is so influential with its members and wields such power over state and districts that doctors still have some semblance, in their own minds, at least, of what we call rugged individualism. They really have two medical societies, one representing the scientific phase and the other the economic aspect of medical practice.

The American Medical Association and various state medical societies have much to learn from the Swedish Medical Society. If every doctor in the United States were a member of organized medicine and if his privilege to practice depended upon such membership, we would have no real problem in our country in handling the promoters of socialized medicine.

Observe that all hospital medical staffs in Sweden are a closed group. Only the physician and surgeon hired

by the hospital have an opportunity to practice medicine in the hospitals. That leaves the city doctors, district doctors, and general practitioners without hospitals. They must send their patients to the hospitals with no privilege of taking care of them nor of following their progress and recovery. Peculiarly enough, the city and district offices are sought for and yet their work is mostly routine. They have charge of the health of the people, in a general way, and examination of school children, all of whom are examined in the first, fifth and seventh grades. The city and district pay the doctors part of their salary, provide office and living quarters which the doctors must eventually pay for. The remainder of their income they obtain from their private patients. They are supposed to make about half of the regular fee schedule, which is supposed to keep down the medical costs. The city and district doctors are obligated to take care of all comers, rich or poor, must always be at the service of the people, and provide substitutes on leaving. It is, of course, a fact that without some such arrangement many communities would have no doctor.

There are very few, comparatively, surgeons or general practitioners outside of the hospitals. There may be some specialists, not affiliated with the hospitals, such as internal medicine, eye, ear, nose and throat, x-ray and lung specialists. These specialists may be able to carry on some activities without the benefit of a hospital but it is difficult for an American doctor to understand how a man with growing skill and interested in the real art of medicine could continue without the services of a modern hospital. Because of this unfortunate situation, the general practitioner as we know him in America is rare in Sweden.

More recently, many of our general practitioners have felt such serious handicaps in the larger cities, where the hospitals are operating more and more on a closed staff basis. This leaves the young general practitioner without a hospital. That predicament is a serious one and can only be understood by the men who have gone through the experience of being in need of a hospital, and who, in order to provide it, must take on a heavy financial burden and the responsibility of operation.

In Sweden there are a few small private hospitals to which any practitioner outside of the hospital forces can bring patients. Therefore operating a hospital not subsidized by the districts becomes almost out of the question. When we recall that every sick person, if he chooses, can enter the hospitals for 3 kronas per day, including the medical charge, it becomes evident that operating a small hospital at 30 or more kronas per patient per day, for hospital care and medical charges in addition, becomes almost prohibitive.

In conclusion I wish to emphasize a few pertinent differences between the practice of medicine in Sweden and that in United States.

1. The hospitals are owned and operated by the districts and the districts pay up to 80 per cent of the cost of operation. The hospitals hire doctors. Only employees of the hospital are permitted to give medical care.

(continued on page 298)

Urinary Extravasation

SAMUEL S. BEIRSTEIN, M.D.* and MICHAEL J. FEENEY, M.D.†
Minneapolis, Minnesota

URINARY extravasation may result from injury to the pelvis or perineum, or from leakage incident to urethral infection. The urinary extravasation associated with periurethral abscess or phlegmon is a septic infiltration following urethral infection and obstruction. Since it presents quite a different picture at onset from that following trauma, the two conditions will be discussed under separate heads.

EXTRAVASATIONS CAUSED BY PHLEGMON

Phlegmon always begins as a periurethral abscess caused by a stricture of the urethra and may occur even when the stricture is passable. The seriousness of the condition is dependent upon the virulence of the causative organism. The anerobic gas-forming bacilli are frequently present, but those most commonly found are streptococcus and the hemolytic staphylococcus, both of which often occur in combination with the colon bacillus and the gonococcus.

The toxic manifestations in these acutely ill patients are due in part to the cellulitis which leads to a vascular thrombosis and gangrene, and in part to the organisms present. Contrary to what might be expected in such a thrombophlebitic process, pulmonary embolus is not a common complication.

From studies of cadaver dissections I have been able to define the anatomical barriers which at first limit and subsequently guide the infections. These are the fascial planes:

Colles fascia, the deep layer of the superficial perineal fascia, is fused with the posterior border of the inferior layer of the urogenital diaphragm, the so-called triangular ligament, by which it is connected to the pubic rami in front, and laterally to the ischio-pubic rami as far back as the ischial tuberosities. From this point it curves forward enclosing the bulb and superficial perineal pouch to become continuous with the Dartos layer of the scrotum and Scarpa's fascia on the abdomen. This superficial pouch contains the bulb and bulbous urethra, and since most strictures occur in this area, the infection breaking through at this point enters the pouch, which, bounded and limited by Colles fascia, becomes the most important barrier. In the series of cases reviewed at Bellevue Hospital, over 90 per cent began in the superficial perineal pouch.

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Buck's fascia, surrounding the corpora, may also limit an infection starting in the pendulous portion of the urethra. Such an infection rarely invades the scrotum and perineum.

The *urogenital diaphragm* also acts as a guide and barrier, particularly when infections begin in the membranous and prostatic urethra.

Infections beginning in the membranous urethra usually rupture through the superficial layer of the urogenital diaphragm, thus entering the space confined by Colles fascia. Infections in this segment of the urethra seldom break through the superior layer of the urogenital diaphragm into the pelvis. When they do, they may dissect the peritoneum from the bladder and extend into the space of Retzius.

Infection may also extend into the ischio-rectal fossa and may involve the buttocks and inner, upper aspect of the thighs. The primary lesion may thus be masked by such a picture of peri-rectal or ischio-rectal abscess.

The patient generally presents a history of many years of urinary difficulty and perhaps one or more bouts of retention. The area about the stricture, which is eroded and weakened from the infection, gives way and septic urine begins to infiltrate the tissues. The condition becomes fulminating; within 24 to 48 hours the patient is stuporous and toxic, having experienced chills, fever, prostration and dehydration. The scrotum is swollen, edematous and gangrenous, with swelling in the perineum and with redness of the skin spreading cephalad to involve the suprapubic area.

External urethrotomy with adequate periurethral drainage is the operation of choice because: (1) The urinary obstruction is incident to the stricture, and the cause of the infection is corrected. (2) The infected periurethral tissue is provided with drainage. (3) The dependent position of the drainage favors complete emptying of the bladder. (4) Since Colles fascia, which guides 90 per cent of urethral infections, is continuous with Scarpa's layer, the infection then, is superficial and really subcutaneous. To perform cystotomy through such infected tissue and introduce infection to the deeper uninfected tissue beneath the rectus sheath is not advisable.

In a series of 180 such cases at Bellevue, 176 were treated by external urethrotomy and drainage. Four had impermeable strictures and cystotomy was performed. However, these four cases were later operated upon perineally to establish continuity of the urethra.

A widespread incision extending through and beyond the infected area is imperative. The attachment of Colles fascia to the fascia lata of the thigh prevents the

spread of infection down the thighs. Gluteal and circumanal spread is common. The scrotum is nearly always involved, but the penis is often protected by Buck's fascia. Parallel incisions through the skin and subcutaneous tissue of the abdomen may be necessary, and if so, are carried as far as the infection spreads, even as high as the axilla.

Counterdrainage has been employed to connect the incisions, and packing of the wound with hot permanganate dressings has been used as a routine measure. When the scrotum is involved it is bivalved and the testicles isolated and wrapped in permanganate-soaked gauze. The inguinal canals are opened and often the gangrenous scrotal areas require excision. Usually wide incision is vital when crepitation is felt beneath the skin. All these cases require administration of gas antitoxin.

At a later date plastic surgery may be necessary to repair defects in sloughed-out urethrae and to cover the scrotal defects. To avoid recurrence, follow-up urethral dilatations are imperative. Since toxemia and septicemia have been the chief causes of death, full use should be made of the antibiotics and sulfonamides. The sulfonamides and penicillin have already helped to lower the mortality rate from 38 to 20 per cent.

It should always be remembered that what appears to be a simple periurethral abscess may overnight become a fatal phlegmon. All cases should be treated in like manner, by urethrotomy and ample drainage as has been outlined above.

EXTRAVASATIONS CAUSED BY TRAUMA

Trauma may be inflicted by the self-introduction of foreign bodies into the urethra, or by instrumentation. Injuries to the urethra may be caused by crushing forces to the pelvis and also by falls astride heavy and pointed objects, blows sustained in athletics, wounds by bullets, or stab wounds. Of course some injuries of the urethra are mild, producing no obstruction except that which is incident to edema and associated with minimal bleeding. These require very little attention.

Extravasations caused by such injuries I prefer to classify according to their relationship to the urogenital diaphragm. This diaphragm, as has been demonstrated, separates the pelvis from the perineum. The superior layer is part of the endo-pelvic fascia, and the inferior layer, the so-called triangular ligament, gives attachment at its postero-inferior border to the fascia of Colles. Between these two layers are the deep transverse perineal muscles, membranous urethra and sphincter, Cowper's glands, artery to the bulb, branches of the internal pudendal vessels, and dorsal nerve of the penis. Also derived from the endopelvic fascia are the pubo-prostatic or pubo-vesical ligaments as well as the prostatic capsule and the fascia of Denonvillier. They are mentioned at this point because they are frequently lacerated during crushing injuries to the pelvis with incidental bladder and urethral rupture.

Extravasations form above the urogenital diaphragm from *rupture of the prostatic urethra*. The perivesical tissues are involved and dissemination may be to the

retroperitoneal space and extend to the ischio-rectal fossa through a lacerated Denonvillier's fascia. The triangular ligament prevents extravasation from extending into the perineum.

With *perforating injury of the prostate* such as that caused by an instrument or foreign body, the only extravasation may be through the fascia of Denonvillier into the retroperitoneal space.

With complete *avulsion of the prostate* from its apex the bladder may retain its urine, but the extravasation of blood will be perivesical and retroperitoneally although confined to the pelvis. Rectal examination of such cases will reveal a soft boggy mass, but the prostate will not be distinguishable.

Rupture of the membranous urethra is usually accompanied by laceration of the superior layer of the urogenital diaphragm which I prefer to consider as endopelvic fascia. This permits a similar perivesical extravasation and from this space the retroperitoneum may be invaded. Here again the triangular ligament prevents extravasation into the perineum.

Trauma to the perineum causing rupture of the bulbous and pendulous urethra produce extravasations below the urogenital diaphragm which follow the fascial planes of Buck and Colles. Buck's fascia forms the deep investment of the penis, covers the corpora along their entire length, and fuses with the suspensory ligament. There is a potential space between the corpora and Buck's fascia, but here again the attachment of Scarpa's fascia to the fascia lata at the level of Poupart's ligament prevents extension to the thighs.

Not infrequently *both anterior and posterior urethrae* are ruptured simultaneously. In such instances the extravasation is both below and above the urogenital diaphragm.

Retroperitoneal extravasation is always a very real menace. Only by adequate drainage will many deaths be prevented. To ascertain the presence of such extravasations, the retroperitoneal space must always be explored.

The surgical management of ruptured urethra may be summarized briefly as follows: (1) cystotomy, (2) exploration of the intra and retroperitoneum, (3) perineal repair to re-establish continuity of the urethra and (4) adequate drainage.

The clinical picture in extravasation from trauma differs only slightly from that caused by infection. The spread of the process varies slightly. Both present the same surgical problems and the diagnosis is not too difficult. However, the deep form of extravasation with pelvic involvement is less readily recognized and is sometimes present associated with the superficial form of extravasation in the perineum.

The extent of tissue involvement depends upon two factors: the duration of the extravasation and the amount of infection present. When the injury is in the vicinity of the bulb and the triangular ligament, and when doubt exists concerning the involvement of the

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Clinical Experience with a New Analgesic Agent*

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THE clinical trial of a new analgesic agent, Dromoran Hydrobromide,† has been carried out. Dromoran Hydrobromide (3-hydroxy-N-methylmorphinan hydrobromide) is a morphine-like compound previously reported under the experimental designation "Nu-2206."³

METHOD

Thirty-nine adult patients received Dromoran Hydrobromide for relief of pain. All of these patients had suffered pain as a result of an operation or a disease process; no normal subjects with induced pain were studied. The degree of analgesia and sedation were recorded after each dose on a scale of excellent, good, fair, or poor. Duration of effect was graded as long (over 5 hours), average (3 to 5 hours), or short (less than 3 hours). Because of the extreme variability of pain, a closer evaluation of duration of analgesia was not attempted except in several notable cases. Untoward reactions were recorded with particular attention to nausea, vomiting, vertigo, euphoria, and respiratory depression. Wherever possible comparison was made with other analgesic drugs used. The causes of pain in the patients in this series that required analgesic drugs are listed in Table I.

TABLE I
Causes of Pain Requiring Analgesic Drugs

Cause of Pain	No. of Cases
Advanced malignancy	14
Postoperative	9
Cardiac disease	4
Peripheral vascular disease	3
Morphine addiction	2
Other causes	7
Total	39

Relief of pain due to disease is more difficult to evaluate than relief of pain induced in normal volunteers. Pain from disease changes considerably in intensity and duration as the causative process pursues its course. Pain thresholds vary from patient to patient and indeed, in the same individual as circumstances change. This fluctuating base line permits only general conclusions to be drawn from a clinical study such as this. The findings are recorded in Table II.

RESULTS

Analgesia. Dromoran Hydrobromide, in amounts of 5 mg. administered subcutaneously, has approximately

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†Supplied by Hoffmann-La Roche, Inc., through the courtesy of M. J. Schiffrin, Ph.D.

the same analgesic potency as 10 mg. of morphine sulfate, 3 mg. of dilaudid and 20 mg. of Pantopon administered by the same route. These values correspond favorably with previously published results.¹⁻⁷ Dromoran Hydrobromide in the aforementioned dose is more effective than 100 mg. of Demerol.

Sedation. The sedative effect of Dromoran Hydrobromide was noticeably less than that produced by equivalent analgesic doses of morphine or dilaudid. This quality was appreciated by many patients who disliked the drowsiness and "drugged" sensation attending the use of other agents. In the more disturbed and apprehensive patients the lack of sedative effect of Dromoran Hydrobromide was not desirable; other agents were needed for sedation although their analgesic qualities were not necessarily greater.

Duration of relief. Eleven patients had relief of pain for 5 to 12 hours following a single dose of Dromoran Hydrobromide. Of these, six were cases of terminal malignancy. The prolonged duration of relief made Dromoran Hydrobromide the drug of choice for these patients.

Tolerance. Patients given Dromoran Hydrobromide over long periods of time demonstrated increased tolerance necessitating gradual increase in dose for the control of pain. One patient (31) required an increase to 20 mg. per dose, an amount which she tolerated well.

Dependence. Two patients (13, 15) showed evidence of dependence on Dromoran Hydrobromide after prolonged administration (25 and 28 days). In three patients (7, 8, 21) who were given total doses ranging from 110 mg. to 225 mg. over periods of 10 to 15 days no evidence of dependence was found on sudden withdrawal of the drug. In one morphine addict (3) the Dromoran Hydrobromide was a good substitute; in another (26) it failed.

Untoward effects. After single doses of 3 mg. to 20 mg. (the latter after tolerance developed) untoward effects were neither severe nor frequent. Gastro-intestinal disturbances ranging from vague nausea to vomiting were the more frequently encountered effects attributable to the drug. (7, 8, 9, 10). Dizziness, true vertigo, slight depression, and euphoria were observed less often. There was no evidence of urinary retention. Respiratory depression was seen in only one patient (27) and in this instance was not unequivocally due to Dromoran Hydrobromide.

TABLE II
Clinical Results from Dromoran Hydrochloride in a Series of 39 Cases

No.	Age	Sex	Dromoran Hydrobromide		Duration of effect*	Side Reactions	Efficacy†	Diagnosis	Comment and Comparison
			Dose Mg.	Total Dose Mg.					
1	43	F	5	185	A	None	G	Carcinoma of stomach	Good pain control, little sedation. Dilaudid used to control apprehension.
2	37	M	5	15	S	None	P	Renal calculus	Inferior to morphine 15 mg. dilaudid 3 mg.
3	42	F	5	60	L	None	E	Diffuse collagen disease. Morphine addiction.	Good substitute for morphine 15 mg. at 8 hour intervals.
4	28	M	5	70	A	None	E	Chronic (terminal) glomerulonephritis	Control of restlessness, tremors: better than Demerol 100 mg. or Dolophine 7.5 mg.
5	52	F	5	95	L	None	E	Carcinoma of breast with bone metastasis	Caused lethargy, drowsiness. Better pain control than morphine 15 mg.
6	36	F	5	15	S	None	P	Herniation of intervertebral disc	Same as codeine 65 mg. Inferior to morphine 15 mg. Pantopon 20 mg. and Demerol 100 mg.
7	67	M	5	110	A	Slight nausea Slight euphoria	F	Gangrene of foot (embolic)	Equal to morphine 10 mg. Pantopon 20 mg. Inferior to morphine 15 mg. dilaudid 3 mg.
8	75	F	3 5	42 130	L	Slight nausea	E	Peripheral arteriosclerosis with gangrene of foot.	Better than dilaudid 3 mg. Pantopon 20 mg. and morphine 8 mg. Given over 11 day period.
9	52	M	3	21	L	Anorexia? Depression?	F	Lymphosarcoma	As good as any other analgesics. Patient very excitable. Also hard to evaluate.
10	75	M	3	9	A	Nausea Vertigo	P	Carcinoma of colon	.....
11	55	M	3	3		None	F	Platybasia postoperative	Equal to Demerol 100 mg.
12	72	F	3	3		Nausea (?)	F	Myocardial infarction	Equal to dilaudid 2 mg. Demerol 100 mg. Nausea following all analgesics but not definitely attributable to drugs.
13	52	F	3 5 6	36 15 108	V	Considerable dependence. Euphoria.	F	Malignant lymphoma	3 mg., 6 mg. equal to 50 mg., 100 mg. respectively of Demerol. Good sedation from Dromoran Hydrobromide. Dependence when drug given 25 days.
14	18	M	3	3		None	F	Appendicitis postoperative	Only analgesic used.
15	65	F	3 5 6 7.5 10 15	114 90 126 22.5 200 60	L	Slight nausea. vomiting. Definite dependence. Marked euphoria	F	Carcinoma of the uterus with metastasis (Terminal)	Early cumulative effect with gradually increasing doses needed for pain control. Total dose of 612.5 mg. in 28 days. 5 and 6 mg. doses equal to morphine 15 mg. as an analgesic but duration of effect of Dromoran Hydrobromide was greater.
16	32	F	3	21	A	Euphoria	G	Hysterectomy (pre-post op.)	Patient allergic to morphine. Demerol. Dromoran Hydrobromide not effective pre-operatively but good post-operative analgesic.
17	47	M	5	25	A	Slight nausea	G	Cholecystectomy (post-op)	Equal to morphine 10 mgs. to 15 mgs.
18	33	F	3 5	3 30	L	None	E	Laminectomy (post-op)	Patient sensitive to morphine, dilaudid, codeine, Demerol. Rapid, effective pain relief from Dromoran Hydrobromide.
19	49	M	3 6	18 6	L	None	F	Chronic glomerulonephritis	
20	44	F	5 10	130 30	L	"Heartburn"	G	Laparotomy (post-op)	Gradually increasing tolerance with decreasing effectiveness over 15 day period. Equal to dilaudid 2 mg. (in 5 mg. amounts)
21	51	M	5	225	L	None	G	Laminectomy (post-op)	No sedative effect noted. Analgesia equal to dilaudid 2 mg. Given 10 days. Patient in-stable personality.
22	21	F	5	20	A	None	G	Spine fusion (post-op)	Little sedation. Good analgesia, equal to dilaudid 3 mg.
23	55	M	5	70	A	None	F	Laminectomy (post-op)	Same as morphine 10 mg. Difficult to evaluate.
24	66	M	5	30	A	None	P	Rheumatoid arthritis	Same relief obtained from Empirin #2.
25	47	F	5 10	10 10	S	None	P	Carcinoma of pancreas.	No sedation. Morphine 30 mg. needed for relief.
26	31	F	5	15	S	None	P	Multiple abscesses.	Morphine addict. No euphoria from Dromoran Hydrobromide. Dilaudid 2 mg. better.

TABLE II—(Continued)

No.	Age	Sex	Dromoran Hydrobromide		Duration of effect*	Side Reactions	Efficacy†	Diagnosis	Comment and Comparison
			Dose Mg.	Total Dose Mg.					
27	65	F	3	3		Respiratory depression(?)	P	Congestive heart failure	Depression probably not from Dromoran Hydrobromide alone.
28	52	F	5 10	5 10	S	None	P	Carcinoma of rectum.	No relief, but patient needed morphine 30 mg. for relief.
29	25	M	5	20	A	None	G	Rib fracture	...
30	29	F	5	5		None	P	Pituitary adenoma.	Relief from morphine 10 mg.
31	46	F	5 10 15 20	25 1020	L	None	E	Carcinoma of ovary (terminal)	Good pain relief with little sedation.
32	25	M	5	55	A	None	G	Fracture of shoulder	Equal to morphine 10 mg.
33	24	F	5	40	A	Nausea(?)	P	Hodgkin's disease	No sedation. (Nausea from nitrogen mustard?) Better analgesia, sedation from Demerol 100 mg.
34	56	F	5	15	A	None	G	Carcinoma of ovary	Equal to Demerol 100 mg.
35	39	F	5	35	A	None	G	Carcinoma of lung	Analgesia good. Sedation poor.
36	73	F	5	15	A	None	P	Diabetes mellitus. Gangrene leg.	Inferior to Demerol 100 mg.
37	45	F	5 10 15	160 2150	A	None	G	Lymphosarcoma (terminal)	Given for 49 days. Increased tolerance necessitating increase to 120 mg./day during last 5 days on Dromoran Hydrobromide then morphine 15/50 mg. every 3 h. during last 14 days.
38	29	F	5	20	S	None	P	Carcinoma of ovary.	Inferior to morphine 15 mg.
39	56	F	*5	20	A	None	G	Myocardial infarction	Equal to Demerol 100 mgm.

*Explanation of symbols: A=average, S=short, L=long.

†Explanation of symbols: E=excellent, G=good, F=fair, P=poor.

CONCLUSIONS

Dromoran Hydrobromide is an effective analgesic agent in doses of from 5 mg. to 10 mg. In general it produces less sedation and euphoria than morphine or dilaudid in equivalent analgesic doses. The untoward effects of Dromoran Hydrobromide are neither common nor severe. Dependence and increased tolerance develop irregularly after prolonged usage. Because of the low incidence of undesirable side effects, Dromoran

Hydrobromide is valuable in situations in which intolerance to other analgesic agents exists. In some instances the duration of the analgesic effect of Dromoran Hydrobromide was considerably longer than that of morphine, dilaudid or Demerol. For this reason, Dromoran Hydrobromide is particularly useful in the treatment of terminal malignancy where heavy sedation is not needed and long analgesic action is desired.

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In the fields of observation chance favors only the prepared mind.

—LOUIS PASTEUR

Applying Psychiatric Principles in Medical Practice

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MAN'S first attempt to combat illness was undoubtedly by purely psychic influences. The medicine men of pre-historic times, like those of our primitive cultures, must have depended upon their ability to influence the thoughts, feelings and attitudes of the sick individual for their success. Treatment was based on the concept that illness was caused by psychic factors, and with the exception of physical trauma, organic factors were not considered.

Bacteriological discoveries brought emphasis upon the physical aspects of illness. With the advent of this scientific approach to medical problems most physicians were trained to consider primarily the physical factors. The emotional aspects of illness and disease were sadly neglected.

One cannot be in daily contact with sick people without realizing that the emotional response of the patient is an important factor in the course of the illness. Nor does one long remain unaware of the fact that all complaints cannot be explained by bacterial invasions, physical trauma or other organic factors.

The manner in which an individual accepts his illness is often overlooked and disregarded. The way he expresses his feelings, how he describes his symptoms, and his emotional responses are fully as important aids in making a diagnosis as the physical examination and the laboratory and x-ray reports. In addition to this the attitudes and the relationship between the physician and the patient may be as important an adjunct to treatment and recovery as drugs and surgery.

An estimate, which appears conservative, suggests that more than half of the people who seek medical treatment are suffering from one of the neuroses. Their difficulty may be purely emotional or in conjunction with a somatic disturbance. Thus we cannot deny the importance of psychotherapeutic procedures in every phase of the practice of good medicine. It must constitute an ever present consideration in the evaluation of any therapeutic procedure.

Psychotherapy, simply stated, is the art of combating illness and promoting health by mental influences. Psychotherapeutic procedures are based upon the relationship between the patient and the physician. The physician receives the patient's confidences and is made aware of many of his difficulties and emotional conflicts, thus becoming arbitrator and advisor for the patient. A definite symbolic relationship arises between the patient and

the physician and even between the doctor and the patient's family. The alert practitioner utilizes this principle and treats the individual and not the disease alone. Almost all diseases and injuries have their emotional component. By considering this an important factor and treating the person as an individual, the entire course of an illness may be altered, the length of convalescence shortened and chronicity often avoided. A good many doctors practice good psychotherapy without realizing that they are using the interpersonal relationship in the management of their cases. Wise use of this factor makes the successful practitioner.

Knowledge and utilization of psychiatric principles can help the physician practice comprehensive medicine. The patient who recognizes his anxiety producing conflicts may find it no longer necessary to use illness as a means of escaping responsibilities. Many patients could be spared their fruitless search for relief by running from one doctor to another and many unnecessary surgical procedures might be avoided. A great deal of tension with its usual resultant state of unhappiness may be relieved. It is indeed unfortunate that many of this type of patient end up in the hands of "quacks" and medically incompetent practitioners.

The medical profession must assume some of the responsibility for the present popularity of cultists. This was bound to follow when medical training in the past placed so much emphasis upon symptoms and their organic components. Until fairly recently the majority of physicians were so conditioned that they felt there was something lacking in their own diagnostic abilities if they failed to find some demonstrable organic basis for the symptoms related to them by the patient. Patients may sense the physician's unsuccessful attempts to correlate their symptoms with organic pathology and antagonism may arise because of mutual frustration. The patient is then likely to seek out some other therapist with whom he can at least have a feeling of sympathy, understanding and security.

Ordinarily the general physician and the pediatrician are in the best position to recognize the troubled and emotionally sick adult or child. However, the physician may fail to evaluate and treat the emotional factors of illness because he feels that psychotherapeutic techniques are intangible and unscientific. He does not realize that the results of psychotherapy may be most striking. Although not measurable by the usual standards of medical criteria, the techniques are valid and grounded

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upon the sound principles of observation and the pragmatic test of recovery.

The practice of medicine deals with the human being's reaction to noxious stimuli. This may be chemical, bacteriological, physical trauma, emotional unrest or any combination of these. Whatever the precipitating factor may be, the end result is the same—a sick human being. There is no such thing as differentiating between organic and functional—it is always both.

The physician must learn that everything the patient says or does has meaning and importance. He must also be aware of his own reaction towards the patient, both positive and negative. In this way the physician may avoid some of the more common pitfalls: telling the patient there is nothing wrong with him; that his troubles are purely imaginary; heightening his anxiety and implanting the impression that he may have a serious malady by examining the patient over and over; over-sympathizing with the patient; or dismissing the patient abruptly, without taking into consideration that he may be attempting to resolve some emotional conflict through illness.

Many physicians tend to remain aloof from psychiatry. This may be due to the facade of descriptive terminology rampant in the field. However, psychiatry is basically plain common sense and an interest in and an understanding of the patient as an individual. The physician need not be too concerned about psychiatric diagnoses, which are at best convenient labels, and add little to an understanding of the patient and his illness. The diagnosis of psychoneurosis may badly frighten a patient so that it is probably better to tell him that he has a nervous upset or that his illness is a result of emotional unrest. The physician may illustrate by examples of how our feelings bring about changes in the physiological processes of the body. How we blush when we are embarrassed, how our heart rate quickens when we are frightened or startled, how many people become nauseated when disgusted and how others develop headaches when worried or irritated.

Most physicians recognize the seriously mentally disturbed or psychotic patient and request consultation or refer them elsewhere for treatment. Our main concern is the types of emotional disturbances more commonly encountered by the average practitioner. For example, there is the patient with a well defined organic ailment who is reacting with strong emotion to his illness, thus delaying convalescence or healing because he does not respond as expected to the usual medical regime. There is the patient with a disease picture which represents a combination of emotional and physiological upset, where the emotional state may be fundamentally responsible or at least the major cause of his upset. Many cases of ulcers of the stomach, hypertension, bronchial asthma, ulcerative colitis, have been shown to have begun with protracted states of emotional unrest and emotional tension leading to permanent and irreversible organic changes.

The internist, surgeon and all specialists should school themselves to recognize the personal problems of indi-

viduals under their care who do not respond as anticipated, or who may even get worse under the usual methods of treatment. There are many patients who seek and crave operations, others who seem addicted to pelvic, genital, cystoscopic and proctoscopic procedures.

Every physician should be able to recognize these conditions in addition to the depressed patient with his characteristic sadness, insomnia, weight loss and gloomy outlook upon life. He can learn to treat mild depressions and anxiety states and to handle fatigue reactions, hypochondriacal reactions and many psychosomatic disorders. In the treatment of these disorders he should realize that hospitalization is rarely necessary and may actually make the condition worse by putting a premium on illness as a mode of reaction. The patients are best treated on an ambulatory basis through repeated visits to the physician's office. Skillful maneuvering on the part of the physician may help the patient rid himself of crippling anxieties or at least help him to deal with them more constructively. Oftentimes it is necessary to help the patient accept the fact that his conflicts cannot be resolved and then help him to wall them off. More involved neurotic reactions or those that do not respond to this manner of approach are best referred for more intensive therapy.

The aim of psychotherapy is to help the patient tolerate more comfortably unbearable situations, or where possible alleviate or alter conditions causing emotional unrest. This may involve working with the family to give them an understanding of the illness. It is often necessary to discuss the tangled emotional relationships between husband, wife or parents. Relatives may need help in avoiding over-indulgence or over-rejection. It is often necessary to help with problems of emancipation or as a marital counselor. The physician often finds himself acting as an impartial arbitrator in family disagreements. This is all part of good medical treatment.

Suggestions are in order but it is well to avoid too much regulation. The wise choice is to let the patient make his own major decisions regarding critical changes in his way of life. It is oftentimes difficult to adhere to this principle as many patients will plead for the physician to make authoritative decisions.

It is important to help the patient achieve inner security, freedom from anxiety and enhanced capacity to meet actual stresses of everyday living. This is talking therapy—psychotherapy in its more specific sense. The ultimate objective is to help the patient get release by talking out or getting his problems off his chest. In the process, if he is wisely handled, he will gain a new outlook and a greater understanding of his emotional life. He then usually handles himself more wisely and works out his difficulties in a more satisfactory manner, freeing himself of many crippling anxieties. *It must be stressed that during this process the physician listens more than he advises.* His task is not to dig out confessions, but to create an atmosphere of understanding, trust and confidence, wherein the patient will spontaneously bring into the conversation his anxiety-laden experiences, memories and phantasies. Following this the patient is usually able to acquire a more objective

understanding of himself. He gains a degree of insight that brings relief from his distress. The healing comes automatically with the release of tensions after talking and sharing with the understanding physician.

In performing this therapeutic function, the physician may be little able to formulate the steps in the procedure. It matters little whether he knows he is using techniques of explanation, reassurance, persuasion, suggestion or re-education. Psychiatric terms and psychological explanations are unnecessary. The real test is the progress the patient is making towards getting well. The physician need not be threatened by the thought that he is not practicing good medicine if he is not giving medications or carrying out complicated procedures. The patient

usually welcomes the opportunity to discuss his problems with an understanding person. If it is explained that a physician's time and knowledge are valuable commodities, few patients will object to paying for this type of service.

All doctors should realize that their patients will be benefited by proper attention to the emotional aspects of any illness. The physician who has achieved an attitude of tolerance towards these unhappy, and often disabled people, has gained much. With increased consideration of the emotional aspects comes greater confidence and skill in their handling. Finally the physician realizes that he can materially help these neurotic patients who constitute the bulk of all medical disabilities.

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CHEMICAL YIELDS ARTIFICIAL MUSCLE

A chemical substance extracted from muscles of rabbits has been used at Columbia University to produce fibers that contract and do work like natural muscles. The findings, expected to lead to a better understanding of the manner in which muscle cells work, were made by Dr. Teru Hayashi of Columbia's Department of Zoology.

While not living tissue, the "artificial muscle" is actually composed of actomyosin, a chemical substance found in all muscles, which is strongly suspected of being the factor that makes muscles contract. Dr. Hayashi extracted the actomyosin from the muscles of rabbits and, after treatment, was able to develop fibers from the substance.

These fibers contracted when treated with ATP (adenosine triphosphate), another muscle substance. In the process of contracting, Dr. Hayashi found, the fibers lifted more than 100 times their own weight.

Dr. Hayashi's study of the properties of actomyosin developed out of research on "interfaces." An interface, it was explained, is the surface area between two different substances, such as air and water or oil and water. Many of the basic physical and chemical changes that take place in the living body are regarded by biologists as taking place at the interfaces that exist within body cells.

The Columbia scientist was able to develop actomyosin fibers that have the ability to contract by spreading a film of the actomyosin at an air-water interface. The fibers formed when the film was compressed.

Dr. Hayashi, who was born in Atlantic City, has been assistant professor of zoology at Columbia since 1948. He became interested in the properties of actomyosin during the summer of 1950 while investigating the significance of interfaces in body cells.

Hepatoma in Infancy

A Case Report

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THE following case report of a primary liver tumor appearing in infancy is presented because of its unusual interest. A similar case was reported last year by Sawyer,¹ and was the first case of primary hepatoma accepted by the Tumor Registry of the American Academy of Pediatrics. The patient died on the operating table during surgery when removal was attempted.

R. H., a female infant, was born at term on July 3, 1949 at 5:25 A.M. with a birth weight of 8 pounds. Measurements were: length, 21½ inches; head, 13¾ inches; and shoulders, 5¾ inches. She was discharged on July 9 in good condition with a weight of 7 pounds, 14½ ounces, and was to return to the clinic for check at a later date. The diagnosis at the time of discharge was that of a normal newborn infant.

She was seen in the office on August 17, at which time she weighed 10 pounds, 3 ounces. She was alert and her skin was in good condition. She was put on orange juice and cod liver oil.

She was not seen again until December 14, 1949, at which time she weighed 15½ pounds. The parents reported that the child was a good baby, that it ate and slept well, but that they and the grandparents had noticed a "lump" in the abdomen just before Thanksgiving. Since then the lump had enlarged, and they said that it seemed larger at times and at other times it almost disappeared. For the past weeks she had seemed to eat less and the grandparents had stated that the girl looked thinner. There had been no vomiting or diarrhea.

Physical examination revealed a large mass in the abdomen which felt like an enlarged liver, extending down to the iliac crest on the right, and the large portion more rounded in the epigastrium. The edges were smooth and not tender. The abdomen was soft otherwise. The baby was generally happy and active. The white blood count was 16,000; differential count was 75 per cent lymphocytes, 24 polymorphonuclears, one eosinophile. K.U.B. showed the bowel pushed into the left lower quadrant. The impression was that of hepatoma. The rest of the general examination was essentially negative.

The x-ray report of the abdomen from St. Alexius hospital at Bismarck, December 15, 1949, is as follows:

"Fluoroscopy of the chest revealed no pathology. Both diaphragms are normal in position. There is a large, roughly triangular mass occupying the superior half of the abdomen excluding the left upper quadrant. The transverse colon and hepatic flexure are displaced inferiorly, and the stomach is displaced slightly laterally to the left, but no intrinsic pathology noted in the stomach following barium swallow. The duodenum and the

jejunum are displaced to the left, and the ileum is displaced inferiorly. There is normal passage of barium meal through the small bowel and in six hours the head of the meal is in the hepatic flexure with only a very slight residue in the stomach.

"On several of these films the right renal shadow appears to be faintly outlined. The left renal shadow cannot be completely outlined. The mass does not appear to represent spleen. Conclusion: Large mass in superior half of abdomen, mostly on the right, which appears to represent either an enlarged liver or possibly a large mesenteric or omental cyst. Suggest intravenous pyelogram to rule out the possibility of renal tumor."

The child was admitted to the hospital as a patient on December 17, 1949. On this date K.U.B. and I.V. pyelograms were done with reports by Dr. J. R. Williams:

"K.U.B.—The previously described large mass is again noted and appears unchanged in the abdomen. Stomach is displaced to the left, and the colon and small bowel are displaced inferiorly."

"I.V. pyelogram—Both sides show prompt excretion of material and appear normal. No intrinsic lesion noted in the kidneys, and no evidence of extrinsic pressure upon the kidneys, suggesting that the mass lies anteriorly and it does not represent a retroperitoneal lesion. Conclusion: 1. normal I.V. pyelogram; 2. large mass in right upper abdomen probably representing a large liver."

On December 18, Dr. Robert Tudor saw the child in consultation. It was his impression that the condition was probable malignancy of the liver, however Gaucher's disease and Von Gierke's disease should be ruled out. An x-ray of the chest, skull and long bones was suggested, and Hanger's test, blood sugar, alkaline phosphatase, serum bilirubin, TBC patch test and S.T.S. were advised.

On December 19, 1949, x-rays of the chest, skull and long bones were made. The report by Dr. Williams stated, "Chest—the heart and lungs appear normal. The diaphragm is in normal position. Skull—no pathology noted. Long bones, including both legs and both arms—no pathology noted. Bone age appears normal."

The patient was seen in consultation by Dr. Arneson on December 20. He recommended surgical exploration with biopsy of the tumor of the liver. On this date also 120 cc. whole blood was given into one of the scalp veins.

On December 21 surgery was carried out with biopsy of the liver. A tumor of tremendous size involving the liver was found. The tumor extended from the right lobe

involving nearly the entire inferior border of the liver and was continuous with the round ligament. There was no definite line of demarcation that could be made out. Exploration of the remainder of abdominal cavity was negative. Biopsy was taken from the lower inferior border of the liver and on cutting through this there was found considerable sponge-like tissue. At first it was thought the tumor might be cystic. A finger could be placed in the liver for some distance. No definite line of demarcation could be made out. Because there appeared to be considerable draining the biopsy site was sutured with No. 40 catgut. This was a most unusual type of tumor and appeared to be a primary liver tumor. Grossly it appeared to be a sarcoma.

The following was the pathological report on the specimen by Dr. Larson: "Histologic examination shows a malignant hepatoma. The sections were examined also by Professor Bell and his staff who confirmed the diagnosis. They stated there is considerable differentiation of the tumor cells, and yet the picture suggests rapid growth. The prognosis is hopeless. Diagnosis: malignant hepatoma."

On December 27, 1949 the child's temperature was 102.4°. X-ray therapy was then started to the upper abdomen. The child had gained two pounds in weight, but her weight began to drop rapidly after daily x-ray therapy.

On January 3, 1950, blood examinations showed RBC 3,090,000; WBC 13,200; platelets 299,460 and Hgb 52 per cent. On January 4 Hgb was 51 per cent. On January 5, 100 cc. of whole blood was given in the scalp vein. The temperature at this time ran about 100.2° average. The child's appetite was fair up to the time of surgery and the onset of x-ray therapy and since then she has had anorexia. Pyridoxine and high vitamin intake in the form of procebrin was prescribed to help maintain nutrition and preclude nausea and vomiting from the x-ray therapy. The mass did not regress to any great degree but seemed to be organizing and becoming harder and somewhat nodular. Blood count on January 6 revealed RBC to 3,480,000; WBC 10,800; Hgb 58 per cent; platelets 334,080. On January 16 RBC were 3,730,000 with WBC 9,000; Hgb 46 per cent and platelets 44,800. Hgb on January 22 was 60 per cent.

On January 20 x-ray therapy was completed to the abdomen. The tumor mass appeared to have enlarged slightly in spite of treatment. On January 22, the date of discharge, the temperature dropped to normal. The final diagnosis at the time of discharge was: malignancy of liver, type undetermined, probably lymphosarcoma, or primary adenoma of liver, unimproved.

On January 30 she re-entered the hospital. She was quite irritable and was not taking nourishment well, and her mother was afraid to keep her at home. Her temperature was 102.2° on admission. In view of the previous diagnosis it was decided not to give her any therapy but to let things ride and see if, as so often happens, we might be mistaken. Her temperature dropped gradually toward normal, finally reaching what could be determined as normal limits about February 13. Her

weight remained more or less stationary, the temperature continued normal throughout her stay except for one spike to 102.2° on February 23 for some unknown reason.

The following blood work was done during her hospitalization from January 30 to March 13. On January 31, WBC was 5,000; Hgb, 40 per cent; PMNs, 60; eosinophiles, 6; lymphocytes, 30; mononuclears, 1. On February 6 blood examination showed WBC, 8,300; Hgb, 44 per cent; myeloblasts, 1; eosinophiles, 20; myelos, 4; juveniles 7; stab, 10; segs, 32; lymphocytes, 21; lymphoblasts, 2; erythroblasts, 2; basophilic myelocytes, 2.

The patient's general condition began to improve. The tumor became definitely smaller during this period, so that she was able to breathe easier and was much more comfortable. She began to smile and ate better. Her hemoglobin began to rise and on February 23 it was 62 per cent and on March 7, 80 per cent. Her color was better and general improvement was noted.

She was seen at the office at various times from April 27 to October 24, 1950, and showed continuous improvement. Her general development was slightly below par but progressed normally. Her weight increased from 14 pounds and 12 ounces to 22 pounds, 2 ounces. The hemoglobin varied from 63 to 73 per cent, and on October 24, 1950 was 71 per cent. The tumor became smaller.

On December 12, 1950, when she was seen again in the office, her weight was 23 pounds, and the tumor was still smaller. She had had a cold with a cough for the past two weeks. She was given aureomycin 50 mg. q.i.d. for a period of four days.

Physical examination revealed the presence of bilateral red drums, pharyngitis and acute rhinitis. Rales and rhonchi were heard throughout both lung areas. There was no evidence of consolidation. The abdomen was soft except for the small hard mass felt in the right upper quadrant as noted in the previous history.

She was sent to the hospital, where x-ray examination showed a bilateral bronchopneumonia in both bases. Under penicillin and aureomycin therapy her temperature returned to normal limits. The patient's appetite improved, she felt much better, and chest findings cleared. She was given 150 cc. citrated blood on the 13th after which her hemoglobin went up to 82 per cent. She was discharged on December 18.

On January 8, 1951, she was seen again in the office at which time her weight was 24½ pounds. She was alert and hated to be examined. Physical examination was negative except for a possible slight enlargement of the abdomen. Her hemoglobin was 75 per cent.

At a subsequent office visit on May 23 the child's weight was 26 pounds and her hemoglobin 71 per cent. She walked very well and talked clearly. The tumor was smaller but hard, and a roentgenogram of the chest was normal. No metastasis was noted. She was referred to Dr. J. R. Williams for his opinion as to the value of further therapy. This is his report:

(continued on page 298)

3-O-Toloxyl 1,2-Propanediol in the Treatment of Rheumatic Diseases

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RHEUMATIC diseases are disabling chiefly because pain and muscle spasm produce limited joint motion, muscle atrophy, tendon shortening and flexion deformities. The vicious cycle of pain and spasm which is established soon produces chronic disability. Prompt reestablishment of normal muscular and skeletal functions is therefore important. Since easing of muscle spasm relieves considerable pain and shortens the period of rehabilitation, methods of treating muscle spasm in rheumatic disorders have received much attention. As yet none of the drugs or physical measures tried either alone or in combination have proved universally successful.

Mephenesin‡ offers a new approach to this problem. This drug, an alpha substituted glycerol ether, was first synthesized (1946) by Berger and Bradley^{1,2} in England as 3-ortho-toloxyl-1,2-propanediol. Their initial animal studies of its pharmacological properties demonstrated that at dosages well within the limits of safety, it produced relaxation of skeletal muscle without affecting consciousness. This led to prompt clinical trials of the drug as an adjunct to anesthesia (Mallinson³) and in the treatment of conditions characterized by tensed or hyperactive muscles (Stephen and Chandy⁴). Encouraging results were reported. While later studies have led to some disagreement regarding the drug's merit in the field of anesthesia, they have substantiated claims of its promise in certain neuro-muscular disorders.

With muscle spasm and stiffness as almost constant findings in rheumatic diseases, they were natural subjects for early studies with Mephenesin. Schlesinger⁵ reports prompt relief of the spasm and pain of Marie-Strümpell arthritis by a two per cent intravenous solution of the drug; Berger and Schwartz⁶ note similar results from the treatment of arthritis of the cervical part of the spine, sub-acromial bursitis, osteoarthritis of the hip joint and similar conditions with an elixir preparation of Mephenesin. Some investigators⁷ to date have failed to duplicate the success attained by Berger and Schwartz, Gammon and Churchill,⁶ and others with oral

preparations of the drug. Still the obvious advantages of the oral route in treatment of chronic conditions led us to investigate the possibilities of several oral forms of Mephenesin in the treatment of rheumatic diseases.

Determination of dosage

To determine the proper dosage of Mephenesin, muscle spasm and key joint motion were observed and measured in 25 patients with clinical muscle spasm. Under the direct observation of the authors each patient, regardless of size, was then given 1.5 gm. of Mephenesin in tablet form, following which muscle and joint observations were repeated at 20 minute intervals. Beneficial results were expected after 30 to 40 minutes, and maximal effect, after 40 to 60 minutes. Patients who responded with relaxation of muscle spasm and increased joint motion were given steadily reduced dosages on succeeding days, while those who showed no improvement and no toxic symptoms were similarly given increasing amounts daily (never more than two gm.) until the effective dose of Mephenesin was determined. This was found to average 0.023 grams per kilogram of body weight.* The benefit ranged from increased motion of 15 to 40 degrees in chronically limited joints with muscle atrophy to a full range of motion in acutely limited joints, while muscle strength remained unimpaired.

Comparative effectiveness of various Mephenesin preparations

The comparative effectiveness of the various oral preparations of Mephenesin was first studied in 87 patients with muscle spasm and limited joint motion. The results, shown in Table I, reveal that both the capsules and elixir are more effective than the tablets. This suggested that the tablets are less readily absorbed than the other preparations. Accordingly, those who failed to respond to a particular form of Mephenesin, were then given the same form in conjunction with 5 grains of glutamic acid hydrochloride.* Additional patients in each group responded (Table I). These results suggest that failures in oral administration result from poor absorption of Mephenesin from the gastrointestinal tract, and that glutamic acid hydrochloride increases the solubility and absorption.

The study of the effectiveness of the preparation in the treatment of 50 patients with rheumatoid arthritis sheds light also upon the comparative usefulness of the

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‡Generic name "Mephenesin". The Mephenesin used in this study was supplied in the form of Tolserol by Dr. H. Sidney Newcomer of E. R. Squibb & Sons.

Berger and Bradley called the drug Myanesin, a name now trademarked by British Drug Houses, Ltd. The British Pharmacopoeia and The Council on Pharmacy and Chemistry in the United States have adopted the name Mephenesin for this compound.

*This is 1.5 gm. up to 135 pounds, 1.75 gm. up to 155 pounds, 2 gm. up to 180 pounds and 2.25 gm. up to 200 pounds. As the weight limit is reached an additional 0.25 gm. of Mephenesin may be needed to effect a response.

TABLE I

Comparative Effectiveness of Oral Preparations of Mephenesin*
Administered with or without Glutamic Acid Hydrochloride
to Patients with Muscle Spasm and Limited Joint Motion.

Preparation Used	No. Tested	No. Effective	Pct. Effective
Mephenesin tablets (0.25 gm.)	50	22	44)
Mephenesin tablets plus glutamic acid HCl **	28	16	57)
Mephenesin capsules (0.25 gm.)	25	20	80)
Mephenesin capsules plus glutamic acid HCl**	5	4	80)
Mephenesin elixir (0.1 gm. per cc.)	12	8	66.6)
Mephenesin elixir plus glutamic acid HCl**	4	3	75.0)
Totals	87	73	83.9

*Only one dose (0.023 gm. per kg. of body weight) administered.

**Tried only on members of each group who had failed to make effective responses to the Mephenesin preparation alone.

different oral preparations (Table II). When a patient failed to respond to one preparation, he was given the next one shown in Table II in the following order: tablets, capsules, elixir, tablets with glutamic acid hydrochloride, capsules with glutamic acid hydrochloride, and elixir with glutamic acid hydrochloride. The results indicate that in some cases, the elixir may be more effective than the capsules, that both are more effective than the tablets, and that the benefits of all three may be increased by glutamic acid hydrochloride. The comparative usefulness of these preparations for rheumatoid arthritis patients is thus in line with the order of effectiveness established in the tests of patients with muscle spasm and limited joint motion. Note, however, that the maxi-

TABLE II

Comparative Effectiveness of Oral Preparations of Mephenesin*
Administered with or without Glutamic Acid Hydrochloride
to Patients with Rheumatoid Arthritis.

Preparation Used	No. Tested	No. Effective	Pct. Effective
Mephenesin tablets (0.25 gm.)	50	6	12
Mephenesin capsules (0.25 gm.)**	44	8	16
Mephenesin elixir (0.1 gm. per cc.)**	36	2	4
Mephenesin tablets plus glutamic acid HCl**	34	8	16
Mephenesin capsules plus glutamic acid HCl**	26	8	16
Mephenesin elixir plus glutamic acid HCl	18	0	0
Total	50	32	64

*Only one dose (0.023 gm. per kg. of body weight) administered.

**Tried only on members of the group who had failed to respond to the preceding preparation (or preparations).

imum percentage of effective results among the rheumatoid arthritis group (64 per cent) is well below that (96 per cent) obtained from patients with muscle spasm and limited joint motion. We may conclude then that Mephenesin is less beneficial in rheumatoid arthritis.

Response of rheumatic conditions to oral Mephenesin therapy

A total of 200 patients with rheumatic diseases were treated with Mephenesin.* Table III shows the conditions represented among them. In all these patients, aching pain and stiffness after inactivity were outstanding symptoms,—difficulties were particularly pronounced in the morning on arising. Except in fibrositis, rheumatoid spondylitis and rheumatoid arthritis, there was negligible improvement of this characteristic morning pain and stiffness after the patient arose and began daily activities. Treatment in most instances consisted of 0.023 gm. of Mephenesin per kilogram of body weight, taken 30 minutes before arising each morning. After 30 minutes rest the patients were instructed to get out of bed and go about their daily routine as normally as possible. In all instances where discomfort ordinarily continued, Mephenesin 0.5 to 0.75 gm. was administered every three hours throughout the day to maintain the muscle relaxation. If glutamic acid hydrochloride was required for an effective response to Mephenesin, an initial dose of five to ten grains of the acid 30 minutes before arising followed by five or ten grains more before lunch and dinner was given daily.

Mephenesin was considered effective only if it relieved aching pain and improved key joint motion beyond 15 degrees by the end of one week of treatment. Gauged by this standard 153 (76.5 per cent) of the 200 patients treated benefited from its use (Table III). In general, acute conditions such as acute torticollis, acute bursitis and lumbago responded better than the more chronic

*Of the 200 patients treated, 122 received tablets, 172 received capsules, and 52 received elixir, at one time or another.

TABLE III

Mephenesin in the Treatment of Rheumatic Conditions*			
Condition Treated	No. Patients Treated	No. Effective Responses	Pct. Effective Responses
Rheumatoid arthritis	50	32	64
Rheumatoid spondylitis	14	14	100
Osteo-arthritis of cervical spine with radicular pain	24	19	79
Lumbosacral sprain and strain	24	18	75
Lumbago	18	16	88.8
Fibrositis	29	20	68.9
Bursitis (acute)	9	8	88.8
Bursitis (chronic)	17	13	76.5
Acute torticollis, recurrent	15	13	86.9
Totals	200	153	76.5

conditions. The one exception was rheumatoid spondylitis, where the benefit was striking.

The 15 patients with acute torticollis and 8 of the 18 with lumbago experienced recurrent attacks which lasted a minimum of four to five days. The patients responding favorably to Mephenesin (13 torticollis, 8 lumbago) had improved motion with relief of muscle spasm and pain within 40 minutes. Treatment was given for three days and there was no recurrence of symptoms when it was discontinued. All of these patients were then supplied with sufficient capsules for three days' treatment in the event of another attack. Three with stiffness of the neck and four with lumbago have reported subsequent attacks and their successful relief.

All of the fourteen patients with rheumatoid spondylitis had excellent results with Mephenesin* (0.023 gm. per kilogram of body weight 30 minutes before arising and 0.5 gm. every three hours throughout the day). The patients were so improved that no medication was required for discomfort, and motion was greatly increased. One of these patients whose case was advanced and of nine years' duration, had been unable to do any work without 10 gr. of aspirin and 0.25 gr. of codeine every four hours, medications which relieved her pain adequately for only three hours. She had existed for four weeks in this manner, doing only a minimum of light housework. However, on the above dosage of Mephenesin, she was able to do not only all of her usual housework, but heavier tasks as well.

Placebo trials

As a control measure 40 patients who had responded well to Mephenesin capsules over a period of one to two weeks were given identical placebo capsules for one week without being told of the substitution. Not one of the ten benefited from the placebos. In fact, most complained bitterly that they had evidently become accustomed to the medicine. When Mephenesin was again given they reported good benefit.

Mephenesin as an adjunct to physical therapy

Since muscle strength is not impaired by Mephenesin, 10 patients with moderate and severe chronic limitation of joint motion due to muscle spasm, muscle atrophy, and tendon shortening, were given Mephenesin 45 minutes before therapeutic exercise in a physical therapy department. Their range of motion and ability to do exercises was greatly improved by the drug.

Toxic effects

Numerous toxic effects of Mephenesin so far reported have been principally from the use of a concentrated propylene glycol solution given intravenously. The serious effects such as respiratory and cardiac depression, hemoglobinemia and hemoglobinuria do not occur with the oral preparations. We did not observe nystagmus or diplopia in the 200 patients receiving regular treatment with these preparations. Table IV gives an analysis of the toxic reactions that did occur either singly or in combination, and serves to indicate the comparative

*This treatment is symptomatic only and is not effective in altering the joint changes.

TABLE IV
Incidence of Toxic Effects During Treatment of 200 Patients with Oral Preparations of Mephenesin

Toxic Reaction	Tablets	Capsules	Elixir
Blood pressure drop only	1	2	1
Muscular incoordination only	0	1	0
Muscular incoordination and dizziness	2	2	1
Anorexia only	10	2	29
Anorexia and dizziness	5	1	3
Dizziness only	6	6	4
Dizziness and lassitude	5	6	4
Lassitude only	1	5	2
Lassitude and anorexia	3	4	2
Number of patients showing toxic effects	33	29	46
Number of patients receiving medication	122	172	52
Percentage of patients having toxic reactions	27.04	16.8	88.4

merits of the different oral preparations with regard to this factor. It is evident from a survey of the table that patients under treatment with the capsules were most free of untoward effects—only 16.8 per cent showing such reactions. However, 27.04 per cent of the patients receiving tablets and 88.4 per cent of those receiving the elixir showed untoward reactions. With regard to the toxicity factor the order of preference for oral preparations of Mephenesin would thus appear to be capsules, tablets and elixir.

Further evidence that Mephenesin capsules cause fewer toxic reactions than the other oral preparations developed in our practical clinical experience with the three forms of the drug. Each of the 33 patients having a toxic reaction with tablets was tried on capsules. Five had toxic reactions to the capsules, two showing anorexia and three complaining of dizziness and lassitude, so that medication was discontinued. Similarly, the 46 patients having toxic reactions to the elixir were given capsules. Of this group eight now had toxic reactions as follows: five complained of mild dizziness and lassitude and three of anorexia. While the medication was promptly discontinued for the latter group, for those showing dizziness and lassitude it was continued with the result that all toxic symptoms disappeared after three days. These direct comparisons point strongly to the capsules as the preparation of choice in oral therapy.

By summarizing pertinent data in Table IV the order of frequency with which individual or associated toxic effects appeared, has been determined as follows: anorexia (59 times), dizziness (45 times), lassitude (32 times), muscular incoordination (6 times), and lowered blood pressure (4 times). All but seven instances of anorexia occurred in patients receiving elixir or tablets. Where a switch to capsules failed to eliminate the reaction, medication was stopped. The dizziness reported

was usually more of a feeling of "light-headedness" and never accompanied by staggering or reeling. In only three cases was the lassitude that developed severe enough to warrant discontinuance of the drug. The muscular incoordination which developed in six patients who had been given more than the calculated dose, affected only the legs and disappeared in 20 to 30 minutes. The decrease of systolic blood pressure which appeared in four patients never exceeded 10 mm. of Hg. and always rose to normal within one hour. We found no indication that the oral form affected the leucocyte or erythrocyte count, the hemoglobin, sedimentation rate, or the urine. It is evident then that toxic effects are not a serious problem in oral forms of therapy and that those that develop are mild and easily reversible by withdrawal of the drug.

Although it is too early to draw conclusions about possible undesirable effects from chronic use of the drug, it may be stated that none has developed among our patients. One patient who has bilateral pulmonary tuberculosis in addition to severe rheumatoid arthritis has taken the full recommended dose for six months with good muscle relaxation and no ill effect. Others have had 4 to 5 gm. daily for four to eight or more weeks without manifesting intolerance. Since Mephenesin is rapidly destroyed or excreted, it seems reasonable to expect that long usage will not produce an increased tendency toward toxic reactions.

SUMMARY

1. That Mephenesin has a place in the treatment of rheumatic diseases has been demonstrated by its benefit to 153 (76.5 per cent) of 200 patients treated with oral forms of this drug.

2. Mephenesin may be given daily over a long period of time for relief of pain and maintenance of both muscle relaxation and better joint function, or administered only prior to exercise to permit increased range of motion and more rapid improvement of muscle strength.

3. Although in general Mephenesin proved more effective in acute than in chronic conditions, it was strikingly beneficial to all (14) rheumatoid spondylitis patients treated and least beneficial in peripheral rheumatoid arthritis.

4. An average dose of 0.023 gm. per kilogram of body weight was found necessary for an effective response. This constituted the pre-exercise dose, and, in prolonged therapy, the initial morning dose which was followed by doses of 0.5 to 0.75 gm. every three hours.

5. Administration is simple except for the pre-exercise or initial morning dose which is six or more capsules.

6. Supplemented by glutamic acid hydrochloride Mephenesin proved effective in many patients who otherwise failed to give the expected response. The daily dosage schedule for the acid where used, was 5 or 10 gr. initially followed by 5 or 10 gr. before lunch and dinner. Until this combination therapy has failed, Mephenesin should not be discarded as ineffectual.

7. Mephenesin is a safe drug. Such toxic effects as appeared were mild and easily reversible by withdrawal of the drug.

8. For oral therapy capsules are probably the preparation of choice, producing a high proportion of effective responses with the lowest incidence of toxic effects.

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Do not waste the hours of daylight in listening to that which you may read by night. But when you have seen, read. And when you can, read the original descriptions of the masters who, with crude methods of study, saw so clearly.

To study medicine without books is to sail an uncharted sea, while to study medicine only from books is not to go to sea at all.

—SIR WILLIAM OSLER

In the interests of continuing medical education, THE JOURNAL-LANCET offers this department of authoritative reviews of important progress in scientific medicine, both in the fundamental and the clinical fields. The editors propose to define medical sciences very broadly, and hope that each subject treated will be of sufficient importance to interest every reader.

Some Scientific Advances in Dermatology

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DERMATOLOGY has shared in the rich expansion of knowledge concerning the basic physiological and biochemical activities of living tissues that has come about in recent years.

The skin contains a number of different types of specialized cells. In addition to the different kinds of epithelial and connective tissue cells and fibers, there are blood vessels, gland cells, hair and a variety of types of nerve fibers and nerve endings.

SKIN COLOR

Five pigments contribute to skin color. These are the reduced hemoglobin and oxyhemoglobin of the blood, melanin, melanoid and carotene. Edwards and Duntley¹ have studied by means of a reflectance spectrometer the relative contribution that each of these pigments makes to the coloration of the skin of various parts of the body.

MELANIN PIGMENTATION

The origin and nature of pigmentation in animals have attracted great interest because of their multicolored coats. In contrast to the existence of several pigments in the integument of some lower animal forms, there is only one pigment in mammals—melanin. Pigmentation in human beings is less pronounced than in animals, hence has attracted less attention. Contractile melanoblasts, which are responsible for rapid and pronounced changes in color of amphibians, are not found in mammals, although melanophore hormone, which can produce expansion of such cells in hypophysectomized frogs, has been reported in pituitary extracts of higher forms and has been identified in the urine of human beings.

Belief in the different mechanisms of melanin formation in plants (tyrosine-tyrosinase), animals (tyrosine-tyrosinase and/or dopa-dopa-oxidase) and human beings (dopa-dopa-oxidase [Bloch]) prevailed until recently, when tyrosine-tyrosinase activity seems to have been established as a prerequisite to melanin formation in all living organisms.

Epidermal melanoblasts are the rule in mammals and human beings; dermal melanoblasts as seen in the ape's skin (and in mongolian spots and blue nevi in human beings) are not expansile and contractile as are those in amphibians and fishes.

Identification of a sheet of melanoblasts in human skin furnishes a more logical origin of pigmented nevi as benign neoplasms and melanoma as malignant neoplasms than the epithelial origin originally sponsored by Unna. The origin of melanoblasts from the neural crest has been proven for amphibians, fowl and mice. This non-epithelial origin could account for the peculiar behavior of pigmented nevi and melanoma as contrasted to true epithelial benign and malignant neoplasms.²

Zimmermann and Cornbleet³ studied melanoblasts in fetal Negro skin. Such cells cannot be identified by the dopa reaction or silver techniques until in direct apposition to the epidermis. They are first identified by the dopa reaction and silver techniques early in the third month (earlier than previously reported in white skin by Bloch). Melanin granules appear in the fourth month. Melanoblasts are dopa positive, while basal and other epidermal cells are dopa negative.

The earliest melanoblasts have ovoid, fusiform or stellate cell bodies, with few and short dendritic processes at their poles. In the fourth fetal month the dendritic cell may reach 100 μ in length. Primary dendrites extend through the epidermal intercellular spaces to form an intricate syncytium. Secondary dendrites arise during the fifth month, to surround the epithelial cells, mainly on their distal poles, and transfer melanin to the epidermal cells. The hair matrix becomes pigmented in essentially the same way.

Billingham and Medawar⁴ have shown that, by separation of the epidermis from the dermis by impure trypsin, that a single layered syncytium of dendritic cells can be demonstrated just proximal to and within the basal layer, by gold impregnation, methylene blue, and, in pigmented areas, by dopa (1,3,4-dihydroxyphenylalanine). Transplantation of black guinea pig skin into a

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Sweat Glands

The secretion of sweat is under the control of the sympathetic nervous system. However, unlike other structures in the skin innervated by this system, the neurohumoral agent released by the nerves ending on the sweat glands is acetylcholine. In other words, these particular sympathetic nerve fibers are cholinergic rather than adrenergic. This is attested by the facts that (a) acetylcholine appears in the blood after stimulation of the sympathetic nerves to an extremity, (b) acetylcholine stimulates sweat secretion, and (c) atropine abolishes reflexly induced sweating. Recently several groups of investigators have demonstrated that the sweat glands of the human skin are capable of being stimulated by sympathomimetic as well as parasympathomimetic drugs.^{9,10} However, there is no convincing evidence to indicate that any part of physiological sweating is mediated by adrenergic impulses.

Cannon has pointed out that when structures are denervated they become supersensitive to stimulation by either the normal neurohumor released by the nerves or other substances capable of stimulating the structure. The general features of this phenomenon have been formulated as a "law of denervation." One should expect, on the basis of this law, that when the sweat glands are denervated, by sympathectomy, that their responsiveness to acetylcholine would be enhanced. Paradoxically, the opposite effect occurs, that is, the response to acetylcholine injected intradermally is actually decreased.^{11,12} The cause of this decrease is not apparent and it cannot be accounted for on the basis of atrophy because histologically the glands are normal in appearance and they still show a secretory response to direct heating of the gland.

When acetylcholine is injected intradermally, sweating occurs not only from the glands at the injection site but also from surrounding glands for a distance of several centimeters. It has been demonstrated that this effect is due to an axon reflex occurring over the ramifying network of sympathetic nerves supplying the glands.¹³ It is the "nicotinic" action of acetylcholine which initiates this axon reflex, whereas, the "muscarinic" action accounts for the direct stimulation of sweat glands.

There have been a number of important studies of both the cutaneous and general symptoms of a newly recognized syndrome of heat exhaustion associated with and probably caused by temporary failure of sweating of a large part of the body's surface. O'Brien,^{14a} and Shelley and Horvath¹⁶ among others have made investigations in this field. It is supposed that anhidrosis diminishes fluid and heat loss from the skin, causing changes in fluid balance and heat retention. There is surprisingly little fever resulting and little distress. Even when the clothing is dampened to simulate sweat, exercise will provoke an attack. Dyspnea and tachycardia may indicate circulatory disturbance in which blood is decreased by excessive dilatation of peripheral vessels. Hyperpnea might represent a true panting response to lose heat by way of the respiratory system. Ordinarily overbreathing

white area is followed by increase in size of the black graft. A black area up to 500 mm.² in size may be produced by "grafting" a minute quantity of a suspension in Ringer's solution of the basal layer cells of black epidermis into a white region. This pigment may be bleached out by transplanting skin from the donor animal. This latter response is interpreted as active immunization.

MAMMALIAN MELANIN FORMATION

Lerner and Fitzpatrick⁵ believe that only one catalyst for pigment formation exists in the skin, and suggest that it be called tyrosinase rather than assuming that both tyrosinase and dopa oxidase are present. Dopa (dihydroxyphenylalanine) participates in the tyrosine-tyrosinase reaction in three ways: (1) dopa is formed from tyrosine; (2) dopa catalyses the tyrosine-tyrosinase reaction, and (3) some amount of dopa is reformed during the conversion of dopa to melanin.

Fitzpatrick, Becker, Jr., Lerner and Montgomery⁶ reported a tyrosine reaction similar to the dopa reaction of Bloch. After eight days irradiation with erythema doses of ultraviolet radiant energy from a quartz mercury lamp, punch biopsy specimens were fixed in 10 per cent formalin at 5°C. for one hour. Slices 1 to 2 mm. thick were placed in 25 ml. of 0.005 M L-tyrosine made up in 0.1 M phosphate buffer at pH 6.8 for 24 hours at 5°C. The slices were again immersed in fresh tyrosine-phosphate buffer and were incubated at 37°C. for another 24 hours. After fixation in Bouin solution (picroformal) for 24 hours, they were dehydrated, cleared in toluene, imbedded in paraffin, sectioned at 15 μ and counter stained with borax carmine. Pigmented dendritic melanoblasts were seen at the epidermo-dermal junction. The data obtained support the view that tyrosine can act as a precursor of melanin in human skin. Tyrosinase apparently exists in an inactive or partially inhibited state in normal unirradiated skin.

MELANIN GRANULES

Woods, DuBuy and Burk⁷ showed that the non-melanized, the partially melanized and the melanized granules of the S91 and S91-A mouse melanoma are identical (staining with Janus green B) with mitochondria. Centrifugally isolated cytoplasmic granules show cytochrome oxidase, succinic oxidase and glycolytic activities comparable to those of typical mitochondria. Melanized granules show dopa oxidase activity.

CYSTOSIDERIN GRANULES IN HEMOCHROMATOSIS

Gillman and Gillman,⁸ by liver biopsy, found pigment cirrhosis in children and adult pellagrins, indistinguishable from that of hemochromatosis. Pigment is deposited in mitochondria through a lipoprotein stage to form combined and free iron. A cell may become so filled with iron that it disappears and iron is deposited in the sinusoids, thence to Kupfer cells and other reticuloendothelial cells. Many patients with this type of pigment cirrhosis are younger than Sheldon's youngest patient (aged 20) with true hemochromatosis.

produces alkalosis and tetany, but these are absent in anhidrotic asthenia. There is neither deficiency of sodium chloride nor dehydration. In sweating areas sodium chloride is concentrated, but this represents compensatory hyperactivity. Whether any of the systemic symptoms result from reabsorption of retained sweat bursting into the dermis is debated. O'Brien¹⁷ felt earlier that lipid depletion of the skin associated sometimes with excessive soap usage was the main cause of poral closure. Later he found evidence to make him believe that staphylococcal poral infection was the predominant cause of acute tropical miliaria rubra.^{14b} Shelley and Horvath¹⁸ were able to induce poral closure and disappearance of surface sweat by nonspecific measures such as, maceration, adhesive tape, phenol, aluminum chloride, chloroform, ultraviolet light, heat and cold. These same investigators were able to produce inflammation at the sweat ducts if they induced profuse sweating after a preliminary closure of poral ducts. Sulzberger and co-workers¹⁹ in pursuing their studies on sweat retention phenomena suggest that electronegativity of the distal end of the sweat duct maintains an electrophysiologic potential along the ducts, which facilitates and expedites the movement of sweat toward the skin surface by electro-osmosis.

Sebaceous Glands

Dunner²⁰ studied the excretory work of sebaceous glands under different atmospheric conditions. From previous work it was found that if sebum is not removed from the surface for several hours, further excretion of sebum ceases and the amount of surface fat remains unchanged. However, if the sebum is continuously removed by absorption of the fat with filter paper, excretion is continuous. Duhner did not find that low atmospheric pressure was conducive toward the total amount or rate of sebum production. Lower temperature markedly curtailed sebaceous excretion. He thought that this result followed from the increasing viscosity of the sebum on the surface with falling temperature. The solidified sebum acts as a brake against the further expulsion of sebum.

Rony and Zakon²¹ observed the effects of testosterone and diethylstilbestrol on sebaceous glands and scalp hair. There was no measurable change in the growth of scalp hair, but a decided increase was noted in the number and size of sebaceous glands in the scalp. This hyperplasia was not maintained after discontinuing the testosterone. Diethylstilbestrol administration caused reversion of the sebaceous glands to their original appearance, and also had no effect on the scalp hair.

McKenna and co-workers²² found considerable amounts of vitamin E in sebum and feel that this and other antioxidants may be of some importance in maintenance of the normal condition of the skin. Cornbleet and Ingraham²³ noted no difference in the degree of rancidity of sebum recovered from the skin two weeks or one day following a bath.

Studies of the free fatty acid fraction of the fat excreted from human hair have revealed saturated and unsaturated fatty acids ranging in chain length from

7 to 22 carbon atoms.²⁴ It has also been shown that with the onset of puberty the sebaceous glands of the scalp excrete high concentrations of short chain saturated fatty acids which have been shown to possess selective fungistatic and fungicidal action on ringworm fungi.²⁵ These facts offer a possible explanation for the clinical observation that some forms of ringworm clear up spontaneously at puberty. Kligman and Ginsberg²⁶ were unable to demonstrate that postpuberal sebum possesses decisively superior fungistatic activity. They found a striking increase in secretion of sebum at puberty and believed that the rarity of ringworm infection is merely due to the greater amount of fungistatic sebum and not to particular qualitative differences from that present during prepuberty.

ADRENERGIC SYMPATHETIC NERVES

The pilomotor muscles and the small blood vessels of the skin (including the arterioles, capillaries and subpapillary venous plexus) are supplied by sympathetic nerves which are classified pharmacologically as adrenergic. Within recent years evidence has been accumulating to indicate that the neuro-humor released at postganglionic adrenergic sympathetic nerve endings is arterenol or nor-epinephrine rather than epinephrine.²⁷ In support of this view it has been shown that intradermal injection of arterenol produces contraction of the pilomotor muscles and constriction of the small vessels.²⁸ There is no evidence for the existence of adrenergic vasodilator nerves in the skin.^{28,29} The nature of the neurohumor involved in reflex vasodilation, as in the flare of the "triple response," is not known.

SENSORY NERVES

The areas of skin supplied by individual nerves are not sharply demarcated but overlap to a considerable degree.³⁰ As a cutaneous nerve approaches its destination, it enters an intricate plexus so that the nerves enter any localized point on the skin from all directions.³¹

Cutaneous pain is subserved by both myelinated and unmyelinated nerve fibers³² with "free" or unspecialized terminations. Unlike the other modalities, pain sensibility is not punctate.

Cold is subserved by Krause end-bulbs, touch by Meissner's corpuscles, Merkel's discs and by hairs, pressure by Pacinian corpuscles and warmth by Ruffini's endings. Each "sensory spot" is supplied by more than one sensory nerve fiber, providing a mechanism for localization and for discrimination of stimulus intensity.

SKIN ENZYMES

During the recent war important progress was made in the understanding of the mode of action of vesicants on the skin. It was shown that vesicants such as lewisite and mustard gas produce inhibition of pyruvate oxidase and hexokinase enzymes in the skin which are concerned with carbohydrate breakdown.^{33,34} It is believed that interference with these enzyme systems may lead to the changes in permeability which result in blister formation. The discovery of a compound capable of protecting against the enzyme inhibition produced by arsenicals pro-

vided a useful therapeutic agent for the treatment of dermatoses and other intoxications due to arsenic. This compound is 2,3-dimercaptopropanol (British anti-lewisite or BAL).³⁵ Another intriguing aspect of wheal formation that has recently been studied concerns the action of proteolytic enzymes in the skin. Proteinases have been shown to be present in skin³⁶ and it has been demonstrated that when skin slices are exposed *in vitro* to proteolytic enzymes such as trypsin a separation of the epidermis from the dermis takes place.³⁷ This has led to the interesting hypothesis that it is the release of proteinase into an abnormal position in the skin which is responsible for the loosening of the epidermis during blister formation.

SPREADING FACTORS

The skin has been shown to contain mucopolysaccharides, including hyaluronic acid, and enzymes such as hyaluronidase capable of depolymerizing these mucopolysaccharides.^{38,39} These substances are of interest from a number of points of view. Thus, hyaluronidase has been shown to be one of the "spreading factors" concerned in bacterial invasiveness. Preparations of hyaluronidase have been used to increase the rate of absorption of subcutaneously administered fluids. The steroid hormones of the adrenal cortex influence the action of hyaluronidase on hyaluronic acid, but this effect can only be demonstrated *in vivo*. Thus, it has been found that cortisone inhibits and desoxycorticosterone augments the spreading of dye particles in the skin due to hyaluronidase.⁴⁰ Scott and Dammin⁴¹ note the increased susceptibility of the testis of the rabbit to infection with *Treponema pallidum*. They relate the metachromasia in syphilitic orchitis to the hyaluronic acid present. They feel on the basis of their experiments that either the ground substance of that organ, including the type of mucopolysaccharide present, is peculiarly suited to growth of the spirochete or the hyaluronidase introduced, either in the inoculum or released by trauma of inoculation, initiates hydrolysis of complex mucopolysaccharides. The latter action can then be carried forward more readily by an enzyme of the spirochete itself.

SYPHILOLOGY

A recent advance in the field of syphilology is the *in vitro* demonstration by Nelson and Mayer⁴² of immobilization of *Treponema pallidum* by antibody produced during syphilitic infection. Their method consists of the collection and extraction of virulent treponemas from rabbit testicular syphilomas. The organisms are obtained in a relatively tissue-free state and kept highly active *in vitro* for several days in a special basal medium. For complement, pooled guinea pig serum was used. Immobilizing activity tests were carried out on serums from nonsyphilitic rabbits, untreated rabbits with *Treponema pallidum* infections of three to nine months' duration, nonsyphilitic humans, individuals with darkfield positive primary or secondary syphilis and nonsyphilitic patients with acute febrile or chronic allergic disease.

Nelson and Mayer found that when guinea pig complement was absent neither normal nor syphilitic serum

impaired motility of *T. pallidum*. When complement was present syphilitic serum reduced the motility markedly, but normal serum did not. Nelson and Mayer believe it probable that an antibody in syphilitic serum immobilized the *T. pallidum*. Greater serum concentrations and longer incubation periods slowly increased the immobilizing effect.

Samples of incubated mixtures of treponemes, serum and complement were injected intracutaneously into normal rabbits to test the validity of immobilization as a criterion of treponemicidal activity. There was a great difference in the incubation period and size of lesions produced by a sample containing 4 per cent motile organisms and one containing 80 per cent. Either a significant number of organisms in the mixture containing syphilitic serum were rendered noninfectious and were presumably dead or the immobilizing antibody rendered the organisms highly susceptible to the host's mechanism. Normal human and most normal rabbit serums showed no significant immobilizing activity. The majority of sera from patients with primary syphilis showed immobilizing activity. Rabbit syphilis serum showed no detectable decrease in immobilizing activity after absorption of reagin by flocculation with Eagle antigen. From this it was concluded that immobilizing and reagin activities were due to separate antibodies. This finding of true antitreponemal antibodies appears to be one of the most important immunologic discoveries in modern syphilology. It may prove important, too, in the study of many fundamental immunologic problems other than in syphilis. Furthermore, it may give us a reliable method of distinguishing between nonsyphilitic complement fixation positive serums from syphilitic positive ones.

Nelson and co-workers⁴³ found that cerebrospinal fluids from patients with central nervous system syphilis gave positive immobilizing reactions. None of the patients with diseases other than syphilis showed immobilizing antibody. In addition serums with presumed "biologic false positive" reactions were free from immobilizing antibody. Thompson, Greenberg and Magnuson⁴⁴ found a corresponding loss of infectiousness of virulent *T. pallidum* as it is rendered nonmotile by immobilizing antibody. They believe that spirochetes immobilized in the test are not infectious and are, therefore, presumably dead. The parallel though not necessarily simultaneous action of immobilization and killing of *T. pallidum* suggests that the antibodies responsible for these phenomena are identical.

SELF-STERILIZATION OF SKIN

That micro-organisms placed on the skin surface disappear has been shown by many workers. Burtenshaw⁴⁵ found in the long chain fatty acids a potent cause for the skin self-disinfection. Hellat⁴⁶ came to the conclusion that there is no substance present on the skin with a considerable disinfecting action upon test organisms. He, therefore, assumes that the mortality of microbes upon the skin is chiefly due to nonspecific exogenous factors. Rebell and coworkers⁴⁷ think that their experiments justify the belief that the assumption of a general antibacterial factor, other than desiccation and those

things on which desiccation depends, is not necessary to account for any of the data obtained in their experiments. The sebaceous film on the skin appears to be necessary for effective desiccation of bacterial suspensions.

GENETICS

Among the many fields which have made rapid scientific advances, as far as dermatology is concerned, is that of applied human genetics. Many skin diseases and conditions are known to be familial, but only in the recent past have studies been made that clarified their mode of inheritance. These investigations have all followed the general genetic principles of Mendel and some later modifications. In human beings, as in nearly all organisms, chromosomes and their genes occur in homologous pairs, one half being contributed by each of the male and female parents. The majority of the mutations that are known in man are dominant; that is, one dose of a gene produces a phenotypic (visible) effect. This follows because in most human cases only the heterozygous (one dose) condition is known since affected individuals almost always marry unaffected ones.

In the case of a dominant character, it is found that each affected individual has such a parent and that roughly half of the members of his family have this stamp, while the remaining part is normal. The affected members have in common a peculiar gene which they transmit to half their offspring, whereas, the normal individuals who have only normal genes produce only normal children.

Certain well recognized conditions primarily affecting the skin tend to be most often inherited as dominants. One is ichthyosis vulgaris which in its severe form produces the "fish scale" man. The "India rubber man" of the side show is exhibiting only one of the several features (the hyperelastic skin, the hyperlaxity of the joints, the fragility of the skin, etc.) of the Ehlers-Danlos syndrome, which also is transmitted as a Mendelian dominant. Other examples of this are found in keratosis palmaris et plantaris, keratosis follicularis, etc.

In some instances where an individual with one abnormal gene happens to marry an individual with the

same abnormal gene, it is known that about one out of four of their offspring will inherit the homozygous (double abnormal gene) condition. This double dose is often found to result in more extreme situations and even death. Fliegelman and co-workers⁴⁸ found such an effect in familial hypercholesterolemia which is an endogenous idiopathic elevation of blood cholesterol levels found in individuals inheriting one gene for it. If an individual happens to inherit this abnormal gene in a double dose (one from each parent) then that individual not only has the essential hypercholesterolemia found only on examination of the blood, but also shows tumors of xanthoma tuberosum over the extensor tendon sheaths. In the light of recent studies linking coronary and atherosclerotic disease with hypercholesterolemia the importance of explaining the mode of inheritance of this situation is one of the most important of recent studies in dermatology. A similar pattern of inheritance for red cell sickling seems apparent. The trait, shown only on examining the blood, is heterozygous. When homozygous, sickle cell anemia ensues. Clarifying such mechanisms of hereditary disease could lead to results of the greatest importance in preventive medicine.

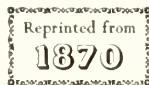
IMMUNOLOGY

One of the most important advances in recent years was the showing by Landsteiner and Chase⁴⁹ that the eczematous type of sensitization could be transferred by means of living cells. Chase⁵⁰ subsequently showed this was also true for the bacterial (tuberculin) type of sensitivity. This work has been corroborated by many other investigators. The aforementioned investigations were in the experimental animal; however, positive transfers have been obtained by Lawrence⁵¹ in humans using peripheral white blood cells. Rostenberg, Last and Rodriguez⁵² have shown that the development of an eczematous sensitization to a drug did not prevent the drug from exerting its usual pharmacologic effect, at least insofar as the skin was concerned even though the pharmacologic activity was tested at the site and height of the eczematous response.

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THE BULLET CURE FOR ILEUS

THE old remedy for colic, of a bullet or quicksilver taken into the stomach, has been revived, in a modified form, by Dr. Maydiou, of Aigent, France. In the *Journal de Med. Pratique*, Dr. M. declares that, after seventeen years of the ordinary treatment, in which he always failed, he has been invariably successful in the twelve cases which he has treated with *shot*. He mixes No. 5 shot, after careful washing, with olive oil sufficient to cover them, and gives a dessert-spoonful every half-hour. In five or six hours the vomiting ceases, gases are expelled, and the bowels are moved. Warm baths, fomentation, and injections of milk and honey are always superadded.

Apropos of this treatment, we take the liberty of telling a little anecdote. Some forty years ago, a traveling preacher in England was taken sick with colic, in the house of a kind old lady where he was spending the night. The good lady brought a bullet, which, after warming, she induced him to swallow. He was soon relieved from pain, and then began to reflect on the course of the bullet, and at last suggested to his nurse a doubt whether a body so heavy could find its way through the intestinal labyrinth, fearing that it would lodge there permanently. "You need not be the least afraid," said the lady, cheeringly, "for that very bullet has gone through *me* at least twenty times."

—*Pacific Medical and Surgical Journal*,
Northwestern Medical and Surgical Journal 1:133, 1870

The Current Status of Extrapleural Lucite Plombage*

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PRESENTATION of papers dealing with extrapleural lucite plombage at two recent sectional meetings indicates that the controversies regarding this operation have not been completely resolved. Four years have elapsed since Wilson's¹ revival of the extrapleural operation, using lucite spheres as a filling material. These four years should have furnished a background of experience sufficient to permit evaluation of the procedure and assignment to its proper place in the armamentarium of the thoracic surgeon.

Our own experience with lucite plombage^{2,3,4} began shortly after the report by the Duke group in 1946. The first operation was done at Oteen in September 1946, and from then until the spring of 1947 lucite plombage was attempted in 30 patients. The operation was abandoned in four patients without implantation of the spheres because of a tear of the pleura. Abandonment was probably unnecessary in these cases as Brantigan⁵ reports similar experiences in which the operation was completed without subsequent complications. A successful operation was completed in 26 patients. Fourteen of these were primary and 12 secondary operations following an unsuccessful thoracoplasty.

Results in terms of cavity closure and sputum conversion were so discouraging as to cause the abandonment of the procedure in early 1947. Table I reproduces the results of the original series of 22 operations. Cavity closure was obtained in 54.5 per cent and conversion of sputum in 27.3 per cent of patients six to eight months after operation. In August 1950 a follow-up study was

made of these 22 patients, as well as 8 others completed shortly after the original group, and a final evaluation of the results of the operation made. The results three years after the last operation are not as good as in the early study.

Table II demonstrates that 15.4 per cent of the patients who had a primary operation and 37.5 per cent of those who had a secondary procedure have now converted their sputum. Cavity closure has been obtained in 28.8 per cent and 58.3 per cent, respectively. Five patients had a negative sputum prior to operation although a cavity was present and the sputum had previously been positive. All of these patients continued to have a negative sputum postoperatively. They obviously cannot be included among the patients whose sputum converted as a result of the lucite plombage.

Complications, as shown in Table III, have not been particularly serious. There were no operative deaths. Four patients were dead three years after the completion of the last operation. Three deaths were due to extension of the disease and one to carcinoma of the pancreas. This one patient, however, had a progressive tuberculous lesion and a positive sputum. A bronchocutaneous fistula occurred after two of the primary plombages and empyema in the extrapleural space in four of the total of 25 patients. The balls have been removed from 15 of the 26 patients. The removal presented no unusual difficulty except in one case where three of the balls had migrated into the mediastinum and were lost in that area. Migration of the balls was present in three other patients. In one, a sphere migrated to the posterior cervical triangle and exerted pressure on the brachial plexus and subclavian artery. In another, the balls were extruded into the subscapular space. This was due to faulty technique. In another

TABLE I
Early Results in 22 Successfully Performed Extrapleural Pneumonolyses with Lucite Plombage

Type of Pack	Patients	Cavity		Sputum		Cases Negative Before and After Operation	Sputum Conversions
		Closed	Unclosed	Positive	Negative		
Primary	14	6 (42.9%)	8 (57.1%)	9 (64.3%)	5 (35.7%)	0	5 (35.7%)
Secondary	8	6 (75.0%)	2 (25.0%)	3 (37.5%)	5 (62.5%)	4 (50.0%)	1 (12.5%)
Total	22	12 (54.5%)	10 (45.5%)	12 (54.5%)	10 (45.5%)	4 (18.2%)	6 (27.3%)

*Reviewed in the Veterans Administration and published with the approval of the Chief Medical Director. The statements and conclusions published by the author are the results of their own study and do not necessarily reflect the opinion or policy of the Veterans Administration.

TABLE II
Late Results After Extrapleural Lucite Plombage

	No. of Patients	Cavity		Sputum			Per Cent Converted
		Closed	Open	Negative Prior	Negative	Positive	
Primary	14	4	10	1	3	11	15.4
Secondary	12	7	5	4	7	5	37.5
Total	26	11	15	5	10	16	28.5

patient the spheres were inserted over the collapsed upper lobe but their presence resulted in a stripping of the pleura over the lower lobe so that the balls dropped into the costophrenic sulcus.

Brantigan,⁶ in a series of 109 primary operations, reports no incidence of migration of the balls. He feels that the envelope of fibrous tissue which surrounds each ball makes migration impossible in the absence of infection. One of our patients had a lucite plombage completed on June 9, 1947. Due to increasing dyspnea and a continuing positive sputum, it was decided to remove the spheres. On September 26, 1947, the extrapleural space was re-entered. Each ball was found contained in

—and oil as a filling material. The men who stated that the surgical principles were wrong objected to placing a hard object up against the moving lung. It was felt that there was a danger of eroding into the cavity.

The eight surgeons who reported a personal experience with lucite plombage were not, for the most part, "shouters" for the procedure.

Table V gives a brief resume of the results reported by these eight surgeons. With the exception of surgeons Number 1 and Number 5, they do not offer impressive evidence of the value of the procedure.

A few comments by men who have used the lucite procedure are interesting:

TABLE III
Complications After Extrapleural Lucite Plombage

	Number	Wound Infection	Spread	Fistula	Empyema	Migration of Balls	Balls Removed	Deaths	
								Operative	Late
Primary	14	3	0	2	3	1	9	0	2
Secondary	12	0	0	0	1	3	6	0	2
Total	26	3	0	2	4	4	15	0	4

an individual fibrous envelope. Sections of the enveloping material showed no inflammatory reaction. No fluid was present. Only 26 of the 33 balls originally implanted could be found immediately and the wound was closed at the request of the anesthetist, leaving seven balls in place. Subsequent studies revealed these to be in the anterior mediastinum. The wound healed without drainage. On two subsequent occasions a thoracotomy was done and four more balls removed without evidence of infection and with primary healing of the wound. At least, in this case migration had occurred without infection.

In an effort to determine whether our own results and experiences with the procedure were consistent with those of other thoracic surgeons, letters were sent to 45 men who were known to be doing a considerable volume of thoracic surgery. Replies were received from 38 of these. Thirty surgeons reported that they had not used the extrapleural operation with lucite balls as a filling material. The reasons given for not using lucite plombage are shown in Table IV. Some men gave several reasons for not using the operation so the table is not in arithmetical balance. Most of the surgeons had previous experience with extrapleural operations using paraffin—air

One surgeon stated, "To date I would say that the main objective of this type of collapse therapy, a converted sputum, has not been obtained in any respectable percentage and the results leave much to be desired."

A second surgeon reports, "We are not nearly as anxious to use it as we were three or four years ago. I am not ready to discard the procedure entirely as I feel that it does have a place in our surgical armamentarium."

The third surgeon reported, "The procedure is still being utilized only in a few patients where contralateral involvement contra-indicates resection."

Another surgeon states, "We like the operation very much but do not use it in preference to a thoracoplasty but rather in old age groups and bilateral cases and those with contra-indications to thoracoplasty, such as heart disease, emphysema, etc. Conversion of sputum has been rather high."

Experience in treating complications following lucite plombage was reported by many of the surgeons consulted even though they had not used the operation themselves. These complications are shown in Table VI.

The catastrophic report of the experiences of the Duke group with lucite plombage, by Trent in 1948,⁷ has had a terrific impact. The operation suffered from early overenthusiasm and a large number of poorly selected cases were operated upon. Trent stated in his report that a later review indicated that only 11.8 per cent of their cases were suitable for a lucite plombage. An operative

TABLE IV
Reasons Given for Not Using Lucite Plombage

1. Experience with other extrapleural procedures prejudiced them against lucite plombage	20
2. Treatment of complications incurred by other surgeons	7
3. Observation—poor results of other surgeons	2
4. Wrong surgical principles	7
5. No reason given	7

mortality of 15.7 per cent and a rate of 21.5 per cent of tuberculous empyema in the extrapleural space was a high price to pay for a 19.6 per cent of sputum conversion.

Brantigan and Rigdon,⁵ on the other hand, have recently reported a series of 72 operations in 64 patients with but one early death. There have been no complications such as fistula, empyema, or migration in their series. Eighty-six and one-tenth (86.1) per cent of their patients who had unilateral disease obtained a negative sputum. They stress the importance of the posterior approach, the leaving of the mediastinal attachment of the lung and the use of local anesthesia. The surgeon who reported 100 operations with only five unfavorable results on the other hand was insistent on the necessity of freeing the mediastinum. Brantigan states that local

TABLE V
Experience Reported by 8 Surgeons Using Extrapleural Lucite Plombage

1. 100 operations—5 unfavorable results.
2. 20 operations for thoracoplasty failure—few successful results—a number of disturbing complications.
3. 20 operations for thoracoplasty failure—successful in 3 patients.
4. 30 operations with two bronchocutaneous fistulas.
5. 38 operations—conversion of sputum in 30 patients.
6. 15 operations with little success.
7. 24 operations with moderate success.
8. A few operations but procedure is now abandoned.

anesthesia forces the surgeon to be gentle with tissues and lessens the chance of spreads and exacerbations. We have had a considerable experience with the use of local infiltration, epidural block, and segmental spinal block in thoracoplasty operations. With all of these procedures there is encountered a substantial percentage of patients who, in spite of careful preoperative sedation, are not adaptable to regional anesthetic procedures. They are emotionally unstable, anxious and cannot relax. Doing an extrapleural stripping on patients of this type under local infiltration can hardly be as non-traumatic as when they are quietly asleep under cyclopropane with an endotracheal catheter in place.

An idea as to the frequency of its present use can be obtained from the files of the Veterans Administration hospitals. During the six months' period from July to December 1949 only four patients who were discharged from the Veterans Administration hospitals had been treated with lucite extrapleural plombage. During the same period 610 discharged patients had received a thoracoplasty.

TABLE VI
Complications Reported by 38 Surgeons After Lucite Plombage

1. Empyema reported by 6 surgeons.
2. Migration of lucite spheres reported by 3 surgeons.
3. Bronchocutaneous fistula reported by 6 surgeons.
4. Perforation of bronchus reported by 1 surgeon.
5. Rupture into the cavity reported by several surgeons.

DISCUSSION

It is evident that extrapleural lucite plombage has failed to capture the enthusiasm of a majority of American thoracic surgeons. Much of the disfavor stems from the unfortunate results of the Duke group reported by Trent in 1948. Recent reports such as those by Brantigan make it evident that the operation may be of value in patients with bilateral cavitation or with diminished respiratory reserve. Recent work by Gaensler and Strieder⁸ and Dressler, Bronfin and Grow⁹ makes it evident that the loss of pulmonary function following extrapleural pneumothorax and lucite plombage is minimal or non-existent. In this respect it is superior to any other form of collapse or excisional therapy.

SUMMARY

1. A three-year follow-up of 26 patients who had a lucite extrapleural plombage in 1946 and 1947 shows that cavity closure was obtained in 11 patients and a conversion of sputum in 5.
2. Complications have not been numerous in this group and there was no operative mortality.
3. The files of the Veterans Administration and the opinions expressed by the majority of 45 thoracic surgeons consulted indicate that the operation is not in common use.
4. Recent reports such as that by Brantigan make it evident that the operation may still be considered when confronted with patients with bilateral cavitation or in those with unilateral disease who will not accept thoracoplasty or resection.

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Student Health and the Public Health*

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IT is an honor to participate in the ceremonies marking the one hundredth anniversary of the founding of a great university. In addition, it is just 30 years next fall when Dr. Harold S. Diehl resigned his position as director of Laboratories of the University Hospitals to become director of the Students' Health Service. He succeeded Dr. John S. Sundwall who, under the presidency of Marion LeRoy Burton, had organized the Students' Health Service about two years before. Dr. Burton was going to the presidency of the University of Michigan and had prevailed upon Dr. Sundwall to go with him.

Dr. Diehl selected Dr. Ruth Boynton and me as his assistants, and we three moved into a small, single room in the basement of Pillsbury Hall, with Dr. Boynton and I occupying opposite sides of the same desk and Dr. Diehl's desk in the other corner. We had one secretary between us. Dr. J. A. Myers and Dr. C. A. McKinley had been previously appointed to the clinical staff and have continued to serve ever since. In addition Dr. Myers became professor of preventive medicine and public health and also internal medicine, and has now served the longest period of any of the faculty in both of these departments. We had 20 beds for men and 20 for women, with two small private rooms for the most critically ill. There was also a small infirmary on the St. Paul campus for which we were responsible. I well remember marveling at the fact that my new crystal radio receiving set, recently assembled from parts purchased at Woolworth's, would operate within the foot-thick stone walls of the basement of Pillsbury Hall.

Dr. Diehl's chief concern from the administrative standpoint was a considerable deficit which had been incurred. Anyone who has had the privilege of working for Dr. Diehl knows that his serious concerns are contagious, and therefore his immediate associates were likewise deeply concerned with this deficit. Suffice it to say that under his administrative genius, which has so long served this school so well, the deficit was soon wiped out and it was not long until we moved to more commodious quarters.

It is my purpose to point out that such progress as we are witnessing here today is of greater than local significance. Duplicated as it is in many other great universities and colleges of the country, the student health movement is serving an increasingly important

function in the public health progress of the nation. This university has produced its full share of national leaders in many fields of endeavor. Everywhere one goes, there are Minnesota men and women giving good account of themselves and bringing credit to their Alma Mater. And for every such national leader, there are a thousand others who have left our gates with a better understanding of the components of good medical care, the values of proper hygienic living, and the importance of community effort for the improvement of the health of all. They might not have acquired such understanding but for their experience with the superb organization of this Students' Health Service.

The student health movement

Let us now turn briefly to the story of the progress of the student health movement in this country. To quote one historian, the schools of the early days were notorious for their unhygienic conditions. He says: "Hitherto, the body had been left to care for itself, with the usual result of devastating epidemics; and schoolrooms had from medieval times been dark, gloomy, and full of evil smells. The reformers had demanded that the body should be duly cared for by the ordinary conditions of healthy living and that communities should be at the expense of supplying at least as suitable accommodations for the nurture of their children as they did for the keeping of their horses."¹ There was much to do about these conditions, both in this country and abroad, until things finally came to a head. Perhaps the most momentous national advance was in Sweden, where health officers were assigned to schools by the government in 1868.

Meanwhile, however, a pioneer venture started here through the remarkable brain and leadership of an outstanding educator. President Stearns of Amherst addressed a public health meeting in 1859, advocating a student health service for his college which would provide for medical examinations, physical exercise and clinical care, the protection and promotion of the mental efficiency and physical well-being of the student. This dream of President Stearns actually materialized in 1861, under the able medical directorship of Dr. Edward Hitchcock. Seventy years later the American Student Health Association awarded a certificate to Amherst College in recognition of its pioneer work.^{2,3}

For a long time still, however, Amherst was alone in its noble experiment, and other colleges remained "dark, gloomy, and full of evil smells." It is hard to realize what happened to students under those conditions. I well remember being the victim of such a situation in

*An address on the occasion of the dedication of the new Health Center Building, Students' Health Service, University of Minnesota, Minneapolis, November 7, 1950.

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my own early student days at Minnesota. "Pinky" Smith woke up one morning too ill to go to class. By the time we got back from classes that night it was evident that he was very sick. Some thought he needed a doctor, but he had no money for a doctor. So we decided, "Pinky is a tough fellow and he'll be better tomorrow." In any event, having had a little medical and nursing experience following my father on his daily rounds, I stayed up with Pinky for two nights, changing ice packs on his terrifically sore throat and giving him tepid sponge baths to reduce the fever. In a few days he was able to stagger to classes, with effusive thanks to me for having saved him the expense of calling a doctor. A week later I came down with a sore throat, a high fever, and was too weak to lift my head. I insisted on having a doctor, and knowing none, someone called the first one in the phone book. I shall never forget his prompt response and his kindly and skilled ministrations. In his opinion, this might be diphtheria, and just to be safe he would give me some antitoxin.

Little did he or I know that Dr. Chesley, then director of the Bureau of Preventable Diseases at the Minnesota State Department of Health, had an agreement with all drugstores selling packages of antitoxin to report to him the name of the physician making a purchase. This was a clever—though, in my case, diabolical—device on the part of Dr. Chesley to assure proper and prompt reporting of contagious diseases, including diphtheria. The next morning Dr. Chesley and the late Dr. Green, epidemiologist for the State Board of Health, came to my bedside in the fraternity house and soon there were "things a-doing." Not only was my throat cultured but the entire fraternity was rounded up at lunch time for the same purpose, and before I knew it two of us were loaded into the city hospital Black Maria, reeking with formaldehyde, and popped into the contagious ward of the city hospital. This cost us nothing, but took six weeks of our valuable time before the throat cultures were negative. Not only did that ruin my grades for the semester but I must, perforce, go to "Doc" Cooke for an excuse from gymnasium. Let me assure you, that required almost more effort than making up my grades!

Gradually colleges commenced to assume a degree of responsibility for athletic injuries and for epidemics, which all too frequently caused high rates of morbidity among student groups. Thus, college infirmaries came into being and usually some temporary provisions for isolating contagious cases, commonly known as the "Pest House."

Along with this, of course, came an increasing concern on the part of colleges for the physical development of the college student, and intramural sports and required gymnasium exercises were introduced.

Finally came the realization that the college does in fact act in loco parentis, especially for students away from home.

The modern student health service

Today the responsibilities of the modern student health service are pretty generally understood and usually

fully assumed by all first-class schools. In the order of their development, these are as follows:

1. The care of the sick, including care during epidemics and care for athletic injuries.
2. Maintenance of physical and mental health, including
 - a. Entrance and periodic physical examination.
 - b. Physical exercise and muscular development which, of course, fits in with the age-long athletic program of most schools and has become so important as to be largely departmentalized in a division of athletics and physical education or whatever its title may be. Here again, however, the student health service acts in an important advisory capacity, helping the coach and the gymnasium director to decide which students may participate safely in strenuous sports and which ones need corrective gymnastics to round out the physical development which is so often irregular during the adolescent and post-adolescent years.
 - c. Environmental sanitation and safety, so that no longer may a typhoid carrier be assigned to the task of serving food; so that dormitories, boarding houses and rooming houses may meet certain necessary minimum standards of sanitation and safety; and so that the entire campus population may be assured a pure food, milk and water supply, and proper disposal of waste.
 - d. Finally—and this is a relatively new concept—the importance of offering early help for emotional immaturity. Just as the physical development of the post-adolescent years is often irregular, producing an individual who may be poorly coordinated and somewhat ungainly, so too do the strains of environment, parental misjudgment, heredity and rapid growth of adolescence produce a spotty and irregular development in emotional stability, that is, in the long struggle to reach maturity. This is a field the importance of which is just beginning to be fully realized, especially here at Minnesota. The fact is, that a person with an emotional upset—call it what you like, conflict, inferiority complex, depression, over-aggressiveness, etc.—that such a person is in even greater need of skilled help than is one with a broken leg. A broken bone will often mend if let alone, though not always straight. An emotional disturbance rarely does. It is a peculiarity of emotional disturbances that the individual having them is frequently oblivious to the defect, or if aware of it, completely powerless to remedy it without assistance. Oftentimes that assistance is brief and relatively simple. Nevertheless, it is a form of medical therapy best rendered by a highly skilled psychiatrist and almost impossible for the individual or his friends or family to render.
3. The third of the modern responsibilities of a well-conducted health service, is teaching health with a

view to improving health conduct—that is, what a person thinks and does about his health. In the well-run student health service, this is done primarily by a demonstration of the meaning of good medical care and an opportunity to observe the conditions under which it is forthcoming. Health educators are agreed that most effective education in health is afforded through experience. The experience of receiving a thorough physical examination, follow-up counseling, advice concerning the correction of remediable defects, and the opportunity to have early medical care at the onset of illness is the best teaching device in health education yet invented. When this is supplemented as it is here by formal courses in personal and community health we are at long last producing a group of community leaders who will facilitate medical and public health progress for the future.

4. The fourth responsibility of the student health service is constant modernization. This is best done through close affiliation with a leading medical school, as here.
5. The fifth responsibility, and somewhat a by-product of a good student health service, is research. Here we have records over several years of many individuals whose variations and whose illnesses and reactions to those illnesses may be carefully studied and compiled and described for future guidance of medicine.¹

Minnesota's record in these responsibilities

When we come to check off the performance record of the Students' Health Service against this list of responsibilities, we find a most gratifying score and one which perhaps is not fully appreciated locally. As to care of the sick, the physical facilities we have seen at the new health center building today are a manifest of the interest of this university in providing the best obtainable medical, hospital, laboratory, and technical facilities for the sick student. But good medical care consists of much more than bricks and mortar, air conditioning, good illumination, hospital beds and shiny instruments. Gratifying as this new equipment is, it is of no avail without the best of physicians, dentists, nurses, and technicians. And here again the Students' Health Service has a unique advantage. These physicians, dentists, nurses, and other staff members are carefully selected by the Medical Director. She, in consultation with her advisers in the Medical School, is in a much better position to judge the relative competence of these highly trained individuals than is the lay person. In fact, an interesting thesis may be developed indicating that the average layman is rather incompetent to select his medical adviser, having no basis of judgment upon which to make that selection. Given good working conditions and a well selected staff which soon learns to work as a team, the sick student is in line to receive the best medical care which this nation can offer. It is illustrated at the Students' Health Service by 10 full-time physicians, four psychiatrists, 50 part-time physi-

cians, 15 part-time dentists, 23 nurses and 32 on the clerical staff.

The results speak for themselves. Ninety per cent of the students of this University use the Students' Health Service for something other than the required entrance or periodic examination. This is a remarkable record in a university where 40 per cent of the students live within easy access of their homes.

These ninety per cent of students make nearly 80,000 visits annually. They average 3.03 visits each.

Nearly 1500 students received hospital care on the Minneapolis campus alone last year and averaged 4.4 days hospitalization each. Let me emphasize again that the quality of this medical care is superior, not only because it is rendered by carefully selected personnel, but because their performance is under constant surveillance by their Director and their peers. They themselves know the difference between good and poor medical care, and will not long tolerate anything but the best, most modern practices.

When we examine the maintenance of physical and mental health among the student body at the University of Minnesota we find that there were 11,000 complete physical examinations rendered last year. There are and have always been special efforts to track down and eliminate tuberculosis in the student body. At Minnesota this consists of the very latest devices, including a tuberculin test and a miniature x-ray film on every student.

We find at this Students' Health Service dental care readily available, given at a time when early repair work may preserve dental health for many more years than would otherwise be possible. We find a dietetic consulting service available, through which students may learn to correct overweight or underweight, or to understand and carry out their physicians' advice in respect to diet for special conditions. Here we find refraction service for those needing glasses for the first time, or those needing changes. We find laboratory and x-ray service readily available at no additional cost so that the physician and the patient may benefit from the most modern techniques in this field. We find necessary drugs furnished readily at reasonable rates.²

I know of no university in which health teaching is more effective and more carefully integrated or better organized than here. As to constant modernization, one need never fear the use of antiquated methods in an institution so closely affiliated with an up-to-date, well staffed, highly organized, highly cooperative medical school such as we have here.

As to the last, but not least, responsibility of the Students' Health Service, that of research, we find in the biennial report of the University Health Service for 1946 to 1948 no less than 105 scientific articles published by members of the Health Service staff, not including book reviews, editorships, and service on editorial boards. These articles are well distributed among members of the staff and cover a variety of subjects.

Finally, one cannot pass over this record of accomplishment without commenting on one intangible but

extremely important attribute characteristic of this institution, that is, the remarkable spirit of cooperation, mutual assistance and encouragement which pervades all who work here. It is a most valuable asset which tends to stimulate, encourage and facilitate the work of each and every member of the staff.

National significance

In closing, let me point out the impact of this type of service and the ultimate results in terms of the years to come. For most of this century, medicine and public health have had a long and discouraging struggle for public support. Without public support our services, researches, endeavors for the betterment of mankind are frustrated. Medical education is costly. It must have public support and appreciation if it is to be done well. Essential research is costly. It is of the utmost benefit to the human race, but cannot be carried on without public support and enough understanding to realize that all research is a gamble, that much of it is negative in results, but that the negative experiments are well worth conducting in order to produce one important discovery now and then. Most important, and most recently, organized medicine is engaged in a struggle to obtain public support for the maintenance of conditions under which the private practice of medicine may continue to flourish and progress. Even this is proving difficult to present, and it remains to be seen, whether we as physicians can stem the tide of state collectivism which has already so far engulfed the nation.

In the public health field, likewise, we have had a century long struggle to teach the public the importance of health departments and their continued support. Despite this struggle, one third of the population in this country is still without the benefit of full-time health departments. There are estimated to be 3000 vacancies in the health departments and the voluntary health agencies in the nation today. The voluntary health agencies depend solely for their financial support upon the understanding and generosity of the public. The importance of well organized medical and preventive medicine programs in industry is only beginning to be understood.

Our difficulty lies very largely in the rapid progress of medicine and public health over the past 80 years. It is a progress so rapid that it is almost impossible for the general public to comprehend. Many of our voters and taxpayers and even our legislators still live in the pre-Pasteur era. They are either unable or unwilling to understand that the nation's health is its greatest asset; that the health of individuals and of communities, both

political and industrial, must be preserved; that it can be preserved through the application of known methods of medical science and public health at a reasonable cost. It is difficult for the general public to realize that expenditures for health protection are investments in sound economy.

To find one case of tuberculosis through the application of well known and well understood methods may cost the taxpayers as much as \$5.00, but by finding it in the early and therefore easily curable stage, we may save the community the expense of perhaps \$15,000 in the prolonged sanatorium care of that case had it been found too late to be curable. It is possible through well known and well understood methods to find an unknown case of syphilis and to cure it at the cost of perhaps \$50 to \$100, but by so doing we may have saved the taxpayer the cost of prolonged care in a mental institution which may run to \$25,000 or \$30,000. To save the life of one mother from the accidents and diseases of childbirth prevents a devastating tragedy to a family, the value of which cannot be estimated in dollars. Saving one worker from death or debility from lead poisoning preserves his productive capacity and his value to the family, the money value of which it is almost sacrilegious to try to estimate.

As time goes on with experiences and learning emanating from such student health services as this one, we shall have the nation's leading citizens aware, alert, and sympathetic to the purposes of medicine and of public health. They will know what good medicine is and will understand the conditions under which it may flourish. They will help us preserve those conditions as well as to help us improve them. We shall find legislators moving out of the pre-Pasteur era into the modern era where good medical service, research and teaching are recognized to be essential to the further progress of our civilization. As time goes on we shall see captains of industry as much concerned about preserving the health of their workers as some are now with preserving the interest rate for their stockholders.

All these things take time; they will come about through sound building and sound education. They will lead us by means of just such demonstrations as here described to a new era of longer and happier lives for all. May this beautiful and highly functional new building stand as a symbol of superlative medical care and of preventive medicine for all the people of this great institution. May what it stands for become one of the firmest foundation stones which will support the continued growth of this University for the next hundred years.

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College Health Service as a Career for the Physician*

IRVIN W. SANDER, M.D.†
Detroit, Michigan

FOR MANY YEARS our colleges and universities, and often the student health services themselves have considered the efforts of the student health service to be confined arbitrarily to the field of health, particularly to the personal health of the individual students. In many instances, we are asked primarily to play the role of fireman, standing by for the alarm which is presented by the student who appears before us complaining of illness.

This is, of course, highly important, and is certainly the largest part of the duties which we assume and expect to discharge. Traditionally, we must care for illness on the campus, whether major or minor. We must render first aid in accident and injury; we must be skilled in the practice of preventive medicine to the end that personal illness cases will be reduced in number; and we must develop a persuasive educational program and technique so that these duties may be better performed. All of these duties are accepted without argument on any campus where there is a health service, and it would be foolish for me to elaborate upon them, or to emphasize our work in these respects. My desire is to point out that there are broader implications, institutionally and individually, of the work done by our student health services.

Any college or university is primarily an educational institution; health supervision is, therefore, but one phase of the activities of such an institution to the end that its students may live fuller, happier, and more socially useful lives. To accomplish this purpose there must be integration among all departments, whether instructional or administrative or both, that have any intimate relationship with students.

This goal has been achieved to the extent that most university curriculums do not limit themselves rigidly to one particular area of study but require a balanced preparation touching on many areas of learning. The young man going into the ministry is no longer trained only in religion, but also in psychology and the social sciences. The pre-medic is required to have not only certain courses in chemistry and biology, but a knowledge of languages, history, and the social sciences. This advancement academically has not, however, been carried through the total university picture, and I am afraid

that in all too few instances does the health service play the part it should in the educational program.

I wonder how many of the persons engaged in student health work are members of campus committees on university policies, or building plans, or course contents, in order that health problems be given adequate consideration. We still build classrooms without proper lighting and ventilation. We still have faculty members who assign book and paper work out of all proportion to the time and welfare of the student.

AREAS FOR SERVICE ON THE CAMPUS

If, then, we may consider that this larger aspect of health supervision can be a function of the health service, and that our departments can assume a greater role in the broader educational objectives of our colleges, here are some of the specific areas in which we may play a part:

The Admissions Office. Most of us have wondered how certain students ever got on the campus; why they were not held up before admission. It should not be too difficult for us to assist the admissions officer with his duties. We might help to look for and point out danger signs in the student's past record, and suggest that whenever a student's admission is questioned because of a health problem, whether physical or emotional, that a preliminary health service evaluation be required. With our assistance, the admissions personnel might become more skilled in suspecting cases where further investigation is needed and in this manner proper guidance can be given to the applicants.

Academic Counseling. The type and amount of work done in this field will vary with the institution; in some it is done by a special group of persons who devote all of their time to the work, in some by faculty members who are requested to do it as an added duty, or in others by some combination of both methods.

Whatever the system, approval of an overload of credit hours is usually given routinely if the student has good grades or an adequate honor point average for the preceding semester. Now each credit hour represents roughly three hours of work per week for the student; a sixteen hour course is approximately equivalent to a forty-eight hour week. It follows then that a student carrying eighteen credit hours has a fifty-four hour work week; nineteen credit hours a fifty-seven hour work week, and so on. If we add to this twelve or fifteen or twenty or more hours of outside work—waiting on table, tutoring, clerking, soda-jerking, factory work or what-

*Address of the President, Twenty-Ninth Annual Meeting of the American College Health Association, Wednesday, May 2, 1951.

†Director, Student Health Service, Wayne University, Detroit, Michigan.

ever it may be—we arrive at a fantastic total of working hours per week for certain students.

Eventually many of these students are seen in the health service because of illness, or a "nervous breakdown," or because they are on the dean's list, or for one of a number of other reasons. By that time a serious problem of health, mental or physical, may have developed. Yet the methods of preventing such disasters are plain. Our counselors need to be health-minded, and could be advised to refer all cases of questionable health to the health service for an evaluation. If the duty of the physicians of the health service is prevention of illness, here is preventive medicine in its purest form.

Health Teaching. It has always seemed that the health service should be intimately identified with a broad program of health teaching on any campus. The departments of health education and health service should work closely and cooperatively together in the matter of health teaching, course contents, and objectives. Some of the lectures in health courses can best be given by the health service staff, and we should be willing always to assume this duty. In the matter of physical education, we are perhaps less concerned, but certainly again there should be close cooperation between the two departments in determining the program in specific instances. We have only to look at some of the health aspects of intercollegiate football to realize how far afield we have occasionally gone from the basic premise of healthful exercise.

These few instances serve merely to point up my premise that there are many areas within our colleges where the functions and potentials of the health service staff can have wide administrative and academic applications in addition to our basic and original function of individual health supervision. The opportunities are here; they are real and obviously worthwhile, both to us as physicians and others engaged in education, and to the schools and universities where we work.

Occasionally in these meetings of our Association, there has been discussion and comment about our recognition or lack of it upon the campus, and also among our professional colleagues. There has been some thought that we might organize a professional association similar to some of the specialty boards, with training programs and standards leading to professional recognition as specialists in student health. This, perhaps, has been in part an expression of a feeling that we are looked upon as neither fish nor fowl—that we are not professors in a recognized discipline nor are we physicians among our practicing colleagues.

RECOMMENDED TRAINING FOR THE STUDENT HEALTH PHYSICIAN

Certainly none of the specialty boards now organized will offer the corollary type of preparation needed for the doctor in health service work as I have outlined it above. Briefly, where should he, besides his medical training, devote additional study time? Two main areas occur to me:

1. *Teaching.* Each day, as we see patients or meet classes, we must be teachers in the field of our prepara-

tion, medicine and health. To do it well, we must constantly be students, and for us the acquisition of knowledge must be an exhilarating pursuit. Fullness of our subject and fascination with our opportunities for service will give us the inspiration necessary to be stimulating teachers.

2. *Administration.* It is essential to know what other departments of the college can and will do for the student, particularly in the field of student service. Many times a student comes to the health service for help with what proves to be an academic or vocational counseling problem, or he may need nothing so much as a part-time job to relieve him of financial difficulties. It is desirable that we know where these services may be obtained, and that we give personal help to the student in obtaining an appointment for the help they can give. We are not going to do the work of the other college departments, but it is essential that we be familiar with their work and methods, so that their special training may be utilized to assist a student where it is indicated. In the same manner, we expect teachers and administrators to be conscious of the health of the student, so that our special talents and training may be made available to him when needed.

A most important single step toward establishing these cooperative procedures is the development of a method of administrative communication, so that material and records at one office or department may be available to other offices without long term negotiation or accumulation. A central information office or clearing house for records, having available on request all information of a non-confidential nature, would make for more effective advising and efficient cooperation with students by all divisions of the colleges.

In suggesting this program, and these corollary activities, I am assuming that proper medical education and clinical training is the background of every person choosing student health work as a career, whether full or part-time. We must always be physicians first, with the primary emphasis and the greatest portion of our time devoted to clinical activities. The recent paper by Moore and Darling tracing the development of a clinical teaching program at Cornell University points up clearly the opportunities and needs for special clinical skills.

If, during this clinical training period, some time can be spent in acquiring administrative and teaching skills, the physician thus trained would have a superb capacity to serve both the students and the school in which he works.

Perhaps sometime one of our larger universities may wish to experiment with the program here proposed. Under the direction of the health service, and with the cooperation of the American College Health Association, it should not be difficult to work out a two or three year program for interested physicians who could gain experience and training in related administrative and academic departments while serving on the health service staff for their clinical training at a reasonable stipend. This clinical training program can readily be developed

in the form and content suggested by Moore and Darling. As a part of the program, they might be assigned to the teaching of courses in health and hygiene, physiology or related subjects for a stipulated number of class hours. They should have some training in hospital management, for that is an important part of the duties of the health service director.

At another time, they might serve for a period with the academic counselors, the vocational guidance department, the financial office of the university, and possibly even spend some time in the office of the president. I am sure that there is not one among us who has not at times felt that morale would be served by a better mutual understanding of the problems that exist in the

higher administrative offices of the college or university and in the health service.

At the conclusion of this training period of two or three or more years, it should then be possible for this Association to grant suitable certification to qualified candidates, indicating the successful completion of the prescribed work. Standards must, of course, be set up, and a name or title for the certification devised. This Association must unquestionably be the prime mover in the establishment of such a program. The conferring of the certificate or title might well be made a part of our annual meetings. Properly handled, it should add dignity and stature to both our Association and to our members.

Meet Our Contributors . . .

SAMUEL S. BEIRSTEIN was graduated from the Long Island College of Medicine in 1929, specialized in diseases of the genito-urinary system, has served as assistant clinical professor of urology in the New York Polyclinic Medical School and Hospital, is now chief of the urological section at Mount Sinai Hospital in Minneapolis and instructor in urology at the University of Minnesota. He is a diplomate of the American Board of Urology.

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PAUL C. BENTON, a graduate from the University of Minnesota medical school in 1937, is instructor in pediatrics and psychiatry at the same school. He is on the visiting staff of Minneapolis General Hospital and the Mental Hygiene Clinic at the Veterans Administration. He is a member of the Minnesota State Medical Association, Southern Minnesota Medical Association, A.P.A., and A.M.A.

★

ROBERT B. COCHRAN was graduated from Temple University medical school in 1943, took graduate work at the Navy Hospital in Brooklyn, specializes in obstetrics and gynecology in Bismarck, North Dakota, where he is on the staff of St. Alexius hospital. He is a member of the Sixth District Medical Society.

★

THEODORE CORNBLEET received his medical degree from St. Louis University medical school in 1927, took graduate work in physiology and biochemistry, is now clinical professor of dermatology at the University of Illinois and attending dermatologist at the Cook County Hospital, Chicago. He is the president of the Chicago Dermatological Society and holds membership in numerous other scientific societies. He has received a number of awards and grants for research.

★

MICHAEL J. FEENEY, a graduate of the University of North Dakota, took his medical degree at Duke University. He specializes in urology and is instructor in that subject at the University of Minnesota.

★

ROBERT C. HEEN attended the University of North Dakota and took his medical degree at Temple University in 1946. He served a three year residency at Milwaukee Hospital, specializes in internal medicine in Long Beach, California. He is a member of the American Medical Association.

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★

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★

IRVIN WILLIAM SANDER was graduated from Wayne University in 1923, is professor of preventive medicine and public health at that school, and last year served as president of the American College Health Association. He is a member of county and state societies, a fellow of A.M.A. and A.P.H.A., and a diplomate of the American Board of Preventive Medicine and Public Health.

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The
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Great Northern Railway Surgeons' Association, Minneapolis Academy of Medicine, North Dakota State Medical Association, Northwestern Pediatric Society, South Dakota Public Health Association, North Dakota Society of Obstetrics and Gynecology and North Dakota Pediatrics Society

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Editorial . . .

HE WHO PAYS THE PIPER CALLS THE TUNE

MEDICAL science has made remarkable strides during the last half century. This period has seen the virtual conquest of a score of microbial infectious diseases. The epoch-making discoveries of Pasteur and Koch and their followers permitted the prevention and treatment of numerous diseases due to micro-organisms. The pioneering of Fleming and Florey with antibiotics has quickly opened the vast territory of therapeutic use of natural substances that are inhibitory or lethal to particular bacteria and other microbes. The discoveries of Abel, Takamine, Kendall, Banting and Best, Herbert Evans, Stewart and Rogoff and many others in the field of hormones have provided specifics for the treatment of endocrine disorders. Surgery has taken enormous strides with the improvements in available anesthetics, blood banks, blood substitutes and in knowledge about the prevention and management of shock. Infant and material mortality rates have been reduced to figures which might have seemed miraculous fifty years ago.

All of these advances have been dependent upon scientific discoveries. Because of the phenomenal results that have been obtained medical science today is in what might seem to be a most favorable position with regard to availability of funds for further research. The investment which has been made in medical research in the past has paid such huge dividends that the public, anxious to eradicate still more diseases, has itself demanded that large sums of money be made available for studies aimed at gaining the necessary knowledge. This development is so spontaneous, so enthusiastic and so sincere that it is in some respects frightening to the thoughtful investigator. It is alarming for one reason because so few persons, even among scientists, have given serious thought to the conditions under which the major advances have been made in the past in contrast to the conditions that are being set up for work today.

Fleming did not discover penicillin by setting about deliberately to find an antibiotic. The functions of the endocrine glands were not discovered by persons looking for the causes of specific disease entities. The discoveries of accessory food factors by F. G. Hopkins were not made with any specific diseases in mind. Marie Curie did not have cancer treatment in view when radio activity was discovered, in fact the Curies were not even looking for atomic mutation when they discovered it. Otto Hahn had no notion that his discovery of the fission of the atom would result in an atom bomb.

The great ground-breaking discoveries in science have been made, almost if not quite invariably, with pure curiosity as the motivating factor for the studies. The exploitation of the basic discoveries can be and has been planned with practical objectives in mind, but the initial breaks have most frequently been "accidental."

In medicine today two problems overshadow all others in practical importance. They are neoplastic diseases and arteriosclerosis. In neither case are there clear indications as to how the practical problems of prevention or cure can be solved. It is, of course, possible that some of the existing knowledge about these diseases may be built upon to find preventives or cures. It is equally possible that entirely new information will have to be discovered before such developments will be possible.

It may be that some student of plant or lower animal forms will hit upon the key piece of information. It may be that a new physical or chemical tool will provide the means to the new knowledge. If history is a guide it is as likely that the solution to these major problems will come through some studies apparently unrelated to the diseases in question as by direct attack.

The danger inherent in the present situation is that the scarcity of funds for fundamental research in contrast with the relatively larger funds ready for expenditure upon research which seems to be more closely pointed at practical problems, may discourage scientists from working at the unpopular basic problems. When large sums are to be had for the asking for applied research and it is difficult to get even meager support for fundamental research it is the rare person who will renounce the larger support.

The real need is for more farsighted and more generous support of investigations that have no obvious connection with practical problems, but aim simply to increase the store of scientific knowledge. It has been well said that there is no useless information. Certainly Faraday's electrical "toys" have become the basis of our machine age, and van Leeuwenhoek's "useless" microscope has been a major basis of advance in biology and medicine. The persons and agencies who control the allocation of funds for research should give more serious consideration to the dangerous and stultifying effects of discouraging basic research which has no immediate prospect of paying practical dividends. Some research fund administrators appreciate the problem. Unfortunately they are themselves subject to pressures for early results. In industry the stockholders must be satisfied, in government the politicians must see some promise of benefit to their voting constituencies, in the public foundations the numerous donors must be intrigued into annual support, in the universities public prestige must be preserved by making practical progress. Only in the private endowed foundations can the strictly long-term view be practically expounded if boards of directors approve.

It is said that over a billion dollars a year are spent for research in this country. Of this all but a very few millions is devoted to work with definite practical objectives. The day of reckoning may not be very far off. Fundamental science is the foundation upon which applications can be built. The greatest danger in the star-

vation of basic science lies, not in the fact that so little money is available for it, but in the fact that scientists are lured away from working at impractical problems by the glitter of gold in the applied fields. The most brilliant scientist cannot break new ground if he is spending his time cultivating already cleared fields.

It is surely true that he who pays the piper can call the tune, in science as elsewhere, but it would be well for

the piper-payer, whether he be taxpayer, business executive, foundation officer or university administrator, to remember that creative composition comes when an artist is given a free hand. Creative science too comes only when the scientist can work with his hands untied—and his brain unfettered by the bonds of practical objectives.

MAURICE B. VISSCHER, M.D.

Notices . . .

North Dakota Establishes State Blood Bank

On April 2, 1951, the North Dakota Medical Center in cooperation with the State Health Department, began the operation of a State Blood Bank. This is a reactivation of the State Plasma Program, with greatly extended facilities in the field of whole blood and other services. Quarters for the Blood Bank are located on the campus of the University of North Dakota; however, its services will extend over the entire state.

The aims and purposes of the Blood Bank are being developed in a long-range program. The distribution of plasma to all hospitals in the state is the first objective, with other services following as soon as practical methods are developed. The objectives of the Blood Bank and the services offered can be outlined briefly as follows:

A. Irradiated normal human dried plasma (available June 1).

1. To furnish plasma free of charge to any North Dakotan who needs it.
 - a. Blood to be processed to plasma will be obtained through volunteer blood donor clinics held throughout the state.
2. To build up reserve supplies of plasma for use for civil defense and in case of disaster.
 - a. District Health Units will serve as depots for plasma.

B. Whole blood (at present available only in Grand Forks area).

1. In time to supply whole blood to all hospitals in the state.
 - a. Through a system of replacement—beneficiaries repay loans with a similar amount of blood from relatives, friends or other sources of donors.
 - b. Through the establishment of "Blood Donor Clubs."
2. Red cell suspensions for transfusions—homologous type for conditions where they may be preferable to whole blood.
3. Dried red blood cells for use in certain types of ulcers and other infections.

C. Walking blood banks

1. To establish walking blood banks in communities which wish that type of service. (A community effort to have available for emergency transfusions a group of possible donors who have previously been classified as to blood group and Rh type).

D. Training laboratory personnel

1. To serve as a training center for laboratory people of the state—to receive refresher training in the various techniques and procedures in blood bank and Rh laboratory work.

E. Civil defense needs

1. To create centers for storage of supplies for procuring and typing of blood in the event of disaster.
2. To have available a mobile unit complete with supplies and equipment to set up blood procurement centers anywhere in the state in the event of a disaster.

F. Blood insurance programs

1. To establish blood donor clubs (donor group insurance) in groups wishing this type of program.
 - a. Prenatal clubs—transfusion insurance during pregnancy.
- G. Establishment of a central register of blood group and Rh type of people from all over the state.
- H. Consultation service (available after July 1).
 1. Blood bank will be equipped to examine referred blood specimens for special studies of problems involving hereditary antigens in blood, M and N factors, Rh, Hr and other hereditary blood antigens.

Continuation Course in Roentgenology of Chest Diseases

The University of Minnesota announces a continuation course in Roentgenology of Chest Diseases to be presented at the Center for Continuation Study from October 29 to November 3, 1951. The course will include detailed anatomical and pathological studies of the chest presented by means of lectures and demonstrations. Visiting faculty members of the course include Dr. W. Edward Chamberlain, Temple University, Philadelphia; Dr. Benjamin Felson, University of Cincinnati; Dr. L. Henry Garland, Stanford University, San Francisco; Dr. George R. Krause, Mount Sinai Hospital, Cleveland; and Dr. Averill A. Liebow, Yale University, New Haven.

Dr. Chamberlain will also give the annual Leo G. Rigler Lecture in Radiology on the evening of Thursday, November 1. Chairman for the course will be Dr. Rigler, Professor and Head of the Department of Radiology. He will be joined by the members of the faculty of the University of Minnesota Medical School and the Mayo Foundation.

Convention in Manitoba

The Convention of the Manitoba Medical Association will be held in Winnipeg October 10, 11, and 12. The complete program of the meeting will follow in a later issue.

Visitors from other provinces and the United States are most welcome. For further information write the executive secretary, Dr. M. T. Macfarland, 604 Medical Arts, Winnipeg, Manitoba.

American Society for the Study of Arteriosclerosis

The American Society for the Study of Arteriosclerosis will hold its annual meeting in Chicago, November 4 to 5, 1951. Presiding at the various sessions will be Dr. G. Lyman Duff, E. Cowles Andrus, Russel L. Holman, Nelson W. Barker.

For further information write to the secretary, Dr. O. J. Pollak, Quincy City Hospital, Quincy 69, Massachusetts.

American College of Surgeons

The American College of Surgeons will hold its 37th annual Clinical Congress in San Francisco November 5 to 9, 1951, with headquarters at the Fairmont Hotel and Civic Auditorium. Dr. Emile Holman is chairman of the San Francisco Committee on Arrangements.

Book Reviews

Newer Concepts of Inflammation, by Vály Menkin, M.A., M.D., 1950. Springfield, Ill.: Charles C. Thomas. 140 pages. \$3.50.

This monograph is indeed a scholarly presentation on the various aspects of inflammation. This book is particularly timely and applicable to present day medicine. In this day and age when antibiotics are too often used in a rather slipshod fashion for any type of infection it is worth while for the practitioner from time to time to cogitate on the underlying pathology where infection is present.

This book, in a most scientific and logical sequence, explains the mechanism of all stages of inflammation. The chapter on capillary permeability and inflammation and the mechanisms by which it takes place is particularly enlightening. The subject of immunity, bacterial invasiveness, and phagocytosis, are presented with a completely scientific attitude. Of particular interest is the subject of diabetic intensification during inflammation and the rationale for this phenomenon.

The entire presentation illustrates the importance of the understanding of cellular injury in terms of advances made in the biochemistry of cellular injury. It appears that this book would be of particular interest to the surgeon, bacteriologist, and the dermatologist, but anyone who appreciates a scientific approach to this subject would find it most valuable. A.A.

•
Cancer of the Colon and Rectum, by Fred W. Rankin, M.D. and A. Stephens Graham, M.D., 2nd edition, 1950. Springfield, Illinois: Charles C. Thomas. 427 pages. \$7.50.

In the second edition of *Cancer of the Colon and Rectum* the authors have included all the worth-while recent advances made in the pathology and treatment of this disease. The book is divided into three parts: general considerations, treatment, and operative procedures. The first part contains five chapters: anatomy and physiology; incidence, occurrence, and etiology; pathology; symptoms and diagnosis; and differential diagnosis. The second part has the following chapters: operability, resectability, and prognosis; choice of operation; radiotherapy (by Fred M. Hodges, M.D.); operative mortality and end results; and preoperative and postoperative treatment. The chapter on mortality and end results is particularly excellent because of its completeness. The presentation of end results from so many clinics does much to give the reader a clear picture of what results can be obtained with adequate management of cancer of the colon and rectum. There are sufficient tables to make this chapter easily read. The third chapter is also divided into five chapters: historical considerations; procedures for overcoming obstruction; procedures for extirpation of lesions of the colon; procedures

for extirpation of lesions of the rectosigmoid, rectum, and anus, and palliative and miscellaneous procedures.

The references at the end of each chapter contain a list of all the worth-while articles, both new and old, in the medical literature on this subject. A detailed subject index makes this book of great value as a reference work. The many illustrations are of assistance in clarifying such difficult subjects as anatomy, pathology, and operative technique. The authors have done a remarkable piece of work in condensing into this relatively small book a complete survey of the subject. They draw liberally on the work of those that have written before them; but only men of their vast experience could review the literature so completely and sift from this the useful information for presentation. Students, general practitioners, and specialists will find this book a worth-while reference volume. F.J.A.

•
The Physiological Basis for Oxygen Therapy, by Julius H. Comroe, Jr., M.D. and Robert D. Dripps, M.D., 1950. Springfield, Illinois: Charles C. Thomas. 85 pages. \$2.00.

This monograph is intended to place oxygen therapy on a physiological basis. The first section of the monograph is relegated to discussion of the effect of oxygen on the normal man with a very concise and excellent review of the physiological process of exchange of gases within the human body. The second portion of the monograph is relegated to a discussion of anoxia and its therapy. This section alone is worthy of the attention of all physicians who utilize oxygen as part of their therapeutic regimen. The authors then discuss the possibilities of harm from the inhalation of oxygen. The monograph is well written and presented in a manner which is easily understood. The review of the physiological principles underlying gas exchange should be used by all physicians as a brief review of the rationale for oxygen therapy and will place the use of oxygen on a more rational basis. The rather routine use of oxygen for various conditions without any thought to the reason for its administration has become commonplace. The general practitioner, internist, surgeon, pediatrician, and obstetrician will find this monograph a great deal of help in bringing their thoughts on this important problem up to date. W.P.E.

The Kidney, by Homer W. Smith, A.B., Sc.D., M.S., professor of physiology, N.Y.U. College of Medicine, 1951. New York: Oxford University Press. 1049 pages. \$12.50.

Following many years of intensive research there has been produced this comprehensive work on the kidney which incorporates anatomy and physiology with a thorough review of the clearances. The application of the knowledge gained by these studies to the clinical problems encountered in medicine and surgery is very carefully and clearly presented. This volume should find a prominent place in the library of the general practitioner, the internist, and the surgeon. S.S.B.

•
The Science of Health, 2nd edition, by Florence L. Meredith, M.D., fellow of the American Medical, American Public Health and American Psychiatric Associations, 1951. Philadelphia: The Blakiston Company. 452 pages. \$3.75.

A new edition of a well-known text for a college health and hygiene course brought completely up-to-date with many simplified and diagrammatic illustrations and new material on contemporary subjects. New features include expanded sections on vitamins and antibiotics, and current statistics on height, weight and age averages, the leading causes of death, and similar material presented in charts, tables and appendices. The mental health section contains an outstanding introductory discussion on the psychology of adjustment.

•
The American Illustrated Medical Dictionary, edited by W. A. Newman Dorland, M.D., F.A.C.S., 22nd edition, 1951. Philadelphia: W. B. Saunders Co. 1736 pages. \$10.00.

Certainly no field of science has a vocabulary that grows and changes as fast as that of medicine. And certainly no field has such need of accurate and flexible word usage. The doctor who is scanning the literature for knowledge of some obscure disease, the writer who must describe a technic in the most exact terminology, the medical editor, the medical librarian and doctor's secretary, all have constant need of a complete and up-to-date medical dictionary.

The twenty-second edition of the American Medical Dictionary is designed to be of the utmost use to all these persons. The scope of the dictionary has been expanded to include the new words in such rapidly developing fields as endocrinology and microbiology. The book has an attractive new format making it much easier to use and read. There are new and well done illustrations, and the older illustrations for the more obscure conditions have been omitted.

One of the valuable new features of the book is an article on the fundamentals of medical etymology as an aid in the comprehension and enjoyment in the derivation and meaning of medical terms. V.L.D.

News Briefs . . .

North Dakota



THESE MEN WILL HEAD THE NORTH DAKOTA STATE MEDICAL ASSOCIATION. From left to right—Dr. W. E. G. Lancaster, *president*; Dr. O. W. Johnson, *president-elect*; Dr. Joseph Sorkness, *first vice president*; and Dr. P. H. Woutat, *second vice president*. Photographs of the other officers were not available at the time the July issue went to press.

THE following new officers will head the North Dakota State Medical Association for 1951-52:

Dr. W. E. G. Lancaster, Fargo, president; Dr. O. W. Johnson, Rugby, president-elect; Dr. Joseph Sorkness, Jamestown, first vice president; Dr. P. H. Woutat, Grand Forks, second vice president; Dr. A. E. Spear, Dickinson, speaker of the house of delegates; Dr. G. A. Dodds, Fargo, vice-speaker of the house; Dr. E. H. Boerth, Bismarck, secretary; Dr. E. J. Larson, Jamestown, treasurer; Dr. W. A. Wright, Williston, delegate to the American Medical association convention, and Dr. G. W. Toomey, Devils Lake, alternate delegate to the A.M.A. convention.

Elected at the sixty-fourth annual meeting of the Association in Bismarck, May 19 to 22, the new officers were installed at the closing session on Monday evening.

Elected for three-year terms as association councillors were Dr. A. D. McCannel, Minot, fourth district; Dr. C. J. Meredith, Valley City, fifth district, and Dr. E. J. Schwinghamer, New Rockford, eighth district.

Recommended for appointment to the state board of medical examiners were Dr. J. C. Fawcett, Devils Lake; Dr. O. A. Sedlak, Fargo; and Dr. R. B. Radl, Bismarck. The convention also recommended for appointment to the Medical Center council Dr. L. W. Larson, Bismarck; and for appointment to the North Dakota state health council, Dr. Wright, Williston.

Six physicians were initiated as members of the association's Fifty Year Club. They include: Dr. V. J. LaRose, Bismarck; Dr. W. E. Blatherwick, Sanish; Dr. Paul H. Burton, Dr. F. O. Gronvold, and Dr. A. C. Morris, all of Fargo; and Dr. G. S. Carpenter, Jamestown. Dr. F. E. Wheelon of Minot was elected to honorary membership in the association for practicing in North Dakota 50 years.

The North Dakota Medical Association auxiliary held its fifth annual meeting concurrently with that of the

society. Dr. L. W. Larson, retiring president of the association, spoke at the opening session of the auxiliary on Monday. At the business session the following officers were elected: Mrs. R. W. Rodgers, Dickinson, president; Mrs. G. G. Thorgrimsen, Grand Forks, president-elect; Mrs. H. Kermott, Minot, first vice president; Mrs. G. W. Toomey, Devils Lake, second vice president; Mrs. John Jansonius, Jamestown, secretary, and Mrs. I. D. Clark, Casselton, treasurer.

* * *

THREE Fargo doctors were elected officers of the North Dakota State Pediatric Society at their meeting on May 22 in Bismarck. They are Dr. Bernard Mazur, president; Dr. M. Poindexter, vice president, and Dr. Wayne LeBien, secretary-treasurer.

* * *

A NEW MEDICAL GROUP to encourage postgraduate work was formed as the North Dakota State Medical Association ended its four-day convention in Bismarck. The new society is a state chapter of the American Academy of General Practice and was organized by twelve North Dakota doctors. Dr. Ira Clark, Casselton, the group's acting secretary, said each member will be required to have 100 hours of informal training and 50 hours of formal training to continue as a member.

* * *

DR. WILLIAM A. STAFNE, Fargo, is the new president of the North Dakota Diabetes Association. He was elected at the annual meeting in Bismarck, succeeding Dr. T. Q. Benson, Grand Forks. Others elected are Dr. Alan Johnson, Williston, vice president; Dr. Martin Hochhauser, Garrison, secretary, and Dr. E. A. Haunz, Grand Forks, executive secretary and treasurer.

One of the objectives of the association is to develop a summer camp in the state for diabetic children.

A PANEL DISCUSSION on the subject "Does North Dakota need a four-year medical school?" was held over four CBS stations in North Dakota on June 3. Members of the panel were J. B. Bridston, Grand Forks, president of the University of North Dakota alumni association; Dr. L. W. Larson, Bismarck, trustee of the American Medical association, Dr. Edgar Haunz, Grand Forks, and Dr. A. D. McCannell, Minot, member of the state board of higher education.

* * *

THE University of North Dakota granted its first degrees in medical technology this spring. They went to Donna Juelke and Joann Johnson, both of Grand Forks.

* * *

DR. LEO SWEENEY, a native of Ardoch, has been chosen president-elect of the Illinois State Medical Society. Dr. Sweeney received his medical education at the University of North Dakota, the University of Chicago and Loyola University school of medicine.

Minnesota

DR. LEO G. RIGLER, head of the department of radiology at the University of Minnesota, will be one of eleven American and five European doctors who will go to Israel next fall as a United Nations world health organization medical team to help with teaching and public health problems. He will stop first in Geneva, Switzerland, and will arrive in Israel about September 1.

* * *

DR. WILLIAM F. BRAASCH of Rochester was one of nine University of Minnesota alumni who were honored with the University's achievement awards at the annual alumni dinner on May 16. Dr. Braasch, now retired, was formerly urologist with the Mayo clinic.

* * *

DR. RALPH ROSSEN, state commissioner of mental health, has returned to his former post as superintendent of the Hastings state hospital, although retaining his position as commissioner. The move will coincide with the opening of an intensive treatment center for the mentally ill at Hastings. Dr. Milton Brown, who has been acting superintendent at Hastings, will be director of the follow-up clinic in the Twin Cities.

* * *

DR. MAURICE B. VISSCHER, head of the department of physiology at the University of Minnesota, was recently re-elected to a three year term as a member of the board of directors of the American Heart Association.

* * *

AS A FIRST ATTEMPT at an alumni reunion centered upon a professional interest, Carleton College, Northfield, held an Alumni Conference on Medicine as part of the commencement program on June 10. Invitations were sent out to almost three hundred Carleton alumni now in the medical profession. Among the leaders for the conference were two Carleton alumni: Dr. Jean A. Cur-

ran, dean of the College of Medicine, State University Medical Center at New York City and Dr. Robert E. Gross, professor of Children's Surgery at Harvard.

* * *

EDITORS of the county newspapers were guests at a dinner and discussion meeting of the McLeod County Medical Society which was held at Hutchinson on May 17. Discussion centered on the value of local newspaper publicity in counteracting medical socialism.

* * *

SPEAKERS at the May 19 meeting of the Association of Friends of the Mentally Retarded held in St. Paul on May 19 included Dr. Harold Delp, Dr. Reynold Jensen, both of the University of Minnesota, and Dr. Ralph Rossen, state commissioner of mental health.

* * *

DR. HERMAN E. HILLEBOE, New York State commissioner of health and former Minnesotan, addressed public health workers, physicians, hospital board members and others on the subject "The Importance of a Chest X-ray of Every Person Admitted to a Hospital" at a meeting on June 25 in the Citizens Aid Building, Minneapolis.

* * *

DR. E. J. HUENEKENS was honored on June 4 by the Community Health service—a group which he helped organize nearly 40 years ago.

* * *

DR. A. J. CHESLEY, executive officer of the Minnesota State Board of Health, in June completed fifty years of work in the health department. The year 1951 is a double anniversary for him—the fiftieth year with the department, and the thirtieth as state health officer.

* * *

DR. BERTRAM ADAMS was honored by the Hibbing Chamber of Commerce at its meeting on May 29 for his 50 years of service in Hibbing and St. Louis County.

* * *

New locations and appointments . . .

DR. CHAUNCEY GOODRICH BLY, a native of Northfield, will join the staff of Kansas State University medical school on July 1 as assistant professor of pathology and oncology. In June of this year Dr. Bly completed two years of study as a fellow in medical sciences of the Atomic Energy Commission.

* * *

DR. S. T. NORMANN, a native of Fergus Falls and recently house physician of Ancker hospital in St. Paul, will join Dr. R. D. Davis and Dr. B. J. Gallagher in practice in Waseca.

* * *

DR. ALICE HICKEY and Dr. Elain Hacker, resident doctors at Maternity Hospital in Minneapolis, will leave soon for new posts. Dr. Hickey will be on the staff of St. Mary's hospital, Minneapolis, and Dr. Hacker will be at Detroit Receiving hospital in Detroit.



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South Dakota

MORE than 250 doctors and their wives were expected in Aberdeen for the 70th annual meeting of the South Dakota State Medical association on June 3 to 6. Headquarters hotel for the convention was the Alonzo Ward, with lectures and exhibits in the Civic theater and arena.

* * *

MEDICAL OFFICERS and dentists of the Aberdeen area of the Bureau of Indian Affairs, met at the area office in Aberdeen on June 1 to discuss mutual problems. Dr. M. M. Van Sandt, area medical officer, was in charge of the meeting. Guests included Dr. Fred T. Board, Washington, D. C., chief of the branch of health of the BIA; Dr. Vernon J. Forney, chief consultant of the BIA; and Dr. R. Williams, medical director of the Minneapolis area office.

* * *

DR. CHARLES W. FOGARTY, JR., of St. Paul, Minnesota, a specialist in rheumatoid arthritis, spoke on Friday, May 11, at the Royal C. Johnson veterans hospital in Sioux Falls on the subject of recent advances in the treatment of arthritis.

* * *

THE TUMOR CLINIC sponsored by the city health department at Sioux Falls will expand its services, according to Dr. Wallace A. Arneson, of the tumor committee for the Seventh District Medical society. The clinic is open to all doctors in the Seventh district, with their patients.

* * *

DR. DONALD L. KEGARIES, Rapid City, was re-elected president of the South Dakota Heart Association at its annual meeting in Pierre on May 13. The association will foster an education program on heart disease for the coming year.

Deaths . . .

DR. W. L. BURNAP, 77, died at his home at Fergus Falls, Minnesota, on May 9, 1951, ending a practice of 45 years. Dr. Burnap helped to organize the Northern Minnesota Medical Association in 1920 and was its secretary and general manager for four years. He was a member of the council of the Minnesota State Medical Association, served as chairman and president, and received the Distinguished Service Medal of the association in 1944.

★

DR. A. R. ELLINGSON, 53, of Detroit Lakes, died May 21 in a Minneapolis hospital. Dr. Ellingson had practiced medicine at Detroit Lakes for the past 25 years and was Becker county coroner at the time of his death.

★

DR. HENRY S. NELSON, 86, practicing physician and surgeon in Minneapolis for more than 50 years until his retirement about 15 years ago, died June 8 in Minneapolis. Dr. Nelson was a graduate of the University of Minnesota and a member of the Hennepin county, Minnesota and American Medical associations. At one time he served as Hennepin county coroner.

PRACTICE OF MEDICINE IN SWEDEN

(Continued from page 260)

The average cost per patient per day is 25 to 30 kronas, and the charge for a ward bed is 3 kronas per day, including medical care.

2. We find the following division of the doctors: (a) hospital chiefs and assistant surgeons, (b) city doctors, (c) district doctors, (d) general practitioners, (e) military doctors, railroad doctors, school doctors, (f) scientific doctors at universities.

3. Because of the long period of medical education and training and the tremendous costs, the doctors struggle with a school debt the greater part of their professional life.

4. The Swedish Medical Society is composed of two parts, the scientific, and the economic and labor part. The Society handling the labor phase is well organized and exercises absolute control of the doctors and the practice of medicine.

5. Hospital insurance is planned to cover the minimum charge of the hospital, which is for the ward beds. High income taxes are due largely to the costliness of the care provided the sick by the various districts.

6. The American practice of medicine and method of providing hospital insurance and care of the sick is far superior, in the writer's mind, to that of Sweden. Private initiative is far superior to the form that is becoming hemmed in by socialism.

URINARY EXTRAVASATION

(Continued from page 262)

urogenital diaphragm, it is wise to combine perineal repair with abdominal and suprapubic exploration. There is no harm in such a procedure and sometimes it is dangerous to omit exploration of the peritoneum. Only in this way is it possible to exclude intraperitoneal bladder rupture or injury to another organ and also to institute drainage to the retroperitoneum if such is warranted by the findings. Peritonitis and retroperitoneal extravasations with their serious sequelae are the most common causes of death.

The question of immediate restoration of continuity of urethrae must be decided by the surgeon in initial attendance on the patient. The presence of shock may be a deciding factor. However, the establishment of urinary drainage, retroperitoneal drainage, and abdominal exploration to repair other injuries must be instituted at the earliest possible moment in order to save life.

HEPATOMA IN INFANCY

(Continued from page 270)

"The liver is smaller than on previous examination, but shows several round hard areas in the anterior inferior margin. It was agreed that therapy would not be given today as this involvement may be due to post-irradiation fibrosis. It was also agreed that if the patient did have new growth in this area that further x-ray treatment might cause degeneration of normal liver. No treatment was given."

REFERENCE

1. Sawyer, C. Douglas: Primary hepatoma in infancy. *J. of Ped.* 36:508, 1950.

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1. Stritzler, C.; Fishman, I. M., and Laurens, S.:
Transactions New York Acad. Sc., 13:31, Nov., 1950.

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American College Health Association News . . .



DR. JOHN E. SAWHILL, New York University, president of the American College Health Association, who assumed office at the 29th annual meeting of the association in Chicago May 3 to 5.

The representatives at the annual meeting in Chicago in May were distributed approximately in the following areas: Eighty directors of Health Service, composed of seventy-four M.D.'s, six R.N.'s, one Ph.C., one M.S., and one M.A. Thirty-six staff physicians, forty-one nurses, seven health educators, one sanitarian, forty visitors.

A recent report entitled *Health Services in State Institutions of Higher Learning in Mississippi* deals specifically with institutions in Mississippi, but it has implications for all persons who have responsibility for health services in a college or university. The publication is a report of a survey made by Dr. R. O. Robertson, Director of Health Service of the University of Denver and a Committee for the American Council on Education and may be obtained from this organization in Washington, D.C., for the price of one dollar. A description is given of the facilities, personnel, and program of health services in the seven institutions in Mississippi and recommendations are made for improving the program of each college or university. Dr. Robertson gave a resume of this study at the twenty-ninth meeting of the Association.

* * *

New directors of university health services have been appointed as follows: University of Illinois, Urbana—George H. Agate, M.D.; Loyola University, Chicago—Walter J. Kawula, M.D.; Mary Washington College, Fredericksburg—J. Richmond Low, M.D.; Carnegie Institute of Technology, Pittsburgh—Snowden K. Hall, M.D.

* * *

Two colleges are in need of a full-time physician to serve as director of health service.

North Carolina College at Durham with a student body of approximately 1,300, has recently acquired an infirmary and dispensary building with adequate equipment. If interested in this position, contact the president of the college, Dr. Alphonso E. Elder.

Virginia Polytechnic Institute at Blacksburg needs a physician to replace the present retiring Director, Charles

R. Woolwine, M.D., who has served the college for fifteen years. The current enrollment at this land-grant college is 3,400 students. A 100 bed infirmary is located on the campus. The annual salary is \$8,500. For further information concerning this position write to the president, Walter S. Newman.

* * *

The Illinois Section had a breakfast meeting on May the fifth in Chicago during the twenty-ninth annual meeting of the Association. Plans are being made for an October meeting. The officers of the Section are as follows:

President: Dr. Leona B. Yeager, Northwestern University; vice-president: Dr. Otto J. Keller, Northern Illinois State Teachers College; secretary-treasurer: Dr. George Agate, University of Illinois, Urbana.

Member-at-large to executive committee: Dr. H. L. Lawder, University of Illinois. Executive committee: Dr. Leona B. Yeager, president; Dr. Otto J. Keller, vice-president; Dr. George Agate, secretary-treasurer; Dr. Earl B. Erskine, past president. Members-at-large: Dr. Otto J. Keller, Dr. H. L. Lawder.

* * *

The South Central Section held a meeting on April 28 at Kansas State College, Manhattan, Kansas. The invitation of Dr. Fenning to hold the next meeting at Lincoln, Nebraska, was accepted.

The officers for 1951-1952 were elected as follows:

President: Dr. B. Lafene, Kansas State College; vice-president: Dr. Richard Wilson, University of Nebraska; secretary-treasurer: Mrs. Alta V. Bergquist, R.N., Nebraska State Teachers College, Kearney; members-at-large (for a two year term): Mrs. Ruth Mathews, Nebraska State Teachers College, Peru; Dr. George Trimble, Washington University, St. Louis.

* * *

Three institutions were approved for membership at the Chicago meeting. The institutions are:

Cotley Junior College, Nevada, Mo.—Director, Miss Carin H. Degermark; North Carolina College, Durham, N. C.—Director, LeRoy R. Swift, M.D.; Pratt Institute, Brooklyn, N. Y.—Director, Paul I. Kearney, M.D.

To paraphrase the words of Matthew Arnold, the function of the teacher is to teach and to propagate the best that is known and taught in the world. To teach the current knowledge of the subject he professes—sifting, analyzing, assorting, laying down principles. To propagate, i. e., to multiply, facts on which to base principles—experimenting, searching, testing. The best that is known and taught in the world—nothing less can satisfy a teacher worthy of the name, and upon us of the medical faculties lies a bounden duty in this respect, since our Art, coordinate with human suffering, is cosmopolitan.

—SIR WILLIAM OSLER, *Teacher and Student*

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Surgical Technic, Surgical Anatomy and Clinical Surgery, Four Weeks, starting August 6, September 10, October 8.
Surgical Anatomy and Clinical Surgery, Two Weeks, starting July 23, August 20, September 24.
Basic Principles in General Surgery, Two Weeks, starting September 10.
Surgery of Colon and Rectum, One Week, starting September 17, October 15.
Esophageal Surgery, One Week, starting October 15.
Thoracic Surgery, One Week, starting October 8.
Gallbladder Surgery, Ten Hours, starting October 22.
Breast and Thyroid Surgery, One Week, starting Oct. 1.
General Surgery, One Week, starting October 1.
Fractures and Traumatic Surgery, Two Weeks, starting October 8.

GYNECOLOGY—Intensive Course, Two Weeks, starting September 24, October 22. — Vaginal Approach to Pelvic Surgery, One Week, starting September 17, November 5.

OBSTETRICS—Intensive Course, Two Weeks, starting September 10, November 5.

MEDICINE—

Intensive General Course, Two Weeks, starting October 1.
Gastroenterology, Two Weeks, starting October 15.
Electrocardiography and Heart Disease, Two Weeks, starting October 22.

UROLOGY—Intensive Course, Two Weeks, starting September 24.

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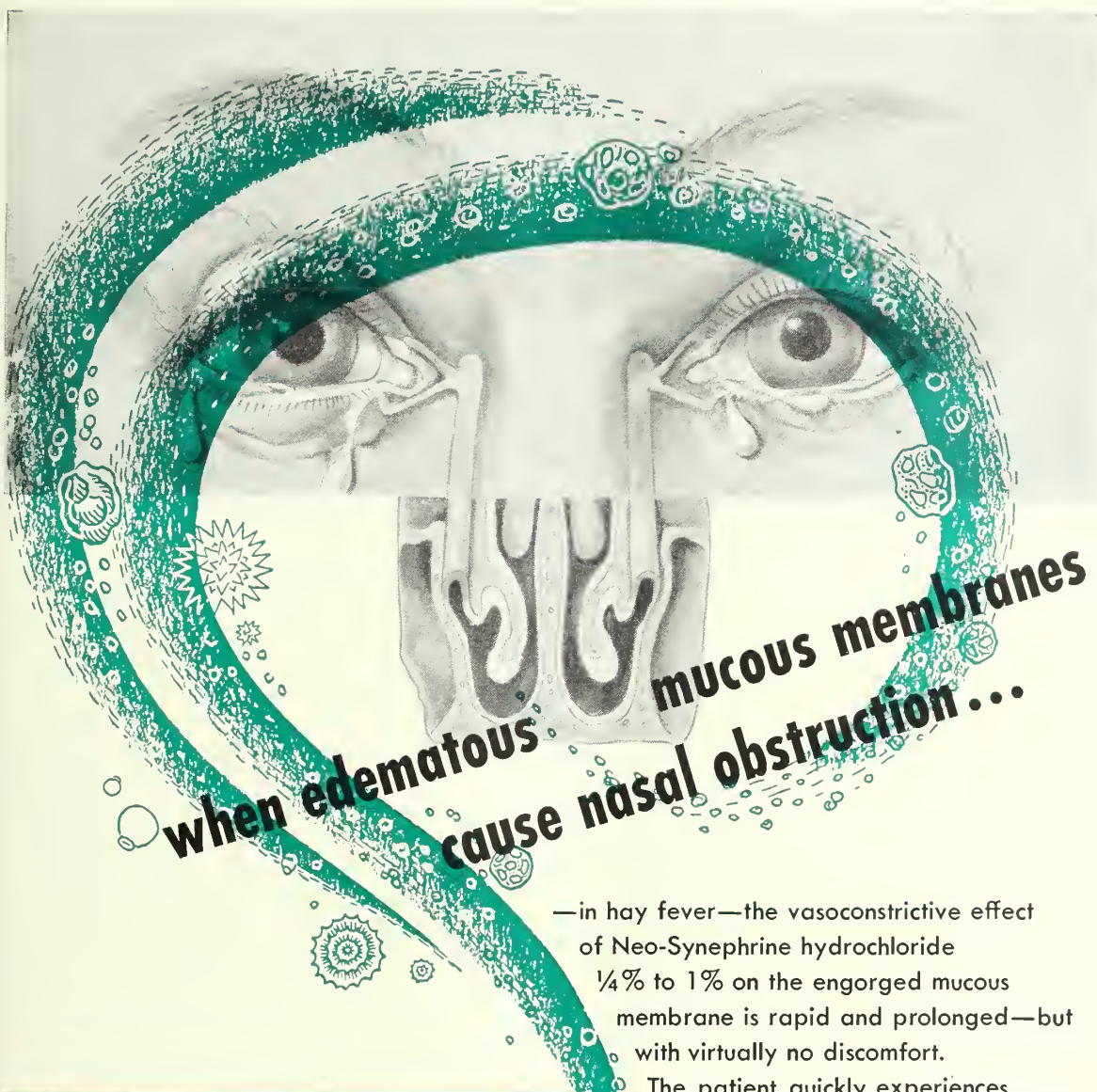
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The "Second-Look" in Cancer Surgery*

*A Patient with Colic Cancer and Involved Lymph
Nodes Negative on the "Sixth-Look"*

OWEN H. WANGENSTEEN, M.D., F. JOHN LEWIS, M.D.
and LYLE A. TONGEN, M.D.
Minneapolis, Minnesota

THE factor which influences most favorably the ultimate result in cancer surgery, is freedom from cancer involvement in all the regional lymph nodes. Wide removal of the cancer, together with the entire regional potential lymphatic drainage area, assures a good result, if the removed lymph nodes are found to be free of cancer. That a large disparity in the surgical accomplishment exists between a lymph node positive and a lymph node negative group of cases having cancer is well-known; moreover, this inequality in the issue is common to all surgeons and all cancers; the significant determinant is the absence or presence of cancerous involvement of the regional lymph nodes. Whereas 75 per cent or more of patients undergoing radical excision of the breast, stomach,† colon or rectum for cancer are living and free from evidences of the disease five years later, when the regional lymph nodes are uninvolved; in a similar group of patients having cancer, exhibiting lymph node involvement, the five year survival rate for cancer of the same organs is more frequently in the area of 25 per cent.

This loss of effectiveness of surgery in the lymph node positive cases is probably, in large degree, a measure of

the length of elapse of time between the beginnings of the cancer and the intervention of the surgeon. Yet, unfortunately, approximately two-thirds of patients having cancer exhibit lymph node involvement at the time of surgery. The length of the silent interval in gastric cancer appears to be about eighteen to twenty months.^{2,3,4} And, inasmuch as four to six months intervene following the appearance of symptoms before definitive treatment is undertaken, it is likely that most gastric cancers, coming to operation on the basis of symptoms, are probably of about two years duration. Moreover, this occurrence probably holds true for most visceral cancers. It is an unfortunate and a regrettable circumstance.

These were the items which prompted the suggestion of a re-entry⁵ of the abdomen in lymph node positive cases, a few months after the initial operation, long before expiration of the silent interval, and before the re-assertion of symptoms. In other words, fear of having left behind residual cancer in lymph node positive cases prompted the study. Our encounters with the problem of such re-entries is recounted here in the case history of the patient to whom the principle of the "second-look" was first proposed.

CASE REPORT

First Admission: Mrs. C. M., a 60-year-old widow, U. H. No. 797020, was first admitted to the University Hospitals on October 29, 1948, with a nine-month history of fatigue, and anemia resistant to iron and liver therapy. Recently, dark red blood had been noted in the stools and there was some tenderness to palpation in the

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†Supported by the Damon Runyon Fund for Cancer Research and the Minnesota Division of the American Cancer Society.

‡Of 19 patients undergoing gastric resection for gastric cancer at the University Hospital in 1944, and presenting no evidence of cancer in the regional lymph nodes, 64 per cent were well in 1950.¹

right half of her abdomen. The hemoglobin was 11.0 grams. A barium enema x-ray study showed an ulcerating carcinoma of the ascending colon just above the cecum.

After preparation with multiple blood transfusions she was operated upon on November 1, 1948, and through a transverse incision a large ulcerating adenocarcinoma of the cecum and ascending colon, broadly attached to the anterolateral abdominal wall, was removed together with a generous portion of the peritoneum, transversalis fascia and rectus and oblique muscles of the abdominal wall (Fig. 1, A). There was a large number of grossly involved lymph nodes. In order to encompass the visible metastatic nodes in the mesentery, 30 cm. of ileum was excised with the specimen. An oblique end-to-end closed anastomosis was made between the ileum and the mid-transverse colon. Her recovery was uneventful and she was discharged on the seventh postoperative day with instructions to return for a "second-look" operation before the expiration of six months' time.

Second Admission: When readmitted five months later, the patient was asymptomatic. Slight tenderness, however, was detected in the right lower quadrant and there was a vague suggestion of fullness in this area. On April 14, 1949, the abdomen was explored through a transverse subumbilical incision. After freeing many adhesions some granulated tissue was encountered in the abdominal wall. An enlarged lymph node 3 cm. in diameter was found overlying the lower aorta; it was

removed together with adjacent periaortic lymph node bearing tissue (Fig. 1, B). Microscopically, the node contained metastatic adenocarcinoma. The patient recovered rapidly from the operation and was discharged on the fifth postoperative day.

Third Admission: Though complaining only of occasional diarrhea, which had persisted since the first operation, she was readmitted four months later and her abdomen was explored on July 15, 1949. A nodule 2 cm. in diameter was found in the transverse mesocolon and excised together with a few centimeters of ileum and colon, a new end-to-end closed anastomosis being made (Fig. 1, C). This nodule proved to be due to a foreign body reaction; however, a lymph node 2 cm. in diameter was found and removed from the para-aortic area just cephalad to the site of the metastatic node removed at the previous operation. This node too, was found to contain metastatic adenocarcinoma. After an uncomplicated recovery, the patient left the hospital on the seventh postoperative day.

Fourth Admission: Six months later, the patient was readmitted and though asymptomatic, and showing no evidence of recurrence, the abdomen was explored on January 13, 1950. Two enlarged soft nodes to the left of the aorta were found and excised (Fig. 1, D). The largest was 2 cm. in diameter; microscopically both lymph nodes showed metastatic adenocarcinoma. Postoperatively, she recovered nicely and was discharged seven days later.

Functioning carcinoma of cecum Large metastatic lymph node

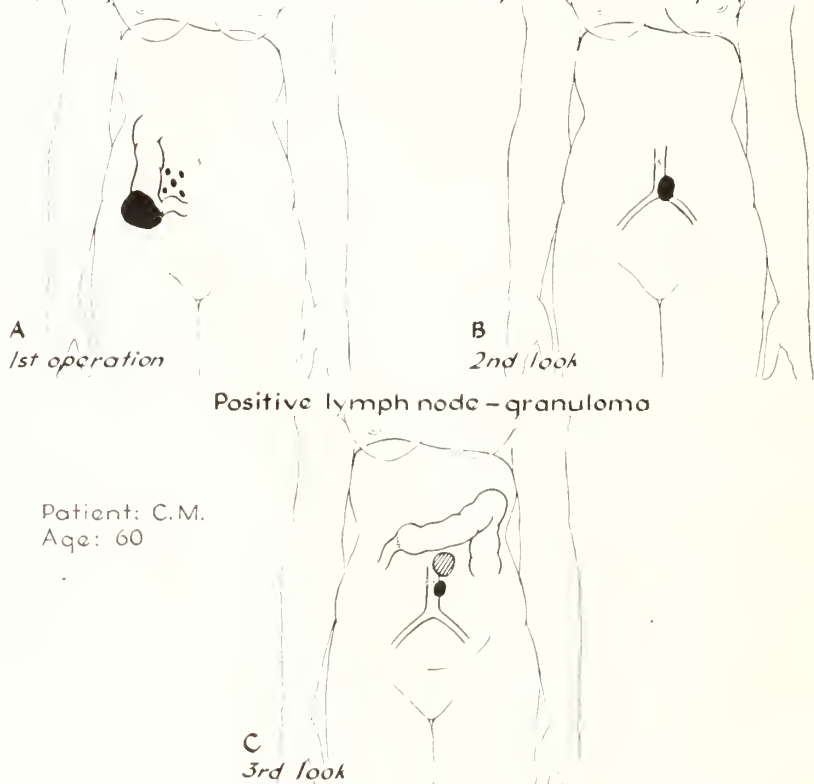


Fig. 1. A, B, C. The findings at operation in Mrs. C. M. depicted schematically.

Patient: C.M.
Age: 60

Fifth Admission: Nine months later, the patient was readmitted again and prepared for another exploration. She was again asymptomatic and there was no clinical evidence of recurrent cancer. Re-exploration was done on September 22, 1950 and several small nodules in the small bowel, mesentery and pelvis were removed. These proved to be benign. An indurated lymph node 1.5 cm. in diameter was located over the aorta and behind the duodenum. It was removed; it contained metastatic carcinoma, microscopically (Fig. 1, E.) All the tissue lateral to and overlying the vena cava and the aorta, as well as the tissue in between, was removed leaving these great vessels bare from the inferior border of the pancreas to the bifurcations of these vessels into external and internal iliac arteries and veins in the pelvis. No peritoneum was available to cover these broad aperitonealized areas at the end of the operative procedure. The recovery of the patient following this operation was without complication, and she was discharged on the sixth postoperative day.

Sixth Admission: Though the patient was occasionally discouraged during this trying series of operations, she was troubled primarily by the burden of hospital costs. She submitted to a sixth operation, five months after the fifth, on February 19, 1951. The abdomen was explored through a paramedian incision and after severance of numerous firm adhesions, similar to those found at each

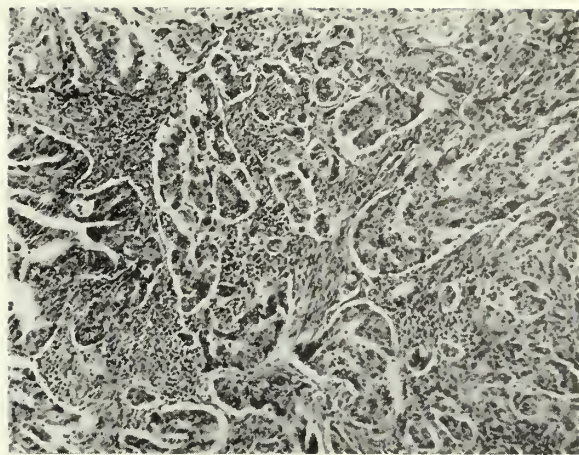


Fig. 2. Microscopic appearance of the original adenocarcinoma of the cecum removed in November 1948.

of her more recent explorations, a careful search was made again for evidence of residual cancer.

Inasmuch as at previous operations, cancer had been found in lymph node tissue along the aorta, as high as the retroperitoneal duodenum behind the pancreas, it was considered advisable to extend the dissection at this exploration to the celiac axis. All remaining fragments of

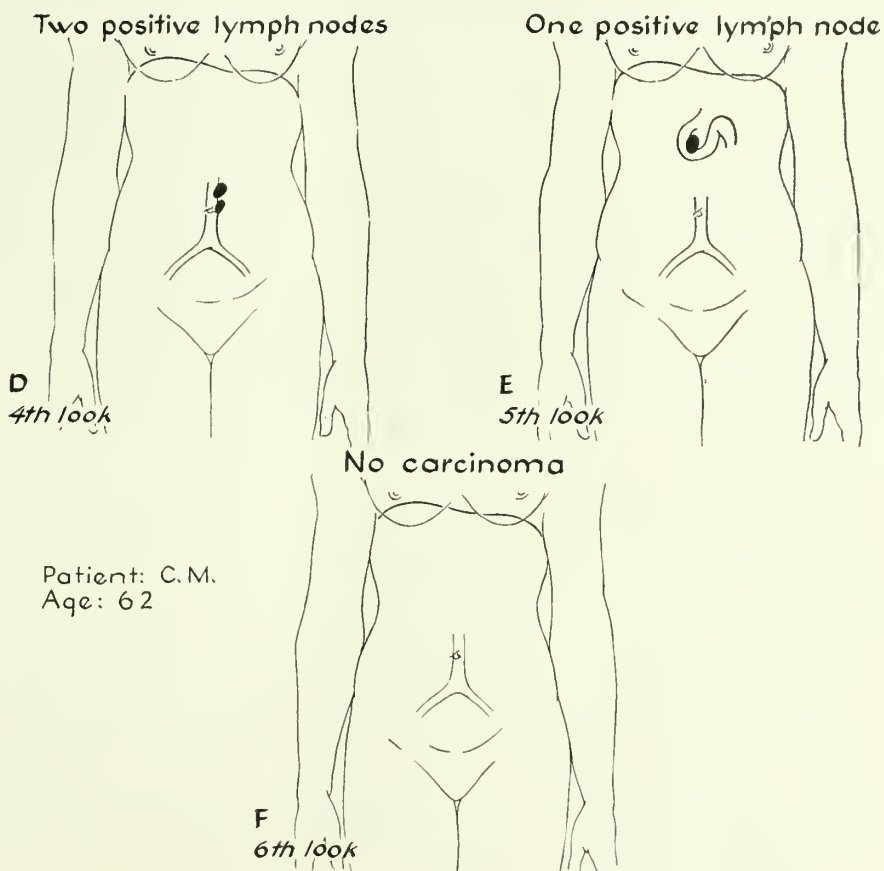


Fig. 1, D, E, F. The findings at operation in Mrs. C. M. depicted schematically.

Patient: C. M.
Age: 62

the greater omentum were removed; also the spleen and its entire pedicle, together with the entire length of the splenic artery and the adjacent lymph node bearing area. The gastrocolic omentum was removed as well as a good portion of the mesentery along the lesser curvature, of the stomach, together with the entire length of the left gastric artery. The tissue adjacent to the celiac axis was removed together with the periaortic tissue at this level. No cancer was found microscopically in any of these tissues.



Fig. 3. Invasion of a retroduodenal para-aortic lymph node with adenocarcinoma, removed at the fifth operation. No carcinoma was found at the following operation (sixth look).

COMMENTS

On her first admission, this patient who is 65 inches in height, weighed 72 kilos (165 pounds); she was obviously somewhat overweight and was instructed to try to hold her weight at approximately 140 pounds (63 kilos); the patient on the subsequent admissions weighed 64, 63, 63, 63, and 62.2 kilos. Her hemoglobin at the time of the last admission was 15 grams per cent and she looked the picture of health. Her sense of joy and relief, on being informed that microscopic studies of the removed tissues were negative for cancer, can be understood.

To have undergone six operations for cancer within a period of time less than 27 months, distinguishes this patient as having courage of a rare sort. Such fortitude excites one's admiration. Yet, such is almost invariably the response of patients to whom the proposal is made. Obviously, it is our custom to acquaint patients having cancer with the facts as they are, a practice which enlists their complete and sympathetic understanding.^{6,7} Anyone who has not observed this practice has failed to understand or experience how much patients appreciate sincerity. In fact, many surgeons express surprise that this group of patients, who look the picture of health and have no symptoms, will accept the suggestion of re-exploration without protest—all of which demonstrates the weakness of rationalization without trial.

A preliminary experience with the application of the principle of the "second-look" in lymph node positive cases suggests that involvement of the para vena cava and aorta lymph nodes in re-entry operations is usual.⁸ No surgeons, however, in the initial operation for cancer of the colon, rectum or stomach, excise regularly this secondary chain of lymph nodes, when the regional lymph nodes are involved. Latterly, in this clinic, in primary operations for cancer of the rectum when the regional lymph nodes appear to be involved, some of us have made it routine practice to excise the lymphatic tissue bearing area of all the major vessels in the pelvis, extending that incision to include the lymph node areas beside the lower reaches of the aorta and the vena cava. The experience with the "second-look" procedure for cancers of the colon, rectum and stomach suggests definitely that, at the time of the first re-entry, if the situation appears at all favorable, and detectable evidence of residual cancer is present, the para and inter vena cava aorta lymph node bearing area should be removed. Moreover, had we been aware of the importance of this suggestion, in the instance of the patient whose case history is recited herein, she might have been spared an operation or two.

It is still too early to speak with finality regarding the worthwhileness of the application of the "second-look" procedure in lymph node positive cases of visceral cancer. A preliminary experience with the method would suggest, however, that the colic cases are the most favorable. Of 17 patients with colic cancer in whom the regional excised lymph nodes exhibited gross or microscopic evidence of cancer, on the occasion of the first operation, 11 of these 17 patients are now free from cancer. If time ultimately indicates that these patients actually are cured, the observation of freedom of involvement of the lymph nodes in 64.7 per cent of the patients in subsequent operations—this circumstance obviously augurs well for the promise of the "second-look" procedure in colic cancer. For as was indicated above, the cure rate amongst lymph node positive cases of any cancer is poor.

In infraperitoneal lying cancer of the rectum with involved lymph nodes, it would appear that a "second-look" in the perineum is in order as well as a look into the peritoneal cavity. Our experience employing the principle of the "second-look" is poorest in gastric cancers exhibiting residual evidence of cancer on the occasion of the first re-entry. However, it is only within the last year that the surgeons of this clinic in operating for gastric cancer have been removing routinely the spleen and the lymph node bearing tissue about the borders of the pancreas.⁹

We have already had enough experience with "second-looks" in patients with cancer of the stomach, rectum or colon, to know that some of them on the occasion of the first re-entry will present hepatic metastases and/or other evidences of residual cancer which will make it dubiously worthwhile to continue a vigorous assault upon the cancer.⁸ Nevertheless, we have, in certain instances, been exploring the possibility of doing something for such patients too.

It is probably not out of place to remark here that the cost of hospitalization has probably been the chief concern of most patients who have had to undergo three or more periods of hospitalization. And, had it not been that a research grant had been made available to us from the Damon Runyon Fund and the Minnesota Division of the American Cancer Society to explore the thesis outlined herein, by defraying the hospital costs of the patient, it is very unlikely that we would have been able to persuade the patient to accept the final operative procedures.

Tuberculosis and infantile paralysis are regarded as disaster diseases in this country, with liberal provision for free hospitalization. The support of a venture such as this—the object of which is to determine what surgery can accomplish in repeated inspections and removal of any suspicious cancer bearing tissue in the area of the original cancer—such support is not easy to find. Established cancer organizations appear unable or reluctant to undertake the support entailed by hospitalization in such a study, suggesting broadly that the outlay of money is for service and not for research. What is research? Anything which increases knowledge or lends understanding or meaning to experience, in the judgment of some of us at least, can be interpreted as constituting research.

It may reasonably be expected that there will soon be public clamor to regard cancer, like tuberculosis and infantile paralysis, as a disaster disease. Already, in the provinces of Western Canada, provision has been made for this contingency. The medical profession, hospitals, cancer organizations and social agencies must combine their resources to ease the heavy financial burden under which the cancer sufferer suffers who needs repeated hospitalization. We cannot lend a deaf ear to their appeals for help.

While we await the solution by simpler means of the therapeutic problem posed by patients having aggressive cancer, there is yet, for most cancers, no satisfactory substitute for surgery. While we entertain sanguine hopes of a reliable biologic test for cancer, let us continue to explore the promise of the Cancer Detection Center. And, when every physician's office becomes conscious of cancer detection, a lesser number of patients will come to operation with cancerous involvement of the regional lymph nodes. While we lament the circumstance that too many patients come with late cancers, aggressive efforts must continue to be made to salvage those who come within the borders of operability. Vigorous attacks upon the cancer problem is making its influence felt. In Connecticut, it is reported, that a third of all patients diagnosed as having cancer are living five years later.¹⁰ The 10-year survival rate for cancer reported in women in Connecticut in the year 1937 is said to be 18.9 per cent; and the five-year survival rate for cancer reported in women for 1941 is 39.6 per cent.¹¹ These reports represent real accomplishment and important gains in cancer control achieved largely through the agencies of good organization and public education.

SUMMARY

The case history of a patient is recited, who presented a large cancer of the cecum and ascending colon with gross involvement of the regional lymph nodes by metastatic adenocarcinoma. During a period of less than 27 months, five additional re-entries of the abdomen were made. On each occasion, save the last, residual cancer was found. The para and inter vena cava—aorta lymph node bearing areas were the sites in which residual cancer was most frequently encountered. It is believed likely now that this patient may have been cured of an aggressive cancer.

This approach to the solution of the lymph node positive visceral cancer is distinctly experimental. It is therefore believed worthwhile to report these skirmishes in a single patient with an aggressive cancer. It remains to be determined by further exploration of the problem what per cent of patients found to have residual cancer on the occasion of the first "second-look" will eventually prove on subsequent re-entry to be free from cancer. With more experience, it is believed that the promise and the shortcomings of the method can be determined. The dauntless courage of this woman typifies the reaction of all patients to whom the principle of the "second-look" is suggested upon leaving the hospital following the first operation. We need to match that heroic spirit by steadfast perseverance in the early detection and radical eradication of cancer.

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Diagnosis of Chronic Subdural Hematoma

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SUBDURAL hematoma is a collection of fluid or solid blood between the dura mater and the pia arachnoid. If this bleeding occurs as the result of a severe head injury and is acute it is designated as acute subdural hemorrhage rather than subdural hematoma. In acute subdural hemorrhage there is often severe brain damage, and the overall prognosis is relatively poor, as shown by Munro¹ and by Voris,² as compared with chronic forms.

Chronic subdural hematoma may be solid, fluid or mixed, and the fluid may be dark or straw colored (hematohygroma). Much has been written concerning this disorder, a summary of which was prepared by Groff and Grant³ in 1942. Since 1914 it has been thought that trauma is the most common cause of chronic subdural hematoma. Voris² mentions 100 cases, of which 96 had a definite history of head injury. Table I lists 292 reported cases with a history of injury present 221 times. Baker⁴ has written about other causes: neoplasm, inflammation, intracranial aneurysm, systemic disease, blood dyscrasia or arteriosclerosis, and the table shows that 80 per cent of the cases he reports did not have trauma as a cause. The possible occurrence of a mild injury, so slight as to be judged insignificant by the patient or other informants, must at least be considered as a possible cause in those patients where no other etiology is apparent.

The pathogenesis of chronic subdural hematoma explains the fact that the clinical symptoms and abnormal physical signs often occur weeks or months after the head injury. Gardner,⁵ in 1932, demonstrated that the tissues surrounding the high protein containing constituents of the hematoma act as a semipermeable membrane which permits spinal fluid to enter the hematoma, thus gradually increasing its size.

From a clinical standpoint patients having chronic subdural hematoma may be divided into two important groups; those with a history of cranial trauma and those without a history of injury. Only Munro and Baker have adequately emphasized the importance of the group of patients without a history of head injury. In the series reported by Voris, in which 96 of 100 individuals had a definite history of injury, the clinical diagnosis could be made with ease and the correct treatment performed immediately. In an industrial or urban practice where there is often a high incidence of head trauma, diagnosis may not be difficult. In rural districts where definite injury to the head is less frequent this is not true, and further discussion is needed concerning this general group of patients.

The "syndrome of chronic subdural hematoma" so often described in textbooks and papers consists of: (a) history of head injury, often followed by (b) a "latent interval" during which there are few if any symptoms and abnormal physical signs, (c) gradually increasing headache, (d) alterations in consciousness, (e) focal signs such as unilateral pupillary dilatation and hemiplegia, and at times (f) choked discs. The only item which differentiates this "syndrome" from that produced by any expanding intracranial mass is the history of head injury. If the optic discs are not choked and the history is negative for head injury, these signs may be produced by almost any serious intracranial pathology. Table II shows that a correct diagnosis of chronic subdural hematoma was made 24 times and was not made in 21 (47 per cent) of the last 45 cases seen at University Hospitals. Among the incorrect diagnoses were brain tumor, cerebral vascular accident, hydrocephalus, multiple sclerosis and expanding intracranial mass of an undetermined type. Five patients had a post mortem examination, without an antemortem operative procedure, and subdural hematoma was found. The two adults in this group were diagnosed cerebral arteriosclerosis and cerebral thrombosis. Twenty-four patients had a history of head injury, and in this group a correct diagnosis was made in 20 instances (83 per cent). All of these had exploratory procedures which revealed the collection of blood. In the group of 21 patients without any known trauma the correct diagnosis was not made in any instance. In 16, an operative exploration exposed the hematoma. Obviously, the group without a definitive diagnosis of chronic subdural hematoma needed surgical therapy as much as that in which the diagnosis was correctly made. The number of patients in the former category emphasizes the fact that one cannot rely on the "subdural hematoma syndrome" as the only indication for doing necessary exploratory trephines and ventriculo-

TABLE I

Etiology of Chronic Subdural Hematoma in 292 Cases

	Traumatic	Spontaneous	Total
Kunkel and Dandy ⁶	31	17	48
Voris ²	96	4	100
Baker ⁴	6	25	31
Grant ⁷	14	2	16
Abbott ⁸	16		16
Coblentz ⁹	12	2	14
Gardner ⁵	22		22
Millikan	24	21	45
	221	71	292

*Assistant professor of neurology, State University of Iowa, Iowa City, Iowa.

TABLE II

No.	Sex	Age	Injury	Headache	Focal Signs	Choked Discs	Change in Consciousness	Cranial Nerve Palsies	Cerebro-spinal fluid	Clinical Diagnosis
1	M	41	+	+	+	+	○	+	155	BT
2	M	53	○	○	+	○	○	○	135	MS
3	M	66	○	+	+	○	+	○	80	BT or Sub
4	M	35	+	+	○	+	○	○	215	Sub
5	M	15	○	+	+	+	○	○		BT
6	M	66	○	○	+	○	+	○	170	BT
7	M	3	+	+	○	○	+	+		Sub
8	M	NB	?birth	?	○	○	○	○		Enteritis
9	M	NB	?birth	?						?
10	M	68	○	○	+	+	+	○	350	BT
11	M	44	+	○	+	○	+	+		Sub
12	M	56	○	+	+	+	○	○	244	BT
13	M	52	○	+	○	○	+	○		?Sub
14	M	8mo.	+	○	+	○	+	○		Sub
15	M	43	+	+	+	○	+	○	250	Sub
16	M	72	+	+	○	○	+	○		Sub
17	F	49	○	+	+	+	+	○	290	BT
18	M	66	○	+	○	○	+	○	130	Stroke
19	M	14	○	+	○	+	+	+	400	Sub
20	M	44	+	+	○	+	○	+	280	Mass ?type
21	M	5mo.	○	○	○	○	○	○		Hydrocephalus
22	M	43	○	+	+	○	○	○	175	BT
23	M	63	○	+	+	○	+	○	50	BT
24	M	57	○	+	+	○	+	○	215	BT
25	M	50	+	○	+	○	+	○		Sub
26	M	62	+	+	+	○	+	○	180	BT or Sub
27	M	NB	○	○	○	○	○	○		Feeding problem
28	M	35	+	+	○	+	○	○	235	Sub
29	M	66	+	+	+	+	+	○	300	Sub
30	M	40	○	+	○	+	+	○	300	?
31	M	67	+	+	○	○	+	+	220	Sub
32	F	4mo.	+	○	○	+	+	○		?Sub
33	M	63	+	+	+	○	+	○		Sub
34	M	58	+	○	+	○	+	○	150	Sub
35	M	69	○	○	+	○	+	○	35	Stroke
36	M	49	○	+	+	○	+	○	180	Sub
37	M	60	○	+	○	+	○	+	140	Sub
38	M	38	+	+	+	○	+	○	170	Sub
39	F	36	+	+	○	○	○	○	150	Sub
40	M	65	+	+	+	○	+	○	75	Sub
41	M	53	○	+	○	○	○	○	210	BT
42	M	7	○	+	○	+	○	○		BT
43	M	46	+	+	○	○	+	○	260	Sub
44	F	59	+	+	+	○	+	○	120	?Vascular or Sub
45	M	68	+	+	+	○	+	○	100	Sub

NB = Newborn
 BT = Brain tumor
 Sub = Subdural hematoma

grams. The following three case histories are examples typical of those patients who had no known head injury.

CASE HISTORIES

Case 1. W. W., a 66 year old white man, was admitted to the University Hospitals on November 27, 1941 in a stuporous condition, unable to answer questions. The history was obtained from his wife.

Social, family and past histories were essentially negative. The patient had been well until about one year before admission when he began having headaches of three or four days' duration two or three times a month, although he was able to continue working. One week before admission he again complained of headache, which, however, seemed no different from

any of the others that he had had. The headache was frontal, bilateral and not accompanied by digestive disturbance. The day before admission the patient felt normal except for the headache which was unchanged. At 4:00 A.M. of the morning of admission he awakened and complained of a more severe headache and was given a sleeping pill by his wife. He had no nausea, vomiting, difficulty with speech or focal signs and went back to sleep in a few minutes. He awakened again at 6:30 A.M. complaining of a very severe headache and pressed his head with his hands. He was able to get up, walked normally and went downstairs to breakfast where he ate poorly but complained of nothing except headache. He continued complaining of pain during the morning and by noon he began to become progressively less responsive. By 5:00 P.M. he did not respond when questioned.

The physical examination at the time of admission revealed the following positive signs: Minimal response to stimuli, blood pressure 175/120, arteriosclerosis of the peripheral vessels and arteriosclerosis changes in the eye grounds.

The tentative impression was cerebral vascular accident. Members of the department of neurosurgery saw the patient and agreed with this impression.

X-rays of the skull and chest showed no evidence of bony disease or injury or of soft tissue involvement. The urine contained one plus albumin but was otherwise normal; the blood counts were normal and the spinal fluid cell count was 4 cells per cubic millimeter, protein 40 mg. per cent and serology was negative. The spinal fluid pressure was 130 mm. of water.

Discussion

A positive diagnosis of subdural hematoma could not be made in this instance. The basic question was the need or absence of need for a surgical procedure. In retrospect the history of headache off and on for a year with severe headache for several hours before alteration of the state of consciousness should have indicated the possible presence of an expanding intracranial mass and ventriculographic studies should have been done.

Case 2: E. B., a 59 year old man, was first admitted to the medical service of the University Hospitals in April, 1941, at which time he complained of vomiting off and on for one year on change of position and dizziness with partial deafness for six months. At that time the physical examination was essentially negative except for a 50 per cent decrease in hearing in the left ear. A diagnosis of Menière's syndrome and acoustic neuritis was made and consultations with the departments of otolaryngology and neurology confirmed this impression. The patient was given ammonium chloride and a low salt diet and discharged from the hospital.

The second admission to the hospital was late in 1943 at which time he complained of intermittent dizzy spells. One month before examination, while walking up a flight of steps, he suddenly fell over backwards but without suffering unconsciousness or serious injury. He was unable to explain this attack and said that he did not vomit or become dizzy. He was able to get up and walk without help and had no other complaints at that time. Several days later he noticed nausea and dizziness and was told, after an unknown period of time, that he had been "out of his head" for a week. The details of this episode were not available.

Physical examination revealed the following positive signs: air conduction 100/20, air conduction greater than bone conduction on the right, but bone conduction greater than air conduction on the left, alternate motion rate of the hands 85/100 and of the legs 85/100, biceps jerk 2—3+/2+, knee jerks 3—4+/2+, Achilles tendon 3+/2+ and plantars 0/flexion.

The clinical impression was arteriosclerosis, cerebral with multiple small vascular accidents and Menière's syndrome.

The patient was again placed on ammonium chloride with a low salt intake and in addition aminophyllin grains 3, three times a day was prescribed.

In September, 1944, the patient was seen by members of the department of otolaryngology who recorded that because of a fall in which he had broken several ribs he had been hospitalized elsewhere during the summer of that year. Attacks of vertigo continued at irregular intervals.

In March, 1945, the patient again entered the hospital with a history of another fall which he said resulted in a cut over his right eyebrow and generalized head trauma. He had been hospitalized elsewhere for nineteen days before admission at University Hospitals.

On May 7, 1947, the patient was admitted to the University Hospitals for the last time. He was confused and disoriented. The history was obtained from his wife who stated that he had been in fairly good health until three weeks before the admission when he suddenly became confused, disoriented and incontinent. He had poor use of the left arm at that time.

Physical examination at the time of this admission revealed the following positive signs: disorientation and confusion, poor use of the arms and legs, increased tone of all four extremities, biceps jerk 2+/3+, knee jerks 2+/2+, Achilles tendons 2+/2+ and plantar reflexes flexion/occasional extension.

The clinical impression was cerebral arteriosclerosis with multiple cerebral vascular accidents.

The urine contained 2 plus albumin and a small number of red blood cells. Blood examination revealed 10 grams of hemoglobin per cu. mm., 4 million red blood cells per cu. mm., and 16,000 white blood cells per cu. mm. The blood serology was negative. The spinal fluid was clear, contained 5 cells per cu. mm., a total protein of 48 mg. per cent and the blood creatinine was 1.8 mg. per cent. The blood serum protein totaled 7.6 grams per cent while the albumin was 3.9 grams per cent and the globulin was 3.7 grams per cent. The blood chloride was 550 mg. per cent and the carbon dioxide combining power was 44 volumes per 100 cc. X-rays of the chest revealed nothing unusual and an electrocardiogram showed a complete right bundle branch block.

The patient remained confused and disoriented. The rectal temperatures revealed a moderate elevation during most of the patient's hospital stay. On May 16, 1947, the patient vomited a number of times, rapidly became comatose and died.

Post mortem examination revealed massive bilateral subdural hematomas with secondary infection. There was also severe cerebral arteriosclerosis with small multiple vascular accidents.

Discussion

The history of repeated moderately severe head injuries, which is not uncommon in patients with arteriosclerosis and alcoholism, was not given adequate consideration in this instance. The pathologist was unable to make a statement concerning the exact duration of the subdural hematomas but believed that they had been present for six months or more. The absence of headache during the patient's last illness made the problem even more difficult. With such a history of repeated head injuries, the physician simply must consider subdural hematoma in the differential diagnosis. Trephines and ventriculograms can ordinarily be done with ease if there seems to be any possible indication for them.

Case 3. M. N., a 53 year old white man, was admitted to the neurology service at the University Hospitals on April 11, 1947, complaining of poor use of his legs and extreme urgency of the bowels and bladder with slight pain between the shoulder blades, all of two weeks' duration.

The history revealed that the patient had been in a stationary car which was struck gently from behind on November 7, 1946, at which time the patient received no known injuries. No complaints appeared until the first week in January, 1947, when there was some stiffness and soreness between the shoulder blades and some difficulty in walking. The legs refused to track properly. On January 10, 1947, there was sudden onset of urgency and later incontinence. There was no trouble in the upper extremities and the history concerning cranial nerve function was negative. The patient had no headache, nausea, vomiting or dizziness.

Physical examination revealed the following positive signs: pupillary light reaction 75/75, finger-nose test 1—2+ hesitant with occasional missing on the left, heel-to-knee test 1+ ataxic bilaterally, knee jerks 2+/2+, biceps jerks 2+/2+, Achilles jerks 1+/1+ and Babinski positive/positive, ataxic gait with tendency to deviate to the right and impairment of pallesthesia, two-point discrimination and sense of position on both lower extremities.

The clinical diagnosis was multiple sclerosis.

Examination of the urine, blood and spinal fluid showed nothing unusual. The spinal fluid pressure was 135 mm. of water. X-rays showed a hypertrophic arthritis of the cervical spine with an old dislocation of the fifth and sixth cervical vertebra as

well as hypertrophic arthritis of the dorsal spine. X-rays of the skull showed displacement of the pineal gland to the left suggesting an expanding mass on the right.

Members of the department of neurosurgery agreed with the latter diagnosis and performed a surgical exploration which revealed a large subdural hematoma covering the right cerebral cortex and containing approximately 200 cc. of clotted blood and bloody fluid. This was evacuated following which the patient made an uneventful recovery, with return of normal neurologic functions to all extremities and loss of the complaints which caused him to seek medical aid.

Discussion

The demonstration of a definite displacement of the pineal gland, which made possible the diagnosis of an intracranial expanding mass, was a fortunate occurrence for this patient as no symptoms or signs had been elicited which pointed toward the correct diagnosis. The discovery of a lesion requiring surgical treatment could easily have been missed. This case demonstrates the extreme variation which may occur in the clinical picture produced by a chronic subdural hematoma.

GENERAL DISCUSSION

Without a history of trauma there is no syndrome of subdural hematoma and there are no physical signs which point unequivocally to this diagnosis. The physical signs enumerated in table II are only evidence of neurological

dysfunction and do not differentiate one type of pathology from another. Encephalitis, neurosyphilis, brain tumor and cerebral hemorrhage can produce any one or all of these signs.

It is more important to make an accurate decision concerning the need for additional diagnostic procedures, that is, trephine openings and ventriculography, than to make a bedside differentiation between various types of intracranial pathology. Only in this way will it be possible to avoid repetition of the five errors listed above in which the subdural hematoma was discovered at post mortem examination.

The greatest aid in making this decision is careful observation of the patient. An increase in the severity of focal signs, evidence of rising intracranial pressure, the gradual development of stupor with alteration of the temperature, pulse and blood pressure are singly or collectively evidence of progressive intracranial disease. These phenomena constitute an indication (in the absence of encephalitis, blood dyscrasias, primary neoplasm elsewhere in the body or other serious systemic disease) for neurosurgical intervention. The risk from such a method of management is slight and only by following such an approach can fatal errors be eliminated.

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DR. EDGAR GORDON TO GIVE JOURNAL-LANCET LECTURE

DR. EDGAR S. GORDON, associate professor of medicine at the University of Wisconsin Medical School, will deliver the JOURNAL-LANCET lecture for 1951-52 on the evening of Wednesday, October 17, 1951, on the campus of the University of Minnesota. The subject of his lecture has not yet been given, but will be announced in the September issue of THE JOURNAL-LANCET.

Dr. Gordon is well known for his research in the field of bio-chemistry and has for many years held a joint academic position in the departments of bio-chemistry and clinical medicine at Wisconsin. He has been active in the use of radio-isotopes in the diagnosis and treatment of thyroid disorders and other clinical conditions and has made many contributions in the field of adrenal physiology.

Diurnal Rhythmic Changes in Blood Eosinophil Levels in Health and in Certain Diseases*

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THE normal animal body is a complex heterogeneous physical chemical system in a steady state of unstable equilibrium. One speaks frequently of certain characteristics as remaining constant during health. Actually there are probably no really constant quantities in living organisms. The systolic blood pressure, for example, oscillates between extremes under the regulatory influences of the pressor and depressor reflexes. The blood sugar level is not constant but also fluctuates under the influence of antagonistic factors tending to raise or to lower it, respectively. Many other such examples could be cited.

The numbers of the various formed elements in the circulating blood are also not constant. Because of an interest in the possible functional activity of the hyperplastic and metaplastic adrenal cortex in castrate mice we began a study of the levels of circulating eosinophils in mouse blood. It was noted quite unexpectedly that in normal mice there is a pronounced diurnal rhythm in eosinophil levels.¹ The minimum level occurs around the midnight hours and the maximum at mid morning. The mouse is a nocturnal animal and the period of maximum activity has been shown to be at about midnight.²

It is known that the level of circulating eosinophils can be influenced by various factors. In intact animals of numerous species epinephrine is known³ to produce an eosinopenia with some regularity, although the regularity is imperfect. Likewise pituitary adrenocorticotrophic hormone³ causes eosinopenia so long as the adrenal glands are present, and cortisone does the same even in adrenalectomized animals.³ The more intimate causes of eosinophilia are less well known. It is, for example, surprising that neither adrenalectomy nor Addison's disease are associated with abnormally high eosinophil counts.⁴ Apparently the adrenal hormones are not essential to the maintenance of low levels of these cells in the blood although certain of the hormones act to lower the level. Other mechanisms are also obviously controlling under certain circumstances.

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In general there can be no doubt that the absolute number of circulating eosinophils is a quantity which depends upon two rates: (a) the rate of addition of such cells to the blood and (b) the rate at which they are removed. Cells are added to the blood either from storage reservoirs or from the formative organs. Cells are removed either into storage or by destruction. In view of the rapid rate of leucocyte turnover in the body it is not unlikely that formation and destruction rates are the major controlling factors in determining the level.

Since cortisone and cortisone-like substances have such dramatic effects upon eosinophil levels it is likely that they influence the rate, either of the formation, or of the destruction of eosinophils. Furthermore, since there are wide fluctuations, from 21 to 168° per cubic millimeter in mean eosinophil counts as between midnight and morning in one strain of mice,⁵ it is at once obvious that there are large swings in the output or removal of these cells, and correspondingly important shifts in the controlling factors. If these controlling factors are the adrenal cortical hormones, studies of the diurnal rhythm in eosinophil levels might yield important information about the output of such hormones.

Consequently studies were undertaken of eosinophil levels in normal and pathological human subjects. Some of the observations are reported in this paper. The first question to be answered is whether or not there is a diurnal rhythm in eosinophil level in the normal human under conditions of limited and unlimited activity. The second is whether the rhythm may be absent or altered in disease. A search of the literature has shown six reports bearing on the question. Three^{6,7,8} indicate a regular and statistically significant decline in circulating eosinophils in the human between 7 and 10 A.M. A fourth⁹ confirms the morning decrease and was the first to present data for variations over an entire twenty-four hour period in four subjects. The other two^{10,11} made observations over short periods of the day at times when regular rhythms are not prominent.

MATERIALS AND METHODS

Since the diurnal variations which might occur in eosinophil count might be related to any one or several of numerous variables, observations were made of some which might prove to be of importance. Two groups of subjects were used for the studies on presumably normal

TABLE I
Individuals Composing the Two Normal Groups

Group 1* (Controlled "normal" environment, limited activity)	No.	Age	Wt., Lbs.	Ht., Ins.	Profession
	11	21-25	147-194	66-76	Medical students
Group 2 (Random conditions, unlimited activity)	No.	Age	Wt., Lbs.	Ht., Ins.	Profession
	6	22-32	131-213	68-73	Graduate students & staff

*The authors are indebted to the following members of the Phi Chi fraternity volunteering as subjects: R. Borreson, B. Clark, J. Huff, V. Kuhlman, G. Merkel, A. Nisswandt, J. Norquist, M. Robbins, C. Schabacker, J. Trautmann, L. Wood.

men. Table I indicates their composition. The Group 1 subjects were controlled in their activity from the evening before the tests began and during the two days of the study they left the fraternity house only to obtain their meals, served at 08:30, 13:00 and 17:30 at the special diet room of the Student Health Service, a distance of about one-fifth mile. The basic diets served were 115 gm. protein, 140 gm. fat and 275 gm. carbohydrate per day. Additional food eaten between meals

TABLE II
Total Caloric Intake of Group 1

Subject	Age in Years	Height	Wt., Lbs.	Calories 3/2/51	Calories 3/3/51	Calories 3/4/51
1	23	5' 9½"	185	2823	2847	2784
2	21	6' 5 "	180	3319	4201	3399
3	24	5' 6 "	147	3576	5649	3952
4	22	5'11 "	170	3008	3330	3013
5	25	5'11½"	165	2825	2852	Withdrew
6	22	5'11½"	194	2730	3507	3464
7	22	6' 1 "	155	3050	3885	3852
8	23	5'11½"	172	4236	3994	3964
9	25	5'10 "	173	2907	3478	No record
10	22	6' 3¾"	185	3288	3689	3770
11	25	5' 9 "	148	2843	3191	3202

was recorded and calorie content noted. The daily caloric intake for each subject in Group 1 is shown in Table II.

On the two days of the study, the hours from 07:30 to 23:30, with the exception of mealtimes, were used for study or sedentary recreation. There was neither sleep

nor strenuous physical exertion during that time. The hours from 23:30 to 07:30 were spent sleeping in a large, well-ventilated dormitory. Room temperature and relative humidity readings were taken in the center of the dormitory during the night and in a representative study room during the waking hours. These data were recorded at the time of collection of each blood sample. An hourly record was made of outdoor temperature, relative humidity, barometric pressure, and weather conditions for the entire three-day period.

Each of the six subjects in the uncontrolled group (Group 2 in Table I) was responsible for certain duties according to the plan of the investigation. The preparation of equipment, the collection and storage of samples, the counting of eosinophils, and the recording of data, in addition to the many trips which had to be made outside between the laboratory and the fraternity house, required most of their time. None of the six slept from 04:00 on the first day of the study to 02:00 on the following day. The average amount of sleep from 02:00 of the second day to 06:30, when the last samples were taken from the uncontrolled group, was one and a half hours. The food intake of the subjects in the uncontrolled group was not recorded.

Sixteen of the seventeen individuals had readily accessible veins. The time required for the withdrawal of blood was in the range of ten to twenty seconds for the majority of the collections. Dried sterile syringes and new 20 gauge needles were used. Stasis of the venous blood was minimized by release and reapplication of the tourniquet whenever the first attempt at venipuncture failed. Immediately after withdrawal, the blood was transferred to a sterile tube containing dry balanced oxalate. The blood and dry oxalate were mixed at once by shaking. After collection, the blood samples were refrigerated and kept at 10° C. until completion of the eosinophil counts and hemoglobin determinations. All blood samples from the controlled group, with the exception of the 12:30 sample on the second day, were withdrawn by the same individual. Samples collected

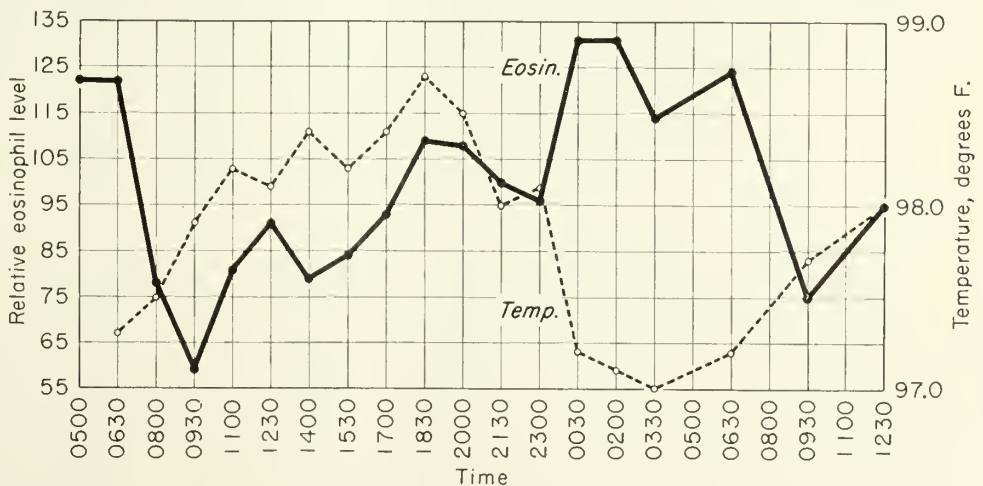


Fig. 1. Mean relative eosinophil levels in Group 1 normals compared with mean oral temperatures.

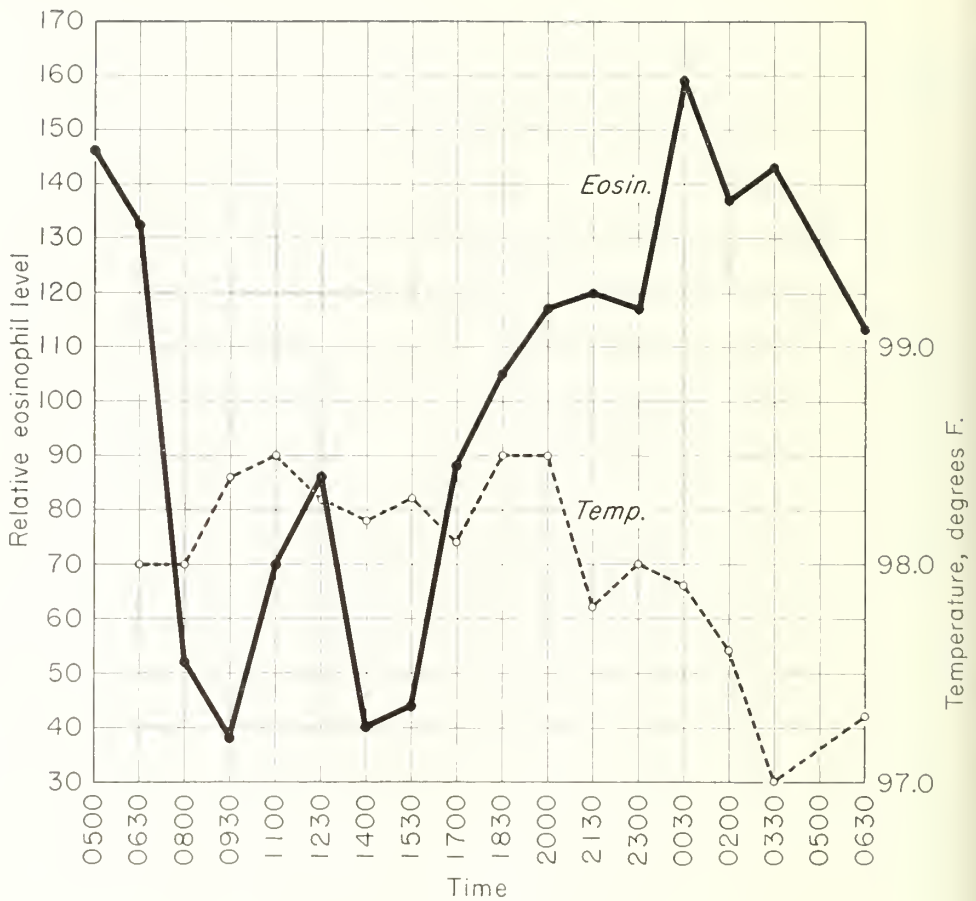


Fig. 2. Mean relative eosinophil levels in Group 2 normals compared with mean oral temperatures.

during the waking hours were withdrawn with the subject in a sitting posture. Samples collected from the controlled group from 00:30 to 06:30 were withdrawn from the subject in bed with minimal disturbance of sleep. Dormitory lights were not turned on; flashlights were used during the venipunctures.

Samples of blood were collected at intervals of an hour and a half from the beginning of the study at 05:00 until 02:00 on the following day. Additional samples were withdrawn on the second day at 06:30

from all of the subjects and at 09:30, 12:30, 14:00 and 18:30 from Group 1. One of the students withdrew on the second day of the study after the 06:30 sample was collected.

Oral temperatures were recorded to the nearest 0.1° F. at the time of blood sample collections, using one clinical thermometer for each subject.

Numbers of eosinophil blood cells were determined by the direct staining method. The same pipette was used for the dilution of all blood samples. Levy chambers

TABLE III
Clinical Findings in Addisonian Patients Studied

Patient	Univ. of Minn. Hospital No.	Age	Sex	Duration	Weakness and Fatigability	Weight Loss	Pigmentation	Gastrointestinal	Coma or Fainting	Irritability	Previous Tuberculosis	Muscle Pain or Stiffness	Crisis	Lowest Systolic Blood Pressure	Pigmentation Skin and Mucosa	Heart Size Cardio-Thoracic Ratio	Calcification of Adrenals	Tuberculin Test
E.H.	796183	30	F	4	+	+	+	+	0	+	+	+	0	70	+	Small*	+	+
O.T.	772701	51	M	5	+	+	+	+	+	+	+	+	+	80	+	.38	0	+
J.N.	769910	40	M	5	+	+	+	+	0	+	+	0	0	80	+	.36	0	+
C.K.	797733	44	F	3	+	+	+	+	+	+	+	0	+	70	+	.36	0	0

*Measurements not recorded.

with Fuchs-Rosenthal double ruling were used. Four chambers were counted for each sample. All eosinophil counts were done by the same individual. Every blood sample was examined for clots but none was found.

The counting of eosinophils was begun at 15:00 on the first day of the study. Five of the refrigerated samples withdrawn at 05:00 from the controlled group were picked at random and counted. The samples obtained from the same five students at 06:30 were counted next. Counting of the eosinophils in the samples in the order of their withdrawal was continued until 04:30 on the second day of the study. At that time eosinophil data were available over the entire 24 hour period. They were rechecked by duplicate counts immediately following the period of investigation.

Mean relative eosinophil levels were calculated in the following manner: All values obtained for a given subject from 05:00 on the first day to 03:30 on the second day of the study were added and their mean computed. All individual values for this same subject were expressed as per cent of this 24 hour mean. Therefore they are

referred to as "relative eosinophil levels." These relative values were then averaged separately for each collection from Group 1 and Group 2 in order to obtain the "mean relative eosinophil levels" for the respective groups.

The pathological subjects employed for study were seven in number. The more important clinical findings in the patients with Addison's disease are shown in Table III. One patient, C.P., had been bilaterally adrenalectomized for malignant hypertension four months before study. This patient had been maintained on 12.5 mg. cortisone daily but had been off therapy for 36 hours before study. Two patients with hypopituitarism, due in one to a chromophobe adenoma of the hypophysis (T.S.) and in the other to a craniopharyngioma (H.L.) were also studied. H.L. had surgery in December, 1940 and T.S. had surgery immediately following this investigation. In both cases the diagnosis was confirmed by tissue examination. No patients in this study received therapy during the period of observation.

TABLE IV
Absolute Venous Blood Eosinophil Levels in 17 Normal Males (eosinophils/cu. mm.)

Subject	Hour										
	0500	0630	0800	0930	1100	1230	1400	1530	1700	1830	2000
1	469	457	244	87	112	150	119	162	150	67	231
2	150	144	167	125	200	225	200	200	262	250	181
3	494	557	369	350	219	425	556	219	381	481	750
4	275	237	391	200	331	325	268	312	290	550	331
5	256	212	44	81	150	94	100	150	181	194	200
6	552	544	456	237	450	475	331	450	531	494	581
7	262	400	194	212	344	406	312	262	369	400	381
8	381	444	287	312	394	375	325	469	367	475	419
9	437	344	219	131	162	200	169	181	150	225	287
10	875	962	650	625	656	681	612	600	550	750	769
11	333	363	100	87	150	231	156	206	250	306	137
12	250	356	100	81	187	125	112	119	206	200	200
13	237	394	131	100	219	200	116	100	231	256	225
14	344	325	194	150	212	256	100	167	225	325	419
15	344	344	238	175	275	362	112	200	356	319	456
16	122	100	25	6	31	112	25	25	75	112	44
17	475	206	50	50	50	62	56	19	87	125	256

Subject	Hour										
	2130	2300	0030	0200	0330	0630	0930	1230	1400	1830	....
1	175	194	269	450	306	375	100	244	100	181	....
2	162	231	256	206	144	150	225	175	225	187	....
3	462	394	400	537	469	600	262	462	431	300	....
4	331	181	400	244	331	237	331	219	231	362	....
5	75	119	275	319	225	331		Withdrew			
6	482	544	769	587	506	562	450	612	493	462	....
7	450	231	550	562	525	569	244	331	331	262	....
8	356	507	693	569	481	675	375	394	507	468	....
9	356	219	281	312	287	325	100	212	287	331	....
10	550	863	612	750	750	731	583	593	1030	718	....
11	387	325	344	262	306	137	137	250	131	162	....
12	267	350	487	287	256	238	....	....	....	....	....
13	244	237	337	250	437	262	....	....	....	....	....
14	194	125	331	419	319	225	....	....	....	....	....
15	387	281	325	406	444	312	....	....	....	....	....
16	181	162	256	150	131	194	....	....	....	....	....
17	162	219	225	212	244	112	....	....	....	....	....

RESULTS

A. Normal Subjects

The absolute values for circulating eosinophils in 17 normal male subjects over time are shown in Table IV. Inspection of the data shows that there are sizeable fluctuations in the case of each individual with a tendency for the 09:30 levels to be the lowest in most but not all cases. When the data are averaged as shown in Table V for the two days for subjects 1-11, constituting Group 1 and subjects 12-17, or Group 2, for the hours 06:30 and 09:30, it will be seen that in all three cases the latter

TABLE V

Average Eosinophil Levels During the Morning Hours for the Controlled and Uncontrolled Groups

Group	Day of Experiment		Ave. \pm Eosinophils/cu.mm.	
	Number		0630	0930
1. Controlled	1	11	424	222
1. Controlled	2	10	436	281
2. Uncontrolled	1	6	287	93

TABLE VI

Statistical Significance of the Difference Between the 06:30 and 09:30 Levels in Circulating Eosinophils in the Controlled and Uncontrolled Groups

Group	Day of Experiment	No.	Difference (Eos./cu.mm.)	t.	Pt.
1. Controlled	2	10	155	2.987	.016
2. Uncontrolled	1	6	194	6.235	.002

TABLE VII

Average Absolute Eosinophil Levels for Periods of "Day" and "Night" Hours

Period of Time	Group	
	1. Controlled	2. Uncontrolled
0030-0630	438	287
0800-2300	322	174

values are much lower than the former. Table VI presents the statistical treatment of these data. It will be seen that the probability that the result could be due to

TABLE VIII

Oral Temperature ($^{\circ}$ F.) for the Controlled and Uncontrolled Group

Subject	Hour									
	0630	0800	0930	1100	1230	1400	1530	1700	1830	2000
1	97.3	97.8	98.6	98.2	98.2	98.4	98.4	99.1	98.7	99.1
2	96.3	96.0	95.7	97.2	97.1	98.0	97.2	97.5	97.7	98.0
3	96.9	97.2	97.6	98.2	98.2	98.6	98.9	98.9	99.2	98.5
4	97.5	97.9	98.0	98.2	98.4	98.8	98.1	98.0	99.0	98.6
5	97.8	97.9	98.4	98.4	98.4	98.7	98.4	98.7	99.0	98.8
6	97.5	98.3	98.2	98.6	98.4	98.6	98.6	98.6	98.8	98.6
7	97.2	96.4	97.6	98.0	98.2	97.4	98.0	98.2	98.4	98.3
8	98.0	98.9	98.2	98.4	98.2	98.8	98.4	98.4	98.6	98.0
9	98.0	98.3	98.4	98.4	98.6	98.7	98.6	98.1	99.6	98.8
10	96.9	96.8	98.4	98.2	98.4	...	98.6	98.7	98.8	98.3
11	97.1	96.8	97.3	96.8	97.3	98.2	97.3	97.3	98.5	98.5
12	98.0	98.1	98.5	...	98.0	98.0	98.0	97.7	97.5	97.4
13	97.6	96.8	...	97.6	97.3	97.2	97.0	98.2	98.2	98.4
14	97.9	97.5	...	98.0	...	97.4	98.6	98.5	98.1	99.0
15	98.0	98.8	98.8	99.2	99.2	98.6	99.0	98.7	99.2	98.6
16	98.1	98.2	97.1	98.5	98.0	98.9	98.5	97.6	98.7	98.7
17	98.6	98.7	99.0	99.3	99.1	99.2	98.8	97.9	99.2	99.0

Subject	Hour									
	2130	2300	0030	0200	0330	0630	0930	1230	1400	1830
1	98.5	98.5	97.2	97.2	97.0	97.5	98.1	98.6	98.5	98.6
2	97.6	97.8	96.7	97.0	96.8	97.0	96.7	97.0	97.1	98.0
3	98.6	98.6	97.2	96.7	97.0	97.2	98.1	98.2	98.6	99.2
4	98.5	98.6	97.3	97.6	97.6	97.4	97.8	98.0	99.0	99.0
5	98.2	98.5	97.9	97.3	97.0	97.0		withdrew		
6	96.1	97.6	97.0	96.8	97.0	96.8	98.4	98.6	98.4	99.6
7	98.2	98.0	97.0	97.2	97.2	97.4	97.4	98.2	97.8	97.8
8	98.0	98.0	97.0	96.9	96.9	97.2	98.2	98.6	99.0	99.0
9	98.2	98.1	97.8	97.4	97.7	97.8	97.4	98.2	99.0	98.4
10	98.4	98.5	96.6	97.2	96.6	97.0	97.3	98.6	98.6	98.6
11	98.2	97.2	97.2	96.6	96.7	97.1	97.2	96.4	98.1	98.4
12	96.6	96.4	97.2	97.2	96.9	97.0				
13	97.7	97.5	97.6	98.0	96.6	97.8				
14	97.4	98.0	97.9	97.6	96.9	97.6				
15	98.5	98.6	98.1	97.2	97.4	97.0				
16	98.7	98.7	98.0	97.8	96.2	96.4				
17	97.6	98.6	98.6	97.7	98.2	98.1				

TABLE IX

Comparison of Average Oral Temperatures at Corresponding Times of the Two Days of Study of Group 1

Time	Mean Oral Temperatures (° F.)			
	Number	First Day	Number	Second Day
06:30	11	97.3	11	97.2
09:30	11	97.9	10	97.7
12:30	11	98.1	10	98.0
14:00	11	98.4	10	98.4
18:30	11	98.7	10	98.7

random sampling error is always less than 2 per cent and may be as low as 0.1 per cent. Thus the mean difference between the two times is established under both "controlled" and "uncontrolled" conditions as to food intake, physical activity and sleep.

A comparison of "Day" and "Night" hours for Groups 1 and 2 shows a smaller but suggestive difference in meal values in both cases, as seen in Table VII.

The oral temperature values for all subjects are shown in Table VIII. The means at five times for Group 1 are shown in Table IX for the two days of study. It will be noted that the daily fluctuations are very similar for the two days of study.

The possibility that the diurnal body temperature rhythm may be related to the eosinophil rhythm is explored in Figures 1 and 2 where the two sets of values are plotted together for Groups 1 and 2 respectively. It will be seen that although in general when the oral temperatures are low the eosinophils are high this negative correlation is not high over the entire period. This correlation is higher in the "controlled" than in the "uncontrolled" subjects.

Other variables noted were the barometric pressure, the room and outside temperatures and the relative humidity. The only variable showing an apparent correlation is the room temperature. However, since the low

temperature periods coincided with sleep periods a causal connection need not be indicated. The relationship between these variables is shown in Figure 3.

If the eosinophil levels are studied in relation to meal times it will be seen that no regular relationship appears.

B. Pathological Subjects

Data on eight hospitalized patients with various disorders related to the adrenal cortex and/or pituitary are presented in Table X. In the group of patients with Addison's disease it will be seen that there is no early morning high level of eosinophils. The fluctuations are small at any time in most subjects. The same tendency for constancy is seen in the patient bilaterally adrenalectomized for treatment of hypertension, and in the two hypopituitary cases. The generally lower level of eosinophils in the last group may be a random coincidence. Further studies will be needed to elucidate this and other questions. The only point which it is believed is proven by these observations is that in severe adrenal cortical hypofunction the regular diurnal rhythm seen in normal subjects, especially the 06:30 to 09:30 fall, is not evident.

In order to compare the results in the normal subjects of Group 1 with those in the patients with adrenal deficiency Figure 4 is presented. It will be evident on inspection that while there is a 50 per cent drop from 06:30 to 09:30 in the mean relative eosinophil levels in the normal, there is a negligibly small rise in the adrenal insufficiency group.

DISCUSSION

The presence of a marked diurnal eosinophil level rhythm in normal subjects, and its absence in extreme adrenal cortical hypofunction, are facts which are consonant with the hypothesis that the adrenal cortex plays a part in the normal rhythm. It would seem, furthermore, that the magnitude and time relations of the eosinophil rhythm might be found to provide indices of ad-

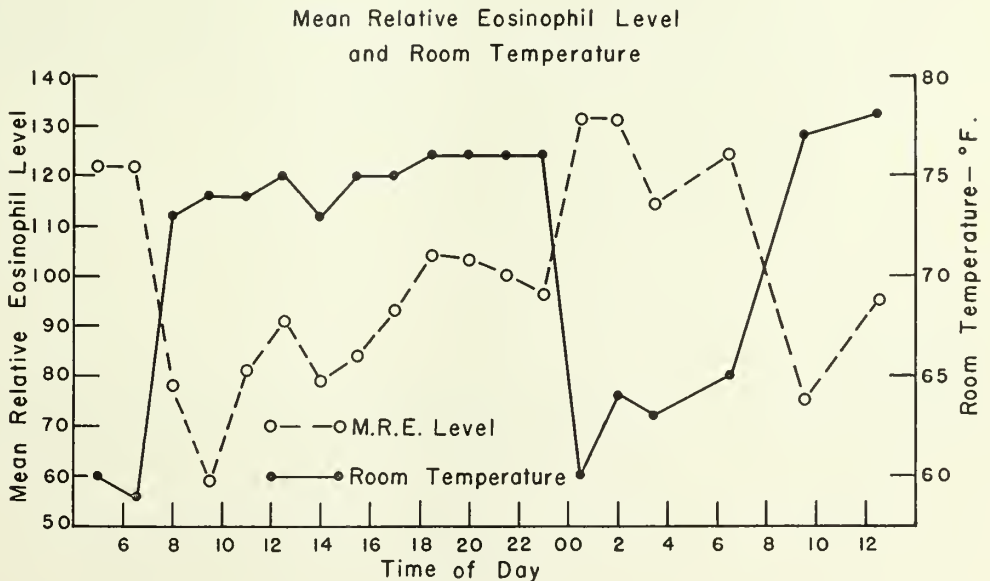


Fig. 3. Room temperature and mean relative eosinophil levels in Group 1 subjects.

TABLE X
Eosinophils in Circulating Venous Blood in Pathological Subjects

Patient	Diagnosis	Eosinophils/Cu. Mm.															
		0030	0220	0350	0500	0630	0800	0930	1100	1230	1415	1535	1700	1830	2000	2130	2300
E.H.	Addison's	256	231	262	279	279	236	282	219	241	226	261	284	254	242	224	283
C.K.	Addison's	256	159	275	244	272	253	325	278	163	247	250	375	241	197	288	175
J.N.	Addison's	581	544	566	597	420	442	442	522	341	516	491	381	453	362	516	487
O.T.	Addison's	297	384	356	284	250	303	294	319	234	282	191	175	275	247	209	206
Average	Addison's	348	330	365	351	305	309	336	335	245	318	298	304	306	262	309	288
C.P.	Bilateral Adrenalectomy	375	486	506	453	444	594	444	491	541	672	613	594	584	531	528	578
H.L.	Hypo-Pituitarism	253	244	269	209	194	222	238	228	218	163	156	213	203	206	166	141
T.S.	"	128	144	128	91	112	94	115	75	115	106	53	100	106	90	109	87
Overall Average		307	313	337	308	282	306	306	305	265	316	288	303	302	268	291	280

renal function equal or superior to tests now in use. The morning drop, characteristic of normals and absent in Addison's patients, is easy to investigate and if shown to be lacking in a larger series of Addisonians may prove to be a valuable aid to diagnosis. However, since the morning drop is also probably absent in hypopituitarism and perhaps in other disease states it is at present impossible to say how precise a diagnostic tool it will turn out to be.

As regards the physiology of the normal subject it is

believed that the data herein reported present proof that in the push-pull type of steady state mechanism governing the eosinophil level there are fairly regular changes either in the output or removal rates for eosinophils during the course of the day. The absence of similar changes in eosinophil level in adrenal insufficiency implicates the adrenal cortical hormones in some aspect of the control mechanism. How these hormones affect the output or removal, or both, of eosinophils in this rhythm awaits further study.

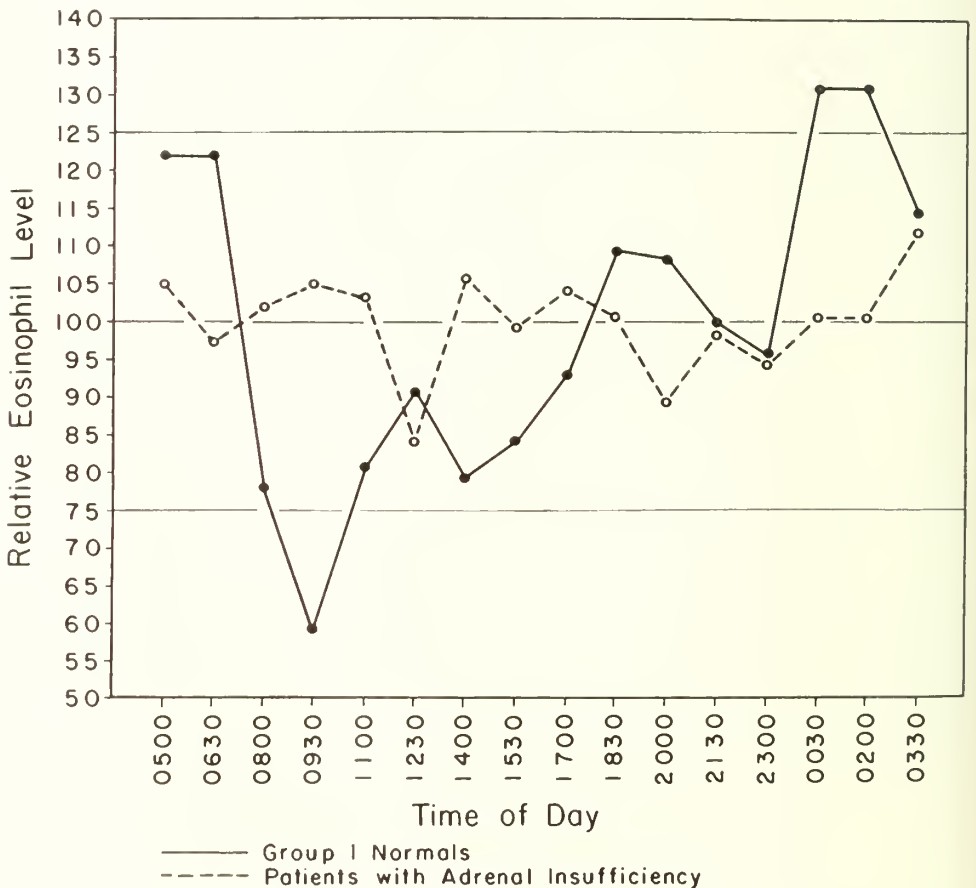


Fig. 4. Comparison of mean relative eosinophil levels in normal subjects and patients with adrenal insufficiency.

CONCLUSIONS

1. In normal adult human males under conditions of either limited or unlimited activity and diet there is a regular diurnal rhythm in eosinophil level in circulating venous blood.

2. There is an average morning drop in eosinophils from 06:30 to 09:30 from 430 to 251 per cu. mm. in "controlled" subjects.

3. There is a rough inverse relation between oral temperature and eosinophil level in controlled subjects but the correlation is not sufficiently regular to encourage the belief that there are direct causal interrelations.

4. Patients with Addison's disease, bilateral adrenalectomy and hypopituitarism have failed to show the normal diurnal eosinophil rhythm. It is pointed out that diagnostic use may perhaps be made of this characteristic.

5. These observations indicate that the adrenal cortical hormones play a part in eosinophil level fluctuations in the normal subject and that studies of the magnitude and time of eosinophil level swings may contribute to knowledge about the dynamics of endocrine function.

6. The general theory of homeostatic mechanisms in eosinophil stability and lability has been discussed.

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QUININE

Therapeutically considered, quinine is certainly one of our most valuable remedies, not only from its positive, but also from its negative virtues; for while other medicines of equal power and value are often harmful and destructive in their character, I think we may justly class quinine among the most harmless and safe of our remedies. It is a *remedy*, and not a *poison*; and while opium and mercury have killed many, and destroyed the constitutions of more, I can find no case where quinine has produced lasting harmful results. Not but that it may be injudiciously used, especially in acute diseases, but that, on the whole, there is less danger in its use than in any other remedy of equal power. It is very unfortunate that there exists such a strong prejudice against it in the popular mind, many persons being unwilling to take it, and its beneficial effects being lessened in the case of others by their suspicions of its injurious nature. It is difficult to account for such a popular delusion; but we know that many confound cause and effect in cases of long continued ague, accompanied with the use of quinine, and that a large proportion of the community, including well educated professional men, are so grossly ignorant of its character as to suppose it a preparation of mercury or opium. We can only wait and hope that this and kindred delusions will be dissipated by time, and a greater enlightenment of those who have a *moderate* stock of common sense on topics *disconnected* with medicine. Although there is no disease in which quinine acts so favorably and surely as in malarial fevers, there is no doubt of its value in a vast number of affections.

Northwestern Medical and Surgical Journal (The Journal-Lancet) 1870.

A Heart Muscle Extract in the Treatment of Cardiovascular Diseases*

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THE beneficial results obtained with hormonal therapy in several clinical conditions led to a search for a hormone which might be of value in cardiac diseases. Extracts were prepared from cardiac and skeletal muscles, venous blood, liver and pancreas and their effect tested upon cardiac action and blood pressure. Numerous reports dealing with the effects of these various tissue extracts on the cardiovascular system appeared at first chiefly in the European literature,¹⁻⁵ but in recent years in the literature of both continents.⁶⁻¹²

It is not within the scope of this paper to discuss in detail the various chemical and physiological studies that have led to the clinical use of these substances. Herein we wish to report our clinical experiences with a substance derived from purified heart muscle extract.†

MATERIAL

Fifty-eight cardiac patients were used as subjects for this study. Thirteen were studied in the hospital alone, 13 in the hospital and later in the cardiac out-patient clinic, and 32 in the clinic alone. These patients demonstrated the following conditions:

Cardiac decompensation (24 cases)

The patients in this group complained of dyspnea and presented dependent edema, pulmonary congestion (basilar rales), orthopnea and, in most instances, hepatomegaly. Twelve of the group were diagnosed as arteriosclerotic heart disease, four as arteriosclerotic-hypertensive heart disease, five as hypertensive cardiovascular disease, and one each as rheumatic heart disease, luetic heart disease and cor pulmonale.

Angina pectoris (19 cases)

This diagnosis of these cases was based on the presence of precordial pain aggravated by exertion and emotional tension and relieved in most cases by rest or glyceryl trinitrate. In one case the pain occurred while the patient was at rest, but was eased by glyceryl trinitrate. All of these patients were followed in the out-patient clinic and in most cases had received previous therapy in an attempt to control the anginal pain.

Hypertension without decompensation (10 cases)

This group was observed for changes in symptoms due to hypertension (dizziness, headaches, throbbing, visual disturbances) and for changes in blood pressure.

*From the Department of Therapeutics (Dr. Frederick Steigmann, Director) and the Cardiac Out-Patient Clinic of the Cook County Hospital, Chicago, Illinois.

†This extract, with the trade name of Myocardone, was furnished by Chemico Laboratories, Inc., Indianapolis, Indiana.

Compensated arteriosclerotic heart disease (5 cases)

These patients had compensated on routine cardiac management. Maintenance of the compensated state was attempted with the drug tested.

DIAGNOSTIC AND THERAPEUTIC PROCEDURE

All patients were subjected to a comprehensive history and physical examination. In addition, complete laboratory studies were made including urinalysis, blood count, determination of the blood non-protein nitrogen and other chemical tests when indicated such as sugar, chlorides, sodium, serum albumin and globulin. When the patient first entered the hospital electrocardiographic tracings were made and an x-ray of the chest was taken. During the course of observation, many of the above tests, particularly urinalyses and electrocardiograph tracings, were repeated.

Heart muscle extract was given in tablet form, each tablet containing $\frac{3}{4}$ grain. The dose varied from six to 14 tablets per day and in three instances 18, 20 and 25 tablets, respectively, were given. The majority of the patients received 12 tablets. The next largest group received nine tablets and three patients only received six tablets per day.

After preliminary clinical and laboratory tests of each patient, the preparation was given, replacing the medication previously prescribed. In some cases it replaced digitalis, and in cases of angina it replaced nitroglycerin.

The hospital patients received the extract in place of the usual digitalization dose of digitalis. Sometimes, especially when there was much edema, a mercurial diuretic was also given. Mercurial diuretics are frequently used to supplement digitalis. The patients, who were observed in the cardiac out-patient clinic, received the drug to replace their maintenance dose of either digitalis, or nitroglycerin or as a supplement to decrease the need of larger doses of nitroglycerin. Some of these patients, who had received a mercurial diuretic in conjunction with digitalis at weekly or bi-monthly intervals, were continued on a similar regime, except for replacing the digitalis with the extract.

All together 24 patients were on heart muscle extract alone; 20 received a mercurial diuretic in addition, 14 were given the extract and a daily dose of digitalis, and nine took the drug and nitroglycerin intermittently.

As an additional control measure, 14 clinic patients who did well on the preparation were given placebos (tablets looking exactly like Myocardone) without the patient being told that any change was made in his medication.

CRITERIA FOR IMPROVEMENT

In the anginal cases the following criteria were used as indications of improvement: decreased number and severity of attacks, increased capacity for exercise, general feeling of well-being and decreased need for nitroglycerin tablets. In patients with cardiac decompensation decrease in orthopnea, dyspnea, cyanosis, pulmonary congestion and general feeling of well-being were taken as signs of improvement.

RESULTS

The results of this study are presented in Table I. Of the 24 decompensated cases with various types of heart disease, ten showed moderate and two definite improvement, while 12 showed slight or no improvement. Of the 19 patients with angina pectoris, ten showed definite and three moderate improvement, while six had little or no results. Of the patients with hypertension, six of the ten enjoyed relief of the distressing symptoms when taking Myocardone, even though little change in blood pressure occurred. Three of the compensated ar-

teriosclerotics maintained compensation with the extract alone and two did not.

Seven patients of the decompensated group died during the period of observation, only two of whom were receiving Myocardone. One died four days after admission following an apparent good response to therapy with definite improvement of the edema and pulmonary congestion and one patient died within 24 hours after admission. Four died while on a digitalis mercurhydrin regimen, and one while in a stage of compensation without any treatment.

All patients tolerated the drug well. Heart muscle extract does not seem to cause any of the gastrointestinal disturbances or pulse changes which frequently occur when large doses of digitalis are administered. Although nine tablets of the extract were sufficient to maintain beneficial response in many cases, as many as 25 tablets were taken repeatedly without any signs of local irritation or systemic disturbances. One patient complained of anorexia, another of mild nausea, and another developed erythema nodosum during the course of therapy.

TABLE I

	No. of Cases	Degree of Improvement		
		None to Slight	Mod-erate*	Defi-nite**
I. Angina (Includes 2 rheumatic heart disease with pain who did not improve)	19	6	3	10
II. Hypertensive without decompensation (elevated blood pressure, headaches, dizziness)	10	4	2	4
III. Arteriosclerotic compensated	5***	—	—	—
IV. Decompensation				
Arteriosclerotic heart disease	12	6	5	1
Hypertensive heart disease	5	5	—	—
Arteriosclerotic hypertensive heart disease	4	—	4	—
Rheumatic heart disease	1	—	—	1
Luetic heart disease	1	—	1	—
Cor Pulmonale	1	1	—	—

*Moderate Improvement

In decompensation—Relief of symptoms but addition of mercurials or other medication needed (except digitalis).

In angina—Improved exercise tolerance, decreased need of nitroglycerin tablets.

**Definite Improvement

In decompensation—Became compensated. Edema disappeared or reduced to trace, minimal exertional dyspnea or no orthopnea.

In angina—Less than half the degree and frequency of attacks. Definite improvement in exercise tolerance. Less than half the number of nitroglycerin needed previously.

***These cases were tested for maintenance of compensation. Three maintained compensation on Myocardone alone and two did not maintain compensation.

PLACEBO CONTROL

As an additional control measure to determine whether the beneficial response which was observed in the patients taking Myocardone was due specifically to the pharmacodynamic action of the product or to such measures as improved diet or bed rest, 14 of the patients who showed marked improvement with extract were given placebos. They were not told that the effective medication was being withdrawn or that any change in their therapeutic regime was being instituted. The placebo tablets were identical in appearance with the Myocardone.

Our preliminary observations suggest the possibility that the beneficial response to the drug continues for considerable periods after cessation of the medication. This finding was first suggested by several cardiologists who studied the effects of the drug in their private patients.

In our investigations, the patients whose response to the extract was satisfactory continued to do well from two weeks to several months after the drug was withheld. After it was stopped for periods which varied with each patient, a few showed recurrence of symptoms, in three of whom (angina cases) placebo administration gave no relief but in whom symptoms promptly disappeared when administration of the drug was reinstated.

COMMENTS

The evaluation of the efficiency of a drug in the therapy of cardiac conditions is subject to many hazards. In the hospital cases the effect of hospitalization with its attendant bed rest, routine hygienic care, diet and fluid regulation is equally and sometimes more effective than the medication itself. In the out-patient clinic the somewhat greater personal attention given to subjects under special study may also be of therapeutic value. Nevertheless, observation of many of the patients for several months before inclusion in this study and comparison of their present general course with their previous one and

with those of many others on routine management, give some idea of the efficacy of a tested substance.

In evaluating the results, the above-mentioned factors as well as the spontaneous natural variations of the cardiac diseases, particularly angina pectoris, were kept in mind. A strict standard was used in measuring the results, and it seems evident that the extract has definite therapeutic value in various cardiac conditions but especially in cases with angina pectoris.

The fact that this substance may replace or supplement digitalis in some patients, as in several who were compensated and maintained on the extract, is important because it offers us a drug for use in those patients in whom digitalis is contraindicated or not well tolerated. Similarly the replacement of nitroglycerin by the new drug or at least the decrease in the number of nitroglycerin tablets needed is also important because not infrequently the use of many tablets of nitroglycerin per day is associated with untoward symptoms. In some patients with angina we believe the Myocardone could completely replace nitroglycerin and in others the need for it was decreased to less than half of the previous amount.

One of the patients studied died suddenly while apparently doing well shortly after being placed on placebo, suggesting that the feeling of euphoria led the patient to more activity and may thus have resulted in an acute coronary occlusion and death. However, this death as well as the others which occurred during the course of the study may have been the result of the natural course of the disease.

The observations dating back to over one year have shown the new substance to be unusually free of side effects, except for the few minor instances discussed above.

The 14 patients who received placebos, of whom ten were in the angina group, had shown definite improvement with the extract. Seven of these patients had shown definite improvement when the drug was given but relapsed when it was temporarily discontinued. However, later in the course, after it had been administered for a longer period, the therapy was again interrupted but the patients remained symptom-free for periods up

to several months. Placebos given during this period had no demonstrable effect. These patients followed the general pattern of such cases who had shown definite relief of anginal pain, suffered recurrence when the drug was stopped and improved when the preparation was given again. With increasing improvement they remained well not only when placebos replaced Myocardone, but also when all medication was discontinued. In three patients in whom symptoms consistently recurred after the drug was withdrawn, administration of placebos did not alter the course of the disease, although there was an immediate improvement when the extract was started again. The patients did not know that there was any change in therapy but complained of recurrence of symptoms when placebo tablets were supplied. For instance, a patient who received relief from anginal symptoms, suffered a definite relapse when placebos were administered for 28 days and again improved when the drug was given. He was never aware of any change in medication.

SUMMARY

The therapeutic efficacy of heart muscle extract was tested during the past year on a series of 58 patients with various types of heart disease.

A good response was obtained in about two-thirds of the cases with angina pectoris. About half of the patients with other types of heart disease showed various degrees of improvement but less striking than the angular cases.

Improvement consisted of increased capacity for exertion, decrease or disappearance of symptoms requiring nitroglycerin in the anginal cases, and in disappearance of orthopnea, pulmonary congestion and edema in the decompensated cases.

There were virtually no side effects. One patient complained of anorexia, and one of mild nausea.

The results would seem to indicate that the drug may replace or supplement digitalis and nitroglycerin in some patients with cardiac conditions. These observations would seem to justify further use and evaluation of Myocardone in cardiac disease, especially angina pectoris.

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Electroconvulsive Therapy in Psychoses Complicated by Cardiovascular Disease

With Report of a Fatality

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UNTIL recently, many patients who would have benefited from ECT have been excluded from treatment because of the presence of cardiac disease. It was thought that patients with such lesions would not tolerate the strain of induced convulsions. Although, at first glance, it would appear that convulsions might aggravate cardiac damage it should be recalled that this is rarely observed in epileptics.

The literature concerning the cardiovascular system in relation to ECT is relatively scanty. The reports^{1,5,6,7,8,12,15} which have appeared may be summarized as follows: Transient disturbances of rate and rhythm are fairly common. These are explained on the basis of increased vagotonia or ectopic contractions of atrial or ventricular origin. Electrocardiographic studies have shown elevated P waves, depressed ST segments and slight increase in PR interval. The changes in P waves and ST segments are thought by some to be produced by transient dilatation of the right atrium and overloading of the right ventricle. Presumably, the prolongation of the PR interval results from delayed auriculoventricular and intraventricular conductivity because of increased vagotonia and also anoxia. One report¹⁵ suggests "the muscular activity" incident to the convulsion as the cause of some of the ECG changes. Consequent to the muscular straining which accompanies the seizure there is a transitory increase in venous pressure. This remains elevated even after the convulsion has terminated. Most authors believe that slight myocardial changes may be caused by apnea and anoxemia. Observations on blood pressure have revealed moderate elevations of the systolic but only slight rise in the diastolic pressure. However, one group¹⁵ reports that there is no change or a lowering of the systolic pressure in about two-thirds of their patients.

FATALITIES

Fatalities following ECT are rare. The exact death rate is difficult to determine since all cases may not have been reported, autopsy data are not always available, and the relationship of ECT to some of the reported deaths is obscure. Kalinowsky¹ reported on more than 2,000 cases without a fatality. Other authors give death rates varying from 0.06 per cent to 0.8 per cent. In a review of 33 fatalities reported in the English and American literature, Will et al⁴ found that 26 were apparently

related to the treatment. Of these 12 were due to cardiac failure, two to respiratory failure, and two others to cardiac or respiratory failure. Two others died in status epilepticus and eight of complications initiated by the treatment. Recently, Eymann and Morris¹⁷ reported three deaths associated with ECT. Two of these were cardiovascular deaths: one occurred in a 34-year-old male with mitral disease and a history of cardiac decompensation. At autopsy a myocardial infarct approximately two weeks old was found. The first treatment had been given eight days before death. The second fatality occurred in a 54-year-old male who showed no clinical evidence of cardiac disease except for a "borderline" ECG. Coronary occlusion and myocardial fibrosis were noted at autopsy.

CARDIAC RISK

Cases of cardiovascular deaths following ECT have been reported in which the history, physical findings and ECG were not indicative of cardiac disease. On the other hand, patients with serious cardiac damage have tolerated the therapy well. The cardiac conditions which contraindicate ECT are not clearly defined because of a lack of knowledge regarding methods of preventing untoward reactions. Most authorities agree that each case should be considered individually, weighing possible psychiatric recovery against possible aggravation of existing cardiac disease. Kalinowsky and Hoch¹ mention only aortic aneurysm as an absolute contraindication. They regard myocardial disease, coronary artery disease and angina as only relative contraindications since many patients with such conditions have successfully tolerated the therapy. Hypertension, rather than being a contraindication, is often considered as an indication since the emotional disturbance is frequently a contributing factor to the elevated blood pressure. They conclude that acute cardiovascular embarrassment occurs occasionally during therapeutic convulsions but believe that there is no evidence that this can ever be predicted or that pre-existing cardiac disorders have any bearing on such occurrences.

Most authors consider acute myocardial infarction and aortic aneurysm as absolute contraindication. However, Harris, quoted by Hejtmancik et al,⁸ has successfully treated two patients—one with each of these conditions. Williams and Barrera¹³ also consider congestive heart failure as a definite contraindication—at least, until cardiac compensation has been restored. Moore⁹ reported on the treatment of 238 patients with cardiac disorders with only one fatality. Evans¹⁰ treated 38 patients with

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TABLE I
Patients with Valvular Heart Disease

Patient	Clinical Findings	ECG	Chest Plate	No. of ECT
No. 1, 28, female	Mitral stenosis Aortic insufficiency Auricular fibrillation History of decompensation	Abnormal	Cardiac enlargement	33
No. 2, 38, male	Aortic insufficiency ? Mitral stenosis Auricular fibrillation	Abnormal	Cardiac enlargement	5
No. 3, 73, male	Aortic stenosis Aortic regurgitation	Abnormal	Cardiac enlargement	11
No. 4, 49, female	Mitral stenosis Mitral insufficiency Auricular fibrillation History of decompensation	Abnormal	Cardiac enlargement	2*

*Expired following the second ECT.

TABLE II
Patients with Hypertension and/or Hypertensive Heart Disease

Patient	Clinical Findings	ECG	Chest Plate	No. of ECT
No. 5, 50, male	Left vent. enlargement Diastolic above 95	Abnormal	Left vent. enlargement	13
No. 6, 53, male	Left vent. enlargement Diastolic above 100 Ankle edema	Normal	Left vent. enlargement	6
No. 7, 59, male	Diastolic above 94	Abnormal	Left vent. enlargement Inactive Tbc	7
No. 8, 56, male	Left vent. enlargement Diastolic above 100 Aortic murmur	Normal	Left vent. enlargement Aortic ectasia	4
No. 9, 69, female	Left vent. enlargement Apical systolic murmur Ankle edema	Abnormal	Left vent. enlargement Aortic dilatation	15*
No. 10, 76, male	Hypertension Left vent. enlargement	Abnormal	Cardiac enlargement	8
No. 11, 71, male	History of angina Labile blood pressure	Normal	Left vent. enlargement Aortic ectasia	19
No. 12, 46, female	Hypertension Left vent. enlargement	Abnormal	Cardiac enlargement	9
No. 13, 60, female	Hypertension "Stroke" 2 years ago with residual left hyper-reflexia	Abnormal	Left vent. enlargement	8

*This case should more correctly be diagnosed arteriosclerotic-hypertensive heart disease.

TABLE III
Patient with Coronary Artery Disease

Patient	Clinical Findings	ECG	Chest Plate	No. of ECT
No. 14, 49, male	No positive physical findings. B.P. 130/80	Abnormal	Negative	3*

*Developed an acute anterior infarction following the third treatment. Recovered under medical management.

cardiac disease, five of whom had auricular fibrillation. Only one death occurred. Strauss¹¹ reported three cases, one with calcifying pericarditis, which developed no complications. A group at the University of Texasⁿ recently reported on the treatment of 26 patients with clinical or electrocardiographic evidence of heart disease without fatality. A more recent publication by this group¹² on the anticipation and prevention of complications in ECT includes 30 patients with clinical and electrocardiographic evidence of heart disease who successfully tolerated treatment. They have used large doses of atropine (gr. 1/50 to 1/30) to prevent cardiac arrhythmias and reduce the severity of post-convulsive apnea and cyanosis. These authors also suggest the administration of oxygen after the convulsion and the judicious use of quinidine, digitalis, aminophylline and other supportive measures.

From the above discussion it is evident that the decision as to the advisability of treating the psychiatric patient who has cardiac disease will require cooperation between the internist and the psychiatrist. The internist's role is to evaluate the severity of the cardiac disease, to estimate the risk and recommend safeguarding procedures. It is unfair to expect the internist to make the decision as to whether or not ECT should be given, as this is the psychiatrist's responsibility. The psychiatrist is more familiar with the probable course of the emotional illness; he is in a better position for example, to gauge the risk of physical exhaustion against possible aggravation of cardiac damage in a severely excited patient or to balance the suicidal risk with the cardiac risk in a depressed patient. In brief, he is in a better position to weigh the various factors concerned.

CASE MATERIAL

During the past 3½ years the question of cardiac risk arose in 23 cases treated with ECT at the University of Minnesota Hospitals. Nine of these cases are excluded from this report since in four there was no clear evidence of cardiac disease after careful investigation, and five others had only abnormal ECG findings. The remaining 14 have been divided into three groups: (1) four cases with valvular heart disease; (2) nine cases with hypertension and/or hypertensive heart disease and (3) one case with coronary artery disease. Tables I, II and III list the pertinent clinical, ECG and x-ray findings of these three groups. Some of these cases were reported in an earlier publication.¹⁸

COMPLICATIONS

In our series, one patient (case 10) developed an arrhythmia after the eighth treatment; another suffered an acute coronary thrombosis (case 14) following the third treatment; and one patient expired following the second treatment (case 4).

ILLUSTRATIVE CASE REPORTS

Case 1: Catatonic schizophrenia in a patient with rheumatic heart disease and auricular fibrillation. This 28-year-old female was suffering from catatonic schizophrenia complicated by rheumatic heart disease. She had had rheumatic fever at age 18 and several subsequent episodes of cardiac decompensation, three or four of which had occurred during the preceding year.

The psychosis had been present for seven months prior to admission. ECT had been withheld elsewhere because of the cardiac disease. On the other hand, her psychosis prevented her cooperation in cardiac management. She refused to take digitoxin and did not follow the prescribed diet. Examination revealed the heart enlarged to the left with conus enlargement, apical diastolic thrill, systolic murmur heard best at the apex, a diastolic rumble at the apex, and auricular fibrillation. The liver was enlarged two fingerbreadths below the costal margin. Blood pressure was 104/50. ECG showed auricular fibrillation, depression and sagging of the ST segments in all limb leads, CF₂ and CF₄, and diphasic T waves in CF₂ and CF₄. X-ray and fluoroscopic examination of the chest revealed marked enlargement of the heart. Circulation time was 5½ seconds and venous pressure was 11 cm. Sedimentation rate was 28; urinalysis was negative. Hemoglobin was 14.1; WBC was 15,400. Two weeks after admission she developed a fever which lasted four days. Subacute bacterial endocarditis was suspected but extensive laboratory investigation failed to confirm this.

The cardiologist made a diagnosis of rheumatic heart disease with aortic regurgitation, mitral stenosis and regurgitation and auricular fibrillation. He considered her a "very poor risk" for ECT. On the other hand, her psychosis interfered with cardiac management. After careful discussion with the family, consent was obtained for treatment. Certain precautions were taken: she was continued on digitoxin (parenterally when necessary) and given atropine (gr. 1/150) and curare prior to each treatment. She received ten seizures all of which were tolerated well. There was no change in the auricular fibrillation and no marked variation in pulse rate. The post-convulsive cyanosis seemed somewhat more marked than usual and for this reason she was given oxygen through a BLB mask after each treatment. Unfortunately, no ECG was obtained after completion of the series of treatment. The psychiatric result was fair. She showed marked improvement in her behavior and cooperated in cardiac management. She was discharged home to the care of her family, though some paranoid trends remained. She was readmitted 14 months later because of a recurrence of her delusional symptoms. Her cardiac status was essentially unchanged. She received 23 more ECT with some improvement in her psychosis. One week after her discharge she was committed to a state hospital where she showed improvement (without further ECT) and was discharged after five months.

Case 14: Acute coronary thrombosis following ECT. This 49-year-old male was admitted to the hospital because of depressive symptoms which had been present for four years. He had been hospitalized at a private hospital shortly after the onset of his depression and had received 12 ECT with some improvement. He had been receiving male sex hormones until about six months before his admission. Past health had been good and system inventory was negative except for a thyroidectomy performed some twenty years previously. Physical examination was essentially negative. Blood pressure on two occasions was 130/80 and 95/55. X-ray of the chest was negative except for scoliosis of the spine. ECG three days after admission showed low voltage limb leads, changes in the ST segments and T waves which were suggestive of coronary insufficiency. Repeat ECGs one and two weeks later revealed prolonged PR interval and first degree heart block. The cardiologist made a diagnosis of asymptomatic coronary artery disease and indicated that the patient was an increased risk for ECT but believed the patient could tolerate it. Treatment was instituted three weeks after admission. He received atropine (gr. 1/100) prior to each treatment. Following the third treatment the patient complained of a dull aching pain in the precordium and left upper arm. An ECG taken immediately after the third treatment showed findings which were consistent with an acute anterior infarction. He was transferred to the medical service for treatment. He was discharged seven weeks later as recovered. While on the medical service additional workup indicated that the patient had hypothyroidism. Followup visit in the cardiac clinic six weeks after discharge indicated that the patient was getting on well.

Case 4: Fatality: Involuntary melancholia in a patient with rheumatic heart disease. This 49-year-old female had suffered from several episodes of cardiac decompensation during the preceding ten years. Though there was no history of rheumatic

fever, she had the signs of typical mitral heart disease with auricular fibrillation. For the ten months prior to admission she had been suffering from a psychosis of gradually increasing severity. The disorder was characterized by obsessive thoughts of an obscene nature, agitation and depression. Her agitation was so marked that it precipitated several episodes of cardiac decompensation during this time.

Examination revealed the heart enlarged both to the left and right. The rhythm was that of auricular fibrillation and the rate was 100-110. Systolic murmurs were audible at the apex and base. A diastolic murmur and thrill were present at the apex. The chest x-ray revealed "marked generalized enlargement of the heart, especially in the left atrium, with enlargement of the pulmonary artery segment and root shadows. Slight pulmonary congestion was also noted." Electrocardiogram showed a rate of 75 with auricular fibrillation. There was slight slurring of the QRS in the limb leads. Depressed and sagging ST in leads 1, 2, 3, and CF_a. Urinalysis on two occasions revealed 1+ albuminuria, occasional RBC and hyaline casts. Fasting blood sugar was 86. Hemoglobin, 15.2; WBC 7,600 with a normal differential. The cardiologist made a diagnosis of rheumatic heart disease with mitral stenosis and insufficiency, auricular fibrillation and cardiac enlargement. He considered her a "fair risk for ECT."

The decision to treat her was based on the following factors: (a) She was miserable and probably would remain so. (b) The psychosis aggravated her cardiac disorder and was thus a threat to her life. (c) The psychosis was of a type which responds favorably to ECT. These matters were carefully reviewed with the husband, who consented to the treatment. With the first treatment there was no grand mal response; she recovered quietly and without apparent untoward reaction. The second treatment was given the following day. This produced a grand mal seizure. She remained more or less cyanotic immediately after the seizure and her respirations were rapid and shallow. She was given continuous oxygen through a BLB mask, intravenous aminophyllin and prostigmine. Her lungs became filled with moist, bubbling rales and pulse became very rapid and irregular. For a brief period her respirations became deeper and color improved, but about one hour after treatment respirations suddenly ceased. Intracardiac adrenalin and artificial respiration were to no avail. Permission for autopsy was not obtained.

DISCUSSION

As a result of our experiences we believe that most patients with cardiac disease can tolerate ECT. Whether

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or not a given patient should receive the therapy must be determined individually taking into account the possible aggravation of coexisting cardiac disease and the psychiatric risk. In order to decrease the incidence of complications from treating patients with cardiac disease we suggest the following prophylactic and precautionary measures:

1. Patients should receive adequate curarization and atropinization prior to each treatment.
2. Following each convulsion the patient should receive oxygen (through a BLB mask).
3. An emergency tray with the following items should be available in the treatment room:
 - i. Prostigmine to counteract overcurarization.
 - ii. Quinidine, a digitalis preparation, and aminophyllin for intravenous use in case of cardiac embarrassment.
 - iii. An intratracheal tube for respiratory embarrassment.

SUMMARY

1. While certain cardiac conditions, such as aortic aneurysm, acute myocardial infarction, and acute cardiac decompensation appear to contraindicate the use of ECT, there are many cases of mild to moderately severe cardiac disease which can successfully withstand therapy. Each case should be judged individually.

2. We have reported the use of ECT in 14 cases complicated by cardiac lesions. One patient developed an arrhythmia, another suffered an acute anterior infarction, and one expired as a direct result of treatment.

3. Three case reports are presented including a fatality directly related to treatment.

4. Certain precautionary and prophylactic measures are suggested.

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MEDICAL SCIENCES REVIEW

In the interests of continuing medical education, THE JOURNAL-LANCET offers this department of authoritative reviews of important progress in scientific medicine, both in the fundamental and the clinical fields. The editors propose to define medical sciences very broadly, and hope that each subject treated will be of sufficient importance to interest every reader.

Comments on the Selection of a Digitalis Preparation

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IN spite of the fact that most physicians have acquired an understanding of the use of digitalis, newer developments in this field have made essential a critical review of this subject. New, chemically pure preparations have been developed, and with them the therapeutic possibilities have expanded. At the same time, a large number of the digitalis products, differing from each other in varying degrees and many times in rather minor degrees, have become available. If the physician attempts to make use of too many of these preparations, unsatisfactory treatment is bound to result. It is not so much the preparation used that is important, as the proficiency with which it is employed. If the physician is thoroughly acquainted with the possibilities and the limitations of no more than two or three good preparations, adequate treatment will always be possible.

The following brief discussion of the pharmacology and clinical applications of digitalis applies just as emphatically to the pure cardiac glycosides as to the whole-leaf digitalis.

PHARMACOLOGY

Effect on the myocardium. Predominantly, by its direct action on the myocardium, digitalis increases the force of systolic contraction. This was demonstrated in classic experiments by Cattell and Gold¹ and by Kabat and Visscher.² At the same time, the mechanical efficiency of the heart is increased. Visscher and co-workers showed that with the aid of digitalis the failing heart could do a given amount of work with less consumption of oxygen.^{3,4} Thus, digitalis brings about a reversal in the changes resulting from the pathologic physiology of heart failure. The ventricles empty more completely; the cardiac output rises; the venous pressure falls.⁵⁻⁸ Studies in Cournand's laboratory,⁶⁻⁸ show that digitalis also mediates reduction of the elevated pressure found in the pulmonary artery in left ventricular failure, thus

directly reducing the symptoms of paroxysmal dyspnea, orthopnea and exertional dyspnea. The size of the enlarged heart may be dramatically reduced with digitalis.

A small group of workers, namely, Dock and Tainter⁹ and McMichael¹⁰ have maintained that the primary action of digitalis is to lower the venous pressure, thereby relieving the increased load on the failing heart and allowing it to recover its efficiency. This view is no longer held tenable, chiefly as a result of the pioneer work of Cournand and his group. "The concept that the primary action of digitalis is upon the myocardium permits adequate explanation of the effects of the drug in all types of cardiac failure."⁷

Heart rate. In the case of sinus rhythm, digitalis cannot be expected to slow the heart rate except as an indirect result of its beneficial effect on the myocardium and the improvement in the circulation. Vagal stimulation may play a part, particularly in patients who have auricular fibrillation, but the vagal effect, by itself, will not control the rate of a fibrillating heart.

Coronary circulation. Although the idea that digitalis, in therapeutic doses, will reduce the coronary blood flow, is rather widely held, there is no good evidence that this is true. Recent studies with advanced technics have failed to reveal such changes¹¹ and Gold's controlled study of 120 patients with angina pectoris¹² failed to show an increase in angina when the patients were digitalized.

INDICATIONS FOR DIGITALIS THERAPY

Congestive heart failure. Since digitalis increases the mechanical efficiency of the failing heart, its administration is indicated in all cases of congestive heart failure and should be continued after compensation is restored. As a matter of fact, some authors advise its use as a prophylactic measure in cases of organically diseased and enlarged hearts, even before congestive failure has developed. Paroxysmal nocturnal dyspnea, the manifesta-

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tion of acute left ventricular failure and a forerunner of frank congestive heart failure, is likewise an indication for the use of this drug. In the event that the patient is seen during his attack, a preparation for intravenous administration may be used. This can be followed by maintenance doses of a preparation of digitalis administered by the oral route.

Rapid auricular fibrillation. Digitalis slows the ventricular rate and eliminates the pulse deficit whether or not congestive failure is present. In many cases paroxysmal auricular fibrillation is likewise best treated with digitalis, especially during the attack when an intravenous preparation may be used if the situation seems urgent. For patients with lowered cardiac reserve, or for those experiencing frequent attacks, digitalis is indicated as a prophylactic measure as well as for treatment of the acute attack.

Auricular flutter. Digitalis given intravenously is the treatment of choice in cases of obstinate auricular flutter.

Supraventricular paroxysmal tachycardia. In frequently recurring, prolonged attacks of paroxysmal tachycardia, digitalis administered intravenously is often effective and can be used in conjunction with quinidine sulfate.

CONTRAINDICATIONS

In the following instances, the use of digitalis is actually harmful or else contributes nothing to the management.

Sinus tachycardia. Digitalis cannot be relied on to slow a sinus tachycardia, although it may do so indirectly by helping restore compensation in the failing heart. Digitalis, of course, is capable of producing bradycardia in the heart of a normal person. Then, however, the bradycardia represents one of the classic toxic effects of overdosage of digitalis and is by no means a measure of therapeutic effectiveness. Recent evidence indicates that the normal heart shows impairment of function after administration of the drug. This impairment results from a decrease in heart size and a concurrent decrease in cardiac output. Digitalis, therefore, is best not used when organic heart disease exists in the absence of dilatation, congestive failure, auricular fibrillation or flutter.

Peripheral circulatory failure. Circulatory collapse occurs in association with acute myocardial infarction and other conditions which may eventuate in shock. Digitalis contributes nothing toward overcoming the shock and actually increases the chances of a fatal outcome by reducing the cardiac output and increasing the tendency toward ventricular tachycardia and ventricular fibrillation.

Acute myocardial infarction. Although complications, such as congestive failure, auricular fibrillation or flutter, may make the use of digitalis mandatory, there is no indication for its routine use in acute myocardial infarction. It will actually increase the mortality rate if routinely employed in these instances. It is of no value, in the absence of failure, in such conditions as heart block and disease of the coronary artery with angina pectoris.

SYMPTOMS OF DIGITALIS INTOXICATION

The early symptoms of overdosage are anorexia, nausea, vomiting, abdominal pain and general malaise. Neurologic symptoms, such as weakness, headache, confusion and lethargy, may occur also before gastrointestinal symptoms have become noticeable. Prolonged auriculoventricular conduction time and extrasystoles may be present. Severe intoxication is indicated by bradycardia, coupled beats, varying degrees of heart block, diarrhea, severe vomiting, mental disturbances and colored vision (yellow, green, white, blue or red). At times, auricular fibrillation may be produced. This is especially likely among patients being treated for active rheumatic fever. Ventricular tachycardia is sometimes a danger, especially if the patient has extensive myocardial degeneration. Ventricular fibrillation with sudden death may follow the tachycardia, or may occur spontaneously. Treatment consists of complete withdrawal of the drug until all symptoms of toxicity disappear and then careful re-establishment of a maintenance dose on a lower level.

WHEN IS A PATIENT DIGITALIZED?

Although a patient may be considered fully digitalized when he has had the maximal therapeutic effect of the drug, the attainment of this objective is not always easy. When the auricles are fibrillating, the slowing of the ventricular rate affords some information as to the degree of digitalization, but, in the presence of a sinus rhythm, the ventricular rate is of no help. Ordinarily, the ventricular rate drops when compensation is regained and, if the patient normally had a relative bradycardia at rest, it is expected that this same pattern will return when full digitalization is achieved. The same situation obtains in a patient who normally had a relative tachycardia when at rest. As a rule, then, bradycardia is not in itself a sign of overdigitalization in the presence of a sinus rhythm, nor is moderate tachycardia a sign in itself that the dosage of digitalis needs to be increased. In fact, overdigitalization may result in tachycardia and even ectopic rhythm. The electrocardiographic changes produced by digitalis are not a reliable indication of the degree of digitalization. The electrocardiogram merely reflects the fact that the patient is taking, or has recently taken, digitalis. The change in the S-T segment produced by digitalis may be absent from the electrocardiogram in some patients who have already had too much digitalis and may be present in others before digitalization is complete.

WHAT SHOULD THE MAINTENANCE DOSE BE?

The amount of digitalis which will be required varies surprisingly from patient to patient. For example, an occasional patient will tolerate 0.3 to 0.4 mg. of digitoxin a day, while a small, aged individual may be unable to take more than 0.3 mg. a week. Although some patients insist that they cannot take digitalis, allergy to this drug is exceedingly rare. In my experience, patients who have stated that they were "allergic" to digitalis have divided into four general groups, none of which show any relationship to allergy: (1) patients who have suffered from

an upset stomach by the direct gastric effects of whole-leaf digitalis (this situation can be corrected by changing to a purified cardiac glycoside); (2) patients who have been treated with doses which have been toxic to them, even though these doses may have been smaller than required by the average patient (in such instances, the correct dose, small as it may be, can usually be determined by clinical trial); (3) patients in whom gastrointestinal symptoms have developed secondary to their heart failure; digitalis is often blamed for these symptoms, and (4) neurotic patients who tend to overreact when any type of medication is given.

Digitalization is a matter of clinical trial and individualization. Although there are no strictly reliable criteria, it seems reasonable to assume that a patient who has required a relatively large amount of digitalis to obtain the maximal therapeutic effect, also will require a relatively large amount to maintain that effect and vice versa. It is a clinical impression that patients who have marked cardiac enlargement frequently require relatively more digitalis than others do. It is of the utmost importance to acquaint all patients receiving digitalis with the symptoms of overdigitalization. If the patient has these symptoms during the state of initial digitalization and while still under close observation, he will profit by this experience in the same way as does a patient who experiences an insulin reaction while the dosage of insulin is in the process of being adjusted, and, what is much more important, he will know what to do if these symptoms should recur subsequently. When a patient is in doubt regarding the meaning of his symptoms, he should consult his physician. Not infrequently, when congestive failure has occurred, dyspepsia and nausea may make themselves known. The presence of the signs and symptoms of congestive failure, with an enlarged liver, will usually demonstrate that the symptoms are a result of the failure rather than the toxic effects of digitalis.

FORMS OF DIGITALIS

In this discussion, the use of a limited number of forms of digitalis will be described. There are a certain number of other cardio-active products, such as thevetin, squill, strophanthin, ouabain and a mixture of lanatoside A, B and C (digilanid), but these substances offer no particular advantages over the products to be considered and, in general, are of use in a limited number of situations. The preparations which are described in the following paragraphs have been carefully chosen as representing reliable and effective products.

DIGITALIS LEAF

The whole-leaf preparation has proved itself over a period of many years as an effective and reliable form of digitalis. The whole-leaf preparations, and especially the tinctures, have been found to vary considerably in strength. Furthermore, biologic standardization, using a cat as a test animal, has not always given a true representation of the therapeutic strength of a given preparation. Therefore, the old cat unit was replaced in 1942 by a standardized powder so that now 0.1 gm. of digi-

tal is represents 1 digitalis unit (U.S.P. XII). This unit is more potent than the old U.S.P. X cat unit, as 1 digitalis (U.S.P. XII) unit is equivalent to about 1.3 cat units.

The dose for digitalization ordinarily varies from 0.5 to 2.0 gm., with 1.2 gm. representing a fair average. With this product the patient can be digitalized in from two days to one week. If one attempts to digitalize the patient in one day with the whole-leaf product, gastrointestinal symptoms are likely to ensue. In a case of considerable urgency a dose of 0.2 gm. three times a day for two days can be given. If there is less urgency, the patient may be digitalized by giving 0.1 gm. three times daily for four or five days. A maintenance dose of 0.1 gm. four to seven times a week will be adequate for the majority of patients. Because of variations in this product, it seems wisest to choose a product of one manufacturer and try to use it exclusively.

LANATOSIDE C (CEDILANID)

This pure chemical glycoside is described because it represents what is probably the best all-round product for intravenous use. This statement is made because, in the past ten years, lanatoside C has undoubtedly been more widely used as an intravenous product than any other preparation of digitalis (intestinal absorption of its counterpart for oral use is too variable and incomplete to make it a desirable medicament to be given by mouth). As a result, a wealth of clinical data has been accumulated in regard to its employment by vein; many physicians are familiar with its characteristics and it has proved to be a satisfactory product. In this product also the need for bio-assay is obviated. Lanatoside C has a rather rapid onset of action (ten to thirty minutes after intravenous injection) but is superior to strophanthin, for example, in having a more favorable therapeutic to toxic ratio. The full digitalizing amount can be given intravenously in one dose, but it is wise, especially for old, debilitated, underweight patients and those who have evidence of considerable coronary disease, or generalized arteriosclerosis, to give the drug in divided doses. The complication which is theoretically possible and has been known to occur, is sudden death, chiefly in the type of patient described in the previous sentence, after a single heavy dose. Lanatoside C lends itself particularly well for intravenous use since symptoms of toxicity, if they happen to occur, will usually disappear within twenty-four hours, owing, apparently, to the rapid dissipation of the drug within the body. The intravenous use of this drug is particularly valuable in acute left ventricular failure (paroxysmal nocturnal dyspnea) and in rapid arrhythmias in which an immediate effect is desirable. Again, judgment must be used as to whether or not to give the full amount in a single dose or in divided doses.

The average digitalizing dose for intravenous use is 6 to 10 cc. (1.2 to 2.0 mg.). One to two cubic centimeters (0.2 to 0.4 mg.) per day will usually maintain the patient in a digitalized state if intravenous administration is to be used for a time.

Lanatoside C is the product of choice in the treatment of paroxysmal tachycardia of infants. One hundredth milligram of the drug per pound of body weight may be given intravenously as the initial dose. In a half hour, if the arrhythmia persists, this dose may be repeated. Then, in another half hour, half of this dose may be given.

DIGITOXIN

Digitoxin appears to be the chemical substance which is chiefly responsible for the therapeutic action of whole-leaf digitalis.¹³ Although first used in Europe in 1869 under the name of "digitaline cristallisée,"^{14,15} it was not of uniform potency, or chemically pure. These deficiencies have since been corrected, and digitoxin has been used extensively in this country in recent years. The Council on Pharmacy and Chemistry of the American Medical Association has recently assigned rigid tests of purity before acceptance, so that digitoxin supplied by a reputable manufacturer can be used with confidence as to its purity.

Digitoxin appears to be completely absorbed from the gastrointestinal tract, a fact which is a definite advantage. Digitoxin also can be used parenterally in the same dosage as when given by mouth; however, since it is a relatively slowly acting glycoside, its intravenous use is not recommended. If the patient happens to be overdigitalized by the intravenous dose, symptoms of toxicity may persist for a number of days. Hence, some relatively rapidly acting and rapidly dissipating product, such as lanatoside C, is recommended for intravenous use.

Although it is known that there are large variations in the individual susceptibility to digitoxin, just as to any other form of digitalis, this fact has often been ignored in recent years, and the figures of 1.2 mg. for the digitalizing dose and 0.2 mg. for the maintenance dose, which have appeared in many publications, have been followed somewhat too strictly. Because of these directions as to the use of digitoxin, many patients have become overdigitalized, since this maintenance dose is often too large, while many other patients have been poorly digitalized by the induction dose, which is often too small.

Digitoxin has been regarded as the "drug of choice" by some physicians.¹⁶⁻¹⁹ However, another group condemns digitoxin and states that "digoxin is the glycoside of choice."^{20,21} A third group, likewise, condemns digitoxin and expresses the belief that the whole-leaf preparations are the most satisfactory forms of digitalis.²² And, finally, Gitalin has been currently represented as "the digitalis preparation of choice for the usual treatment of the patient with congestive heart failure."²³

The criticisms of digitoxin result from the fact that symptoms of toxicity, once appearing, are rather slow to disappear. There is no doubt that the toxic effects of digitoxin are of longer duration than those of other cardiac glycosides (experimental and clinical evidence testifies to this^{21,22,24-26}); however, this same factor of persistence of action has always been cited as one of the

advantages of the digitalis leaf and since digitoxin resembles the whole-leaf preparations more than any other glycoside, this criticism cannot be considered as a serious objection.

It should be mentioned, finally, that the difference in the duration of symptoms of toxicity due to digitoxin versus other preparations of digitalis, is not always easy to determine. Duration of toxicity (and duration of therapeutic action) is, in part, a basic pharmacologic function of the drug under consideration. It also is related to the *degree* of overdigitalization. Thus, a patient severely poisoned by a large overdose of any preparation of digitalis will have a greater persistence of symptoms than a patient whose dose has been pushed only to the point of minor toxicity. This same factor of the degree of overdigitalization has rarely been considered and is difficult to evaluate in comparing the duration of toxicity of digitoxin with that of other preparations, especially digitalis leaf.

It has been my experience that, in a well-supervised program, digitoxin produces no more toxicity than the whole-leaf products. Although there is no "digitalizing dose" which is suitable for everyone, the concept of an "average digitalizing dose" as propounded by Gold is of great value in establishing a base line for adjusting the dose for a digitalis product.

The average digitalizing dose of digitoxin approximates 2 mg. rather than 1.2 mg., and the average maintenance dose is closer to 0.15 mg. than to 0.2 mg. Although it has been suggested that the digitalizing amount be given in one dose,^{16,19} this is not recommended, since if this were done, it would be inevitable that in a definite percentage of cases symptoms of toxicity would develop. This is true if *any* single-dose method designed for full digitalization is used and applies to digitalis products in general. Therefore, it seems wise to make the initial dose approximately two thirds or three fourths of the expected total, or average, digitalizing dose. In six, twelve or twenty-four hours, depending on the urgency, the remainder of the dose may be given in a single dose or in divided doses. Another plan is to follow the initial dose, as mentioned previously, with 0.4 to 0.6 mg. doses at intervals of twelve to twenty-four hours. This may be continued until the desired effect is obtained or early symptoms of toxicity supervene. The program of digitalization, however, must not be rigid, since each individual presents a different problem.

DIGOXIN

Digoxin is one of the cardiac glycosides derived from the *Digitalis lanata* plant and does not have a counterpart in the *purpurea* species (fig. 1). It is obtained by the hydrolysis of lanatoside C or cedilanid, whereby three sugar molecules are removed. Thus it resembles lanatoside C rather closely in its pharmacology as well as in its chemical structure. The chief advantage of Digoxin over whole-leaf preparations is its prompt onset of action when given orally and its rapid dissipation in the body. Toxic symptoms persist for twenty-four to forty-eight hours at the most. Unfortunately, this

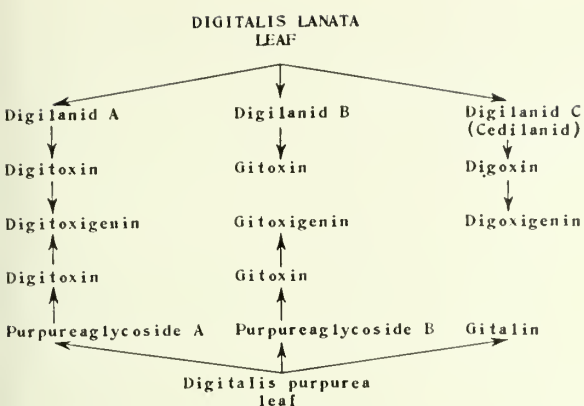


Fig. 1. Cardiac glycosides derived from chemical breakdown of digitalis leaf. Reprinted from Scheifley, C. H.: *The Current Digitoxin Controversy*. GP. 2:59-61 (July) 1950.

rapidity of action also constitutes a disadvantage, since it increases the difficulty of maintaining digitalization with this glycoside. However, it can be used successfully if the physician is familiar with its characteristic properties and carefully regulates the maintenance dose.

It is well known that the toxic reaction commonly disappears in a few hours after administration of the drug is discontinued. One might interpret this observation in terms of the maintenance dose of Digoxin since this evidence suggests that better maintenance might be obtained if the required amount were given in divided doses rather than in a single daily dose. Paradoxically, clinical experience indicates that this is not true. Let us assume that a certain daily undivided dose of Digoxin has been found to be somewhat too large and toxicity has developed. The toxicity may be quickly eliminated by giving the same daily dosage in divided amounts. By the same token, in those patients not maintained by a divided dose, control may be rapidly effected by giving the same amount as a single daily dose.²⁷

I prefer this glycoside for those special cases in which it seems necessary to maintain the patient in a state of digitalization as near the level of toxicity as possible—usually for relatively short periods of time. This can be done without the danger of producing symptoms of toxicity that are more than transient in nature. Thus, if necessary, the patient of average intelligence, knowing the early effects of overdosage, can easily keep his digitalis intake at an optimal level with the assurance that he will not be subjected to prolonged distress should toxicity occur. On such a program, frequent evaluation by the physician may be necessary.

In the relatively rare case in which an immediate effect is urgent, Digoxin, given orally, is satisfactory. Many physicians prefer to follow this dosage with a more slowly acting preparation, such as digitoxin. In this case, half of the expected digitalizing dose of digitoxin may be given twenty-four hours after the Digoxin was administered and the other half forty-eight hours after the last dose of Digoxin. Since Digoxin appears to be completely eliminated from the body within forty-

eight hours after the last dose, there is little danger of a combined cumulative effect.^{27,28}

The following scheme has proved a generally satisfactory way to use Digoxin. The initial dose is 1.0 to 2.0 mg.; this is followed by 0.5 to 0.75 mg., every six hours, until the desired effect is obtained. The maintenance dose usually falls somewhere between 0.25 and 1.25 mg. per day; a dose of 0.5 to 0.75 mg. will maintain more than 50 per cent of the patients in good state of digitalization.

For intravenous use, 1.0 to 1.5 mg. may be injected initially, followed by 0.25 to 0.5 mg. every six to eight hours, as necessary.

GITALIN

Gitalin has currently been studied by Batterman and co-workers,²³ who regarded it as "the digitalis preparation of choice for the usual treatment of the patient with congestive heart failure." They based their opinion on the clinical observation that the "therapeutic ratio" or margin of safety of Gitalin is greater than that determined by them in patients who were likewise tested with digitalis leaf, digitoxin and Digoxin. Levy and Boas²⁹ and Baker and Bloom³⁰ studied the action of Gitalin and concluded that it compared favorably in regard to toxicity and clinical effectiveness with digitalis leaf preparations. Thus, it seems apparent to date, that Gitalin has not received a wide enough clinical trial in this country to warrant the abandoning of the effective and well-established digitalis preparations which have been discussed in favor of this new product which has recently become widely available. Further studies are needed before Gitalin will find its proper place in the growing list of cardiac glycosides.

The digitalizing dose recommended is 2.5 mg. initially followed by 1.0 mg. every six hours until the desired result is obtained. The maintenance dose centers around the value of 0.5 mg. daily, ranging from 0.25 mg. to as high as 1.25 mg.

SELECTION OF THE PRODUCT

The ideal preparation of digitalis has not yet been obtained and the foregoing paragraphs are not meant to indicate that one preparation is superior to any of the others.

Although I personally prefer digitoxin for routine use, this is not meant to imply that this is the ideal drug to the exclusion of the others. Because of the rather numerous preparations of digitalis which have made their appearance on the market in the past fifteen years, there is often a tendency to switch from one drug to another in the order of their appearance. The physician would be wise, however, to remain faithful to the product which he knows by experience has served him well until it is unequivocally proved that a new product is superior to the one he is using.

In order to obtain optimal therapeutic results, the physician needs only to be thoroughly acquainted with two types of digitalis; namely, a product for oral use and another for intravenous administration.

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... True Alchemy has but one aim and object, to extract the quintessence of things, and to prepare arcana, tinctures and elixirs which may restore to man the health and soundness he has lost.—SYLVIUS, cir. 1664.

The Eyegrounds of Toxemia in Pregnancy

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EARLY recognition of impending toxemia of pregnancy has caused a marked reduction in the incidence of ophthalmoscopic signs of this condition. It is a rare occasion when the old textbook picture of eclampsia is seen with all the cardinal eye signs of arteriolar spasm, hemorrhages, exudates and retinal edema. In the majority of patients seen with early toxemia the only positive finding in the eyegrounds is generalized or focal arteriolar narrowing. Focal narrowing, as the term indicates, is a blood vessel constriction confined to only a small segment of the arteriole.

The normal ratio of caliber of the retinal arteriole to the accompanying vein is two to three, or in other words, the arteriole is two-thirds the diameter of the vein. When there is a generalized contraction or spasm of the arteriole this ratio will change so that the arteriole in grade 1 narrowing is one-half the caliber of the vein, in grade 2 narrowing the arteriole is one-third the caliber of the vein, and so on.¹

In comparing the caliber of the vein and accompanying arteriole care must be taken to have the two vessels in such an area that each vessel has sent off the same number of branches. The correct ratio will not be obtained if a vein that has branched twice is compared to an arteriole that has divided only once. Caliber comparison of these vessels should not be made just as they leave the optic disk. In many fundi the arteriole will appear to have a localized narrowing at this point without any variation in the normal 2:3 ratio in other areas of the retina. In these cases the apparent focal constriction is due to an overgrowth of glial tissue partially concealing the arteriole for a short distance and thus causing a narrowing of the visible blood column in that segment of the blood vessel.

A localized constriction of the arteriole is evident when there is a sudden narrowing of the vessel for a very short distance with the vessel showing a larger caliber proximal and distal to the constricted portion. An exaggerated instance of this type of narrowing is the connection between links of sausage.

There have been many proposals advanced explaining the cause of arteriolar narrowing. The most widely accepted theory, which does not explain all the changes, is that there is a pressor or humoral substance secreted by the kidney and discharged into the blood stream.² This toxic material causes abnormal constriction of the arterioles thus bringing about an increased peripheral resistance which in turn causes an elevation of the blood pressure in toxemia of pregnancy and vasospastic disease.³

The result of vascular narrowing is arteriolar sclerosis. Sclerosis is graded from 1 to 4 according to the light

reflex from the vessel wall, which is dependent on medial hypertrophy, and also on the amount of vein compression, indentation or nicking where the vein is crossed by an arteriole.

The retinal vascular changes seen in toxemia of pregnancy are no different from those of vasospastic hypertension from other causes. Gibson⁴ has listed the characteristic steps in the progression of retinal vascular damage as attenuation or generalized arteriolar narrowing, angiospasm or focal narrowing, arteriolar sclerosis and retinopathy.

The determination of the arteriole-vein ratio is important and should be noted early in the pre-natal period. Bartholomew and Colvin⁵ showed that of a group of early pregnancies with normal A-V ratio only 25 per cent developed hypertension four to six weeks before term. Of those cases showing a disturbance of the A-V ratio early in pregnancy 66 per cent developed hypertension four to six weeks before term.

The most difficult cases to evaluate by the ophthalmoscopic examination are those women who have pre-existing hypertension. If the pre-existing diastolic pressure is 90 or above there will be varying amounts of arteriolar narrowing and sclerosis which may have a patchy distribution not involving all the arterial branches. The grade of sclerosis will depend on how long the hypertension has been present and its severity. In these cases we have to look for areas of localized narrowing from which the light reflex is normal. The normal light reflex excludes sclerotic changes at this point so that we can interpret the constriction as an acute condition due to the present toxemia.

Although there are exceptions, the majority of patients with hypertension show fundus changes paralleling the degree of blood pressure elevation and the severity of the toxemia. Mussey⁶ analyzed the findings in 108 patients with late toxemia of pregnancy. He found that all the patients with a systolic pressure over 200 showed retinal vascular changes. Ninety per cent of those with systolic pressure between 170 and 200 had vascular changes. In the group having systolic pressure readings of 140 to 169 only 50 per cent had visible ophthalmoscopic changes in the retinal vascular system.

It has been well substantiated that persistent hypertension will often follow an attack of toxemia of pregnancy. Chesley⁷ in a study of 318 cases of pre-eclampsia, both mild and severe, found that 37.5 per cent of the mild cases and 42.3 per cent of the severe cases had a residual hypertension $3\frac{1}{2}$ to $5\frac{1}{2}$ years later. In a similar study Peckham⁸ showed the incidence of residual hypertension depended on the length of time the pre-eclampsia symptoms had been present. If symptoms are present for one to two weeks he found approximately 16 per cent

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of patients carried a persistent hypertension. If symptoms had been present nine to twelve weeks 71 per cent had persistent hypertension.

It is the opinion of most authorities that in cases where the retinal arterioles show generalized or focal narrowing the pregnancy need not be terminated. However, if there is evidence of arteriolar sclerosis developing in the angio-spastic vessels or retinopathy is observed the uterus

should be emptied. Signs of arteriolar sclerosis are probably evident within two weeks of the time of onset of the retinal angiospasm.

We can conclude that the early recognition and treatment of toxemia of pregnancy, before the onset of irreversible changes is all-important. The ophthalmoscopic examination of the eyegrounds is a useful procedure especially when early symptoms of toxemia are present.

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Editorial . . .

HANDICAPPED CHILDREN IN NORTH DAKOTA

THE North Dakota Crippled Children's Service (C.C.S.) is interested in seeing that each child in the state with a remediable physical handicap is offered the advantages of appropriate medical treatment. In the majority of cases such treatment is arranged for the child privately by the family physician. Where financial assistance is needed applications are processed jointly by the county welfare board and the child's physician, and treatment may be approved under the C.C.S. No case is accepted for treatment unless such care is requested by a physician.

The responsibilities of the North Dakota Crippled Children's Service fall into four areas: case finding, diagnosis, treatment and follow-up. Case finding is rather complete, the C.C.S. receiving reports of handicapped children from physicians, public health nurse, teachers, clergy, and many interested persons. Some 3800 children in North Dakota are known to suffer from physical handicaps for which treatment could be sought under C.C.S. auspices. These are primarily orthopedic conditions, and many of these children receive appropriate medical care without financial subsidy. However, numerous conditions are reported to C.C.S. in seeking assistance which is not available through this agency for the treatment of conditions such as epilepsy, rheumatic fever, speech defects, severe hearing loss, mental retardation amenable to education in special classes, etc. If such needy children are unable to obtain assistance through their county welfare board, at the present time they commonly go without treatment or supervision. The numbers and types of cases of handicapped children far exceed the treatment facilities, even when the financial status is not a consideration.

Diagnosis of cases has been provided for since 1930 by a series of free clinics sponsored jointly by the North Dakota Elks Association and the C.C.S. These clinics are held once annually in eleven cities of the state, bringing physician specialists in pediatrics and orthopedics to the various areas where easy consultation may be arranged by the family physician, nurses, or teachers. Approximately 1500 children have been examined in this fashion each year, the reports being made available to the responsible local authorities and treatment arranged, when indicated, through the most appropriate channels.

Treatment of cases under C.C.S. auspices is limited to the usual orthopedic problems of childhood plus several other handicapping conditions such as congenital cardiac lesions amenable to surgery, congenital eye and ear defects, tracheo-esophageal fistula, hare lip, and cleft palate. The scope of the program is controlled by the Committee on Crippled Children of the North Dakota State Medical Association, which acts as an advisory group to the medical director of C.C.S. This group has recommended

expansions of the program which have not been possible because of budgetary limitations. They also approve the selection of physicians who participate in the treatment of patients, requiring that these men must either be certified specialists in their field, or eligible for such certification. The actual treatment is furnished in the several cities where the approved specialists practice, hospitalization being in the private hospitals, since there is no state hospital for either crippled children or adults.

The consulting staff in June 1951 consisted of five orthopedic surgeons, eight pediatricians, seven otolaryngologists, eleven ophthalmologists, six radiologists, three urologists, and three orthodontists. This group furnished more than 13,000 hospital days of care in 1949, and more than 10,000 hospital days of care in 1950. Payment for these services is provided on a cost basis by the C.C.S., funds for which come approximately half from state and half from federal appropriations. In cases of residual orthopedic problems resulting from poliomyelitis, a large share of the financial burden for continuing orthopedic care in needy cases is carried by the various county chapters of the National Foundation for Infantile Paralysis, the remainder of these cases being sponsored by the C.C.S. funds.

The fourth major responsibility of the C.C.S. is providing adequate follow-up supervision to cases under active treatment. This has been the most difficult task in the past and is now receiving intensive study and effort. Because of the great distances involved in travel for patients in North Dakota, the relative separation of referring physicians, and the concentration of the specialists in only a few of the cities, in many instances the treated cases have had no follow-up services of any kind. This has been particularly true of the Indian children coming from the four Indian reservations in North Dakota. It is felt that the person best able to supervise the convalescence and rehabilitation of a case is the family physician, working with the physician specialist as a consultant. A concerted effort is being made therefore to identify the responsible local physician of each case being considered for treatment so that he may receive reports of the specific corrective measures used by the specialist and may in turn assist in keeping the child under supervision and adequate care. Most cases which become delinquent in their follow-up supervision do so because of fear, misunderstanding, or confusion on the part of the child's family.

These common but unfortunate episodes can be appreciably reduced if a person with full information as to the long range implications of a child's problem can sit down and discuss it completely with the family and help to keep them in a sympathetic and enlightened frame of mind toward the treatment program. The family physician seems best situated in North Dakota to assist in this role. However, several other persons in

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1. Stritzler, C.; Fishman, I. M., and Laurens, S.:
Transactions New York Acad. Sc., 13:31, Nov., 1950.

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the local community are also in a position to be of service here. The public health nurse is commonly the one who made the initial contact with the family, perhaps first reporting case as the result of a post partum or pre-school home visit. The child's problem may have been noted by her during a routine school health inspection. She is commonly the "professional person" best known by the family, having been the one who first persuaded them that there might be some help available for the condition by going to a physician. Another local person who frequently fills the same role with the families is the welfare worker from the county welfare board. They work very closely with families in the lower income groups and are responsible for bringing many handicapped children to the attention of physicians.

By cooperating with the public health nurses and county welfare workers, a physician can spread his influence to a much larger group of patients than he would be able to see privately in his office. There is a real need to augment the past follow-up service of the C.C.S. program by using all available local professional groups. In this fashion the family physician will be able to use the C.C.S. as a consultation service and the specialist in charge of the treatment will be able to really be responsible for the end result.

Follow-up services for C.C.S. cases are currently being expanded by the introduction of a new series of small clinics, cases being limited to children already under treatment, and limited geographically to a given community or county. These clinics are primarily for the purpose of determining the present day status of the delinquent cases—those whose records show no contact for several years or more. These clinics are staffed by the medical director and the physical therapy consultant for C.C.S. together with the public health nurses and county welfare worker for the area being screened. Service is being offered upon invitation from the county, priority being given to those regions of the state most isolated from the communities where the consulting specialists practice. Since the 53 counties in North Dakota have an average case load of sixty-odd C.C.S. cases, many of these cases are delinquent in follow-up. Those who need further treatment are encouraged to obtain it; those past due for dismissal are being discharged. The local physicians and specialists each receive a copy of the findings and recommendations at these follow-up clinics.

In the past year six counties have been serviced with these clinics, together with two of the four Indian reservations. It is hoped in the future to assist all counties to evaluate their delinquent cases in this fashion if the children cannot be brought under the supervision of a practicing physician. In regions of heavy Indian population it is planned to hold regularly scheduled follow-up clinics throughout the year on the reservation to supplement the annual spring clinics. This is particularly appropriate since many of these children are unable to attend the annual clinics in April and May because of the frequent snows, thaws, or floods which make travel in North Dakota difficult at this season.

The North Dakota Crippled Children's Service attempts to assist one segment of the rather large group of children who may be classified as "handicapped children." An effort is being made to encourage parents to seek medical advice in making specific plans for these children and to adopt a realistic attitude in the management of their handicapped child. Professional groups are being acquainted with the conditions for which there is adequate treatment available, and parents are advised to keep their child under medical supervision so that they may have early advantage of any new developments in the fields of therapy. Physicians are encouraged to refer problem cases to the C.C.S. consultant for diagnosis and to initiate applications for C.C.S. in those situations where they feel the family is unable to furnish suitable care for the child under a medical specialist. Our intention is to furnish whatever help is indicated, especially in the major crippling conditions where treatment is long and expensive, and to furnish consultation for the treatment of the less serious problems in their local communities.

DOUGLAS T. LINDSAY, M.D.*
Bismarck, North Dakota

*Medical Director, North Dakota Crippled Children's Services and Director, Division of Maternal and Child Health, North Dakota State Department of Health.

Notices . . .

University of Minnesota Postgraduate Courses

The University of Minnesota announces a continuation course in *physical medicine* to be presented September 27-29, 1951, at the Center for Continuation Study. The course will stress the role of physical medicine in therapy in general practice. The care of fractures and arthritis will be emphasized. Symposia will be held on "The Care of the Hemiplegic Patient" and "Geriatric Problems.."

★

A continuation course in Industrial Medicine will be held at the Center for Continuation Study on October 6, 1951. Dr. Arthur K. Peterson, Medical Director of the R. R. Donnelly Company of Chicago, Illinois, and guest faculty member for the course, will discuss certain visual problems in industry. Other subjects which will be emphasized include dermatitis, back injuries, and lead poisoning as industrial hazards.

★

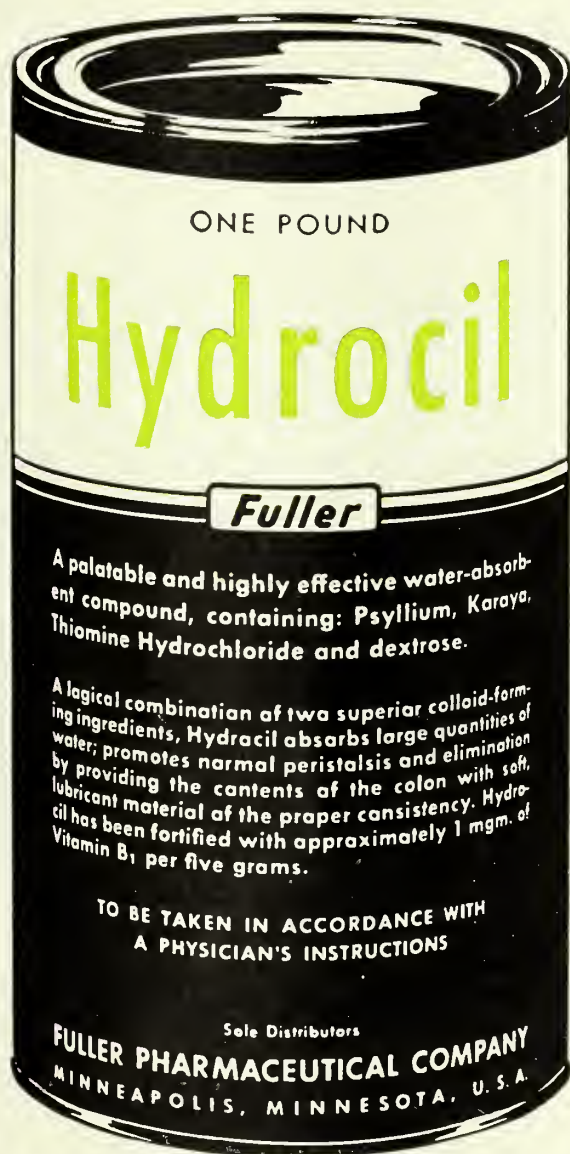
ACTH and Cortisone will be discussed in a one-day continuation course for physicians to be presented by the University of Minnesota October 17, 1951. Dr. Edgar S. Gordon, associate professor of medicine, University of Wisconsin Medical School, will be visiting faculty member for the course and will also deliver the annual JOURNAL-LANCET lecture on the evening of Wednesday, October 17, 1951.

★

Chest Diseases will be the subject of a continuation course to be presented by the University of Minnesota October 18-20, 1951. The course is sponsored by and given with the financial support of the Minnesota Chapters of the American College of Chest Physicians and the American Trudeau Society. Visiting faculty members for the course include Dr. William E. Adams, Professor of Surgery, University of Chicago Medical School, Chicago; Dr. Robert G. Bloch, Chief of the Pulmonary Division of the Montefiore Hospital, New York; and Dr. O. A. Sander, Marquette University Medical School, Milwaukee, Wisconsin.

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Enzymes, Growth, and Cancer, by Van R. Potter, Ph.D., 1950. Springfield, Illinois: Charles C. Thomas, 61 pages. \$1.85.

This little book is an excellent digest of the enzyme problem. We are given a treatise on enzymes following a "bird's eye" view of the cell.

Dr. Potter has divided his discussion into five premises concerning enzymes—the role, determination, organization, factors influencing, inhibition and chemotherapy.

One gains the impression the book is not intended so much for those working directly with enzymes but for the enlightenment of those whose principal interests are in allied biology and chemistry. The inescapable reaction places enzymes in one of the prime positions of importance in biochemistry.

The book is readable and presented in understandable fashion. It is to be recommended to all students of science.

B.O.

•
Regulation of Blood Pressure and Heart Rate, by Gornelle Heymans, M.D., 1950. Springfield, Illinois: Charles C. Thomas Company. \$2.00.

This 60 page monograph presents in a very compact manner most of the essential principles attendant to an adequate understanding of the basic fundamentals of regulation of the heart rate and blood pressure. The author has provided an excellent review of the experimental background relative to the basic physiology underlying these principles. He has included a number of illustrations of the experimental procedures and numerous diagrams as well as an excellent bibliography of world literature pertaining to the subject. This monograph is probably of more value to the student of physiology and to the research man than it is to those interested in clinical medicine as the majority of the material covered pertains to experimental data with laboratory animals. There is no doubt, however, that either the clinician or researcher may obtain much valuable information from this monograph since it ties together in a very concise manner the many variable factors that are attendant to the regulation of blood pressure and pulse rate.

W.R.

•
Urgent Diagnosis without Laboratory Aid, by Prof. Dr. Hanns L. Baur, 1950. Springfield, Illinois: Charles C. Thomas. 89 pages. \$2.00.

This is an interesting little monograph on the subject of diagnosis by physical means alone in situations where life is endangered. The theme is well developed and clearly presented throughout the book. The material is divided into seven chapters: nervous manifestations; facies, position, and attitude; abnormal odors; cutaneous manifestations; disorders of respiration; urinary symptoms; and gastro-intestinal manifestations. The sections discussing convulsions, cyanosis,

Book Reviews

and facies are most excellent. A helpful feature in the understanding of the various manifestations of situations requiring urgent diagnosis is the author's presentation of the underlying pathological physiology and altered biochemistry.

The translation from German to English is well done but nomenclature is occasionally confusing. The printed material is large and easily read. There are no illustrations and no bibliography.

Obviously such a vast subject cannot be thoroughly covered in 89 pages. This is neither a textbook nor a reference volume. Because there have been so many recent advances in the field of x-ray and laboratory diagnosis, students and clinicians are in danger of forgetting how to use their senses of sight, hearing, smell and touch. This monograph is intended to stimulate the reader to develop the use of his senses. In the opinion of the reviewer the author has admirably attained his objective.

F.J.A.

•
Perspectives in Human Malnutrition.

A contribution to the Biology of Disease from a Clinical and Pathological Study of Chronic Malnutrition and Pellagra in the African, by Joseph Gillman and Theodore Gillman, 1951. New York: Grune & Stratton, 584 pp. Under the curiously modest title of "Perspectives" the authors of this large monograph present one of the most important collections of original data on problems of human malnutrition ever assembled. The genius of the book and the genius of the authors lies in perspicacity with which old clinical entities are re-examined in the light of modern knowledge and the hitherto unsuspected inter-relationships between various findings elucidated.

The skin, the nervous system, the liver, the blood and hematopoietic organs, the alimentary tract and the bones are the subjects of important chapters. The book contains 259 illustrations and 48 tables and charts and refers to more than 800 other publications on the subject. It constitutes an exhaustive review as well as a mine of new information. It will be of interest and value to all students of the problems of nutrition. Its historical and geographic sections are unique as regards the problem of pellagra. The inclusion of socio-economic data is likewise unusual, but adds to the roundedness of the treatment of the subject. The authors have presented a comprehensive study marking them as competent scholars in several areas of knowledge.

M.B.V.

Significance of Body Fluids in Clinical Medicine, by L. H. Newburgh, M.D., 1950. Springfield, Illinois: Charles C. Thomas, 76 pages. \$2.00.

This concise monograph on body fluids is divided into two parts. The first deals with the physiology of body fluids, their composition, and their regulation within the various compartments of the body. The second portion is devoted to the clinical significance of the body fluids, the abnormalities which exist, and certain disease patterns and the effect of abnormalities of the various fluid balance patterns. The most difficult part of fluid balance are the physiological principles which control the distribution of body fluids. This aspect of the fluid balance problem is presented in a manner which can be very easily understood. The application of these physiological principles to the clinical case is clearly presented. This monograph should be read by all physicians who utilize parenteral fluids as part of their therapeutic regimen. For the busy practitioner, a more concise and easily understood presentation of this entire problem would be difficult to find.

W.P.E.

•
The University of Minnesota, 1851-1951, by James Gray. 609 pages. Minneapolis, Minnesota: University of Minnesota Press, 1951. \$3.75.

This book is, as its title indicates, a history of the great state university of Minnesota. But there is in it such a full and lively account of the beginning and development of the medical school, that we feel on the merits of that section alone it should be recommended to the readers of THE JOURNAL-LANCET.

James Gray was a most excellent choice as historian for this volume. As a University alumnus, he has familiarity with, and sentiment for his alma mater. As a novelist, he knows a good story and puts color and drama into what must otherwise have been a dry recital of facts. And as an historian he is sure of his facts, and interprets them with discernment and understanding.

Gray tells us that the medical school was established as one of the last creative acts of the first president, William Watts Folwell, and perfected as an independent unit of the university by Dr. Hewitt, a notable pioneer physician. The first faculty, he says, sometimes served without pay. "From Winona, Red Wing, Stillwater they came, occasionally even at their own expense, to attend to duties which social conscience had invented for them." In 1892, under Cyrus Northrop, the medical school moved into the first building of its own, the original Millard Hall.

In a chapter entitled "Operation Buzz Saw" Gray describes the lively days under President Vincent, and the negotiations which led to the affiliation with the Mayo Foundation at Rochester. Subsequent chapters sketch the growth of the various departments with the school and record something of the personalities and achievements of its great teachers, clinicians and research men.

V.L.D.

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News Briefs . . .

North Dakota

TWENTY-ONE licenses to practice medicine in North Dakota were granted July 7 by the state board of medical examiners. Successful applicants and intended place of practice include: Lemual T. Longmire Jr., Stanley; Bernard A. Girard, undecided; Paul L. Johnson, Bismarck; Mack Trayner Jr., Devils Lake; Lee A. Christoferson, Fargo; Arthur A. Dodds Jr., Bismarck; William F. Nuessle, Fargo; Ralph D. Gustin, Gackle; William F. Buehler, undecided.

Jerome S. Wingartner, undecided; Kenneth J. Johnson, Bismarck; Franz Gutowski, Steele; Arnold Kalnins, Washburn; Duane Sommersness, Jamestown; Marlin J. Johnson, Bismarck; Robert O. Johnson, Bottineau; Richard L. Chastain, Minot; Henry Y. Sunagari, Grand Forks, and Eric W. Walter, Bismarck.

* * *

THE medical advisory council of the North Dakota State Medical Center, at a meeting on June 16 at the University, recommended to the board of higher education that an addition to the medical school be built of the same size as the present new structure.

Money for the addition will be allocated from the one-mill levy. The new medical building, completed in the fall of 1949, cost in the neighborhood of \$400,000. Because of increased construction costs, it is expected a duplicate structure would cost about \$600,000.

* * *

DR. ROBERT G. FISCHER, of the department of bacteriology of the medical school, is continuing his research in infantile paralysis on the theory that cockroaches are carriers of the disease. In his work, Dr. Fischer has been partially supported by a grant of the state medical center.

* * *

A CHECK for \$1,047.76 was presented to the University of North Dakota by the Women's Auxiliary of the North Dakota Medical Association to inaugurate a loan fund for sophomore medical students.

* * *

DR. N. D. SMITH became president-elect of the American Proctologic Society at its recent meeting in Atlantic City.

* * *

WORK has been started at Kulm on the construction of a new medical-dental building, which will be completed sometime in August. Dr. Fandrich, formerly of Goodrich and now a resident of California, is expected to arrive soon to take up his practice in Kulm.

* * *

New locations and appointments . . .

FOUR new members who have been added recently to the staff of the University of North Dakota medical school include Dr. Paul Potter, who has been taking his internship at St. Luke's hospital in Duluth, Minnesota; Dr. W. E. Cornatzer, professor of biochemistry, from Bowman-Gray medical school at Winston-Salem, North Carolina; Dr. Carl Calman, assistant professor of physiology and pharmacology, from an internship at a hos-

pital in Lansing, Michigan, and Dr. William Koons, assistant professor in the same department, from the general hospital at Denver.

* * *

Lt. (jg.) JACK R. DULEY, who has been at the Great Lakes Naval Training Station, is a new doctor at the naval recruiting station staff at Ft. Lincoln. A graduate of the Louisville, Kentucky, medical school, he was in private practice in Russellville, Kentucky, until called back into service in 1950.

* * *

DR. BENJAMIN DEBOERS arrived August 1 from St. Louis university to assume the position of professor of pharmacology.

* * *

DR. THOMAS LONGMIRE, who has recently completed an internship in St. Francis hospital at LaCrosse, Wisconsin, has established a practice in Stanley in association with Dr. M. G. Flath. Dr. Longmire received his medical education at the University of North Dakota and Wake Forest college in North Dakota.

* * *

DR. JOHN BROPHY, a graduate of the University of North Dakota and Northwestern University medical school, has been appointed resident at Cook County hospital, Chicago.

* * *

DR. FRANKLIN WINDSOR HEGGENESS of Fargo received his medical degree at the University of Rochester school of medicine on June 12. He will serve his internship in Peter Bent Brigham hospital at Boston.

* * *

DR. JAMES H. DUNLEVY, also of Fargo, received his medical degree from Washington university at St. Louis in June. He will serve his internship at the University of Minnesota hospitals in Minneapolis.

* * *

DR. JOHN J. ROUSSEAU, Crosby, a 1951 graduate of Cornell University Medical College, has started his internship at King County hospital at Williston.

Minnesota

FOUR grants for poliomyelitis research have been granted to the University of Minnesota by the National Foundation for Infantile Paralysis. The largest grant, \$30,646, will be directed toward the possibility of producing human polio virus in quantity to be used in a vaccine. A grant of \$9,935 will be used to continue studies of bulbar polio, a grant of \$3,700 will enable workers to complete an analysis of data collected on patients stricken during the 1946 epidemic in Minnesota, and a fourth grant of \$4,850 will finance continued investigation of pulmonary edema, frequently associated with bulbar poliomyelitis.

Directing the grants will be Drs. Jerome T. Syverton, A. B. Baker, Gaylord W. Anderson and Allan Hemingway.

* * *

OVER 2000 persons attended ceremonies for the new \$276,000 hospital at Park Rapids on June 28 when the

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25-bed institution was dedicated to the village and the surrounding territory. Dr. M. M. Hargraves of the Mayo clinic, Rochester, delivered the dedicatory address.

* * *

MEMBERS of the board of trustees of Miller hospital laid the cornerstone on June 5 for a two-million-dollar wing which is expected to be ready for use next fall. Dr. Peter Ward is the medical director.

* * *

DR. L. A. BUJE of Rochester was elected chairman, for a period of five years, of the Council on the Constitution and Bylaws of the American Medical Association. This council was formed at the recent meeting of the House of Delegates of the association in Atlantic City.

* * *

THIRTEEN Minnesota doctors were affected in July by the first draft of medical men since World War II, as part of the national quota of 717 doctors.

* * *

DR. WESLEY W. SPINK, professor of medicine at the University of Minnesota and brucellosis expert for the United Nations, will spend July and August in England, France, Italy and Yugoslavia correlating current brucellosis research. Dr. Spink will compare notes with specialists in the European brucellosis centers, and will serve as consultant to local health authorities in Europe on their specific brucellosis problems.

* * *

DR. JOHN J. BITTNER, director of the University of Minnesota's division of cancer biology, has been named first winner of the Comfort Crookshank Award for Cancer Research, an honor presented through the Middlesex hospital medical school in London, England. Late in September Dr. Bittner will go to London to receive the silver medical award and the monetary grant of 230 English pounds. At the same time he will deliver a lecture on his cancer research at the Middlesex hospital medical school.

* * *

DR. E. J. BALDES, head of the Mayo clinic section of biophysics, was recently honored by being made a chevalier of the French legion of honor in ceremonies at Rochester for his medical work in the field of aeronautics.

* * *

New locations and appointments . . .

DR. GEORGE RYSGAARD of Minneapolis has established a new practice in Northfield, Minnesota.

* * *

DR. NINA KODRES, a native of Estonia and a graduate of the University of Innsbruck medical school, has been accepted for an internship in St. Luke's hospital, St. Paul. Later Dr. Kodres plans to take a three-year fellowship in neurology at the University of Minnesota.

* * *

DR. JOHN NOBLE, formerly of Graceville and Brown's Valley, has opened a medical practice in Amery, Wisconsin.

* * *

DR. IRVING C. BERNSTEIN and Dr. Paul S. Blake have joined the psychiatric staff of Glenwood Hills hospital, Minneapolis. Dr. Bernstein is a graduate of the University of Colorado and Dr. Blake completed his medical work at the University of Minnesota.

South Dakota

DR. D. A. GREGORY of Milbank was elected president of the South Dakota State Medical Association at the 70th annual meeting held in Aberdeen on June 3 to 6. Other officers include Dr. Roy E. Jernstrom, Rapid City, president-elect, Dr. R. G. Mayer, Aberdeen, vice-president, and Dr. L. J. Pankow, Sioux Falls, secretary-treasurer.

The new council members are Dr. Magni Davidson, Brookings, and Dr. R. A. Buchanan, Huron. Dr. A. P. Peeke, Volga, was named speaker of the house of delegates, and Dr. Van Demark, Sioux Falls, chairman of the council.

Deaths . . .

DR. J. B. EAGAN, of Dell Rapids, South Dakota, died May 28. A graduate of the Chicago College of Physicians and Surgeons in 1905, Dr. Eagan took his internship in a Chicago hospital, and practiced in Wisconsin and Woonsocket until he came to Dell Rapids in 1910.

★

DR. RUTH VORIES HECK, former fellow in pediatrics of the Mayo Foundation, died in Rochester, Minnesota, on June 18, 1951.

★

DR. J. T. LAUGHLIN, Grey Eagle, Minnesota, died suddenly on June 11 while making a professional call. A graduate of the University of Wisconsin, Dr. Laughlin had practiced in Grey Eagle over 37 years. He was a member of county and state medical societies, A.M.A. and Mississippi Valley Medical Association.

★

DR. ALBERT M. LIMBOURG, former Fargo physician, died June 26 at South Bend, Indiana. Dr. Limbourg practiced medicine in Fargo from 1918 until 1944, and was superintendent of health in Cass county for a time.

★

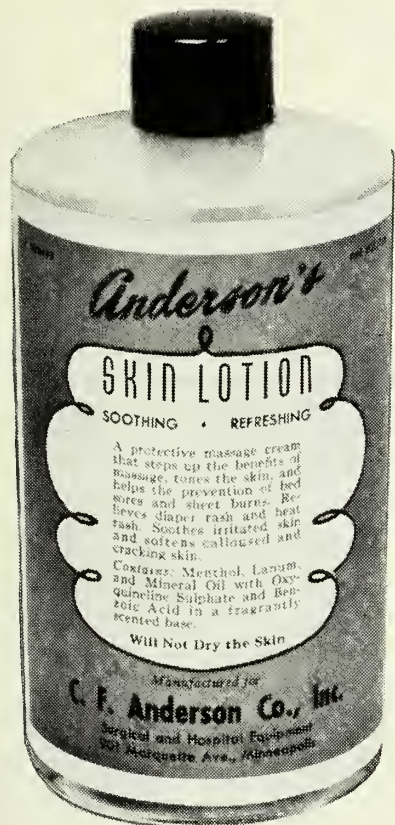
DR. DONALD W. POLLARD, superintendent of Minneapolis General hospital since 1941, died on June 27 following a heart attack. A graduate of the University of Minnesota in 1927, Dr. Pollard spent most of his active practice in service at General hospital. In 1931 he was named acting city physician, in 1939, acting superintendent, and in 1941, superintendent.

★

DR. FLOYD OWEN WOODWARD, a physician at Jamestown since 1920, died July 2 at a Jamestown hospital. Dr. Woodward, a graduate of the University medical school in 1916, had been city health officer of Jamestown many years, and was a past president of the Stutsman County medical association.

★

JOHN A. PAGE, director of the North Dakota state medical center, died July 5 at his home at Grand Forks. Before taking over full-time duties as director in September, 1949, Mr. Page had served as director of the teacher placement service at the University since 1936.



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American College Health Association News . . .

The president, Dr. John E. Sawhill, has appointed Dr. Irvin W. Sander and Dr. Laurence B. Chenoweth to serve with the elected officers on the executive committee for the coming year. The Executive Council, according to Article III of the Constitution, "acts for the Council during intervals between its meetings."

* * *

The chairman of the Local Arrangements Committee for the annual meeting in Boston in May 1952 is Dr. Dana Farnsworth of Massachusetts Institute of Technology, Cambridge, Massachusetts. Plans are already under way for the meeting, with Dr. John Monks of Harvard and Dr. Thomas Umy of Williams College in charge of the program.

* * *

The Local Sections Committee, headed by Dr. S. I. Fuenning of the University of Nebraska and including Dr. Frank O. Robertson, University of Denver (serving for a two-year period) and Dr. G. R. Leymaster of the University of Utah (serving for one year), are making plans to reactivate the inactive sections of the Association in addition to increasing the membership.

* * *

The Tuberculosis Committee for this year consists of the following members: Dr. William T. Palchanis, chairman, Ohio State University; Dr. Ralph I. Canuteson, University of Kansas; Dr. H. D. Lees, University of Pennsylvania; Dr. Mary Louise Hippert, University of Cincinnati; Dr. Edward Johnson, University of Texas; Dr. Otto J. Keller, Northern Illinois State Teachers College; Dr. Charles N. Lester, University of Washington; and Dr. William M. Brace, University of Michigan. Serving as advisors to the Tuberculosis Committee are: Dr. Robert Anderson, Tuberculosis Control Division, Public Health Service, Washington, D.C.; Dr. Henry C. Sweaney, State Tuberculosis Board, Jacksonville, Florida; Dr. Floyd M. Feldman, assistant to managing director, National Tuberculosis Association, New York City; Dr. Esmond R. Long, Henry Phipps Institute, Philadelphia, Pennsylvania; Dr. J. A. Myers, University of Minnesota, Minneapolis, Minnesota; and Dr. J. Burns Ambersson, Chest Service, Bellevue Hospital, New York City.

* * *

The Council, whose duty it is to "direct all affairs and activities of the Association not otherwise provided for by the Constitution, and the By-Laws," this year consists of the following:

Past presidents: Dr. Warren E. Forsythe, University of Michigan; Dr. Raymond W. Bradshaw, Oberlin College; Dr. E. Lee Shrader, St. Louis University; Dr. Ruth Boynton, University of Minnesota; Dr. Ralph I. Canuteson, University of Kansas; Dr. Harry D. Lees, University of Pennsylvania; Dr. Laurence B. Chenoweth, University of Cincinnati; Dr. Irvin W. Sander, Wayne University.

Present officers: Dr. John E. Sawhill, New York University; Dr. Max Durfee, Miami University; Dr. J. G. Grant, Iowa State Teachers College of A & M A, Dr. Edith M. Lindsay, University of California.

Members-at-large: Dr. Dana L. Farnsworth, Massachusetts Institute of Technology; Dr. John P. Monks, Harvard University; Dr. Grace Hiller, Goucher College; Dr. Norman S. Moore, Cornell University; Dr. Frank O. Robertson, University of Denver; Dr. Herbert R. Glenn, Pennsylvania State College.

* * *
A vacancy exists at the Student Health Service at Indiana University for a male physician, preferably under forty years of age. An interested physician should contact Dr. E. Bryan Quarles, Director, Student Health Service, Indiana University, Bloomington, Indiana.

* * *
The fourteenth annual meeting of Michigan College Health Association was held at Wayne University on Friday, May 25. The registrants numbered thirty-four persons representing seventeen organizations. The officers elected for the coming year are: president—Gayle Pond, R.N., Western Michigan College; vice-president—Charlotte Mersky, M.D., Wayne University; secretary-treasurer—Opal Thorpe, R.N., Central Michigan College.

* * *
A physician with several years' part-time experience in student health work would like a position in a Student Health Service, preferably in the warmer portions of the country. If interested, please contact Edith Lindsay, Secretary-Treasurer, School of Public Health, University of California, Berkeley, California.

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Woodward Medical Personnel Bureau (formerly Aznoes—Established 1896) have a great group of well trained physicians who are immediately available. Many desire assistantships. Others are specialists qualified to head departments. Also Nurses, Dietitians, Laboratory, X-Ray and Physiotherapy Technicians. Negotiations strictly confidential. For biographies please write Ann Woodward, Woodward Medical Personnel Bureau, 185 North Wabash, Chicago.

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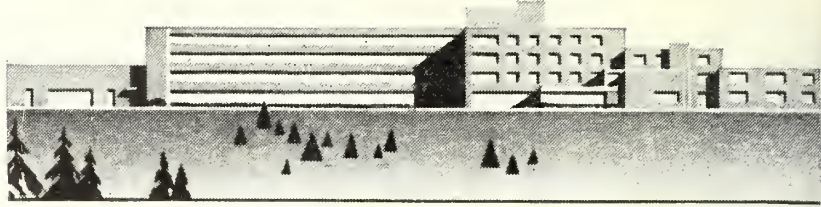
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Glenwood Hills New Wing

Depicted at right is the proposed \$1,100,000 addition to Glenwood Hills Hospitals which, when completed, will be a four-story structure housing facilities for geriatrics, the treatment of mentally retarded, emotionally disturbed and epileptic children, an outpatient clinic and additional beds for psychiatric patients. The 90-bed wing will be immediately adjacent to the present structure.

These are outstanding necessities in the Northwest and no such services are available today on a voluntary hospital basis. Glenwood Hills Hospitals, with the largest psychiatric staff in the United States, is willing and able to spearhead these projects. Hospitalization in these branches is not a question of beds alone but a program for which Glenwood Hills is well suited with its million dollar plant and its beautiful 140-acre tract of land sur-



rounded by hills, parks, woods and lakes adjacent to the city. Also, Glenwood Hills, a voluntary, non-profit, non-sectarian institution, is eligible for this project because of its large organization already accepted and functioning, its deluxe nursing service and, above all, its school of nursing, neurology and psychiatry. This school is a most important and integral part of the community, furnishing properly trained nurses and hospital personnel in the Northwest. Glenwood Hills is in Minneapolis.

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NEW LAKESIDE BROCHURE

Realizing that some medicinal preparations of their company and many now in chemical research or shortly to be introduced for the treatment of degenerative disease can be used to best advantage only with an understanding of the metabolic groups for which they are intended, Lakeside Laboratories, Inc., of Milwaukee have published a 16-page 5-color brochure entitled, "Metabolic Individuality and Diagnosis of Degenerative Disease." This is a very handsome and informative piece of promotional literature for Lipoliquid Lakeside which is a product for the restoration of liver function in degenerative disease.

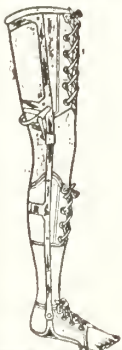
The human being's metabolic individuality is constituted of his somatotype and chemotype. The somatotype is one manifestation of metabolic individuality, seemingly a genetic expression, and a clue to the susceptibility to degenerative disease for that person. In the brochure the remarkable drawings of somatotypes—and there are several examples of each, ten in all—were done by Dr. Frank H. Netter of New York City. In addition there are six charts showing proportions of the various somatotypes, a chemotype chart and seven other Netter illustrations. Arteriosclerosis, thyroid activity, impairment of liver function in diabetes are discussed together with the role of choline and methionine. The authors have leaned heavily on W. H. Sheldon's Atlas of Man and Varieties of the Human Physique and Gertler's concept of the chemotype, some of which data is still to be published. There are forty-two medical, anatomical, biochemical, and anthropological references in the bibliography. The brochure may be had without cost by application to Lakeside Laboratories, Inc., and will well reward an hour's reading.

PABALATE SODIUM-FREE (Robins)

Pabalate Sodium-Free has been introduced by the A. H. Robins Co., Inc., of Richmond, Dallas and Los Angeles, as a new form of the antirheumatic Pabalate, a synergistic combination of two drugs for maintaining higher salicylate blood levels on lower salicylate dosage. Therapeutic indications for the use of the new product in the rheumatic affections are basically the same as for Pabalate, but Pabalate Sodium-Free is especially recommended where conditions prevail making it desirable to restrict sodium intake or increase potassium intake or both. Each tablet contains Ammonium Salicylate (5 Gr.), 0.3 Gm., and Para-Aminobenzoic Acid (5 gr.), 0.3 Gm. (as the potassium salt).

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The Journal Lancet

SEPTEMBER 1951
Volume LXXI, No. 9

SERVING THE MEDICAL PROFESSION OF MINNESOTA,
NORTH DAKOTA, SOUTH DAKOTA AND MONTANA

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PARKE, DAVI

The Journal Lancet

A dedication . . .

DR. GEORGE M. WILLIAMSON, who practiced in North Dakota, first at Ardoch from 1895 to 1906, and at Grand Forks from 1908 until retirement, was one of the truly great men in American medicine. Immediately after graduating from the medical school of the University of Manitoba in 1895 he established a general practice in North Dakota. After nine years he went to Edinburgh, Glasgow, London



GEORGE M. WILLIAMSON, M.D.

and Dublin where he took special postgraduate work. He returned to North Dakota in 1908 and re-entered the general practice of medicine, this time at Grand Forks, where he remained until his death at the age of 83 years, on December 11, 1950. He was a firm believer in the fundamental principles upon which America was built and practiced these principles so religiously that it can now be said no finer or more trustworthy American citizen ever lived. His life and the high quality of his work fully merited the abiding confidence and respect of his innumerable patients, his fellow physicians, both locally and nationally, and everyone who had the privilege of knowing him. His medical and graduate training, his years of experience in general practice, his constant reading of current

medical literature, made him an unusually well informed and skillful physician. His unexcelled character and trustworthiness, his completely unselfish spirit, and his constant interest in the welfare of others caused his advice and counsel to be sought and revered.

The confidence of the medical profession was manifested in the high and important positions to which he was appointed and elected by fellow physicians. Prior to 1911 there was in North Dakota, as well as many other parts of the country, considerable irregularity in the practice of some physicians. This irked him and he was finally able to take positive action to correct it when he was appointed chairman of a committee to frame a Medical Practice Act for his state. This Act became effective in 1911 and Dr. Williamson was appointed Secretary of the North Dakota State Board of Medical Examiners. The medical profession insisted upon his remaining at this post for the next 38 years. Throughout this period he and other board members were successful in barring undesirable persons from the practice of medicine in the state. Concerning Dr. Williamson and the State Board of Examiners, the famous Dr. J. Grassick commented, "It is not too much to say that the

burden of the work fell upon his shoulders and that he has given it his best effort and made it a model, the equal of any board of a similar nature in the country." Dr. Williamson's work on this board was so outstanding that he was soon recognized by the Federation of State Examining Boards where he remained in various capacities for the next 36 years. For example, he served on the Executive Committee from 1919 to 1922 and served as president for the year 1934.

He was appointed surgeon for the Great Northern and Northern Pacific railroads at Grand Forks in 1908, and became a Fellow of the American College of Surgeons in 1920.

The North Dakota State Medical Association honored him and itself by electing him to its presidency in 1918. He served on many committees. Indeed, he was chairman of the committee that revised the constitution and by-laws of the State Association in 1919. Over a long time he was an influential member of the council of the State Association.

Dr. Williamson was a stalwart supporter of the official publication of the North Dakota State Medical Association, which was the *Northwestern Lancet* until 1912 when its name was changed to THE JOURNAL-LANCET. He was thoroughly appreciative of the ability of Dr. A. J. Stone of St. Paul, who was editor until 1900, and of Dr. Stone's successor, Dr. W. A. Jones, of Minneapolis, who served for nearly three decades of the present century. He was also a close friend of W. L. Klein, long time publisher of this journal. When the present publishers and editorial board succeeded those who retired about 1930, Dr. Williamson's deep interest in the journal continued. His advice was sought frequently with reference to policies. This continued even for a time after he retired from private practice, as his 50 years of experience and close association with the journal provided him with information that no one else possessed.

Dr. Williamson initiated and promoted many worthwhile activities apart from his profession. The welfare of the youth of his city and nation was uppermost in his mind. In 1921 he was elected president of the Grand Forks Commercial Club. In that organization he led the drive for a municipal recreation field. He was responsible for the organization of the Grand Forks Associated Charities.

As president of the Commercial Club he initiated plans for installing municipal music in the schools and city of Grand Forks. Soon this city became one of the outstanding musical centers of North Dakota and received national recognition for its school and municipal band. In 1925 Dr. Williamson played the leading role in the formation of the Grand Forks Community Music Association. He was elected first president, which position he held through the remainder of his active life.

To visit Dr. Williamson's home and speak before one of his local organizations was a unique experience. He and Mrs. Williamson, who celebrated their fiftieth wedding anniversary in 1945, conducted a home in which hospitality was unexcelled. To spend an evening in their "cellar" was a rare privilege, enjoyed only by their most intimate and trusted friends. In this cozy part of the home they had assembled a rare and expensive collection of extraordinary relics of great historical significance from various parts of the world, including books, paintings and other items. The fine character of Dr. and Mrs. Williamson permeated the very atmosphere of this home. It was possible, for instance, to sign the "cellar" guest book and to see the names of many widely and favorably known persons engaged in various activities of life in this country and abroad, with the immediately preceding name, that of Harry Lauder.

The publishers and editorial board of THE JOURNAL-LANCET have the significant honor of dedicating this North Dakota issue of September 1951 to Dr. George M. Williamson in recognition of his outstanding service to humanity.

J. A. MYERS, M.D.

Concepts of Bone Grafting

GEORGE M. HART, M.D.*

Minot, North Dakota.

THE earliest creditable report of the grafting of bone is attributed to Jobi Meekren² who in 1682 repaired a defect in a soldier's cranium with pieces of bone removed from the skull of a dog. Meekren's work was not published but was recorded in the archives of the church from which it was later ordered deleted.

Almost a century later John Hunter,² who was born in 1728, recognized the principles of bone grafting. He studied the antlers of deer, noted the rich vascular bed which was present and recognized the importance of blood supply in the formation of bone. He knew that in the healing of fractures bone was formed by the growth of vascular cellular tissue from the surrounding muscles, periosteum and bone ends. He knew that in the process of repair bone fragments, completely stripped of all soft tissue attachments, could be incorporated into the mass of newly formed bone and even contribute toward union by bridging the fracture. He transplanted a human tooth into a cock's comb and proved that transplanted tissues could survive long enough to await revascularization. He transplanted the bone spurs of hen chickens into the legs of young cockerels and saw them take root and grow. However, he was unable to establish bone grafting as a part of surgical technic as he was defeated by sepsis.

Merrem,² in 1809, obtained successful healing of bone plates placed in the skulls of animals after trephining. Walther a few years later applied the same technic to humans and noted partial healing of the graft in spite of coincident suppuration. Lister, 70 years after Hunter's death, published his work on the control of infection.

William Macewen,² a Scotsman from Glasgow, performed in 1880 the first successful bone graft of a long bone. At the age of 29 he had introduced the operation of wedge osteotomy for correction of rachitic deformity. One day a boy was brought to his hospital for amputation of an arm from which the humerus had previously been resected for osteomyelitis. Macewen gathered the wedges from six rachitic children and transplanted them into the patient's arm. The reconstructed bone measured six inches in length, four inches consisting of transplanted bone. It is stated that the patient grew to be a capable workman with a strong but slightly curved humerus measuring eleven inches in length.

Fred Albee¹ of New York published in 1911 the first of his many articles on bone grafting. He devised a surgical armamentarium for cutting and modeling bone. He introduced his motor saw, stating that according to Crile's kinetic theory a rapidly revolving motor instru-

ment should diminish shock on account of the lessened excitation of the afferent nerves. He noted clinically that shock was less. However, he did not know whether this was due to Crile's theory or to the lessened operative time. Albee did not use metal for fixation, but employed kangaroo tendon when necessary and fitted grafts with his motor saw, constructing bone inlays, wedges, dowels, tongue and groove joints, morticed and dove-tailed joints.

M. S. Henderson⁶ reported in 1923 in the *Journal of the American Medical Association* on his use of massive onlay grafts for non-union of fractures. He believed the inlay grafting method of Albee a sound procedure but objected that the grafts were too small, particularly when used in fractures of the forearm. He gave the following arguments in favor of his onlay graft: (a) when the graft was firmly fastened it provided a higher degree of internal fixation than any other method; (b) a broader contact of bone forming elements was obtained deep in the cortical layer; (c) the size of the graft provided splint-like support; (d) the time of absorption and replacement of the graft was longer than when a smaller graft was used and (e) callus was stronger and more mature when the "weak period" of the graft was reached six to eight weeks after operation.

THE FATE OF A BONE GRAFT

The fate of transplanted bone has interested many workers throughout the past century. It has long been recognized that cellular life may be quite independent of organic or somatic life. Tissue cells may retain their viability long after being detached from the living organism. The higher the specialization of the cell, the less its resisting and proliferating powers. The richer the tissue in blood vessels, the less likely it is to survive transplantation. Thus the more simple connective tissues such as bone, fat and fascia are most suitable for transplantation. They are capable of extracting nutrition from the tissue into which they are planted and are able to regenerate so that portions which disintegrate are replaced.

Ollier in 1858 first described the osteogenic power of the periosteum. He showed experimentally that new bone was formed from the free periosteum included on a transplanted bone graft. Buchholz in 1863 confirmed Ollier's macroscopic observations by finding histologic evidence of periosteal regeneration. Barth, working with dogs in 1893, noted that though in most cases of bone transplantation the graft was reabsorbed, the defect was frequently bridged by new bone. He believed that this bone arose from the borders of the defect and grew out along the transplant which acted as a scaffold. Axhau-sens in 1908 disagreed and stated that though the bony

*Section on Orthopedic Surgery, Northwest Clinic, Minot, North Dakota.

substance died it was reabsorbed while the periosteum and medullary bone lived and laid down new bone. Macewen in 1912 advanced still another theory in which he stated that the periosteum acted only as a limiting membrane during the growth of the new bone which was formed from the bony substance of the transplant. He denied any specific osteogenic power of the periosteum.

Baschkirzew and Petrow, in that same year, transplanted bone into the soft tissues of rabbits and noted that it was reabsorbed and new bone laid down in its place. Repeating their experiments with boiled bone, they found that though reabsorption occurred no new bone was formed. In the former cases new bone formation occurred even though periosteum was not included in the transplant. From this they concluded that new bone was formed by metaplasia of connective tissue cells which grew around the transplant. They reasoned that the boiled bone acquired new biochemical properties which failed to stimulate connective tissue to form new bone.

Murphy in 1914 transplanted whole bones including cartilage and epiphyses. He concluded that these were unsuitable for transplantation as they hindered osteoblastic attempts on the part of the surrounding connective tissue. Gill in 1915 disagreed with Murphy and transplanted whole metatarsal bones including the cartilage covered ends. He found that though they were reabsorbed, new bone, probably coming from surviving osteoblasts of the transplant, was laid down in their place.

McWilliams in 1916 made the interesting observation in dogs that when the periosteum on a transplant was left intact the entire transplant remained viable. When the periosteum was scraped off, approximately one-half of the transplant seemed to be reabsorbed. He concluded that the periosteum had bone building capacity and also acted as a nutritive membrane. Berg and Thalheimer in 1918 transplanted free periosteum in cats and found that it formed bone. They believe that in bone transplanted without periosteum, the osteoblasts in the Haversian canals were the most important cells in new bone formation.

Bancroft in 1918 resected 3 cm. sections of the radius in dogs. He removed the periosteum, split the bone into splinters 1 to 2 mm. thick from which he scraped off the endosteum, and replanted these sections into the defect. He noted that in one year the bone had assumed its normal appearance. He thought that bone formation occurred from the osteoblasts in the Haversian canals and from metaplasia of the surrounding connective tissue.

Nageotte in 1920 transplanted bone into the subcutaneous tissues of rabbits and studied the transplants histologically two to four months later. He noted reabsorption of the graft took place on the surface and in the Haversian canals. Haas in 1923 transplanted fractured living and boiled metacarpal bones in dogs. The living bones formed callus and healed; the boiled bones did not. He thought this experiment proved the theory of connective tissue metaplasia, reasoning that the peri-

osteum and endosteum were alive in unboiled bone and were responsible for repair. In boiled bone these tissues were not viable so repair did not occur.

Polettini in 1924 found that bone and cartilage treated with alcohol and formalin previous to transplantation stimulated new bone formation. He concluded that untreated bone which died after transplantation gave off some autolytic ferment which inhibited metaplasia of the surrounding connective tissue.

Four theories of the mechanism of new bone formation following transplantation of bone were advanced through the years. *Ollier's theory* held that the periosteum and osteoblasts in medullary bone live to form new bone. *Barth's theory* stated that the transplanted bone acts merely as a scaffold and itself is passive. New bone is formed from the edges of the defect in the living bone and bridges across the graft. *Macewen's theory* held the periosteum acts only as a limiting membrane during the growth of new bone. Osteoblasts in the substance of the transplant proliferate and lay down new bone. *Baschkirzew and Petrow's theory* proposed that the transplanted graft dies and is reabsorbed. Metaplasia occurs in the surrounding connective tissue to form new bone which invades the transplant.

The present concept as to the fate of a transplanted bone is somewhat as follows. When bone is transplanted, the greater portion dies. Osteoblasts in the lacunæ appear shrunken or the lacunæ are empty. Cells which live are determined by the nourishment provided by the surrounding blood and lymph supply. These consist of the osteoblasts on the surface of the graft, those lining the medullary cavity and those situated at the mouths of the Haversian canals. In the course of a few days these cells show marked proliferation. Soon revascularization of the graft takes place. New vessels from the surrounding connective tissues invade the Haversian canals and are accompanied by proliferating osteoblasts. Osteoclasts appear and remove the dead bone. Spaces are formed which become lined by the proliferating osteoblasts. The graft is thus absorbed and replaced at the same time.

These changes are entirely dependent on the activity of the osteoblasts. When a graft is boiled the osteoblasts are killed. Revascularization still takes place but absorption and new bone formation do not occur. However, if boiled bone is brought in contact with living osteoblasts, it is invaded and new bone formation begins. Thus when small gaps are to be bridged, it is conceivable that boiled bone would function satisfactorily.

Absorption and new bone construction are not evenly balanced. During the first six to eight weeks following transplantation of bone, absorption proceeds more rapidly than reconstruction. If at the end of this period the bone has some function to perform, reconstruction outpaces absorption. However, if bone is implanted in a site where it has no function, absorption continues to dominate reconstruction, and in about six months the graft is represented by a fibrous scar.

The activity of the osteogenic process depends on the amount of bony surface exposed to the surrounding tis-

sue fluids. Thus, cancellous bone such as iliac crest or ribs will show new bone formation earlier than cortical bone.

FUNDAMENTAL PRINCIPLES IN BONE GRAFTING

The most fundamental principle of bone grafting is expressed in the statement of Wolff's law: "every change in the form and position of bones or of their function is followed by certain definite changes in their internal architecture and by equally definite secondary alterations in their external conformation in accordance with mechanical laws." Stated more simply, form follows function.

Wolff's law influences bone grafting procedures of all types. It not only stimulates grafts to proliferate and strengthen to an almost unlimited degree if the new mechanical environment requires it, but it causes bone from which grafts are taken to be restored to its original strength. It affects the general histological character of bone; cortical bone implanted in an area of cancellous structure ultimately becomes spongy, and cancellous bone proliferates to become dense when the stresses so require.

When bone is transplanted, close and stable contact should be obtained between large surface areas of the graft and the host. As noted previously, a large portion of the graft dies and revascularization is the essential process through which the graft becomes living bone. Therefore, the graft should be in contact with a vascular area. The deeper layers of the cortex and the medullary cavity are a better source of capillary growth than the hard superficial cortex. Similarly, the graft itself is more readily revascularized if it consists in part of soft, cancellous endosteal bone into which capillaries can readily grow. This layer should be in immediate contact with the surface of the host bone. Also, the larger the areas of graft and host bone which are brought into contact, the more readily revascularization takes place with subsequent replacement by living bone.

Fixation of the graft to the host must be mechanically stable. Bone differs from soft tissues which are pliable and movable. Any movement between graft and host bone tears the new capillaries and delays or prevents revascularization. To produce adequate internal fixation, the graft must be strong enough to withstand such forces as it may be subjected to without bending or breaking. Therefore it must be relatively large and consist in part of hard cortical bone. Cancellous bone chips can be packed around the graft. This procedure is logical as the chips are not subjected to strain and serve to provide a supplementary source of new bone.

Before grafting, the fractured surfaces should be cleared of fibrous tissue and sclerotic bone. When these are not removed, a barrier to revascularization and new bone formation exists. The normal apposition and alignment of the fragments of the host bone should be restored, reducing the amount of bone absorption which must occur and minimizing new bone formation. Where actual bone loss has occurred, the gap can be bridged by a cortical graft filled in with cancellous bone.

TYPES OF BONE GRAFTS

Ten types of bone grafts are used in reconstructive bone surgery. These are intramedullary, inlay, onlay, double onlay, buried, bone pegs, bone fragments, sliding, split bone and osteoperiosteal.

Intramedullary grafts. An intramedullary graft is a closely fitting cortical graft which is driven into the medullary cavity of one fragment leaving a portion protruding from the fractured surface. By manipulation, this end is then introduced into the medullary cavity of the opposite fragment, and the fracture is impacted upon the graft.

Such a graft has several disadvantages. The length of the graft introduced is limited by the amount of distraction which can be produced by manipulation. If the graft is loose enough to be threaded easily down the medullary canal so that its center is at the fracture site, it does not hold the fragments firmly enough. An intramedullary graft introduces a hard cortical plug into the medullary cavity which diminishes blood supply to the bone ends. Its use should be limited to those cases in which it is the only practicable procedure.

Inlay grafts. An inlay graft is placed in a slot cut through the cortex of the host bone and crosses the fracture site. In this type of graft, the various bone layers coincide with those of the host bone. Such a graft may be rectangular, wedge or diamond-shaped.

An inlay graft has certain advantages. The structure of the bone is returned to near normal. Three surfaces of the graft are in contact with the host bone: periosteum, cortex, and endosteum. The soft tissue usually closes over the graft without undue tension.

An inlay graft has some disadvantages. The size of the graft is limited by the size of the slot which can be cut into the host bone. Springing an inlay graft into its bed is often difficult, and the graft may be broken easily or the host bone split. Often the fit is not perfect and fixation can be obtained only by driving the graft into the medullary cavity of the host bone producing in effect an intramedullary graft.

Onlay grafts. In an onlay graft, a portion of the cortex is removed on one surface of the bone to form a flat bed to which the graft can be fixed with metal screws. The amount of cortex of the host bone removed is important. By removing it entirely, the graft can be placed in contact with the vascular medullary bed; however, the screws then penetrate but one cortex of host bone. A compromise can be effected by leaving a thin layer of cortex and drilling holes so as to avoid the areas through which the screws will pass. In this way the screws engage some cortex on both sides of the host bone.

This method of grafting is simple and effective. A massive graft can be used providing strength and quantitatively many osteoblasts. However, only one surface of the graft is in contact with the host bone, and some tension is usually placed upon the soft parts when the wound is closed.

Double onlay grafts. Two onlay grafts may be used on opposite sides of the host bone. Such a procedure is useful when the host bone is too fragile to allow stable fixation with a single graft.

Buried grafts. For a buried graft a bed is prepared by driving a chisel into the host bone. A channel is thus formed into which the graft may be driven. This procedure has been extensively used by Brittain³ in arthrodesing joints.

Bone pegs. Bone pegs are fashioned from cortical bone. They are driven into a drill hole crossing the fracture line as nearly as possible at a right angle. Their function is mechanical and osteogenic value is of secondary importance.

Bone fragments. Fragments of cancellous bone can be packed about a fracture site or used to fill defects in bone. Such fragments have excellent osteogenic power but provide no mechanical fixation. They are used only in conjunction with some other form of graft which effectively immobilizes the host bone or when fixation is not required.

Sliding grafts. A sliding graft is a modification of the inlay graft. The graft is cut from one of the fragments at the fracture site and slid halfway across the defect into a bed prepared in the opposite fragment. The graft bridges the fracture site and provides stability. Such a graft has two disadvantages. It is often osteoporotic because of the absorption of bone salts occurring following fracture. Fixation is not always secure for saw cuts reduce the breadth of the graft in relation to the width of the bed. This may be partially compensated for by cutting a wedge shaped graft.

Split bone grafts. Split bone grafting technic was first described by Gill⁵ in 1932 for the treatment of fractures of bones of the forearm. Flanagan and Burem⁴ reported in 1947 their adaptation of the method for reconstruction of defects of the tibia and femur. In their technic, the bone is split lengthwise above and below the fracture line. One fragment is constructed to be approximately twice the length of the other. The longer piece is then used to bridge the fracture site. The remaining bone is placed in the most suitable position depending upon the location of the fracture. Fixation is carried out with metal screws.

Such a graft bridges large defects with a massive amount of bone closely simulating the normal contour of the host. A great disadvantage, however, is that should the graft sequestrate, little remains for future procedures.

Osteoperiosteal grafts. This type of graft was first advocated by Ollier. The periosteum and outer layer of cortex of the donor bone are removed with a chisel. This tissue is then transplanted to provide stimulation of osteogenesis. Such a graft provides no mechanical continuity but is a good source of osteoblasts.

SOURCES OF BONE GRAFTS

Bone grafts may be autogenous, homogenous or heterogenous and, in general, are effective in this order.

Autogenous grafts. Autogenous grafts are removed from and transplanted into the same individual. There are several types. Tibial grafts contain strong cortical bone of fairly high osteogenic value. Most commonly used is a flat rectangular graft cut from the anteromedian surface of the tibia. Massive tibial grafts including the solid cortical crest of the tibia can be used where greater strength is required. Bone pegs may be fashioned from the cortex of the tibia without opening the medullary cavity. Their use has been discussed previously. Soft cancellous bone of high osteogenic value is available from the crest and lateral surface of the ilium. Such grafts provide little strength and cannot be depended upon for internal fixation. The entire upper two-thirds of the fibula can be resected subperiosteally and used as a bone graft. Such a graft has a hard outer shell of cortical bone and initially provides great strength. However, it is revascularized slowly and has limited osteogenic value.

Homogenous grafts. An homogenous graft is removed from one individual and transplanted into another of the same species. They are less satisfactory than autogenous grafts in which a portion of the graft may survive. It is probable, though not certain, that all cells in an homogenous graft die. Unless tolerated as an encapsulated foreign body or absorbed and regenerated by the host, they are usually unsuccessful. However, they are useful in many instances where osteogenetic power is not required or can be supplied by the surrounding host bone. The advantage of such grafts is that they can be stored aseptically at temperatures of -20° to -25° Centigrade for periods up to at least ten months. Large amounts of bone can be provided when removal of autogenous bone of an equal quantity would be impossible or extremely hazardous to the host. Bone stored at low temperatures remains aseptic almost indefinitely providing no period of thawing occurs. The method of storage is simple, the bone merely being placed in a sterile glass tube with a screw cap which is wrapped in a sterile towel and immediately placed in a deep freeze where it is left until used.

Heterogenous grafts. This type of graft is mentioned only as a matter of interest as its use has been largely abandoned. A heterogenous graft is removed from an animal of a species different from the one into which it is transplanted. Such grafts stimulate a marked foreign body reaction and are not incorporated into the host bone. Many types of heterogenous grafts have been used. Henderson introduced beef bone screws in 1920 and used these successfully for many years. Apparently they were often fairly well tolerated by the tissues. They have now been supplanted by vitallium and stainless steel screws.

Os purum, a type of heterogenous graft, was introduced by Orell⁷ in 1937 with the hope of eliminating the reaction which followed the use of transplanted beef bone. Os purum is beef bone prepared by removing all soft tissues by scraping. The bone is soaked in saline to remove blood and serum and then immersed in ether

(Continued on page 416)

Myxedema

A Case Report

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F. M., a 50-year-old widow, was first seen at Ancker Hospital, St. Paul, Minnesota, in December, 1950, because of a three-year history of progressive fatigue and cold intolerance. Her illness first began in 1947 with fatigue which she described as a "dragged out" feeling. She also noted an intolerance to cold, using four or five blankets in the winter months. She began to have rather severe intermittent headaches, and soon observed slight swelling of the face, neck, and ankles, which was most noticeable in the evening. There was also a dryness of the skin with little sweating. During the three years of her illness she experienced an intermittent constricting precordial pain, radiating through the chest, which occurred when she walked briskly or climbed stairs and which was relieved by rest. There was associated dyspnea. Crampy pains appeared in the calves of the legs when she walked a half block or so, which were also relieved by rest. Similar cramps of the arms and hands were noticed when sewing or cooking. Symptoms had been especially severe in the ten months before she sought medical attention. In this same period she developed progressive hoarseness. Crying spells were frequent. Despite noticeable anorexia, she had a weight gain of 40 pounds in six months.

Past history revealed that the patient had typhoid fever at nine years of age. In 1946 she was hospitalized for three and one-half months because of a severe migratory arthritis, accompanied by swelling, redness, and increased heat in the joints. The clinical impression was rheumatic fever. She had pneumonia four times, the last in 1944. She had three previous operations: one for appendicitis in 1919; another for "fibroids" in 1929; and hysterectomy with removal of the tubes and ovaries in 1932. Family history was non-contributory. On system review, the patient admitted dizziness for years. She had chronic constipation. A bladder infection in 1937 responded readily to therapy. Menstrual periods had been regular until they ceased with her surgery of 1932.

On physical examination the patient was found to be a moderately obese, white female of middle age who appeared sluggish and tired. Ears, nose, and throat were negative although the fundi showed slight arteriosclerotic changes. Thyroid was not enlarged. Chest was negative and lung fields were clear. Heart was regular with normal tones and no murmurs. Blood pressure was 118 over 90 and pulse was 68. The abdomen revealed no

masses or enlarged organs. Pelvic examination was negative. The deep-tendon reflexes were found to be snappy with a slow, deliberate return. No adenopathy was noted. Skin over the entire body was thickened and dry. No pitting occurred. Hair was coarse and brittle especially close to the scalp.

The laboratory examinations revealed a hemoglobin of 11.0 gm. Red blood count was 4,510,000 and hematocrit was 35.5 per cent. Leukocyte count was 5,200 with a normal differential. A fasting eosinophil count was 88 per cu. mm. and dropped to 47 four hours after 0.3 mg. of epinephrine. Later the fasting eosinophils were 75 per cu. mm. and decreased to 29 with epinephrine. Sedimentation rate was 20 mm. per hour. Blood urea nitrogen was 11.2 mg. per cent. Initially, the cholesterol was 675 mg. per cent. Glucose tolerance test revealed a fasting blood sugar of 87 mg. per cent which rose to a high of 203 mg. per cent in one hour and fell to 92 mg. per cent in three hours. Cephalin cholesterol was negative. Blood Wassermann and Kahn were negative. Gastric analysis showed no free hydrochloric acid in the fasting specimen. There was a rise to ten degrees of free acidity 15 minutes after histamine. Urinalysis was negative. The first basal metabolic rate was -20 . A radioactive iodine test revealed a thyroid uptake of 6.1 per cent in 24 hours. Urinary excretion in 24 hours was 58.7 per cent. The electrocardiogram showed inverted T waves in many of the limb and precordial leads.

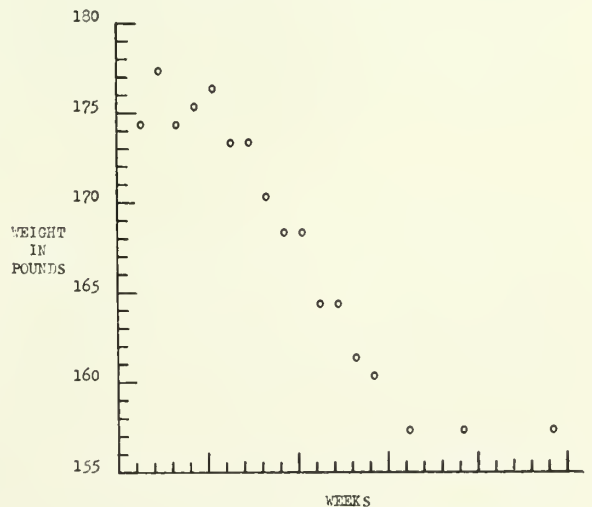


Fig. 1. Weight of patient from Dec. 1, 1950 to June 1, 1951.

*Formerly on the staff of Ancker Hospital, St. Paul; now with the Dakota Clinic, Fargo, North Dakota.

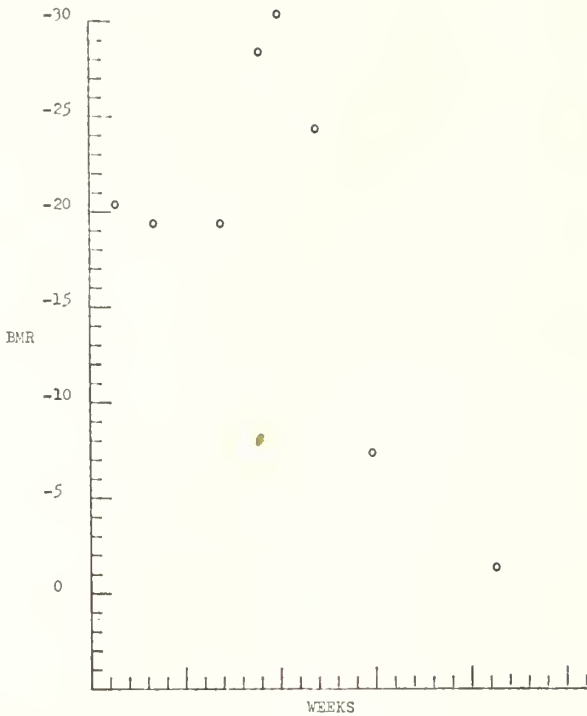


Fig. 2. Basal metabolism rates from Dec. 1, 1950 to June 1, 1951.

In some leads there was slight ST depression. PR interval was 0.16 seconds and QT interval was 0.38 seconds.

On chest x-ray the heart was found to be within normal limits although there was slight prominence of the left ventricular area. Lung fields were clear. Skull x-ray was negative. The sella turcica was normal in size. The cholecystogram, and upper and lower gastro-intestinal series were normal.

The patient was considered to have myxedema. Therapy, consisting of 7.5 mg. of desiccated thyroid daily, was instituted on January 3, 1951, with the dosage increased at two-week intervals until 120 mg. were given daily. After a few weeks, the patient slowly but definitely improved. Her weight, which was 174 pounds in

December, 1950, steadily decreased to 157 pounds in May, 1951 (Figure 1). During this time she lost much of her brawny edema and puffiness, regained strength and became more cheerful and talkative. Hoarseness disappeared. Her episodes of precordial pain, as well as arm and leg cramps, became more infrequent. The patient soon stopped complaining of feeling cold. The basal metabolic rate, which was -20 on initiation of therapy, showed a transient increase in negativity to -30 in February, 1951. Thereafter, there was a steady change toward normality, with a reading of -1 on April 27, 1951 (Figure 2). There was a progressive fall in blood

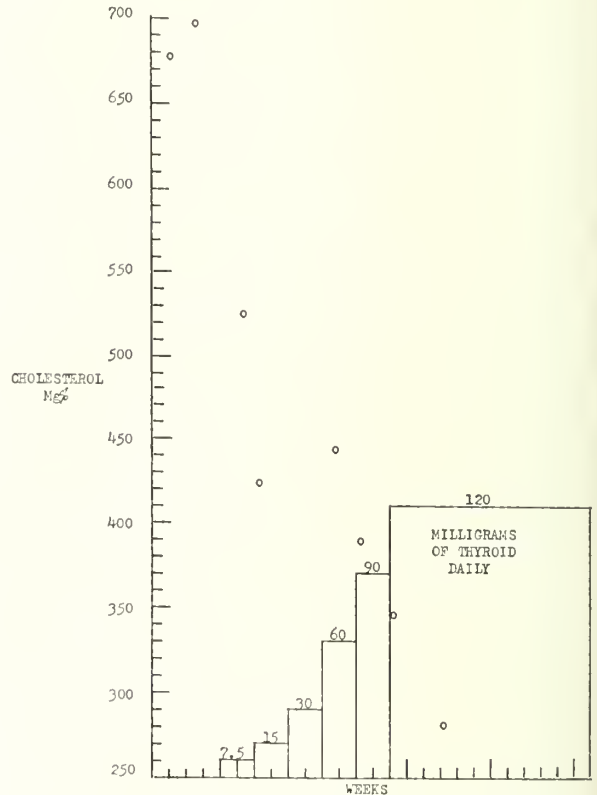


Fig. 3. Cholesterol values and thyroid therapy from Dec. 1, 1950 to June 1, 1951.

TABLE I
Millimeters of Negativity and Positivity of T Waves

	I	II	III	aVr	aVl	aVf	V1	V2	V3	V4	V5	V6
December 6, 1950	-2.0	-2.0	-1.0	2.0	-0.5	-1.0				-1.0		
December 18, 1950	-1.5	-1.5	-0.5	1.5	-0.5	-1.0				-1.0		
December 26, 1950	-1.0	-1.5	-0.5	1.5	-0.5	-1.0	1.0	1.0	1.0	1.0	-2.0	-2.5
January 9, 1951	-1.0	-1.5	-0.5	1.0	-0.5	-1.0	0.5	0.5	0.5	-0.5	-1.5	-2.0
January 17, 1951	-1.0	-1.5	-0.5	1.0	-1.0	-1.0				-1.0		
January 24, 1951	-1.0	-1.5	-0.5	1.5	-0.5	-1.0	1.0	1.5	1.5	-1.0	-3.0	-2.5
February 6, 1951	-1.0	-0.5	0.5	1.0	-0.5	0.5	1.0	1.0	1.0	-0.5	-1.0	-1.0
February 20, 1951	-0.5	0	0.5	0	-0.5	0.5	1.0	1.5	1.5	1.0	-1.5	-1.5
March 12, 1951	0	0.5	1.0	0	-0.5	1.0	1.0	2.5	2.5	1.5	-1.0	-1.0
April 5, 1951	0.5	1.5	1.0	-1.0	0.5	1.0	-0.5	2.5	3.0	3.0	2.0	1.0
May 10, 1951	1.0	1.0	0.5	-1.5	0.5	1.0	-0.5	2.5	3.0	3.0	2.5	1.0

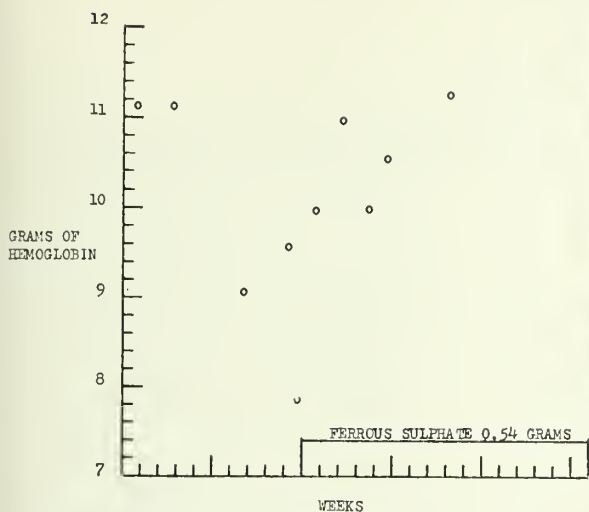


Fig. 4. Hemoglobin and iron therapy from Dec. 1, 1950 to June 1, 1951.

cholesterol from a value of 675 mg. per cent in December, 1950, to 278 mg. per cent in April, 1951. Figure 3 shows the cholesterol determinations and also the amount of thyroid which was given daily. Hemoglobin, which was 11.0 gm. on initiation of thyroid therapy, dropped to a value of 7.8 gm. on February 5, 1951. With iron therapy, the hemoglobin rose to 11.2 gm. in May, 1951. The hemoglobin values and daily iron therapy are shown in Figure 4. The electrocardiogram showed a steady progression to normal. The most striking abnormality present was the inversion of the T waves. Table I gives the values showing the eventual return to normal. In Figure 5 is shown a cardiogram before therapy as well as one five months after treatment was begun. Figure 6 shows the patient before and after treatment.

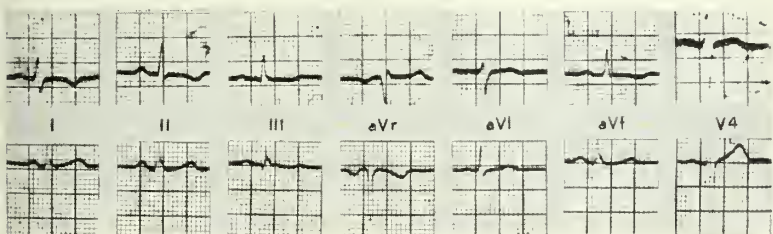


Fig. 5. The first electrocardiogram was taken December 26, 1950, before treatment. The second tracing was taken on May 10, 1951, after five months of thyroid therapy. The return of the T waves to normal may be noted.

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Fig. 6. The photograph on the left was taken in December 1950 and that on the right in May 1951, after treatment.

DISCUSSION

The patient presented the characteristic symptomatology of myxedema. The usual myxedema reflex with its slow return to normal was demonstrated. BMR's and blood cholesterols were in accordance with the diagnosis of hypothyroidism. An iodine uptake of 6.1 per cent also suggested that diagnosis.^{1,2,3} The low fasting eosinophil count with substantial drop after epinephrine was considered indicative of adequate adrenal function.⁴ Thus, primary myxedema, rather than secondary myxedema from hypopituitarism was suggested. The intermittent chest pain brought on by exertion and relieved by rest was thought to be angina pectoris. The T wave inversion in the electrocardiogram was thought consistent with either coronary insufficiency or myxedema per se. Such T wave changes have been described in myxedema patients with or without heart disease.^{5,6,7,8} The drop in hemoglobin after initiation of thyroid therapy was believed possibly due to hemodilution coincident with mobilization of edema fluid. The patient showed a gratifying response to thyroid therapy.

CONCLUSION

A case of myxedema with typical symptomatology has been described. The patient's laboratory and electrocardiographic findings have been presented and discussed. A satisfactory response was made with desiccated thyroid.

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The Journal-Lancet Exhibits Pioneer Instruments

IT WAS THE PRIVILEGE of the JOURNAL-LANCET staff to prepare, in collaboration with the State Historical Society of North Dakota, an exhibit of instruments and artifacts used by the pioneer doctors of North Dakota and Minnesota, for the meeting of the North Dakota State Medical Association held at Bismarck May 19 to 22, 1951. It was dedicated to the members of the Fifty Year Club and the honorary members of the association.

The State Historical Society of North Dakota loaned much valuable material, furnished four glass display cases, and helped arrange the exhibit. Other contributing groups included the Minnesota State Historical Society, Hennepin County Historical Society, Minneapolis, and Ramsey County Medical Library, St. Paul. Individual contributors were, from North Dakota, Dr. A. T. Horsman, formerly of Dunseith; Dr. O. C. Maereklein, Mott; Dr. G. F. Drew, Devils Lake; Dr. H. E. French and Dr. F. N. Burrows, Grand Forks; and from Minnesota, Dr. John S. Lundy, Rochester.

Since the material had to be assembled in a few weeks, and set up in a matter of hours, no attempt was made at a chronological arrangement. Each article exhibited, however, had its card with full identification and name of lender. Altogether, more than one hundred items were collected for display. It seemed like an anachronism that some of the more primitive instruments such as the lancets and cups for bleeding, were used only 65 or 70 years ago, here on the midwestern prairie. Still others, such as the obstetrical and surgical tools, looked as functional and well designed as those in use today.

From the fine collection of the State Historical Society came several objects which had belonged to the late Dr. Evan Engstad of Grand Forks; many surgical tools purchased during the 1880s and '90s; a specimen of the original Riva-Rocci apparatus, the first practical device for testing blood pressure, purchased in 1896; a chloroform inhaler from 1901; a Graefe knife, bought in 1886 and used in performing the first cataract operation in what is now North Dakota; medical syringes with leather pistons, 1900; and a fluoroscope used with a static x-ray machine, 1889.

Several items—a pocket surgical kit, and adjustable angular metal splint, a pocket dispensing kit, a medical book—belonged to Dr. Henry Porter, who was with General Terry's command on the campaign of the summer of 1876, and who treated the wounded in Major Reno's command at the Battle of the Little Big Horn.

An odd item from the North Dakota collection was a "Morse Electric Belt," useless and indeed injurious,

because of the acids used to charge it. It was a device very popular around the turn of the century, bought at drug stores, and allegedly good for building sexual strength and for relieving digestive, nervous, and other disorders.

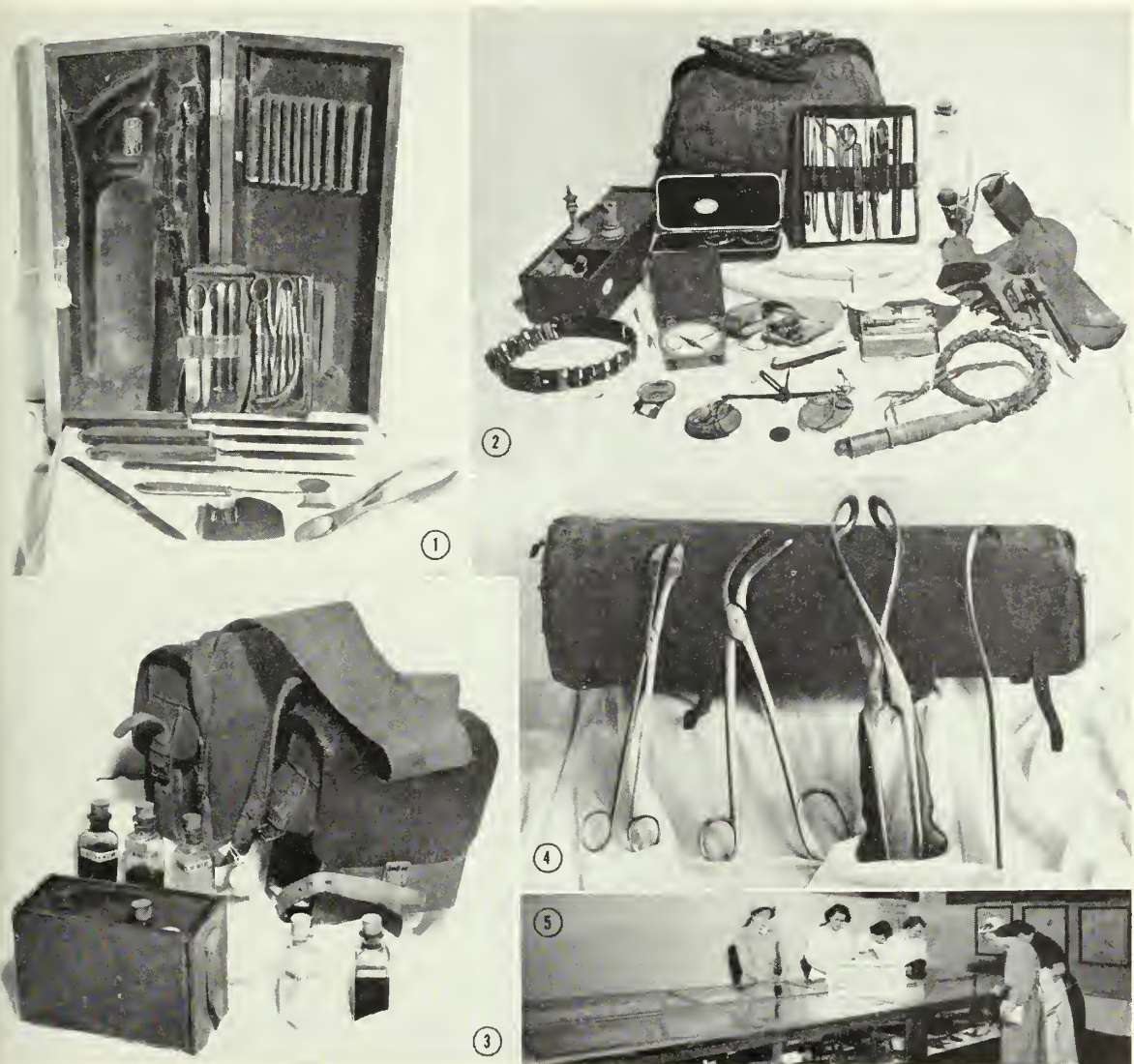
From the Minnesota Historical Society came some most unusual examples of diagnostic and laboratory devices, as well as machines for treatment. These included a "Harris Urine Segregator," of eleven intricate parts; a "lungbath" for the treatment of consumption, asthma, and other respiratory ailments, a magneto-electric machine, used in 1854 by Dr. J. C. Ferguson for the treatment of nervous diseases; a handsome brass stomach pump in a mahogany case, also used by Dr. Ferguson; and Mattson's "Family Syringe."

A pair of handmade forceps were among the articles loaned by the Ramsey County Medical Library. They had been constructed by a blacksmith for Dr. D. F. Powell, a former partner of Buffalo Bill, to enable him to extract a bone from the throat of a choking Indian. A pair of leather saddle bags, worn from use, contained some of the original medications dried in their respective bottles.

A most unusual walking stick belonging to the late Dr. A. J. Grassick, author of *North Dakota Medicine Sketches and Abstracts*, was loaned by Dr. H. E. French, dean emeritus of the University of North Dakota medical school. Inscribed with drawings and autographs by classmates or fraternity brothers at the University of Michigan medical school, the stick gives a disarming view of student life of seventy-five years ago. There are drawings of the school; a doctor with high hat, frock coat, Van Dyke beard, carrying a bag labeled PILL; a surgeon's saw; a skull and crossbones; a stethoscope, a campus cenotaph. It served the doctor in later life, no doubt, as a conversation piece on professional and social calls.

Dr. Henry F. Sigerist, in his recently published *History of Medicine*, advocates that each medical society build up its own historical collection of instruments from its own region or locality. In this way priceless mementoes would be saved for future generations, and each society would have a visual record of its own history, establishing a feeling of continuity and identity with the past.

The JOURNAL-LANCET exhibit was a very temporary affair, collected in a matter of weeks, and displayed for only the three days of the state meeting. But it proved so interesting to the staff who collected it that we also commend to every organized society the building of its own permanent collection of medical artifacts.



Figures 1, 2, 3 and 4 by Indahl, Minneapolis.
 Figure 5 by R. Kenneth McFarland, Bismarck.

INSTRUMENTS AND ARTIFACTS OF OUR PIONEER PHYSICIANS

1. A set of amputation instruments belonging originally to Dr. Ruger, a medical officer who was stationed at Fort Totten shortly after the Civil War and who later practiced at Devils Lake, North Dakota. Loaned by Dr. A. T. Horsman.
2. A bag belonging to the late Dr. Fred Lundy of Inkster, North Dakota, with its original contents. Among other things, these include a compass for determining direction on the prairie; a chess set, perhaps for passing time on an obstetrical call; a horsewhip; a pistol, for shooting at wolves that followed his horse on lonely winter nights. Loaned by Dr. John S. Lundy.
3. A pair of leather saddle bags, with some of the original medicine bottles. Loaned by the Ramsey County Medical Library, St. Paul, Minnesota.
4. A set of obstetrical instruments with leather case. Loaned by the Ramsey County Medical Library.
5. A group of visitors look over the instruments on display at the meeting of the North Dakota Medical Association in Bismarck.

Recent Developments in Poliomyelitis*

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New York City, New York

TAking some liberties with the title, I should like to discuss first the facts about some problems of medical care, and second, factors in our progress toward prevention of paralytic poliomyelitis.

PROBLEMS OF MEDICAL CARE IN POLIOMYELITIS

Until we eventually conquer poliomyelitis by the development and application of safe practical methods to prevent paralysis and death, we seem to be facing the prospect of increasing epidemic incidence. A review of some important medical care problems in polio is worthwhile. With a rising age incidence and correlated severity of the disease, we are seeing many more serious cases. An illustration of the latter fact is the rapidly growing number of chronic respirator cases in the nation. I thought that you might be interested in the national picture and what we're trying to do about it, since these do have direct clinical interest. It may also serve to point out a typical facet of National Foundation medical department activity in its efforts to help clinicians improve care for polio patients.

A survey of chronic respirator cases in November 1950 in the nation disclosed: (1) Five hundred eighty-three chronic respirator patients, of which 60 per cent were from 1950 and 40 per cent had been in respirators one or more years; this was a 30 per cent increase over the preceding year, despite one-fourth fewer cases. (2) The cost to the National Foundation, paying for care for over 80 per cent of all cases was at a rate of about \$8,000 per day, or between two and three million dollars per year. These cases were scattered over the country, isolated individually for the most part, in 135 different hospitals, often requiring expensive individual nursing around the clock.

It is interesting clinically and epidemiologically that: Two-thirds were over 15 years of age, one-half were over 20, and one-third were over 25, and that up to 10 years of age, there were twice as many males and over 20 years of age, 15 per cent more females.

We clinicians have long felt the need for more knowledge about the basic physiological, psychological and anatomical disturbances in bulbar and spino-bulbar poliomyelitis patients, especially those with breathing difficulties, the dreaded complication of poliomyelitis that kills so many. We have been relatively helpless in many of these situations; without simple practical clinical tools for evaluation of these disturbances, we have lacked accurate criteria for rational therapy. As a consequence it is believed that many still die who might be saved, and

many survive to become unnecessarily long term prisoners of respirators. The rapidity with which patients become psychologically, physiologically and then anatomically "fixed" in respirators calls for early expert care if they are not to become chronically dependent on respirators.

We can figure from experience that during an epidemic, about 20 per cent to 30 per cent of cases will be bulbar or spino-bulbar cases, and that about half of these will require the use of respirators for varying periods. It is our job, of course, to make equipment available to you. Respirators, tank and chest, and rocking beds from six pools are shipped in by air when necessary to point of need to supplement local equipment.

Although the mortality rate appears to be dropping somewhat—probably because of the availability of more hospitals, equipment and nursing personnel for care in recent years—it is still relatively high, and is accounted for by the death of about one-fourth to one-half of our critical cases with breathing difficulty. Advances in knowledge are necessary to help us further reduce deaths. It is already being demonstrated that newer knowledge and techniques in care *applied early in the course* of respiratory difficulty will help us get more patients out of respirators *earlier* than is now the case. This brings us to a consideration of what the National Foundation has been doing about these problems:

First, we have sponsored a series of four national conferences of clinicians and basic science researchers, on the problems of care of bulbar and respirator patients, and these have served to stimulate thinking and investigation and a teamwork approach. They have brought about a critical re-examination of existing knowledge and a definition of the remaining problems to be solved. The clinician has had to analyze his own rationale for treatment methods in the light of facts from the researcher. It has stimulated the basic scientist to adapt research methods, techniques and equipment for practical clinical use. Together they are now working to study and analyze physiological disturbances and to correlate them with practically useful clinical criteria as guides for the evaluation and management of patients. Interest in both diagnostic and therapeutic equipment problems is resulting in the development of a number of new devices, and improvements in existing ones.

It became obvious that the National Foundation must establish and support special centers for purposes of patient care, evaluation, clinical investigation and teaching, in university medical centers where patients could be grouped for care and studied by a team of both clinical and basic science interests, and where special equipment and personnel could be concentrated for the purpose. Two such centers have already been established

*Read at the sixty-fourth annual meeting of the North Dakota State Medical Association at Bismarck, North Dakota, May 22, 1951.

†Director of Medical Services, National Foundation for Infantile Paralysis.

to serve the following purposes: (1) To conduct experimental and demonstration care programs, and provide teaching and training for professional personnel. (2) To carry out patient evaluation and clinical investigation, combining clinical and basic science disciplines in the study of patients. (3) To evaluate critically, diagnostic and therapeutic equipment and techniques, measuring the physiological efficiency of such and recommending modifications for improvements and developing new equipment. (4) To serve local hospitals, by admitting selected cases for evaluation and investigation and trial therapy, and to provide consultative and assistive services to doctors in local hospitals, especially during epidemics of polio, when requested.

In addition to these clinical investigation centers, the National Foundation is encouraging the grouping of respirator patients in good hospitals where care personnel can be trained and special equipment can best be provided to aid them. The advantages of group care have been amply demonstrated.

It is of interest to point out that respiratory and cardiovascular physiologists have made tremendous progress in the last few years, and there are many research devices and techniques available to study these problems which we have scarcely begun to apply to patients. In our program to support clinical application of these and to stimulate and support further research in these problems, which are not alone peculiar to poliomyelitis, we are advancing clinical knowledge and skills important in many other fields as well.

Turning now to some other problems, I should like to present one for the solution of which we must turn to the practicing physician caring for polio patients, that of over-hospitalization.

Although no records exist for accurate comparison, it is obvious that proportionately *many more* patients diagnosed or even suspected as having polio are being hospitalized today than ever before. There are a number of contributing factors:

1. Compared to five years ago, there are today almost four times the number of hospitals, well distributed over the nation, and better equipped and staffed, now accepting acute polio. It is thus easier to obtain admission of cases.
2. There is little or no cost deterrent; if the patient can't pay, its chapter will.
3. There is greater public and professional awareness of symptoms and signs, bringing attention to many cases formerly unrecognized, especially of abortive and non-paralytic types.
4. The National Foundation has long encouraged early hospitalization for early treatment, to save lives and minimize deformities. We necessarily rely on the physician's clinical discretion to care for "suspects" and "abortives" in the home.
5. There is an unwarranted persisting "pest-house" attitude about polio. Many of the public, and some of the profession still believe that polio should

be hospitalized to *protect* the rest of the family and community. We know that hospitalization of the manifest case to control spread is futile. By the time a case is suspected or recognized, the rest of the family and many other intimate contacts are already excreting polio virus, most of them having silent infections. Therein also lies the futility of quarantine.

6. Many doctors prefer not to care for polio and even refer all suspects into a hospital for diagnosis and care by a polio team. For many cases, diagnosis and care can be done in the home with the aid of a consultant when needed. Spinal taps are *not* usually required for diagnosing.
7. Hospitals should establish diagnostic out-patient admission-screening clinics, and admit only those for which close observation or care is needed.
8. Many patients, of course, are hospitalized immediately because of poor home situations, inconvenient distance from doctor or consultant, or from the hospital in case emergencies develop, or because public health or visiting nurse services or physical* therapy is not available in or near the home.

Altogether the trend has been to *recognize more cases*, and to *admit the great majority* to hospitals *for diagnosis as well as for care*, often to the disadvantage of the patient, the hospital, and the agency rendering assistance. The net result of this trend, plus the last three years of record high incidence in which more cases have been reported than in the previous ten years—together with the great increase in hospital costs—is that the National Foundation for Infantile Paralysis has wound up each of the past three years in debt to the next March of Dimes for hospital bills. Almost five million dollars of this year's funds have come to pay last year's bills, and unless we have an unexpected very light epidemic year, we shall run out of funds long before the job is done this year.

It has been shown that many patients can be diagnosed and cared for adequately at home thus conserving hospital facilities and personnel for the more critically ill or seriously involved, and also conserving funds. The physician should become more familiar with the use of the community's resources to help the family care for patients at home.

In some communities where good public health leadership and services exist, proper planning, organization and use of medical consultants, public health nurses and visiting physical therapists have made good home care possible. This is especially important because there are a number of disadvantages to hospital care. First, there is a psychic trauma of separation from family and home security and isolation in a strange place. Second, there is relatively less adequate attention to patient comfort and ordinary needs in the crowded polio ward of the average hospital during epidemic load stress. Staff shortages are increasing. Third, transportation of the acute polio patient, with attendant trauma and fatigue, is recognized clinically as an additional hazard.

A third big problem is that of unnecessarily prolonged hospitalization. Through hospital polio census surveys conducted during the past year, it has become obvious that if we could but reduce the length of hospital stay of non-paralytics and those with but minor involvement—roughly half the cases—we could effect a great economy of hospital space and personnel, and free large funds for the more useful purposes of caring for and rehabilitating the paralytic cases. This requires physicians' cooperation to discharge those cases early which may be followed up and treated as out-patients. Hospital bed and board is very expensive, and doubly so when unnecessary, for it wastes space, facilities and personnel as well as funds.

Where the provision of more home and out-patient follow-up and treatment services is needed in order to relieve the epidemic hospital load, the National Foundation makes epidemic aid grants to health departments or hospitals so that these may be established during the emergency.

Where the home situation is adequate, and diagnostic and therapeutic consultation services and auxiliary services for continued follow-up and treatment—principally public health nursing supervision and physical therapy under orthopedic direction—are available, the physician is urged then to arrange care for many at home who are now hospitalized, and to discharge earlier the many patients who could be as well cared for at home.

War-time shortages again intensify a fourth big medical care problem we face. Along with equipment and epidemic aid funds, the National Foundation supplies nurses, physical therapists and resident physicians to help doctors and hospitals meet epidemic emergencies in communities throughout the nation.

Personnel are again in short supply and it is essential that we employ our professional assistants to the best possible advantage, and that we use more practical nurses, nurses aides and trained volunteers if we are to meet the country's epidemic needs this year.

PROBLEMS AND PROGRESS TOWARD CONTROL OF POLIOMYELITIS

Realizing that there are few physicians today without either a clinical or a personal interest in polio, I thought a brief summary of known facts about polio and of our progress toward the prevention of paralytic polio would be interesting.

I believe we will all agree that polio is the most serious of our remaining uncontrollable communicable diseases. We can summarize its natural history by saying that:

1. Polio is a common virus infection of human beings, without any evident extra human reservoir.
2. Polio may be caused by any of three known immunologically different types of polio virus.
3. All evidence points to transmission of polio virus by close person to person contact of the kind that occurs between individuals within a household, and there is no reliable evidence of transmission to humans by insects, water, food or sewage. When

polio afflicts one member of a household the other members and close personal associates of the family are commonly found to be infected with the virus.

4. It is believed that the virus gains entrance to the digestive tract through the nose and mouth and, in those relatively few who are to develop manifest disease, travels directly up nerve pathways to invade the central nervous system.
5. The elapsed time from infection to onset of symptoms—the incubation period—may be from 3 to 35 days, usually 7 to 14.
6. The sources of infection are considered to be the secretions of the pharynx and the excretions of the bowel from infected persons, including patients; although there is no evidence involving flies or sewage in the spread of virus to humans, these must be regarded still as potential sources of infection. It is believed that the infected individual is most likely to transmit the virus during the latter part of the incubation period and for a few days after onset of symptoms, although stool excretion of the virus begins shortly after infection and may continue for several weeks thereafter.
7. Polio produces silent infection with resultant immunity in the many, manifest disease in the few, with a broad clinical spectrum from minor illness to rapidly paralytic death. Recent surveys indicate that about 80 per cent of the population over 15 years of age possess antibodies to one or more of the three known types of polio virus.
8. Polio is an ancient disease and has emerged only in more modern times in serious epidemic and paralytic form and paradoxically in those countries with the highest material standards of living.
9. Peak incidence is now in the 5 to 9 year age group, and 25 per cent of cases are now over 15 years of age. The epidemiologist indicates that this is due to deferred exposure. The clinician observes that this carries penalties (as is true with other commonly infant and childhood infections) for the older the patient, the more severe the consequences. Provided with antibodies at birth from an immune mother, and exposed to infection during the period of passive protection, the infant can apparently acquire active lasting immunity without serious risk of paralytic disease. It is believed that we have in some way disturbed this natural process, deferring exposure until individuals are more susceptible to paralytic disease, and that epidemics of manifest disease are replacing the pattern of polio as an endemic disease with milder characteristics.

Among the essential steps toward the development of a vaccine preventive have been, first, the collection and identification or classification immunologically of all possible types of virus that can cause polio; this tremendous typing job is just about completed, and indications are that all known strains fall into three immunologically distinct groups. A vaccine will necessarily contain repre-

sentatives of each of these three groups. Second, cultivation of the virus outside the living primate, to obtain it in more purified form and in practical quantities for vaccine production; wonderful progress is being made here through the use of tissue cultures as media. In addition, the latter technique has speeded up the job of virus typing, and the titering of antibody in immune sera, both of which have been most costly and laborious procedures. Third, demonstration of efficacy of polio vaccines in the experimental animal; this, as you know, has been accomplished, though much additional work still needs to be done.

The situation at this time is that we think we will be able to prepare a *combined* vaccine against *all known* polio viruses, and that it should work with experimental animals. If this proves to be true, there are some other problems remaining to be solved, such as how to try it out with human beings, how to test duration of effect, size and number of doses which would be needed, how to get the great quantities of viruses of the different types needed to make vaccine for all who should have it, and, very importantly, how to determine among the total population the susceptible persons who should be inoculated. The question of the relative values of effectiveness of *inactivated* versus *live* virus vaccines, the question of adjuvants to enhance effects, the possibility of producing modified or attenuated virus strains, minimizing virulence and pathogenicity, with preservation of immunizing potency—these and many other problems will still need answers. Though we are optimistic, it is obvious that we shall not overnight have a safe effective vaccine with which to control polio epidemics.

It is not impossible that a combination will prove to be most desirable—a combination of both passive and active immunizing agents, or perhaps a chemoprophylactic agent with modified live virus vaccine. Scientists

are also considering the possibility of the control of polio through the prophylactic administration of a polio antibody-rich serum, such as gamma-globulin. Before large scale field trials can be made to test it some questions to be answered are: (1) what concentration of antibodies is required to protect humans against paralytic polio; (2) how long will such passive antibodies remain effective in the human; (3) will the introduction of such passive antibodies prevent the benign infection of the individual and the consequent development of lasting active immunity; (4) how large a field trial would be necessary to produce significant results and under what conditions? Many brilliant minds in well equipped laboratories are collaborating in a well supported and coordinated effort to get us the answers to these and other related problems.

As to the possibility for the discovery of a curative agent to treat polio, once it has become clinically manifest, there seems to be little reason for hope; once the virus is within nerve cells producing clinical symptoms and signs of polio it would seem impossible to find an agent so selective in action that, introduced intracellularly, it would not also injure the cell itself while destroying the virus. Nevertheless, explorations are being made of this possibility also.

For lack of a quick and specific diagnostic test for the presence of virus, or for antibodies to detect immunity, the health officer and the clinician are both severely handicapped. However, there seems now to be good reason for optimism on this count, if current work develops as we all hope for.

Finally, I should like to say that this year we, in the medical department of the National Foundation, will need your help, understanding and cooperation more than ever before, to be able to meet our obligations and fulfill our public trust.

AN INVITATION TO THE JOURNAL-LANCET LECTURE

ALL READERS of THE JOURNAL-LANCET are cordially invited to attend the JOURNAL-LANCET Lecture for 1951-52, which will be given on the evening of Wednesday, October 17, by Dr. Edgar S. Gordon, associate professor of medicine at the University of Wisconsin Medical School. The lecture will be held on the campus of the University of Minnesota. The subject of his lecture has not yet been given, but will be announced in the October issue of the journal.

Dr. Gordon is well known for his research in biochemistry and endocrinology, and has for many years held a joint academic position in the departments of biochemistry and clinical medicine at Wisconsin. He has been active in the use of radio-isotopes in the diagnosis and treatment of thyroid disorders and other clinical conditions and has made many contributions in the field of adrenal physiology.

Delayed Healing in Pilonidal Cyst Wounds

BERNARD J. NIEMIRO, M.D.

Holyoke, Massachusetts

THE chief problem in the treatment of pilonidal cysts is not the type of operative procedure used, but rather the care given in the postoperative period. Most of these wounds heal in the normal period of time. However, according to the vast amount of literature dealing with this subject, one can assume that there are a large number of wounds which do not heal promptly. This is due in large part to the unfortunate location of the operative site from a surgical point of view. Movement of the lower trunk places tension on a tissue which, because of its fatty nature, is slow to heal at best. Soiling with feces and sweat is most difficult to avoid.

During three years service in the Army in World War II as chief of the proctologic sections in two Army hospitals and nine years of civilian practice, I have had the opportunity to observe closely the behavior of pilonidal wounds in many hundreds of cases. Fortunately, most of these wounds healed within the expected time. However, since such a large amount of pilonidal disease is encountered, particularly in the armed forces, one inevitably sees many wounds which do not heal promptly.

To overcome the problem of the slow healing pilonidal lesion, an ointment containing water-soluble chlorophyll has been used. The results of this therapy have been good, and it is believed that an account of our experience will be of significance to any practitioner who is confronted with a similar problem.

During the past ten years the studies of numerous observers have demonstrated the value of water-soluble chlorophyll in promoting the growth of clean, healthy granulation tissue in various types of chronic ulcers, in non-healing infected wounds, and in osteomyelitis.¹⁻⁵ Lt. Col. Warner F. Bowers¹ reported on 19 cases of pilonidal cyst wounds, and stated that seventeen healed better and more rapidly than by other methods previously employed. One of his patients had a postoperative non-healing wound of nine months duration. The wound was foul with grayish-red granulations, friable, and covered with exudate. Within 48 hours after use of chlorophyll solution as a wet dressing, the wound was found to be clean, odorless, with healthy red granulations.

METHODS

The variety of initial operative procedures performed on our patients consisted of: (1) mid-line incision and suture of skin edges to the sacrococcygeal fascia, (2) primary closure, (3) exteriorization, (4) block dissection, and (5) simple incisions of the cyst and its sinus tracts.

The postoperative care was meticulous. Dressings were done daily. When necessary, wounds that were

bridging were curetted and overhanging skin edges were excised. In cases where sinuses were evident, they were incised. Local therapy included at different times application of vitamin A and D ointment, penicillin packs and irrigations, sulfanilamide powder, urea powder and Carnoy's sclerosing solution. When indicated, these patients were given orally iron and multiple vitamin preparations. Physical therapy included hot sitz baths and ultraviolet radiations.

Despite this therapy, many of these wounds failed to heal over long periods of time. We began to use a chlorophyll ointment routinely, applied directly to the wounds with a wooden tongue depressor and covered with gauze squares about one inch in thickness, and kept in place with adhesive tape. Dressings were done every other day in this manner.

The main advantage shown by this type of therapy in over a hundred cases of pilonidal cyst is a prompt, clean healing with firm granulation. Furthermore, the chlorophyll ointment immediately eliminates the foul odor often encountered in pilonidal wounds and in this respect is a boon to patient and physician alike.

Using the chlorophyll ointment routinely, one has little opportunity to evaluate possible speeding-up of healing. In such circumstances the only fact established is that the wounds heal promptly and well. However, on various occasions, we have encountered cases which had remained unhealed for long periods under good standard therapy. When these long unhealed wounds respond promptly and favorably to the use of the chlorophyll ointment, we believe that an acceleration of repair can definitely be attributed to this medication.

Five cases showing the typical resistant condition in which chlorophyll ointment was effective are reported. Of these, four cases had not healed in more than twelve weeks postoperatively and one had not healed in four weeks. Following initiation of treatment with chlorophyll ointment four of these cases healed in two weeks or less. One case required 16 days for complete healing.

CASE REPORTS

Case A was admitted to the hospital with a history of symptoms of over a year's duration. Two operations with excision of sinuses and exteriorization were performed followed by slight healing in fourteen weeks. Chlorophyll ointment therapy was started and the wound was completely healed eight days after institution of therapy.

Case B was admitted to the hospital with a history of symptoms of two years' duration. He had had repeated

(Continued on page 414)

Transactions of the North Dakota State Medical Association

Sixty-Fourth Annual Meeting

Bismarck, North Dakota, May 19 to 22, 1951

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Sixty-Fourth Annual Meeting

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M. E. BELTZ	Wahpeton
J. D. CRAVEN	Williston

To consider reports of the Council, Councillors, Delegate to the American Medical Association, and Member of the Medical Center Advisory Council:

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To consider reports of Standing Committees, except the report of the Committee on Economics and its sub-committees:

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J. C. FAWCETT, Alternate	Devils Lake

To consider report of Committee on Medical Economics including the Sub-Committees on Prepayment Medical Care, Veterans Medical Service and Rural Health:

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R. W. RODGERS	Dickinson
THOMAS PETERSON	Jamestown
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D. J. HALLIDAY	Kenmare
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Committee on Credentials:

R. B. RADL, Chairman	Bismarck
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*Many other doctors were appointed to these committees. However, as they did not attend this session of the House of Delegates, those listed above are the only ones who served.

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W. H. GILSDORF	Valley City	O. A. SEDLAK, Chairman	Fargo
C. O. McPHAIL	Crosby	A. C. FORTNEY	Fargo
F. I. DARROW	Fargo	R. B. RADL	Bismarck
R. C. LITTLE	Mayville	J. L. DEVINE, JR.	Minot
H. B. HUNTLEY	Kindred	M. S. JACOBSON	Elgin
J. C. FAWCETT	Devils Lake	K. E. FRITZELL	Grand Forks
H. M. WALDREN	Drayton	<i>Committee on Emergency Medical Service:</i>	
A. F. HAMMARGREN	Harvey	C. A. ARNESON, Chairman	Bismarck
O. W. JOHNSON	Rugby	C. M. GRAHAM	Grand Forks
<i>Committee on Cancer:</i>			
L. W. LARSON, Chairman	Bismarck	H. E. GULOIEN	Dickinson
E. J. SALOMONE	Elgin	C. G. JOHNSON	Rugby
P. J. BRESLICH	Minot	V. J. FISCHER	Minot
G. W. HUNTER	Fargo	R. B. RADL	Bismarck
C. M. LUND	Williston	<i>Committee on Mental Hygiene:</i>	
O. W. JOHNSON	Rugby	R. H. BRESLIN, Chairman	Mandan
E. J. LARSON	Jamestown	G. S. CARPENTER	Jamestown
<i>Committee on Medical Economics:</i>			
P. H. WOUTAT, Chairman	Grand Forks	A. M. FISHER	Jamestown
W. E. G. LANCASTER	Fargo	L. H. FREDRICKS	Bismarck
R. B. RADL	Bismarck	M. J. GEIB	Fargo
M. S. JACOBSON	Elgin	J. G. LAMONT	Grafton
R. W. RODGERS	Dickinson	J. T. CARTWRIGHT	Bismarck
O. A. SEDLAK	Fargo	<i>Committee on Diabetes:</i>	
TED KELLER	Rugby	E. A. HAUNZ, Chairman	Grand Forks
R. F. GILLILAND	Carrington	E. J. BEITHON	Wahpeton
F. E. WOLFE	Oakes	L. E. WOLD	Fargo
A. D. McCANNELL	Minot	G. W. TOOMEY	Devils Lake
J. W. JANSONIUS	Jamestown	A. K. JOHNSON	Williston
<i>Sub-Committee on Prepayment Medical Care:</i>			
W. E. G. LANCASTER, Chairman	Fargo	MARTIN HOCHHAUSER	Garrison
J. L. DEVINE, JR.	Minot	G. D. ICENOGLA	Bismarck
R. D. NIERLING	Jamestown	T. D. PEDERSON	Jamestown
H. L. REICHERT	Dickinson	R. F. GILLILAND	Carrington
		W. A. STAFNE	Fargo
		R. M. FAWCETT	Devils Lake
		T. Q. BENSON	Grand Forks
		W. G. ENSIGN	Minot
		W. H. GILSDORF	Valley City
		R. W. ROGERS	Dickinson
		H. A. LAFLEUR	Mayville

Committee on Scientific Program:

Appointment expiring 1951:
 A. K. JOHNSON Williston
 J. W. JANSONIUS Jamestown

Appointment expiring 1952:
 V. G. BORLAND Fargo
 R. B. WOODHULL Minot

Appointment expiring 1953:
 A. E. HAUNZ Grand Forks
 C. H. PETERS Bismarck

Committee on Arrangements for Annual Meeting:

General Arrangements:
 H. M. BERG, Chairman Bismarck
 CARL BAUMGARTNER Bismarck
 R. O. SAXVIK Bismarck
 JOHN CARTWRIGHT Bismarck
 ROBERT RADL Bismarck
 M. M. HEFFRON Bismarck
 LEONARD FREDERICKS Bismarck

**PROCEEDINGS OF THE HOUSE OF DELEGATES
 of the North Dakota State Medical Association
 Sixty-Fourth Annual Meeting**

First Session, Saturday, May 19, 1951

The first session of the House of Delegates of the North Dakota State Medical Association was called to order by Speaker of the House, Dr. A. E. Spear, at 8:00 p.m. in the Princess room of the Prince Hotel, Bismarck, North Dakota, May 19, 1951.

Dr. Robert Radl, chairman of the Credentials committee, reported that all credentials were in order and there was a quorum of 16 duly elected delegates present. The Secretary, Dr. Sedlak, called the roll. The following doctors responded: John Fawcett, alternate, Devils Lake; E. M. Haugrud, Fargo; A. C. Fortney, Fargo; M. E. Beltz, Wahpeton; N. A. Youngs, Grand Forks; E. L. Grinnell, Grand Forks; R. W. Vance, Grand Forks; J. D. Craven, Williston; A. R. Sorenson, Minot; D. J. Halliday, Kenmare; W. H. Gilsdorf, Valley City; R. B. Radl, Bismarck; M. S. Jacobson, Elgin; R. O. Saxvik, Bismarck; R. W. Rodgers, Dickinson; T. E. Pederson, Jamestown.

Sixteen delegates answered the roll call. The Speaker declared a quorum present.

Introduction of President

The Speaker introduced the President, Dr. L. W. Larson, who welcomed the delegates to the convention and made the following remarks:

"I want to say a word of appreciation for the support given me last summer, following the meeting in Grand Forks, in support of my candidacy to the board of trustees of the American Medical Association. I doubt very much that I could have been elected without the very active support of the association itself, and that of several individual members of this association who were kind enough to write to fellows who are members of the house of delegates of the American Medical Association.

As far as the state association is concerned, I am sure it is in good hands and will be in better hands after Monday night, when Dr. Lancaster takes over. There is nothing much I can say about the duties of the house of delegates and its members except this: I believe that if medicine is to progress in its public relations, there is a great responsibility on the shoulders of the house of delegates. The house of delegates of this association, as well as the American Medical Association, determines the basic policy and whenever a man is elected as a delegate to this body, he carries a great deal of responsibility on his shoulders. I know each one of you realizes this and will assume that responsibility. There are problems that are plenty grave even though we think that things are going our way in the national picture and also our own state, but we must be vigilant. I appeal to you to exercise caution in what you do and forego the pleasures there might be in Bismarck, until after the session of the house of delegates is over, tomorrow afternoon.

I do not know how many of you read these reports in the handbook. I am proud of the reports in this. I think George Lull is going to be surprised at the amount of work put into those reports. It is going to be up to you to bring in recommendations that may be far-reaching in their effects."

Minutes of the 1950 Meeting Approved

On motion of Dr. R. W. Vance, seconded by Dr. R. B. Radl, and carried, the reading of the minutes of the 1950 session as published and circulated in the September 1950 issue of THE JOURNAL-LANCET were dispensed with and the minutes adopted.

Secretary's Report

Dr. O. A. Sedlak, secretary, presented the following report, as prepared for the handbook, which was referred to the reference committees on reports of the president, secretary, and special committees:

MEMBERSHIP: The total membership for 1950 was 368. Of this number 356 paid their annual dues and 12 were honorary members. Five members died during the past year and nine of those who paid their 1949 dues did not pay their 1950 dues.

Table I shows the annual membership for the past eight years. From this table one can readily see that the membership dropped until a low of 313 paid members were recorded in 1945. Since that time, there has been a slow but appreciable gain in membership.

TABLE I

Comparison of Annual Membership

	1943	1944	1945	1946	1947	1948	1949	1950
Paid memberships	331	318	313	322	342	356	364	356
Honorary membs.	11	10	9	9	8	5	13	12
Dues cancelled—								
Military serv.	61	59	57	4	—	—	—	—
	403	387	379	335	350	361	377	368

Table II shows that the annual dues for 1951 are coming in quite promptly. There are still a number of members who have not paid their 1951 dues and the district medical society secretaries and councillors are urged to use every possible means to collect the dues of these delinquent members.

TABLE II

	1945	1946	1947	1948	1949	1950	1951
Paid-up members	294	305	316	320	302	309	307
Honorary members	9	9	8	6	9	11	11
To be honorary					4	1	2
Dues cancelled—							
Military service	57	?	0	0	0	0	0
Associate				1	1	0	0
	360	314	324	327	316	321	320

District	State Association Memberships 1950			State Association Memberships 1951			A.M.A. General Memberships 1950 1951
	Reg.	& Rtd.	Hon.	Reg.	& Rtd.	Hon.	
First	67	3	—	53	6	—	65 61
Devils Lake	13	—	2	19	1	2	12 20
Grand Forks	42	1	4	39	1	3	37 37
Kotana	11	—	—	12	—	—	10 11
Northwest	42	—	1	43	—	2	40 28
Sheyenne Valley	8	1	1	9	1	—	8 9
Sixth	53	7	2&1	60	5	3	39 43
Southwestern	17	—	—	19	—	—	10 3
Stutsman)							
Southern)	23	1	1	22	2	1	22 23
Traill-Steele	13	—	—	9	—	—	9 6
Tri-County	7	—	—	6	—	—	5 6
	296	13	11&1	291	16	11	257 247
	309	321		307	313		

Of the 307 paid memberships to date, 16 are retired memberships, leaving a total of 291 regular memberships. Of the 291 regular memberships, 247 have paid their A.M.A. general membership dues. Of the 307 paid memberships, 80.4 per cent have paid their A.M.A. general membership dues. Of the 291 regular memberships, 84.8 per cent have paid their A.M.A. general membership dues.

The revised constitution and by-laws of the North Dakota State Medical Association state that the secretary shall employ such assistance as may be ordered by the council. Under this by-law, the office of the executive secretary was created and by now has become such an integral part of our association that without the services of an executive secretary, the multiple duties

of the secretary could not be carried out by any doctor with an active practice. The office of the executive secretary is now running so smoothly that it takes care of all the routine administrative affairs of the association. The report of the executive secretary will include all data regarding the active and honorary members. Your secretary wishes to congratulate the executive secretary and his staff on the efficient management of their office. At the request of the council, this office had printed a list of all doctors practicing in North Dakota.

Your secretary attended all meetings of the council during the year and attempted to attend the meetings of most of the important committees. The executive secretary again kept a careful watch over the Legislature and after consultation with officials of the association and members of the committee on legislation, took active steps to kill all bills which were felt to be detrimental to the policies of this society.

Your secretary remained as a member of the executive board of both Blue Cross and Blue Shield and attended all local and district meetings of both organizations. He likewise attended the interim session of the American Medical Association at Cleveland, Ohio. As chairman of the committee on displaced physicians and as a member of the state board of medical examiners, your secretary attended a meeting called to investigate charges of alleged malpractice brought against a practicing displaced physician. This will be covered under a separate report of the committee on displaced physicians.

As secretary, the only suggestion to be made is that the office of the executive secretary be continued, but it is suggested that, if possible, a secretary from Bismarck be nominated so that there could be a closer liaison between the office of the executive secretary and the elective secretary.

Executive Secretary's Report

1951 was no doubt the most auspicious year of the North Dakota State Medical Association to date, as it marked the first time in history when a North Dakota physician was elected to the board of trustees of the American Medical Association. This was an honor brought to Dr. Leonard Larson and to this association and which is an honor which can be shared by all of the states comprising the Great Plains area and the Rocky Mountain region. Your past president, Dr. W. A. Wright, was also appointed to the important A.M.A. committee on rural health, and your secretary, Dr. O. A. Sedlak, to the executive board of Blue Cross and Blue Shield. The year can also be noted for considerable accomplishment within the state as the various committee reports will show.

1. *State office:* There have been several changes of personnel in the state office this year. It seems as though the state office provides a stepping stone for further accomplishments. Rhea McDonald, whom so many of you know, has left to take a civil service appointment and has been succeeded by Mrs. Margaret Fremming, whom I know all of us will enjoy. Mr. John Fox, director of the veterans medical service division, has also left for newer fields, and has been replaced by Mrs. Anita Meisner, who previously worked under John, knows the entire set-up, and is managing things very smoothly. It is still thought that the staff is sufficiently large to carry out the program of this association.

2. *Office work:* The American Medical Association continues to become more helpful in aiding the state associations in carrying on good and positive programs. The national educational campaign carried on this last October, is very illustrative of this point. The state association expended close to \$2500 in order to obtain maximum effect from the campaign and most of the district societies spent additional sums. This office, in seeking participation of associations within this state, found many such organizations sympathetic and cooperative. It was very heartening to find so many local cooperative creameries, druggists, insurance agents, utilities, banks and merchants of practically all types joining with organized medicine in support of and expressing the stand of the American Medical Association regarding the socialization of medicine. More and more groups in our economic life are getting together to form a joint program against the further socialization of our economy. A glance at the treasurer's report will indicate that we are building up a considerable surplus. It is the recommendation of your executive secretary that a substantial proportion of such annual surplus be expended on a program of public relations of such

a type as might best fit the purposes of this association as determined by the committee on public policy and legislation. In addition to the Newsletter of the Association, this office is now publishing a periodic newsletter for the Woman's Auxiliary. The Woman's Auxiliary is carrying on a remarkable job for a new organization. Its president, Mrs. E. T. Keller of Rugby, initiated a new program this year, which is turning out to be a remarkable success. A student loan fund has been set up and I believe all the district societies of the auxiliary are now carrying on activities to raise money for this fund. In addition to this particular project, the auxiliary continues to grow and the state association finds the membership to be willing workers when needed and called upon.

3. *Meetings:* The committees appointed by Dr. Larson this year have been active, diligent and effective. Some streamlining of the committees has been accomplished in that the committees on pneumonia, tuberculosis and venereal diseases have been combined and merged into the committee on public health. Your executive secretary has attended the various meetings of the council, meetings of the committee on medical economics and its sub-committees, being the sub-committee on prepayment medical care and sub-committee on veterans medical service, the committee on public policy and legislation and such other committees holding meetings touching on social and medical economic problems. He has planned for and arranged material for many such programs and has attended as an observer or a participator in numerous meetings of other groups whose problems are somewhat allied to those of the medical profession. In the regional and national field, your executive secretary attended the annual meeting of the American Medical Association at San Francisco, the interim session of the house of delegates of the American Medical Association at Cleveland, the medical society executives' conference, the conference on secretaries and editors of the state medical associations and the national public relations conference. He also attended the North Central medical conference in Minneapolis and another area meeting in Omaha, Nebraska. Due to the fact that the North Dakota legislature was in session this winter, your executive secretary did not meet with as many district societies as usual, as most of the district society meetings fall in the mid-winter months.

4. *Legislative activities:* We have finished an interesting session of the North Dakota state legislature within the last month and a half. The writer will not go into any detail as to a report of the various bills which medicine was interested in this session, as such a report will appear in the report of the committee on public policy and legislation. It should certainly be noted, however, that the committee on public policy and legislation is functioning very well and it becomes increasingly encouraging to note the very cooperative attitude on the part of the membership in coming to the aid of the state office when it becomes necessary to explain the stand of this association to the various legislators throughout the state. No legislation detrimental to the practice of medicine was passed during the session, and several bills which were backed by the association were passed which should inure to the good of the general public. The state association has not been called upon to do much this year regarding national legislation. Innumerable bills affecting medicine have been introduced again into the national legislature, including another bill for a national compulsory health insurance and many other so-called "fringe" bills. Due to both effective educational programs carried on by the A.M.A., and the various state associations, and of course also due to the fact that the federal Congress is so occupied in foreign matters, none of the bills opposed by the medical profession have made much headway in the national Congress. There is one exception, that being the bill to provide federal aid to medical colleges. This bill did come out of the Senate with unanimous endorsement for passage, but has been held up on the call calendar since that time and it is not known when it will come to the floor for actual vote. Many think that this particular bill will pass the Senate, and if it does, it is up to the medical profession to take such action as may be necessary when the bill goes to the House.

5. *Finance:* As indicated before, one has only to refer to the treasurer's report to find out that the financial status of this association is very good. Again the preceding report is the financial report of the office of the executive secretary and under

ACCOUNTS OF OFFICE OF EXECUTIVE SECRETARY

May 1, 1950 — May 1, 1951

	NDSMA	Convention	Public Relations	Medical Exams.	Total
Balance on hand, May 1, 1950					
Income, NDSMA	\$34.29	\$1,428.45	—\$23.53		\$1,439.21
Refund, legislative exp.	9,610.00				9,610.00
Committees and societies credit	283.75				283.75
Income, convention 1950	110.88				110.88
Refund deficit		390.00			390.00
Income, convention 1951		1,062.78			1,062.78
		1,285.00			1,285.00
	\$10,038.92	\$4,166.23	—\$23.53		\$14,181.62
Executive secretary, salary	\$3,208.34				
Stenographer, salary	2,188.61				
Furniture and fixtures	7.85				
Office supplies	353.55				
Telephone and telegraph	172.21				
Rent	330.00				
Cleaning	55.00				
Postage	106.16				
Travel	592.60				
Power and light	5.58				
Social security matched	78.77				
Subscriptions and dues	167.00				
Office equipment repair	20.59				
Miscellaneous (itemized below)	393.68				
Convention, 1950		\$2,881.23			
Public relations			\$275.12		
Board of medical examiners				\$160.63	
Convention, 1951		18.26			
Total spent	\$7,679.94	\$2,899.49	\$275.12	\$160.63	\$11,015.18
Income	\$10,038.92	\$4,166.23	—\$23.53		\$14,181.62
Balance					\$3,166.44

MISCELLANEOUS ITEMIZED—				
Flowers	\$ 21.36	Public policy and legislation		283.75
Bank service charge	3.91	Cleaning supplies		2.56
Procurement and assignment	32.19	Box rent		3.00
Woman's auxiliary	28.03	Miscellaneous		3.95
Personal property tax	14.93			
				Total \$393.68

VETERANS MEDICAL SERVICE
TRIAL BALANCE
January 1, 1951 through April 30, 1951

	Debit	Credit
First National Bank	\$ 3,166.08	
North Dakota State Medical Association		5,000.00
Medical accounts payable		5,054.00
Veterans Administration center	4,296.03	
Income fees		1,616.59
Social security		4.59
Withholding tax		44.00
Social security matched	30.58	
North Dakota State Medical Association		2.00
Printing	86.49	
Salary	1,200.00	
Postage	95.90	
Office supplies	72.35	
Travel	30.10	
Rent	120.00	
Power and light	2.99	
Telephone and telegraph	29.72	
Furniture and fixtures	1,296.63	
Miscellaneous	197.31	
Reserve for depreciation		417.49
Deficit	1,514.49	
	\$12,138.67	\$12,138.67

the constitution and by-laws, it is the province of the council to accept or reject this report. It is, nevertheless, included in this report of the executive secretary so that the reference committee will be advised as to the financial expenditures of this office. The reference committee will find the action taken by the council regarding this report in the supplementary report of the council. It is again recommended that a fund and an adequate amount be set aside for the payment of necessary meals for doctors attending state-wide meetings, covering the business of their office or committee. As a method of holding committee members together between afternoon and evening sessions, this proposal has considerable merit. Your executive secretary has already made a reference previously in this report relative to spending a substantial proportion of the annual surplus on a public relations program.

6. *Annual session:* Your executive secretary wishes to express his appreciation to the members and committees of the Sixth District medical society with whom he has worked in

connection with the 1951 meeting. As reported to you previously, the state society is not now permitted to make a charge for registration at the annual meeting. This, naturally, eliminates one source of income for the support of the annual sessions. It should be noted that the cost of holding a meeting seems to increase like all other things from year to year. The last several meetings have been held with some deficit, even though we have been successful in interesting more exhibitors to our meeting each year. With the financial status of the association as good as it is, this situation does not cause your executive secretary any alarm. The annual meeting is one occasion where all of the members can enjoy a concrete result of the state association's work, and it would appear to be a good idea to continue these meetings on a basis of being wholly free to the membership.

7. Lastly, your executive secretary has appreciated and does appreciate the opportunity of working with the doctors of North Dakota. The practice of medicine is an exacting task and among the noblest of work. It is gratifying to know that in addition to their high calling, the doctors have a keen appreciation for the problems of others and the problems of the nation. The writer particularly appreciates the great number of physicians who have been at all times willing to help this writer and who have carried on the bulk of the work of this association.

E. FORSYTH ENGBRETSON,
Executive Secretary

Report of the Treasurer

Dr. E. J. Larson, treasurer, presented his report as published in the handbook:

Balance on hand, May 26, 1950	\$22,181.96
1st James River National Bank	
Receipts from dues, May 26, 1950	
to April 30, 1951	\$15,085.00
Interest on bonds	112.50
Total receipts	\$37,379.46
DISBURSEMENTS:	
Vouchers No. 175 to No. 192 inclusive:	
Checks No. 578 to No. 595 inclusive:	
6-19-50 Office Exec. Sec., expenses	\$ 2,500.00
8-2-50 Office Exec. Sec., convention deficit	1,062.78

	Newberry Ins. Agency, treasurer's bond	25.00	
8-18-50	Mrs. R. Byrne, steno. exp. Dr. A. W. Wright, exp., San Francisco	195.00	
	Office Exec. Sec., expenses	2,500.00	
9-20-50	Dr. C. A. Arneson, exp. Chicago	98.33	
	THE JOURNAL-LANCET, subscriptions	714.00	
10-3-50	Conrad Publishing Co., October A.M.A. campaign	1,292.48	
11-1-50	Office Exec. Sec., exp., Sec. and Dr. Larson, San Francisco	532.04	
11-28-50	Conrad Publishing Co., bal., A.M.A. campaign	983.88	
12-5-50	Office Exec. Sec., expenses	2,500.00	
12-26-50	Dr. E. A. Hanz, diabetic drive	99.12	
1-9-51	1st James River National Bank, treasurer's checks, (printing)	3.21	
1-27-51	Bismarck Tribune, printing constitution and by-laws	252.09	
2-20-51	North Central Medical Con- ference, 1951 dues	75.00	
3-22-51	Office Exec. Sec., balance of budget	2,110.00	
	Office Exec. Sec., legisla- tive expense	283.75	
	Total checks issued	\$15,451.68	
	Bank exchange	1.80	\$15,453.48
4-30-51	Balance on hand—1st James River National Bank		\$21,925.98
	Bonds		4,500.00
4-30-51	Total assets		\$26,425.98

Report of the Chairman of the Council 1950-1951

Dr. A. D. McCannel, chairman, presented the following report which was referred to the reference committee on reports of the council, councillors, delegate to the A.M.A., and member of the medical center advisory council.

In making the report for the chairman this year, I have very little to report other than the work carried on by our secretary, who has been doing such an exceptional job the past years.

There have been two meetings of the council during the year 1950-1951. A supplementary report will be prepared for your consideration following the meeting of the council to be held in Bismarck at 4:00 p.m., May 19, 1951. At the first session of the new council, Dr. A. D. McCannel was re-elected chairman, Dr. C. J. Glaspel, secretary, and Drs. McCannel, Waldschmidt and Nierling were appointed to the executive committee of the council. Following this, the council adopted the budget for the ensuing year as follows:

Misc. travel expenses for various committees	\$1,750.00
North Central Conference	75.00
Official meeting stenographer	150.00
THE JOURNAL-LANCET	800.00
Salary Executive Secretary	3,500.00
Rental	360.00
Lights	25.00
Telephone	200.00
Office supplies and postage	650.00
Stenographer	2,100.00
Traveling expenses, Executive Secretary	1,000.00
Misc. fund. Executive Secretary	750.00
Woman's Auxiliary	200.00

This made a total budget of \$11,560.

A number of bills were presented for approval and approved. Approval was given for the payment of expenses for Mrs. Fay Byrne from Miller, South Dakota, to Grand Forks, North Dakota. A good deal of time was spent in discussing the possible means of being of aid to the candidacy of Dr. L. W. Larson to the office of trustee of the American Medical Association and the authorization for the expenditure of necessary moneys toward this end was made.

An interim meeting of the council was held at Bismarck, January 13-14, 1951, at a joint meeting with the committees on medical economics, and public policy and legislation. The problems in connection with the Public Welfare department's new permanent disability program were presented by Clifford Williams and Dr. Lindsay of that department. The association assured the department of their support. At the present time, Dr. Icenogle is acting as one of a medical review team and Dr. Icenogle explained the workings of the program from his standpoint.

Mr. Williams also reviewed the new proposal made by the public welfare board for the payment of medical and hospital services under their programs. They propose to carry on this program by a flat grant to each client which will be accredited to an account rather than received by the recipient, from which fund they propose to pay for medical and hospital care. After considerable discussion, it was determined that the association need take no action in this regard and that the method of proposed payment was entirely the business of the welfare board. The now perennial matter of negotiating a new fee schedule with the welfare board was discussed at length by Carlyle Onsrud, director of the public welfare board, and by Dr. Woutat. It was perfectly clear that nothing could be accomplished at the present time.

The proposed arrangements between the National Foundation for Infantile Paralysis and the Crippled Children's division of the welfare board relating to the poliomyelitis program was discussed by Dr. Lindsay of the Welfare Department. Negotiations at that time were not far enough along for the adoption of a definite program, and it is expected that Dr. Lindsay and possibly Dr. Landauer will make some additional statements regarding this proposal before the house of delegates.

A review of the status of the North Dakota Physician's Service was given by Dr. Lancaster which showed a healthy growth both from the standpoint of policy holders and from the standpoint of financial reserves. All district societies have now approved this plan.

A good deal of discussion and thought was given as to how to meet last year's request of the house of delegates that a survey of commercial insurance companies be made. It was thought that the state association has neither the required expert talent nor the finances to carry on such a program. The council therefore asked the house of delegates to reconsider its request.

A tentative proposal offered by Dr. Van Sandt, area medical director of the Indian Service, for care of the Indian in private hospitals and by private practitioners of medicine on a basis somewhat similar to our Veteran Home Care plan was explained by Dr. Wright. The council voted to approve the basic idea of this proposal and it is expected that a more concrete program will be submitted to the house of delegates through the committee on medical economics and Dr. Van Sandt. The council also authorized the issuance of letters stating our basic approval to our Washington representatives in congress.

Mr. William F. Little, a representative of the Professional Protective Bureau, explained the services offered by his company for the collection of medical accounts. While the council felt that this service seems to be a good one, the council also felt that it did not care to either enter into an agreement with the Professional Protection Credit Bureau as an association or to single it out from other ethical collection agencies for the approval of this association.

A presentation was made by James Moore, president of the North Dakota Pharmaceutical Association asking for cooperation of doctors relative to authorization of refills on prescriptions. The federal government has not only threatened to crack down on the pharmacists who are lax with refills but has instituted legal action against a large number of prominent pharmacists throughout the United States. The correction of this situation requires the cooperation of physicians. The council recommended that all the physicians be advised to cooperate to the utmost in specifying on prescription blanks the number of times the physician desires the refill of the prescription. It is necessary that the pharmacist have this; otherwise, he is up against the situation of continually calling the doctor for authorization and seeing to it that a further written authorization be given by the doctor following the phone call.

A considerable period was devoted to review of legislative bills introduced by that time in the North Dakota legislature and the presentation of the method of operation for legislative activities was made by the executive secretary.

A comprehensive and elucidating report was presented by Dr. Radl, member of the advisory committee to the selective service, relative to the status of doctors draft.

As you know, the executive secretary was kept quite busy this year on account of the legislature being in session. Unfortunately, very few bills came up that had any bearing on our medical group. However, the committee of the state medical association sponsored a bill in the legislature of 1947 and again

in 1949, to regulate and prohibit the sale of fireworks in North Dakota. On both occasions the bill was defeated and this year the State Fireman's Association sponsored the bill and when there was a hearing, Dr. Neve of Bismarck and myself appeared before the committee, urging the passing of the bill which had already been passed by the senate.

There was also a welfare bill that was handled by Mr. Engbretson which was satisfactory to the state medical society and a bill urging the medical center to create a four-year medical school as quickly as possible was passed but that will be reported on by the representative of the state medical society of the advisory council of the medical center.

ARCHIE D. McCANNEL, M.D.,
Chairman of the Council

Supplemental Report of the Council

The following report is supplemental to the report of the chairman of the council, and is dated May 19, 1951. Dr. A. D. McCannel, chairman of the council, called the meeting to order, roll call was taken and the following members were present: Drs. J. F. Hanna, C. J. Meredith, R. D. Nierling, A. R. Gilsdorf, C. J. Glaspel, R. H. Waldschmidt. Dr. McCannel declared a quorum present.

Minutes of the last meeting were read by Secretary C. J. Glaspel and approved as read.

Dr. Larson expressed his deep appreciation of the help given him by the council and the medical profession of North Dakota in assisting him in obtaining his election as a trustee of the A.M.A. He commented further on the fact that the treasurer's balance was a very healthy one and that some method should be found to spend some of this money in the field of public relations.

Dr. McCannel referred the treasurer's report and the secretary's report in the handbook to the auditing committee for audit. Dr. Hanna made the motion and Dr. Waldschmidt seconded, that these reports be referred to the auditing committee. Motion carried.

Mr. Engbretson, the executive secretary, referred to his report in the handbook and commented on the desirability of our improving public relations and selling our society not only to our own membership but also to the people of the state. It was his opinion that some additional funds should be expended for the purpose of bettering our relations with those outside the profession.

Dr. McCannel stated that the council could include this in the budget for an amount to be used for public relations. Dr. McCannel suggested that the council recommend that the house of delegates place this in the hands of the committee on public policy and legislation to formulate some plan to be referred to the executive committee of the council for their approval on expenditures.

There was a brief discussion relative to whether we should continue our contract with the Veterans Administration on its present basis, or whether we should switch and take on a new contract on a cost plus basis as is done in Minnesota and Wisconsin. Dr. Varco stated that from the standpoint of the Veterans Administration it was immaterial as to which type we selected as there were advantages and disadvantages to both. Dr. McCannel stated that final action on this would be deferred until the next meeting.

Mr. Cohen of THE JOURNAL-LANCET appeared before the council in regard to renewing the contract for next year. Dr. Waldschmidt moved and Dr. Hanna seconded that this contract with THE JOURNAL-LANCET be renewed for a period of one year. Motion carried.

Dr. McCannel appointed the following to the auditing committee to audit the reports of the treasurer and executive secretary: Drs. R. D. Nierling, A. R. Gilsdorf and C. J. Meredith. There was a recess while the auditing committee audited the reports.

The council reconvened to hear the report of the auditing committee, which is as follows: The auditing committee reported that the treasurer's report and the executive secretary's report were duly audited and found to be correct. Dr. Waldschmidt made the motion, and Dr. Fawcett seconded, to accept the report of the auditing committee. Motion carried.

Dr. A. R. Gilsdorf moved and Dr. Meredith seconded that the expenses of Mrs. R. B. Byrne, stenographer for the medical meeting, be allowed.

This supplemental report was then turned over to Dr. Gilsdorf, chairman of the reference committee to consider the reports of the council, councillors, delegate to the A.M.A. and member of the medical center advisory council.

A. D. McCANNEL, M.D., Chairman

REPORTS OF COUNCILLORS

First District

Since our last report the First District medical society has held eight regular meetings. These were all well attended due to careful choosing of the guest speakers who presented a wide variety of clinical material, thus insuring the interest of all members.

The active membership of the society has been augmented by the addition of Drs. Melton, LeBien, Beaton, Macauley and Storrs. Drs. Wright and Richter have moved from North Dakota and have established practice in Texas and Minnesota respectively.

Dr. Carl Elofson, who has been on a tour of active duty with the navy, is expected to resume practice in Fargo in the near future. The total membership of the society, exclusive of associate members from the Veterans hospital is 81.

During the past year death has claimed three of our outstanding members. Dr. W. F. Baillie had for many years practiced in Cass county and was well known and highly respected by his patients and colleagues. Dr. J. H. Bond's sudden death was a great shock to all who knew him. He was extremely well liked and at the time of his death was vice-president of this society. Dr. A. W. Skelsey was one of the early practitioners in Fargo. He had innumerable friends throughout the state and was one of the society's most active members both in state and county medical circles.

The society has pledged complete support of the civilian defense efforts. A motion was passed that the members provide professional services without charge for any immunization program deemed feasible by the civilian defense health committee. In a recent practice alert, the doctors reported to their assigned stations and have since been highly commended for their active participation by the leaders in civilian defense of the community.

The new officers for 1951 are: President, Dr. B. A. Mazur; vice-president, Dr. C. B. Darner; secretary-treasurer, Dr. H. W. Hawn.

Delegates to the state meeting: Drs. E. L. Haugrud, A. C. Fortney, M. E. Beltz.

J. F. HANNA, M.D., Councillor

Second District

The Devils Lake District medical society, Second district, had five scheduled meetings in the past year. These meetings were all well attended, and as a good program with outside speakers was held each time, a great deal of interest and enthusiasm was shown.

A resolution was passed to present to the house of delegates for more stringent control of prepayment health programs. Another resolution passed by our society was telephoned directly to all of our senators of this area, expressing opposition to Senate Bill No. 212. This paid off well, insofar as Senator Duffy was able to get a revote in the senate, and kill the bill.

There was another resolution passed by the society expressing opposition to a four-year medical school in this state, and that money be spent in building up the present two-year school instead.

There were four new members added to the society during the past year, and with none dropping out.

JOHN C. FAWCETT, M.D., Councillor

Third District

The Third District society has had seven meetings during the year, all of which were well attended. The September meeting was held, as usual, in Grafton, and at this meeting Dr. F. E. Weed of Park River, North Dakota, gave a report of his trip to the meeting of the International College of Surgeons in Buenos Aires the previous July.

Guest speakers during the year were Dr. R. W. Varco and Dr. John Bittner of the University of Minnesota; Dr. Emerson Ward of the Mayo Clinic; Dr. Milton Koons of the North Dakota Public Health Laboratory, and Dr. Ralph Mahowald of Grand Forks, who discussed problems of atomic medicine.

The active membership to date numbers 36, with 33 paying the A.M.A. assessments. Our membership is usually around 60.

The following officers were elected at the December meeting: President, V. S. Quale, Grand Forks; vice-president, A. C. Kuhlmeier, Larimore; secretary-treasurer, John Graham, Grand Forks. The delegates to the state convention are Drs. Vance and Benson of Grand Forks and Dr. George Waldron of Cavalier.

During the past year Dr. George Williamson of Grand Forks died following an illness of several years. Dr. Williamson was the secretary of the state board of medical examiners for a period of 37 years until resigning in 1948 and was personally acquainted with most of the physicians in North Dakota. He was a constructive force in our society for years.

New members of the society are: Drs. Robert Painter, A. S. Rathkey, R. A. Vaaler, J. D. Folsom and W. A. Randall of Grand Forks, Dr. A. C. Kohlmeier of Larimore and Dr. Tiber Osten of Michigan.

The Traill-Steele District medical society had three regular and one special meetings during the past year. Dr. David Hoehn of Sharon gave an illustrated lecture on Alaska, its geography, people and medical service based on six years of medical service there. At another meeting, Dr. R. C. Little of Mayville discussed the Rh factor and at still another meeting Dr. T. M. Cable of Hillsboro gave an audio-movie on "Cancer of the Breast."

Present officers: President, Dr. O. A. Knutson, Buxton; vice-president, Dr. G. S. Wheeler, Portland; secretary-treasurer, Dr. Syver Vinje, Hillsboro; censor, Dr. A. A. Kjelland, Hatton; delegate to state medical meeting, Dr. T. M. Cable, Hillsboro; alternate delegate, Dr. H. A. LaFleur, Mayville; present membership: Paid-up, 13; members paying A.M.A. dues, nine; members who have left the district in 1950, four.

C. J. GLASPEL, M.D., Councillor

Fourth District

We have two medical societies in the Fourth district. The Northwest medical society and the Kotana society, with headquarters at Williston. We have had seven dinner meetings in the Northwest District medical society, alternating between St. Joseph's and Trinity hospitals, except for two held at the Minor Country club.

At six of the meetings we had outside speakers. Dr. O. Colp of the Mayo Clinic gave a talk on urological emergencies and infections; Dr. M. G. Peterman of Marquette university discussed febrile convulsions; Dr. Forrest Adams of the University of Minnesota discussed the use of ACTH and Cortisone in the treatment of fever; Lawrence C. Fallis, Henry Ford hospital, Detroit, discussed rectal disease; Dr. W. A. Wright of Williston discussed the state medical association and the American medical association; Dr. Arthur Kerkhof, Minneapolis, discussed cardiac arrhythmias and Dr. H. M. Berg, Bismarck, reviewed his visit to England, Norway and Sweden.

We have 57 members, one of them now in the service. We have no honorary members and there was one death, that of Dr. H. E. Neve of Rolette.

The present officers of the Northwest district are as follows: President, Dr. R. H. Gammel, Kenmare; vice-president, Dr. Leo Devine, Minot; secretary-treasurer, Dr. W. G. Ensign, Minot.

The Kotana medical society located at Williston has a membership of twelve and have had twelve meetings. The elected officers for this year are as follows: President, Dr. E. J. Hagan, Williston; vice-president, Dr. Duane Pile, Crosby; secretary-treasurer, Dr. Donald E. Skjei, Williston; delegate, Dr. J. D. Craven, Williston; alternate delegate, Dr. A. K. Johnson, Williston.

Dr. Carlos Jones, pioneer physician at Williston, died during the year.

ARCHIE D. McCANNEL, M.D., Councillor

Fifth District

Herewith is the councillor's report for the Fifth District society for the year 1950-1951:

There are now nine active members in our society, a loss of one since 1949. Dr. J. Van Houten retired from practice. Dr. A. W. Macdonald, an honorary member of the state society for two years, was lost to the society by death. One new mem-

ber, Dr. N. A. Macdonald, transferred to our society from the Traill-Steele District society.

All members of our society are paid up members of the A.M.A.

Four regular meetings of our society were held during the year. Scientific programs consisted of viewing of medical and surgical films. Because of the small membership of our society, no effort was made to obtain outside speakers.

A diabetic detection program was again carried out with a much more satisfactory response than in the previous years.

Officers elected for the year 1951 are as follows: President, Dr. J. P. Merrett; vice-president, Dr. N. A. Macdonald; secretary-treasurer, Dr. C. J. Meredith; delegate, Dr. W. H. Gilsdorf; alternate delegate, Dr. Paul Cook.

C. J. MEREDITH, M.D., Councillor

Sixth District

Four meetings of the Sixth District medical society have been held during the past year with an average attendance of 32. The membership of the society is 70.

The present officers are: President, Dr. L. H. Fredricks, Bismarck; vice-president, Dr. H. M. Berg, Bismarck; secretary-treasurer, Dr. C. H. Peters, Bismarck.

New members added during the year were: Drs. Dewitt Shannon, Riverdale; Val Martynski, Glen Ullin; John T. Boyle, Garrison; M. E. Nugent, Bismarck; Douglas T. Lindsay, Bismarck; Wesley E. Levi, Beulah; Robert R. Kling, Bismarck.

Dr. A. C. Groudr transferred his membership to Indiana. Dr. G. M. Constans, who is now retired and no longer in Bismarck, has resigned from membership in the society.

Dr. Leo C. Culligan of Minneapolis spoke on "Acute Intestinal Obstruction" at one meeting. Dr. Richard Tudor of Minneapolis presented a discussion on "Simple Diagnostic Aspects of the Common Contagious Diseases." Dr. V. R. Zarling of Minneapolis spoke on "Headaches, Infections of the Central Nervous System and Electroencephalography." Dr. James Moore, president of the North Dakota State Pharmaceutical association, discussed prescription problems. Dr. Fred Kortke, department of physical medicine, University of Minnesota, spoke on "Physical Medicine and Rehabilitation." Mr. Raymond Reise, director of field service, Welfare Department of the State of North Dakota, discussed the new program for the permanently and totally disabled in North Dakota.

R. H. WALDSCHMIDT, M.D., Councillor

Seventh District

The Stutsman County medical society, which is the Seventh District society, had six meetings during the year 1950.

On January 26th a dinner meeting was held at the Moline cafe, and 13 members were present. The subject of dues was mentioned. They are: \$50 for state, \$10 for local and \$25 for A.M.A., making a total of \$85. It was suggested that the society members read the book "The Road Ahead" and that they buy some copies for distribution—no decision was made. After the election of officers, Dr. J. J. Spier, Fargo, gave an excellent paper on "The Modern Concepts of Hypertension." Following this, a film "The Kidney in Health" was shown.

The next meeting was held on February 23rd. Fourteen members and two guests were present. Dr. Elsworth presented the program of the Security Council and stated their wish to establish a blood bank for Jamestown. Mrs. P. C. Peterson, Jamestown, who spent several months in England last fall, gave her observations and experiences with medicine in England under Labor government.

On March 30th a dinner meeting was held at the Moline cafe. Motion was made, seconded and carried that the society support the program of an emergency blood typing and donor service which is being established through the Security Council. Dr. C. H. Peters of Bismarck gave a paper and showed illustrative slides on "Some Chemotherapeutic Agents in Use of the Treatment of Blood Dyscrasias." Following this, a film "The Pennsylvania Story" was shown.

The next regular meeting was held on April 27th, with several local businessmen as guests. Mr. George Gorman was guest speaker. He gave a plan whereby he feels socialism can be prevented in this state and nation. He feels publicity must be obtained by means of the newspapers, radio and circulars. Discussion and questions followed. A film on allergy concluded the meeting.

Another meeting was held on September 28th. Forsyth Engebretson described plans for the advertising campaign of the A.M.A. to be held October 8th to 22nd. The object is to promote "The Voluntary Way" and expresses the views of the A.M.A. on health insurance. The Business and Civic Federation of North Dakota was organized in Devils Lake on September 20th.

The last meeting was held on October 19th. Dr. Frank Melton of the Dacotah clinic in Fargo presented a talk on "Contact Dermatitis," and showed some slides of various skin lesions produced by foreign materials.

The society has had one meeting thus far in 1951.

On January 25, 1951 the following officers were elected: President, Dr. E. J. Larson; vice-president, Dr. Basil Maloney; secretary-treasurer, Dr. R. D. Nierling; delegate, Dr. T. E. Pederson; alternate delegate, Dr. R. Woodward; censor (three years), Dr. R. L. McFadden; holdover censors, Dr. R. Woodward (two years), Dr. George Holt (one year).

A film depicting the meeting of the Fourth World Medical assembly in New York City this past summer was shown.

R. D. NIERLING, M.D., Councillor

Eighth District

The Tri-County society has held only two meetings during the year. This society is in the process of disbanding. Most of the members prefer to join some of the neighboring societies.

E. J. SCHWINGHAMER, M.D., Councillor

Ninth District

The Southwest District medical society, as of December 31, 1950, had 21 members. Two new physicians have set up practice in this district during the year: Dr. A. Martens, DP physician, practicing in Killdeer, North Dakota. Dr. Martens received training in St. John's hospital, Fargo, in preparation for his general practice. Dr. Julian Tosky, practicing at Richardton, North Dakota, graduate of University of Manitoba, Winnipeg, previously practicing at Larrimore, North Dakota. As of the date of this report, Dr. Harlan Larson of Dickinson has been called to military duty but was still in practice on December 31, 1950. Dr. Sherwood Seitz transferred from Richardton to Mott, North Dakota.

The Ninth district had three official society meetings during the year 1950, all of which were held in Dickinson.

The first meeting was preceded by a dinner at the Elks Club dining room followed by scientific papers by Dr. J. J. Spier, pathologist at St. John's hospital, Fargo, and Dr. Oliver A. Sedlak, internist at Fargo. Discussions were on "Modern Trends in Hypertension from both the Diagnostic, Prognostic and General Management Aspects." Election of officers was held and officers elected were: Dr. R. W. Rodgers, president; Dr. H. L. Reichert, secretary; Dr. R. W. Rodgers, delegate to the state meeting; Dr. H. E. Guloien, alternate delegate; councilors: Drs. O. C. Maercklein, S. W. Hill and J. W. Dach.

The second meeting was on April 21, 1950. This meeting was essentially to consider medical economic problems previous to the state meeting at Grand Forks. No scientific papers were given.

The next official meeting was November 28, 1950. The meeting was preceded by a dinner at St. Joseph's hospital. A representative of the Lawson agency of New York spoke to us regarding the drive for an addition to the hospital. The physicians of the community were in favor of the drive, and the need of the hospital for the vicinity was acknowledged.

Our society totals two less members for 1950 than in 1949. We expect to lose more to the military service.

None of the younger active physicians of the territory failed to pay their \$25 special assessments to the A.M.A.

A. R. GILSDORF, M.D., Councillor

REPORTS OF STANDING COMMITTEES

The following reports of the standing committees were referred to the reference committee on reports of standing committees except the report of the committee on medical economics and its subcommittees:

Medical Education

A meeting of the committee on medical education was held at the state office in Bismarck, January 13, 1951, called by Chairman Leigh. Drs. Berg, Meredith, Peters, Hamre, Naegli, Potter, Weible and Mahoney were in attendance.

Dr. Leigh called the meeting to order and called upon Dean Potter to review the progress of the Medical school for the last two years. Dean Potter stated that the one mill levy had been passed by the voters in 1948, but that the first money available from the levy became available July 1, 1950. He stated that for the biennium 1949-1950, the University Medical school had an appropriation of \$160,000, three quarters of which could be used up until the last quarter of the biennium. He pointed out that the professorship of anatomy and pathology had been well filled by Drs. Hamre and Cardy, respectively. The library is well under way. From July 1, 1950, he stated that the bulk of the work aside from carrying on of the teaching in the medical school was made up of compiling lists of furniture and equipment so that the new school can be properly equipped and so that the school will function properly. Lists of necessary equipment were gone over by the various departments which required a lot of work in specifications for the calling for bids. Bids were opened on September 1, 1950, but unfortunately by that time the war had intervened and many of the companies which were interested in making bids backed out. The best possible bids were accepted but much of the furniture and equipment, because of the war, will not now come until the summer of 1951. He pointed out that Dr. Hamre has arranged with the university shop for temporary benches and pieces of equipment which will have to suffice until the equipment ordered is delivered.

In connection with the budget, he stated that the administration now has sufficient money to properly run the school. The budget approved for the coming year is in the sum of \$210,000. Of this amount \$20,000 was allotted to the library. The department of anatomy under Professor Hamre is fully staffed and the department of pathology under the professorship of Dr. Cardy was fully staffed until Dr. A. K. Saiki contracted tuberculosis. The department of bacteriology has been greatly strengthened by the addition of Drs. Fisher and Hoffman. In the department of pharmacology, Dean Potter stated that try as hard as they could, they had not been able to locate a pharmacologist to date. He pointed out that many large medical schools are having the same trouble. He stated, however, that it now appeared as though they would be successful in obtaining the services of one Dr. Buetner. In the department of physiology, Dean Potter pointed out that he is still lacking an assistant for himself. The equipment ordered this fall is in addition to the budget of \$260,000. The budget for the two-year medical school in South Dakota for the past year is in the sum of \$186,000.

Dr. Hamre, chairman of the entrance committee, was called upon by Chairman Leigh to explain matters concerning the expansion of enrollment in the two-year school and certain matters relating to the entrance requirements. In 1950, 93 formal applications had been filed with the school. Some 1200 or 1300 letters had been received from out of state men seeking enrollment in the North Dakota school, but in connection with this latter group, inasmuch as it is becoming necessary to confine enrollment largely to North Dakota residents, out of state men had been discouraged from submitting applications. He did state that out of the 93 formal applications, a number of men came from residence in Montana, which has been customary for some years.

Enrollment for the current year has increased from 25 the previous year to 36 in the freshman class of this year. Out of the 93 applications, Dr. Hamre stated that there really weren't many more applicants worth accepting over the number of 36 which were accepted. He explained the criteria for entrance as follows:

1. That an applicant should be a bona fide resident of North Dakota.
2. That the applicant have medical and physical qualifications to make a good doctor.
3. If he meets 1 and 2 and there is a surplus of applications over and above the number which the school is able to take, the remaining number must be weeded out on the basis of grades. In paying attention to grades, it is necessary for the entrance committee to give weight to the school in which the grades were obtained.

The function of the entrance committee is now so well performed that it is very rare that any student who is accepted for medical training fails after acceptance. He stated that the examiners, Drs. Anderson and Smiley from the American Med-

ical association and the American Association of Medical colleges, stated to him that if more than 5 per cent of the accepted students fail at the end of the first year, that this is an indication of poor admissions work. Every failure means a loss in the utilization of the valuable facilities of the medical school. He stated that the admissions committee will not consider any applicant who has less than a C-plus average or an equivalent to what a C-plus average at the University of North Dakota would mean. If applicants have been to schools where the grades are unreasonably high as a matter of custom, this of course has to be taken into consideration. He stated that it was very rare that a student raises his grade in medical school over the entry average and stated that almost always the grade drops.

In connection with the transfer of students, he stated that better admission work in all medical colleges was going to mean that there would be fewer students flunking in the four-year schools and therefore fewer openings for transfers for our students at the end of the second year.

Dr. Leigh made a comparison of the North Carolina and Dartmouth two-year medical schools with the North Dakota medical school. Drs. Anderson and Smiley, while inspecting the North Dakota two-year school, stated to Dr. Leigh that no four-year school had ever worked with less than a two million available population. There might be exceptions to this broad general relation in cases such as Iceland where the population cannot possibly go any other place for medical care or medical instruction, but that certainly is not true here in North Dakota.

The two present difficulties temporarily blocking the progress of the school from the standpoint of the teaching institution lie in the department of physical diagnosis and the department of biochemistry. Dean Potter stated that the difficulty in the department of physical diagnosis will be cured this year. The difficulty in the department of biochemistry is more difficult to solve. The department of biochemistry is not under the direction of the medical school, but under the direction of the department of science. Biochemistry is taught not only to the two-year medical school students but, of course, also to engineers, etc. This is not satisfactory for any of the various types of students taking the course. The engineers claim that the department is teaching medical biochemistry and the medical students claim that they are not getting proper physical biochemistry instruction and that it is so bad that they do not feel that they dare take the first half of the national boards in biochemistry after completing their course at the University of North Dakota, but feel that they must later brush up on their biochemistry before attempting to take the national boards. Drs. Anderson and Smiley, in their inspection tour, stated that the university must have a department of biochemistry in the medical school. It was stated that the medical school would need two men attached to the medical school in this department. After some discussion, it was moved by Dr. Berg and passed "that all phases of biochemistry be strengthened and be under the direction of the school of medicine and be brought to the position of full approval by examiners of the A.M.A. and Association of American Medical Colleges and be made to fulfill all its obligations in training medical students."

Dr. Leigh then brought up the question of a possible four-year medical school. He stated that at the present time there were not sufficient monies available for a four-year school. The two-year school is already overcrowded with the expansion of students from 25 to 36. A four-year school would require considerably more building space, available hospital beds for teaching instruction, and of course much more personnel. He pointed out that the one-mill levy had been passed after the assurance that it would bring more and better medical care to the citizens of North Dakota, and that in part this meant more doctors. Granted, a four-year school would be one way of obtaining more physicians in the state, but he pointed out that this can be reasonably accomplished through utilization of the medical center at a cost that the state can afford. He stated that the president of the University of Minnesota and Dean Diehl of the medical school are now considering the possibility of taking over the complete second year graduate class of both North and South Dakota. The University of Minnesota has available facilities which are not now being utilized. It has the teaching hospital of Ancker hospital, St. Paul, which has 900 beds; and has adequate and sufficient personnel to undertake this program. It would mean, of course, that the state of

North Dakota would have to subsidize to some extent the students sent to the University of Minnesota in that it would be required to underwrite a reasonable cost for teaching North Dakota students there. The question of what this cost will be is still not decided. It is thought that we could afford to subsidize up to \$1500 per student and that this money should and could come from the funds provided by the one-mill levy; the student just as he has to in Minnesota, would pay his own tuition over and above this \$1500 subsidization. Other problems that would have to be worked out in this connection would be a standardization of our two-year school with that of the University of Minnesota and a correlation so that North Dakota two-year graduates would have the same background as the Minnesota boys.

Dr. Leigh also pointed out the possibility of reaching some similar arrangement with the University of Minnesota in the establishment of a branch medical school in Duluth. In Duluth they have available about 1300 teaching beds and have available adequate and sufficient teaching personnel. The conversations regarding the Duluth possibility have been entirely informal and Dr. Leigh said that if the University of Minnesota proposition involving Ancker hospital can be swung, it was by far the best proposition for North Dakota and that it would insure the placement of all our second year graduates in a school teaching the highest type of medical training at a cost which the state of North Dakota could very well afford. If an arrangement cannot be reached with the University of Minnesota, he states that then we should further investigate the possibility of subsidizing our second year graduates' tuition in any other school that we can persuade to take one or more of our second year graduates. If this were done, it would be done with the stipulation that the student sign a note for the advances made from the one-mill levy for their tuition, which note would be cancelled year by year, provided the student came back to North Dakota and took his full internship in this state.

Dr. Leigh then brought up the problem of establishing a rotating internship in the state of North Dakota as another means of encouraging doctors to come into the state and remain here. He states this would be a statewide program under the direction of the medical center and should be overseen by a doctor of medicine holding the position of director of internship. The two-year medical school would do what they could to tie up our own second year men to come back and take their internships in North Dakota. The director would both work toward the goal of getting an adequate number of good men to fill the internship openings and would also travel from one teaching hospital to another throughout the state, overseeing the teaching the local hospital staff was giving to the intern. If such a program was set up, then the individual hospitals, instead of going out and looking for interns, the medical center could ask for thirty or whatever number might be proper to fill interns certified by the medical center. These men would be placed in teaching hospitals throughout the state and rotated and circulated through the various state hospitals such as the North Dakota Hospital for the Insane, the San Haven Tuberculosis Sanatorium, etc. This proposition has already been taken up with the North Dakota Hospital association and they are very anxious to do everything possible to get such an internship program under way. One of the big problems will possibly be to encourage the doctors on the various staffs of the prospective teaching hospitals to devote their time to teaching, thereby taking time from their already overcrowded day.

There may be also a problem resulting from the fact that throughout the country there seems to be internship locations in many of the best teaching hospitals which are going begging. Dr. Berg pointed out that this is true for example at the University of Minnesota hospital. It was pointed out, however, that the University of Minnesota hospital does not give a rotating internship of the type required by many states, but on the contrary is now giving specialized internships. Discussion indicated that the present medical graduates do not like such internships and prefer very much a good general rotating internship program. It was indicated that there seems to be a trend on the part of present graduates back to the general practice of medicine. It was clear that if this proposed internship program is to be effective, that the resulting internships must be fully accredited so as to be accepted in all parts of the country.

It was suggested by Dr. Leigh "that this committee recommend to the medical center advisory committee, the medical school administration and the state medical society that they cooperate with the state hospital association to establish and provide a state-wide internship program in hospitals sufficiently large and equipped to fulfill the requirements of the American Medical association and the American Hospital association."

The question was then brought up as to the diversity of authority in the medical center program. It was pointed out that the money was spent under the supervision of the University of North Dakota, the authorizations for expenditures were made by the board of higher education, and that the recommendations for various programs came from the University Medical Center Advisory Council. It was pointed out that the Medical Center act is of broad scope and contains many possible functions other than the actual running of the medical school. John Page and Dean Potter were praised for the work they have done, but it was obvious that the functions of running the medical school as distinguished from the outside functions in connection with the medical center program are not sharply delineated. It was suggested that a director of medical science be obtained to take care of all functions other than the actual running of the medical school itself. Dr. Berg moved "that a doctor be obtained as a director of medical sciences and that the man to fill the position must have a Doctor of Medicine degree and be a man outside the state and have a wide administrative experience in medicine."

Dr. Berg also submitted the following resolution, "that all hospitals be urged to have miniature chests taken of all hospital personnel every six months."

A motion was made to "commend Dean Potter, the advisory council and the board of education for the progress made to date."

It was recommended that report of this meeting be made to the University Medical Center Advisory Council at their meeting on January 31, either through Dr. Larson as the association's representative, or by some person appointed by him to do the same. All motions contained in these minutes were duly passed.

RALPH E. LEIGH, M.D., Chairman

Official Publication

Inasmuch as there has been no suggestion or criticism received by your JOURNAL-LANCET committee during the year, no meeting has been held.

While there is always an opportunity present for improvement, it would appear that the editorial staff have been doing a reasonably good job.

P. G. ARZT, M.D., Chairman

Necrology and Medical History (1951)

"Death comes at last to all mankind"; so let us fittingly take time to speak about those in our professional circle who have died since last we met and make some written record in our archives about them.

"When death comes, breaking into the circle of our friends, words fail us, our mental machinery ceases to operate, all our little store of wit and wisdom, our maxims, our mottoes, accumulated from daily experience, evaporate and are of no avail. These things do not seem to touch or illuminate in any effective way the strange vast presence whose wings darken the world for us."

KASPER P. CAVENY

Dr. K. P. Caveny died June 5, 1950. Kasper Patrick Caveny was born December 19, 1906 at Ward, South Dakota. His mother being an invalid, he was reared by an uncle and aunt, Mr. and Mrs. D. D. Stephens, at Luverne, Minnesota, and attended school there. He attended the University of Minnesota and was granted his doctor's degree by the school of medicine in 1936. During an interval in his school work, he came to Langdon, North Dakota, and was associated for several months with Dr. V. A. Mulligan. After completing an internship at Bethesda hospital, St. Paul, Minnesota, July 1, 1937, he went to Elkton, South Dakota, where he practiced medicine for four months. In February 1938 he returned to Langdon and was again associated with Dr. Mulligan for a year before he bought the practice of the late Dr. C. J. King and established his own office. He suspended his Langdon practice in August 1948 and

the next month left with his family to reside in Portland, Oregon, where he established a medical practice October 1, 1949, in a new building that he had erected in the suburban west slope area of the city. Dr. R. J. Rutten, a former Langdon dentist, had erected a similar building on adjoining property and they were associated in the general planning of the medical-dental center, though not practicing together. Dr. Caveny was married to Edna Mae Pederson, formerly of LeSueur, Minnesota, who survives him with their three children, Candace, David and Kent.

CARLOS SELBY JONES

Dr. C. S. Jones died May 20, 1950, at the age of 74. Dr. Jones was born in Boston, Massachusetts, August 16, 1875. As a small child, his parents moved to Duluth, Minnesota, where he attended grade and high school. From here he received an appointment to the U. S. Naval Academy at Annapolis. He graduated from this school in 1896. Determined to study medicine, this young naval officer resigned from the navy following his graduation and entered the University of Minnesota, school of medicine, where he spent two years. His last two years in medical school were at the College of Surgeons at Chicago, Illinois, from which he was graduated in 1900, receiving his M.D. degree. Dr. Jones began the practice of medicine at Ironwood, Michigan, and in 1904 was appointed surgeon for the United States Steel corporation at Tower, Minnesota. He remained in this capacity for four years. Following two years of postgraduate work at Augustana hospital in Chicago, he came to Williston, North Dakota, where he practiced medicine until two years before his death. Illness incapacitated him at this time. He was married in October 1909 to Lucille B. Cameron, at Anoka, Minnesota. Entering service in the U. S. Army Medical Corps April 1, 1918, he left for overseas duty June 11, 1918, where he served for more than a year. He was in the St. Mihiel offensive and the Meuse-Argonne from September through November, and was wounded. Discharged as a captain, September 30, 1919, at Camp Grant, Illinois, he returned to Williston, but practiced medicine a short time in Plentywood, Montana, before he returned to Williston, North Dakota, where he remained until his death. Dr. Jones was a member of St. Peter's Episcopal church, American Legion, Veterans of Foreign Wars, and was a state officer of the 40 et 8. He was a member of the American Medical Association, College of Surgeons, Kotana Medical Association and North Dakota State Medical Association. He was a member of the Elks, Knights of Pythias and Masonic lodges. A charter member of the Williston Rotary Club, he was recently honored by the local club for 30 years membership. In 1949, Dr. I. D. Abplanalp presented him with the badge of the North Dakota Medical Association, honoring him for 50 years in the practice of medicine. His wife, a brother, Dr. G. Herbert Jones of Duluth, and a half brother, Dr. Selby V. I. Brown of Milwaukee, survive him.

ARTHUR H. JOISTAD

Dr. Arthur H. Joistad died August 8, 1950. Born in St. Paul, Minnesota, April 1, 1885, Dr. Joistad graduated in 1907 from the Minneapolis College of Physicians and Surgeons, later affiliated with the school of medicine at the University of Minnesota. Dr. Joistad interned under the late Dr. Edward Bockmann of St. Paul, a leading eye specialist of the day. In 1909 he entered the general practice of medicine at Maddock, North Dakota, and later at Fairdale, North Dakota. About 1918 he did two years of postgraduate work at Manhattan Eye, Ear and Throat hospital, coming to Fargo in 1920. He specialized in eye, ear, nose and throat work until his retirement. In 1936 he was in Europe with his family; while there he visited clinics in England and on the continent for further study. He was licensed to practice medicine in Nebraska and California as well as North Dakota, although his entire practice was confined to North Dakota. He was a fellow of the American Medical Association and a member of the Cass County and North Dakota Medical Associations. He was a member of the Phi Rho Sigma medical fraternity, the Exchange Club, Masonic orders and the Shrine. He married Hilda Eiken in St. Paul June 2, 1910. Besides Mrs. Joistad and his son, he leaves a daughter, Mrs. Frederick B. (Virginia) Scheel, 1513 7th St. So., Fargo, a sister, Mrs. Emma Clausen, St. Paul, a nephew, who had been

a close member of the family, Irvin Clausen, Hamburg, New York, and two grandsons. A daughter, Ruth, was killed in an automobile accident July 7, 1923.

THOR OLSON ENGH MOELLER

Thor Olson Engh Moeller died September 3, 1950. Dr. Moeller received his degree of doctor of medicine at Rush Medical college in 1893. He was born in Christiania (now Oslo), Norway, June 20, 1863. He was licensed to practice medicine in North Dakota July 17, 1894. Dr. Moeller practiced in Hillsboro, Perth, Munich and Devils Lake, where he was at one time city health officer. He was a Mason and Shriner. Dr. Moeller was in the North Dakota national guard in 1907 and 1908. He served in the Medical corps, U.S.A., in World War I. Dr. Moeller had been hospitalized for two years before his death in Fargo. He is survived by several nieces and nephews, one of whom is William S. Moeller of Bismarck, North Dakota.

ALEXANDER WILLIAM MACDONALD

Dr. Alex W. Macdonald, 80, passed away at Mercy hospital, Valley City, November 26, 1950, following a lingering illness. His death was caused by hypertensive heart disease and arteriosclerosis. Dr. Macdonald was a native of Nova Scotia. At the age of nine, a new home was established in Winnipeg, Canada, and here he received his early education. Being of a studious and scientific nature, he decided on the profession of medicine for his life's work. He enrolled at the Bennett Medical college, medical school of Loyola university, Chicago, and was graduated from this institution with the class of 1897. He interned in Chicago, and took postgraduate work at Tulane university, New Orleans. Dr. Macdonald came to North Dakota and was licensed to practice April 14, 1898. He located at Courtenay where he remained in practice until after the turn of the century whence he removed to Valley City to become associated with the late Dr. L. S. Platon in the practice of medicine and surgery and in the operation of the Platon hospital. He became a fellow of the American College of Surgeons. Dr. Macdonald was civic minded and contributed much to community welfare. He had held the offices of the Sheyenne Valley Medical society; was many times a delegate to the state medical meetings; had been city and county health officer and chairman of the committee on arrangements when the state association met in Valley City. Dr. Macdonald had large farming interests, but during the many years of his active practice his obligations to his patients were always of first importance. In 1948, Dr. Macdonald was made an honorary member of the state medical association and the "50 year club" because of continuous practice for that length of time. He is survived by his wife, one daughter, Ethel, Mrs. F. E. Runyon of Los Angeles, two sons, Dr. James Macdonald of Van Nuys, California, and Allen of Los Angeles, California, two grandchildren, a step-son, William C. McCulloch. A son, Stuart, passed away in 1947.

WILLIAM FINLEY BAILLIE

Dr. W. F. Baillie, 72, passed away in a Fargo hospital May 5, 1950. Dr. Baillie was a native of Scotland, coming with his parents to this country in 1883. For several years the family resided in Iowa and came to Barnesville, Minnesota, where he grew to manhood. He received his cultural education at Macalester college, St. Paul, and his medical degree from the University of Minnesota in 1903. He spent his internship at St. John's hospital in Fargo and was licensed to practice in North Dakota in 1904. Dr. Baillie then located at Hunter, where he practiced for nearly twenty years. He came to Fargo in 1923 and became associated with the Fargo clinic. He had served as president of the board of directors of the clinic, as well as president of the staff of St. Luke's hospital. He held important committee appointments of our state association. He was a fellow of the International College of Surgeons. Dr. Baillie was a lifetime sports enthusiast and had been a skillful baseball player in his younger years. He never was too old to enjoy golf. Dr. Baillie was married to Gertrude Morey of Minneapolis in 1913. He was a trustee of the First Presbyterian church, a member of the Hunter Masonic lodge, Scottish Rite bodies in Fargo, El Zagal temple of the Shrine, the Fargo Elks lodge and the Fargo Country club. Survivors besides Mrs. Baillie are a son, Glenn, a senior at NDAC., three daughters,

Mrs. C. Warner Litten and Mrs. John W. Shotwell of Fargo and Mrs. George W. Hosfield, Sacramento, California; a sister, Mrs. E. F. Morey, Palo Alto, California, and eight grandchildren.

J. G. VIGELAND

Dr. J. G. Vigeland died August 8, 1950. Dr. Vigeland was born in Norway in 1876, and came to the United States in 1895. For a time, he was a farm laborer in Iowa, later he attended St. Olaf college, Northfield, Minnesota, and studied medicine at the University of Minnesota and Marquette university. The latter school conferred the degree of doctor of medicine on him in 1910. He practiced two years in Minnesota and then settled in Brinsmade, North Dakota, where he practiced medicine for the remainder of his life. During his first years at Brinsmade, he made his rounds in a cart pulled by a pony. During the 1918-1919 influenza epidemic, he was credited with traveling more than 4,500 miles with horses in five months, caring for his patients. Active in church and community affairs, he had been superintendent of the Benson county board of health nearly thirty years and also served as coroner and member of the insanity board. In 1948, the North Dakota State Medical association named Dr. Vigeland North Dakota's "family doctor of the year." He leaves Mrs. Vigeland; two sons, Dr. Norman Vigeland, physician, and Dr. Harold H. Vigeland, dentist, both of Rugby, North Dakota; a brother and two sisters, all in Norway.

GUSTAF W. DAHLQUIST

Dr. Gustaf W. Dahlquist died October 25, 1950. A graduate of the University of Minnesota, school of medicine, 1893, he received his North Dakota license on January 15, 1903, while living in Bottineau county. He served as an army lieutenant in World War I. He also practiced at Lancaster, Minnesota, and was a member of the staff of the Veterans bureau at Fargo, North Dakota, prior to his retirement.

JOSEPH OWEN HAYHURST

Dr. Joseph Owen Hayhurst died April 29, 1950, at the age of 73, of coronary thrombosis. He was a graduate of Barnes medical college of St. Louis, Missouri, in 1907. He was past president of Rolette county, N. D., medical society. He received his North Dakota license through reciprocity with Illinois July 9, 1915. His death was reported from Inglewood, California.

NAPOLEON A. CHAGNON

Dr. Napoleon A. Chagnon died December 22, 1950, in a Bad Axe, Michigan, hospital. He was 76 years old. He was graduated from Laval university in 1898, and was licensed to practice medicine in North Dakota October 13, 1898. On August 14 in Port Austin, he was honored in observance of over 50 years practice of medicine, 30 of which were in Port Austin. He was widely known as "the family doctor of the tip of the thumb," the eastern projection of Michigan into Lake Huron. He was born in Montreal, Quebec. He was the youngest of fourteen, all the rest of whom were born in France. In 1898, he entered practice at Neche, North Dakota. In 1915, he moved to Fargo and resided at 910 Fourth Ave. S., Fargo. He served in the Army Medical corps in World War I. Following his army discharge, he located at Detroit, Michigan, and two years later moved to Port Austin. He leaves Mrs. Chagnon, six sons, three daughters, a sister in Montreal, and 21 grandchildren.

ALBERT W. SKELSEY

Dr. Albert W. Skelsey, 86, died March 14, 1951. He was a native of Montreal, Canada, being born April 7, 1864, in that city. He came to Fargo in 1903 and practiced medicine here continuously since that date. He was a member of the Cass County, North Dakota State and American Medical associations. He gave ten years of service, from 1930 to 1940, as secretary of the North Dakota State Medical association and was widely known throughout the state. In World War II, Dr. Skelsey was commissioned as a medical officer in the U. S. Army and served as medical officer with the Officer Candidate school at the North Dakota Agricultural college. He was a past secretary and president of the Cass County Medical society. Dr. Skelsey was a member of Shiloh Masonic lodge and was

a 32nd degree Scottish Rite Mason. His wife preceded him in death in 1946.

GEORGE M. WILLIAMSON

Dr. George M. Williamson died December 11, 1950. Dr. Williamson, one of North Dakota's most widely known physicians and an outstanding citizen of Grand Forks, died at the age of 83. He had been in failing health for several years, after his retirement from active practice as a member of the medical firm of Campbell, Williamson, Benwell and Vance. He had survived a grave illness in 1939 to return to his active part in the professional, civic and social life of the community, but his physical condition forced his retirement several years later. Dr. George M. Williamson was born May 21, 1861, in Picton, Ontario. He graduated from the University of Manitoba medical school in Winnipeg, Canada, in 1895, with the degree of M.D., D.M., and came to North Dakota in 1895, establishing his practice at Ardoch, where he was licensed by the state on October 10, 1895. He had graduated that year from the Manitoba medical college, after going to Winnipeg from Prince Edward county, Ontario, in 1890. At Ardoch, he was associated in practice with Dr. John Montgomery, then superintendent of the state board of health. It was in Ardoch that Dr. Williamson met Miss Emma A. Holstrom, who taught school there. They were married on November 2, 1898, in Minneapolis. They lived to celebrate their 50th wedding anniversary in 1945. Five months later to the day, Mrs. Williamson died suddenly.

In 1906, Dr. Williamson disposed of his interest in Ardoch and went to Edinburgh, Scotland, for further medical study and received several degrees. He then went to London and took special courses in surgery at Guy's and Middlesex hospitals and in diseases of children at the Hospital for Sick Children at Great Ormonde street. From London, he went to Dublin, Ireland, for special study in gynecology and obstetrics at the internationally famous Rotunda hospital, under Sir Hastings Tweedy, returning to Grand Forks in 1908.

He left an indelible imprint in the records of his profession, both in North Dakota and among national organizations, and his contribution to the civic betterment of Grand Forks marked him as one of its more valuable citizens. From the time he established his practice in North Dakota, first in Ardoch in 1885 and since 1908 in Grand Forks, he had foremost in his thought the advancement of his state and city, with particular consideration for youth and the underprivileged child. This latter phase was evidenced in his unceasing efforts in behalf of the Shrine hospital for Crippled Children in Minneapolis, promotion of music for school children, and his leadership in launching the municipal recreation field. It was while he was president of the Grand Forks Commercial club in 1921, that he evolved the "Grand Forks Plan of Music," calling for employment of a band leader for the city, to devote part time to directing the municipal band and part time to organization and direction of public school bands. This program, which has made Grand Forks one of the outstanding musical centers of the state and has brought national recognition to its school and municipal bands, was followed in 1925 by formation of the Grand Forks Community Music association, with Dr. Williamson again playing a leading part. From the time of its organization, under the sponsorship of the Grand Forks Chamber of Commerce, Dr. Williamson was president of the music association, which arranged Sunday concerts by local musicians each winter and brought to Grand Forks the past two winters an artist series by internationally known artists.

Dr. Williamson was an ardent Mason from the time he joined the Blue Lodge, and became a member of all branches of Masonry. He was especially active in the Shrine and became potentate of Kem temple in 1930. For 38 years, he served as secretary of the North Dakota State Board of Medical Examiners. He was appointed to this post in 1911, under the medical practice act of 1911. Dr. Williamson was chairman of the committee that framed this act. For 36 years he was associated with the Federation of State Medical Boards of the United States, and that organization paid him a special tribute at its meeting in 1949. Dr. Williamson was the 29th president of the North Dakota State Medical association in 1918. In 1919, he was chairman of the committee that revised the constitution

and by-laws of our association. He was a past president of the Grand Forks District Medical society and was a fellow of the American College of Surgeons.

On the personal side, this man was pleasant to know. His Scotch ancestry was quite apparent, although it had passed through Canada and the United States. Dr. Williamson was full of song and anecdote and could always swing from the serious to the lighter side with grace and ease. On many counts, he will be missed in a great number of circles.

F. L. WICKS, M.D., FRANK I. DARROW, M.D.,
Co-Chairmen

Public Health

The committee on public health having met March 31, 1951, submits the following report:

TUBERCULOSIS

Summary of Chest X-Ray Surveys 1946, 1947, 1948, 1949 and 1950

	1946	1947	1948	1949	1950	Total
Total satisfactory films	29,054	89,591	70,246	56,820	71,143	316,854
Negative	26,998	85,435	67,839	55,379	69,433	305,084
Suspicious	1,966	1,361	868	868	586	—
Pct. of total	2.2%	1.9%	1.5%	1.5%	.8%	—
Positive	117	116	36	36	23	—
Pct. of total	.1%	.2%	.1%	.1%	.1%	—
Other pathology	2,073	930	537	537	1,101	—
Pct. of total	2.3%	1.3%	.9%	.9%	1.5%	—
Ref'd to physician	2,056	4,156	2,407	1,441	1,710	11,770
Pct. of total	7.1%	4.6%	3.4%	2.5%	2.4%	3.7%
Reported by private physicians	—	—	—	—	—	129
Reported by the sanatorium	—	—	—	—	—	88
Reported from mental institutions	—	—	—	—	—	5
Reported by death certificate	—	—	—	—	—	16
Reports from other sources (VA, IRN, etc.)	—	—	—	—	—	54

Total cases reported 292

White male	144	Non-white male	22
White female	91	Non-white female	35
Total white	235	Total non-white	57

Year	Estimated Population	No. of Cases	No. of Deaths	D.R. per 100,000
*1950	616,185	292	73	11.8
1949	605,000	246	60	9.9
1948	—	346	59	10.5
1945	537,055	234	113	21.7
1940	641,935	283	123	19.1
1930	680,000	437	222	35.0
1925	—	109	309	46.5

*Provisional

The committee, concerned with the necessity to continue the improvement of the tuberculosis control system in North Dakota and particularly interested in the improved standards of care of the tuberculosis patient, makes the following recommendations:

1. That the governor, the board of administration and any other interested or responsible agency or board be urged to initiate the development of an immediate and adequate nursing education program in tuberculosis at San Haven sanatorium. This program should be of such quality that it can be used for accredited student nurse affiliation in tuberculosis.

The committee wishes by this recommendation to call to the attention of the medical profession the fact that at the present time, clinical facilities for teaching tuberculosis are available but are not being utilized; that there is a constant loss of nursing service to North Dakota patients since at present all schools of nursing who offer tuberculosis affiliations have found it necessary to send student nurses outside of the state for this education; that the schools of nursing are having a marked additional expense in their training programs.

2. That the president of the medical association appoint a committee to meet with the officials of the board of administration to consider the administration of San Haven sanatorium.
3. That A. F. Hammargren, M.D., be given the opportunity to bring to the attention of the house of delegates a program for certification of schools—a tuberculosis patch testing program. This project is sponsored by the American School Health association.

Venereal Disease

Age	Not Stated		Primary		Secondary		Early Latent		Late Latent		Late Tertiary		Neuro		Congenital	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
All ages	9	9	13	9	4	9	34	55	36	21	19	8	7	—	8	9
Under 1 year	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
1 to 14	—	—	—	—	—	—	1	1	—	—	—	—	—	—	1	2
15 to 24	1	3	5	4	1	2	4	23	1	—	1	—	—	—	4	4
25 to 44	3	1	5	5	2	5	17	21	14	10	2	1	1	—	1	2
45 to 64	2	2	1	—	1	2	3	7	14	5	3	4	4	—	1	—
65 and over	1	—	1	—	—	—	—	—	3	2	9	—	2	—	—	—
Unknown	2	3	1	—	—	—	9	3	4	4	5	2	—	—	—	—

Primary	22
Secondary	13
Early Latent	89
Late Latent	57
Late (Tertiary)	27
Neurosyphilis	7
Congenital	17
Not stated	18
Total	250

their wives concerning the defunct EMIC program that the subject be called to the attention of the house of delegates for their consideration and recommendations.

3. The possibility of initiating a study of each maternal death occurring in North Dakota was considered. The program currently underway in Minnesota was presented. It was felt that such a move should be sponsored by the North Dakota Obstetrical association if it were to be undertaken. The chairman offered to call the attention of this association to the discussion by the present committee at an appropriate time.

4. Current practices and proposed changes in the vital statistics reporting to the state department of health were considered. It was agreed to arrange for presentation of this material to coming meetings of the North Dakota Pediatrics association and the North Dakota Obstetrical association.

5. It was resolved to inaugurate a study by the state department of health of nursery facilities and procedures in the care of newborn infants throughout the state. This information is to be made available to the individual hospitals for self-study by their professional and administrative staffs.

6. It was resolved to call the attention of the house of delegates to the prevalence of accidental deaths in the younger age groups.

Pneumonia

Pneumonia Cases by Month		Pneumonia Cases by Age and Sex			
Month	Cases	Age Group	Male	Female	
January	220	Under 1 month	4	7	
February	190	Over 1 month and			
March	274	under 1 year	143	154	
April	262	1 to 4	220	174	
May	205	5 to 9	123	79	
June	176	10 to 14	56	48	
July	109	15 to 19	69	52	
August	125	20 to 29	86	86	
September	143	30 to 39	93	88	
October	195	40 to 49	105	65	
November	265	50 to 59	92	68	
December	308	60 to 69	117	96	
		70 and over	208	161	
		Not stated	36	42	
Total	2,472		1,352	1,120	

Kind of Pneumonia	Place of Treatment
Lobar	Home 67
Broncho	Hospital 2,114
Other	Not stated 291
Not stated	
Total	2,472

LEADING CAUSES OF DEATH Minnesota, 1949

Age 1 to 4 years: First—accidents, 107 cases; second—congenital malformations, 39 cases; third—pneumonia, 32 cases.

Age 5 to 9 years: First—accidents, 66 cases; second—leukemias, 18 cases; third—poliomyelitis, 16 cases.

Age 10 to 14 years: First—accidents, 51 cases; second—poliomyelitis, 20 cases; third—cancer, 10 cases.

Age 15 to 19 years: First—accidents, 96 cases; second—poliomyelitis, 16 cases; third—nephritis, 13 cases.

Age 20 to 34 years: First—accidents, 256 cases; second—cancer and leukemia, 86 cases; third—diseases of heart, 57 cases.

From "Maternal, Infant and Childhood Mortality,"
by Division of Maternal and Child Health,
Minnesota Department of Health, 1949.

It was recommended that programs be formulated under the leadership of the medical profession to institute effective preventive measures.

F. A. DeCESARE, M.D., Chairman
Cancer

As in the past, the activities of the committee on cancer have been integrated with those of the North Dakota Cancer society. All the committee members serve on the board of directors of the cancer society, whose membership includes six lay persons. This strong representation insures careful consideration of the medical viewpoint in all decisions of the board. It does, however, place great responsibility on the medical directors who, because of their majority representation on the board, have such a dominant voice in the determination of the policies of the society. Association with the lay directors and the many lay workers in the field, all of whom are volunteers, is not only pleasant but also a privilege because it affords the medical directors an opportunity to obtain the viewpoint of laymen who are intensely interested in the fight on cancer. It is gratifying to note that this viewpoint is not only sympathetic to the attitudes of the medical representatives on the Board but also to the problems of the practicing physician on whose shoulders much of the responsibility for the success of the society's program rests.

FLUORIDATION OF PUBLIC WATER SUPPLIES

In the interest of public health in North Dakota, evidence is rapidly accumulating that fluoridation of public water supplies creates a lowered rate of dental caries. Where a strong public demand has developed in a community, and the procedure has the full approval of the medical and dental professions and the local and state health authorities, be it

RESOLVED, that this procedure be recommended as a safe and effective method for reducing the prevalence of dental caries.

CIVIL DEFENSE

The committee, in its awareness of the responsibility of the physician in civil defense and civil disaster plans, wishes to concur with the report of the committee on emergency medical service.

RUSSELL O. SAXVIK, M.D., Chairman

Maternal and Child Welfare

The committee on maternal and child welfare met in Fargo April 7, 1951. The committee submits the following recommendations:

1. Methods were discussed of bringing to the attention of the medical profession current material in the field of infant and maternal care. Regional medical meetings with special speakers sponsored by the medical center were considered. It was recommended that the North Dakota Pediatric association and the North Dakota Obstetrical association cooperate in developing special programs for the education of physicians.

2. The former EMIC program of World War II is being increasingly inquired about. A resolution to the house of delegates was authorized: The committee recommended that since there is a marked increase in the number of men entering the armed services and a proportionate inquiry and demand from

The North Dakota Cancer society continues to place major emphasis on education, in addition to the other features of its program, namely service and research. This is directed toward widespread dissemination of information among the people of the state concerning the known facts on cancer, the danger signals which may mean cancer, the necessity for immediate consultation with the family physician if any of the danger signals appear, and the value of periodic physical examinations to detect early and possibly symptomless signs of cancer.

Lay education in cancer places a great responsibility on the medical profession. In order that it may discharge this responsibility, the physician must be sympathetic to the program of the society and he must be willing and able to give his patients the type of medical service that they are being taught to expect.

It is undoubtedly true that the fate of the average cancer patient rests in the hands of the first physician the patient consults. It is imperative, therefore, that the physician becomes cancer-conscious so that he 'examines his patients thoroughly and does not belittle the patient's fear of cancer or his interpretation of his own symptoms. To promote the idea of "a cancer detection center in every doctor's office," much attention has been given by the cancer society to professional education. Informative material prepared by the American Cancer society has been distributed to all the physicians in the state. The latest is a convenient sized periodical entitled "CA". It contains short authoritative discussions of the diagnosis and treatment of cancer and abstracts of the latest developments in cancer research, therapy, etc. The district medical societies have been urged to devote the major portion of at least one meeting a year to cancer. Many of them have done so. Numerous physicians throughout the state have attended the refresher courses on cancer at the University of Minnesota, which have been co-sponsored by the cancer society. However, it has become apparent that a majority of the general practitioners in the state, for whom the refresher courses were intended, have found it difficult or impossible to spare the time necessary for travel to and from Minneapolis and attendance at a three or five day course. For this reason, qualified experts are being brought into the state this spring to conduct cancer meetings in most of the district societies. The success of this experiment will depend on the attendance of the physicians as well as the teaching ability of the experts who contribute to the programs.

The North Dakota State Medical association has repeatedly endorsed the program of the North Dakota Cancer Society. It should reaffirm this endorsement, urge its members to participate in the program in every way possible, and applaud the efforts of the many volunteer lay workers throughout the state who are giving generously of their time and money in the fight against cancer.

L. W. LARSON, M.D., Chairman

Fractures

The members of this committee did not hold a meeting during the year. However, the policies, as carried out in previous years, have been continued.

R. H. WALDSCHMIDT, M.D., Chairman

Public Policy and Legislation

Another year has rolled by and in the interim the proponents on the national level—that is, the present administration—received a very definite answer from the public as to their stand on many problems, particularly that of the socialization of medicine. It has been said that this issue alone was an important one in the defeat administered to President Truman's administration. Very definitely the majority of the voters in our last presidential election served notice that they do not want compulsory medical insurance and undoubtedly the administration forces recognize that they can no longer attempt to put across a wide scale type of compulsory health insurance of the type for which they were propagandizing the country. It should also become very definite to us that the administration forces will not give up the fight but will attempt to obtain their welfare state by piecemeal legislation and against that we must be on our guard; for its stand against the welfare state, organized medicine in the United States has publicly been commended.

For us here in the State of North Dakota, it is encouraging to note that the men that we elected to represent us in the United States congress are of the belief and opinion that com-

pulsory medical health insurance should be discouraged. It is likewise comforting to know that for the next two years we have representatives to whom we can bring our problems with assurance that they will be sympathetically received. At the local state level we did not find any particular axes to grind in the state legislature. It is true that several bills came up upon which we were called to give aid to and rightfully so, and in all instances, the legislation which we were against was defeated. As many of you remember at the legislature in 1949, we were faced with curbing the powers of the North Dakota State Board of Medical Examiners, particularly as it related to displaced physicians of questionable professional qualifications being admitted to our state board examinations and review by a board of higher-up. This was defeated and as we look back on the past two years, especially in regard to the program of the displaced physician, I believe that we can say that we have kept our pledge with the state legislature in carrying out the promises that we made.

Insofar as the displaced physician program is concerned, it was not entirely successful and neither was it a failure and there have been several promising young displaced physicians who in all likelihood will give a good account of themselves and five years hence probably will take and pass their final examinations without a great deal of difficulty. We believe that anyone familiar with the problems and who have investigated the physicians that have been placed in the state will agree that the steps taken by the North Dakota State Board of Medical Examiners was a very wise one. No one can argue that they were not taken for the purpose of protecting the health and welfare of our citizenry.

The advent of the Korean crisis has had its effects upon the medical profession of this state. Several of our doctors have gone with national guard units. A number of them will undoubtedly go if and when the selective service system is called upon to obtain professional men for the services. One other effect of the Korean crisis also has been the vast undertaking of preparedness that faces the nation. Because of this, there is little likelihood that any appropriation will be made for President Truman's welfare program. That has been quite definitely decided in the United States congress only recently.

The question of voluntary health insurance to state employees came up during the recent session of the legislature. This was something new insofar as state medicine was concerned. It was at that time, however, felt that probably we should not deny the state government this right insofar as the procedure was all on a voluntary basis and the insurance apparently was to be purchased through the various agencies operating in the state. However, it does open a new field, that is, state medicine, and it is something that we should scrutinize carefully if any further legislation should come up.

It would be well for everyone, especially the members of the house of delegates, to read the special article entitled "The Doctor's Case Against Compulsory Disability Insurance," by E. H. O'Conner, in the March 31, 1951 issue of the *Journal of the American Medical Association*. Apparently, this problem of state insurance has gained some foothold in this country and is actually being practiced in some of the states. It is, of course, different than what was proposed and enacted in our legislature, but one should be certain that it goes no further. The warning, we believe, by Mr. O'Conner is a timely one.

The American Medical association answer to the plea of the medical schools for help in a financial way for the maintenance of the medical schools in the United States was very definitely answered by the association appropriating one-half million dollars for that purpose. This was to directly counteract proposals being made to the United States congress for such an appropriation and it is hoped that this will be the solution by the medical profession on a voluntary basis.

Insofar as our state activities are concerned, we have had only one meeting of the committee and that was last fall and was called for the purpose of deciding what part our state society would play in the nation-wide campaign being put on by the American Medical association against compulsory health insurance just prior to the elections in November. Our committee decided to go along with the program and an appropriation was made for that purpose. There was a very fine response from the businessmen in the cities and in the smaller towns through

the medium of advertising. To those far-sighted businessmen we are grateful.

A. C. FORTNEY, M.D., Chairman

Crippled Children

This committee held no regular meetings during the year, however, a sub-committee, termed the medical advisory committee on crippled children's services, met with the officers of the Crippled Children's bureau in Bismarck on September 24, 1950.

At this meeting there was discussed the matter of establishing funds for the treatment of rheumatic fever and cardiac cases. The rheumatic fever program, up to this time, had not been established in the state, but it appears that it will be probable that funds can now be made available for prolonged care of rheumatic fever and cardiac cases.

A. R. SORENSON, M.D., Chairman

Medical Economics

Your committee on medical economics respectfully submits the following report:

The committee met in the Prince hotel in Bismarck at 2:00 p.m. on Saturday, January 20, 1951, and the following items were considered:

In the spring of 1950, the medical economics committee presented a new proposed welfare board fee schedule to the state welfare board, which in turn presented it to the various county welfare boards. Since that date, correspondence and personal communication with Mr. Carlyle Onsrud, executive secretary of the state welfare board, indicates that the various county welfare boards state that they have not the funds to increase their payments to physicians for medical services. Accordingly, the matter stands as it did one year ago and there is no welfare board fee schedule in effect.

In correspondence with Mr. Onsrud, he has given us the information that in a survey that his board has conducted, it appears that about 61 per cent of the welfare board costs for medical care goes for hospitalization, 16 per cent for drugs, 16 per cent for doctor's services, and the rest for dental care, nursing services, etc. Inasmuch as the percentage for doctor's services is so small, and that the increase which we have recommended would amount to a relatively small amount of money for each county involved, your committee has not seen fit to enter into any further negotiations with the welfare board. They have made no counter proposal.

Representatives of the public welfare board informed us that they are considering trying to make an arrangement with a commercial insurance company or with Blue Cross-Blue Shield to insure their clients against hospital, medical and surgical expense. After consultation with representatives of Blue Cross and Blue Shield, it appears that as far as these organizations are concerned, the plan is not feasible. There is also some question as to whether commercial insurance companies would be interested in such an arrangement.

These possibilities failing, the public welfare representatives told us that they will consider setting up what amounts to their own prepayment insurance system, taking approximately \$5.00 per patient per year and crediting it to a fund which would be used for paying hospital, medical and surgical expenses.

It was pointed out to them that we have little to say about how they take care of their payments, but that we felt that they should base their budget on a higher fee schedule than they have previously used in order to be certain that they have adequate funds. It appears that all such plans eventually come back to a fee schedule. No action was considered necessary on this information.

Recent federal legislation has authorized federal funds to aid state welfare boards in embarking on a program of aid to the permanently and totally disabled. This program will be under the direction of the social security administration. It appears that the plan calls for welfare board clients who are disabled, undergoing a rather comprehensive physical examination for classification as to their degree of disability. This, together with information gathered by social service workers, and after consultation with people familiar with the possibilities of rehabilitation, would be used to ascertain whether the patient is permanently and totally disabled and entitled to aid as such, or whether it might be possible to rehabilitate him so as to enable him to become partially or totally self-supporting.

It appears that in such a program, the physicians of the state will be called on to make the general physical examinations and probably advise regarding patients in their own communities. After considerable discussion it was the opinion of your committee that the state welfare board should be offered the services of an advisory committee from the state medical association for this program.

Inasmuch as this program was under serious consideration at the time of our meeting, our recommendations were placed before the council of the state association and approved by them.

We would recommend that all members of the association carefully read any information sent out to them from the state association or state welfare board officers regarding this program.

Dr. Douglas Lindsay of the Crippled Children's division of the public welfare board presented the problems of the care of poliomyelitis patients as regards the confusion that has existed in the minds of the general public and physicians as to the position of the National Foundation for Infantile Paralysis and the crippled children's program of the welfare boards. Apparently, representatives of the national foundation and of the Crippled Children's bureau in North Dakota have worked out a solution that appears feasible. They propose to have the national foundation finance the care of poliomyelitis patients during the first year when necessary and the Crippled Children's bureau take care of them thereafter. As presented to us, it appears that the activities of the national foundation have not been commensurate with their local financial ability. It also appears that the crippled children's program in this field may have been handicapped by lack of appropriation from the legislature due to misunderstanding as to the extent of the national foundation's participation. Their proposal must be approved by higher officials of the national foundation before it can be put in effect.

It appeared to your committee that this plan offers a reasonably good solution to the confusion that has arisen. No action was considered necessary.

In the fall of 1950, Dr. M. M. Van Sandt, area medical officer of the Bureau of Indian Affairs, approached the officials of the state medical association with an idea of his own for improving medical service to indigent Indians of the state. Under Dr. Van Sandt's proposal, a number of the Indian hospitals in the state would be closed and provisions made for taking care of indigent Indians by private physicians in the various general hospitals of the state in a manner similar to our Veteran home care arrangement. Dr. Van Sandt could not be at our meeting in January, so no details regarding his proposal have been discussed.

It was the opinion of your committee that the general principles in Dr. Van Sandt's proposal are sound, so your committee recommended that Dr. Van Sandt be informed of our approval of the general principles of his plan, and that letters be sent to our senators and representatives in Washington informing them of our action in the matter. This matter was presented to the council of the state association at their meeting the following day, and our action was approved by them.

Accordingly, the chairman of your committee has sent letters to Dr. Van Sandt, Senators Langer and Young, and Representatives Burdick and Aandahl informing them of our attitude in the matter and offering our services in working out details provided the plan of Dr. Van Sandt is approved by the higher officials in the Bureau of Indian Affairs.

Dr. W. E. G. Lancaster, chairman of the committee on prepaid medical care plans, reported to us on the status of the North Dakota Physician's Service, the details of which will no doubt be included in Dr. Lancaster's report to you.

At the 1950 meeting of the house of delegates a recommendation was passed that the state association investigate the possibilities of arranging to approve or disapprove various hospital, medical and surgical care insurance plans. This was considered to be a matter for Dr. Lancaster's committee. At their meeting in January 1951 they took action regarding this which will no doubt be included in their report to you.

Mr. William F. Little of the Professional Protective Credit Bureau appeared before your committee at our January meeting, requesting approval of the bureau which he represents in this area and offering us a proposal whereby his company would collect accounts for all the physicians in the state wishing it, for a commission which totals 20 per cent. However, 2 per cent

of this would be retained by the State Medical association, his organization would retain 18 per cent, and the balance of 80 per cent would be turned over to the physician whose account was collected. It would appear from information available to your committee that this is probably a sound collection agency, but we seriously question the advisability of the state association entering into such a transaction, so the matter was postponed indefinitely.

P. H. WOUTAT, M.D., Chairman

Supplementary Report of the Committee on Medical Economics—May 19, 1951

The following supplementary report of the committee on medical economics was introduced by reading by Dr. Woutat, chairman of the committee, and referred to the reference committee to consider the reports of the committee on medical economics, prepayment medical care, rural health and veterans medical service:

The committee met in the Prince hotel at 3:00 p.m. Dr. M. M. Van Sandt, area medical director of the Bureau of Indian Affairs, presented your committee a detailed discussion of his proposal for a change in the method of providing medical, surgical and hospital care for indigent Indians.

The essential features of his proposal are:

1. That a number of Indian hospitals be closed.
2. That arrangements be made with the hospitals in the state to take care of Indian patients on a per diem basis.
3. That arrangements be made for medical and surgical care with the physicians practicing in the state on a fee schedule.
4. According to Dr. Van Sandt's discussion with us, there would be a physician, probably with public health service training in the state, to supervise such a program and facilitate its operation. We understand that he would have considerable control over the selection of patients to be treated.

After considerable discussion and questioning of Dr. Van Sandt by various committee members, your committee voted to recommend to the house of delegates:

1. That the state medical association approve the proposal of Dr. Van Sandt.
2. That we offer the Bureau of Indian Affairs the same fee schedule that we presented to the state welfare board over one year ago, for care of welfare board patients.

The matter of a welfare board fee schedule, the crippled children's program fee schedule, and arrangements for the care of acute and chronic poliomyelitis patients was discussed after a presentation by Dr. Lindsay of the Crippled Children's Bureau. No action was taken on these matters.

P. H. WOUTAT, M.D., Chairman

Prepayment Medical Care

The committee on prepayment medical care met at Bismarck in November 1950. Mr. Donald Eagles met with the committee and reported the progress of Blue Cross and Blue Shield throughout the state, all districts of which now participate. There were at that time 212 doctors enrolled. He gave a report of the financial status and discussed the National Sales agency as a means of better standardization the country over.

The inclusion of the welfare group in Blue Cross and Blue Shield was discussed. Federal money was indicated available, providing a prepayment plan be set up. There were considered about 9,000 of such applicants in the state, 25 per cent of whom were hospitalized last year. Considering the age of the patient, the frequency of hospitalization, and the duration of stay in the hospital, it was not felt feasible.

General insurance forms were discussed and it was hoped that a standard form, stressing brevity, could be adopted.

At the last annual meeting of the house of delegates, this committee was instructed to make a survey of all local insurance companies of which there are over two hundred. This request was considered and the committee concluded that it would be impossible to make a fair and impartial estimate and evaluation and felt it would be contrary to the policies of the state medical society to enter into such a controversy.

W. E. G. LANCASTER, M.D., Chairman

Rural Health

The committee on rural health has not held a meeting since the Fargo meeting, March 4, 1950. It is difficult at times to get this committee together, due to several reasons; the busy rural practice, and the fact that the members of this committee cannot always get someone to take care of their practice while they are gone.

As has been stated in previous reports, the rural health committee decided to stress the organization of rural health councils. There are several health councils in the state of North Dakota. Most of these health councils have been developed by the state health department and the physicians and surgeons residing in the local health districts in the state. To date there are five health districts, located at Willison, Dickinson, Minot, Mandan and Devils Lake. There are a few more proposed districts in the process of development.

According to Dr. R. O. Saxvik, state health officer, there are twelve active health councils in the state.

The rural health councils, sponsored by the medical profession, have been slow in developing. Your chairman of the rural health committee has information of the development of only one such council, that in Grant county, which was organized in 1949. This council, as previously reported, consists of members of several organizations, interested in the betterment of rural health. This council has had its good effect. This council recommended that the Grant county commissions interest themselves in re-establishing a county health unit or consider the possibility of Grant county belonging to a local health district. The commissioners chose the latter, and now Grant county belongs to the Custer health district, located at Mandan.

This health district is headed by Dr. C. C. Smith of Mandan. Dr. Smith is an energetic worker, and with the help of his able associates has already achieved much in the development of a good health district.

In the organization of the local health councils, the lay members need help and guidance from local physicians. Experience so far indicates that the members of the rural health councils look for this help from the local physicians.

Since 1949, there have been several modern hospitals built in the rural areas. This hospital building program has developed through the people's interest and desire for better medical care. Both professional and laymen's organizations (too numerous to name) have worked together and have made this program possible. Federal moneys made available by the Hill-Burton act was also greatly responsible for this building program. Credit is also due the state health department for the part it played in stimulating this program.

The rural people have been vitally interested in the development of hospital programs. Probably, because they believe that with better medical facilities they would be able to keep and also get more medical personnel into the rural areas.

Since the advent of this program, several younger physicians have located in rural areas where these hospitals have been built. In many places the local physician or physicians have worked very hard, giving much of their time and income to develop the rural hospitals.

At this time, it might be well to inject the idea (which is not a new idea) of developing the so-called small, local medical center or clinic, associated with adequate hospital facilities; that the physicians of these small medical centers or clinics cooperate with physicians in neighboring towns and all work together as a clinic unit, using one centrally located rural hospital.

These clinical units, with their hospital facilities, should have referral centers for their patients that need the attention of a specialist.

We cannot have hospitals in every small town, because the economic burden for operation is too great, plus the added difficulties in maintaining a hospital staff adequate to give the good hospital care the American public demands.

Since 1949, nine hospitals have been completed in the rural areas, with a total bed capacity of 218 beds. The over-all approximate cost of these hospitals is \$2,182,426.64. The federal participation in the building of these hospitals is \$474,470.20. The cost per bed is a little over \$10,000. There are 17 more rural hospitals in various stages of construction. Some of these hospitals are being built with federal aid, and some are being built without federal aid. If these hospitals are completed there

will be an addition of 343 beds, with an estimated cost of about \$3,430,000, probably more.

The breakdown of federal money for hospital construction for the years 1948, 1949, 1950 and 1951, up to July 1st, is as follows:

Total allocated		\$1,304,278
Federal funds obligated to approved projects	\$1,088,842	
Estimated federal funds required for two pending projects listed on 1950 and 1951 construction schedules	322,990	
Total estimated federal funds required to complete the 13 projects, including the two pending projects on the present construction schedule to July 1, 1951	\$1,411,832	1,411,832
Estimated deficit to complete 13 projects is		\$107,554

The over-all rural health program now involved includes 561 beds, with an approximate conservative estimate of \$5,610,000. This figure includes hospitals completed, and hospitals in various stages of construction. With the increase in cost of construction, the program may cost well over \$6,000,000.

The chairman would like to recommend to the state medical society that its sub-committee on rural health, after conducting a survey and study, report their findings on the following problems:

1. How successfully is the present rural hospital building program developing?
2. Has the rural hospital building program resulted in interesting physicians to locate in rural areas?
3. To what extent has the building of rural hospitals stimulated the development of rural medical centers?

M. S. JACOBSON, M.D., Chairman

Veterans Medical Service

The following is a report of the chairman of the sub-committee on veterans medical service to the committee on medical economics of the North Dakota State Medical Association and to the house of delegates.

The year 1950 marked the fifth year of operation of the North Dakota Veterans Medical Service. Mr. John Fox, the previous director, resigned to enter other employment and his previous assistant, Mrs. Anita Meisner, became the director and has been very efficient.

The program has gone along quite smoothly during the year 1950. Except for minor incidents the program appears to be mutually satisfactory to the Veterans Administration officials, to the physicians in the state, and to the veterans medical service division. This program has been in effect in our state for approximately five years and the Veterans Administration wishes the program to continue and we believe all of the physicians cooperating in the plan wish it to continue.

We expressed the hope in our report in 1950 that "we hope we can get on a cash basis with the Veterans Administration soon." During the year 1950 the work load was definitely less than in 1949 which was less than in the year 1948.

A conference was held with the personnel of the Veterans Administration center at Fargo, on April 19, 1951. We were led to believe that the work load will not increase during the next year or two and will probably decrease. As most of you know, a sum of \$5000 was advanced to the veterans medical service by the North Dakota State Medical association for working capital. This sum has not been repaid to the state association. In addition to the \$5,000 there was an operating deficit on December 31, 1947, of approximately \$2,900. This was reduced to approximately \$1,540, by December 31, 1950, but the total deficit is still \$6,540. Obviously it is going to take a long time to erase this deficit of \$6,540, especially if the work load and income decreases.

As a result of the recent meeting, we were encouraged to proceed as rapidly as possible to request the Veterans Administration to reimburse us in total for the deficit we have incurred as the intent of the veterans medical service division was to operate without profit and without loss; secondly, that a cut-off date be established at which time one of two actions would

occur: (1) That the veterans medical service committee continue as a functioning intermediary between the Veterans Administration and the participating physicians in the plan but that the previous percentage commission basis would be abolished and that this office would go on a pay as you go basis, actual operating expenses being paid by the Veterans Administration; (2) That the intermediary veterans medical service office be abolished entirely and the Veterans Administration forward authorizations and deal directly with the participating physicians in the plan; this procedure is in effect in some states. The thought was expressed by one of the Veterans Administration officials that reimbursement of the total deficit and a cut-off of the present plan would be more likely to be accomplished if (2) procedure were to be carried out.

Veterans Administration officials recommended that if efforts were to be made to reimburse the deficit and go on a new plan, negotiations should be started immediately. Accordingly, the members of the executive committee of the council of the North Dakota State Medical association were contacted and they recommended that preliminary steps be taken immediately with the hope that further information can be given verbally at the time of the 1951 meeting of the state association and that possibly a new contract could be made effective as of the Veterans Administration fiscal year which is July 1, 1951 to June 30, 1952.

In accordance with the authority given by the executive committee of the council and after careful consideration, your chairman makes the following recommendations and has instituted preliminary correspondence with the Veterans Administration on these recommendations: (1) That a cut-off date be made, that an audit be made of the present financial status of the veterans medical service, and that the deficit including the \$5,000 loaned by the North Dakota State Medical association be erased entirely, either by payment in full or over a twelve-month period in the next fiscal year. (2) That the North Dakota State Medical association offer the continued services of the intermediary body, namely the veterans medical service, to assist the Veterans Administration in this plan. However, the North Dakota State Medical association is agreeable to the abolition of the intermediary agency, namely the veterans medical service, and pledges the continued cooperation of the participating physicians in the state with direct relationship with the Veterans Administration. Your chairman recommends that this association should at all times be willing to further negotiations with the Veterans Administration as to whether the intermediary agency should or should not continue in existence.

Representatives of the Veterans Administration hope to be present at the 1951 meeting of the North Dakota State Medical association and it is hoped a report as to progress can be given in more detail. Our relationships with the Veterans Administration officials and especially with those of the Fargo Veterans Administration center, with whom we have had the most contact, have been very satisfactory.

There have been other problems such as minor changes in the fee schedule which are also being taken up with the Veterans Administration at the time this report is prepared but the major problem is as outlined above.

ROBERT B. RADL, M.D., Chairman

SPECIAL COMMITTEES

The following reports of special committees were referred to the reference committee to consider the reports of the president, secretary and special committees:

Emergency Medical Service

The committee on emergency medical service submits the following report:

Civilian defense must develop into a permanent and lasting program. Warfare, as we know it, has developed to such an extent that a program of civilian defense must be perfected as it will be a necessity through the years to come, whether in peace or war. This program will be even more important as a local and state problem than it will be nationally, as each community and state must lay its own groundwork of preparedness to coordinate with that of the nation as a whole. The Council on National Emergency Medical Service is right in assuming that the medical profession must accept responsibility and actu-

ally play a leading role in this program. Many physicians will have to be secured for civil defense as well as for the armed services and the national council agrees that more consideration will be given in the future to making full use of the physician's talent.

A meeting of the North Dakota Civil Defense council has been called for April 3, 1951, at Bismarck. Dr. John L. Devine, Jr., of the North Dakota State Medical association, plans to attend. It was the plan of the emergency medical committee to follow closely and correlate their activities with the program of this state defense council. Legislation has been approved, giving the program \$50,000 for a two-year period, with further funds available if the necessity should arise. This was last-minute legislation, so that all details are not yet available, but the governor of North Dakota has been given the powers to appoint a director, etc. At the present time General Heber Edwards is director of the council, although a new director will possibly be appointed at the Bismarck meeting. It was the general consensus that the North Dakota State Medical association go on record as expressing a desire to do everything possible in the present civilian defense program. It was felt that there should be a permanent state medical defense committee or disaster committee. It was felt also that the doctor appointed to the civilian defense committee should be selected carefully with particular emphasis on the fact that he would not be subject to call for military service.

A training program must be set up to cover: Defense against atomic warfare; defense against biological warfare—humans, animals and crops; defense against chemical warfare.

Thus far, three members of the North Dakota State Medical association have been trained in an atomic course. These are: Dr. Berg, radiologist, Dr. Saxvik, health officer, and Dr. Kling, pathologist. The course proved to be almost too technical and could have been greatly shortened and more to the point.

It is strongly recommended that until a more definite state-wide training program can be organized, every doctor make it a point to read all available literature covering civilian defense.

North Dakota, with a population of approximately 600,000, has about 400 practicing physicians, and although it is felt that possibly no bombs will be wasted in the state, the various communities, counties, etc., must be organized to handle all emergencies. We must have a definite plan for the doctors' information. So far, state, municipal and county plans are just getting started and, in many instances, physicians have been given no specific information as to where they would go in case of an emergency (this not only covers the necessary duties in case of war, but would apply to any emergency). Since the population of North Dakota is widely scattered it would seem necessary to have civilian defense function on a county-wide and area-wide basis. Once our local communities and state have been organized in all ways, the time will come to join with adjoining states in plans for evacuation, possibly from the larger cities in other states, and for mutual assistance in the blood bank program.

It was felt that proper recommendations should be made to the house of delegates to get complete coverage of all the civilian defense problems and to secure services of all doctors in case of emergency or disaster. It was also believed that the county director should appoint an advisory committee and if the local doctors wish to recommend representatives, this would doubtless be advantageous.

It was believed advisable to send a list of the names of doctors who have taken an active part in the civil defense program, as well as those who have expressed a desire to do so, to the A.M.A. council on national emergency medical service as they requested. It was also suggested that a representative of the North Dakota State Medical association be sent to the meeting of the council on national emergency medical service of the A.M.A. to be held in Chicago, probably in May, and that the chairman of the emergency medical service committee, to be appointed in May for the years 1951-1952, could possibly be appointed in advance of the annual meeting of the North Dakota State Medical association. Thus he would be able to attend this important meeting and be able to handle the details of the committee problems more efficiently during the coming year.

Inasmuch as the civilian defense program is relatively new, with many problems, much intensive work and research will be required. This is, however, a worthwhile and necessary procedure, and it is felt that, with the cooperation of all doctors, full coverage of details will be reached.

The following recommendations were adopted as a result of the meeting of the committee on emergency medical service, April 1, 1951:

- I. Whereas, it is felt that the best coordination should be attained between the doctors of this association and the officials of the civilian defense program, both on a county basis and on the state level and,

Whereas, the committee on emergency medical service is well suited to carry on this work for the association,

It is recommended, that the committee on emergency medical service undertake the work of this organization relating to the civilian defense program and that the scope of its work also include all problems relating to medical aspects of disaster work of all kinds whatsoever, and

- II. Whereas, it is felt that in order to initiate a practical working program throughout the state, that concrete plans must be coordinated to fit into the civilian defense program in each county and,

Whereas, the state's civilian defense program is set up on a county basis with the civilian defense director for each county and,

Whereas, the doctors within each county know best as to the proper utilization of medical manpower within the county,

It is recommended, that the doctors within each county survey their medical manpower and resources and formulate their best possible concrete program for the utilization of the medical resources within their county; that said plan be submitted to the county civilian defense director; and that the doctors within each county offer the county director of civilian defense a local advisory committee to work out such modifications as may be necessary in said plan and to offer advice to said county director relating to all medical aspects of civilian defense.

It is further recommended, that the names of said local advisory committees be reported to the chairman of the committee on emergency medical service so that they may be sent current information on the medical aspects of civilian defense, and

- III. Whereas, an official civilian defense program requires close coordination among the various counties, and

Whereas, an efficient civilian defense program further requires close coordination between the various states, and

Whereas, this coordination is not possible unless all medical aspects are to be the direct concern of the committee on emergency medical service,

It is recommended that the chairman of the committee on emergency medical service be recommended to the governor of the state of North Dakota for appointment to the state council on civilian defense, and

It is further recommended, that the president of the North Dakota State Medical association appoint to the chairmanship of the committee on emergency medical service, a physician who is not liable for military service, and

- IV. Whereas, the state director of civilian defense may have need for medical advice relating to the medical aspects of civilian defense,

It is recommended, that the committee on emergency medical service be offered to the state director of civilian defense as an advisory committee, and

- V. Whereas, the committee on emergency medical service ought at all times to have the benefit of the latest national information on the program of civilian defense, and

Whereas the American Medical association provides such service and disseminates such information on a national level,

It is recommended, that the chairman or at least a member of the committee on emergency medical service be sent to each national meeting, sponsored by the American Medical association's committee on emergency medical service, and

VI. Whereas, in order to have an efficient state-wide program, it is necessary that working agreements for the proper utilization of medical resources be accomplished among the various counties, and

Whereas, the committee on emergency medical service can provide aid and help in effecting coordination of the program throughout the state,

It is recommended, that this committee be kept advised as to the development and adoption of all plans worked out with each county director of civilian defense.

C. A. ARNESON, Chairman

Industrial Health

Due to the fact that there have been no important changes in our state relative to industrial health problems, your committee has had no official meeting.

A review of the accidental deaths in North Dakota during 1950 is most interesting:

Deaths due to automobile accidents	116
Deaths due to train accidents	17
Deaths due to accidental falls	82
(In the home, 56; at work, 8; in streets, 18)	
Deaths due to plane crashes	7
Deaths due to machinery accidents	22
Deaths due to fire	27
Deaths due to accidental gunshot	14
Deaths due to accidental poisoning	16
Deaths due to accidental electrocution	5
Deaths due to accidental suffocation	17
Deaths due to accidents by animals	5
Deaths due to accidental drowning	23
Deaths due to excessive cold	4
Deaths due to lightning	1
Total deaths due to all types of accidents	368

These statistics prove the need for more emphasis on safeguards against accidents on the highways, in the home, on the farm and while at work.

It is suggested that each district society devote one of its meetings each year to some phase of accidental trauma.

Your chairman has been in frequent communication with the national committee on industrial health which is very active.

C. J. GLASPEL, M.D., Chairman

Mental Hygiene

The material of this report comes from observations made in the fall of 1950, and winter of 1951 and from written opinions of members of the committee.

Drinking of alcoholic beverages in North Dakota is prevalent among adults and adolescents. Since for many, drinking becomes an incapacitating and a person-destroying habit, the ingestion of alcohol becomes a problem in medicine and mental hygiene. Accordingly, efforts are made to help those who are markedly and adversely affected by drink. The following comments are made in answer to some of the questions on alcohol.

What is the purpose of a medical program dealing with alcohol? It should aim to prevent alcohol becoming a problem to the population, to keep well those who would be hurt by alcohol, and to cure those who suffer because of their addiction or habituation to alcohol. In assessing the factors in alcoholism, some committee members stress the social and some the medical aspects.

Towards whom shall the program be directed? All persons of all ages and both sexes, who voluntarily apply for help, who are advised to try to get help, or who are ordered to try to get help—all these should be beneficiaries of such a program.

Research and study should be conducted into the various drinking habits. For example, it may be noted that many classifications of drinkers are possible—those who drink for a lark; those who like the taste of liquor; those who drink socially; those who drink alone; those who erroneously believe in the medical powers of alcohol; those who crave the effects of alcohol to forget, to relieve tension, to acquire courage or to escape a real situation. They may be classified by the data of their personal history, duration of the drinking habit, and amount of personal damage done by alcohol.

Some whose efficiency is only moderately impaired or who are only moderately maladjusted may try to get help at an alcohol clinic, or in a general hospital. Those, for example, who suffer economic loss because they cannot work, or who meet

with serious problems at home or in society should be cared for in a hospital devoted to the care of alcoholics. An alcohol clinic should have one location if possible, and should be allied with medical facilities such as laboratory, clinic or hospital. The location may be in an out-patient service of a hospital, some rooms in a public building or house, or in an especially prepared building. A minimum staff consists of a psychiatrist, a psychologist, a nurse, a social worker and a secretary.

A hospital service for alcoholics should provide beds with privacy so that other patients will not be disturbed. It must be recognized that for short periods of time, the alcoholic's judgment may be very poor and he presents a problem in management.

We must be realists. We must realize that the alcohol problem is complex, that proper attempts at treatment are costly, and that until now cures have been few. Again and again we shall be confronted with questions—*are we doing the right thing, are we getting anywhere, are the results obtained worth the cost and the effort?* While we should aim for perfection, we must realize that we shall be only partially successful.

A hospital program that is at all worth while may cost a minimum of ten dollars per day per patient. One hundred thousand dollars will look after one hundred patients for about three months, not counting initial capital expenditures. Insofar as practicable each patient or his relatives should be required to assume the major portion of the cost of treatment.

Unpleasant as it may be we shall have to reconcile ourselves in part to an undesirable situation, and shall have to be satisfied temporarily in only prolonging the period between benders. If we make this part of hospital policy, we shall lengthen the life and earning power of a number of people. However, our aim should be total cure.

In order to be fair to the patient seeking help, and to his attendants, he should not be admitted to an alcohol hospital the first time for less than thirty days. Human nature being what it is with reference to impatience, curiosity and a desire to try out the repaired wings, the first admission may be as short as thirty days. The second admission should be three months, the third admission six months, the fourth admission one year. It will then be necessary to consider further plans for the patient. These suggestions in regard to time may be left to the discretion of the authority in charge of the patient.

Methods and facilities for treatment should be the best and most advanced, including physical and mental examination of the patient; treatment of abnormalities when found; cheerful, comfortable quarters; tasty and nourishing food; and recreational and occupational therapy, including outdoor activity.

It should be remembered that in the cases requiring hospitalization, the consumption of alcohol is probably incidental to a sick personality. Accordingly, treatment should emphasize recognition of the personality. Various therapeutic measures should be considered, such as a regimen of progressively decreasing dosage of alcohol given in hospital, vitamin administration, glandular extracts, insulin and glucose, antabuse and complete sudden withdrawal of alcohol.

It should be a prime undertaking to search for the reasons for drinking, and insofar as it is possible to remove those reasons. This will require the help of a number of agencies. It would be wise to enlist the help of social service advisors, employers, family, the courts, the clergy, and last, but certainly not least, Alcoholics Anonymous. This latter organization works quietly, intelligently and unselfishly to obtain as good results as any non-medical organization known to us.

All attempts should be made to establish a new adjustment in living, to remove insofar as possible the stresses that the patient encountered and which seemingly led the patient to drink.

R. H. BRESLIN, M.D., Chairman

Displaced Physicians

The displaced physicians program of North Dakota is now entering its third year and apparently is operating satisfactorily.

As of October 1, 1950, when the Directory of Registered Licentiate of North Dakota was published, there were four DPs in actual private practice. At the January 1951 meeting of the state board of medical examiners, three more were allowed to practice. There are at present ten doctors serving

their required internships in various hospitals throughout the state.

I have personally visited three who were licensed prior to January 1951 and had correspondence with reliable citizens in the community of the fourth. Except for some minor grievances, all seemed satisfied and well accepted by their respective communities. There was only one instance where any charges were brought against a DP. These charges were thoroughly investigated before a full panel of the North Dakota state board of medical examiners. After hearing testimony from various patients and from substantial citizens of the community, it was felt that the charges were not of a sufficient degree to warrant any drastic action of the board. After being censured for not keeping complete records, the DP accused was acquitted and allowed to return to his practice.

At present, the cooperation of the sponsoring agency is excellent and I feel sure that the program will continue to be successful as long as this cooperation can be maintained.

O. A. SEDLAK, M.D., Chairman

Diabetes

A committee on diabetes was initiated by Dr. Leonard Larson last year with its major function the organizing and coordinating of the annual diabetes detection drive in North Dakota as part of "National Diabetes Week" sponsored by the American Diabetes association. The committee also encourages a year round search for the million undiscovered diabetics now proven to exist throughout the United States. Its members all belong to the North Dakota Diabetes association as evidence of their genuine interest in this disease.

In cooperation with the North Dakota Diabetes association, this committee secured full endorsement and virtually full participation of constituent societies of the state medical association in the execution of community diabetes detection drives during Diabetes Week in November 1950. In most areas intensive publicity campaigns were instituted and well received by the general public and were completely devoid of alarm or invective. Care was taken that each program was supervised and executed entirely by physicians and that the constituent medical society was the supreme authority over its own local drive. The public good will of such a free service by the medical profession was, and still is, self-evident.

A total of 24,374 people received "free diabetes tests" (urinalyses) throughout North Dakota last November. Of these, 399 exhibited glycosuria. Grand Forks virtually doubled the number of tests of any other district society in screening 8,137 people. Next in line was Fargo with a total of 4,172 tests. The remaining totals were as follows: Bismarck, 3,323; Wahpeton, 3,157; Jamestown, 2,120; Dickinson, 1,515; Valley City, 784; Williston, 680; Minot, 344; Devils Lake, 142.

It is indeed conservative to estimate that at least 80 hitherto undiscovered cases of proven diabetes mellitus should be revealed among 24,374 tests. This estimate can be substantiated by the published report of the Dayton (Ohio) diabetes drive in which 69,159 persons were tested and 148 new diabetics discovered although well over half of those tested were school children in whom the incidence of this disease was quite low (.05 per cent). *J.A.M.A.* 144:914-919, 1950.) The total number of school children tested in the North Dakota drive was relatively small.

At the time of this report a total of 39 newly discovered diabetics had been reported throughout the state. In addition, 15 previously known diabetics had reported erroneously for detection tests. These figures cannot be considered as final since more reports are forthcoming from various district societies. However, valuable statistics are being lost because of inadequate reporting by individual physicians. In fact, one local committee reported "poor cooperation" on the part of local physicians as the reason for lack of careful follow-up on positive cases. It is a curious paradox that after expending a tremendous amount of effort on publicity and actual screening tests that physicians should lose interest in the most fascinating aspect of all—the final outcome.

As experience is the best teacher, the committee on diabetes believes it has learned the following from its coordinative efforts in the diabetes detection drive of 1950:

1. That a more intensive effort should be made to follow up positive tests in next year's drive.

2. That a house-to-house delivery and pick-up of specimen containers is far superior to any other method of getting cooperation of the general public. This can be done most efficiently by progressive service clubs and "Jaycees". (This is the method which enabled Grand Forks to double the total of any other community.)
3. That physicians be encouraged to check all "positives" with glucose tolerance tests, since it is well known that early diabetes is not infrequently characterized by a normal fasting blood sugar.

In conclusion, the state committee on diabetes wishes to express its deep appreciation to the innumerable physicians throughout the state who unselfishly sacrificed many hours of valuable time as members of local committees and as individuals genuinely interested in rescuing those afflicted with a disease of increasing prevalence. Indeed, by 1985, the number of living diabetics will have increased by 74 per cent compared with an increase in the general population of only 22 per cent!

E. A. HAUNZ, M.D., Chairman

Report of John D. Lemar, M.D.

Member of North Central States Committee on Blood Banks

As you are no doubt aware, the North Central States committee on blood banks was organized last summer, composed of one or more blood bank directors from each of North and South Dakota, Minnesota, Wisconsin and Iowa. A plan was formulated by them for procurement of blood in event of disaster or for civil defense. Copies of this plan are available to those who desire it. I was named the representative from North Dakota on this committee. A great deal of work has been done in formulating the plans here.

In regard to the status of this group, it has been recognized by the state governments and many city governments in the other four states as the blood procurement agency. In this state, the Fargo council for civilian defense has instructed me to invite the aid of the North Central States committee on blood banks in planning for and procuring blood for the city in event of disaster or should need arise under military conditions. This has been done. The program in general has also been adopted by the Fargo council of civilian defense in regard to procurement of blood locally. The effect of this adoption is to organize our own resources so that we can supply limited quantities of blood for short periods of time, until blood from the other four states could be sent to us. The same plan applies in the event of disaster or military action against the cities in the other four states. We would be expected to furnish as much blood as we could to help them out. I believe that the program has a great deal of merit in it, and apparently other persons feel so too, since the North Central States committee has been given the responsibility in virtually all of the states in this area now for procurement of blood under these circumstances.

We have also met with national representatives of the American Red Cross, the United States Public Health service with regard to this and all have expressed their approval of the recommendations of this committee.

I represented General Edwards at the last meeting in Minneapolis and submitted a report to him, but I have not heard from him in regard to the state civil defense set-up. I believe it is best, however, that the state medical association, if it approves, accept this program, and I know that other groups in the state have already expressed their acceptance and willingness to cooperate to the fullest extent.

It would seem to me that it ties in very closely with the work of the state medical committee on emergency medical service, and that its adoption by this committee as an official policy would be of great value in establishing such a service in the state. I might also add that my appointment as the state representative to the American association of blood banks is now in the mill and probably will be approved. Inasmuch as the American association of blood banks is vitally concerned with the procurement of blood under such circumstances and has already expressed its approval of the action of the North Central States committee on blood banks, it seems likely that there will be close coordination between these two organizations as well as between various medical and nursing associations. I know that the North Central States committee stands ready to

help the North Dakota State Medical association in its plans in this regard.

Also, if you feel that I can be of value to the state medical association by serving on the committee on emergency medical service, I would be most happy to do so.

JOHN D. LEMAR, M.D.

Committee on Scientific Program

As chairman of the scientific program committee for the North Dakota State Medical association for the annual session of 1951, I wish to submit to you a summary of the committee's work in preparation for the scientific portion of this program. The initial meeting of the committee was held in November 1950 in the office of the executive secretary, Bismarck. Dr. L. W. Larson, president of the association, was present. Since this meeting, close contact has been kept with members of the committee by letter and phone.

You will note from the program that has been issued to you that we have obtained the services of thirteen speakers, three from the state of North Dakota and ten from leading medical centers of the country. Every effort was made to obtain a balanced program with representative papers from various branches of the medical sciences. I believe our speakers to be outstanding in national reputation and ability. One innovation has been the presentation of panel discussions on both afternoons of our meeting, employing the same speakers who will present individual papers in their particular specialty. Panel discussions were designed to cover large subjects in which considerable information is available and some of it perhaps of controversial nature. A question and answer session has been set up for these two panels, which should be of great help to the members in having some of their personal questions answered, and give them a greater opportunity for contact with the individual speaker.

Three speakers are from North Dakota. We had planned on a fourth, Dr. William J. Ball of Minot, but he notified us a short time ago that he would be unavailable. Consequently, he was not replaced on the program because of the limited time left and also because of the length of our program at this time. Nevertheless, we still have three speakers from the state which is approximately 23 per cent representation on the program from North Dakota. The constitution of the North Dakota State Medical association states that we should have 25 per cent local speakers.

You will also note from the program that none of the North Dakota speakers are from Bismarck. This was planned deliberately as the committee members present wished to set a precedent that the North Dakota members of the program should be from communities other than the convention city. I believe that this will help to eliminate criticism in selection of speakers from North Dakota as the chairman of the committee is usually a local member. It will still give equal representation on the program to any qualified member within the state over a period of time.

As you are well aware, our state society is a relatively small one. Considerable time, effort and expense is expended in obtaining outstanding speakers, not only from our own state but from the leading medical centers. Consequently, I believe it to be imperative that we make every effort to present these men with as large an audience as possible. As chairman of the committee, I have found that the special luncheons held by the specialty societies frequently run into time allotted for our main convention speakers. These societies have contributed a great deal to our program in helping select speakers and in many instances helping to defray the cost of the speakers. Nevertheless, it is my feeling that our primary object is to present a strong program for the state meeting and a precedent should be set that the specialty societies should limit their luncheons so that no conflict will arise in the main convention program. Some of these groups have already taken this problem into consideration and are merely holding a luncheon and business meeting during the dates of the state convention, and holding their own scientific programs at a different time of the year.

As chairman of this committee, I wish to extend my thanks for the fine cooperation of the other members and of the officers of the association.

C. H. PETERS, M.D., Chairman

Report to the House of Delegates by the Chairman of the Selective Service Advisory Committee

It is felt that a report of the Selective Service advisory committee to the house of delegates would be of interest and worthwhile. A national Selective Service advisory committee has been established as part of the national Security Resources board at Washington, D. C. State committees have been established and the committee of this state consists of Robert B. Radl, M.D. of Bismarck as chairman, Dr. Russell Saxvik, state health officer as the other medical member, and Dr. C. O. Fergusson of Jamestown as the third member. As most of you are aware, priorities three and four are not being investigated at this time as to their availability or essentiality for military service. However, an opinion as to the availability for military service or essentiality in their community of every special registrant and priority one and two has been given and sent to the registrant's local board for their consideration. This committee is advisory only to the selective service system but the cooperation of the selective service system has been very satisfactory. It is to be remembered that the national committee and this state committee have the function of assuring essential medical care in home communities and the function of assisting the development and maintenance of adequate medical manpower for the armed forces.

The question is constantly asked as to when priority one and priority two physicians can expect to be called for duty. At the date this report is prepared there has been no call for induction of physicians but the future is difficult to predict and we have no specific information on this point from the Washington office.

This state committee, however, has been advised that every special registrant in priority one, who is considered available for military service, can expect to go into active duty. It is hoped that none will have to be inducted from the state since there may be quite a delay after entering military service before they receive commissions. Furthermore, they will not receive the \$100 a month extra pay to which they are entitled if they request a commission.

Operations Bulletin No. 30 was issued on April 9, 1951 by the national headquarters of Selective Service system and concerns special registrants completing internships and residencies in June 1951. The bulletin advises special registrants in the first priority who will finish internships and residencies by June 30, 1951, to apply for commission on or before May 1, 1951. They will not be ordered to active duty until July 1951, giving them time to complete their internship or residency training. This state committee urges those available in priority one to consider promptly obtaining commissions in the armed forces.

ROBERT B. RADL, M.D., Chairman

Report of the Delegate to the Midcentury White House Conference, Washington, D. C. December 3 to 8, 1950

The following report was referred to the reference committee to consider the reports of the president, secretary and special committees:

Your delegate submits the following report:

The fifth national Whitehouse conference on children and youth was held in Washington, D.C., December 3rd to 8th, 1950. It was my privilege to be one of the 180 physicians participating in this conference from all parts of the country. I went there as a delegate representing the Minot Elks lodge and the North Dakota State Medical association. These conferences have been held every ten years since their inauguration by President Theodore Roosevelt in 1909.

The first conference on "Aid to Dependent Children" developed the modern social service worker. It also promoted the formation of the children's bureau. The second conference in 1919, called by President Wilson, produced many labor laws and the Sheppard-Towner act. In 1930, President Hoover called a conference on the "Care of the Handicapped Child." This conference produced the "Children's Charter" which was published in 32 volumes and has been widely used in reference work. In 1940 President Franklin D. Roosevelt called a conference on "Children in a Democracy" but due to the second world war which so closely followed, there was little that came from this conference.

All of the conferences have been the result of citizen initiative, a desire of over 400 organizations of child activities to be heard and represented in a national program for child welfare.

The national committee in 1950 stated that: "The purpose of the conference shall be to consider how we can develop in children the mental, emotional and spiritual qualities essential to individual happiness and to responsible citizenship, and what physical, economic and social conditions are deemed necessary to this development." There were almost 6,000 delegates at this conference, representing over 400 organizations of which not over 40 were medical. The conference consisted of three parts. The first was a two-year preparatory program, the second was the conference itself, and the third part of the program was occupied with the implementation of some 66 resolutions and recommendations of the conference at the state and local levels.

The American Medical association viewed this conference with suspicion. This in spite of the fact that Dr. Henry F. Helmholz, a prominent pediatrician of the Mayo clinic, was chief consultant and active in the plans and preparations in Washington, D. C., for two years. About 90 of the delegates who were members of the A.M.A. attended a preliminary meeting at the D. C. Medical Society auditorium on December 3rd, the day of registration, and were briefed on the program and anticipated procedures of the conference. For the benefit of uninformed but large number of critics of the conference, may I state that there was no evidence in any meeting at any time of political pressure by the national chairman, Oscar Ewing, nor by any other branch or representative of the federal government. Dr. Helmholz told us that during the two years of planning in Washington, D. C., Oscar Ewing never made even a suggestion. He also stated that the Federal Security agency and the U.S.P.H.S. responded promptly and willingly to all requests for assistance.

When the delegates registered, they were given programs, pamphlets and individual assignments to one of the 35 work groups. Every attempt was made to arrange the groups to include as many representatives as possible of all the various organizations. The work groups spent three long half days in discussion of their assigned topics. Besides this, the program consisted of formal lectures and panel discussions. The days were filled from 9 a.m. to 10 p.m. On the morning of December 8, the recommendations of the various work groups were presented and discussed. Then followed the formulations of about 66 resolutions which were voted upon by the entire body.

The most spirited debates concerned the teaching of religion in public schools, federal aid to schools, the incorporation of nursery and pre-kindergarten schools into the public school system and racial and religious tolerance and segregation.

The three major resolutions of the conference are summarized as follows:

1. That church and state must remain separate; that religious instruction should not be permitted in public schools.
2. That federal aid to states for educational services should be extended to tax-supported schools, but not to students of schools other than those supported by taxes.
3. That there must be an end to racial and religious segregation in the United States.

The remaining important resolutions are:

1. *Citizen responsibility.* Acceptance of citizen responsibility for providing adequate community programs in education, health, recreation, and social service, making full use of voluntary and public resources. Broad representation from community groups including youth, and the use of technical assistance in planning and carrying out programs.
2. *Health.* Establishment of standards of quality of hospital care for mothers and children, including recognition of the importance of avoiding unnecessary anxiety. Federal aid to states and localities to stimulate the early development of local health services.
3. *The handicapped.* Expansion of programs for the handicapped to provide for physical, mental, emotional and occupational needs. The provision of educational programs and services to the handicapped by local boards of education, with leadership and stimulation from state departments of education.

4. *Migrants.* Extension of protection and services to children of migrants, especially in regard to transportation, housing, sanitation, health and educational services, social benefits, labor exploitation.

5. *Housing.* Maintenance of standards of construction. Full speed ahead in construction of 810,000 low-rent housing units. Development of a cooperative housing program for the middle-income. Consideration of families of every size and communities of every type in housing planning. Support of slum clearance and urban re-development. Application of the need principle in the provision of defense housing. Recognition of health, recreation, and social needs in housing development.

It was the plan and intent of the national committee which arranged the conference that the medical profession be represented as one of the many groups interested in the subject of the meeting. Inasmuch as the preceding conferences featured and emphasized the physician, it was rather a disappointment to realize that the doctor and particularly the pediatricist, was not the important factor in the program. However, the medical profession was given fair recognition and representation. There was no evidence of political pressure at the Whitehouse conference.

The youth council of the State of North Dakota has planned to have regional meetings throughout the state so that the delegates that attended the conference may give the highlights to the local people. There is also to be a state-wide meeting held in Bismarck sometime in April.

R. E. DYSON, M.D., Delegate

Annual Report of Delegate to American Medical Association

The following report of the delegate to the American Medical association was referred to the reference committee to consider the reports of the council, councillors, delegate to the American Medical association, and member of the medical center advisory council:

Your delegate submits the following report:

Your delegate attended all sessions of the house of delegates during the annual meeting at San Francisco, California, and the clinical session in Cleveland, Ohio. At the Cleveland session he served as a member of the reference committee on amendments to the constitution and by-laws. During the year he was appointed a member of the committee on rural health, a standing committee of the board of trustees, and attended two meetings of this committee.

Complete reports of all sessions of the house of delegates and all reports of the various councils and committees are available in the *Journal of the American Medical Association*, so that this report will merely draw your attention to certain important actions that were taken, as follows:

A Student American Medical association has been formed and as soon as the necessary amendments to the constitution and by-laws can be effected, they will have representation in the house of delegates. This organization will be open to all medical students enrolled in Class A schools.

The Washington office has been greatly expanded and their activities have been under close scrutiny and it is felt that their efficiency has been tremendously improved during the past year. A coordinating committee on legislation supervises all legislative activity and meets frequently.

The advertising campaign last fall is, I am sure, familiar to all of you. The general feeling is that it was tremendously successful. The firm of Whitaker and Baxter has been retained at least until December 1951. Their current activities are largely in the field of trying to get favorable support from portions of organized labor. The A.M.A. is also reorganizing its own public relations set-up, so that eventually it may take over all public relations activities. Mr. Leo Brown is the new director of public relations.

The council on medical service is extremely active in its field and has under it the following coordinating committees:

1. Hospitals and hospital service: This committee, under the chairmanship of Dr. Elmer Hess, presented at San Francisco the Hess report, which in essence states that a physician should not dispose of his professional attainments or services to any hospital, corporation or lay-body by whatever name called or

however organized under terms or conditions which permit the sale of the services of that physician by such agency for a fee. The enforcement of this principle naturally presents many difficulties.

2. Indigent care.
3. Maternal and child care.
4. Medical care of veterans.
5. Prepayment insurance.
6. Relations with lay-sponsored voluntary health plans.

Constitution and by-laws. A temporary committee on constitution and by-laws was appointed at the San Francisco meeting under the chairmanship of Dr. J. D. McCarthy of Omaha. An extensive revision of the constitution and by-laws was effected at the Cleveland meeting and a permanent committee on constitution and by-laws provided for.

For several years past, the delegates from Tennessee have been presenting a proposal, whereby medical care to veterans would be effected through the medium of a hospital and medical service contract purchased by the government. For various and probably good reasons, this proposal has always been turned down by the house of delegates.

The following officers were elected in San Francisco: President—Elmer Henderson, Louisville, Ky.; president-elect—John W. Cline, San Francisco, Calif.; vice-president—R. B. Robins, Camden, Ark.; member of board of trustees—L. W. Larson, Bismarck, N. D. This, I believe, is the first time North Dakota has been privileged to have a representative on the board of trustees.

At Cleveland, the question was raised as to whether it was advisable to continue the interim or clinical session and the house of delegates voted to do so.

The selected general practitioner of the year was Dr. Dean Sherwood Luce, of Canton, Mass.

The house of delegates voted to participate with the American College of Surgeons and the American Hospital association in a program of hospital standardization. It is expected that this will become operative after January 1951.

A committee to study chronic alcoholism was appointed.

The delegates registered their opposition to federal aid to medical schools and other types of federal legislation involving the possibilities of federal control.

Dr. Louis Bauer, chairman of the board of trustees, announced at the Cleveland session the formation of the American Medical Education foundation with an initial gift of \$500,000 from the educational fund of the American Medical association. This action of the board of trustees leads the way for philanthropists, doctors and others to contribute to the cause of medical education and is a challenging answer to the efforts of those who would place all education in the hands of the federal government. So far, the California State Medical society has contributed \$100,000 to this fund and other substantial contributions have been made and more are expected. The money will be given to various medical schools with no strings attached. Donations to this fund by individual doctors are invited.

The delegates turned down two proposals to increase the size of the house of delegates, one by giving the immediate five past presidents membership in the house and the other increasing the number of delegates from the smaller states from one to two.

The following is the exact situation, regarding fellowship and membership in the association and dues for 1951:

Facts about A.M.A. dues for 1951.

1. A.M.A. membership dues for 1951 are \$25.
2. Fellowship dues for 1951 are \$5, and are exclusive of membership dues.
3. A.M.A. membership dues are levied on "active" members of the association. A member of a constituent association who holds the degree of doctor of medicine or bachelor of medicine and is entitled to exercise the rights of active membership in his constituent association, including the right to vote and hold office as determined by his constituent association, and has paid his American Medical association dues, subject to the provisions of the by-laws, is an "active" member of the association.

4. A.M.A. membership dues are payable through the component county medical society or the constituent state or territorial medical association, depending on the method adopted locally.
5. Fellowship dues are payable directly to the headquarters of the A.M.A., 535 N. Dearborn street, Chicago 10, Ill., on receipt of the bill for such dues.
6. A dues-paying, active member is eligible for Fellowship and may request such status by direct application to the secretary of the A.M.A. Applications for Fellowship are subject to approval by the judicial council of the association.
7. Commissioned medical officers of the United States army, the United States navy, the United States air force or the United States public health service, who have been nominated by the surgeons general of the respective services, and the permanent medical officers of the Veterans administration, who have been nominated by its chief medical director, may become Service Fellows on approval of the judicial council. Service Fellows need not be members of the component county or constituent state or territorial associations or the A.M.A. and do not pay Fellowship dues. They do not receive any publication of the A.M.A., except by personal subscription. If a local medical society regulation permits, a Service Fellow may elect to become an active member of a component and constituent association and the A.M.A., in which case he would pay the same membership dues as any other active member and receive a subscription to the *Journal of the American Medical Association*.
8. An active member of the A.M.A. may be excused from the payment of A.M.A. membership dues when it is deemed advisable by the board of trustees, provided that he is excused from the payment of full dues by his component society and constituent association.

The following may be excused in accordance with this provision: (a) members for whom the payment of dues would constitute a financial hardship as determined by their local medical societies; (b) members in actual training for not more than five years after graduation from medical school, and (c) members who have retired from active practice.

9. Active members of the A.M.A. are not excused from the payment of A.M.A. membership dues by virtue of their classification by their local societies as "honorary" members or because they are excused from the payment of local and state dues. Active members may be excused from the payment of A.M.A. membership dues only under the provision described in paragraph 8 above.
10. A.M.A. membership dues include subscription to the *Journal of the American Medical Association*. Active members of the association who are excused from the payment of dues will not receive the *Journal* except by personal subscription at the regular subscription rate of \$15 per year.
11. Fellow members may substitute one of the special journals published by the association for the *Journal* to which they are entitled as members. A Fellow who substitutes a special journal will not also receive the *Journal*.
12. A member of the A.M.A. who joins the association on or after July 1 will pay membership dues for that year of \$12.50 instead of the full \$25.00 membership dues.
13. An active member is delinquent if his dues are not paid by December 31st of the year for which dues are prescribed and shall forfeit his active membership in the A.M.A. if he fails to pay the delinquent dues within thirty days after the notice of his delinquency has been mailed by the secretary of the A.M.A. to his last known address.
14. Members of the A.M.A. who have been dropped from the membership roll for nonpayment of annual dues cannot be reinstated until such indebtedness has been discharged.

15. The apportionment of delegates from each constituent association shall be one delegate for each thousand (1,000), or fraction thereof, *dues-paying active members of the A.M.A.* as recorded in the office of the secretary of the A.M.A. on December 1st of each year.

W. A. WRIGHT, M.D., Delegate

Medical Center Advisory Council New Business

The following report of our representative on the medical center advisory council was referred to the reference committee to consider the reports of the council, councillors, delegate to the A.M.A. and member of the medical center advisory council:

The council has met twice since the 1950 meeting of the house of delegates. Its deliberations have been concerned primarily with ways and means by which the recommendations contained in the reports of Drs. Anderson and Smiley, the consultants who visited the medical school in April 1950, can be carried out. It is encouraging to note that great progress has been made as evidenced by the following:

1. *Department of physiology and pharmacology.* This department has been handicapped by the lack of an adequate staff. Dean Potter has had to carry much of the teaching load in addition to his duties as dean. After a long search, two members have been added to the department staff and negotiations are under way for a third.

2. *Psychiatry.* The report stressed the need for instruction in psychiatry by a physician trained and experienced in this field. Dr. Duane Sommerness has assumed his duties as state psychiatrist and conducts classes regularly at the medical school. Part of his salary is paid by the medical center.

3. *Physical diagnosis.* The teaching of this important subject has been inadequate in the past. It is being remedied by a plan in which students, in groups of four, are assigned to a Grand Forks physician for a weekly two-hour period of instruction. Clinical cases are demonstrated on patients in the office and hospitals.

4. *Biochemistry.* The report stressed the need for a separate department of biochemistry. Unfortunately there is no room available in the present building and competent teachers in biochemistry are very difficult to obtain. However, plans for an addition to the medical school building include adequate space for a department of biochemistry and, as soon as this has been assured, a capable biochemist has indicated his willingness to accept a position on the staff.

5. *Animal experimentation.* This has been handicapped by inadequate quarters for housing animals and rooms for experimental work. Temporary quarters have been provided and the new addition to the building will undoubtedly include quarters for animal experimentation.

6. *Library.* The report states that the library was inadequate. This deficiency is being corrected through an adequate budget for the purchase of periodicals and books. A number of physicians have donated valuable books and bound volumes of leading medical magazines. The library will undoubtedly pass inspection in a short time.

7. *Department of anatomy.* This department has not had as large a staff as it should have but two new instructors have been added which increases the staff to four. Cadavers are scarce but Professor Hamre hopes to obtain a sufficient number for the coming class of freshmen.

The council passed a resolution at its January 1951 meeting that the entering class in September 1951 be increased from 36 to 40 students. It also resolved that the entering class in September 1952 shall consist of 60 students "if this is deemed to be expedient in furthering the program of national defense." These increases will strain the teaching and physical resources of the medical school but they represent an attempt to meet the demands of the public that more students be admitted.

The council resolved that an investigation be made into the possibility of establishing internships and residencies in the hospitals of the state. This action was prompted by the conviction on the part of many that if internships and residencies are offered in the state, a sizeable proportion of those taking such training will remain in the state. Conferences have been held between the medical center authorities and the hospital associa-

tion and staff members of several hospitals in the state. The reaction appears to be favorable. It might be pointed out, however, that many desirable internships and residencies are vacant, and if the hospitals in the state wish to establish such training facilities, the hospital managements must be ready to assume the expense involved and the medical staffs must be willing and able to teach.

The official report of the council on medical education and hospitals of the A.M.A. contained a suggestion that a special committee be appointed and given the responsibility for making a comprehensive study and for drawing up specific, detailed proposals for the consideration of the university administration and the board of higher education. This suggestion was approved by the council and its president was authorized to appoint Dean Potter, Dr. A. D. McCannel and Dr. R. O. Saxvik (with President West as consultant) to activate the above suggestion. The members of this special committee met in Minot recently and agreed to invite two medical school deans to conduct a survey of the situation with regard to the development of a four-year medical school. Dean Middleton of Wisconsin and Dean Lewis of Colorado have been appointed. These gentlemen are capable administrators with a rich background of experience in the development of medical schools in states somewhat comparable to North Dakota. Their report will be awaited with much interest.

COMMENTS

- (a) The illness of Mr. John A. Page, medical center director, is most unfortunate. He has served the medical center and the advisory council well. The choice of his successor poses a problem which must be met. It is my personal opinion that the director of the medical center should be a physician who has administrative ability. He should be given full responsibility for the administration of the entire medical center. He could be given the title "dean of medical sciences." It is likely that he could serve as dean of the medical school also, at least during the initial phases of the expanded activities of the medical center.

- (b) The advisability of establishing a four-year medical school in the immediate future is debatable. The report of the two deans who are to make a survey of the situation should be an important factor in the decision. However, it would seem that until a hospital to accommodate at least 200 indigent patients is constructed on the university campus, there will not be sufficient clinical material available for teaching purposes. Financial reports from comparable medical schools indicate that the present one-mill levy for the medical school might be sufficient to cover the operating expenses of the medical school. It would not be sufficient to cover the cost of maintaining a teaching hospital.

There have been conferences between several individuals in the state and the deans of nearby medical schools as to whether or not an arrangement might be reached whereby the third and fourth year students could enter these schools on a mutually satisfactory basis. I have been assured by Dean Diehl of the University of Minnesota that he would be receptive to such a move. He told me on April 30, 1951, that he had repeatedly encouraged negotiations between his institution and our university but nothing had come of it. Dean Lueth of Nebraska expressed the opinion to me on April 25, 1951, that his institution would favor taking a part of our students as soon as his hospital facilities are expanded. Thus it would appear certain that satisfactory arrangements can be made so that the graduates of our two-year school can be assured of admittance to a medical school for their clinical training. The cost would be much less than if a four-year school were developed in the state. I strongly urge that this alternative be investigated immediately by those in authority at the university and in the board of higher education so if a four-year school appears to be undesirable, an affiliation with some other school can be consummated without undue delay.

L. W. LARSON, M.D.

NEW BUSINESS

Dr. Spear invited comment on the first order of business which was to fix the dues for the ensuing year. Dr. Fortney and Dr. Haugrud informed the house of delegates that they had been instructed as delegates of the Cass County District

medical society to suggest that the yearly dues of the association be reduced to \$35.00. In view of the fact that the reference committee had not as yet given its report, it was moved and seconded that the order of business of fixing the per capita dues be postponed until after the report of the reference committee had been read.

The next order of business was the appointment of the nominating committee by President Larson as follows: Dr. Sorenson, chairman; Dr. Fortney and Dr. Waldschmidt.

The matter next brought up was the presentation of the name of a doctor who has practiced medicine in North Dakota for over 50 years and it was asked that he be eligible for honorary membership in the association. He had been approved and elected to this by the district medical society. The motion was made by Dr. Sorenson that Dr. Frank Wheelon of Minot be approved by the house of delegates for honorary membership in the state medical association, seconded by Dr. Halliday and motion passed.

The following resolution was then presented to the house of delegates:

Whereas, statistics indicate that dental caries is most prevalent in our school children,

And whereas, the public is vitally concerned about this problem,

And whereas, fluoridation of public water has been proved to be a safe and effective method of reducing dental caries,

And whereas, the North Dakota State Dental association has gone on record supporting a fluoridation program,

Now, therefore, be it resolved, that the house of delegates of the North Dakota State Medical association recommend this procedure as a safe and effective method.

It was moved by Dr. Vance, seconded by Dr. Gilsdorf, that this resolution be referred to the committee on resolutions.

Dr. Hammargren then presented another resolution to the house of delegates:

Whereas, skin testing for tuberculosis followed by x-rays in positive reactors is an accepted procedure for discovering undiagnosed cases of tuberculosis,

And whereas, the North Dakota subcommittee on tuberculosis of the American School Health association has developed standards in awarding a certificate to a school which has complied with their recommended procedures of tuberculosis case finding,

Now, therefore, be it resolved, that the house of delegates of the North Dakota State Medical association approve and endorse the activities of the subcommittee of tuberculosis of the American School Health association.

It was moved by Dr. Gilsdorf, seconded by Dr. Grinnell, that this be referred to the committee on resolutions.

Dr. Larson next introduced Dr. McCannel, who is also a member of the board of higher education, who submitted the following report that Dr. Larson wished to have accepted as a supplementary report to his report:

"As you know, by legislative enactment the law set up a one-mill levy to create a medical center. That was turned over to the board of higher education to spend. The board of higher education has one representative, besides myself, on the advisory council, Dr. L. W. Larson; one member represents the public health department, Dr. Saxvik; one represents labor, one represents the farmers, and one at large. The advisory council has tried to advise the president of the university as to the handling of the medical school.

We are almost fully accredited now for a two-year medical school. We do not have sufficient room as yet in the present building. We met practically all the requirements, and the consultants from the A.M.A. accrediting committee and the American Association of Medical Schools are coming again in August this year to evaluate this shortage of room. The one-mill levy brings in quite a sum and we have salvaged enough in the first year of the biennium to help in the building of an addition to the medical building. Yesterday our board of higher education approved putting in an addition to the east wing equal to the size of the original building, that is, 564,000 cubic feet of space. That has been okayed by the board of education and will be a reality. We do hope to have a fully accredited two-year medical school as good as any school in the United States. We are not talking in terms of any further expansion at the present time.

The board in Chicago does not consider a four-year medical school advisable until we have our two-year medical school in full operation. That is as much as I can report to you at the present time."

Speaker Spear accepted the remarks of Dr. McCannel as a supplementary report to Dr. Larson's report on the medical center advisory council and referred it to the proper reference committee.

Adjournment

The first session of the house of delegates was adjourned at 10 p.m., to reconvene at 2 p.m., May 20, 1951. The motion carried.

SECOND SESSION, HOUSE OF DELEGATES

Sunday Afternoon, May 20, 1951

The second session of the house of delegates was called to order by the speaker, Dr. A. E. Spear, at 2 p.m. in the Princess room of the Prince hotel, Bismarck, North Dakota, May 20, 1951. The Secretary called the roll. Fifteen delegates responded and the Speaker declared a quorum present. The following delegates were present:

Drs. J. C. Fawcett, alternate, Devils Lake; E. M. Haugrud, Fargo; A. C. Fortney, Fargo; N. A. Youngs, Grand Forks; E. L. Grinnell, Grand Forks; R. W. Vance, Grand Forks; J. D. Craven, Williston; A. R. Sorenson, Minot; W. H. Gilsdorf, Valley City; R. B. Radl, Bismarck; M. S. Jacobson, Elgin; R. O. Saxvik, Bismarck; R. W. Rodgers, Dickinson; T. E. Pederson, Jamestown; D. J. Halliday, Kenmare.

The reading of the minutes of the first session were dispensed with upon motion of Dr. Rodgers, seconded by Dr. Grinnell, and carried.

Report of the Nominating Committee Election of Officers

Dr. A. R. Sorenson, chairman of the nominating committee, presented the following report. The Speaker announced that there was nothing in the report of the committee that precluded additional nomination of officers from the floor and inquired as to whether any additional nominations were to be made. Hearing none, he declared that a motion would be in order to declare the nominees duly elected to their respective offices. On motion made and seconded that the nominees be elected unanimously, all voted aye and the following officers were elected unanimously:

President	W. E. G. Lancaster, Fargo
President-elect	O. W. Johnson, Rugby
First vice-president	J. Sorkness, Jamestown
Second vice-president	P. H. Woutat, Grand Forks
Speaker of the house	A. E. Spear, Dickinson
Vice-speaker of the house	G. A. Dodds, Fargo
Secretary	E. H. Boerth, Bismarck
Treasurer	E. J. Larson, Jamestown
Delegate to A.M.A.	W. A. Wright, Williston
Alternate " " "	G. W. Toomey, Devils Lake

Councillors:	
Fourth district	A. D. McCannel, Minot
Fifth district	C. J. Meredith, Valley City
Eighth district	E. J. Schwinghamer, New Rockford

Board of Medical Examiners:	
John C. Fawcett	Devils Lake
O. A. Sedlak	Fargo
R. B. Radl	Bismarck

Member, Medical Center Advisory Council:	
Dr. L. W. Larson	Bismarck

State Health Council:	
W. A. Wright, Williston	

Selection of 1952 Meeting Place

The Speaker announced that he would be glad to entertain an invitation for a place for the 1952 meeting to be held. Dr. Haugrud extended the North Dakota State Medical association an invitation from the Cass county medical society to meet in Fargo for its 1952 session. This motion was seconded by Dr. Fortney and unanimously passed.

REPORTS OF REFERENCE COMMITTEES

Reference Committee to Consider the Report of the President, Secretary and Special Committees

Dr. R. W. Vance, chairman, presented the following report which was received section by section, and as a whole:

1. Report of the President: This committee feels that it is insignificant in reporting the accomplishments of and recognitions tendered Dr. Larson. He is the first North Dakota physician to be honored by appointment as a trustee of the A.M.A. In turn, through his ability, he has honored all members of this state association. His wide acquaintance and knowledge tell each of us of the energy and effort that he has long put into making our state association outstanding.

2. Report of the Secretary: Your reference committee has reviewed the secretary's report. It is gratifying to note the constant increase in membership since the low point of 1945. We congratulate the secretary for his diligence in attending the council meetings and his vigilance in legislative matters. We concur in your secretary's view that the association's secretary be a Bismarck resident because of the close association with the executive secretary's office.

The committee wishes to join the state medical association in commending the executive secretary in his excellent work and service to the state association.

3. Report of Committee on Emergency Medical Service: The committee concurs with Dr. Arneson's opinion that adequate representation from his committee be provided on the council of civilian defense and recommends constant liaison between his committee and the council of civilian defense as to publicity to the medical profession and contact with these meetings on a national basis. It is felt that their powers should be broad and that consultations with the correct authorities of the state association should be immediately available to them, but the decisions of the committee should be final in a state of emergency. Further, all speed should be made in acquainting each county or area with the problems presented in Dr. Arneson's report, and it is recommended that this committee remain as a special committee.

4. Report of the North Central States Committee on Blood Banks: It is felt that this committee should be represented on the committee of emergency medical service and be subservient to the latter committee. It was called to the attention of the house of delegates that the North Dakota public health service is setting up a blood bank which will be in operation in one year for the entire state.

5. Report of the Selective Service Advisory Committee: The reference committee reviewed the report made by the chairman of the selective service advisory committee and concurs wholeheartedly with the suggestions as set forth by Dr. Radl.

6. Report of Committee on Industrial Health: In view of the potential industrial development of our state in petroleum and lignite industries, we feel that the industrial health committee should be continued.

7. Report of the Committee on Mental Hygiene: The reference committee reviewed the report of the committee on mental hygiene and feels that Dr. Breslin has given a very fine report on one of our greatest medical and mental problems. It is felt that alcoholism is a tremendous problem in all classes of society.

8. Report of Special Committee on Displaced Persons: The reference committee has reviewed this report and feels that the program is functioning normally and will continue to do so.

9. Report of Committee on Diabetes: This report has been reviewed and its acceptance recommended.

10. Report of Committee on Scientific Program: The reference committee, after reviewing this report, wishes to commend the committee for their excellent program.

The reference committee recommended that every member of the North Dakota State Medical association read the report of the delegate to the Midcentury White House conference held in Washington, D. C., December 3, 1950. The committee does not recommend its acceptance nor does it refuse its acceptance,

believing it should be referred to the proper committees because of the multiplicity of the demands.

R. W. VANCE, M.D., Chairman
J. D. CRAVEN, M.D.
M. E. BELTZ, M.D.
H. A. LAFLEUR, M.D.
ROBERT WOODWARD, M.D.

Reference Committee to Consider the Reports of the Council, Councillors, Delegate to the A.M.A. and Member of the Medical Center Advisory Council

Dr. W. H. Gilsdorf, chairman, presented the following report which was adopted section by section and as a whole:

1. Report of Chairman of the Council: The report of the chairman of the council was received by your committee and found very complete. We wish to congratulate the council on the assistance given to the candidacy of Dr. L. W. Larson to the office of trustee of the A.M.A. It is gratifying to have North Dakota represented on this board of trustees.

Your committee was pleased to note the growth of the North Dakota physician's service and was pleased to note that all the district societies have approved the plan.

Your committee feels that all doctors should cooperate with the pharmacists in regard to refills on prescriptions. It is felt that prescription blanks should be printed so that the number of refills may be indicated easily at the time they are written.

The committee was exceptionally pleased with the results of efforts made to pass necessary laws to prohibit sale of fireworks in North Dakota. This is a definite step forward in accident prevention.

2. Report of the Chairman of the Council's Supplementary Report: The committee has reviewed this report, together with the financial statement of the society. Your committee agrees that better public relations are to be desired between our society and its members and the general public; hence, the committee feels that the council should include specific funds in the budget for this purpose.

The committee emphatically disapproves a reduction in the yearly membership dues for the following reasons:

- (1) An adequate reserve is essential for a healthy organization to carry on a full program.
- (2) Since the state has 356 members, a reduction of \$15 per membership would amount to a decrease of \$5,340 per year. Our fixed expenditures for 1950 were \$13,200, exclusive of money for a program for public relations. The income from dues was \$17,800. If the dues were cut \$15 per member, we would have a deficit of about \$1,000 per year.
- (3) In view of the unsettled world situation and business conditions, your committee feels it would be unwise to reduce yearly dues at the present time.

The committee compliments the council on the large amount of work successfully completed.

3. Reports of Councillors: The committee is pleased to note the large number of scientific meetings held during the year with activity present in all districts except one.

4. The committee reviewed the report of the delegate to the A.M.A., and wishes to compliment him on the completeness of his report and on the large amount of work done by him. It is recommended that any public relations effort on the part of this society be coordinated with the A.M.A.'s program.

5. Report of the Member of the Medical Center Advisory Council: It is noted that marked progress was made during the past year towards improving medical education in the state of North Dakota, and further efforts are recommended in further improving the medical school.

The committee heartily concurs with Dr. Larson's recommendations that a physician with administrative ability be appointed as director of the medical center.

It was further agreed that parties in authority should explore fully and negotiate necessary arrangements with accredited four-year medical schools, whereby the graduates of our two-year

medical school may be assured admittance for completion of the medical course.

W. H. GILSDORF, M.D., Chairman
NELSON A. YOUNGS, M.D.
W. G. VOGELWEDE, M.D.
E. R. WASEMILLER, M.D.
R. E. MAHOWALD, M.D.

Reference Committee to Consider Reports of the Standing Committees, Except the Report of the Committee on Medical Economics and Its Sub-Committees

1. Report of the Committee on Medical Education: The committee wishes to commend the committee on medical education for its most excellent report on the progress of medical education in the state of North Dakota. The salient points of this report bring out the fact that under the one-mill levy act, sufficient funds have been provided to carry out in an acceptable manner the requirements for an accredited two-year medical school.

Secondly, the committee wishes to commend the policy of the medical school in restricting entrants to bona fide North Dakota residents and also the increase in admissions to the school. It is agreeably noted by this committee that the difficulties have been overcome in meeting the requirements for a class A school.

It is recommended by the committee that the program with regard to rotating internships within the state be endorsed by the state association in collaboration with state hospital associations.

2. Report of the Committee on Crippled Children: The reference committee has reviewed this report and approved it.

3. Report of Committee on Official Publication: This report was reviewed and approved.

4. Report of Committee on Necrology and Medical History: Your reference committee moves the adoption of the report on necrology and medical history. (At that time, the Speaker announced that the chair would request the house of delegates to rise for one moment in silent tribute to the members who have passed on. Thereupon followed a moment of silence with all delegates and guests standing.)

5. Report of Committee on Public Health: This report was reviewed and approved.

6. Report of Committee on Maternal and Child Welfare: The reference committee commends this report and specifically suggests a discussion of recommendation No. 2 in the report with regard to E.M.I.C. program.

7. Report of Committee on Cancer: Your committee highly commends the committee on cancer, not only on its report but also on its fine program of bringing cancer clinics to the district medical societies.

A. R. SORENSON, M.D., Chairman
H. E. GULOIEN, M.D.
THOMAS M. CABLE, M.D.
W. R. FOX, M.D.
C. B. DARNER, M.D.

Reference Committee to Consider the Reports of the Committee on Medical Economics and Sub-Committee on Prepayment Medical Care, Veterans Medical Service and Rural Health

Dr. M. S. Jacobson, chairman, presented the following report, which was adopted section by section and as a whole:

1. Report of Committee on Medical Economics: Your reference committee has reviewed the report of the committee on medical economics, including their supplemental report, relating to the problem of medical care of indigent Indians and the problems involved in the crippled children's program and approve this portion of the report.

2. Report of the Committee on Prepayment Medical Care: This committee has reviewed the report of the committee on prepayment medical care and concurs with their decision that it is not in the province of the medical society to enter into controversy regarding the merits of the various insurance companies or insurance plans.

3. Report of the Committee on Rural Health: This report was thoroughly reviewed and the committee recommends that the sum of \$500 be allocated to conduct a survey because of the need and urgent demand for adequate medical and hospital care in the rural areas. It is wished to determine: (1) how successfully the present rural hospital program is developing; (2) whether the rural hospital building program resulted in interesting physicians to locate in rural areas; (3) to what extent the building of rural hospitals has stimulated the development of rural medical centers; (4) what has been the past and present economic experience of the rural hospitals now in operation.

4. Report of the Committee on Veterans Medical Service: This report was reviewed and the following is recommended:

1. That the veterans medical service continue to act as the intermediary body between the veterans administration and the members of the North Dakota State Medical association.

2. That the veterans medical service continue as intermediary body on a cost basis contract for the fiscal year July 1, 1951 to June 30, 1952.

3. That there should be established a cut of date in order that the veterans medical service could reimburse the North Dakota State Medical association for the deficit which has been incurred to the date of the new contract accepted.

M. S. JACOBSON, M.D., Chairman
R. W. RODGERS, M.D.
THOMAS PETERSON, M.D.
E. L. GRINNELL, M.D.
C. M. HUNTER, M.D.

The motion was next made by Dr. Gilsdorf, seconded by Dr. Youngs, that the dues for the North Dakota State Medical association remain at \$50 per year. Considerable discussion followed this motion, which was opposed by Dr. Haugrud, who felt that dues of \$35 per year would be sufficient. However, it was pointed out that a cut of \$15 per membership per year would mean using the present surplus, inasmuch as current expenses total more than the sum would be for the total membership at \$35 per year. The motion was then passed that the dues remain at \$50 per year.

The matter of allocating \$500 for investigating the rural health situation was postponed inasmuch as this was a tentative figure and the situation would have to be studied as to whether it would cost more or less than this figure.

The motion was next made by Dr. Fortney and seconded by Dr. Gilsdorf, that the house of delegates authorize the council to set aside an amount of \$3,000 for the use of the committee on public policy and legislation for their work on public relations. This would primarily be for promoting better relations between the public and the association. Motion passed.

Reference Committee on Resolutions

Dr. A. C. Fortney, chairman, presented the following report which was adopted section by section and as a whole:

Your committee wishes to present the following resolution:

Whereas, the 64th annual meeting of the state medical association is being held in Bismarck, and

Whereas, the city of Bismarck has lent their whole-hearted cooperation to make our meeting an enjoyable and successful one,

Now, therefore, be it resolved, that the house of delegates of the North Dakota State Medical association express their sincere appreciation and gratitude to the city of Bismarck.

Your committee on resolutions wishes to present the following resolution:

Whereas, the 64th annual meeting of the North Dakota State Medical association held in Bismarck, May 19-23, 1951, presents a scientific and entertainment program of outstanding merit,

Now, therefore, be it resolved, that the house of delegates extend its thanks and appreciation to the Sixth District medical society and to Dr. L. W. Larson, state association president and member of the board of trustees of the A.M.A., and to the several local program and entertainment committees for the effort and contribution they have made to insure a successful annual meeting.

Your committee wishes to present the following resolution:

Whereas the woman's auxiliary of the North Dakota State Medical association under the capable leadership of President Mrs. E. T. Keller of Rugby, North Dakota,

And whereas, they have been most willing workers when called upon to promote better public relations in their several communities,

And whereas, they have initiated an assistance program known as a student loan fund to the medical students of the University of North Dakota,

And whereas, they have made important contributions to the civil defense and blood bank projects,

Now, therefore, be it resolved, that the house of delegates of the North Dakota State Medical association warmly commend them for their efforts.

The committee wishes to present the following resolution given by Dr. Hammargren at the first session of the house of delegates:

Whereas, statistics indicated that dental caries is most prevalent in our school children,

And whereas, the public is vitally concerned about this problem,

And whereas, fluoridation of public water has been proven to be a safe and effective method of reducing dental caries,

And whereas, the North Dakota State Dental association has gone on record supporting a fluoridation program,

Now, therefore, be it resolved, that the house of delegates of the North Dakota State Medical association recommend this procedure as a safe and effective method.

The committee wishes to present the following resolution given by Dr. Hammargren at the first session of the house of delegates:

Whereas, skin testing for tuberculosis followed by x-rays in positive reactors is an accepted procedure for discovering undiagnosed cases of tuberculosis,

And whereas, the North Dakota sub-committee on tuberculosis of the American School Health association, has developed standards in awarding a certificate to a school which has complied with their recommended procedures of tuberculosis case finding,

Now, therefore, be it resolved, that the house of delegates of the North Dakota State Medical association approve and endorse the activities of the sub-committee of tuberculosis of the American School Health association.

Your committee wishes to present the following resolution:

Whereas, a national state of emergency exists, and

Whereas, certain licensed and practicing physicians, members of the North Dakota State Medical association, have been called into active duty in the armed forces,

And whereas, there is the probability that other members of the North Dakota State Medical association may be called into military service,

Now, therefore, be it resolved, that membership fees be cancelled during the period that these said members are on active duty in the armed service,

And be it further resolved, that upon their return to active practice, they be automatically accepted into their local societies upon their application.

Your committee wishes to present the following resolution:

Whereas, the council has requested the house of delegates to reconsider its recommendation on a survey of commercial insurance companies,

And whereas, the council feels that the state association has neither the expert talent nor the finances to carry on such a survey,

Now, therefore, be it resolved, that the house of delegates instruct the council to discontinue any further action on this matter.

Your committee wishes to present the following resolution:

Whereas, a state-wide political election has been held since the last regularly convened session of the house of delegates of the North Dakota State Medical association,

And whereas, several members have been elected to the congress of the United States,

And whereas, the danger of compulsory health program or some disguised substitute of a similar character will most likely be presented to the United States congress,

Now, therefore, be it resolved, that the house of delegates of the North Dakota State Medical association, through its executive secretary, advise the North Dakota senators and representatives to the United States congress of our continued opposition to any national legislation promoting compulsory health insurance or any system of medical care designed for national bureaucratic control.

Your committee wishes to present the following resolution:

Be it resolved, that the North Dakota State Medical association go on record as commending the work done in raising the physical and personnel standards of the medical school to levels commensurate with requirements for class A medical schools.

Be it further resolved, that as resources and facilities accumulate, the school may progress to the end result of providing doctors for the medical care of the citizens of the state.

Your committee wishes to present the following resolution:

Whereas, a few complaints against practicing physicians have been received by the association from both laymen and other physicians, and,

Whereas, no method has been established for investigation of these complaints,

Now, therefore, be it resolved, that the five immediate past presidents of the association constitute a grievance committee to investigate and dispose of these complaints,

Be it further resolved, that the committee on public policy and legislation formulate plans for the future selection of this committee and define their duties and submit their plans to the council at their next meeting.

The motion carried that the five last past-presidents be a grievance committee temporarily until the committee on public policy and legislation draw up the rules for an appointment of a new committee. This will function for a year until the house of delegates can elect the new committee next year.

Your committee wishes to present the following resolution:

Whereas, Dr. O. A. Sedlak has served this association faithfully and diligently for the past four years,

And whereas, our secretary has sacrificed his time and talent unstintingly to further the cause of democratic Medicine,

Now, therefore, be it resolved, that the house of delegates of the North Dakota State Medical association by a rising vote of thanks, recognize Dr. Sedlak's contributions.

Speaker Spear at this time called for a rising vote of thanks and applause to adopt the motion. Motion passed.

The motion made by Dr. Fortney and seconded by Dr. Halliday, that the report as a whole be adopted. Motion passed.

A. C. FORTNEY, M.D., Chairman
PAUL COOK, M.D.
D. J. HALLIDAY, M.D.
W. H. WITHERSTINE, M.D.
A. K. JOHNSON, M.D.

Adjournment

The Speaker declared the house of delegates adjourned sine die at 6 p.m.

SCIENTIFIC PROGRAM

Monday, May 21, 1951

Legion Auxiliary Room, World War Memorial Building
Bismarck, North Dakota

9 to 9:30 a.m.—Registration.

9:30 to 10 a.m.—"Early Diagnosis of Malignant Lesions in the Genito-Urinary System"—Dr. Budd Clark Corbus, Jr., Fargo.

10 to 11 a.m.—Intermission, to view exhibits.

11 to 11:30 a.m.—"The Problem of Jaundice"—Dr. Robert M. Kark, professor of medicine, University of Illinois, Urbana, Illinois.

11:30 to 12 a.m.—"Cancer in Children"—Dr. Harold W. Dargeon, Memorial hospital, New York City.

2 to 3:30 p.m.—Panel discussion on ACTH and Cortisone. Moderator, Dr. H. W. Dargeon, Memorial hospital, New York City; Dr. Robert M. Kark, professor of medicine, University of Illinois; Dr. Keith S. Grimson, professor of surgery, Duke university, and Dr. John P. Wendland, department of ophthalmology, University of Minnesota.

3:30 to 4 p.m.—Intermission.

4 to 4:30 p.m.—"Management of Duodenal and Gastric Ulcer from the Surgical and Medical Standpoint," Dr. Keith S.

Grimson, professor of surgery, Duke university, Durham, North Carolina.

4:30 to 5 p.m.—“Seasonal Dermatoses (Spring and Summer)”, Dr. W. L. Macaulay, Fargo.

BANQUET

Monday Night, May 21, 1951

American Legion Building, Bismarck, North Dakota

A joint banquet was held for the members of the North Dakota State Medical association and the Woman's Auxiliary in the club rooms of the American Legion building. Dr. Berg, toastmaster, introduced officers of the Sixth District medical society, North Dakota State Medical Association, Woman's Auxiliary; Mrs. Mason G. Lawson, national third vice-president of the National Women's Medical association; Dean French and Dean Potter of the North Dakota Medical school, and a number of the doctors appearing on the scientific program.

Dr. Spear introduced the names of the six doctors who during the past year had completed a half century in the practice of medicine. In completing these fifty years, they had become eligible for membership in the Fifty Year club in North Dakota. In addition to these six new members, the membership of this club is 18. Drs. Paul Burton, Fargo; George S. Carpenter, Jamestown; V. J. LaRose, Bismarck, and A. S. Morris, Fargo, were present at the banquet and were presented with a certificate and a button by the president of the association, Dr. Larson. Drs. W. E. Blatherwick of Sanish and Gronvold of Fargo could not be present and their certificates and pins were forwarded them later, together with letters of commendation. Another member of the association, Dr. Wheelon, Minot, received his certificate in the Fifty Year club last year, and he was, this year, elected an honorary member of the North Dakota State Medical association. Dr. Wheelon was also present at the banquet and honored by the members and guests of the association.

Mrs. T. E. Keller, Rugby, spoke as president of the Woman's Auxiliary: "In behalf of the ladies of this auxiliary, I would like to thank all of you doctors for inviting us to be with you tonight. We have had a lot of fun, and a good time. I am sure we are all enjoying the program. As you know, we ladies have a project. During the past year we started the Medical Student Loan fund. Previous to the establishment of this fund, there was exactly \$25 available at the medical school for loans. I do not believe that anyone knows better than you how far \$25 goes towards furthering a medical education. We thought if we could help anyone in continuing his medical career, we would be very glad to do so. During the past year all ten of our district societies have worked hard and through rummage sales, food sales and any number of different projects for raising money, we have raised the fund. Tonight I am very happy and very proud to tell you that we are establishing this medical school fund with an initial fund of \$1,047.76. Thank you."

Dr. Berg complimented Mrs. Keller for the accomplishments of the auxiliary and then introduced the president, Dr. L. W. Larson.

PRESIDENTIAL ADDRESS

LEONARD W. LARSON, M.D.

Bismarck, North Dakota

I wish to express my appreciation to the members of the North Dakota State Medical association for the opportunity to serve as their president during the past year. Circumstances have prevented me from devoting as much time to the duties of the office as I would have liked. Fortunately, the association has not been confronted with any major problems. The other officers and the committees have carried on admirably. For this, I thank them. Our executive secretary, Mr. Engebretson, continues to serve the association in a most satisfactory manner, thus justifying the confidence we had in him when he was appointed to the position four years ago.

The responsibility for breaking precedent and holding a joint banquet with the ladies this year must rest primarily on my shoulders. Most of them belong to the woman's auxiliary, which we are beginning to realize in this state has an important function to perform. May the organization grow in numbers and increase in importance.

In the time allotted to me I have chosen as the subject of my remarks "Medicine's Challenge."

As a profession, we can point with pride to the accomplishments which have resulted in the high level of medical service which is available to the people in this country. Furthermore, I believe we can justify our feeling of satisfaction and gratitude over the apparent desire on the part of at least a majority of citizens to maintain the free practice of medicine as we know it in the United States. Recent polls, and other, possibly more reliable signs during the past year indicate extreme reluctance on the part of the public to change the form of medical practice which has made this nation the healthiest in the world. However, political, social and economic forces combined with a seemingly endless threat that we will be plunged into another global conflict at any moment, demand that we remain alert lest we be destroyed by them.

No sane person will deny that we face a terrible danger because of the determination of the mad men in the Kremlin to dominate the world. No sacrifice in men or materials is too great to thwart them in their plans. However, we face greater danger, in my opinion, from within our own borders. The middle-aged and the elderly in this country have had the privilege of living through the golden era of freedom and opportunity. They were taught that a man's future depended not so much on the degree of his God-given abilities but on his willingness to use them and to work from the ground up without the ever-present benevolence of a paternalistic government. These same people know, and the younger generations would do well to learn, that the majority of the men and women who have risen to positions of prominence in the arts and sciences, in business and in agriculture, and those who attained lesser heights but were nevertheless happy and comfortable and able to make their contributions to society, came from humble circumstances. They succeeded because they were willing to strive for success without help from others, including the government. Unfortunately, this spirit, which is considered old-fashioned by some, does not appear to be as universal among our young people today as it was a generation or two ago. A large segment of middle-aged and elderly people also belong to the ranks of those who feel that man's destiny is to enjoy the more abundant life while they may—Uncle Sam is rich and generous, and will provide security now and later for all. Some of you may be saying to yourselves: "So what! We won't be here too long! Why worry? They'll wake up some day!" But will you, before it is too late? Better that we ask ourselves: "Are we to blame for conditions as they are today? What can we do to safeguard the future for those who will take our place?" Surely we face certain indictment if we fail to do all we can collectively and as individuals to leave this country of ours in better condition than it was when we entered.

As members of the medical profession, I believe we must do two things as our contribution to the betterment of America and its citizens who still enjoy a measure of freedom in it. First, we must give our people the best medical care known at a price they can afford to pay. We must rekindle the spirit of service and self-sacrifice for the benefit of our patients, which too many of our critics, even those who are friendly, accuse us of having abandoned. People complain that there is too much specialism in medicine today. I suspect that the fault lies not in specialism per se but in the unfortunate tendency of many specialists, who have spent the best years of their lives in preparation, to neglect at times the art of medicine because of the science they must emphasize to qualify as specialists. A little consideration, a little milk of human kindness, not only helps to cure the patient but it makes of him a friend of the physician and of the profession he represents. If satisfied, he will make any sacrifice necessary to preserve a free system of medical practice in this country.

Second, we must accept our responsibilities as citizens and make our individual contributions to the preservation of those things which we have enjoyed in the past and which may be denied others in the future. We decry the apparent moral breakdown of our people these days. Congressional inquiries suggest that we are the victims of gangsters and political hoodlums. "Politics as usual" seems to be the slogan of both parties until you wonder what, if anything, you can believe. As physicians, who have been blessed with at least average intelligence

and more-than-average opportunities for learning, we must assume leadership in our own communities, join forces with others, many of whom look to us for guidance, encourage capable and honest citizens to run for public office and defeat those who are incompetent or dishonest, or who will lead this nation down the path to moral and financial bankruptcy. We cannot do these things as medical organizations but we can as individual citizens.

The people of the United States are the envy of the people in every other land. Most of them would make most any sacrifice to enjoy the freedoms and benefits we sometimes prize too lightly. We are threatened both from without and within by those who would substitute our way of life for ideologies which are foreign to us. We cannot ignore social change nor can we obstruct progress. But we can all unite in the good fight to preserve our priceless heritage of freedom. As physicians, we are among the privileged in this country. Responsibility and duty always go hand-in-hand with privilege. Our challenge is to preserve the American way, not only for our profession but also for the people we serve.

* * *

The guest speaker of the evening, General George Lull, secretary and general manager of the American Medical association, was introduced by Dr. Larson.

Dr. Larson next introduced the new president with the following words: "It is now my pleasant duty to install your new president. Dr. Lancaster is well qualified to assume the duties of his office. In addition to carrying on a busy practice, he has contributed much to our association. He has been a member of numerous committees in past years and has gained a reputation for his willingness to serve for the benefit of his colleagues in the state and the public. The association will be in good hands. Dr. Lancaster, I present you with this symbol of your office as president of the North Dakota State Medical association. With it go my best wishes for a successful year. Ladies and gentlemen—your new president, Dr. W. E. G. Lancaster.

INAUGURAL ADDRESS

W. E. G. LANCASTER, M.D.

Fargo, North Dakota

General Lull, members of the North Dakota State Medical association, Auxiliary and guests:

I accept with hesitancy this honor you have bestowed upon me, knowing full well the responsibilities involved. My predecessors have established standards I am going to find it difficult to equal. I know that I can expect the unselfish devotion of time and effort that has been characteristic of the chairmen and the members of the various committees. Few are aware of the sacrifice men like Dr. Willard Wright and President Leonard Larson have given in behalf of our association. Dr. Leonard Larson's election to the board of trustees of the American Medical association is a rare national honor of which we are all rightly proud. In the hands of these men our association has run on an even keel and I know that I can promise you their guidance will still be felt.

The welfare of our association, however, is going to be influenced in the months just ahead by the trend of present-day political developments. These are indeed confusing times, and we hear much criticism of the administration's efforts both politically and militarily. Many say we should not criticize, we should not set ourselves up as "armchair generals," yet that is one privilege to which we, living in a free democracy, are entitled. After all, we spend more than one-third of our time and effort supporting government, and it will be a sad commentary should the time ever come that we dare not criticize.

During the last world war, I frequently heard the remark, "You can't blame the German people; they are the victims of poor leadership." Probably we should, before it is too late, do as Mr. Taft suggests—become re-examiners and more closely scrutinize our own leadership over the past twenty years and see where we are being led. Since its origin, the history of our country has been one of recurring political cycles of varying duration but following similar patterns. Each has brought a swing to the left, followed by a return to the right, but seldom, if ever, has a counter swing brought the pendulum to its previous position. In the course of time, therefore, there has been a gradual but somewhat irregular drift to the left.

Developments in other countries have had some influence, but these cycles have resulted primarily from an American response to meet domestic conditions.

The course of the past twenty years has differed from the usual pattern in that the swing in one direction has been longer and largely has been dominated by alien ideas. Instead of being a change to meet altered domestic conditions, it has struck at the basic principles of our democracy.

Until recently few people recognized the extent of this development. The great majority of our people as yet fails to appreciate its significance, and few realize that it has been brought about by the acquiescence, if not the actual connivance, of government.

In 1934 the United States became a member of the International Labor organization. Our Social Security act passed in 1935, as a result, was something wholly foreign in concept and philosophy.

In the 1930's much emphasis was placed on social reform and welfare projects, through which socialistic ideas were planted in the minds of the people. The same ideas crept into our school textbooks. Organized medicine was berated in the eyes of the public. And finally, a whole generation has been sold the idea that the world owes them a living; that it is up to the government to provide a job for everybody from the cradle to the grave; that a doctor will give them pills when they are sick; that there is a nice plot in the cemetery, and a nice funeral when they die, and, I suppose, a harp and a gold crown in heaven. Yes, Mr. Average Man has changed his philosophy. The world now owes him a living whether he works or not. He has shifted his responsibilities to government in return for what he thinks is security. He has lost the pride that once made him hesitate before accepting relief. The New Deal formula of tax, spend and elect has been very successful in providing the power and money to accomplish these ends. The American people today are being taxed into dependency—dependency on the federal government. Do I still need ask, "Where are we being led?" The manner in which the federal government is entering the field of business, competing with free enterprise in housing, power and transportation. An examination of their avowed intentions in the realm of medicine, insurance, and education, and the introduction of such bills as the Spence bill should be sufficient to warn us that we are being led down a blind road and we have but to look about us to know that it is a road of no return. Compare this to the development of socialism in Britain and you will find it is the same "fair deal" with little different labels all along the line. The British never voted on the issue of socialism versus democracy—neither shall we.

In 1948 we were addressed at the annual meeting at Minot by Representative Forrest Harness, who then suggested that it was about time the doctors rolled up their sleeves and got into the fray rather than always expecting someone to do their fighting for them. We have been forced into politics in self-defense—let's each of us lend our support and do our share. Never before has American medicine been so challenged. Never before have the issues been so far reaching, for we must remember, that the attack on medicine is merely a means to an end—it is war upon our whole economic and social system. Never before have we needed the respect, the good will, and the support of the people we serve. We can command public support by showing, not by words alone, but by action too, that their best interests lie in non-political, free, competitive medicine in a free America. Let us do this by exposing the real intentions of the socialistic groups in Washington—by educating the public—by each of us assuming leadership in some way, shape, or form in our respective communities.

Freedom can't be traded off today and then reclaimed tomorrow. Trades of that kind are serious business and they are made for keeps. So, let's accept that responsibility which is ours. Join hands with any group that becomes a victim of the piecemeal attacks of the socialistic groups. Their fight is our fight for the strategy is to divide and conquer. We could well use an old slogan used by the Allies in the first world war: "Each for all, all for each."

In closing, I would like to quote from the writings of John Foster Dulles, "Something has gone wrong with our nation, or we should not be in our present plight and need. It is not like us to be on the defensive and to be fearful. That is new

in our history. What we lack is a righteous and dynamic faith. Without it, all else avails us little. The lack cannot be compensated for by politicians, however able; or by diplomats, however astute; or by scientists, however inventive; or by bombs, however powerful.

Our greatest need is to regain confidence in our spiritual heritage. There is no use having more and louder Voices of America unless we have something to say that is more persuasive than anything yet said."

SCIENTIFIC PROGRAM

Tuesday, May 22, 1951

World War Memorial Building, Bismarck, North Dakota

9:30 to 10 a.m.—"Recent Experience in the Use of Antihistaminics, Cortisone and ACTH in Respiratory Allergy"—Dr. L. E. Prickman, Mayo clinic, Rochester, Minnesota.

10 to 10:30 a.m.—"Problems in the Management of Severe Diabetes Mellitus"—Dr. Herman O. Mosenthal, associate clin-

ical professor of medicine. New York Postgraduate School of Medicine, New York City.

10:30 to 11 a.m.—Exhibit time.

11 to 11:30 a.m.—"Prolonged Labor"—Dr. Carl P. Huber, professor of obstetrics and gynecology, University of Indiana, Bloomington, Indiana.

11:30 to 12 noon—"The Diagnosis and Treatment of Carcinoma of the Body and Cervix of the Uterus"—Dr. H. Dabney Kerr, professor of radiology, University of Iowa, Des Moines, Iowa.

2:00 to 2:30 P.M.—"Problems in Treating Fractures of the Elbow, Forearm and Wrist"—Dr. John H. Moe, Minneapolis, Minnesota.

2:30 to 2:45 p.m.—Intermission.

2:45 to 4 p.m.—Panel discussion on "The Toxemias of Pregnancy." Moderator, Dr. Carl P. Huber, University of Indiana; Dr. Herman O. Mosenthal, New York Postgraduate School of Medicine and Dr. H. W. Hawn, ophthalmologist, Fargo.

North Dakota State Medical Association Roster-1951

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Burns, H. J.	Fort Totten	Foster, George C.	Fargo	Benson, T. Q.	Grand Forks
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Stickelberger, Josephine	St. Paul	LeMar, John	Fargo	Hill, Frank A.	Grand Forks
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Toomey, G. W.	Devils Lake	Lewis, T. H.	Fargo	Johann, O. P.	Grafton
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		Pray, L. G.	Fargo	Peake, F. Margaret	Grand Forks
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		Storrs, R. P.	Fargo	Ruud, John E.	Grand Forks
		Swanson, J. C.	Fargo	Silverman, Louis B.	Grand Forks
		Thompson, A. M.	Wahpeton	Strom, Adrian D.	Langdon
		Tronnes, Nels	Fargo	Thorgrimson, G. G.	Grand Forks
		Urenn, B. M.	Fargo	Tompkins, C. R.	Grafton
		Veitch, Abner	Lisbon	Turner, R. C.	Grand Forks
		Wasemiller, E. R.	Wahpeton	Vance, R. W.	Grand Forks
		Weible, R. D.	Fargo	Waldren, G. R.	Cavalier

Grand Forks—(continued)

Waldren, H. M., Jr. Drayton
 Weed, F. E. Park River
 Williamson, G. M. Grand Forks
 Witherstine, W. H. Grand Forks
 Youngs, N. A. Grand Forks

Kotana

AbPlanalp, Ira S. Williston
 Craven, J. D. Williston
 Craven, J. P. Williston
 Hagan, E. J. Williston
 Johnson, A. K. Williston
 Skjei, D. J. Williston
 Johnson, P. O. C. Watford City
 Korwin, J. J. Williston
 Lund, C. M. Williston
 McPhail, C. O. Crosby
 Pile, Duane F. Crosby
 Wright, W. A. Williston

Northwest

Amstutz, K. N. Minot
 Ayash, John J. Minot
 Ball, Wm. J. Minot
 Beck, Charles Harvey
 Blatherwick, Robert Parshall
 Blatherwick, W. E. Sanish
 Breslich, Paul J. Minot
 Cameron, A. L. Minot
 Combs, A. B. Minot
 Conroy, M. P. Minot
 Craise, O. S. Towner
 Devine, J. L., Jr. Minot
 Devine, J. L., Sr. Minot
 Ensign, William G. Minot
 Erenfeld, F. R. Minot
 Fischer, V. J. Minot
 Flath, M. G. Stanley
 Gammell, R. T. Kenmare
 Garrison, M. W. Minot
 Goodman, Robert Powers Lake
 Greene, E. E. Westhope
 Halliday, D. J. Kenmare
 Hammargren, A. F. Harvey
 Hochhauser, Martin Garrison
 Hulit, Bob E. Minot
 Huntley, Wellington Minot
 Hurley, William C. Minot
 Johnson, O. W. Rugby
 Kermott, Louis H. Minot
 Kermott, L. Henry Minot
 Knudson, K. O. Glenburn
 Lampert, M. T. Minot
 Livingston, N. B., Jr. Mohall
 Malvey, Kenneth Bottineau
 McCannel, A. D. Minot
 Naegeli, F. D. Minot
 Nelson, L. F. Bottineau
 Ohrt, Harry Allan Kenmare
 Olman, D. L. Minot
 Rowe, P. H. Minot
 Seiffert, G. S. Minot
 Sorenson, A. R. Minot
 Sorenson, Rodger Minot
 Spomer, John P. Minot
 Spyker, Michel A. Minot
 Timm, J. F. Portland, Ore.
 Uthus, O. S. Minot (U.S. Army)
 Vandergon, Keith G. Mohall
 Wall, W. W. Minot
 Wheelon, F. E. Minot
 Woodhull, R. B. Minot

Sheyenne Valley

Almklov, L. Cooperstown
 Christianson, Gunder Valley City
 Cook, P. T. Valley City
 Gilsdorf, W. H. Valley City
 Macdonald, A. C. Valley City
 Macdonald, Neil A. Valley City
 Meredith, C. J. Valley City
 Merrett, J. P. Valley City
 Van Houten, J. Valley City
 Wicks, F. L. Valley City

Sixth

Arneson, C. A. Bismarck
 Benson, O. T. California
 Bahamonde, Jose M. Elgin
 Baumgartner, C. J. Bismarck
 Berg, H. M. Bismarck
 Bertheau, H. J. Linton
 Blumenthal, Philip Mandan
 Boyle, John T. Garrison
 Bixby, Harriet Massachusetts
 Bodenstab, W. H. Bismarck
 Boerth, E. H. Bismarck
 Breslin, R. H. Mandan
 Brink, N. O. Bismarck
 Buckingham, T. W. Bismarck
 Cartwright, John Bismarck
 Cochran, R. B. Bismarck
 Craychee, W. A. Minneapolis
 Dahlen, G. A. Bismarck
 DeMouilly, O. M. Flasher
 Diven, W. L. Bismarck
 Enders, W. R. Hazen
 Fredricks, L. H. Bismarck
 Freise, P. W. Bismarck
 Gaebe, O. C. New Salem
 Goughnour, Myron Bismarck
 Griebenow, F. F. Bismarck
 Heffron, M. M. Bismarck
 Heinzeroth, George Turtle Lake
 Henderson, R. W. Bismarck
 Hetzler, A. E. Mandan
 Icenogle, Grover Donald Bismarck
 Jacobson, M. S. Elgin
 Kling, Robert R. Bismarck
 LaRose, V. J. Bismarck
 Weyrens, P. J. Hebron
 Larson, L. W. Bismarck
 Lindsay, D. T. Bismarck
 Levi, W. E. Beulah
 Lipp, G. R. Bismarck
 Martynski, V. K. Glen Ullin
 McEwen, J. C. California
 Nuessle, R. F. Bismarck
 Nugent, M. E. Bismarck
 Orr, A. C. Bismarck
 Oster, Ellis Mandan
 Owens, P. L. Bismarck
 Perrin, E. D. Bismarck
 Peters, Clifford Bismarck
 Pierce, W. B. Bismarck
 Quain, E. P. Salem, Oregon
 Radl, R. B. Bismarck
 Ramstad, N. O. Bismarck
 Roan, M. W. Bismarck
 Rosenberger, H. P. Aberdeen, S. D.
 Salomone, E. Elgin
 Saxvik, R. O. Bismarck
 Schoregge, C. W. Bismarck
 Schoregge, R. D. Bismarck
 Shannon, Dewitt D. Riverdale
 Shook, Lester D. Kansas City, Mo.
 Smith, C. C. Mandan
 Spielman, George Mandan
 Strobel, Robert J. Bismarck
 Thompson, Arnold Bismarck

Sixth—(continued)

Tudor, Robert B. Bismarck
 Vinje, E. G. Hazen
 Vinje, Ralph Minneapolis
 Vonnegut, F. F. Linton
 Waldschmidt, R. H. Bismarck
 Williams, J. R. Bismarck

Southwestern

Bush, Clarence A. Beach
 Dukart, C. R. Dickinson
 Dukart, Ralph Dickinson
 Gilsdorf, A. R. Dickinson
 Goulding, Robert L. Bowman
 Guloiien, H. E. Dickinson
 Gumper, A. J. Dickinson
 Hill, S. W. Regent
 McNeil, J. H. Hettinger
 Maercklein, O. C. Mott
 Larson, Harlan Dickinson (U. S. Army)
 Martens, Opollon Killdeer
 Murray, K. M. Scranton
 Reichert, D. J. Dickinson
 Reichert, H. L. Dickinson
 Rodgers, R. W. Dickinson
 Schumacher, Wm. A. Hettinger
 Smith, Oscar M. Dickinson
 Spanjers, Arnold J. Dickinson
 Spear, A. E. Dickinson
 Tosky, Julien Richardton

Stutsman

Arzt, P. G. Jamestown
 Beall, John A. Jamestown
 Culbert, M. H. Medina
 Fergusson, V. D. Edgeley
 Fisher, A. M. Jamestown
 Fitz Jerrell, H. B. Jamestown
 Gerrish, W. A. Jamestown
 Hieb, Edwin O. Jamestown
 Hogan, C. W. Jamestown
 Holt, G. H. Jamestown
 Jansonius, J. W. Jamestown
 Larson, E. J. Jamestown
 Miles, Jas. Jamestown (U. S. Army)
 Lucy, R. E. Jamestown
 Lynde, Roy Ellendale
 McFadden, Robert L. Jamestown
 Maloney, Basil W. La Moure
 Martin, Clarence S. Kensal
 Melzer, S. W. Woodworth
 Nielring, R. D. Jamestown
 Pederson, T. D. Jamestown
 Sorkness, Joseph Jamestown
 Wolfe, F. E. Oakes
 Wood, W. W. Jamestown
 Woodward, R. S. Jamestown

Traill-Steele

Cable, Thomas M. Hillsboro
 Cleary, Hugh G. Northwood
 Dekker, O. D. Hope
 Kjelland, A. A. Hatton
 Knutson, O. A. Buxton
 LaFleur, H. A. Mayville
 Little, R. C. Mayville
 Savre, M. T. Northwood
 Vinje, Syver Hillsboro

Tri-County

Boyum, Lowell E. Harvey
 Boyum, P. A. Harvey
 Owens, C. G. New Rockford
 Schwinghamer, E. J. New Rockford
 Seibel, Glenn W. New Rockford
 Voglewede, William C. Carrington

FIFTH ANNUAL MEETING
WOMAN'S AUXILIARY TO THE NORTH DAKOTA STATE MEDICAL ASSOCIATION
Bismarck, North Dakota, May 19, 20, 21, 22, 1951

Pre-Convention Board Meeting

The pre-convention board meeting was held in the Rose room of the Patterson hotel, Bismarck, Sunday, May 20. Mrs. E. T. Keller, president, presided.

The minutes of the last state post-convention board meeting were read by Mrs. Keller and were approved as read.

Plans for the meeting were discussed and decided upon. Some revisions were made in the program.

Mrs. Keller requested that question period be allowed after each report.

An auditing committee, consisting of Mrs. Rodgers and Mrs. Thorgrimson, was appointed.

It was decided that the bills for the convention were to be paid by the auxiliary. If it became necessary, the auxiliary would ask the medical association for funds.

Mrs. Mason G. Lawson, third national vice-president of the Woman's Auxiliary to the American Medical Association, was unanimously elected to honorary membership in the North Dakota Woman's Auxiliary.

Members present were: Mrs. Keller, president; Mmes. Kermott, Nierling, Lancaster, Sedlak, Buckingham, Arneson, Berg, Culmer, Alger, Mrs. Lawson, Thorgrimson, Gertson, Halliday, Rodgers.

The meeting was then adjourned.

MRS. R. W. RODGERS, Acting Secretary

Opening Meeting of Convention

The fifth annual meeting of the Woman's Auxiliary to the North Dakota State Medical association held in Bismarck, North Dakota, was formally opened by Mrs. E. T. Keller, state president, at 10 a.m., May 21, 1951, in the new American Legion club room.

The pledge of loyalty was given by Mrs. W. A. Liebler and repeated in unison by the members present. The group stood together for a silent prayer for peace.

Mrs. T. W. Buckingham of Bismarck gave the address of welcome on behalf of the woman's auxiliary of the Sixth district. The response was given by Mrs. Clara Gertson of Grand Forks. Mrs. Keller then presented the president-elect, Mrs. R. W. Rodgers, of Dickinson. Mrs. H. M. Berg, chairman of the convention committee, was introduced and in turn introduced Mrs. L. W. Larson, her co-chairman. Mrs. Keller introduced the honor guest of the convention, Mrs. Mason G. Lawson, national third vice-president, Little Rock, Arkansas.

Mrs. Keller stated there were no memorials.

The roll was called, and the following were present:

Officers: Mrs. E. T. Keller, president; Mrs. R. W. Rodgers, president-elect; Mrs. G. G. Thorgrimson, first vice-president; Mrs. Henry Kermott, second vice-president; Mrs. J. W. Janssonius, secretary, and Mrs. R. D. Nierling, treasurer.

State chairmen: Mrs. R. W. Rodgers, organization; Mrs. C. A. Arneson, legislation; Mrs. L. J. Alger, press and publicity; Mrs. W. E. G. Lancaster, revisions; Mrs. H. M. Berg, nominating committee; Mrs. D. J. Halliday, finance.

Councillors: Mrs. Clara Gertson, Third district, and Mrs. E. Salomone, Sixth district.

The minutes of the executive board meeting of the Woman's Auxiliary held in Devils Lake, September 27, 1950, were read and approved.

Dr. L. W. Larson, Bismarck, immediate past president of the state medical association, was then introduced. He praised Mrs. Keller for the initiation of a project to aid medical students. He also stated that the Woman's Auxiliary could render service of unestimable value from the standpoint of public relations. Mrs. Clara Gertson, Grand Forks, gave the response to Dr. Larson's word of welcome.

Dr. Larson introduced General George Lull, secretary and general manager of the American Medical association, who spoke briefly. He stressed that as auxiliary members our weight

could be exercised by joining many organizations since the achievement in local units passed on to higher controls. He added that our chief problem was a matter of education of other professions.

Mrs. Keller suggested that the date of expiration of all councillor's terms be published. They are as follows:

- First district (Fargo), Mrs. O. A. Sedlak—1954.
- Second district (Devils Lake), Mrs. G. W. Toomey—1952.
- Third district (Grand Forks), Mrs. Clara Gertson—1953.
- Fourth district (Minot), Mrs. A. R. Sorenson—1953.
- Fifth district (Valley City), Mrs. J. P. Merrett—1954.
- Sixth district (Bismarck), Mrs. E. J. Salomone—1953.
- Seventh district (Jamestown), Mrs. J. V. Miles—1953.
- Eighth district (Williston), Mrs. J. D. Craven—1954.

The president asked that all bills incurred by the officers and chairmen of the state committees during the fiscal year be presented to the treasurer, and upon presentation said bills be paid out of the funds in the treasury of the Woman's Auxiliary. None of the bills had to be approved as those presented were within the budget limits. She suggested that the president-elect be given her railroad fare to the national convention before departure.

After reading her report to the national society, Mrs. Keller spoke on "Individual Responsibility."

The following reports were given by the officers, state chairmen, councillors, and auxiliary presidents:

President's Report

The Woman's Auxiliary to the North Dakota State Medical association extends greetings to the national president, to all national officers, and to the members of the Woman's Auxiliary to the American Medical association.

We have just completed four years of what I feel are gratifying accomplishments. Since each district was a charter member during our first year of organization, we have only had to concentrate on new members during the past year. This year has shown an increase of 12 new members, making a total of 227.

Last summer I was privileged to attend the national convention in San Francisco. The amount of auxiliary work, with its many projects and undertakings, is tremendous and very far reaching. This president was also at the conference in Chicago last November. The new panel discussions were very enlightening and I was able to carry home many ideas applicable to my state.

During the year I have been able to visit only five of our ten districts, due to the fact some districts meet only twice a year, some are organized for social meetings, and because the weather is often unreasonable.

The state board meeting, held last September, was well attended.

Press and Publicity. It was voted to have four newsletters sent out each year. Each district councillor is responsible for the news from her district. Our newsletters are mimeographed through the courtesy of the office of the executive secretary.

Today's Health. The report totals 42, from six districts, and at this writing there are four districts which have not reported. Many members have pledged to be responsible for two subscriptions.

Bulletin. It is urged that each member take a subscription at the time her dues are paid.

Legislation. Of interest to our state: (1) The outlawing of fireworks with the exception of caps for cap pistols. (2) A state alcoholic commission set up to aid and rehabilitate persons afflicted with alcoholism. (3) Defeat of a bill honoring the billings of chiropractic hospitals and physicians.

I would like to follow Mrs. Witherstine's suggestion, that in the future, district societies devote more time to discussion of state and national legislative problems.

Public relations. The promotion and sale of handicraft work of our state tuberculosis sanatorium, and the donation of books and gifts to this institution. The opening of the state blood bank at the medical Center, State Health department, University of North Dakota, found many auxiliary members assisting in any way possible.

Assistance has been given to the Cancer drive, Red Cross, Crippled Children's hospital, North Dakota Tuberculosis association, and diabetic clinics. Some auxiliaries are furnishing hospitals with linens and bathrobes.

Programs. Guest speakers have been at several meetings, many of them stressing the urgency to still fight socialized medicine. Films on cancer, nurse recruitment, and first aid in the homes have been shown. We are sorry we cannot take advantage of the many excellent programs prepared for television.

Project. Our biggest project, of which I am very proud, is the establishment of a sophomore medical student loan fund. Previous to the establishment of this fund, only \$25 was available to a medical student. We, as an auxiliary, felt it most worthwhile to help these students, and by doing so, encourage them to return to their native state. This loan is available to residents of North Dakota and cannot exceed \$500. We are very happy to announce that by graduation this spring we will be able to help at least two students. This fund was raised by various means, such as rummage sales, dances, bridge parties, raffles, and donations.

Mrs. Mason Lawson, our third national vice president, is going to tell us how a lone doctor's wife, in an isolated community can carry on auxiliary work.

I would like to acknowledge the wonderful cooperation received all through this past year, not only to my state officers and state chairmen, but also to each auxiliary member.

Mrs. E. T. KELLER, President

Organizations Report

It is a pleasure to report that all auxiliary districts in our state are fully organized.

We have a total membership of 227, which number includes 38 new members for 1950. I hope each district chairman will try to persuade all eligible members to become active in the auxiliary, and that our membership will show an appreciable increase again at our next meeting.

Mrs. R. W. RODGERS, Chairman

Legislation Report

This year the North Dakota state legislature met in their 32nd session, in what might be termed a favorable session so far as the physicians of North Dakota were concerned. In fact, the entire session did not require any great effort on the part of our auxiliary in the promotion or defeat of special measures. Nevertheless, many of our auxiliary members, and particularly those in Bismarck contacted our legislators in expression of our desires and opinions on proposed bills.

Some of the bills which were of interest to the medical association have been outlined by Mr. E. F. Engebretson and are as follows:

Fireworks outlawed. The legislature passed Senate Bill No. 66, which has the effect of outlawing all fireworks with the exception of caps for cap pistols.

Voluntary hospital and medical plans for state employees. House Bill No. 633. It provided that the state of North Dakota or any of the subordinate departments or agencies of the state might establish a hospital and medical plan to cover the employees of the state or the employees of the individual departments or agencies. This bill was killed in the house.

House Bill No. 751. This bill virtually passed the house before it was printed. The printed bill disclosed that it contained a direct inference that diagnoses of optometrists should be used by the public welfare board to determine what kind of remedial care was indicated in connection with that department's program for the aid to the blind.

Chiropractors attempt to require Blue Cross and Blue Shield to honor billings of chiropractic hospitals and physicians. Senate Bill No. 212. Through an unusual senate procedure, the bill was actually once passed by a vote of 27 to 19. It was

called back for reconsideration about four days later and defeated 37 to 11. Many doctors worked hard for the defeat of this measure.

Other bills. There were numerous other bills of interest. House bill 644, because of its title, may have caused some confusion through the state. The title intimated that it was doing away with serology tests for marriage license applicants. The bill, however, was killed. Senate bill No. 94, supported by the North Dakota Pharmaceutical association and affecting proprietary medicines and restricting their sales to registered pharmacists (with certain exceptions when pharmacists were not readily located) was killed. House bill 617 was an interesting measure, setting up a state alcoholic commission to aid and rehabilitate persons afflicted with alcoholism. This bill was passed and will probably require a high degree of cooperation from North Dakota physicians in order to make the same effective. *Senate concurrent resolution No. K*, called upon the board of higher education to proceed with all possible despatch to get a complete four-year medical school in operation at the University of North Dakota. This resolution has no force and effect as law. It is simply a recommendation to the board of higher education that a complete study be made as to the feasibility of developing a four-year school.

Nationally the present emergency and the fighting in Korea has lessened the federal program for socialized medicine. There still persists the continued efforts for socialism on a national basis, with continued unfavorable program so far as our physicians are concerned. To meet this it is believed our auxiliary should continue to ever be alert and informed to counteract this threat. To this end, the bulletins put out by the American Medical association, Washington office, under Director Joseph S. Lawrence, have been most informative and worth while. These have been carefully reviewed and space does not permit a review of much of the interesting legislation. It is extremely urged that these bulletins be continued and sent to interested personnel of our auxiliary.

Mrs. C. A. ARNESON, Chairman

Program Report

The Woman's Auxiliary to the North Dakota State Medical association had a very successful year.

One of the main projects was the raising of money for the student loan fund. This project originated with Mrs. Keller, our state president, and the various auxiliaries have shown their support of and approval for this scholarship by cooperating wholeheartedly in their first year's effort to get the fund started.

The president of the auxiliary, Mrs. E. T. Keller, visited some of the component auxiliaries and reported on the national convention which was held in San Francisco and also the interim meeting held in Chicago. Those members who were not able to hear Mrs. Keller during the year will, no doubt, have that pleasure at the state convention to be held in May 1951.

Quite an extensive use of films was made. These covered a variety of subjects and were often supplemented by talks and explanations given by doctors.

Each auxiliary made a special effort to keep itself current on the progress made in the fight against socialized medicine and to see that literature and information be made available to all organizations and groups.

In addition, an active participation was taken in aiding the doctors to put on the diabetic clinics, which were held throughout the state.

The component auxiliaries followed the general program outlined by the national program chairman, studying various phases such as their local health department, legislation, nurse recruitment and voluntary prepayment medical and hospital care plans.

We feel that the Woman's Auxiliary to the State Medical association has made excellent progress during year 1950-1951.

Mrs. A. P. NACHTWEY, Chairman

Historian's Report

The Woman's Auxiliary to the North Dakota State Medical association was organized on May 26, 1947, in Fargo, with the help of Mrs. Leo J. Schafer of Salina, Kansas, with the following acting officers: Mrs. Hanna, Mrs. Weikle, Mrs. Arzt, Mrs. Baillie, Mrs. Berg, Mrs. Rodgers, Mrs. D. M. Smith and Mrs.

Borland; also Mrs. Keller. All ten major districts in our state were charter members.

The main objective of the organization at that time was a 100 per cent membership.

Next, we should consider ourselves a state-wide public relations committee regarding the following points:

1. Tell others the benefit of voluntary group health insurance.
2. Tell others the real meaning of compulsory government health insurance.
3. Let the public know that doctors have a better plan.
4. Make the public realize that our husbands are greatly overworked.
5. Assist with public health work in all possible ways.
6. Because uninformed prejudice does no good, we should keep ourselves informed, so that we may speak intelligently and coherently on matters pertaining to public health.
7. Refrain from mumbling disapproval.
8. Undertake no project without the approval of our advisors.

At the state convention held in Grand Forks in May 1950, Mrs. Corbus, Mrs. Fawcett and Mrs. Haunz were appointed to serve on the project committee. At the fall executive board meeting, Mrs. Corbus presented the proposed medical student loan project, which has been endorsed by Dr. Potter, dean of the medical school, and Dr. Leonard Larson, president of the North Dakota State Medical association. It was unanimously approved by all members present. This project will be brought before the state convention at Bismarck for final approval by all members in the state. Individual auxiliaries have been completing plans for obtaining funds for the project.

At the present time we have a membership of 227, and are looking forward to promoting our original objectives and our first project.

MRS. A. E. CULMER, JR., Historian Chairman

"Today's Health" Report

District 1 (Fargo)—no report. Chairman: Mrs. Elroy Peterson, 1214 N. 3rd St., Fargo.

District 2 (Devils Lake)—23 one-year subscriptions; 1 three-year subscription. Chairman: Mrs. G. N. Vigeland, Rugby.

District 3 (Grand Forks)—10 one-year subscriptions; 1 two-year subscription. Chairman: Mrs. E. Grinnell, 1207 Lincoln Drive, Grand Forks.

District 4 (Minot)—No subscriptions. Chairman: Mrs. William Hurley, 207 - 7th St., Minot.

District 5 (Valley City)—No subscriptions. Chairman: Mrs. C. J. Meredith, Valley City.

District 6 (Bismarck)—2 one-year subscriptions. Chairman: Mrs. P. W. Freise, 831 Mandan St., Bismarck.

District 7 (Jamestown)—5 one-year subscriptions. Chairman: Mrs. Robert McFadden, Jamestown.

District 8 (Williston)—No report. Chairman: Mrs. E. J. Hagon, 410 - 2nd Ave., Williston.

District 9 (Carrington)—no report. Chairman: Mrs. R. F. Gilliland, Carrington.

District 10 (Dickinson)—no report. Chairman: Mrs. Harlan C. Larson, 35¹ - 10th Ave., W., Dickinson.

Total from state: 40 one-year subscriptions; 1 two-year subscription; 1 three-year subscription.

MRS. C. O. HEILMAN, Chairman

Auxiliary President's Report—First District

The First District auxiliary is comprised of members from Cass, Ransome and Richland counties. Of an eligible number of 75, there are 35 paid-up members, a decrease of seven over the previous year.

Our meetings are held four times a year, with dinner at the Gardner hotel. We average 33 at these meetings, including guests who are wives of veterans hospital doctors, ineligible for membership in the parent society. Nevertheless, aside from their valued presence at our meetings, these women have contributed much to our district society.

We had guest speakers at two of our meetings, who discussed problems of juvenile delinquency and civil defense. Our final meeting featured a fashion show of spring and summer clothes,

and our guest, Mrs. E. T. Keller, the state president, reported on the national convention.

Our primary concern this year was the raising of money for the sophomore student loan fund by means of a raffle.

MRS. B. C. CORBUS, JR., President

Auxiliary President's Report—Second District

Number of eligible members—20; number of active members—17, and number of new members—3.

The Devils Lake District medical Auxiliary has met four times this year. The first meeting was at Rugby, where we were entertained with our husbands at dinner by the Rugby members, and then adjourned to our meeting in one of their homes. The other three meetings have been in Devils Lake, where we have also gone out to dinner following our business sessions in the various homes.

Our programs this year have been timely and interesting discussions of current magazine articles and books, showing us the constant need for us to keep up a vigilant fight against socialized medicine. We have felt fortunate and honored to have as one of our members, our state president, Mrs. Ted Keller of Rugby, and have been impressed by her first-hand accounts of the national convention at San Francisco, and the national board meeting in Chicago. At our last meeting, she gave us a talk on cancer.

We have sold 27 *Today's Health* subscriptions, 21 one-year, and 2 three-year. All our members but one are *Bulletin* subscribers. We have offered our services to help with blood typing in our home counties, as a part of the civil defense program.

Of course, our biggest project this year was our dance to raise funds for the sophomore medical student loan fund. We gave a benefit formal at the Devils Lake Town and Country club, November 17, to which we all invited as many guests as possible. After paying for the orchestra and food, we made a profit of over \$100, thanks also to the generous contributions of our members who were unable to attend the party.

MRS. JAMES H. MAHONEY, President

Auxiliary President's Report—Third District

Our year 1950-51 was advantageously introduced by the many helpful suggestions that we brought back from the state board meeting in Devils Lake last fall. That meeting was attended by Mrs. G. G. Thorgrimsen, Mrs. L. J. Alger, Mrs. A. E. Culmer and myself. Among the many suggestions mentioned, one was to become very popular—the sophomore medical student loan fund. It has since become more commonly familiar to us as "the project." The proposed project met with immediate enthusiasm and appeal to the result that a project committee was formed and the actual raising of funds near five hundred dollars has been accomplished.

The effective drive for members directed by Mrs. J. D. Cardy, membership chairman, is noteworthy, I believe, in that it shows a substantial gain in membership with 100 per cent membership for the city of Grand Forks.

Our year was made up of four well attended meetings in October, November, March and April. The pledge of the medical auxiliary was repeated at each meeting. It is evident to me that friendly relations and mutual understanding have been promoted through these scheduled meetings.

ALICE S. QUALE, President

Auxiliary President's Report—Traill-Steele District

My report of the activities of the Traill-Steele medical auxiliary is very brief. We have a membership of eight and an average attendance of five or six at each meeting. We have four meetings a year, and they coincide with the doctor's meetings. We always meet in Mayville, have dinner with our husbands and then enjoy a social evening at one of the doctor's homes there. Our group voted in favor of establishing a scholarship fund at the university and our contributions were sent in by Mrs. LaFleur, project chairman.

Our group is so small and so widely scattered we are not able to accomplish much; however, we do enjoy our meetings very much.

BERNICE CABLE, President

Auxiliary President's Report—Fifth District

The Woman's Auxiliary of the Sheyenne Valley medical society has a membership of 11, with an average attendance of 6. We had four meetings, three of which were held in the homes of members, with no definite program outlined.

We entertained the Sheyenne Valley District Nurses' association, and members of the 1951 graduating class at a meeting and social hour in the Nurses' Home. A recently employed occupational therapist at the Crippled Children's home in Jamestown was guest speaker, and she interspersed her talk with the showing of kodachrome transparencies.

One subscription to the *Bulletin*, and six to *Today's Health* are reported by the members.

A donation to the student loan fund has been made. The following officers were elected for the coming year: president, Mrs. Gunder Christianson; secretary-treasurer, Mrs. Paul T. Cook, and district councillor, Mrs. J. P. Merrett.

MRS. W. H. GILSDORF, President

Auxiliary President's Report—Sixth District

The Sixth district has an eligible membership of 56, out of which 40 are active members. The average attendance has been 23.

It has been the usual plan to have four dinner meetings followed by an educational program. However, this year a Christmas party was held at the time of the second meeting.

Mrs. E. T. Keller, state president, our guest on February 19, gave a review of the national convention at San Francisco. Mr. Forsyth Engebretson, state association executive secretary, also spoke on: "Legislative Procedures." The film, "Cancer of the Breast" was shown at the first meeting. Dr. Russell Saxvik, state health department, was guest speaker at the April 24 meeting. His topic was "The Blood Bank at Grand Forks and what it means to the State." To add interest to the meetings, we have had door-prizes.

Mrs. J. Tosky, of the Southwestern district, and Dr. Agnes Stucke, of Garrison, have been visitors during the year.

There are two new subscriptions to *Today's Health* and 17 to the *Bulletin*.

Our three Elgin members gave a bridge luncheon to raise money for the student loan fund and presented us with a sizeable sum. We sold candy at the capitol when the legislature was in session and have raffled gifts in the form of centerpieces at several meetings. It was voted to contribute \$200 towards this fund.

Committee appointments were made in December for the state convention to be held in Bismarck, May 19-22.

MRS. T. W. BUCKINGHAM, President

Auxiliary President's Report—Seventh District

The Stutsman county chapter of the Woman's Medical Auxiliary has held three dinner meetings during the 1950-51 year.

The first meeting in the fall was held at the Gladstone hotel. Mrs. J. W. Jansonius, state secretary, gave a report on the 1950 state medical convention which she attended in Grand Forks. She explained the student loan fund to the members, substituting for Mrs. Keller, who was unable to attend. At this meeting it was decided to carry on with our usual project of giving Christmas baskets to two needy families.

At our second meeting, the film, "Self-Examination of the Breast," was shown. Following this, Dr. E. J. Larson, Jamestown, gave a very interesting talk on cancer.

Dr. Ann Carlson, psychologist, was the guest speaker at the spring meeting. She gave us a very interesting and informative talk on the great work being done at the Crippled Children's school in Jamestown.

The fourth meeting of the year will be held April 27, at which time election of officers will take place and money for the student loan fund will be collected.

MRS. R. S. WOODWARD, President

Auxiliary President's Report—Eighth District

The following is a report of our activities for the past year: Our group which is composed of nine members meets twice a year. We have given the library a year's subscription to

Hygeia and our treasurer is forwarding a check for \$65 to the chairman of the medical student loan fund.

Mrs. J. D. Craven is our delegate to the annual state convention at Bismarck in May.

The following officers were elected for a two-year period: Mrs. C. M. Lund, president; Mrs. J. J. Korwin, vice-president; Mrs. E. J. Hagan, secretary-treasurer; Mrs. A. K. Johnson, publicity chairman; Mrs. J. P. Craven, public relations chairman; Mrs. E. E. Skjei, program chairman; Mrs. Joan Hagan, *Hygeia* chairman; Mrs. J. D. Craven, councillor.

MRS. C. M. LUND, President

* * * *

Meeting adjourned to reconvene at 2 p.m., Masonic temple.

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The convention reconvened at 2 o'clock p.m., May 21, 1951. The meeting was called to order by Mrs. E. T. Keller, president.

The remainder of the reports that were not read in the morning session were read at this time.

Mrs. Keller read a letter from the Ninth district (Carrington). Some discussion followed as to whether Carrington should continue as a separate auxiliary, or affiliate with Devils Lake or Minot. Mrs. Lawson suggested that they collect dues in their own district in order to keep complete records; yet, attend medical meetings in either Devils Lake or Minot.

It was then decided that Traill-Steele should come in with Grand Forks if the husband affiliates with Grand Forks.

The report of the Tenth district (Dickinson) was then read:

Auxiliary President's Report—Tenth District

The Woman's Auxiliary to the Southwest District medical society has just concluded a most successful year. Meetings were held in conjunction with those of the district society and were for the most part dinner meetings.

The president received full cooperation of all the officers and members and is very grateful to them.

Activities included aiding the local medical profession in sponsoring the nationwide diabetic detection drive.

Several of the members assisted the city health nurse at the sight clinic held in the public schools of Dickinson.

One of the meetings was devoted to the viewing of a film illustrating accident prevention in the home.

Projects undertaken included the furnishing of linens for several of the rooms in the new addition to St. Joseph's hospital now under construction in Dickinson. It was also decided that a per capita assessment of two dollars per member be made and such sum to be contributed to the student loan fund of the state medical school at Grand Forks.

Officers for the coming year are Mrs. C. R. Dukart, president; Mrs. H. L. Reichert, vice-president, and Mrs. Arnold J. Spanjers, secretary-treasurer.

The members have decided that the group will be, for the most part, social, but will continue to aid the local medical profession in its public relations program and any other worthy causes related to medicine in general.

Again, your president wishes to thank the officers and all members for their splendid help and cooperation in realizing the fulfillment of the above program.

MRS. H. E. GULOIEN, President

Mrs. H. M. Berg, chairman of the nominating committee, then submitted the following report:

Nominating Committee's Report

President—Mrs. R. W. Rodgers.

President-elect—Mrs. G. G. Thorgrimson.

First vice-president—Mrs. Henry Kermott.

Second vice-president—Mrs. G. W. Toomey.

Recording secretary—Mrs. J. W. Jansonius.

Treasurer—Mrs. I. D. Clark.

MRS. H. M. BERG, Chairman

MRS. W. B. PIERCE

MRS. CLIFFORD PETERS

Mrs. Keller then asked for nominations from the floor. As there was none, motion was made by Mrs. Liebeler that the secretary be instructed to cast a unanimous ballot for the entire slate of officers. Mrs. Cardy seconded the motion. All voted "Aye".

Mrs. Cardy then read the "Project Report":

Sophomore Student Loan Fund Project Report

At the annual meeting of the woman's auxiliary to the North Dakota State Medical association, held in Grand Forks in May, 1950, a proposal was made that the organization establish a continuing project. Various activities were discussed and the plan finally agreed upon was the establishment of a student loan fund for the benefit of medical students transferring from the University of North Dakota at the end of their sophomore year. The outline of the project, attached herewith, was drawn up with representatives of the University of North Dakota, endorsed by them, by the president of the North Dakota State Medical association, and formally approved by the board of the woman's auxiliary at the annual meeting in September 1951.

Copies of the outline of the project were mailed to each auxiliary member in the state and district presidents notified to begin fund-raising campaigns in their own localities. As of May 1, 1951, the sum of \$713.76 has been raised, with a few districts remaining to report. Activities which different groups engaged in to raise this money are as follows: rummage sales, dinner dances, benefit card parties, and raffles as well as the receipt of individual donations from members and friends of the auxiliary.

This project now awaits the formal approval of those in attendance at the 1951 annual meeting of the North Dakota State Medical Association Auxiliary.

Mrs. Cardy stated that the project had been approved by the board and resolutions committee.

Sophomore Student Loan Fund Project Receipts

Grand Forks society	\$ 455.61
Devils Lake district	100.00
Trall-Steele district	16.00
First district ..	152.25
Stutsman	30.00
Sheyenne Valley	15.00
Sixth district	200.00
Williston	65.00
Dickinson	24.00

Total \$1,047.76

MRS. B. C. CORBUS, Chairman

Mrs. Keller then stated that sufficient copies of the amendments to the constitution had been mimeographed for every auxiliary member in each district. She requested that some representative at the convention from each district be responsible for taking the necessary supply for distribution to their local auxiliary.

Discussion followed in regard to the number of copies of the original constitution available in each district. Mrs. Cardy made a motion, seconded by Mrs. Berg, that two copies of the constitution be placed on file in each district.

The new business of electing two delegates and two alternate delegates to the national convention to be held in Atlantic City, June 10 to 15 was then brought before the convention. Mrs. Keller asked for nominations. Since there were no nominations, it was suggested that Mrs. R. W. Rodgers, president-elect, take the signed certificates to the convention to present to any possible delegate. Before a state has any voting power, it has to have a certified delegate.

Mrs. Keller then stated that one of the major issues scheduled at the convention was to be the voting on the revisions to the constitution and by-laws. She thought it quite important that we instruct our delegate how we should like her to vote on the revisions.

Mrs. Lawson stated that the real controversial revision would be on the membership section. For an auxiliary member to become an active member of the American Medical association, the husband must pay yearly dues. She thought it very important that we urge our husbands to pay dues. On all the other revisions, Mrs. Berg made a suggestion that we permit Mrs. Rodgers to use her own discretion as a voting delegate.

Mrs. Keller then presented Mrs. Mason G. Lawson, national third vice-president, honored guest and speaker.

Mrs. Lawson first expressed her appreciation for being selected as an honorary member of the Woman's Auxiliary to the North Dakota State Medical Association. She then announced

her topic would be "How a Lone Doctor's Wife in a Small Isolated Community Can Play Her Part."

The convention then adjourned to reconvene Tuesday, May 22, 10 o'clock a.m., Masonic temple.

* * * * *

The Woman's Auxiliary to the State Medical association reconvened at 10 a.m., Tuesday, May 22, at the Masonic temple. The meeting was called to order by Mrs. Keller.

The report of the auditing committee was then requested by Mrs. Keller.

Mrs. I. D. Clark, newly elected treasurer, read the balance of \$690.39, and stated that all bills had been paid.

Mrs. Keller then asked for the report of the registration committee. Mrs. W. B. Pierce stated that 722 auxiliary women had registered.

Mrs. R. W. Rodgers then moved that the secretary write a thank-you note to Dr. Larson for the lovely banquet. Motion was seconded by Mrs. W. E. G. Lancaster.

Mrs. Keller then distributed the required number of copies of the amendments to the constitution to each representative present.

She then asked for the report of the resolutions committee.

Report of Resolutions Committee

Resolution 1.

Whereas, the president, Mrs. E. T. Keller, has served the Woman's Auxiliary to the North Dakota State Medical association faithfully and well; and

Whereas, under her leadership a prosperous and fruitful year has been enjoyed, and

Whereas, her efforts have led to wider recognition of the Woman's Auxiliary to the North Dakota State Medical association, therefore be it

Resolved, that the Woman's Auxiliary to the North Dakota State Medical association, in convention assembled in Bismarck, May 22, 1951, extend to Mrs. E. T. Keller its heartfelt thanks and sincere appreciation for the great service that she has rendered to that group.

Resolution 2.

Whereas, the Woman's Auxiliary to the North Dakota State Medical association has held its fifth annual meeting in Bismarck, and

Whereas, the Woman's Auxiliary to the Sixth District Medical society has served as hostess during the meeting, and

Whereas, the Woman's Auxiliary to the Sixth District Medical society has performed its functions so admirably, and

Whereas, the North Dakota State Medical association and the Sixth District Medical society have assisted in this convention, and

Whereas, the arrangements for the various meetings and entertainment have contributed very materially to the success of this our fifth annual meeting; therefore be it

Resolved, that the Woman's Auxiliary to the North Dakota State Medical association extend a vote of thanks to the Woman's Auxiliary to the Sixth District Medical society, to the North Dakota State Medical association, and to the Sixth District Medical society.

Resolution 3.

Whereas, at the fourth annual meeting of the Woman's Auxiliary to the North Dakota State Medical association, held in the city of Grand Forks in May 1950, a suggestion was made that a continuing project be established, and

Whereas, at a meeting of the board of the Woman's Auxiliary to the North Dakota State Medical association, held in the city of Devils Lake in September 1950, a proposal to create a loan fund for sophomore medical students of the University of North Dakota was adopted, and

Whereas, all members of the Woman's Auxiliary to the North Dakota State Medical association have received and studied copies of the plans for this loan fund, and

Whereas, all component auxiliaries of the Woman's Auxiliary to the North Dakota State Medical association have approved and adopted the plans for such a loan fund, and

Whereas, all component auxiliaries by various and sundry means have raised sums of money totaling \$1,047.76, and

Whereas, through the activities by which this money was raised, interest in this society and friendly public relations were created, and

Whereas, such a project furthers the aims of the American Medical association and the North Dakota State Medical association by offering direct assistance in medical education to the youth of this state, therefore be it

Resolved, that the Woman's Auxiliary to the North Dakota State Medical association adopt the "sophomore medical student loan fund of the University of North Dakota" as a continuing project, and further be it

Resolved, that the Woman's Auxiliary, through a duly appointed representative, turn over to the University of North Dakota the sum of \$1,047.76 to implement such a loan fund, the money to be administered by duly appointed officers of the university in accordance with the plan previously adopted.

Resolution 4.

Whereas, the Woman's Auxiliary to the North Dakota State Medical association by a previous resolution has created a sophomore medical student loan fund at the University of North Dakota and has adopted such a fund as a continuing project, and

Whereas, the continuation of this project is very desirable for increasing the friendly public relations of the medical profession and interest in medical education in this state, and

Whereas, the continuance of this project can be best assured through a standing committee, therefore be it

Resolved, that the president of the Woman's Auxiliary to the North Dakota State Medical association appoint a standing committee on the sophomore medical student loan fund, this committee to advise, control, implement and handle all matters arising in connection with this loan fund in this society and its various component auxiliaries and further be it

Resolved, that this standing committee consist of five members appointed for a term of five years, except that on the initial committee the third, fourth and fifth appointees shall serve for terms of only three, two and one years respectively.

Resolution 5.

Whereas, the Woman's Auxiliary to the North Dakota State Medical association has established a sophomore medical student loan fund, and

Whereas, under the leadership of Mrs. E. T. Keller during her term of office as president of this society a brilliant start was made, and

Whereas, it is desirable that the accomplishments of this society to date be made public, therefore be it

Resolved, that the Woman's Auxiliary to the North Dakota State Medical association appoint Mrs. E. T. Keller to represent this society to meet with officials of the University of North Dakota and formally inaugurate the sophomore medical student loan fund by the presentation of a check.

AGNES MAC VICAR CARDY
MRS. J. D. CARDY

After it was stated that no expenses were to be deducted from the student loan fund, it was decided that the entire amount be sent to the university.

On resolution 3, motion was made by Mrs. Cardy, seconded by Mrs. M. M. Heffron, that the resolution be adopted. All voted "aye".

On resolution 4, motion was made by Mrs. Cardy, seconded by Mrs. W. A. Liebeler, that the resolution be adopted. All voted "aye".

On resolution 5, motion was made by Mrs. Cardy, seconded by Mrs. R. E. Leigh, that the resolution be adopted. Motion carried.

Mrs. Keller then highly praised Mrs. Cardy and Mrs. Corbus for their untiring efforts on the student loan fund project.

Mrs. Keller then gave a highly amusing talk on her trips to San Francisco to the national convention, and the board meeting in Chicago. She particularly found the panel discussions of the various state auxiliary presidents at the board meeting very informative.

She then asked for any other business. Since there was none, Mrs. Lawson asked for an ovation for Mrs. Keller for her very successful year as state president. Mrs. Keller thanked the Bismarck women for the fine convention. She then turned the meeting over to Mrs. Lawson, who congratulated the new officers on their new duties and installed them in their new offices.

Mrs. Keller then turned over the files to Mrs. R. W. Rodgers, who thanked the group for the great honor bestowed on her.

The matter of registration was then discussed, and Mrs. W. A. Liebeler made a motion, seconded by Mrs. Keller, that it be written into the program that all members of the woman's auxiliary be required to register at the convention before they could attend any of the social functions. Motion carried.

There being nothing further to come before the meeting, the meeting adjourned.

Post-Convention Minutes

Meeting was called to order by Mrs. Rodgers. She then asked Mrs. Jansonius to read the minutes of the pre-convention board meeting.

Mrs. Rodgers then appointed the following state committee chairmen:

Historian—Mrs. A. E. Culmer, Grand Forks; organization—Mrs. G. G. Thorgrimson, Grand Forks; *Bulletin*—Mrs. Henry Kermott, Minot; legislation—Mrs. C. A. Arneson, Bismarck; program—Mrs. A. P. Nachtwey, Dickinson; public relations—Mrs. W. E. G. Lancaster, Fargo; press and publicity—Mrs. D. J. Halliday, Kenmare; *Today's Health*—Mrs. C. J. Meredith, Valley City; nominating committee—Mrs. E. T. Keller; finance—Mrs. R. D. Nierling, Jamestown, Mrs. E. T. Keller, Rugby, and Mrs. G. G. Thorgrimson, Grand Forks.

The following were appointed to the "project committee": Mrs. E. T. Keller—one year; Mrs. J. D. Craven—two years; Mrs. Cardy—three years; Mrs. B. C. Corbus, Jr.—four years; and Mrs. C. J. Baumgartner—five years.

So few reported that they had handbooks that it was decided that all district officers should have a copy of the handbook.

Meeting was then adjourned.

1951 MEMBERSHIP ROSTER

WOMAN'S AUXILIARY TO THE NORTH DAKOTA STATE MEDICAL ASSOCIATION

(Membership by Districts)

First	Grand Forks
Bachelor, Mrs. S. C.	Enderlin
Baillie, Mrs. W. F.	719 Broadway, Fargo
Bateman, Mrs. C. V.	529 4th St. No., Wahpeton
Beithon, Mrs. E. J.	429 5th St. No., Wahpeton
Beltz, Mrs. M. E.	207 6th St. No., Wahpeton
Bond, Mrs. J. H.	921 South 9th St., Fargo
Borland, Mrs. V. G.	1514 South 9th St., Fargo
Burton, Mrs. John P.	804 South 8th St., Fargo
Corbus, Mrs. B. C., Jr.	424 14th Ave. So., Fargo
DeCesare, Mrs. F. A.	1401 South 9th St., Fargo
Dillard, Mrs. J. R.	620 South 8th St., Fargo
Elofson, Mrs. C. E.	1334 North 3rd St., Fargo
Fjelde, Mrs. J. H.	1526 South 8th St., Fargo
Fortney, Mrs. A. C.	1122 South 9th St., Fargo
Hall, Mrs. Howard	1250 No. 5th St., Fargo
Hanna, Mrs. J. F.	907 12th Ave. So., Fargo
Heilman, Mrs. C. O.	1338 North 2nd St., Fargo
Hunter, Mrs. C. M.	1335 So. 6th St., Fargo
Huntley, Mrs. H. B.	Kindred
Irvine, Mrs. V. S.	Lidgerwood
Kellogg, Mrs. I. W.	Fairmount
Lancaster, Mrs. W. E. G.	1437 So. 8th St., Fargo
Larson, Mrs. G. A.	1538 South 9th St., Fargo
LeMar, Mrs. John D.	1249 No. 10th St., Fargo
Lewis, Mrs. T. H.	121 North 5th St., Fargo
Long, Mrs. W. H.	1438 So. 8th St., Fargo
Lytle, Mrs. F. T.	1007 No. 13th St., Fargo
Mazur, Mrs. B. A.	1237 North 3rd St., Fargo
Moe, Mrs. A. E.	1112 6th Ave. So., Moorhead, Minn.
Miller, Mrs. H. H.	609 4th St. No., Wahpeton
Ostfield, Mrs. J. H.	1120 5th Ave. So., Fargo
Poindexter, Mrs. M. H.	721 So. 4th St., Moorhead, Minn.
Pray, Mrs. L. G.	1526 So. 7th St., Fargo
Richter, Mrs. E. H.	Hunter
Rodgers, Mrs. R. G.	1217 So. 7th St., Fargo
Sasse, Mrs. Sophia	Lidgerwood
Schneider, Mrs. J. F.	11 No. 11th St., Fargo
Sedlak, Mrs. O. A.	1406 So. 8th St., Fargo
Stafne, Mrs. W. A.	1409 So. 9th St., Fargo
Swanson, Mrs. J. C.	1220 So. 8th St., Fargo
Schleintz, Mrs. F. B.	Hankinson
Weible, Mrs. R. D.	1630 So. 9th St., Fargo
Weible, Mrs. R. E.	714 So. 8th St., Fargo
Wold, Mrs. L. E.	912 So. 13th, Moorhead, Minn.
Thompson, Mrs. A. M.	313 7th St. No., Wahpeton
Wasemiller, Mrs. E. R.	531 1st St. No., Wahpeton
Wright, Mrs. W. K.	1417 So. 8th St., Fargo

Deviils Lake	Kotana
Engesather, Mrs. J. A. D.	Craven, Mrs. J. D.
Fawcett, Mrs. D. W.	Craven, Mrs. J. P.
Fawcett, Mrs. J. C.	Hagan, Mrs. E. J., Jr.
Fawcett, Mrs. R. M.	Hagan, Mrs. E. J., Sr.
Fox, Mrs. W. R.	Johnson, Mrs. A. K.
Graham, Mrs. J. D.	Korwin, Mrs. J. J.
Gerber, Mrs. L. S.	Lund, Mrs. C. M.
Johnson, Mrs. C. G.	Skjei, Mrs. D. E.
Keller, Mrs. E. T.	Wright, Mrs. W. A.
Mahoney, Mrs. J. H.	
Palmer, Mrs. D. W.	
Pine, Mrs. L. F.	
Pollard, Mrs. W. S.	
Sihler, Mrs. W. F.	
Toomey, Mrs. G. W.	
Vigeland, Mrs. G. N.	

Northwest
Ball, Mrs. W. J.
Beck, Mrs. Charles
Bethea, Mrs. R. O., Jr.
Blatherwick, Mrs. R.
Breslich, Mrs. P. J.
Cameron, Mrs. A. L.
Conroy, Mrs. M. P.
Craise, Mrs. O. S.
Devine, Mrs. J. L., Jr.
Dyson, Mrs. R. E.
Erenfeld, Mrs. H. M.
Erenfeld, Mrs. F. R.
Fischer, Mrs. V. J.
Gammell, Mrs. R. T.
Garrison, Mrs. M. M.
Halliday, Mrs. D. J.
Halverson, Mrs. H. L.
Hurly, Mrs. W. C.
Ingalls, Mrs. C. L.
Johnson, Mrs. H. P.
Kermott, Mrs. Henty
Lampert, Mrs. M. T.
McCannel, Mrs. A. D.

Naegeli, Mrs. F. D. 920 3rd Ave. N.W., Minot
 Oltman, Mrs. D. L. 303 Thompson Apts., Minot
 O'Neill, Mrs. R. T. 529 3rd St. S.E., Minot
 Pence, Mrs. J. R. No. 4 Emerson Apts., Minot
 Ransom, Mrs. E. M. 715 1st Ave. N.W., Minot
 Seiffert, Mrs. G. S. P.O. Box 389, Minot
 Spomer, Mrs. J. P. 115 7th St. S.E., Minot
 Sorenson, Mrs. A. R. 114 6th St. S.E., Minot
 Sorenson, Mrs. Roger 1000 4th Ave. N.W., Minot
 Uthus, Mrs. O. S. 301 Thomas Apt., Minot
 Wallbank, Mrs. W. L. Dunseith
 Woodhull, Mrs. R. B. 203 Thompson Apt., Minot

Sheyenne Valley

Cook, Mrs. P. T. Valley City
 Christianson, Mrs. Gunder Valley City
 Gilsdorf, Mrs. W. H. Valley City
 Merrett, Mrs. J. P. Valley City
 Meredith, Mrs. C. J. Valley City
 Macdonald, Mrs. A. C. Valley City
 Macdonald, Mrs. A. W. Valley City
 Wicks, Mrs. F. L. Valley City
 Brown, Mrs. Nida Valley City
 Crosby, Mrs. Kate Valley City

Sixth

Arneson, Mrs. C. A. 714 2nd St., Bismarck
 Baumgartner, Mrs. C. J. 615 Washington, Bismarck
 Bahamonde, Mrs. J. B. Elgin
 Berg, Mrs. H. M. 214 Avenue A, Bismarck
 Brandes, Mrs. Marion E. 601 5th Ave., Bismarck
 Boerth, Mrs. E. H. 610 Avenue B., Bismarck
 Breslin, Mrs. R. H. 107 1st Ave. N.W., Mandan
 Buckingham, Mrs. T. W. 1030 5th Ave., Bismarck
 Cartwright, Mrs. John 926 7th St., Bismarck
 Cochran, Mrs. R. B. 520 Avenue C. West, Bismarck
 Dahlen, Mrs. G. A. 202 Avenue A., Bismarck
 DeMouilly, Mrs. O. M. Flasher
 Diven, Mrs. W. L. 119 Avenue B West, Bismarck
 Fredricks, Mrs. L. H. 112 Avenue B West, Bismarck
 Freise, Mrs. P. W. 831 Mandan, Bismarck
 Gaebe, Mrs. O. C. New Salem
 Goughnour, Mrs. Myron 614 6th, Bismarck
 Heffron, Mrs. M. M. 422 8th, Bismarck
 Hetzler, Mrs. A. E. 602 6th Ave. N.W., Mandan
 Icenogle, Mrs. G. D. 232 Ave. C West, Bismarck
 Jacobson, Mrs. M. S. Elgin
 LaRose, Mrs. V. J. 522 Sixth St., Bismarck
 Larson, Mrs. L. W. 219 Ave. B West, Bismarck
 Nuessle, Mrs. R. F. 106 Ave. D., Bismarck
 Peters, Mrs. Clifford 220 Ave. A West, Bismarck
 Pierce, Mrs. W. B. 615 Raymond, Bismarck
 Ramstad, Mrs. N. O. 824 4th St., Bismarck
 Roan, Mrs. M. W. 222 Park St., Bismarck
 Salomone, Mrs. E. Elgin
 Saxvik, Mrs. R. O. 622 8th St., Bismarck
 Schoregge, Mrs. C. W. 507 6th St., Bismarck
 Thompson, Mrs. Arnold 1124 4th St., Bismarck
 Tudor, Mrs. R. B. Highland Acres, Bismarck
 Waldschmidt, Mrs. R. H. 600 Washington, Bismarck
 Wheeler, Mrs. H. A. 100 4th St. N.E., Mandan
 Williams, Mrs. John R. 409 Washington, Bismarck

Southwestern

Bowen, Mrs. J. W. 221 7th Ave. W., Dickinson
 Dukart, Mrs. C. R. 208 4th Ave. No., Dickinson
 Dukart, Mrs. Ralph 46 W. 5th St., Dickinson
 Guloien, Mrs. H. E. 41 5th Ave. W., Dickinson
 Gumper, Mrs. A. J. 7 E. 4th, Dickinson
 Hill, Mrs. S. W. Regent
 Larson, Mrs. Harlan 35 1/2 10th Ave. W., Dickinson
 Nachtwey, Mrs. A. P. 115 5th Ave. W., Dickinson
 Reichert, Mrs. H. L. 543 1st Ave. W., Dickinson
 Rodgers, Mrs. R. W. 146 W. 6th St., Dickinson
 Smith, Mrs. O. M. Killdeer
 Spanjers, Mrs. A. J., Jr. 119 7th Ave. W., Dickinson
 Spear, Mrs. A. E. 610 1st Ave. W., Dickinson

Stutsman

Arzt, Mrs. P. G. 502 4th Ave. S.E., Jamestown
 Beall, Mrs. J. A. 501 2nd Ave. N.E., Jamestown
 Carpenter, Mrs. G. S. State Hospital, Jamestown
 Cuthbert, Mrs. W. H. State Hospital, Jamestown
 DePuy, Mrs. T. L. 301 2nd Ave. S.E., Jamestown
 Elsworth, Mrs. J. N. 605 5th Ave. N.E., Jamestown
 Fergusson, Mrs. F. W. (Kulm) Lodi, Calif.
 Fergusson, Mrs. V. D. Edgeley
 Jansonius, Mrs. John 405 4th Ave. S.E., Jamestown
 Larson, Mrs. E. J. 321 2nd Ave. S.E., Jamestown
 Lucy, Mrs. R. E. 523 3rd Ave. S.E., Jamestown
 McFadden, Mrs. R. L. 910 3rd Ave. N.W., Jamestown
 Maloney, Mrs. B. W. LaMoure
 Miles, Mrs. J. V. 420 4th Ave. N.E., Jamestown
 Nierling, Mrs. R. D. 415 9th Ave. S.E., Jamestown
 Pederson, Mrs. Thomas 316 4th Ave. N.E., Jamestown
 Robertson, Mrs. C. W. 106 6th St. N.W., Jamestown
 Sorkness, Mrs. Joseph 318 3rd Ave. S.E., Jamestown
 Van Houten, Mrs. R. W. Oakes
 Wood, Mrs. W. W. 509 2nd Ave. N.E., Jamestown
 Woodward, Mrs. F. O. 722 3rd St. N.E., Jamestown
 Woodward, Mrs. R. S. 114 1/2 N.E. 3rd, Jamestown

Trail-Steele

Andrews, Bernice (M.D.) Sharon
 Cable, Mrs. T. M. Hillsboro
 Cleary, Mrs. H. G. Northwood
 Dekker, Mrs. O. D. Finley
 Kjelland, Mrs. A. A. Hatton
 Knutson, Mrs. O. A. Buxton
 LaFleur, Mrs. H. A. Mayville
 Little, Mrs. R. C. Mayville
 Vinje, Mrs. Syver Hillsboro
 Wheeler, Mrs. G. S. Portland

Tri-County

Boyum, Mrs. P. A. Harvey
 Gilliland, Mrs. R. F. Carrington
 Owens, Mrs. C. G. New Rockford
 Schwinghamer, Mrs. E. J. New Rockford
 Voglewede, Mrs. Wm. Carrington

Editorial . . .

CASE REPORT ON SOCIALISM

Complaints:

- (1) Excessive and unnecessary taxation
- (2) Intemperate spending
- (3) Lack of individual initiative
- (4) Personal greed and selfishness
- (5) Cancerous political machines
- (6) Inroads of racketeers

Family History:

Father—dead—natural causes
Mother England—succumbed to socialism
Brother Australia—living—has chronic socialism
Sister New Zealand—living—convalescing from socialism

Present Illness:

Our country enjoyed very good health except for an occasional depression until about 1932. During this last depression and World War II, under the pressure of continual "crises" and "emergencies" the people gave up many of their freedoms "temporarily", only to find that freedom so surrendered is not easily regained. More and more controls and regulations have been imposed, these leading to "planning" until now the government is pretty much taking over the running of our lives. This "planning" has not only changed the character of our government, but the character of our people as well. Opportunity goes unrecognized in the wild search of security. Millions seem willing to give up their independence for the promise that the government will take care of them. To gain political advantage these social planners promise to provide for everyone shelter, food, medical care, education, pensions, etc., always under the deception that the cost would be insignificant, and the inference that it would be borne by "others". Jefferson predicted future happiness for Americans if the government could be prevented from wasting the labors of the people under the pretense of taking care of them.

Physical Findings:

General appearance is that of a country in seemingly good health in a world of illness, in spite of the fact that the people have been robbed of more than half of their savings by monetary inflation; in spite of the fact that they are relieved of one-third of their earnings through taxation to support a government that admonishes the people not to spend, yet can see no value in setting a similar example; in spite of the fact that with more money in their pockets people find it increasingly difficult to obtain the necessities of life.

Beneath this outward appearance of false prosperity is a lack of moral principle on the part of some of those entrusted to manage our affairs—the Pendergast Voting Scandal in Kansas City; the report of the Kefauver Crime Committee and its influence on government; and the red herrings in cover-up of Communists in government. This lack of moral fiber does not confine itself

to our representatives in government but extends into our national athletics and to individual citizens who by their toleration of such, condone it.

On closer examination, we find the government assuming the role of master rather than servant. It has entered the fields of business, banking, insurance, electrical power, agriculture, and medicine, investing billions of taxpayers' money in these various fields of endeavor in competition with private enterprise. Coercion is resorted to if necessary. Within the past month, Oscar Ewing, would-be czar of health, withheld all federal aid from the state of Indiana when officials in that state tried to purge their welfare rolls of chiselers by publishing the names of those receiving such aid. Government payrolls swell by leaps and bounds in a pre-election year. Through these hand-outs, grants-in-aid or subsidies, the "social planners" build their political machine and state, municipal, and individual independence is lost to a federal bureaucracy, which responsible citizens fail to do anything about.

Diagnosis:

The history and physical findings indicate that the disease is identical with that which has recently infected other members of this family, particularly England. *The disease is socialism.*

Prognosis:

Medical men must realize that they are first, citizens, and second, doctors, and that they, therefore, as citizens, must assume their share of responsibility in government, and not as at the last election have a voting average of 50 per cent.

As long as we elect to political office men who disregard their oath to support the Constitution of the United States, who resort to welfare platforms for the purpose of political advantage, who advocate taxation and unwarranted spending, thus plunging the nation into further debt and possible economic disaster — the prognosis becomes more serious. In spite of Stalin's prediction that this nation would spend itself into defeat, many in this country would seem to be exerting their utmost to accomplish just that.

In the final analysis the prognosis depends upon the extent of the infection — upon that unknown factor as to whether the disease has made such inroads as to be "irreversible".

Treatment:

The treatment is specific and must be applied by every true American. This country was not built by men who relied on somebody else to take care of them. It was built by men who relied on themselves, who dared to shape their own lives, who had enough courage to blaze new trails — enough confidence in themselves to take the necessary risks.

This self reliance is our American legacy. It is the secret of that something which stamped Americans as

Americans. Some call it individual initiative; others, backbone. But whatever it is called, it is a precious and an indispensable ingredient in our national character.

The time has come for us to re-establish the rights for which we stand—to reassert our inalienable rights to human dignity, self-respect, self reliance — to be again the kind of people who once made America great.

Such a crusade for renewed independence will require a succession of inspired leaders — leaders in spirit and

in knowledge of the problem, not just men with political power who are opposed to communism, or to diluted communism, but men who are militantly for the distinctive way of life that was America. We are likely to find such leaders only among those persons who teach self-reliance and who practice it with the strict devotion of belief and understanding.

W. E. G. LANCASTER, M.D., President,
North Dakota State Medical Association

Notices . . .

American College of Physicians

The North Dakota Regional Meeting of the American College of Physicians will be held in Bismarck on September 8 at St. Alexius hospital. The scientific session includes the following speakers:

Grover D. Icenogle, Bismarck, Electroencephalography in Internal Medicine.

Thomas E. Pederson, Jamestown, Low Salt Syndrome.

Edgar A. Haunz, Grand Forks, Report of Nine Cases of Canicola Fever in One Family.

Francis T. Lytle, Fargo, Newer Autonomic Drugs.

Allan E. Moe, Fargo, Palpebral Edema.

Howard Wakefield, Chicago, Tuberculous Pericarditis with Effusion: Diagnosis and Management.

Robert M. Fawcett, Devils Lake, Bronchography in Chronic Diseases of the Lungs.

Lester E. Wold, Fargo, Amyloidosis.

After the scientific session, an informal dinner will be held at the Bismarck Municipal Country club. The guest speaker will be Dr. Wakefield.

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North Dakota Urological Society

The North Dakota Urological society will hold its second annual meeting on Friday, September 28, 1951, in Fargo. The program will consist of a clinical morning on the urological service of the Veteran's hospital, including ward rounds, movies of urological surgical technique and a clinical conference. Luncheon will be at the Fargo County club.

The afternoon program, to be held at the Gardner hotel, will consist of five papers by the local membership to be concluded by a pyelographic seminar. In the evening there will be cocktails, followed by a banquet, at which Dr. C. D. Creevy, professor of urology at the University of Minnesota, will be the guest speaker.

The society was organized in Grand Forks during the state meeting of 1950, and held its first all scientific meeting in Fargo during October, 1950. President of the group is Dr. Budd Clarke Corbus, M.D., of Fargo.

★

Annual Cerebral Palsy Clinic

The fifth annual North Dakota Cerebral Palsy Clinic will be held on October 15-16 at the North Dakota Medical Center in Grand Forks with Dr. Meyer A. Perlstein, Chicago, present as consultant pediatrician. This event is jointly sponsored by the North Dakota State Medical association, the State Department of Health, the North Dakota Crippled Children's Services, the North Dakota Chapter of the National Society for Crippled Children and Adults, and the North Dakota Medical Center. Physicians of North Dakota are invited to attend the Clinic, if possible, and to refer children whom they would like to have examined in consultation by Dr. Perlstein. Physicians from neighboring states and Canadian provinces are also cordially invited to be present. Cases should be referred for selection as soon as possible to Dr. D. T. Lindsay, Director, Crippled Children's Services, Bismarck, North Dakota.

University of Minnesota Continuation Center Courses

A course in Physical Medicine will be presented on September 27-29, stressing the role of physical medicine in therapy in general practice. The care of fractures and arthritis will be emphasized. Symposia will be held on "The Care of the Hemiplegic Patient" and "Geriatric Problems."

A course in Industrial Medicine will be held on October 6. Dr. Arthur K. Peterson, medical director of the R. R. Donnelly Company of Chicago will be guest faculty member for the course.

ACTH and Cortisone will be discussed in a one-day course on October 17. Dr. Edgar S. Gordon, associate professor of medicine, University of Wisconsin, will be visiting faculty member and will also deliver the annual JOURNAL-LANCET lecture on the evening of October 17.

Chest Diseases will be the subject of a course on October 18-20. The course is sponsored by and given with the financial support of the Minnesota Chapters of the American College of Chest Physician and the American Trudeau Society.

A course in Bacteriology for Medical Technologists will be presented on October 15 and 16. Emphasis will be placed on laboratory methodology, classification and identification of disease producing agents, and on clinical correlation and application.

A course in Roentgenology of Chest Diseases will be given October 29 to November 3. Material will include detailed anatomical and pathological studies of the chest presented by means of lectures and demonstrations. Dr. W. Edward Chamberlain, Temple university, Philadelphia, will be guest faculty member and will also give the annual Leo G. Rigler Lecture in Radiology on the evening of Thursday, November 1.

A Symposium on Rheumatic Fever is to be held on November 29, 30 and December 1, 1951. The symposium is being given with the sponsorship and financial support of the Minnesota Heart Association.

★

Essay Contests

The Trustees of the Caleb Fiske Fund of the Rhode Island Medical society announce the following subject for the prize dissertation of 1951: "The Present Status of Adreno-Cortical Hormone Therapy—Its Uses and Limitations." For the best dissertation a prize of \$200 is offered. Copy must be typewritten, double spaced, and should not exceed 10,000 words. For further information write the Rhode Island Medical society, 106 Francis Street, Providence 3, Rhode Island.

★

Mississippi Valley Medical Society

The 16th annual meeting of the Mississippi Valley Medical Society will be held at the Pere Marquette Hotel, Peoria, Illinois, September 19 to 21, 1951, under the presidency of Dr. Ralph McReynolds, Quincy, Illinois. The program, which is planned for the general practitioner, will be conducted by more than 30 clinical teachers. A program may be obtained from Harold Swanberg, M.D., Secretary, 209-224 W.C.U. Building, Quincy, Illinois.

News Briefs . . .

North Dakota

THE University of North Dakota medical school was recently awarded a grant of \$5,000 by the USPH for instruction of medical students in diagnosis and treatment of cancer. Dr. W. F. Potter is director of the program established by the grant.



E. J. LARSON, M.D.

DR. ERNEST J. LARSON, Jamestown, has been appointed as a member of the board of trustees of the state soldiers' home at Lisbon, for a new five-year term. Dr. Larson is the recently elected treasurer of the North Dakota State Medical Association.

THE first catalog of the University of North Dakota school of medicine will be published soon, according to Dr. Richard M. Marwin, head of the booklet committee. The booklet lists officers and faculty members of the school, curriculum, graduate activities, research facilities, buildings and equipment, requirements for admission and graduation.

DR. JOHN FAWCETT, Devils Lake, has been appointed to the state board of medical examiners.

DR. ROBERT C. LEWIS of the Colorado University medical school, Denver, and Dr. Harold Leuth of the Nebraska University medical school, Omaha, spent July 25 to 27 making a visit preliminary to a survey of the University of North Dakota medical school at Grand Forks.

THE average net income of North Dakota physicians in 1949 before taxes was \$12,262, according to a joint study of the U. S. department of commerce and the American Medical Association. The North Dakota average compares with a national average of \$11,058. It is higher than Montana's, \$11,810, lower than Minnesota's, \$13,175 and South Dakota's \$12,351.

THE following physicians have been named to a committee on hospital and medical care by W. C. Lynch, deputy director of civil defense for North Dakota: Dr. R. O. Saxvik, state health officer, Bismarck, chairman; Dr. Charles Arneson, Bismarck; Dr. John D. LeMar, Fargo; and Dr. T. O. Brandenburg, Bismarck.

TWO HUNDRED AND FOURTEEN PEOPLE registered at the blood typing clinic held at the new McKenzie County Memorial hospital in Watford City July 20. The clinic was under the direction of Dr. P. O. C. Johnson, deputy health officer for the Upper Missouri Health unit.

DR. R. O. SAXVIK was recently appointed by Governor Norman Brunnsdale to another four-year term as state health officer.

DR. NESTOR MARTINEZ BARRERA, a graduate of the University of Mexico, has begun a year of residency in surgery at the Bismarck hospital. He is studying here by special permission of United States and Mexican governments.

New locations and appointments . . .

DR. ANTON ZUKOWSKI, a graduate of the University of Krakow medical school, who recently completed his internship in Fargo and Harvey hospitals, has opened a practice in Steele.

DR. PAUL POTTER, the son of Dr. W. F. Potter of the University of North Dakota medical school, has joined the staff of the Leigh clinic at Grand Forks. A graduate of Northwestern University medical school, Dr. Potter will also teach medical classes at the University.

DR. KEITH G. VANDERGON, a native of Mohall, North Dakota, and a graduate of Loyola University medical school, will practice in Portland.

DR. ARNOLD KALNINS, a graduate of the University of Riga in Latvia, will set up a medical practice in Washburn, following the completion of an internship in a Bismarck hospital.

DR. FRANZ GUTOWSKI, a graduate of the University of Ukraine, will practice in Wishek. Dr. Gutowski has completed a year of internship at St. John's hospital in Fargo.

DR. RALPH D. GUSTIN, a graduate of the College of Medical Evangelists in Los Angeles, will practice in Gackle, where a new health center has been opened.

DR. WILLIAM F. NUESSELE, a 1946 graduate of the University of Minnesota medical school, has become associated with the Dakota clinic at Fargo.

DR. J. A. LUND of Leeds, who recently finished internship at Ancker hospital, St. Paul, will be associated with the Quain-Ramstad Clinic in Bismarck.

Minnesota

THE Northern Minnesota Medical Association, a group of approximately one hundred doctors, met August 24 and 25 at Hotel Coates in Virginia.

MINNESOTA doctors had the highest average net income in 1949 of all doctors in the United States. The average net income in Minnesota was \$13,175, against a national average of \$11,058. Salaried doctors earned an average of \$11,632, which was the highest in the nation for this type of practice.

Minneapolis is the only city in the state for which a statistical analysis was made. Here the average physician

has a net income of \$16,010 and the medical net income for the city is \$12,125.

* * *

MINNESOTA'S QUOTA of 13 doctors has been filled in the first national draft of medical men since World War II, according to Col. Lloyd E. Lilygren, state selective service director. Doctors selected were given the choice of volunteering for commissions or being inducted into the army as privates.

* * *

THE new Twin Valley medical center, built at a cost of more than \$30,000, was opened on July 14. The center will be staffed by Dr. C. J. Stadem and Dr. A. L. Walonick, both of whom had been practicing in Minneapolis.

* * *

DR. F. J. HIRSCHBOECK, Duluth, is now president of the Minnesota Heart Association. Other officers are Dr. Grace M. Roth, Rochester, and Alan W. Giles, Minneapolis, vice president; Dr. Charles N. Hensel, St. Paul, secretary, and Otto B. Klett, St. Paul, treasurer.

* * *

THE 895 citizens of Parker's Prairie gathered on Sunday, July 22, to honor Dr. H. H. Leibold, 67, who has practiced in the town for 42 years. Joining in the picnics and parades are many of the 2,000 babies Dr. Liebold has delivered in the course of his practice.

* * *

NAMED by Governor Luther Youngdahl as members of the Tuberculosis Facilities Commission were Dr. A. J. Chesley, Minnesota Department of Health, Dr. Russell H. Frost, Glen Lake Sanatorium, and Dr. J. Arthur Myers, University of Minnesota, and Dr. Davis Sharp, Anoka State hospital.

* * *

DR. WILLIAM L. BENEDICT, executive secretary-treasurer of the American Academy of Ophthalmology and Otolaryngology, has been given an honorary life fellowship in the American Academy of Optometry. The award will be presented December 10 at the group's annual meeting in New York City. Dr. Benedict retired in March 1950 as head of the section of ophthalmology at the Mayo clinic.

Meet Our Contributors . . .

WILLIAM E. G. LANCASTER was graduated from the University of Toronto medical school in 1922, specializes in internal medicine in Fargo, where he is on the staffs of St. Luke's and St. John's hospitals. He is a member and former president of Cass County medical societies, a fellow of the American College of Physicians, and president for 1951-52 of the North Dakota State Medical Association.

★

KENNETH STEWART LANDAUER is a graduate of Johns Hopkins medical school in 1934, specializes in pediatrics, has been with the National Foundation for Infantile Paralysis. He is a diplomate of the American Academy of Pediatrics, and a member of the American Academy of Allergy, American College of Allergy, American Public Health Association, and A.M.A.

★

J. ARTHUR MYERS, a graduate of the University of Minnesota medical school, serves there as professor of medicine and preventive medicine and public health. He is chief of the tuberculosis service, Minneapolis General hospital; medical director

A SPECIAL PROGRAM was held in Hayfield, Minnesota, on July 9, to honor Dr. Harry R. Baker, who has practiced there for more than 40 years.

* * *

DR. E. J. BALDES, head of the Mayo clinic section of biophysics, was made a chevalier of the French legion of honor in ceremonies at Rochester. Dr. Baldes was honored for "outstanding service to medical science, especially in the field of aeronautics."

* * *

A DINNER in honor of Dr. John D. Camp of the Mayo clinic was given in St. Paul by the Minnesota and North Dakota radiological societies, July 21. Dr. Camp is leaving Minnesota to go into private practice in Los Angeles, California.

Deaths . . .

DR. VERNE G. BURDEN, former fellow in surgery of the Mayo Foundation, died on June 23, 1951, in Philadelphia, Pennsylvania.

★

DR. ALBERT M. LIMBER, who had practiced medicine in Wilmont, Minnesota, died June 26 in South Bend, Indiana. A graduate of the University of Minnesota medical school, Dr. Limberg had also practiced in Fargo and Bowbells, North Dakota.

★

DR. LESTER MACLEAN, a former resident of St. Paul, was drowned July 6 while swimming at Farm Island lake, near Aitkin. Dr. MacLean was a graduate of the University of Minnesota medical school and a combat surgeon during World War II.

★

DR. H. C. DOMS, who had practiced at Slayton, Minnesota, since 1912, died July 17. A graduate of Kansas City Medical college in 1905, he had practiced at Holland before going to Slayton.

★

DR. A. W. ECKSTEIN, Grand Meadow, died July 19 at Mankato after a short illness. He had practiced medicine for about 35 years, first at Comfrey, Minnesota and at Mankato for 18 years before going to Grand Meadow.

★

DR. CARL J. LIND, 79, who had practiced in Minneapolis for 50 years, died July 22 at his home. A graduate of Hamline university, he taught materia medica at Hamline and also served on the staff of General and Swedish hospitals.

of tuberculosis activities, Minnesota Public Health Center; and chief of chest clinic, University of Minnesota.

★

WILLIAM F. NUESSELE was graduated from the University of Minnesota medical school in 1946, took three years of graduate work in internal medicine at Ancker hospital, St. Paul. He practices in Fargo, where he is on the staffs of St. John's and St. Luke's hospitals.

★

BERNARD J. NIEMIRO was graduated from Middlesex University medical school in 1932, took graduate work in proctology, practices now in Holyoke, Massachusetts, where he is on the staff of Holyoke hospital.

★

GEORGE M. HART was graduated from Northwestern University medical school in 1943, studied on a fellowship in orthopedic surgery at the Mayo Clinic, specializes in orthopedic surgery in Minot, where he is a staff member of Trinity hospital. He is a member of district and state medical societies, and the A.M.A.

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CONCEPTS OF BONE GRAFTING

(Continued from page 354)

to dissolve the fat. It is then soaked in alkali to digest the protein following which it is washed and dried and sterilized by boiling.

Os novum is os purum transplanted subperiosteally for a period of two weeks previous to grafting. Mesenchymal tissues from the host were thought to penetrate the open Haversian canals during this period so that osteogenesis would be more rapid when the bone was transplanted to its definitive site.

SUMMARY

A review of the history of bone grafting has been made. The fate of a transplanted bone graft has been discussed and the types of bone grafts used at the present time have been enumerated.

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Wanted: Internist who will do some general practice. Well established group clinic in eastern South Dakota city of 12,000 population. Salary or percentage basis. Partnership in 3-4 years. Write Box 921, The Journal-Lancet.

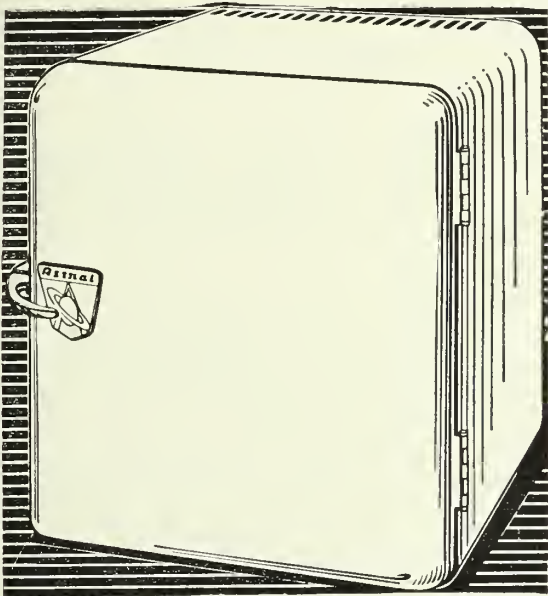
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Several more registered nurses for duty in all divisions of obstetrics. Also a few part-time certified practicals and surgical, medical, and registered nurses. Contact Miss M. Younglove, Director of Nurses, Mount Sinai Hospital, Minneapolis, Minn.

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Head Pain as a Diagnostic Aid

Frequently the presence of head pain is overlooked. The physician learns of it only if he has made an effort to elicit the information. Etiology is the key to rational management. The patient should be warned against taking medication before diagnosis.

Friedman deplors the regrettable tendency to call any chronic recurring headache migraine. Thoroughgoing history-taking and full physical and neurological examination are essential for accurate diagnosis. The following chart gives briefly the primary diagnostic leads and therapy for some common types of headaches.

Etiology of Headache	Primary Diagnostic Data	Primary Therapy
Inflammatory e.g., Meningitis Abscess	Inflammation of intracranial structures; fever; leucocytosis; bacteriologic diag.	Specific: sulfonamides and antibiotics. Symptomatic: analgesics.
Tumor	Pain varies as spinal press. changes; skull X-ray.	Specific: surgery. Symptomatic, analgesics, &/or hypnotics.
Sinusitis	Sinus congestion and infection; cloudy X-ray.	Specific: antibiotics and drainage. Symptomatic: analgesics.
Hypertensive	Hypertension present but pain not related to b. p. level; Dihydroergotamine relieves pain.	General hypertension therapy; sedation. Symptomatic: analgesics.
Migraine & other vascular headaches	Headache: recurrent, intense, throbbing. No organic causation; migraine in family; patient: energetic, perfectionist. Visual prodromata; g-i. upset during headache.	To abort attack: oral ergotamine plus caffeine — Cafergot (dosage given below) General: adjustment to minimize nervous stress.

Data tabulated is from: Wolf, G. Jr.: *Pennsylvania M. J.* 54: 25, 1951. Friedman, A. P., in Conn, H. T.: *Current Therapy*, 1950, Phila., Saunders Co., 1950, p. 563.

Acute Migraine Attack Therapy: Numerous clinical studies have reported effective oral treatment with Cafergot® tablets (ergotamine tartrate 1 mg. plus caffeine 100 mg.). Reeves says Cafergot affords "... predictable response, economy, flexibility, oral administration and absence of notable side effects." Proper dosage procedure is important. Failures in true migraine result from inadequate or delayed dosage.

Dosage; two tabs. at onset of attack and, if necessary 1 tab. every 1/2 hr. till full relief (limit: 6 tabs.).

DOSAGE INSTRUCTION SLIPS for the patient, available on request, write to:

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DELAYED HEALING IN PILONIDAL CYST WOUNDS—(Continued from page 364)

incisions and drainage at different army hospitals. There was little healing noted twelve weeks after the final excision of pilonidal sinus. Complete healing was obtained 16 days after chlorophyll ointment therapy was begun.

Case C was admitted to the hospital with a history of pilonidal disease for one year. After an operation with excision of pilonidal cyst with exteriorization there was no healing for a period of four months. Complete healing occurred after use of the chlorophyll ointment for twelve days.

Case D had a recurrent pilonidal disease for six years. An operation with exteriorization was performed and the wound showed little healing in twelve weeks. Chlorophyll ointment therapy was started and the wound was completely healed in eight days.

Case E was admitted to hospital with a history of two operations for pilonidal disease with continued drainage. Two months after the last operation, the wound was still open and draining. Chlorophyll ointment therapy was instituted and the wound was completely healed in fourteen days.

COMMENT

It is our experience that the use of chlorophyll ointment shortens the healing time on difficult lesions and is effective in the postoperative care of pilonidal cysts.

In addition to providing freedom from obnoxious odors which bother both patient and physician, the chlorophyll ointment facilitates identification of hidden sinus tracts through contrast with the healthy tissue. Prolongation of treatment through neglect of pathological extension is thus more easily avoided.

The chlorophyll preparation used in this study was furnished by the Rystan Company, Mount Vernon, N. Y., under trade name Chloresium.

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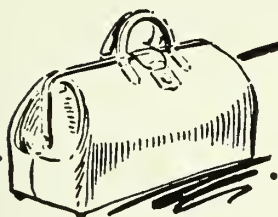
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The October number of THE JOURNAL-LANCET will be a special issue devoted to diseases of the cardiovascular system, with Dr. George N. Aagaard the guest editor.

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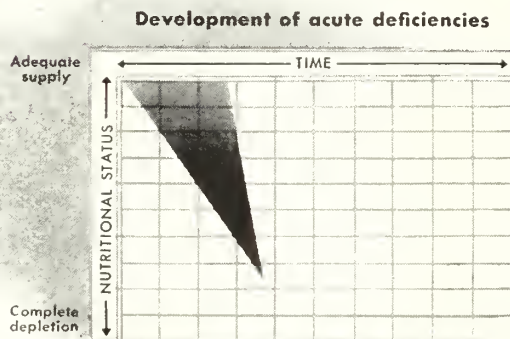
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American College Health Association News . . .

The following openings have been reported to us. Communications should be addressed directly to the individuals and institutions.

California State Polytechnic College, San Luis Obispo, California, is desirous of obtaining the services of a young doctor as health officer. The dean of students, Everett M. Chandler, advises that the college, an agricultural and engineering institution, has a male enrollment of about 3,000. The doctor selected would be in charge of a 20-bed infirmary, responsible for environmental sanitation, act as athletic team physician, perform some minor surgery and occasionally a major operation. At his option, and in concurrence with the school program, he may teach a class in health and hygiene. Housing on the campus can be furnished for the doctor and his family.

Western Illinois State College at Macomb, Illinois, has an opening for a college physician. Mr. F. A. Beu, president, advises the position will pay \$500 to \$550 per month on a twelve-month's basis. There are 1,500 college students and 400 in the campus laboratory school; the faculty totals 120 members. The campus consists of 290 acres, including the college farm, a nine-hole golf course, and fourteen well-equipped buildings. The medical office is staffed with two full-time nurses. The duties of the physician will include annual physical examinations of students, treatment of minor illnesses and injuries, and acting as medical examiner for the retirement system. Mr. Beu writes: "We have an excellent retirement system to which all employees are required to belong. To be eligible for participation the individual must pass a physical examination equivalent to a standard insurance examination. As retirement is required at the age of 68 and an individual must be employed 25 years in order to receive full retirement benefits, we prefer candidates who are not more than 42 years of age. Either a man or a woman is acceptable for the position."

Dr. B. W. Lafene, Director of Student Health Service at Kansas State College of Agriculture and Applied Science, Manhattan, Kansas, reports an opening for a young physician in his department. The salary would be \$530 per month for a doctor who has just completed his internship, slightly higher for one with some experience. A staff of four physicians take care of 5,000 students. Being under the state civil service there are the usual advantages and disadvantages, such as limited working hours—8 a.m. to 11:50 a.m. and 1 p. m. to 5 p.m. daily except Saturdays when the clinic closes at 11:50 a.m. There are no home calls to make. Vacation time accrues at the rate of one day per calendar month so that at the end of a year one has two weeks with pay additionally. Sick leave is accrued at the same rate. The clinic and 57-bed hospital are under one roof, and it is a very pleasant and congenial place to work. All equipment and diagnostic facilities are provided.

Dr. Elmer Werner, presently associated with the Department of Hygiene, Students' Health Service, University of Cincinnati, Cincinnati, Ohio, is seeking a position in student health service work. He has been associated with Dr. L. B. Chenoweth on a part-time basis, spending the remainder in private practice in Cincinnati. Dr. Werner would be particularly interested in an opening in one of the warmer sections of the country.

Dr. George H. Agate, Secretary-Treasurer of the Illinois Section of the Association, reports the death of Dr. Harry C. Gebhart on July 15, 1951. Dr. Gebhart was a member of the medical staff of the Health Service of the University of Illinois from September 1926 until his death. He took his medical training at the University of Michigan and Rush Medical College, receiving the degree of doctor of medicine from the latter in December 1916. Dr. Gebhart and his wife, who is also a physician, served four years as medical missionaries in Fo-Chow, China, prior to coming to the University of Illinois campus.

Word has been received of the appointment of Dr. Max Durfee as the director of College Health Services at Oberlin, Oberlin, Ohio.

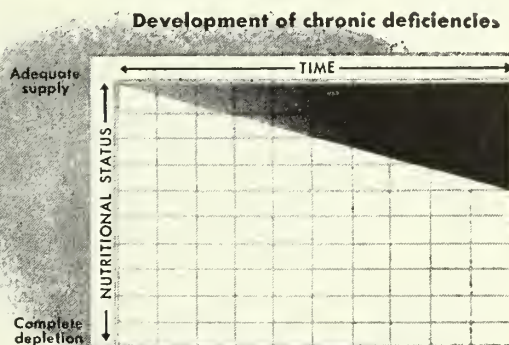
The following acceptances to committee chairmanships for the coming year are reported: Dr. A. O. De Weese for the Health Education Committee, Dr. John D. Schonwald for the Eye Health Committee, and Dr. S. I. Fuenning for the Local Sections Committee.

The Report of the Environmental Health Committee, made at the Annual Meeting last May, was recently sent to the membership. The chairman, Walter S. Mangold, reports an encouraging response from many institutions who have found the survey form an excellent aid in evaluating the sanitary practices and conditions on their campuses. In order that the committee may have a complete picture of environmental health problems, it is essential that a wide representation of institutions be included in the study. Members, who have not already done so, are urged to complete the evaluation forms and return them to Mr. Mangold, School of Public Health, University of California, Berkeley 4, California.

The Council at its May meeting voted to resume its previous policy of refunding two dollars from the national dues to the treasurer of any section for each constituent member in the section who is a member both of the local section and the American College Health Association. The refund is to be made only upon application by the section and upon presentation of evidence that the local section is active for that year. This policy becomes effective the current academic year, and refunds will be made to those local sections who make their applications and present evidence of activity in the academic year. Applications and evidence, consisting of a program of a meeting to be held or a report on a meeting which has been held, should be submitted to the Secretary-Treasurer of the Association, Dr. Edith M. Lindsay, School of Public Health, University of California, Berkeley 4, California.

chronic vitamin deficiencies

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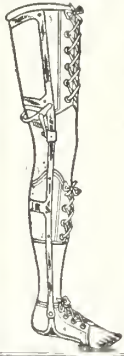
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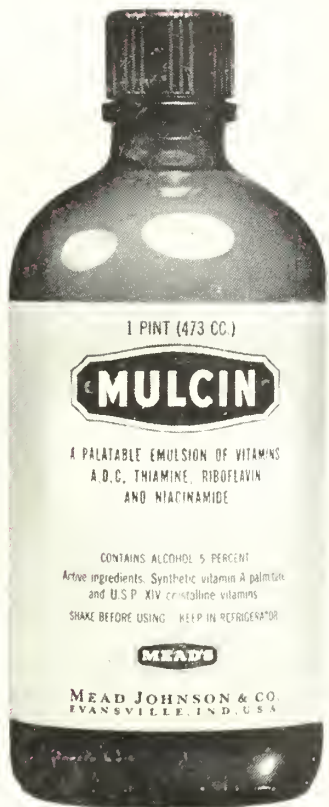
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A blue-tinted illustration of two hands, one from the left and one from the right, firmly grasping a horizontal metal bar. The hands are shown from the wrist up, with fingers wrapped around the bar. The background is a light, pale blue gradient.

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Foreword

HEART DISEASE presents a challenge to the entire medical profession. The general physician does not need to be reminded of this, for the damage wrought by the various forms of cardiovascular disease confront him daily in the hospital, the office, and the sick bed at home. Medical specialists are likewise constantly made aware of the prevalence of these diseases. Neuro-surgeon, pediatrician, ophthalmologist, physiatrist, these and all the other clinical specialists must reckon with disorders of the cardiovascular system as they work in their respective fields of interest.



GEORGE N. AAGAARD, M.D.

Through its pages THE JOURNAL-LANCET brings frequently to the medical profession articles concerned with cardiology or peripheral vascular disease. The editors of THE JOURNAL-LANCET, however, feel that here we have a special challenge. Here is a land of shadows and obscurity which must be illumined by the light of medical research. Here is a battle ground for physicians whose weapons of knowledge and understanding are maintained in polished readiness by a lifelong program of education.

In recent years the tempo of the attack of the problems of cardiovascular disease has been stepped up. We are engaged in a "hot" war and a sense of urgency may at times overwhelm us as we realize the personal stake which each of us has in this struggle. The news from the front is not discouraging. Skirmishes are won. Local advances are made. However, the final victory is not yet ours.

The gains that have been made are not easily measured, but they are still manifested in definite though varying ways. Until recently the precise diagnosis of congenital cardiac defects was a matter of academic interest. The cyanotic child with the tetralogy of Fallot, the patient with a patent ductus arteriosus, and the hypertensive individual with coarctation of the aorta were given supportive therapy and the inevitable end perhaps postponed somewhat. Today, through the efforts of cardiovascular surgery, the congenital defects mentioned above can often be cured or altered with significant benefit to the patient.

As our need for more precise diagnosis has increased, so has our armamentarium. New methods have been introduced which heighten the accuracy of diagnosis especially in those fields in which the surgeon has been successful. The cardiac catheter is no longer a purely research tool but a laboratory aid, gaining ever wider application in diagnostic service. The electrokymograph and the ballistocardiograph are similarly in transition from the research laboratory to increased application in the hospital and clinic.

We can, therefore, find some comfort in the progress which medical science has made in recent years. Complacency, however, we cannot afford. A great challenge still confronts us. It is with the profound conviction that the challenge of cardiovascular disease can be met by the medical profession through service, research, and education that the editors dedicate this issue of THE JOURNAL-LANCET.

GEORGE N. AAGAARD, M.D., *Guest Editor*
Director, Department of Continuation Medical Education
University of Minnesota

The Surgical Treatment of Constrictive Pericarditis*

Clinical and Experimental Observations

EMILE HOLMAN, M.D.

San Francisco, California

I appreciate greatly the privilege of doing honor tonight to the memory of E. Starr Judd, whom I knew personally, and whom I have seen perform difficult operations so easily, so expeditiously and withal so unassumingly, that one hardly sensed his supreme craftsmanship and his remarkable skill.

For the benefit of the younger generation who may not have known this master surgeon of America I should like to review briefly his accomplishments. He was born in Rochester, Minnesota, of humble parentage, lived there throughout his life to become the chief of the greatest surgical clinic of its kind, to which surgeons from all over the world journeyed to see him operate. He served at various times as president of the Minnesota State Medical Society, as president of the American Medical Association, the highest honor in American medicine, as president of the Western Surgical Association, and as president of the Society of Clinical Surgery, one of the high honors in American surgery.

His many friends speak feelingly and not without awe of his prodigious energy, of his miraculously accurate clinical sense, and of his uncanny ability to strip the chaff from the wheat in a medical history, and hit upon the source of the patient's trouble.

He harnessed himself to a day's work that would have broken most of us. He spent each morning from 7 to 1 in the operating room and each afternoon from 2 to 6 in the clinic. As a result of the rich clinical experience thus gained he was much sought after as a lecturer and postgraduate teacher. This same wealth of clinical experience led to the publication of over 300 articles covering the gamut of general and special surgery. From the date of his first article in 1907 on "The Superficial Lesions Caused by the Diplococcus Pneumoniae" to his last article published after his death on "Surgical Lesions of the Stomach and Duodenum" he averaged ten to twelve articles each year. As evidence of the great diversity of his interests I should like to list the subjects presented in publications during the single year 1921: vesico vaginal fistule, exophthalmic goitre, fibromyomata of the mesentery, cancer of the bladder, ureteral stones, pancreatic cysts, pathological conditions of the duodenum, thyroid adenoma with hyperthyroidism, esophageal diverticula, laryngeal junction following thyroidectomy, pathological conditions of the thyroid, problems in surgery of the gallbladder and bile ducts, relation of liver and pancreas to infections of the gallbladder, and jejunal ulcer.

In one year he published 14 articles on major surgical problems and during this same year let us not forget he performed at least 1500 major surgical operations and interviewed at least 4000 patients! Moreover, as one admiring biographer recalls, "No other surgeon ever carried so much surgical responsibility with as little outward ruffling as Starr Judd." He was a man of great talents which he used efficiently and unsparingly. His fame as America's greatest surgical technician will long go unchallenged, and through his writings he established for himself a permanent place in American surgery.

I HAVE CHOSEN for my topic of discussion a lesion known to Galen, more accurately described in 1669 by Lower, recognized and recorded under such well known names in medical history as Lancini, Morgagni and Laennec, but not successfully treated until 1913, when the German surgeon Rehn, acting upon DeLorme's suggestion made as early as 1896, resected the thickened pericardium with great improvement in the patient's condition. My purpose in presenting this fascinating though perhaps somewhat infrequently seen disease is fourfold.

First, since this entity so frequently goes unrecognized for long periods I should like to enlist the interest of all internists, general practitioners, and family doctors

*Presented as the 18th E. Starr Judd lecture at the University of Minnesota Medical School on February 15, 1951.

From the Stanford University School of Medicine.

in keeping a weather eye beamed to the possibility of this disorder when a comparatively young patient presents all the evidence of circulatory failure but no obvious cardiac lesion to account for it. It is said that a number of cases of constrictive pericarditis amenable to correction by operation are now improperly labeled valvular or rheumatic heart disease, tuberculous peritonitis, cirrhosis of the liver, or ascites of unknown origin. Levine states, "It is amongst patients who are regarded as having heart failure, but in whom the ordinary causes are lacking, i. e., hypertension, coronary sclerosis, valvular disease, hyperthyroidism, or who are thought to have cirrhosis of the liver, in whom constrictive pericarditis will be found." As an example of long deferred recognition of this disorder, the following case may be cited:

Case 1. J. C., a 24-year-old white male, entered Fort Miley hospital on February 24, 1947. At the age of three he had had a fever and was confined to bed for some time with swollen

joints, and a tentative diagnosis of rheumatic fever was made. After finishing high school, while a laborer in a shipyard varicose veins appeared in both legs. A left saphenous vein ligation was performed in 1941 with very little relief.

In April 1943 the patient was inducted into the army. In August 1943 he was hospitalized for two weeks for varicose veins and dermatitis of the legs, and was discharged from the army in September 1943 for these diseases.

In November 1943 the patient was admitted to Fort Miley hospital complaining of shortness of breath and pain in the left chest which was made worse on coughing and when lying flat on his back, or on the left side. He had tired easily and had been short of breath on exertion for a few months. There had been night sweats, a slight cough and on one occasion his sputum had been blood streaked. He had noted swelling around his eyes and swelling of his ankles. Physical examination at that time showed a heart at the upper limit of normal in size. No thrills or murmurs were noted. Blood pressure was 105/75. The liver and spleen were not palpable. The abdomen was not distended and there were no signs of fluid. There were bilateral varicoceles and bilateral varicosities, both more marked on the left.

Laboratory studies disclosed a red blood count of 4.6 million, hemoglobin of 13.7 gm., a normal white blood count, normal urine, a sedimentation rate of 13, sputum negative for tubercle bacilli, plasma protein of 5.35 gm. with a normal AG ratio; a negative tuberculin skin test and a negative Kahn test. A roentgenogram of the chest showed bilateral hydrothorax and moderate enlargement of the heart. On bed rest most of the fluid in the chest disappeared. The decholin circulation time was 28 seconds which became shortened to 13 seconds after digitalization. Electrocardiogram showed normal axis deviation; PR interval .16 to .20 seconds; P wave scalloped in Lead II; T waves isoelectric in Lead I, negative in II and III. A pleural effusion was suggested as the cause of flattened T waves, and the broad P waves in II and III were interpreted as evidence of *rheumatic heart disease with mitral involvement*.

In December 1945 he appeared for re-examination. His pulse rate was 85, blood pressure 100/80. Pulsations were visible in the neck while the patient was sitting. When lying down the neck veins became greatly distended and the face moderately cyanotic. No ankle edema was found, but the legs appeared to be swollen which was ascribed to varicose veins. The liver was enlarged two to three fingerbreadths below the costal margin. A chest film showed "the heart of borderline size with a straight left border and without a waist line suggesting mitral lesion configuration." An electrocardiogram showed the following changes from the previous record: the PR interval was .20 to .21 seconds; the P waves had become broader and notched; an S wave had become apparent in Lead I. T waves had become inverted in Lead I and II and markedly inverted in Lead IV. His trouble was still attributed to rheumatic heart disease.

The patient was again admitted February 24, 1947 because of chills, fever, chest pain, dyspnea, cyanosis, a cough productive of bloody sputum, nose bleeds and vomiting of coffee ground material, of two days duration. During the previous year he had noticed increasing fatigue, dyspnea on exertion, ankle edema, puffiness of the face, frequent nose bleeds, and increasing abdominal distention. Examination revealed shortness of breath, cyanosis, a generalized venous distention, crepitant and moist rales at both bases, and the heart was enlarged. A paradoxical pulse and a short systolic murmur were noted. A pleuropericardial friction rub was heard over the left border of the heart. The blood pressure was 120/60; pulse rate was 140. The abdomen was markedly distended and tympanitic, with shifting dullness in both flanks. The liver was three fingerbreadths below the right costal margin and very tender. There were marked bilateral varicoceles, pitting edema over the sacrum, marked varicosities of both legs with discoloration and moderate pitting edema, and a mild bilateral gynecomastia attributed to liver dysfunction.

The red cells numbered 3.1 million, hemoglobin 9.5 gm., white cells numbered 7,200. The urine showed a faint trace of albumin. Sedimentation rate was 18 mm. The usual roentgenogram of the chest disclosed an increase in the size of the

hila together with infiltration extending out from both hila with a small amount of fluid in the left base. The electrocardiogram was not changed from that taken a year before.

Further special roentgenograms disclosed a calcification of the pericardium. Kymographic studies revealed that the amplitude of cardiac pulsation was clearly diminished in the areas of calcification. An electrocardiogram on April 9, 1947 with the patient lying alternately on the right and left sides showed that the heart was not fixed.

Venous pressure on February 28, 1947, in the right arm, was 25 cm. water; on May 2, 30 cm. water; on July 4, right arm, 19.6 cm. water, right leg, 23.6 cm. water. Circulation time on April 8 was 35 seconds (saccharin). On July 3, an abdominal paracentesis yielded 8,000 cc. of amber colored transudate. On July 6, temperature was 98.8°, pulse rate 88, respirations 20. On a diagnosis of pericarditis, operation was performed on July 7, and an extensive pericardiectomy was performed, the pericardium along the inferior border and around the inferior vena cava showing the greatest thickening.

On July 12, venous pressures were 16 cm. of water, right arm, and 18 cm. water, right leg. On October 27, venous pressure was 12 cm. water, and the circulation time 13 seconds (decholin). On November 6, fluoroscopy revealed a strongly beating heart. On November 14, bilateral high-low ligation of the greater saphenous vein was performed, and he was discharged as fit for work on November 29, 1947.

The diagnosis in this instance was not suspected until calcification of the pericardium was revealed by roentgenogram. It is safe to assume that constriction of the heart by the pericardium had been present for many years — certainly as far back as 1943, and probably longer.

Summarizing, it may be said that any young patient who presents symptoms of circulatory failure, who has ascites or pleural effusion or peripheral edema, whose heart sounds are quiet or muffled and unaccompanied by a murmur, whose cardiac borders move little under fluoroscopy, whose arterial pressure is low and pulse pressure small, whose venous pressure is above 15 cm. of water in the arm and possibly 5 cm. to 10 cm. higher in the leg, should be strongly suspected of having constrictive pericarditis, and should be surveyed again with this diagnosis in mind. Particularly suspect should be the patient who has Beck's triad of a "small quiet heart, ascites, and increased venous pressure," associated with the corroborative evidence of an electrocardiogram exhibiting low voltage in the QRS complex and inversion of the T waves. When a febrile illness accompanied by pericardial effusion and a large cardiac shadow is followed by reduction in size of the cardiac area, but also by signs of increasing cardiac failure such as ascites, pleural effusion, and increased venous pressure, one should strongly suspect the development of constriction of the heart by a contracting pericardium.

The second object of my presentation tonight is to urge that when a diagnosis of pericarditis is made, and evidence indicates that it is tuberculous in origin, operation should not be unduly delayed, but should be performed at an early date if cardiac compression can be demonstrated, regardless of whether it is due to a pericardial effusion or to a contracting pericardium.

From its very inception, tuberculous pericarditis poses the twofold problem of controlling infection and of correcting the mechanical interference with the flow of blood imposed by compression of the heart or of its great

vessels. The gravity of the disease is illustrated by the study of Harvey and Whitehill⁵: "Of 20 proven cases with effusion 16 died and of 17 proven cases without an effusion 15 died, a mortality of 83 per cent." Blalock and Levy⁶ in a study of 22 proven cases in 1937 reported that "every patient, with one exception, with a proved diagnosis of tuberculous pericarditis who has not had a pericardiectomy, is dead . . . Of the six patients operated upon for removal of constricting pericardium, three were cured or markedly improved, and three are dead. Of the latter, one died six months after operation of miliary tuberculosis, the second died two months following operation, also of miliary tuberculosis, and the third died a few minutes after completion of the operation."

Churchill says: "Active tuberculosis of the pericardium may produce the entire syndrome of chronic constrictive pericarditis. The point at issue is whether operation can be effective if performed during the active stage of infection. The reports in the literature of operations performed during this period are uniformly discouraging and confirm our personal experience." Beck has stated that "As long as the tuberculosis shows activity, one cannot expect to relieve the cardiac compression."

Clinically, tuberculous pericarditis is characterized by a prolonged course exhibiting in the acute stage chills, sweats, fever, rapid pulse, dyspnea, increased sedimentation rate, leucocytosis, anemia, pericardial friction rub, and pericardial effusion sufficient at times to produce cardiac compression as shown by increased venous pressure, by absent ventricular pulsations at fluoroscopy, and by a reduced voltage in the QRS complex and inverted T waves in the electrocardiogram. Such effusion may persist, or may subside, as shown by reduction in the size of the cardiac shadow. Such subsidence of signs of effusion may be followed promptly by the signs and symptoms of cardiac compression due to contracture of the inflamed, thickened and fibrous pericardium. The venous pressure may again become greatly elevated, persistent pleural effusions may require repeated aspirations, ascites may develop, and complete and chronic invalidism may follow. It is suggested that this insidiously and relentlessly progressive character of tuberculous pericarditis demands early consideration of operation and that if a diagnosis of *cardiac compression* can be made clinically either in the stage of pericardial effusion or in the stage of pericardial contracture, there is great need of prompt cardiac decompression. In a very ill patient with tuberculous pericardial effusion such decompression might best be effected by removal of the left sixth costal cartilage for evacuation and drainage of the pericardium, followed at a second stage 10 to 20 days later by median sternotomy and extensive pericardiectomy. Despite improvement after the first operation the second operation must not be omitted.

Five cases of proven tuberculosis of the pericardium, all active at time of operation as indicated by positive cultures of tubercle bacilli in four and by the demonstration of tubercle bacilli in the tissues of the fifth, were treated by radical pericardiectomy with resulting cure in three and marked and still progressive improvement in

the other two. All operative areas healed per primam, despite the presence in the pericardium of active tubercle bacilli.

The following experience illustrates the application of this suggested *modus operandi* to tuberculous pericarditis:

Case 2. R.W.B., aged 20, a college student, entered the hospital on July 10, 1950, complaining of fever, headache, and joint pains.

As a young man in high school he had suffered many bad colds. In February 1950 he had first noted the feeling of a tight band around his chest. He had been well, however, until July 8 when he first felt feverish and flushed, with a severe frontal headache. Temperature when admitted to the hospital on July 10 was 102° F., pulse rate 90, respirations 20, blood pressure 110/68, white blood cells 8,000, red cells 4.2 million, Hb. 12.8 gm., sedimentation rate 11 min., roentgenogram showed a transverse cardiac diameter of 162 mm. (normal estimated diameter 129 mm.). Heart and lungs were clear.

There followed a severe febrile course of daily fever of 103°, profuse sweating, chills, headache and abdominal pain. Chloromycetin, aureomycin, and penicillin were administered without effect. By the sixth day, sedimentation rate had risen to 25 mm., the transverse cardiac diameter had increased to 185 mm. and T₁ and T₂ had become inverted in the electrocardiogram. A severe pericarditis of undetermined origin was diagnosed. Terramycin was administered without effect. Previous signs and symptoms all increased, precordial pain became severe, anemia developed, and the left cardiac border reached the left chest wall. Postulating a rheumatic origin, ACTH, 20 mg. every six hours, was administered for 20 days with an extraordinary initial improvement, but followed by recurrence of fever and drenching sweats. A pericardial tap recovered 9 cc. of blood-tinged fluid. A Middlebrook-Dubos test using tuberculin-sensitized red blood cells showed agglutination through dilution 1:6 using patient's blood, and 1:32 using pericardial fluid. Tuberculosis was suspected and ACTH was discontinued. On the 38th hospital day, dihydrostreptomycin, 2 gm. daily, and PAS, 12 gm. daily, were begun. On the 46th day, venous pressure was 228 mm., a pericardial tap yielded 19 cc. bloody fluid which was replaced with air permitting the demonstration by roentgenogram of a marked thickening of the pericardium.

By September, the patient's condition had become stabilized. There was a daily fever of 101°; venous pressure 240 mm. water, blood pressure 90/65 with small rapid pulse; drenching sweats; severe episodes of nonproductive cough; a large cardiac shadow; low voltage in the electrocardiogram with inversion of T₁ and T₂, and TV_{2,3,4}, and 6.

On October 5, the patient was taken to the operating room, and under local anesthesia the 6th and 7th costal cartilages were removed with intent to establish drainage of a presumed tuberculous pericardial effusion. However, no fluid was obtained, identification of the wall of the heart was not possible, and accordingly, projected drainage of the pericardium was abandoned in favor of a pericardiectomy through the usual median sternotomy to the first intercostal space and transverse sternotomy at this level. There was considerable inflammatory reaction in the mediastinal tissues, the pericardium was hemorrhagic, inflamed and 1 cm. thick. Dark bloody fluid was loculated over the left heart anteriorly and posteriorly, and over part of the right ventricle. About 700 cc. were removed, which later yielded tubercle bacilli on culture.

Superiorly over the base of the heart and over the right auricle and ventricle the pericardium was densely adherent to the surface of the heart, but over the left ventricle, beyond the left border and beyond the inferior border of the heart, the pericardium was easily excised. The inferior and superior vena cavae were freed by excision of the pericardium over them. The pericardium was freed from the right ventricle and auricle and excised beyond the right border.

Over the surface of the heart was a 2 mm. thick layer of fibrous granulation tissue. This was removed directly over the auriculo-ventricular groove, thus liberating the heart completely along a 1½x8 cm. pathway. Its intimate adherence to the heart prevented excision elsewhere. The mediastinum was drained through a mushroom catheter entering the right chest. Primary healing of all the wounds occurred.

The excised pericardium showed numerous tubercles with some localized caseation. Postoperatively the right chest required four aspirations yielding 1950 cc. of blood-tinged fluid. The left chest was tapped once yielding 1100 cc. of fluid. He was discharged to his local hospital on October 23 and from there to his home on November 27.

A roentgenogram on January 6 showed no evidence of pleural effusion. Streptomycin was discontinued on January 12. The patient is making a satisfactory recovery but will be continued on restricted activity and anti-tuberculous regimen for about a year. There can be little doubt that his recovery could not have been effected without pericardiectomy, and that its performance three months after onset of his illness in the presence of a pericardial effusion greatly shortened his illness and hastened his recovery.

The third object of my talk this evening is to emphasize the necessity of a wide excision of the pericardium in order that one may be certain in each case that all critical areas have been liberated. There is abundant evidence that the calcification and thickening of the pericardium vary greatly in their localization over the heart. We have seen the pericardium over the left ventricle only 1 mm. thick with excellent kymographic evidence of left ventricular excursion, but great thickening and calcium deposits over the right ventricle and very marked constriction of the inferior vena cava. In another instance, a ring of calcium compressed the left ventricle. In a third patient the superior vena cava was severely constricted producing a bloated, edematous appearance to the face and upper extremities. A number of cases are recorded in which a limited pericardiectomy failed to reduce venous pressure, necessitating secondary operations. The only reliable procedure, therefore, is to liberate the heart widely by removal of the thickened pericardium beyond the left border, beyond the right border, beyond the inferior border and overlying the superior and inferior vena cavæ. Delayed recovery and operative failures to reduce venous pressure due to inadequate decortication will thus be avoided.

It should be noted that in most of our cases, the pericardium over the left ventricle has not been as greatly thickened nor as "oppressive" as the pericardium over the right heart and the two caval vessels. An explanation for this may lie in the more active pulsating movements of the left ventricle which forced the irritating pericardial fluid of the precontractive period of effusion into the less active and more quiet areas. Its localization and concentration at these sites produced a greater inflammatory reaction of the overlying pericardium, with subsequent greater contraction. Moreover, if the strongly pulsating, highly muscular left ventricle can be hampered visibly in its activity as seen at fluoroscopy, how much more vulnerable to constriction would be the more easily compressible right heart and the superior and inferior vena cavæ as they lie in the intrapericardial space.

The effects of localized compression of the various cardiac areas have been studied in our experimental laboratory. In one set of experiments the pericardium over the left heart was excised, the edge of the remaining pericardium was sutured to the edge of the right ventricle and allowed to heal. After four weeks, the pericardial sac over the right heart was irrigated with Dakin's solution for 30 minutes. One month later the sac was injected with 18 cc. of sodium morrhuate. By the 20th

postoperative week, ascites had developed and during the 50th week 1400 cc. of ascitic fluid were removed, and the animal killed. The right ventricle was small and constricted, the left ventricle was large and non-constricted.

In another set of experiments the pulmonary veins were constricted to one-half their diameter on both sides at the same operation in three animals. One animal died immediately following surgery, the other two on the second postoperative day. One animal had marked pulmonary edema and dyspnea, and coughed up bloody frothy sputum. The other animal showed no cause of death. In a fourth animal both pulmonary veins were constricted to only two-thirds their outside diameter, i. e., the diameter of the veins was reduced by one-third. No ill effects followed. In a fifth animal the left pulmonary vein was constricted to one-half its normal size and thirty days later the right pulmonary vein was constricted to one-half. There was no rise in venous pressure and when the dog was sacrificed 292 days later there was no pleural effusion or ascites.

In another animal the inferior vena cava was constricted to one-half its normal diameter, followed in seven days by the development of ascites, and a venous pressure elevation in the lower leg from 3 cm. to 23 cm. of water. In another animal, the constriction of the inferior vena cava by one-half was followed promptly by ascites, only to have it disappear within 140 days,—most probably due to the development of a collateral venous bed permitting blood to reach the heart by way of the superior vena cava. To test this possibility, the superior vena cava in this same dog was constricted to one-half its normal diameter. This was followed in five days by the reappearance of ascites and the elevation of venous pressure in the jugular vein from 5 cm. to 32 cm. of water and in the lower leg from 16 to 23 cm. of water.

Recent attempts to produce ascites or effusion by constriction limited to the left heart, using the same procedure utilized in compressing the right heart, have been totally ineffectual in producing a rise in venous pressure or an ascites in nine months time.

Experimentally, therefore, the symptoms and signs of constrictive pericarditis have been produced only by compression of the right heart or by constriction of the inferior vena cava alone or by constriction of both inferior and superior vena cavæ.

The fourth and last reason for presenting this topic tonight is to champion a particular approach to the heart, namely the median sternotomy from xiphisternum to the second or first intercostal space where transverse sternotomy permits lateral displacement of the ribs on each side. The upper sternum is left intact in order to maintain stability of the thorax.

A median sternotomy is favored first because it provides the necessary exposure for the extensive pericardiectomy described and advocated above, and secondly because it is considered a much safer approach than that provided by a left thoracotomy or a left parasternal incision.

In the literature are recorded 22 deaths on the operating table during pericardiectomy and probably many

more have occurred that have not been so recorded. We have been particularly impressed with the hazardous nature of decorticating the right side of the heart. On three occasions as we approached the right border of the heart sudden and frightening hemorrhage has occurred, but because the heart lay before us in complete view, it was a comparatively simple procedure to replace the liberated pericardium and stitch it over the bleeding point (Bigger), which was probably a hole in the auricle in two instances and a lacerated coronary vein in the third. Other experiences have given added weight to our preference for this approach. In our last decortication a heavy band of calcification overlay the right border and right heart. It was cautiously mobilized from over the right ventricle but only partly from the right auricle which was easily identified as a very thin, blue-walled structure. The calcified band over the auricle was carefully circumvented, isolated and left attached to the auricle, the remainder of the calcified band being removed by rongeurs. Because of the exposure afforded by the median sternotomy this was performed under direct vision. It can be stated without qualification that if an attempt had been made to free this in any way except under direct and adequate vision, as for example by finger dissection or by dissection at an adverse angle or under inadequate exposure as from a left thoracotomy, a catastrophe could easily have resulted from a tear in the auricular wall.

Decortication of the thick-walled left ventricle is a comparatively safe procedure, but liberation of the thinned out right ventricle and the even more fragile and thinner right auricle is fraught with the ever-present danger of sudden tears into the chambers of the heart. Adequate exposure is absolutely indispensable over these vulnerable and dangerous areas.

Objection may be raised that this approach is more productive of shock than the simpler left thoracotomy. This has not been our experience. As evidence of its comparative innocuousness, following our last pericardiectomy, the pulse did not rise above 104 after operation, and temperature was elevated to 99.2° on only one occasion. For greater safety and for more adequate exposure the limited median sternotomy is strongly recommended.

SUMMARY

1. Constrictive pericarditis is frequently unrecognized for long periods and masquerades as rheumatic heart disease, tuberculous peritonitis or cirrhosis of the liver. A young person with an apparently normal heart but with evidence of circulatory failure such as ascites, pleural effusion, peripheral edema, or all three, whose heart sounds are quiet, or muffled and unaccompanied by a murmur, whose cardiac borders move but little under fluoroscopy, whose arterial pressure is low and pulse pressure small, whose venous pressure is above 15 cm. of water in the arm, and perhaps 5 to 10 cm. higher in the leg, due most probably to greater constriction of the inferior vena cava, whose electrocardiogram exhibits a low voltage and inversion of the T waves, should be strongly suspected of having constrictive pericarditis.

When a febrile illness, accompanied by pericardial effusion and by a large cardiac shadow by roentgenogram, is followed by reduction in the cardiac area, but by signs of increasing cardiac failure such as ascites, pleural effusion and increased venous pressure, one should strongly suspect the development of compression of the heart due to contraction of an inflamed and fibrous pericardium.

2. The relentlessly progressive character of tuberculous pericarditis from its onset with chills, fever, sweats and pericardial effusion, to later reabsorption, but with evidence of increasing constriction by an inflamed and fibrous pericardium, demands consideration of operation at the first evidence of compression of the heart. Whenever such compression can be demonstrated, be it in the stage of effusion or in the stage of pericardial contraction, cardiac decompression by pericardiectomy is indicated even though the disease be still active.

3. In constrictive pericarditis the extent and site of compression by the thickened pericardium varies from case to case, and to ensure an adequate liberation of the heart in each instance all borders must be freed routinely, including excision of the pericardium beyond the left border, beyond the right border, and beyond the inferior border, with liberation of both vena cavæ. If such extensive decortication is performed in each instance prompt lowering of venous pressure will occur and secondary operations will be unnecessary.

4. The limited median sternotomy from xiphisternum to second intercostal space is recommended for pericardiectomy because it provides the necessary exposure for the adequate decortication described above, and most particularly because it ensures a safer operation, with less danger of injury to the thin-walled, fragile right auricle and ventricle.

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Major Cardiac Arrhythmias of Apparent Psychogenic Origin Observed in Young Adults*

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BECAUSE the striking symptoms and findings of several patients with cardiac arrhythmias had no demonstrable underlying cause beyond emotional factors, the authors have documented nine cases of varying arrhythmias including auricular and ventricular fibrillation, nodal tachycardia, ventricular tachycardia and the like. In each of the nine cases the past history, psychic evaluation, examination during an attack, and at a period not during an attack, together with chest x-ray films, cardiac fluoroscopy and electrocardiographic findings have been noted. In addition, the medications used during the attack have been indicated together with the duration of the attack.

In five of the cases, psychiatric therapy was undertaken and these effects were noted. In observing these cases the attempt was made to establish, by physical examination and laboratory procedures, the fact that no pathology was present beyond emotional factors. The more recent cases, which are being reported, stimulated our observation that a number of the arrhythmias, including auricular fibrillation and in one instance the probable ventricular fibrillation, were conceivably on the basis of emotional problems. Impressive were the facts that first, these problems were definitely evident as indicated by psychiatric interview and second, no underlying positive physical cause could be elicited.

The borderline between physiological response of the heart to effort and excitement and abnormal cardiac rhythm is sometimes difficult to determine. Minor disturbances of the cardiac rhythm such as severe tachycardia, sinus arrhythmia, premature contractions and possibly paroxysmal atrial tachycardia have become part and parcel of common concepts of vascular phenomena attending the anxiety state and the cardiac neuroses. However, major disturbances of the cardiac rhythm such as auricular fibrillation, auricular flutter, and ventricular tachycardia have been considered as due to intracardiac pathological changes rather than to extracardiac neurogenic reflex and associated mechanisms. Hermann¹ in discussing cardiac neuroses mentions that while there may be sinus tachycardia or arrhythmia, bradycardia or occasional sino-atrial standstill, no serious disorders of the cardiac mechanisms such as fibrillation, flutter, heart block, alternation or gallop rhythm are usually present. This observer² notes that auricular fibrillation occasionally occurs in normal individuals and that it seems possible that there is a nervous hypersensitiveness that pre-

disposes to the arrhythmia. Levine³ has noted major disturbances of the cardiac rhythm occasionally unassociated with any other disease. Degraff⁴ states that while auricular fibrillation is usually associated with organic heart disease, it may occur without it. White⁵ has noted auricular fibrillation in subjects with normal hearts. In instances in which transient auricular fibrillation has occurred in individuals with normal hearts, factors, sometimes infectious or toxic, have been advanced as possible provocations. The frequency with which auricular fibrillation occurs with hyperthyroidism is well known.

The paucity of case reports in which emotional factors have been established as significant as to etiology and treatment in major cardiac arrhythmia is considered a justification of the present report. Serial electrocardiograms have seldom been reported in cases in which so-called functional disturbances of the nervous system have affected the heart and circulation. The frequency with which segments of the alimentary tract have become sensor organs for psychic and emotional overflow has stimulated numerous clinical studies. Such reports, as well as those relating to the circulation, have the virtue of recording the clinical application of physiological data which, while well established in the laboratory, have been applied inadequately to explain the mechanisms and nerve pathways involved. The clinician is confronted continually with the variability of different individuals in the response to a given disease or noxious agent. Close clinical observation may disclose more precisely the somatic effects of emotional strain. Mediation of such effects is through the autonomic nervous system which has significance to the circulation through inhibitory effects of the vagus and acceleration of the cardiac sympathetic. The importance of the hypothalamus in the control of the heart should be mentioned for Beattie, Brow and Long⁶ have found that the cutting of certain tracts within the hypothalamus caused experimentally produced premature contractions to disappear. In addition the hormonal effects on the heart have been mentioned. Moreover one should consider the mechanism of function of the embryonic heart. It has been shown that the embryonic heart, first in the ventricle, then in the auricle and finally in the sinus venosus has as its rhythm the fundamental myogenic beat. This occurs before there is any suggestion of a specialized conduction system or of the presence of nerve cells. This beat in its earliest stage is described by Patten⁷ as one of fibrillation. Soon, however, the embryonic heart shows synchronized contractions. A clinical analogy might be

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TABLE I
History and Physical Findings in Series of Nine Patients

	Sex	Age	Number previous attacks	Contrib. past history	Psychic factors	Complete phys. exam. not in attack	Chest x-ray and card. fluoro.	BMR	Onset
Case 1—J.W.M.	M	28	0	pneumonia 10 yrs.	marked	normal	normal—adhesions rt. costophrenic angle	—6	while studying
Case 2—R.F.M.	M	26	2—preceding week	none	extreme	normal	normal	+4	spontaneous
Case 3—W.C.T.	M	24	0	none	marked	func. syst. murmur	normal	+15	spontaneous
Case 4—D.W.S.	M	22	2—3	none	marked	normal	normal	0	upon awakening
Case 5—W.D.B.	M	20	3—4	none	marked	normal	normal	—	spontaneous
Case 6—R.W.I.	M	25	2—3	none	evident	normal	normal	—	following drinking bout
Case 7—A.T.M.	M	27	3—4/yr.	none	evident	normal	normal	—	spontaneous
Case 8—W.J.K.	M	31	1—2/yr.	none	evident	normal	normal	—	spontaneous
Case 9—T.B.	M	23	3—4	none	evident	func. syst. murmur	normal	—	spontaneous

drawn that under certain conditions of emotional stress the cardiac rhythm becomes more primitive as it loses more recently developed nervous controls.

Thus, although we are unable to explain the exact mechanism of all arrhythmias, we should like to point out in presenting these nine cases that in no instance were we able to find any physical abnormality, nor functional incapacity, beyond the arrhythmia itself. It may be noted that of the nine cases all were males (see table 1) and this is an interesting fact because the cases were drawn from a population average of about 25,000, from 1947 to 1950, with a ratio of better than two to one in favor of males. None of the individuals was under twenty years of age, although this span at the University of Minnesota Student Health Service varies from 12 years of age (University High School) to 68 years of age (faculty). The oldest patient was 31, the youngest 20. The average age was 25 years plus. Each of the individuals was questioned as to the number of previous attacks, and there was an extensive delving into his past history in regard to infection such as rheumatic fever, diphtheria and the like. Each was interviewed from the psychiatric standpoint and from this interview a relative notation of emotional factors and their evidence was made. Arbitrarily, the terms, extreme, marked, and evident were used as a matter of gradation. It may be noted that in all nine instances, it was not difficult to elicit emotional factors. Chest x-ray and cardiac fluoroscopy were done in all instances as was an examination of the heart not during an attack. The basal metabolic rate was done in five of the cases. There was no evidence, particularly as noted by the usual pulse rate, of hyperthyroidism in the remaining cases. A notation as to the situation and onset of the attack was indicated.

In general it may be pointed out that most of the cases occurred spontaneously with no particular association except for one instance in which the individual had imbibed to excess. The usual heart rate and the usual blood pressure in millimeters of mercury were recorded as average of several examinations, and a complete physical examination beyond that relative to the heart was documented. The heart rate, the blood pressure, and the electrocardiograph were recorded during the attack and following it. The length and time of the attack were noted in each instance as was the number of subsequent attacks in our follow-up. A relative notation is made as to the psychiatric aid in those instances in which it was accepted. Lastly, medications used during the attack are mentioned in the text.

Several general observations were noted. One was that when the electrocardiograph indicated ventricular involvement there was a moderate drop in blood pressure. When it indicated auricular involvement there was a moderate increase in blood pressure. In addition, sedation was noted to play a great part in the treatment of each and in one instance of auricular fibrillation it alone was the treatment. All the cases would not accept psychiatric aid but in those that did, four have not had subsequent attacks, a fifth had one further attack during a period of stress but since has not had a repeat episode. It was not possible by means of hospitalization to follow each of these individuals throughout a given period of arrhythmia, however, in four such instances this was possible and these will be noted in graph form on the following charts.

CASE REPORTS

Case 1. The case which was most striking and difficult to explain is case 1. The patient, J.W.M., was a 28-year-old male who had been examined previously at the University of Minne-

sota Health Service. His first examination was on January 30, 1948 at which time the history of an appendectomy followed by pneumonia was indicated. This had occurred in 1941. In 1943 there was a removal of the benign bone tumor, an osteochondroma of the femur; otherwise, his history was negative. Physical examination at that time showed a blood pressure of 120/60, the pulse rate was 86 with a normal exercise response. The heart examination was normal and his status was considered to be that of a normal adult male. On April 18, 1949, he was admitted to the University of Minnesota Hospital having noted a sudden period of relative syncope, apprehension and palpitation. This was extreme in nature but he did not lose consciousness. Again at this time he gave no history of cardiac disease but stated that he had been markedly tense over a period of time and particularly preceding the present episode. Examination showed the patient to be apprehensive and somewhat cold. His heart was grossly irregular with an apical rate of 100 and a radial rate of 64. No murmurs were heard and the size and shape were normal. The blood pressure at this time was 104/70, respirations were 18. An electrocardiograph was ordered which showed a rate of 250 (see figure 1).

It was interesting to note that the diagnosis of ventricular fibrillation was immediately entertained by the persons reading the electrocardiograph. Others rationalized it to be a ventricular tachycardia with shifting auricular flutter. He was given quinidine in progressive doses every hour up to nine grains at which time he became extremely emetic. In addition, he was given morphine sulfate and then procaine, intravenously. Then finally 5 gm. of procaine in 200 cc. of normal saline were dripped in gradually (see figure 2).

A follow-up electrocardiograph the next day showed the rhythm to be sinus with the definite abnormalities as noted in the accompanying tracing. He felt considerably better although exhausted and the pulse rate was 80. There was a duplication of a second sound in the third left interspace. The tones were more distant. On the next day an electrocardiograph had

become borderline normal and subsequent electrocardiographs daily were essentially the same. Clinically the patient improved, his heart tones became stronger and continued to be regular. The basal metabolic rate was a minus 6. Chest x-rays and cardiac fluoroscopy showed adhesions in the right costophrenic angle, but normal cardiac silhouette and normal lung fields. The serology was negative, bleeding and clotting times were normal, the sedimentation rate was normal. The leukocyte count was 18,000 with 83 per cent PMNs initially, returning to 6750 with 64 per cent PMNs in a short while. Urinalyses were essentially negative, although there was a trace of albumin on admission which was never found on repeated examinations. He was placed on sedation, rest, and adequate diet, responding nicely. He was discharged on May 2, 1949.

A subsequent examination on May 6, 1949 showed no essential change. An x-ray of the bone from which the tumor had been removed was made. This showed the near total removal of an osteochondroma of the right femur. He was continued on sedation in the form of phenobarbital grains $\frac{1}{4}$ three times a day. He noted some further tension in the middle of May and a blood pressure taken at that time showed 148-150/90-100. The heart was normal but the pulse rate was 96 with no irregularity. He was rechecked the following day, after psychotherapy, and his pressure and tension had regressed, the pressure being 126/82, with a pulse rate of 82. He was again checked on May 23, with a normal heart and pulse rate of 84. Blood pressure was noted to be 130-84 and an electrocardiograph was taken. He was followed in psychiatry. It was noted that with tension he would have some increase in heart rate. With physical exertion he had no difficulty whatsoever. Never did the cardiac irregularity nor the palpitation return. Again in April of 1951 he was checked particularly because of a recurrence of tension. A period of psychotherapy was undertaken and an examination of the heart was noted which showed the rate to be 84, the blood pressure 138/76. Physical examination showed no change.

Case 2. The patient, R.F.M., was a 26-year-old white male who was seen on May 2, 1950 complaining of his heart beating rapidly and hard. He stated that five days previously he had noted this cardiac sensation which had lasted about six hours and then had disappeared. This had recurred four days later lasting about four hours. The day of admission to the hospital the episodes had been present about eight hours. He had been checked for a routine physical examination the year previously at which time his blood pressure was 128/80 and pulse rate 84. There was no contributory history. The physical examination revealed him to be a normal adult male. He stated that he smoked excessively and was extremely tense. At the time of admission he was in an acute anxiety state because of a severe conflict. Examination upon admission showed the blood pressure to be 140/80, a radial pulse of 96 and the apical rate 180. The heart showed a marked irregularity in rhythm. No murmurs were heard. In addition, he was noted to have cold, moist palms with a coarse tremor of the fingers and tremulous lips. The electrocardiograph was done (see figure 3), which showed auricular fibrillation. He was then given sodium amylal intravenously, following which he went to sleep and the fibrillation stopped. The following day a repeat electrocardiograph was normal as was the pulse rate. Physical findings showed no evidence of cardiac involvement. The basal metabolic rate was a plus 4, cardiac fluoroscopy was normal. He was referred to psychiatry with good response and has had no difficulty since. The accompanying graph shows his course during his hospital stay (see figure 4).

Case 3. This patient, W.C.T., was a 24-year-old white male who was seen on April 1, 1950 because of rapid heart action and weakness. He had been examined the year previously, at which time there was no contributory past history. Pulse rate was 68, blood pressure, 130/70. His physical status was considered to be that of a normal adult male and there was no evidence of a cardiac involvement. At the time of admission, the complaints had been present for about an hour. He stated that there had been no previous history of this nature except for having been heart conscious in noting a rapid heart with tension, or occasionally with exertion. There was no history again of a

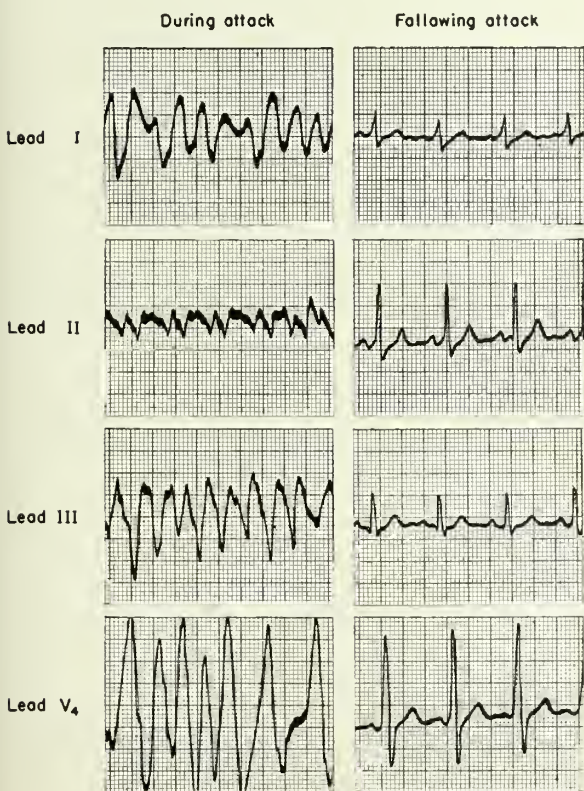


Fig. 1. Case 1, J. W. M. — Ventricular fibrillation.

contributory nature. Examination at this time revealed a very tense individual, asthenic in build. His blood pressure was 130/80, the heart rate was 144 at the apex, 88 at the radial pulse. There was a soft, apical systolic murmur, but it was difficult to elicit. The remainder of the examination was essentially negative. The electrocardiograph showed auricular fibrillation with frequent ventricular extra systoles (see figure 5). He was given three grains of quinidine followed in two hours by another three grains and in three hours by six grains. In

addition, he was given a grain and half of seconal. The next morning the examination showed a blood pressure of 130/70, the pulse was 90 and regular. The heart was normal in size, rhythm and rate. There was a soft apical systolic murmur. M₁ was forceful and A₂ was equal to P₂. The remainder of the examination was negative. Follow-up electrocardiographs showed a return to normal. He started psychiatric care. Although he did not complete the study, he showed definite improvement. He was seen in November of 1950 at which time

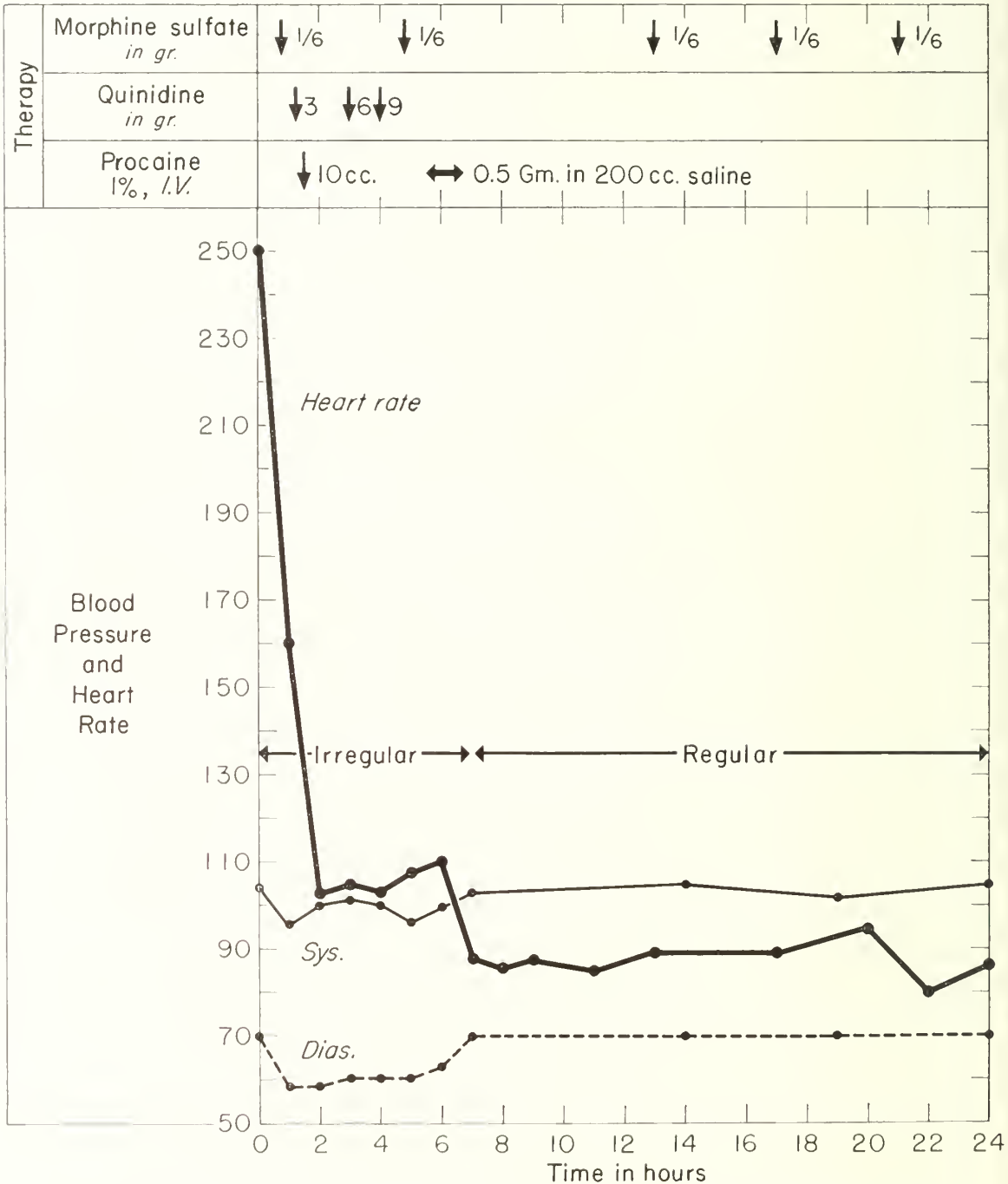


Fig. 2. Case 1, J. W. M. — Graphic record of heart action, blood pressure and medications during acute attack.

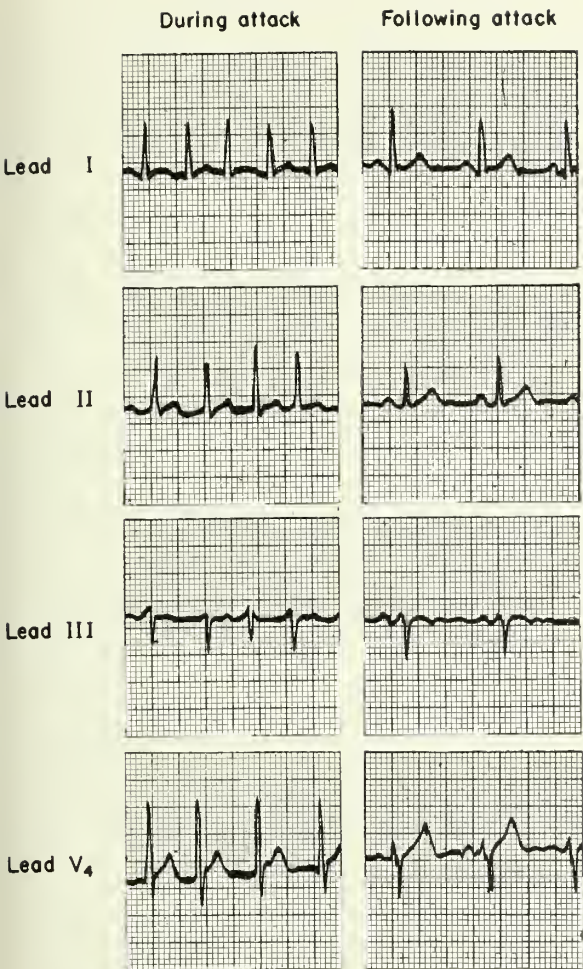


Fig. 3. Case 2, R. F. M. — Auricular fibrillation.

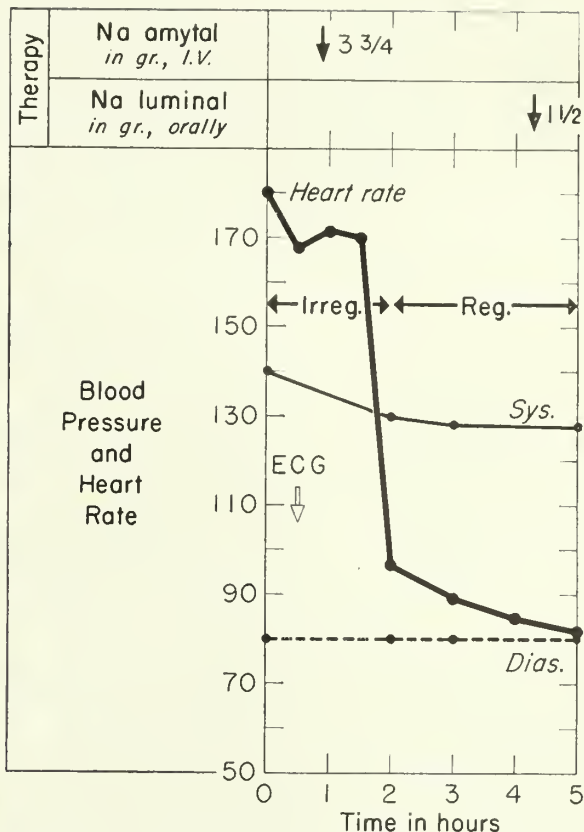


Fig. 4. Case 2, R. F. M. — Graphic record of heart action, blood pressure and medications during acute attack.

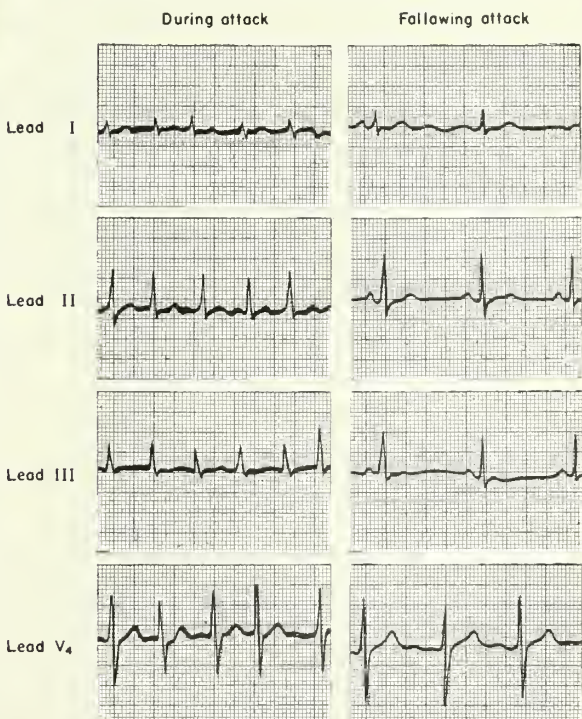


Fig. 5. Case 3, W. C. T. — Auricular fibrillation.

his blood pressure was 120/70, pulse rate was 70. He has had no further difficulty whatsoever. The chart of his hospital course is noted (see figure 6).

Case 4. The patient, D.W.S., was a 22-year-old white male who was first seen on August 15, 1946, for a routine physical examination. At that time he had no history of rheumatic fever nor of any infectious process. His blood pressure was 122/80 and his heart was normal. The pulse rate was 76 with a normal exercise response. His only complaint was that of recurrent epistaxis but this was on the basis of a superficial blood vessel which responded to cautery. He was considered to have a normal physical status. On December 18, 1947, he awakened with a slight headache following which he became nauseated and vomited. Shortly thereafter he developed palpitation which was severe and persistent. He therefore presented himself to the physician at which time he stated that he had had several short and minimal episodes of palpitation while he was in the service. These had not been studied. The examination at the time of the attack showed the blood pressure to be 155/95. His heart was normal in size and shape. The apical impulse was forceful and located in the fifth intercostal space nine centimeters from the midline. No thrills were heard. The radial rate was 100. The electrocardiograph showed auricular fibrillation (see figure 7). He was treated with phenobarbital grains $\frac{1}{2}$ q.i.d. Within a few hours the rate and regularity returned to normal and the following day his blood pressure was 110/70.

Several examiners checked the cardiac status, all concurring that beyond the fibrillation it was normal. He was rechecked

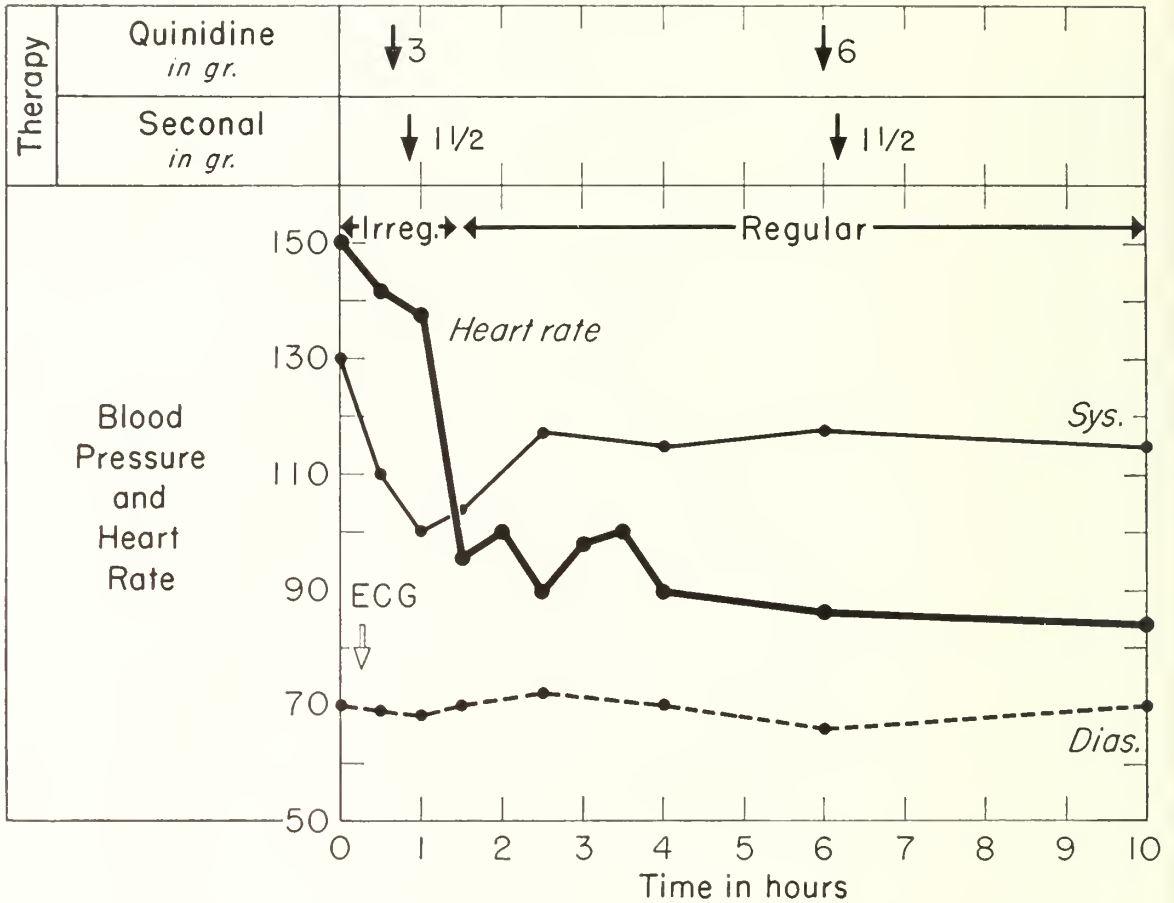


Fig. 6 (above). Case 3, W. C. T. — Graphic record of heart action, blood pressure and medications during acute attack.

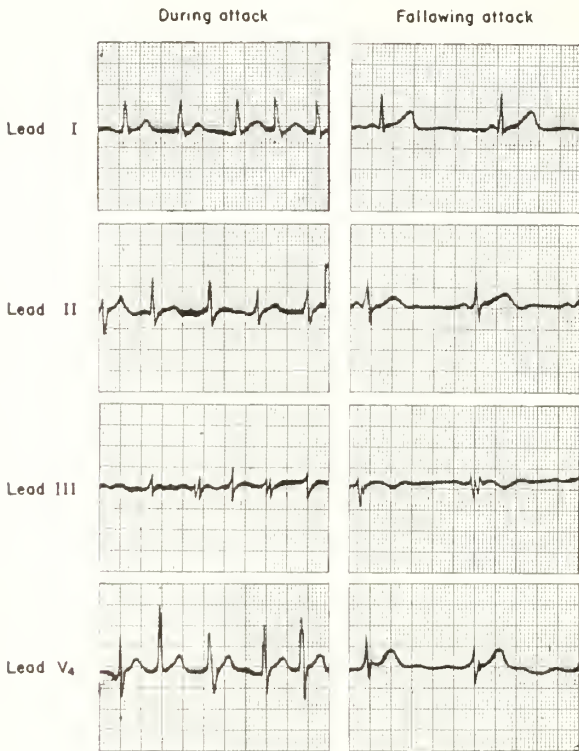


Fig. 7 (left). Case 4, D. W. S. — Auricular fibrillation.

with an electrocardiograph, which had returned to normal and because of the definite tension factors which were evident he was referred to psychiatry in January of 1948. He has been followed regularly by psychiatry since that time and has had excellent response. He has had no further episodes and his last complete physical examination showed his blood pressure to be 116/76, his pulse rate 72, and his cardiac status normal.

Case 5. The patient, W.D.B., was a 20-year-old white male who was first examined on September 19, 1946. At that time his blood pressure was 130/76. His pulse rate was 120, after exercise 100, two minutes later 100. There were no complaints of cardiac symptoms although tension factors were elicited. There was no history of rheumatic fever nor other serious infectious disease. He stated that he had had three or four episodes of palpitation. On January 15, 1949, he noted a sudden onset of rapid palpitation and a feeling of weakness. He reported to the physician who found his blood pressure to be 80/60 with a pulse rate of 183. The electrocardiograph at this time showed ventricular tachycardia (see figure 8). He was given prostigmine, quinidine in progressive doses every hour from 3 to 9 grams, and 5 cc. of 1 per cent procaine intravenously. Following these medications the pulse rate began to drop (see figure 9). The patient did not respond to the suggestion of psychiatric care at this time; however in May 1949 his tensions and the psychic difficulties had become more severe and he was, therefore, followed by the department of mental hygiene. On February 6, 1950, he noted a sudden onset of rapid heart action again with a queer sensation in his chest,

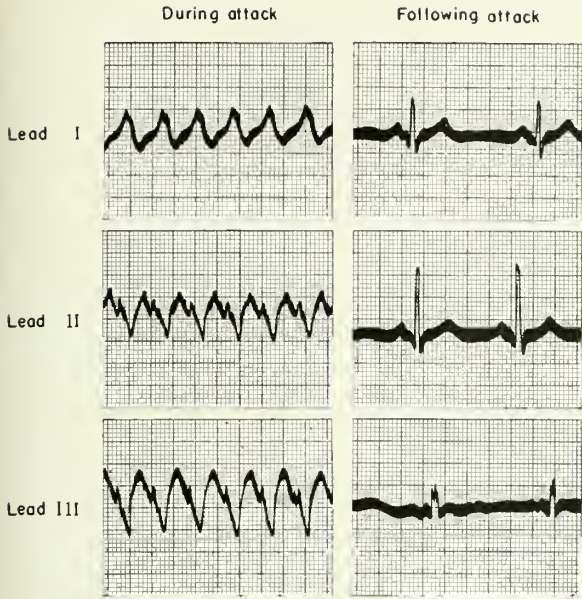


Fig. 8. Case 5, W. D. B. — Ventricular tachycardia.

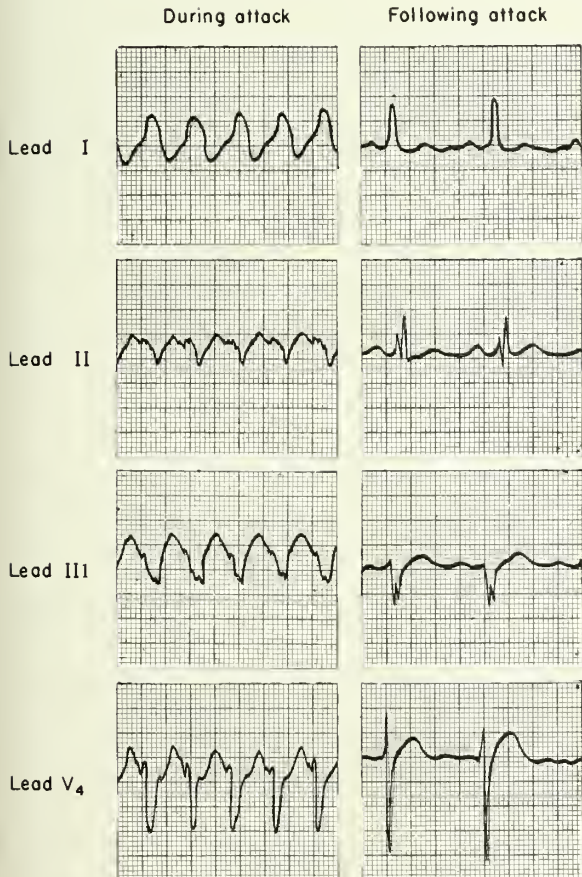


Fig. 10. Case 5, W. D. B. — Ventricular tachycardia.

weakness, and pain in the left shoulder. The pulse was 180 as noted by the examining physician, the blood pressure 96/65. The electrocardiograph was taken (see figure 10). He was given quinidine, and sodium amytal. Following this his pulse dropped to 98 and he was more comfortable. The electrocardiograph following this episode showed a return to normal and the patient continued to consult regularly with the mental hygiene department with no further difficulty since that time.

Case 6. The patient, R.W.I., a 25-year-old white male, was seen on January 14, 1949, complaining of a rapid heart. This had occurred suddenly and had persisted with associated dyspnea. He stated that he had had two or three attacks of tachycardia about the age of 15 which had not been diagnosed. No history of rheumatic fever nor other infectious processes were indicated.

Previous physical examinations done at the University of Minnesota Health Service showed the usual blood pressure to be 110/70, the pulse rate 68. The heart examination was normal as were the chest x-ray and cardiac fluoroscopy. The history at admission indicated that he was nauseated and had vomited previously, this having followed a bout of drinking. That morning he had a severe headache upon awakening following which the present episode had begun. The other bouts had never lasted more than a few minutes. Examination showed the blood pressure to be 100/70, the rhythm of the heart was regular. The rate was 200 per minute. There were no murmurs. He was given quinidine and cedilanid. An hour later he was given another 3 grains of quinidine, three hours later another 3 grains; in addition to 1½ grains of secal. Following the first 6 grains of quinidine he became nauseated and vomited. Immediately after this, the rate dropped to 104 per minute. The electrocardiograph was taken before the administration of medication (see figure 11). The following day the pulse rate had returned to 72 and the electrocardiograph was normal. He received some psychotherapy but did not choose to follow a prolonged routine. Subsequent recheck examinations have shown his cardiac status to be normal and he has had no further episodes.

Case 7. The patient, A.T.M., a 27-year-old white male, was first examined in October of 1948, at which time a history of recurrent episodes of rapid heart action in childhood had been noted. These were sudden in onset and occurred three to four times a year. There were no constant nor definite provoking factors. He had received several complete physical examina-

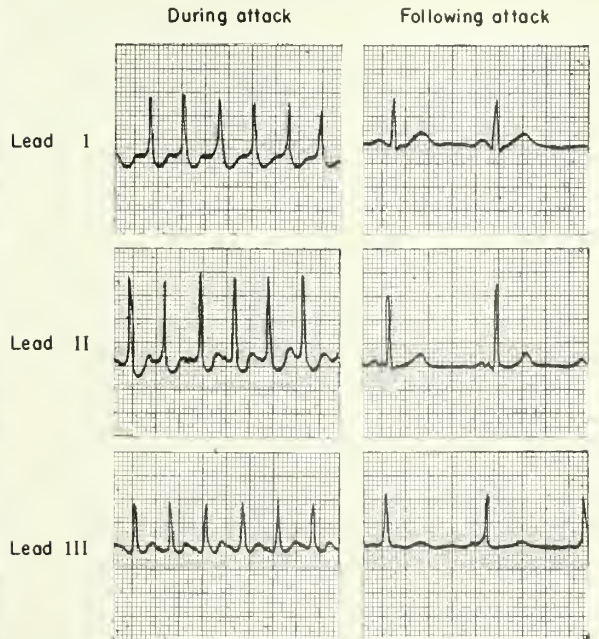


Fig. 11. Case 6, R. W. I. — Supraventricular tachycardia.

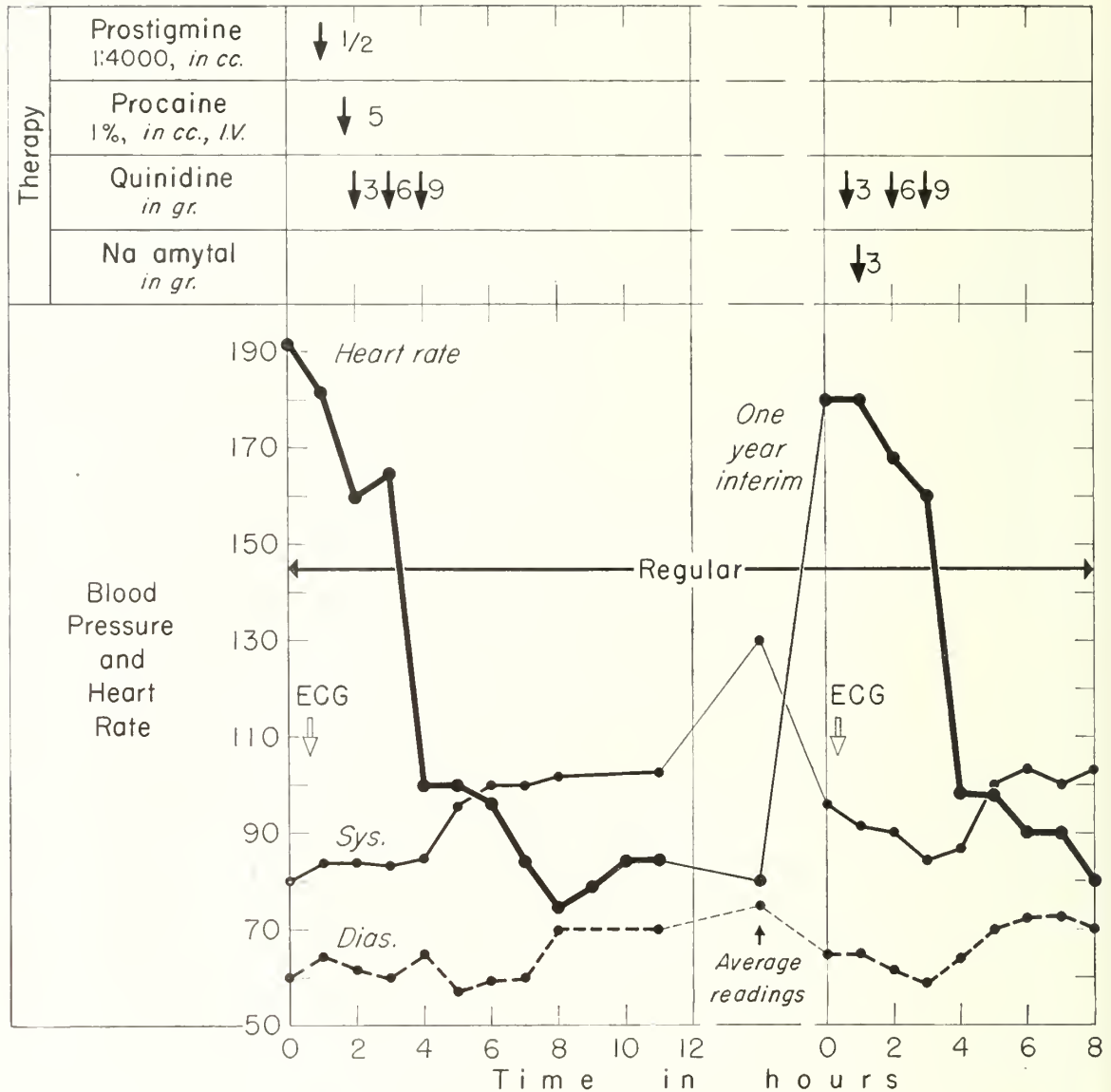


Fig. 9. Case 5, W. D. B. — Graphic record of heart action, blood pressure and medications during acute attack.

tions which showed the usual blood pressure to be 130/78, pulse rate 64. Cardiac checks along with x-ray and cardiac fluoroscopy were normal. He stated that the attacks would last about ten minutes and were generally relieved by micturition and lying down. In January 1949 he was seen complaining of this rapid heart action. At this time, his blood pressure was 120/76, his heart rate 153. The electrocardiograph was taken (see figure 12). The attack subsided spontaneously and the electrocardiograph showed a return to normal. Psychotherapy was again partially instituted and discussed but he did not choose to follow a regime. Subsequent follow-ups have shown that he still has attacks, however, he states that they are less. Physical findings show no change.

Case 8. The patient, W.J.K., a 31-year-old white male, was admitted to the hospital for observation on March 20, 1949, following a sudden onset of rapid heart action. He stated that for six years, once or twice a year, he had had the same type of sensation. There were no definite precipitating factors. He had been seen for a routine physical examination previously, at which time his blood pressure was 112/70, his heart rate 76.

He had no contributory history. Examination of his cardiac status including the heart rate and a cardiac fluoroscopy was normal. At the time of the attack his blood pressure was 120/78, the heart rate was 130 to 140, no murmur, enlargements, nor thrills were found. A_2 was greater than P_2 . The electrocardiograph was taken (see figure 13) and showed nodal tachycardia with occasional shifting pace maker. He was given 3 grains of quinidine followed in four hours by 6 grains, and in another hour by 9 grains. The tachycardia ceased and an electrocardiograph following this showed the tracing had returned to normal. He was interviewed from the standpoint of prolonged psychotherapy but decline to follow-up on a regular routine. Subsequent examinations and interviews indicate that he had had less difficulty and he has never been seen due to subsequent attack.

Case 9. The patient, T.B., a 23-year-old white male, was first seen at the University of Minnesota Health Service on September 22, 1948. At that time his blood pressure was 116/77, and his pulse rate was 68 with a normal exercise response. There was a systolic murmur heard at the apex which was

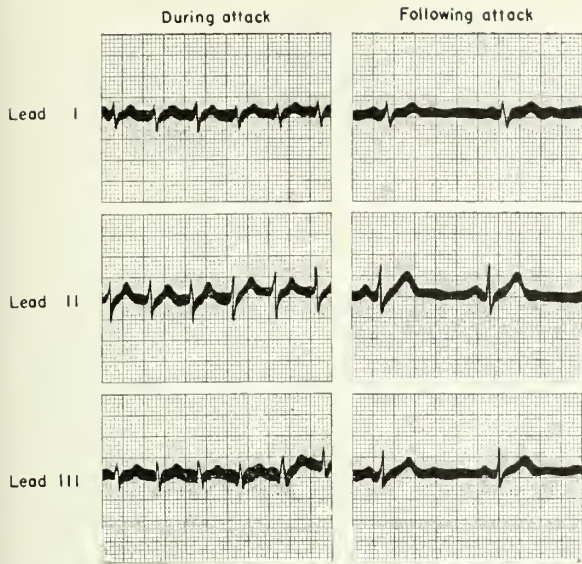


Fig. 12. Case 7, A. T. M. — Supraventricular tachycardia.

noted by several examiners and felt to be functional. He was admitted to the hospital on December 3, 1948 because of tachycardia. The rate was about 180 per minute. An electrocardiograph was not taken for the tachycardia stopped spontaneously and at this time he stated he had had several episodes, usually very short in duration, and relieved by walking about or by bending forward. On January 13, 1949, he had another episode at which time an electrocardiograph was taken (see figure 14). This again stopped spontaneously, with blood pressure returning to 120/70 and pulse rate to 70. It was noted that there was a considerable period of stress involving emotional conflict during the period of these two attacks. Subsequently, these have resolved with adjustment to a great extent. He has been followed with no change in cardiac status and no further attacks.

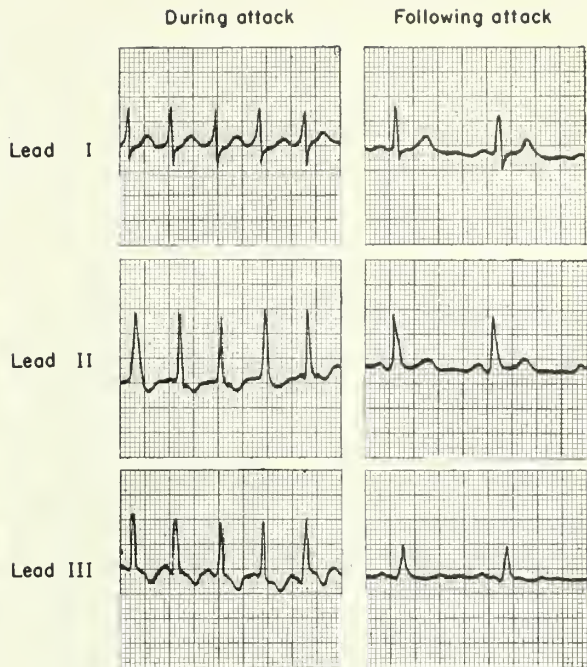


Fig. 14. Case 9, T. B. — Supraventricular tachycardia.

DISCUSSION

The presentation of these nine cases of varying arrhythmias, all sufficiently bothersome to require hospitalization, none responding to the usual procedures such as carotid sinus pressure and orbital pressure, none showing a physical causative factor, has given us considerable thought as to their possible etiology. The series, obviously, is not of sufficient size to be conclusive statistically but the thought cannot help but pass our minds, that the provocative agent at times may be psychogenic in nature. In one instance, case 2, in which the individual was smoking very heavily and in case 6 in which there was excessive indulgence in alcohol, an extrinsic factor is possible. However, in others, a possible source was not elicited, although it is realized that pathological factors sometimes are not demonstrable. In those individuals who have continued with psychotherapy the psychiatrist has indicated definite improvement and this appears to be reflected in the lack of further arrhythmia. The cases have been followed from one to three and a half years which, of course, is a rather short interval. The same individuals did not treat each of the nine cases, thus, evaluation of medications on such a small series is difficult. Our observation was that sedation was the most important factor as reflected in case 2 at which time nothing else was given. Quinidine seemed to be of value in all instances. This certainly has been proven time and again. In case 1 which was extremely striking, and in which the diagnosis was believed to be ventricular fibrillation, the observers felt that its response was due especially to the prolonged intravenous procaine.

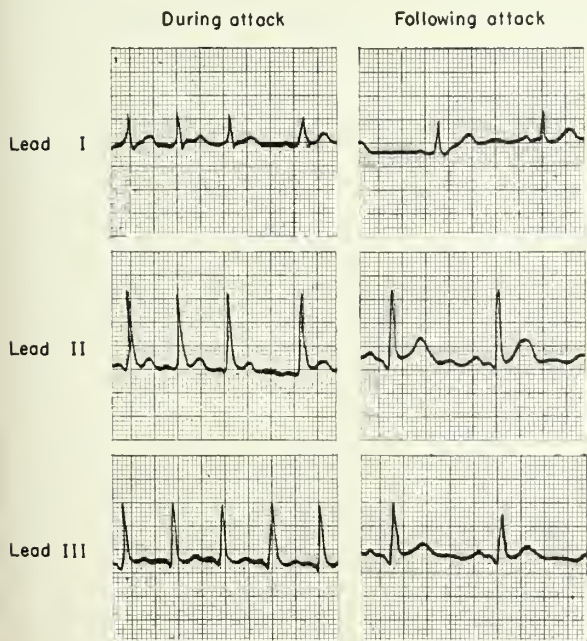


Fig. 13. Case 8, W. J. K. — Nodal tachycardia.

TABLE II
Physical Findings During Attack and Subsequent Course in Series of Nine Patients

	Heart Usual	Rate During Attack	Blood Usual	Pressure During Attack	EKG during attack	Duration attack	Subsequent attacks	Psychiatric aid	Time Followed
Case 1	84	250	120/70	104/70	ventricular fibrillation	10 hrs.	0	beneficial	2¼ yrs.
Case 2	84	167	128/80	140/80	auricular fibrillation	2 hrs.	0	beneficial	1¼ yrs.
Case 3	68	150	130/70	130/80	auricular fibrillation	3½ yrs.	0	not completed	1¼ yrs.
Case 4	74	140	122/80	155/95	auricular fibrillation	3 hrs.	0	beneficial	3½ yrs.
Case 5	70-90	1st—183 2nd—180	130/70	80/60 85/60	vent. tachy. vent. tachy.	3½ hrs. 4½ hrs.	1 0	beneficial beneficial	2½ yrs.
Case 6	68	208	110/70	122/74	supraventricular tachycardia	5 hrs.	0	—	2½ yrs.
Case 7	64	153	130/78	120/76	supraventricular tachycardia	10 min.	less	—	1½ yrs.
Case 8	76	140	112/70	120/78	nodal tachy. with shifting pacemaker	3 hrs.	less	—	2¼ yrs.
Case 9	68	180	116/76	120/76	supraventricular tachycardia	15 min.	0	—	2½ yrs.

SUMMARY

1. Nine cases of varying types of arrhythmias as noted at the University of Minnesota Health Service together with the studies made by physical examination and laboratory procedures before, during and after an attack are presented. Electrocardiograph tracings showing the arrhythmia and the return from the arrhythmia are also presented in each instance.

2. The possibility of psychogenic provocation of certain cases of auricular and ventricular arrhythmias is proposed, in the absence of demonstrable organic disease.

3. It may be postulated that if emotional factors attain such proportions as to effect the soma, e.g., the peptic ulcer, the end organ may be the heart in some instances.

4. While the psychogenic origin of certain cases of severe arrhythmias is accepted by many authorities, the value of psychotherapy has not been established. In this series the evaluation by the psychiatrist and these observers together with the lessening or cessation of attacks, indicated the probability of therapeutic response.

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THE JOURNAL-LANCET LECTURE OCTOBER 17, 1951

ALL READERS OF THE JOURNAL-LANCET are invited to hear Dr. Edgar S. Gordon, associate professor of medicine at the University of Wisconsin Medical School, who will give the JOURNAL-LANCET lecture for 1951-52 Wednesday evening, October 17, 1951, on the campus of the University of Minnesota. Dr. Gordon has been active in the use of radio-isotopes in the diagnosis and treatment of thyroid disorders and other clinical conditions and has made many contributions in the field of adrenal physiology. The subject of his lecture will be "Integrated Functions of the Adrenal Cortex."

Vena Cava Ligation in Thromboembolic Disease*

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THE INFERIOR VENA CAVA has been ligated in many instances, particularly within the past five years. Kocher in 1883,¹ and Billroth² in 1885 each recorded a case, both were done by mistake and both patients died. In 1893 Bottini³ ligated the vena cava, the patient survived without sequelae of any sort. All of the early cases were done because of accidental injury to the vena cava during the course of kidney surgery.

Purposeful ligation of the vena cava has long been used in the treatment of puerperal pyemia with considerable success. Trendelenburg⁴ did two cases in 1906 and a third one in 1910. Only the third lived. Today the procedure is used by a number of gynecologists not only in the treatment of pelvic phlebitis,^{5,6} but also as a prophylactic measure in extensive pelvic surgery. Foley⁷ has recently reported eight cases in which vena cava ligation was used as an adjunct to his method of treating "bad" bladder tumors.

Recently there has developed considerable enthusiasm for vein ligation in the prevention of pulmonary embolism in patients with thrombophlebitis. Initially it was advocated that superficial femoral vein ligation be done, then as the procedure was found to afford incomplete protection, common femoral vein ligation or external iliac vein ligation supplanted superficial femoral ligation. Because of the high incidence of asymptomatic involvement of the opposite extremity by thrombophlebitis it is now generally accepted that the ligations must be bilateral.

The amount of protection afforded by vein ligation is directly correlated with the level of the ligation. The higher the ligation the more complete the protection against embolization. Experience has shown that ligation of the inferior vena cava affords complete protection against embolization from the legs and pelvis, whereas this cannot be said of more distal ligations. Large communications between the superficial femoral and deep femoral veins (Figure 1) may nullify the protective effect of superficial femoral vein ligation. Furthermore, after femoral vein ligation there is left a large bed of veins between the ligature and the heart which may serve as a source for further emboli. Erb and Schumann⁸ have recently shown that superficial femoral vein ligation in their hands did not decrease the incidence of



Fig. 1. Venographic demonstration of communication between superficial and deep femoral veins.

pulmonary embolization. Superficial femoral vein ligation causes almost no disturbance of circulation but there is considerable interference with venous return from the leg when the common femoral vein is ligated. The bed for collateral circulation in the latter case is considerably limited whereas in the former it is abundant. Likewise it has been demonstrated by Thebaut and Ward,⁹ Moses,¹⁰ O'Neill,¹¹ Northway and Buxton¹² and others that there is less disability following vena cava ligation than following common femoral ligation. The bed for development of collateral circulation is far greater after vena cava ligation than after common femoral ligation. (Figure 2.)

The routes of circulation after vena cava ligation have been well demonstrated by Northway and Buxton¹² using injection techniques. These primary routes are:

*From the Veterans Administration Hospital, Minneapolis, Minnesota. Published with approval of Chief Medical Director. The statements and conclusions published by the author are the result of his own study and do not necessarily reflect the opinion or policy of the Veterans Administration.

- a) Superficial
 - 1. Superficial circumflex iliac
 - 2. Superficial epigastric
- b) Deep
 - 1. Deep circumflex iliac
 - 2. Deep epigastric
- c) Communications with the vertebral plexus
 - 1. Lateral sacral veins—from hypogastrics
 - 2. Segmental spinal veins
 - 3. Intra and perivertebral plexuses

INDICATIONS

On the vascular service of the Minneapolis Veterans Administration Hospital we prefer to treat phlebotrombosis and thrombophlebitis with anticoagulants. The results have been extremely satisfactory even when embolization has occurred prior to recognizing the disease in the extremities. Our preference is for intermittent intravenous heparin, but depoheparin or dicumarol are used for maintenance in most patients.

Heparin is preferred because of its prompt and dependable action. It can be depended upon to bring about subsidence or at least marked alleviation of symptoms within twelve to eighteen hours after initiation of treatment. After achieving this result dicumarol can be used to maintain anticoagulant therapy for prolonged periods of time. Tromexan has not been used because of its expense and short action. In selected instances vena cava ligation is used in preference to anticoagulant therapy.

Our indications for vena cava ligation are:

- a) Repeated embolization in patients who cannot, for one reason or another, be maintained on anticoagulants.
- b) Embolization in patients requiring further surgery.
- c) Septic embolization

OPERATIVE APPROACH

Vena cava ligation is done through a transverse right abdominal incision using a retroperitoneal approach as for lumbar sympathectomy. The cava is freed from the aorta and lumbar vertebrae and doubly ligated with No. 2-0 cotton, separating the ligatures by about 1 cm. Ligation is done just above the iliac vein junction. Care must be used to avoid injuring the lumbar veins for extremely troublesome bleeding may result from injury of one of these veins. Right lumbar sympathectomy is usually done at the same time—first, because there is frequently associated vasospasm which is benefited by sympathectomy; and secondly, because sympathectomy, if necessary later, would be extremely difficult through the same operative incision.

The patients are put on anticoagulants within twelve hours after operation in attempt to prevent thrombotic obliteration of the collateral venous channels. Failure to use heparin may allow the thrombophlebitis to extend postoperatively, for in the immediate post-ligation period there is increased venous stasis which contributes to intra-

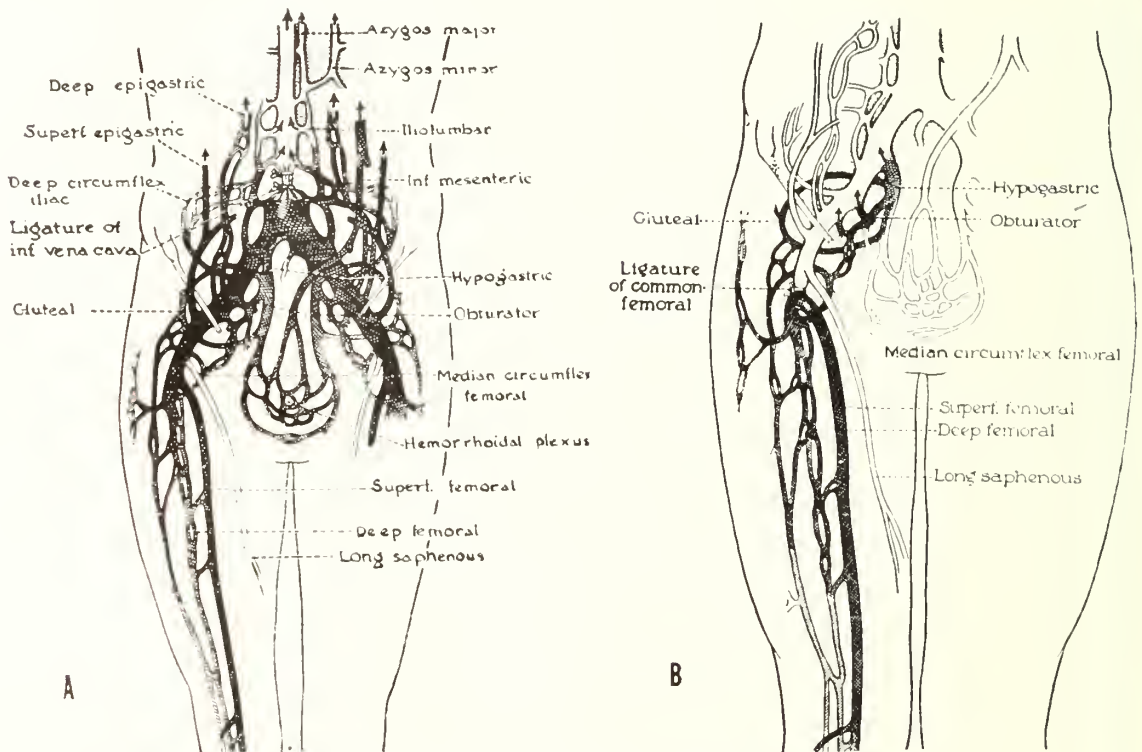


Fig. 2. Bed of veins affected and collateral channels utilized by: A. Vena cava ligation; B. Common femoral vein ligation.

TABLE I
Results after Vena Cava Ligation

Patient and Age	Antecedent thrombophlebitis	Number of emboli prior to ligation	Sympathectomy	Postoperative complications	Follow-up in months	Immediate Effects Edema	Pain	Late Edema	Effects Vari-cosities	Ulcer
K-28	Right and left legs	4	(a) R and L	0	60	+	0(a)	0	0	0
R-52	Right and left legs	2	(a) R and L	0	32	++	(a)	+	0	0
N-61	Right and left legs	2-3	R	0	23	++	0	++	+	+
W-55	Left leg	2	R	P.O. hematoma and phlebitis	22	L++ R+++	0	L+ R++	+	0
S-59	Right and left legs	1	R	0	21	++	0	0	0	0
B-54	Right and left legs	3	R	0	21	+++	0	++	0	0
C-61	Left leg	1(3)	0	0	17	++	0	+	0	0
K-53	Right and left legs	2	R	P.O. phlebitis while on dicumarol	11	+++	0	0	0	0
B-61	Right and left legs	3	R	P.O. phlebitis while on dicumarol	2	+				
H-54	Right leg	3	R	0	2	0	0			
P-41	Right and left legs	1	R	0	1	+	0			

(a) Bilateral sympathectomies necessary later because of post phlebitic pain in legs. Complete relief of pain resulted from sympathectomy.

vascular thrombosis. It is felt that within a period of seven to ten days collateral channels have opened up sufficiently to reduce this stasis to a point where the thrombotic process is less likely to extend. Anti-coagulant therapy is maintained, as a rule, for at least three weeks. It is the patient with extending thrombophlebitis or recurrent thrombophlebitis who develops severe edema after cava ligation. Those without obliteration of collateral channels have no edema.

This fact is well borne out by observation of patients who have undergone cava ligation for pelvic thrombophlebitis without involvement of the leg veins. These patients consistently are free from postoperative edema of the legs.

In the immediate postoperative period the patient's legs are elevated and he is kept in bed if there is any swelling. The legs are wrapped to the groin with ace bandage. After a week the legs are allowed to dangle and in ten days the patient may begin to walk. Some swelling persists for a period of a few weeks in all patients with considerable thrombophlebitis but this tends to subside in two to four months. Only those with very extensive thrombotic obliteration of vessels have persistent edema. Ace bandages control this swelling rather well. Those patients without swelling are ambulated the

day after surgery. Women tolerate ligation of the vena cava better than men presumably because of additional collateral circulation through the ovarian veins. For men, collateralization by way of the spermatic veins is minimal.

The late results of this mode of therapy have not been recorded but the early results are satisfactory in that the incidence of ulcer, dermatitis and other changes of stasis are not increased over that in the group without cava ligation. The factor of primary importance is the care given the legs in the postoperative period, for ligation of the vena cava does not alter the basic disease in the veins of the legs. Thebaut¹³ in discussing the late (three to five years) results in his patients after vena cava ligation states that there is no increase of disability, edema, ulceration or pigmentation in this group over the routine group of thrombophlebitis group.

SUMMARY OF PATIENTS

Eleven patients have been subjected to vena cava ligation in this hospital.

The primary indication has been repeated pulmonary emboli in patients with thrombophlebitis of the lower extremities (eight cases). Three patients were operated upon because of embolization and persistent thrombo-

phlebitis in attempt to prevent further emboli at the time of contemplated surgery. In this group of eleven patients, no embolization has occurred after ligation of the vena cava. Two of these patients had previously developed pulmonary emboli following ligation of leg veins for thrombophlebitis (superficial femoral—one, saphenous—two). There has been no operative mortality and all patients are alive at present.

The patients have all been followed from one to 60 months since the time of surgery. In each case the residual disability corresponds to the severity of the thrombophlebitic process in the legs. One patient has noted progressively increasing dyspnea with exertion since the time of ligation of the vena cava. This patient has evidence of arteriosclerosis obliterans in the lower extremities as well as arteriosclerotic heart disease. His disability arises primarily from his cardiac disease and is not related to his venous disease. The other patient who is unable to work has arteriosclerosis obliterans as well as post-phlebitic ulceration of one leg. Recent stripping of superficial varicosities has improved his general condition to a marked degree. Most patients have to accept the fact that elastic leg supports will have to be

worn for a prolonged period, but this is because of the thrombophlebitis and not because of the vena cava ligation itself. We have found that the best results are obtained with the use of anticoagulants in the postoperative period for, as mentioned previously, the cava ligation may cause flare-up of the thrombophlebitic process. If we are to get good results we must spare as many collateral channels as possible. Sympathectomy was required at a later date in the first two patients because of postphlebitic pain in the legs. Since that time a right lumbar sympathectomy has been done routinely at the time of cava ligation because of the difficulty of later sympathectomy through the same incision.

SUMMARY

1. The experience in eleven cases of vena cava ligation has been satisfactory.
2. It is felt that fatal pulmonary emboli have been prevented in these individuals by cava ligation.
3. Sequelae have been mild and result not from cava ligation, but from the thrombophlebitis of the veins on the extremity which was the primary disease.
4. This procedure has definite usefulness in treatment of thromboembolic disease.

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REVISED HEART MANUAL AVAILABLE

THE American Heart Association has issued the first revision of its manual for physicians, "Examination of the Heart," originally published in 1940. The initial limited printing is being made available free to physicians concerned with the diagnosis of cardiovascular diseases. Requests for the booklet should be directed to local affiliated heart associations or directly to the American Heart Association, 1775 Broadway, New York 19, N. Y.

The purpose of the original booklet was to outline the clinical examination of the heart without the help of any instrument other than the stethoscope. The revision adds new material on blood pressure, comments on the use of the electrocardiograph, and on other more specialized procedures employed in heart disease. The booklet includes sections on cardiac rhythms and rates, cardiac enlargement, and cardiac sounds and murmurs.

Multiple Chest Leads in Clinical Electrocardiography*

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ALTHOUGH the earliest experiments in clinical electrocardiography were made with chest leads,¹ most investigations in the first thirty years following Einthoven² were concerned principally with limb leads. Einthoven, Fahr, and DeWaart³ laid the mathematical basis for consideration of limb leads in terms of vector analysis. Duchosal⁴ has shown that chest leads can also be interpreted vectorially. Limb leads alone can portray only that component of electrical force which lies in the plane of the extremities, the frontal plane. Forces acting in the transverse plane of the body are not demonstrated in the limb leads. In clinical electrocardiography several types of common lesions present changes in the chest leads with the limb leads unaffected or minimally disturbed. The case studies outlined illustrate the need for multiple chest leads.

Appreciation of the principle of vector analysis is fundamental in understanding the need for leads other than in the frontal plane. Figure 1 illustrates a simple mechanical vector. The suspended weight exerts a force in the direction of the diagonal arrow and the length of the arrow indicates the magnitude of the force. A diminished component of the total force is exerted along the sides of the rectangle. This component reduces to zero as the angle increases to 90 degrees. At any instant

*Sponsored by the Veterans Administration Hospital and Department of Medicine, University of Minnesota, Minneapolis, Minnesota, and published with the approval of the Chief Medical Director. The statements and conclusions published by the author are the result of his own study and do not necessarily reflect the opinion or policy of the Veterans Administration.

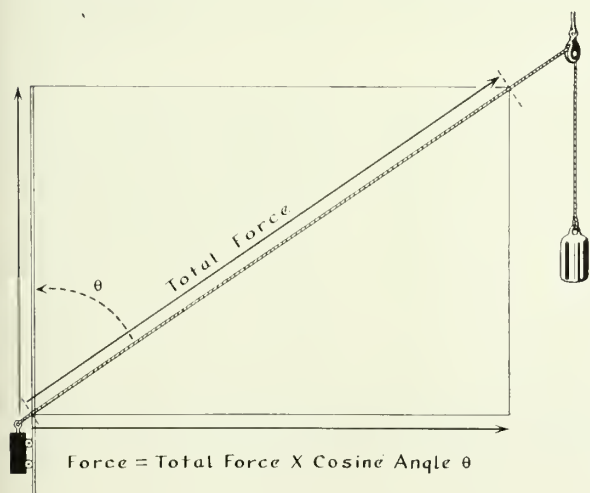


Fig. 1. A simple mechanical vector; explained in the text.

the summation of cardiac electrical forces can also be delineated as a single force having magnitude and direction, hence a vector. Forces in the frontal plane are reflected well in one or two of the limb leads. Forces in the transverse plane act at 90 degrees to the frontal plane and are nullified in all the limb leads. Similarly a force in the transverse plane directed toward the left axilla will be poorly reproduced from presternal leads as these positions approach 90 degrees from the line of force. For the vector treatment of chest leads at least two leads must be recorded.

Wilson and the Ann Arbor group⁵ have written at length of the effect of variation of position of the chest electrodes. They showed that the peak of the R wave represents the beginning of electrical activity in the muscle immediately under the exploring electrode. To portray these changes many chest leads are required. The six conventional precordial chest positions lie in an arc extending a little more than one quarter of the way around the chest. Grant⁶ in his recent monograph has shown that these are adequate to represent electrical activity in the transverse plane.

Wolferth and Wood⁷ in 1933 produced myocardial infarctions in dogs with remarkable changes in the direct epicardial and in precordial leads while the limb leads revealed almost no variation from the normal. Myers^{8,9} has reclassified myocardial infarction by location of the lesion. Anterolateral damage showed mainly in chest leads from the left axilla⁸ (V_5 and V_6). Antero-septal infarcts often could be demonstrated only in leads near the sternum⁹ (V_1 , V_2 , V_3).

The American Heart Association and the Cardiac Society of Great Britain and Ireland¹⁰ in 1938 recommended the routine use of a single precordial lead, 4R or 4F. Later in that year a supplementary report of the American Heart Association¹¹ described six chest positions for multiple precordial leads. In 1943 a second supplementary report¹² recommended that at least three chest leads be taken for general clinical use. Nearly all institutions and individuals whose material is exploited in the medical journals currently utilize multiple chest leads. This is obvious from inspection of the electrocardiograms illustrating current articles in such journals as *Circulation*, the *American Heart Journal*, and the *British Heart Journal*.

Chest leads are of great importance in differentiating patterns of ventricular hypertrophy, in separating right from left bundle branch block, in elucidating electrical activity in the transverse plane such as that which accom-

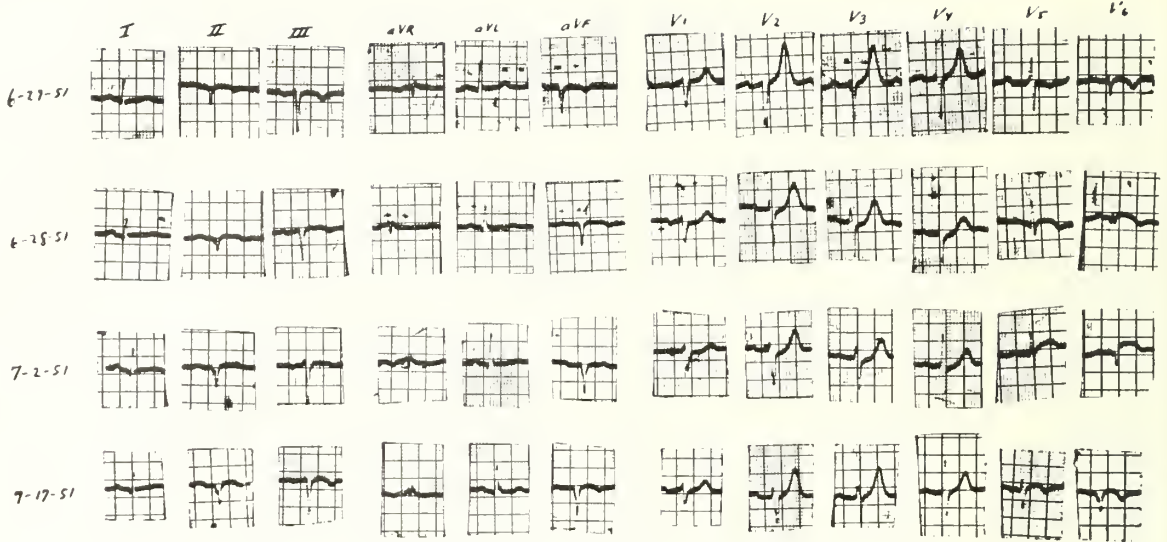


Fig. 2. Serial tracings in lateral myocardial infarction, case 1. Note changes in V_5 and V_6 .

panies pericarditis or anterior wall infarction. Figures 2, 3 and 4 illustrate electrocardiographic problems in four cases in which several chest leads are necessary for interpretation.

CASE REPORTS

Case 1. K. L., a 55-year-old white male, entered the Minneapolis Veterans' Hospital June 27, 1951, with the complaint of severe crushing substernal pain of three hours' duration. His past history disclosed rather typical attacks of angina pectoris associated with exertion and emotional strain during the past four years. On admission he was pale, sweating, and dyspneic. The blood pressure was 140/80. Cardiac examination was non-revealing. There were a few coarse rhonchi at the lung bases. The initial white blood count was 13,500 per cm. The sedimentation rate (Westergren) was 3 mm. per hour. The white blood count rose to 17,400 and in one week subsided to 10,000. The sedimentation rate reached a peak of 67 mm. on the fifth day and gradually fell to 15 mm. in four weeks. The temperature was elevated to 100° to 101° during the first week. The clinical diagnoses were coronary thrombosis and myocardial infarction. The serial electrocardiograms are illustrated in fig-

ure 2. The limb leads alone yield the information that the electrocardiogram is abnormal but they are not diagnostic of infarction. If the one chest lead V_1 is added, no further information is forthcoming. In this case only V_5 and V_6 demonstrate the changing picture of the disease.

Case 2. F. B., a 54-year-old white male, was admitted to the Minneapolis Veterans' Hospital July 6, 1950, complaining of substernal pain. He had been well until two weeks before his admission, when he began having bouts of chest pain lasting ten to fifteen minutes. These were not associated with meals or exertion and occurred several times daily. On the day of admission he suffered a prolonged severe chest pain unrelieved for seven hours. Physical examination was non-revealing. The blood pressure was 130/80. The temperature was elevated to 100 degrees and fluctuated between 99° and 101° during the first week. The sedimentation rate reached 40 mm. per hour the third day and remained elevated for two weeks. The white blood counts were within normal limits. The clinical diagnosis was anteroseptal myocardial infarction. The electrocardiograms are shown in figure 3. The limb leads again give no hint of the serious lesion present. The addition of an apical lead, should this lie lateral to V_1 , would add nothing. In this case V_1 , V_2 , and V_3 , and to a lesser extent, V_4 demonstrate the

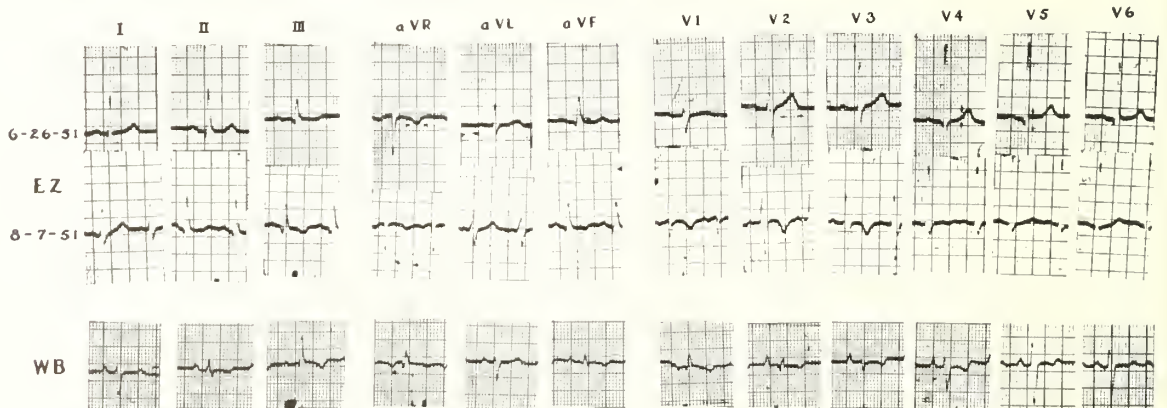


Fig. 3. Serial tracings in anteroseptal infarct (case 2). The diagnostic changes occur in V_1 , V_2 , V_3 and V_4 . Note the inadequacy of limb leads in this case.

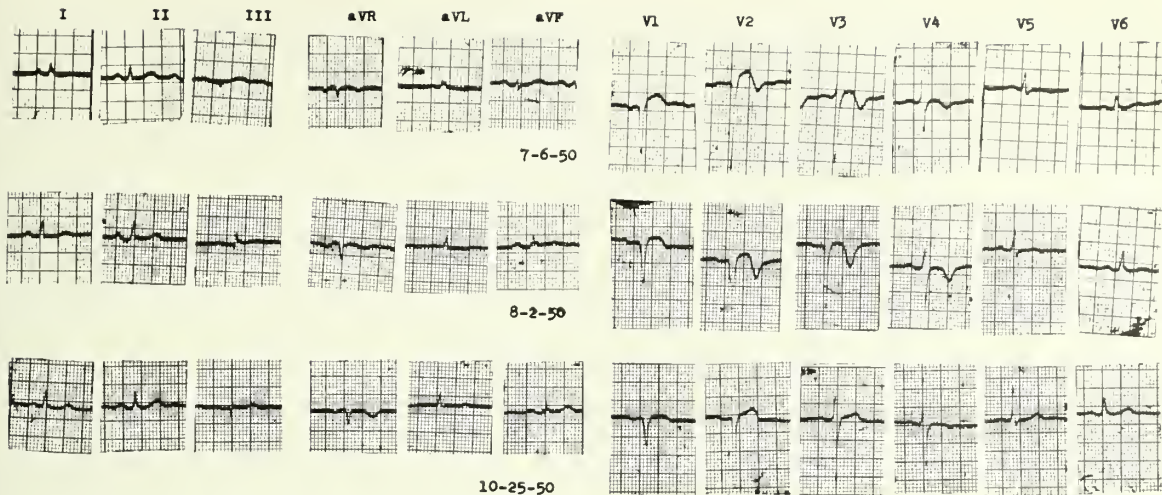


Fig. 4. Top two tracings: Acute cor pulmonale. ECG dated June 26, 1951 is the preliminary control. ECG of August 7, 1951 shows the changes one day after pulmonary infarction. Bottom tracing: Chronic cor pulmonale in an old asthmatic.

infarct. An electrocardiogram including only limb leads and one apical lead often misses completely the pathological changes of such an infarct medially placed in the left ventricle.

Case 3. E. Z., a 55-year-old white male, entered the Minneapolis Veterans' Hospital June 25, 1951, with the complaint of recent passage of tarry stools with clots of blood. He gave a history of recurring abdominal pain typical of peptic ulcer for the past thirty years. He was not in shock. Physical examination was essentially negative. The admission hemoglobin was 12.6 gm. per 100 cc. Bromsulfalein retention was 2 per cent. Gastro-intestinal x-ray study disclosed an extreme deformity in the first portion of the duodenum. A subtotal gastric resection was performed July 31, 1951. On August 6 he began to cough, raising a small amount of bloody sputum. The temperature rose to 101°. Chest x-ray film showed a density in the right lower lobe interpreted as a pulmonary infarct. Later thrombophlebitic changes became obvious in both legs. The clinical diagnoses in addition to the G.I. pathology were thrombophlebitis of the legs and pulmonary infarction. The electrocardiograms are shown in the upper portion of figure 4. The first tracing on June 26, 1951, is the normal control. The second taken August 7 shows changes characteristic of acute cor pulmonale. Tachycardia has occurred. Bipolar limb leads show only small T wave changes in leads two and three. T waves previously positive in the medial chest positions now show deep negativity extending to V₄. Only a hint of the available electrocardiographic information in this case is revealed in the older four leads.

Case 4. W. B., a 62-year-old white male veteran of World War I, was admitted to the Minneapolis Veterans' Hospital February 27, 1951. His complaints were extreme dyspnea, orthopnea, and edema. For the past thirty years he had been a victim of bronchial asthma with a long record of many admissions to various veterans' hospitals for this condition. Since 1949 his asthmatic wheezing had been aggravated by exertional dyspnea. Orthopnea followed shortly. Since then he had spent most of his waking hours in a chair. For six months prior to this admission he was unable to lie down and spent the night in the chair also. Dependent edema became extreme. Examination showed deep cyanosis of the skin and mucous membranes. The neck veins were distended. Many asthmatic noises were heard throughout the chest. The blood pressure was 130/90. Cardiac percussion was impossible. There were no murmurs. The liver was felt 5 cm. below the costal cartilages. Edema was present in the lower extremities with anasarca of the abdominal wall. Chest x-ray film showed a diffusely enlarged heart, moderate pulmonary congestion, and low flat diaphragms. The clinical diagnoses were bronchial asthma, pulmonary emphysema, chronic cor pulmonale, and heart failure. The electrocardiograms were all similar to the one illustrated in the

bottom tracing of figure 4. Marked right axis deviation is present with high P waves and negative T₂ and T₃. The chest leads show the prominent P waves much more clearly. Abnormal T waves are present. S waves are greater than R waves from V₂ to V₆ suggesting the clockwise rotation of the heart associated with enlargement of the right ventricle.

To determine to what extent chest leads are being used in the upper midwest, a questionnaire was sent out in the spring of 1951 to the hospitals in Minnesota and North and South Dakota listed in the 1949 Hospital number¹³ of the *Journal of the American Medical Association*. Two hundred twenty-two questionnaires were distributed and 75 (33.8 per cent) replies were received. The leads currently taken in these hospitals are tabulated in table I. The three standard limb leads are universally used. Five hospitals use only limb leads. Thirty-eight added one chest lead (in most cases 4F); three used two precordial leads. It appears then that 46 of 75 hospitals (61.3 per cent) utilize an insufficient number of chest leads if three is considered the minimum. It is unlikely that a greater percentage of replies to the questionnaire would diminish this percentage.

Table II shows the charges for electrocardiography in 64 private hospitals. The average charge in 43 hospitals using two chest leads or less is \$7.47. The charges of nine hospitals using four or more chest leads averages

TABLE I
Electrocardiographic Leads Taken in 75 Hospitals of Minnesota, North and South Dakota

Leads taken	No. of hospitals	Per-centage
Three limb leads only	4	5.3
Three limb leads and one chest lead	38	52.0
Three limb leads and two chest leads	3	4.0
Three limb leads and three aV limb leads	1	1.3
Three limb leads and three or four chest leads	15	20.0
Three limb leads and three or four chest leads plus aV leads	5	6.6
Three limb leads and five or six chest leads	2	2.7
Three limb leads and five or six chest leads plus aV leads	7	9.3

TABLE II
Electrocardiographic Charges in 64 Private Hospitals of
Minnesota, North and South Dakota

Leads taken	No. of hospitals	Charges		
		Maximum	Minimum	Average
Three leads	3	\$10.00	\$5.00	\$7.50
Four leads	36	10.00	5.00	7.33
Five leads	3	10.00	5.00	8.33
Six leads	13	12.00	7.00	9.42
Seven to nine leads	5	10.00	5.00	8.00
Ten to twelve leads	4	10.00	7.00	8.62
	64	12.00	5.00	7.95

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§8.27. In this group as the number of chest leads increases, the cost to the patient does not go up proportionately.

CONCLUSIONS

Electrical forces of the heart outside of the frontal plane are not adequately recorded in limb leads. Multiple chest leads add significantly to the value of the electrocardiogram. Illustrations are presented in which multiple chest leads are essential for electrocardiographic interpretation. The use of several chest leads is not common practice in the upper midwest states. The addition of chest leads in private hospitals of this area adds little to the charges made to the patient.

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PHYSICAL CHARACTERISTICS AND HEART DISEASE

AN INVESTIGATION of factors of possible value in forecasting coronary artery disease was made by Menard M. Getler, M.D., Stanley M. Garn, M.D., Samuel A. Levine, M.D., and Paul D. White, F.A.C.P. The three classifications of the study included 97 men who had had myocardial infarction before the age of 40 and who were again active, 146 healthy men of similar age and social level, and 97 men individually matched to the heart subjects in age, physique, occupation, race and economic status. It was found serum uric acid did not rise with age during the third, fourth and fifth decades and was not related to purine in the diet. Values increased, however, with weight and body mass, especially endomorphy, and with coronary disease. Physique was also related to serum uric acid, since values were highest in endomorphs and lowest in ectomorphs.

Body weight versus weight standards in coronary artery disease and a healthy group. *Ann. Int. Med.* 34:1416-1420, 1951. Serum uric acid in relation to age and physique in health and in coronary heart disease. *Ibid.* 34:1421-1431, 1951.

Massive Thrombus of the Left Auricle

A Case Report

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AS AN OCCASIONAL and rather unusual complication of mitral stenosis, one may find a very massive thrombus involving the entire cavity of the left auricle. In 1948 Evans and Benson described such a clot, that forms in the left auricle during a life, as a mass thrombus. Mitral stenosis particularly lends itself to the development of this type of complication. It probably results because of the slower movement of blood through the left auricle, as well as the favorable influence that auricular fibrillation has to the formation of such intra-auricular thrombi. The diagnosis of such a complication may be made if a patient with mitral stenosis develops severe cyanosis and orthopnea with evidence of marked increase in venous pressure. At times the murmurs will disappear as a result of the formation of such a clot, and frequently the legs will assume a cadaveric appearance.

The case presented here represents a classical example of such a complication of mitral stenosis.

L. P., white, married, male, age 37, was seen for the first time on March 22, 1949 with the story that he had been suffering from dyspnea and palpitation for four years. He stated that he had rheumatic fever at the age of eight, but that as far as he knew he had no secondary involvement of his heart. He was able to lead a normal life and did hard work without discomfort. Four years ago he consulted a physician because he felt poorly, and he was advised to have his tonsils removed. A short time after the removal of his tonsils the patient began to have a hacking cough, pain in the abdomen, shortness of breath and marked fatigue. It was found at this time that he was suffering from pneumonia and heart failure, and he was sent to a local hospital where he received penicillin for a period of three weeks. Following this he felt well for one year when he again developed weakness, fatigue and pain in the abdomen. He was treated at home because of congestive heart failure. He recovered strength gradually, and continued to work until five weeks before consulting us when he had a recurrence of symptoms. In addition, he now had drenching sweats and a low grade fever. He was treated at home by his family physician for congestive heart failure and was finally referred to the hospital for further treatment.

At the time of admission to the hospital, his blood pressure was 145/50, pulse 42 with slow auricular fibrillation, and his temperature was 99.4°. The physical examination was normal with the exception of (1) marked cyanosis and anasarca, (2) systolic and diastolic murmur

at the apex, (3) systolic aortic murmur and (4) great enlargement of the liver and spleen. Petechiae were present over the body. Significant laboratory tests were hemoglobin 17.7 gm., red blood count 4,660,000, white blood count 13,200 and a normal differential count. Blood cultures were negative, but the patient had been receiving some antibiotic treatment at home. It was felt that he had subacute bacterial endocarditis in addition to his rheumatic heart disease. He was treated with penicillin and diuretics, and received routine care for the congestive heart failure. He made an excellent recovery.

The patient was then ambulatory and able to return to work and carry on a useful occupation until December 9, 1950 when he was readmitted to the hospital because of the recurrence of severe congestive heart failure. There was no essential change in his physical examination except that he had developed marked cyanosis and was extremely dyspneic. He failed to respond to the usual therapy for congestive heart failure. His course in the hospital was unrelentingly down grade until shortly before death. About December 28, 1950, the patient developed severe cyanosis of the upper half of his body and a cadaveric appearance of the lower legs. There was tremendous distension of the veins in the neck and the arms. It was suspected that he had a massive thrombus of the left auricle.

The patient expired on December 31, 1950. The autopsy was performed by Dr. John F. Noble, and the description of the heart follows:

"The heart weighs 658 grams. Examination of the valves shows the aortic leaflets to be definitely thickened and sealed together. They are also markedly shortened. The ventricular surface of the leaflets at two points is definitely roughened, but no visible vegetations are present. The mitral leaflets are markedly thickened and sealed together and the mitral orifice is extremely small. The mitral orifice is not more than 1.5 cm. in diameter. The auricular surfaces of the valve show several areas of ulceration and what appears to be flat vegetations. There are no typical subacute vegetations present. The valve leaflets are shortened. The tricuspid leaflets are definitely thickened and opaque, particularly at their free margins. The degree of involvement is less pronounced than the mitral or aortic. The pulmonary leaflets show nothing of note. Examination of the coronary arteries shows only a minimal amount of sclerosis with no evidence of interference in their lumina. The myocardium on section is extremely pale but shows no gross evidence of excess fat, fibrosis, or infarction. The right and left

(Continued on page 470)

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MEDICAL SCIENCES REVIEWS

In the interests of continuing medical education, THE JOURNAL-LANCET offers this department of authoritative reviews of important progress in scientific medicine, both in the fundamental and the clinical fields. The editors propose to define medical sciences very broadly, and hope that each subject treated will be of sufficient importance to interest every reader.

Physiological Tests in Cardiovascular Pulmonary Disease*

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ONE of the most significant developments in the field of clinical investigation in this country has been the application of physiological methods to clinical medicine. Physiology has broken out of the laboratory and invaded the hospital ward. This does not mean that the great advances which physiology has made by means of animal experimentation have been of no value. Rather, experiments on animals performed during the last fifty years have become the basis for many diagnostic physiological procedures on the human being. It would be interesting to speculate on the need for these modern methods in clinical medicine and to take stock of the advantages of more accurate quantitative methods over the more simple procedures of 30 years ago. However, this is not within the scope of this present paper, which

will be limited entirely to a description and evaluation of physiological methods useful in the diagnosis and understanding of diseases of respiration and circulation. It can be readily seen that a sharp demarcation between the diagnostic and the purely investigative studies cannot be made. They are intimately related. However, as a rule, investigative studies precede those concerned with diagnosis. Similarly a study of patients for diagnostic purposes will result in a better understanding of the disease processes.

It is the purpose of this discussion to review some of the physiological methods which have been of aid in the diagnosis and the investigation of circulatory and respiratory diseases in man.

A. Circulatory Physiological Tests

I. CATHETERIZATION OF THE HEART:

Catheterization of the heart may be either intravenous or intra-arterial. It was first performed by a German physician, Forssmann, who introduced the tube into his own heart through a needle inserted in the arm vein.¹ Shortly after that, Klein, also in Germany, was able to report eleven successes in eighteen attempts at placing a catheter in the right heart by using the same technic, and in three cases he obtained blood samples for the determination of the arteriovenous oxygen difference.² In the beginning, the technic of right heart catheterization was primarily intended for the injection of drugs into the cardiac cavities directly or for the injection of radiopaque substances in order to visualize the chambers of the heart and emanating vessels. In 1941, Cournand and Ranges in this country described the introduction of a radiopaque catheter into the right auricle of man.³ Since then, a great number of investigators have used this method for diagnostic and physiological studies.

Catheterization of the heart is of particular importance in the diagnosis of congenital heart disease, and without

any question this field will see the greatest diagnostic application of this technic.⁴ In the use of the catheter the following criteria should be followed:

1. The catheter should be moved under fluoroscopic control only.
2. Pressures should be recorded from chambers of the heart and great vessels.
3. The oxygen content of blood in the various chambers of the heart, the superior and inferior vena cava, and where possible, the pulmonary artery or the artery or the aorta should be determined.
4. The volume of blood flow through the various portions of the circulatory tree and the shunt should be calculated from the oxygen contents of the blood obtained.

Although catheterization is of great diagnostic importance, it by no means replaces a thorough clinical examination and an accurate history. However, in the more complicated cases, catheterization and angiocardiography are indicated. A detailed discussion of the diagnostic criteria in the various malformations of the heart and the great vessels is not possible in this review. The reader

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is referred to publications dealing with the subject in detail.⁴⁻⁶ However, the value of catheterization in some of the congenital malformations of the heart will be discussed at this point.

A. Congenital heart disease:

The tetralogy of Fallot may be usually diagnosed without too much difficulty by clinical methods alone. Diagnostic problems may arise, however, particularly when there is present large collateral circulation to the lungs resulting in pulsation in the lung field and thus simulating either elevation of the pulmonary artery pressure or an increased pulmonary blood flow. The presence of associated malformations may also complicate the picture. *Tricuspid atresia* may usually be recognized by clinical and electrocardiographic means. When this malformation is present, the rudimentary right ventricle is not catheterized, and the tube usually enters a high pressure chamber in which the oxygen content considerably exceeds that of the right auricle. The fact that the catheter has entered the left ventricular chamber through the left auricle is very often not recognized. In patients with tricuspid atresia studied in this laboratory, the pulmonary artery or the aorta were never intubated.⁷

In *transposition of the great vessels*, catheterization offers information on the location of the intracardiac shunt.⁸ Furthermore, if the aorta is intubated, it is helpful to turn the patient in the right oblique or right lateral position. If the catheter lies anteriorly and in close proximity to the right ventricular outflow tract, the aorta is probably transposed. Unless the presence of transposition is recognized, calculations of various shunts and volume flows will be misleading.⁸

In *patent foramen ovale with pulmonic stenosis*, which is now an operable malformation,⁹ catheterization of the heart is of value. Clinical findings may suggest a tetralogy of Fallot especially when the pulmonary conus is not prominent. When the foramen ovale is open, the intracardiac shunt is usually exclusively directed from right to left. This results in the reduction of peripheral arterial oxygen saturation.¹⁰ When the foramen ovale is closed, there is no intracardiac shunt and the peripheral arterial saturation is normal. In patients in whom there is no intracardiac left to right shunt and where it is sometimes difficult to establish the presence or absence of either an overriding aorta or a ventricular septal defect, it has been found helpful to insert the catheter in the right ventricle, inject Evan's blue through the catheter and record the appearance time of this dye in a peripheral artery.¹¹ A rapid appearance of dye in arterial blood indicates the presence of a right to left shunt either through an overriding aorta or a ventricular septal defect. These considerations are of practical importance because the construction of an artificial ductus is not indicated in valvular pulmonic stenosis with closed foramen ovale because there is no right to left shunt. Although the construction of an artificial ductus should increase peripheral arterial oxygen saturation in patients with valvular pulmonic stenosis and patent foramen ovale, other considerations suggest that here too pulmo-

nary valvulotomy is the operation of choice.¹⁰ Apparently, the construction of an artificial ductus increases the volume of blood returning to the left auricle, leading to an increase in pressure in this chamber preventing the operation of the interauricular vent mechanism. As a result, the right auricular pressure rises and backward failure ensues.¹⁰

Catheterization is of particular importance in the diagnosis of *anomalous venous return*.¹² If pulmonary veins drain into one of the caval veins, the blood oxygen content in these vessels will be increased above that of the subclavian veins or the inferior vena cava distal to the entrance of the anomalous vein. If the anomalous veins drain into the right auricle, the oxygen content of the right auricular blood will be elevated above that of inferior or superior vena caval blood. It is sometimes difficult to distinguish anomalous drainage of pulmonary veins into the right auricle from auricular septal defect with a left to right shunt.¹²

Two patients with transposition of the great vessels and anomalous drainage of pulmonary veins were studied in this laboratory.¹² In this malformation the drainage of pulmonary veins into the right side of the heart constitutes a compensatory mechanism by allowing oxygenated blood to enter the systemic circulation. Two patients have been studied in whom all the pulmonary veins drained into the superior vena cava or its tributaries. In this rare malformation oxygenated blood enters the superior vena cava, and the blood oxygen content in all chambers of the heart, the pulmonary artery and systemic arteries are equal.¹²

Eisenmenger's disease is characterized by pulmonary hypertension and usually a normal pulmonary blood flow and a right to left shunt through the ventricular septal defect and the overriding aorta.¹³ Difficulty in diagnosis by catheterization may arise because of the possible absence of an intracardiac left to right shunt. Dye injection through the catheter with the tip in the right ventricle, however, may be an important adjunct in the diagnosis. Selzer has recently stated that "the Eisenmenger complex merges inconspicuously with the ventricular septal defect, the dividing line being a clinical feature, namely the completeness of oxygen saturation of the arterial blood."¹⁴ There is no question that the two malformations are similar. However, there is no doubt that Eisenmenger's complex is always associated with pulmonary hypertension whereas pulmonary hypertension may be absent in ventricular septal defect.¹³ Recent studies from autopsy material from lungs of patients with Eisenmenger's disease have shown severe pulmonary vascular lesions consisting of intimal proliferation, thrombus formation and recanalization. There was also prominence of the muscular media.¹⁴

Isolated auricular or ventricular septal defects usually offer no great diagnostic problems. Cyanosis is usually absent in patients with uncomplicated defects of the ventricular septum. Ventricular septal defect is usually characterized by a gradient in oxygen content between auricular and ventricular blood. In auricular septal defect the gradient in the oxygen content is between the

caval and auricular blood. Both auricular or ventricular septal defects may be accompanied by pulmonary hypertension.¹⁵

Single ventricle and truncus arteriosus offer the greatest obstacles to diagnosis by means of catheterization of the heart. Although the presence of a single ventricle may be suspected, if the oxygen content in a high-pressure chamber exceeds that of right auricular blood by at least 3.5 volumes per cent, such a finding does not exclude the possibility of tricuspid atresia, if the catheter has passed into the high pressure chamber through the left auricle.⁴ Diagnosis is particularly difficult if other malformations of the great vessels are associated with the presence of a single ventricle. This is frequently the case. In single ventricle the pulmonary artery may arise from the rudimentary outlet chamber, or it may be transposed, with the aorta arising from the rudimentary outlet chamber. Therefore, a calculation of the blood flow is important.⁴ If the pulmonary blood flow calculated from oxygen figures of the high pressure chamber is low, it may be assumed that the pulmonary artery either originates from the rudimentary outlet chamber or that there is present pulmonic stenosis. On the other hand, when the calculated pulmonary blood flow is high, and the systemic flow is low, the aorta probably originates from the rudimentary outlet chamber.⁴

Patent ductus arteriosus usually may be diagnosed without much difficulty by the presence of a gradient in oxygen content from right ventricular to pulmonary arterial blood.⁴ A special pressure tracing from the pulmonary artery in patients with patent ductus has been described by Griffith and may be of diagnostic importance.¹⁶ In some instances, the catheter may be introduced through the patent ductus into the aorta. Catheterization of the ductus is sometimes essential for the diagnosis, particularly if the malformation is accompanied by pulmonic insufficiency or if pulmonary resistance is elevated and the shunt through the ductus is directed from the pulmonary artery into the aorta. If this is suspected, it is advisable to take arterial blood samples from the right brachial and/or femoral artery. In the presence of a reversal of flow through the ductus, the oxygen saturation in femoral arterial blood is usually less than that in the right brachial artery.¹⁷

Intravenous catheterization is of no diagnostic value in *coarctation of the aorta*. However, intra-aortic catheterization followed by injection of radiopaque material has been found useful in establishing the exact location of the constriction.¹⁸

B. Acquired heart disease:

Mitral stenosis. A diagnosis of mitral and other valvular diseases can be made on the basis of a clinical examination alone. However, recent progress in the surgical treatment of mitral stenosis has renewed the interests in the physiopathology of this disease and has made it advisable to study patients in order to obtain more information on the advisability of operation on the mitral valve. Furthermore, cardiac catheterization is also of interest in postoperative studies in order to evaluate the possible benefits of operation and the prognosis. Before

the advent of catheterization, clinical information indicated disturbances in the pulmonary circulation. Accentuation of the pulmonary second sound, increased prominence of the pulmonary vascular shadow, enlargement of the right ventricle indicated the presence of increased pressure in the lesser circulation.

Bloomfield was the first to find increased right ventricular pressure in patients with mitral stenosis.¹⁹ Harken,²⁰ Bland and Sweet,²¹ Bayliss²² and others reported increase in right ventricular pulmonary artery pressure in mitral disease. An elevation in the pulmonary artery pressure could be the result of increased pulmonary flow in the presence of fixed vascular resistance or of an increased left atrial pressure and/or increased resistance of the pulmonary vascular bed. An investigation of the factors which change the pulmonary resistance in mitral stenosis is of great practical importance. If operation on the mitral valve results in a fall in left atrial pressure alone, the danger of pulmonary edema will be lessened, but the danger of right heart failure due to increased pulmonary resistance will not be eliminated. It is possible to obtain information on the state of the pulmonary vascular bed by comparing the results obtained in patients with mitral disease during rest and exercise. Such studies have been performed by Hickam and Cargill,²³ by Gorlin and his associates,²⁴ and in this laboratory.²⁵ Most investigators agreed that the pulmonary artery pressure in mitral disease was elevated at rest, rising still further during exercise. Bayliss et al found some correlation between exercise tolerance and the height of the pulmonary artery pressure; patients with normal systolic pressure being less incapacitated than those with raised pressure.²² However, they described several exceptions to this rule. There is no doubt that the primary factor responsible for the development of pulmonary hypertension in mitral stenosis is the mechanical obstruction offered by the diseased mitral valve. However, pathological and physiological studies have indicated that pulmonary vascular disease may be equally if not more responsible for the maintained elevation of pressure in the lesser circulation. Gorlin, for instance, has shown that with lesser degrees of pulmonary hypertension the pulmonary artery pressure is increased in proportion to the pulmonary capillary pressure and that the pressure gradient from the pulmonary artery to the pulmonary capillaries as well as pulmonary arteriolar resistance, is normal.²⁴ This finding could not be corroborated by Calazel and his co-workers, who found that there was no direct correlation between the height of the pulmonary capillary pressure and that of the pulmonary arterial pressure.²⁶ Pulmonary artery and capillary pressures of patients with mitral disease were elevated at rest and rose further with exercise. It is of particular interest that in some patients exercise resulted in a decrease of the pulmonary vascular resistance.²⁵ This indicates that in some patients the pulmonary vascular resistance is not fixed. This is a promising finding because it does indicate that operation on the mitral valve may result in a reversibility of the pulmonary changes. The physiological findings indicating elevation in pulmonary artery resistance are borne out by the anatomical observations

of Parker and Weiss²⁷ and by the Mayo Clinic workers.²⁸ The latter stressed that medial muscular hypertrophy preceded intimal fibrosis.

Gorlin and Gorlin developed standard hydrokinetic orifice formulae for the calculation of the size of the stenotic mitral valve.²⁹ These formulae are primarily of theoretical interest. They present an objective evaluation for physical procedures designed to widen a stenotic orifice. Furthermore, a theoretical prediction of the benefit to be derived from surgical widening of the stenotic valve may be made. It is doubtful, however, that these formulae aid in deciding the course of therapy. Clinical judgment is the most important factor. However, the following physiological factors may be taken into consideration. Operation may be helpful in patients in whom elevation in pulmonary artery pressure is primarily the result of the resistance at the stenosed valve. Furthermore, operation is not indicated in the presence of marked elevation in the right auricular pressure and increased residual volume in the right ventricle.²⁵ The latter findings result from the presence of right ventricular failure.

As already mentioned, operation on the mitral valve results in most instances in a fall in the pulmonary artery pressure.^{26a,29a} The changes in pulmonary vascular resistance are not uniform. In many patients the postoperative clinical course cannot be correlated with physiological findings, for instance, the pulmonary artery pressure may show a significant fall, while the exercise tolerance remains poor; it is entirely possible that a comparison of the pre- and postoperative efficiency measurements of the whole organism during exercise may show a better correlation with the clinical results.

C. Cardiac failure:

In the study of heart failure and the action of cardiac glycosides, cardiac catheterization is of importance if the findings are correlated with those obtained by an investigation of electrolyte balance and renal function tests. In general, catheterization of the heart has confirmed studies which preceded the advent of this technic.³⁰ There is no question that the cardiac output in most patients with heart failure is decreased³¹ except in those suffering from hyperkinetic syndrome (anemia, beri-beri heart disease, Padgett's disease, hyperthyroidism, arteriovenous aneurysm).³² McMichael on the basis of catheterization studies defines heart failure as follows: "The heart is failing when its capacity to increase output is seriously impaired, and when output is only maintained at the expense of a raised venous filling pressure."³³ However, it seems to the author that Harrison's definition of myocardial failure is more in line with the results obtained with recent catheterization studies: "The sine qua non of myocardial failure is to be found not in the cardiac output alone, but in the completeness of cardiac emptying."³⁴

Catheterization does not contribute to the diagnosis of congestive failure. However, it is important to assess the degree of cardiac failure by a study of the relationship between the degree of cardiac emptying and the changes in the initial tension of the cardiac muscle fibers.

This relationship is of particular importance because the response of the heart to changes in the initial tension and the diastolic volume varies with the degree of failure.³⁵ In patients with severe failure, increase in the diastolic volume reduces the cardiac output whereas in patients with moderate failure, an increase in the diastolic volume increases the output. It might be of practical importance to study the relationship between load and systolic discharge by following changes in stroke volume second to alterations in cardiac filling. This could be accomplished by the injection of digitalis. If digitalis produces an increase in the systolic discharge, a strict salt restriction or similar measures might be advisable. If the glycoside reduces stroke volume, such measures are not indicated. Stead concluded that symptoms of congestive failure develop whenever the cardiac output is inadequate for the demands of the tissues over a long period of time and that there is no absolute level of cardiac output at which the symptoms of congestive failure appear.³¹ He states furthermore that there is no close correlation between the level of cardiac output and the presence of dyspnea or orthopnea. In his opinion this lack of correlation results from the fact that the lungs may be waterlocked. Anything which will improve the edema of the lungs will improve these symptoms even though the cardiac output remains inadequate. True as this may be, salt retention may cause dyspnea or orthopnea not only through accumulation of fluid in the lungs but also through an increased diastolic volume in the left side of the heart with ensuing elevation in pulmonary venous pressure.

Catheterization of the heart has made possible a critical analysis of the relationship between right atrial pressure and variations in cardiac output. It should be remembered that in Starling's original preparations at a given heart rate, diastolic heart size was determined largely by the head of pressure in the great veins and atria. This need not be the case in heart failure in vivo. Here excessive increases in the initial stretch of the muscle fiber may well be the primary phenomenon which is followed by an increase in the pressure in the great veins. Stead has shown that the output of the heart in the presence of an adequate volume of blood is varied by changes in ventricular relaxation and contraction which are independent of fairly wide variations in atrial pressure.³⁶ Bloomfield reporting on the effect of ouabain found no correlation between the effect of venous pressure and the cardiac output³⁷ Richards summarizes the situation in congestive failure very well when he says: "one of the basic phenomena of congestive heart failure appears to be inadequate ventricular emptying during systole" and when he says furthermore "in left ventricular failure it is probably correct to assume simply that pulmonary congestion is caused in the first instance by failure of emptying of the left ventricle accompanied by adequate systolic output of the right ventricle." In incipient failure, in which salt and water retention occur early, right sided congestion develops secondary to increased blood volume. On the other hand, in the cases in which inadequate right ventricular emptying occurs first, the congestion appears before the hypervolemia.³⁸

D. Coronary flow and myocardial oxygen consumption:

Recent work employing catheterization of the coronary sinus of man has shed further light on the mechanism of cardiac failure in man, and also elucidated some of the action of cardiac glycosides.^{39,40} It has been found that in patients with myocardial failure the heart not only maintains the coronary flow until failure becomes evident, but also extracts oxygen to such a degree that the coronary sinus blood contains sometimes less than three volumes per cent.⁴⁰ The most important step in the understanding of the mechanism of myocardial failure is the realization that the oxygen consumption per cent of myocardium is normal or only slightly increased. There appears to be no failure in the oxydative energy production. Cardiac failure is characterized by the inability of the heart to convert oxydative energy into useful work. Cardiac glycosides given to normal individuals lower cardiac output but do not alter myocardial oxygen usage. The normal heart is therefore doing less work after digitalis but using the same amount of oxygen, and the loss of efficiency is sometimes considerable.⁴¹ In the failing heart, digitalis preparations increase the cardiac output but do not significantly alter the coronary flow or the arteriovenous oxygen difference. Thus the heart becomes more efficient, but it does not gain in efficiency by decreasing energy consumption. The conclusion is that it develops greater facility in transferring oxydative energy into mechanical work or in the utilization of energy.

Coronary catheterization in man has also contributed to an understanding of the behavior of myocardium and the coronary circulation in such conditions as anemia, hyperthyroidism, coarctation of the aorta, and hypertensive cardiovascular disease accompanied by cardiac hypertrophy. The reader is here referred to the original publications.⁴⁰

The subject of pulmonary heart disease will be dealt with in the portion concerned with pulmonary function tests.

II. ELECTROKYMOGRAPHY

The electrokymograph is an instrument which permits the graphic registration of the movements of the heart and great vessels. It also reflects the movements and the density changes of a chosen portion of the border or body of the heart or great vessels. The development of this new tool for the examination of the heart is primarily the work of Henny and Boone.⁴² The electrokymograph converts the motions and density changes of selected points to corresponding electric current variations which are then recorded on photographic paper. The apparatus consists principally of a roentgen wave sensitive pick-up unit and its power supply. The area to be recorded is framed by a lead diaphragm behind which is placed a piece of fluorescent screen, the light emanating from the screen or from the photosensitive surface is picked up by a photomultiplier tube which is activated by fluorescent light.⁴³

Using this method, ventricular, atrial and arterial electrokymograms can be obtained. Furthermore, the apparatus is of use in obtaining records of such events

as heart density changes and hilar shadow movements. The left and right ventricular electrokymograms have basically similar configurations though they may differ in detail. The various phases of the cardiac cycle such as isometric contraction, ejection phase, protodiastolic phase, and isometric relaxation phase can be studied and their duration can be measured. Basic patterns from the atria can be also obtained. Electrograms from the pulmonary artery, the ascending aorta and the aortic knob closely resemble the carotid sphygmogram or direct pressure tracing obtained from these vessels. It should be stressed, however, that the electrokymogram does not record pressures but only border movements of the vascular wall.

Boone studied extensively the ventricular isometric relaxation phase of the cardiac cycle in man.⁴⁴ He found that the duration of the isometric relaxation phase as measured from the electrokymogram has a well defined range in normal subjects. It is of significance that in a group of patients with heart disease the range of isometric relaxation is significantly different from that found in the normal. Some of the factors mentioned by Boone which may individually or in combination affect the duration of the phase of isometric relaxation are: the inherent rate of muscular relaxation, the intraventricular pressure at the onset of isometric relaxation and the intra-atrial pressure at the end of isometric relaxation.

Gillick and Schneider recorded lung field pulsations by means of the electrokymograph.⁴⁵ They found that lung field pulsations were affected in contour and amplitude by expiration against a resistance. They conjecture that the sudden elevation of the intrathoracic pressure produces an immediate obstruction to venous return and pulmonary outflow, thus causing a cardiac tamponade with accompanying distorted or absent pulse wave.

Of particular value is the electrokymograph in the recognition of constrictive pericarditis. Gillick and Reynolds performed electrokymographic examination of four patients with radiologically and surgically proven constrictive pericarditis, in which calcification had produced a constant type of ventricular curve.⁴⁶ The ventricular wave had the appearance of a square wave, that is, its top is flat and it is practically devoid of secondary waves. The descending or emptying component of the wave had about the same duration and angle as the ascending or filling limb. These findings together with those obtained from catheterization studies may be of importance in the recognition of this disease. The electrokymograph may also be important in the differential diagnosis of abnormal shadows within the region of the cardiac silhouette.⁴⁶

Ring and his co-workers utilizing electrokymography described a method which they believe records rapid changes in the size of the heart within the intact chest.^{47,48} They used the densogram for this study. Greater x-ray density indicates more vigorous contraction of the heart muscle. Ring et al have also devised a formula for the determination of the stroke volume from densograms. A method for standardizing the amplitude of border movements has yet to be perfected. Such a

standardization would be of the greatest value in clinical interpretation of cardiac disorders. Recently, Akman and co-workers obtained over 200 left ventricular electrokymographic tracings in 32 normal adults.⁴⁹ They found considerable variations in the contour and time sequence of events in the normal electrokymogram. They suggest that caution should be used in the interpretation of electrokymograms, both as to the contour and their relation to the phases of the heart cycle. In another paper, Solons et al correlated electrokymographic tracings and pressure pulses of the human heart and the great vessels.⁵⁰ They found that the electrokymographic deflections obtained from the superior vena cava and the pulmonary artery show a remarkable constance of time relationship with simultaneous intraluminal pressure curves. They believe that the electrokymograms reflect closely the mechanical activity of the heart as it is propagated to the adjacent major vessels. They suggest that until more complete definition of the physiological meaning of the electrokymographic tracings is obtained, clinical application must be approached with great caution.⁵⁰

It appears, therefore, that the electrokymograph can be a most useful instrument in the study of cardiac physiology and physiopathology, if it can be shown that the stroke volume of the heart can be accurately determined and that the amplitude of border and density changes can be standardized.

III. BALLISTOCARDIOGRAPH

The ballistocardiograph is an apparatus which records the movements of the body resulting from forces generated in the cardiovascular system by the ejection and flow of blood. The form of the record is constant in healthy young persons and the records are both qualitatively and quantitatively reproducible in the same individual.⁵¹

The various ballistocardiographic waves caused by the contraction of the heart and the ejection of blood are probably produced in the following manner: As blood is ejected from the heart into the ascending aorta, the recoil drives the body footward producing the I wave. A moment later as blood reaches the arch of the aorta it is suddenly decelerated while blood in the descending aorta is accelerated. These two forces are additive and drive the body headward producing the J wave. When the blood flowing down the abdominal aorta meets the resistance of the branching vascular tree, it is abruptly slowed; this results in a footward movement of the body, the K wave.⁵²

Several models of ballistocardiographs have been employed. Nickerson and Curtis devised a model which has been critically damped by metal sylvphon bellows.⁵³ These bellows result in low frequency critically dampened ballistocardiographs of 1.5 cycles per second. According to Nickerson the advantage of this low frequency critically dampened bed is that the elastic properties of the tissues which almost completely determine the size and shape of the record at higher frequency play a lesser role at lower frequencies around 1.5 per second. Nickerson and Curtis believe that oscillations of the ballistocardiogram, which according to Hamilton and Dow are caused by impacts

of the blood at peripheral boundaries and surging of the blood within the aortic Windkessel, are over-accentuated in high frequency undampened recordings. Using this critically damped system, Nickerson and Curtis developed formulae for the calculation of the stroke volume.⁵³ Jones and Goulder evaluated empirically the low frequency critically damped ballistocardiograph in order to record the amplitude and temporal relationship of the first four ballistocardiographic waves.⁵⁴ Various patterns were found in coarctation of the aorta, in vertical hearts, in essential hypertension and in aortic insufficiency.

In contrast to the critically damped ballistocardiograph, Starr employs an apparatus with a high natural frequency (about 10-15 c/s). Using this apparatus the patient may continue normal breathing during the test, which is not possible with the critically damped ballistocardiograph. It is believed that a bed with a high frequency response must be used in order to faithfully reproduce the forces acting on it and accurately follow the rapid physiologic events. Starr's model is gaining in popularity and the method is more widely used as an adjunct to the clinical and electrocardiographic examination.⁵¹

It seems to the present writer that although Starr did not design this instrument for the purpose of diagnosing cardiac infarction, coronary sclerosis, hyperthyroidism and the like, the large amount of literature which has been published since then indicates the tendency to use the ballistocardiogram as a diagnostic tool. Starr and his co-workers have found a high incidence of abnormal ballistocardiograms in patients suffering from coronary heart disease.⁵¹

Using the same type of ballistocardiogram, Brown and his coworkers studied the ballistocardiographic pattern in typical cases of angina pectoris and established a definite relationship between this symptom complex and the ballistocardiographic waves.⁵⁵ They believe that their study established the ballistocardiogram as an instrument in the diagnosis of cases of angina pectoris.

Baker and associates attempted to determine the relative frequency with which abnormal electrocardiograms and ballistocardiograms are found in a selected series of patients with coronary artery disease.⁵⁶ They found that ballistocardiograms were abnormal in a much greater number of patients with clinically proven coronary heart disease than electrocardiograms. They found the ballistocardiograph to be a valuable tool for the detection of circulatory dysfunction in patients with coronary artery disease.

Scarborough and his associates used the ballistocardiograph in a study of the cardiovascular response in normal subjects and 11 patients with suspected coronary artery disease before, during and after the induction of controlled anoxemia.⁵⁷ In normal individuals, the ballistocardiograms remained normal throughout the period of anoxemia, and there was a progressive increase in cardiac output as the arterial saturation decreased. It is of particular significance that in the patient group, one normal and two borderline records became abnormal or more abnormal during the period of oxygen lack.

Using the ballistocardiogram with a pick-up directly from the body, Chesky and associates measured ballistocardiograms in 600 consecutive cases.⁵⁸ The cases studied included normal individuals, hypertensive patients, and patients with angina pectoris and those with previous myocardial infarction. They showed that the ballistocardiograms were abnormal in most patients with hypertension. In patients with angina pectoris with normal resting electrocardiograms but positive Master two step electrocardiograms, the resting ballistocardiograms were abnormal in about 80 per cent. If ballistocardiographic tracings were recorded after exercise as well, the percentage of abnormal tracings reached over 90 per cent.

Previous ballistocardiographic apparatus have recorded only those vibrations which are directed parallel to the long axis of the body. Scarborough and co-workers recently modified a standard type of high-frequency ballistocardiograph so that vibrations other than those directed in the longitudinal axis of the body could be recorded.⁵⁹ The new apparatus attempts to explore the distribution of these ballistic movements in space. It

consists of a light wooden turntable placed on top of a regular ballistocardiograph bed. This turntable permits rotation through 360 degrees with respect to the long axis of the ballistocardiographic bed. Vector loops are then derived from the tracings. Scarborough and co-workers found that subjects with cardiovascular disease often showed marked alterations in their vector diagrams. The obvious limitations of the methods are that the records are not taken simultaneously and that the vector loops, similar to head-foot vibrations, do not result from the movements of the blood in the great vessels alone. In later studies Scarborough and co-workers described several types of vector ballistocardiographic abnormalities found in coronary disease. Braunstein et al have recently developed a high frequency table, which allows ballistic recordings in two planes.⁶⁰

The future value of the ballistocardiogram has been well defined by Hamilton: "It is to be hoped that investigations in this field will take a descriptive and empirical trend rather than one based on over-simplified mathematics."⁶¹

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B. Pulmonary Physiological Tests

Some of the methods useful in diagnosis and investigation of circulatory disorders described above are also applicable to the study of respiratory function. However, the methods described below apply principally to pulmonary disease.

METHODS

1. Lung volumes (Spirometry):

Measurements of the amount of air exchanged during each breath at rest (resting tidal volume),¹ as well as maximum inspiration after an ordinary expiration (inspiratory capacity), maximum expiration after an ordinary expiration (expiratory reserve volume), and maximum expiration after a maximum inspiratory effort (vital capacity) can all be measured by means of a spirometer. The amount of air remaining after a maximum expiratory effort (residual volume) can be determined by the helium dilution method of McMichael or by the nitrogen elimination method of Cournand.²

The maximum breathing capacity is the total amount of air that can be moved through the lungs in one minute. A low air resistance spirometer may be used for this measurement. It is important to know the amount of resistance in the spirometer used, as small increases in resistance cause changes in the velocity and duration of breathing.³

2. Studies on gas transportation:

Analysis of the fall in oxygen tension from inspired air to arterial and thence to mixed venous blood can now be made by use of the system outlined by Lilienthal and Riley.^{4,5} The fall in oxygen tension from inspired air to alveolar air is dependent on ventilation and distribution of air in the lungs. Study of the rate of output of nitrogen from the lungs while the patient is breathing pure oxygen⁶ may reveal the presence of emphysema. The use of the pneumotachogram for the study of air velocities is at present a research method, but when combined with determination of intrapleural pressures may eventually give valuable information about the elastance and viscance of lung tissue.⁷ The fall in oxygen tension from the alveolus to the lung capillary is dependent

upon permeability and area of the alveolar-capillary membrane as well as ventilation perfusion ratios in the lungs and capillaries.⁸ The fall in oxygen tension from pulmonary capillary to arterial blood is due to mixing of venous blood which has not been adequately exposed to alveolar oxygen.

Alveolar oxygen tension may be obtained, indirectly from an analysis of the inspired and expired air, the R.Q., the arterial oxygen tension and arterial carbon dioxide tension.⁸ Once this value is obtained it is possible to find the gradient between alveolar and arterial oxygen tension. This gradient may be subdivided into two other gradients, that between alveolar air and pulmonary capillary blood caused by poor diffusion of oxygen and that between capillary blood and arterial blood caused by mixture with unaerated blood. At high pressure levels of inspired oxygen, the alveolar-capillary gradient is minimized and most of difference in oxygen tension between alveolar air and arterial blood is due to admixture of venous blood. At lower levels of inspired oxygen most of the alveolar-arterial oxygen tension gradient is caused by poor diffusion across the alveolar-capillary membrane and the effect of venous admixture is minimized. This differential effect is due to the shape of the oxygen dissociation curve. By a series of approximations it is possible to calculate the percentage of venous admixture (blood passing through unventilated areas of the lungs) and the mean difference between alveolar and pulmonary capillary oxygen tension. From the latter value the diffusing capacity*

*Diffusing capacity in cc. of oxygen/mm./mm. Hg. = $\frac{\text{O}_2 \text{ intake in cc./min.}}{\text{Mean pressure difference between alveolar and pulmonary capillary oxygen tension in mm. Hg.}}$

may be calculated. Thus by this system, the relative part played by faulty diffusion of gas, and perfusion of poorly ventilated areas of the lungs in the production of arterial blood unsaturation may be calculated.

3. Studies on arterial saturation:

The oximeter has proved a handy tool in estimating arterial saturation and especially in measuring changes during exercise or while breathing high or low oxygen. Douglas and Edholm⁹ have measured the time required to bring the arterial blood oxygen saturation to 99.5 per cent saturation in patients with various lung conditions while breathing pure oxygen. The saturation time was found to be prolonged in patients with emphysema. Bing¹⁰ has shown that a right to left shunt may increase during exercise. Measurement of arterial oxygen saturation while the patient is breathing pure oxygen serves as a rough method for differentiating cyanosis due to anatomical shunts from that due to intrinsic lung disease. In lung disease, the shunts are generally not very large and are due to distribution or diffusion difficulties. On breathing pure oxygen, the effects of poor distribution of oxygen throughout the lungs and the effects of poor diffusion on pulmonary capillary oxygen desaturation are eliminated so that the arterial oxygen saturation reaches normal limits. Where a large anatomical shunt is present, full saturation of arterial blood does not occur while the patient is breathing pure oxygen. However, with small anatomical shunts, the increased dissolved oxygen in pulmonary capillary blood may be sufficient to fully saturate the shunted blood. Therefore, if the arterial blood is desaturated when the patient is breathing pure oxygen, the shunt is anatomical, but if it is fully saturated there may be either a small anatomical shunt or a physiological shunt through the lungs.

4. Blood electrolyte studies:

Many workers have noted that the arterial CO₂ pressure is elevated in chronic pulmonary disease, particularly where alveolar hypoventilation is present. The CO₂ pressure may be determined directly by the method of Riley and Lilienthal¹¹ or indirectly with CO₂ content and pH from the charts of Van Slyke.¹²

A slightly low serum chloride may accompany and be caused by the high serum bicarbonate in certain patients. However, in occasional patients the serum may be reduced far greater than the corresponding increase in serum bicarbonate, and may even approach the changes seen in Addison's disease.¹³ In such patients, however, there is a normal serum sodium and potassium and a normal total blood volume.¹⁴ In cases where Addison's disease is suspected, the sodium deprivation test¹⁵ is helpful.

5. Bronchspirometry:

Although not strictly a diagnostic test, bronchspirometry may give a valuable physiological information about the separate function of the two lungs. The test is of particular importance prior to the resectional lung surgery in predicting how removal of a lung will affect respiratory function after operation. Separate estimates of vital capacity, ventilation and oxygen intake may be recorded by well described methods.¹⁶

RIGHT-SIDED HEART FAILURE DUE TO PULMONARY DISEASE

The application of pulmonary function tests is mainly useful in elucidating the causes of cor pulmonale, the

presence of emphysema and of diffusion fibrosis. Carcinoma of the bronchus, bronchial asthma, bronchiectasis, and other lung infections are diagnosed best by clinical, bacteriological and radiological means.

Failure of the right heart occurs most frequently secondary to failure of the left heart caused by valvular disease, systemic hypertension or myocardial ischemia. Right-sided failure may also occur concomitantly with left-sided failure as in hyperthyroidism or diphtheritic myocarditis. Constrictive pericarditis may cause predominantly right-sided failure.

Isolated right-sided heart failure occurs rarely with acquired pulmonary and tricuspid valvular lesions and with congenital deformities of the valves and/or interauricular and interventricular septal defects.

Cor pulmonale is defined as isolated enlargement and failure of the right ventricle secondary to diseases of the lungs or pulmonary arteries. The earliest and occasionally the only sign of cor pulmonale is elevated pulmonary artery pressure. Acute cor pulmonale is most frequently due to pulmonary embolus¹⁷ but may occur rarely in bilhariosis. Chronic cor pulmonale is caused by chronic lung diseases which gradually impinge on and reduce the pulmonary vascular bed. Rarely, diseases of the pulmonary arteries or arterioles may result in chronic cor pulmonale.

The following table shows positions in the vascular tree where pathological processes may cause obstruction to the passage of blood through the lungs.

Pectus excavatum and kyphoscoliotic heart disease are listed as causing obstruction at the level of the pulmonary artery.

However, emphysema is usually present in these conditions,¹⁸ and may play an important part in the development of cor pulmonale.

Pulmonary artery:

- a) Aneurysms
 1. syphilitic
 2. arteriosclerotic
- b) Thrombi³¹
- c) Emboli³¹
- d) Pectus excavatum¹⁹
- e) Kyphoscoliotic heart disease^{18,20}

Pulmonary arterioles:

- a) Arteriosclerosis²⁹
- b) Arteriolosclerosis
- c) Bilhariosis²¹

Pulmonary capillaries and venules:³⁰

- a) Emphysema
- b) Fibrosis of the lung
 1. idiopathic
 2. tuberculosis
 3. infection
 4. sarcoid
 5. berylliosis²²
 6. scleroderma

- c) Bronchiectasis
- d) Carcinoma
 - 1. Metastatic (embolic carcinomatosis)
 - 2. Lymphangitic (miliary carcinomatosis)

Pathological physiology:

The reduction in the pulmonary vascular tree associated with chronic disease of the lungs or pulmonary arteries causes interruption of two closely related physiological processes. First, because blood flow has to be maintained through a reduced cross sectional area, pulmonary artery pressure, pulmonary resistance and work of the right heart must increase if life is to be maintained. Right ventricular hypertrophy follows and finally right heart failure appears with increased venous pressure, liver engorgement and ankle edema. There is accentuation of the pulmonic second sound and right axis deviation.²³

Secondly, impingement on the vascular tree by chronic lung disease also reduces the area through which oxygen diffusion may occur, and certain lung diseases such as carcinomatosis and berylliosis cause thickening of the alveolo-capillary membrane and further interruption of oxygen diffusion. Anoxemia and cyanosis, therefore, appear often associated with hypervolemia and polycythemia, thus increasing the load on the heart at a time when the oxygen supply to the heart is limited.²⁴

The shunts occurring in pulmonary disease are different from those present in congenital heart disease. In the latter, the shunt is an anatomical shunting of venous blood into the peripheral circulation. The amount of the shunt may be calculated from the mixing equation* by assuming the pulmonary venous blood to be 96 per cent saturated.

*Mixing equation: $S = 100 \frac{BA - PV}{MVB - PV}$ where S is the shunt and BA, PV, and MVB the oxygen contents of brachial artery, pulmonary vein and mixed venous blood respectively.

In pulmonary disease the shunting of blood takes place within the lung because part of the venous blood is not exposed to well ventilated alveoli and therefore does not reach full saturation. The pulmonary venous blood cannot be assumed to be 96 per cent saturated. An estimate of the shunt created by poor ventilation perfusion relationships may be obtained by the two level oxygen breathing test of Riley and Lilienthal.

Physiological diagnostic methods in chronic cor pulmonale:

Because dyspnea, cough and cyanosis are associated with either heart or respiratory failure, it is frequently difficult to determine which system is predominately responsible. With recent advances in the treatment of emphysema²⁵ and cor pulmonale²⁴ this differentiation may be of great practical importance. Furthermore, in the surgical treatment of tuberculosis and bronchiectasis, resection may relieve dyspnea and cyanosis in some cases of lung disease alone by elimination of non-functioning lung parenchyma containing venous shunts. Surgery in

cases where right-sided heart failure is present may result in death.

In patients with an accentuated second pulmonic sound, x-ray evidence of enlargement of the pulmonary arteries and right ventricle, electrocardiographic evidence of right ventricular hypertrophy, in the absence of the usual causes of left-sided heart failure, catheterization of the right heart may yield valuable information. Where cyanosis is present, it may be possible to rule out congenital heart disease, and when the pulmonary artery pressure is elevated, an early diagnosis of cor pulmonale may be suspected. Occasionally, pulmonary artery pressure will be normal in patients with compensated cor pulmonale. However, elevation of the pulmonary artery pressure during exercise, strongly suggests limitation of the pulmonary vascular bed. Where clinical right-sided heart failure due to cor pulmonale is present, the right ventricular end diastolic pressure is found to be elevated.

Once the finding of pulmonary artery hypertension in the absence of left-sided or congenital heart disease has been made, the question will arise as to the cause of the limitation in the vascular tree. Pulmonary function studies may be diagnostic.

1. *Cor pulmonale due to emphysema:*

Emphysema is a frequent cause of cor pulmonale. It is characterized physiologically by an increase in the residual volume to total lung capacity ratio, prolonged excretion of nitrogen from the lungs when the patient breathes pure oxygen, decreased maximum breathing capacity, and high arterial blood carbon dioxide tension.²⁶ Spirograms and pneumotachogram may show a prolonged rate of expiration, and during the maximum breathing capacity test, ventilation will tend to take place in the inspiratory position. Arterial oxygen unsaturation following a standard exercise test is present in the more severe cases. In advanced cases cyanosis may be present at rest.

2. *Cor pulmonale due to pulmonary fibrosis:*

Baldwin, Cournand and Richards²⁷ have recently published a series of investigations on pulmonary fibrosis without emphysema. They found pulmonary fibrosis to be of two physiological types: In simple fibrosis there was reduction in the lung volumes and maximum breathing capacity with hyperventilation during exercise. The maximum breathing capacity was usually not so greatly reduced as in severely emphysematous patients. Cor pulmonale and cyanosis were not present in this group. Patients with silicosis, widespread bronchiectasis, chronic fibroid tuberculosis and sarcoidosis constituted this group. In spite of the widespread involvement of lung tissues by silicosis and resulting pulmonary vascular lesions, it is unusual for cor pulmonale to be associated with silicosis in the absence of emphysema.²⁸

The second type of fibrosis, diffusion fibrosis, was found in patients with scleroderma, lymphangitic carcinoma, interstitial pneumonitis, berylliosis and foreign body granulomas of the lung. The physiological abnormalities included reduction in lung volumes with rela-

tively normal maximum breathing capacities. There was severe hyperventilation. On study by cardiac catheterization, increased pulmonary artery pressure was found. Study of the gradient between alveolar air and arterial blood oxygen tension revealed interference in oxygen passage across the alveolar-capillary membrane. There was a high mean difference between alveolar and pulmonary capillary oxygen tension. The oxygen diffusing capacity was reduced.

3. *Cor pulmonale due to pulmonary vascular disease:*

Occasionally the pulmonary artery pressure may be found elevated in the absence of any abnormality in the pulmonary function tests and without congenital heart disease or left-sided heart failure. In such cases, disease of the pulmonary arteries or arterioles may be suspected.²⁹ Recently, one of us has studied the syndrome of cor pulmonale secondary to thrombosis or emboli to major pulmonary arteries.³¹

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The Comparative Susceptibility to Endocarditis and Glomerulonephritis in Dogs With and Without Arteriovenous Shunts*

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SPONTANEOUS endocarditis in animals in general is uncommon¹ and in the dog, quite rare.² The problem of inducing endocarditis in experimental animals regularly has been a difficult one. Rosenbach³ in 1878 reported producing endocarditis by traumatizing the heart valves and then injecting bacteria. Nine years later Dreshfield⁴ reported producing the disease by the injection of bacteria alone. Since that period most of the efforts to produce endocarditis have followed in general these two lines of approach. In most of them, *Streptococcus viridans* or hemolyticus was used apparently since the streptococcus is the offending organism in most cases of human endocarditis. A brief resume of previous work on experimental endocarditis has appeared in a previous publication.⁷

In the exploration of the physiologic changes occurring in dogs having large arteriovenous fistulae,⁶ many of the animals died with endocarditis.⁵ This brought up the questions: First, could endocarditis be regularly induced by bacterial injections in dogs having large arteriovenous fistulae? Second, would dogs with fistulae develop endocarditis spontaneously when known possible factors for adventitious introduction of bacteria are controlled? In order to obtain some answers to these questions the following experiments were carried out.

METHODS

Mature dogs, weighing 5.3 to 27.0 kg., of both sexes were dewormed (*Vermiplex*‡) and immunized against distemper (*Virogen*‡). These dogs were kept entirely free of body vermin by periodic (four to six weeks) dipping in a suspension of 6 per cent benzene hexachloride. Their diet consisted of commercial dog biscuit with about a half pound of fresh horse meat daily and cod liver oil several times a week. It was estimated the oldest dog was probably not more than eight years old. This selection was made because old dogs do not tolerate large bilateral fistulae as well as younger ones.

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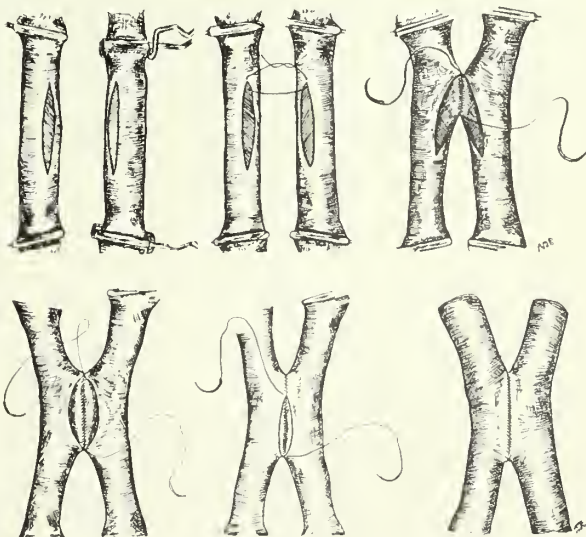
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‡Pitman, Moore Co., Indianapolis, Indiana.

These dogs were divided into four groups. The first group was made up of normal animals sacrificed to establish normal organ weights. The second group was made up of normal animals injected with bacteria. The third group was made up of animals having large iliac and femoral fistulae and had no bacteria injected. The fourth group was made up of animals having large iliac and femoral or bilateral iliac fistulae and injected with bacteria. One animal, No. 98, had three fistulae, an iliac, a femoral and a brachial. Initially animals were apparently normal except No. 745, which had a malunion of an earlier foreleg fracture.

Fistulae were constructed using sterile technique slightly modified from the one described by Deterling⁸ (figures 1 and 2). Vessels were freed for a length two centimeters or more in excess of the length of the proposed fistula. Silk suture 5 or 6-0 was found most convenient for tying branches and tributaries of the arteries and veins. The iliac fistulae were made just distal to the aorta and the femoral just below the inguinal ligament. All fistulae were made so the resulting communication would exceed by several times the diameter of the vein proximal to the fistula. Small clamps having a slight right angle projection at the end of one jaw were



Figures 1 and 2. Diagram of fistula techniques.

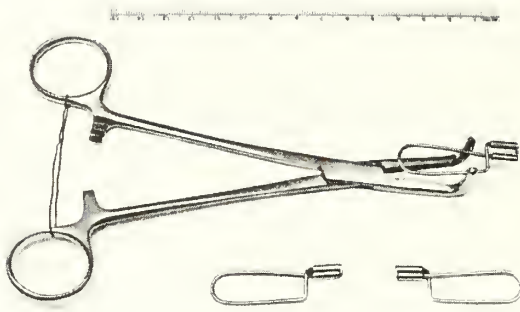


Fig. 3. Instruments useful in making arteriovenous fistulae, especially those in deep locations.

found to be most useful. To apply these in the iliac fistulae a clamp similar to a gallbladder clamp greatly facilitated the application (figure 3). Although only one suture was used, no constriction (purse-string effect) of any of the fistulae was seen. All females were sterilized by tying and cutting the horns of the uterus. Postoperatively, all dogs were given a single injection of ½ cc. (300,000 U.) of penicillin in oil given intramuscularly. No postoperative infections were seen. No dressings of any kind were used. It was found that the second fistula could be made safely within 48 hours after the first. Of approximately 100 fistulae prepared with this technique only two, early preparations, closed. As would be predicted on physical grounds the intensity of the thrill and bruit over the fistulae were not proportionate to their size. However, all patent fistulae showed a distinctive thrill and bruit.

When two weeks or longer had elapsed after the last operation bacteria were injected intravenously. The organisms injected were (1) coagulase negative Staphylococcus, (2) Streptococcus viridans, isolated from a patient with subacute bacterial endocarditis and (3) beta Streptococcus hemolyticus, Group D, (I.F.). At the beginning ½ cc. of a 24-hour broth culture was given daily intravenously for seven consecutive days. With the last two organisms, 0.05 and 0.005 cc. of such a culture were administered daily for a week. However, dog No. 60 received only two injections. The counts on the Streptococcus viridans show that there are approximately 83 million organisms per cc. in the beta Streptococcus culture, 1,500 million in the Staphylococcus and the beta Streptococcus hemolyticus cultures. The doses injected and the number of injections are shown in the tables of data.

In the bacteria injected dogs, cultures were taken before the injections were started. All of these were negative. After the injections, cultures were again taken. All dogs had blood cultures taken before death. These were always positive for the organism injected in the dogs showing endocarditis.

The final diagnosis of endocarditis was based on finding gross vegetations or ulcerations on the heart valves at autopsy, confirmed by microscopic examination of the stained sections.

RESULTS

Streptococcus hemolyticus, generally conceded to be the most pathogenic of the three organisms, was most successful in inducing endocarditis (six of seven). The Streptococcus viridans produced endocarditis in two of seven. The Staphylococcus produced endocarditis in

TABLE I
Dogs with Induced Endocarditis

Dog No.	Weight (kg.)	Length of fistula (mm.) and type*	Amount of culture injected (cc.)	No. of Days Injected	Time (days) between fistula and 1st Bact. Inj.	Survival (days) after 1st Inj. of Bact.	Survival after second fistula	Cause of Death
Streptococcus hemolyticus								
779	13.6	22I 22F	0.5	7	15 18	41	56	Sacrificed (moribund)
718	14.6	21F 32I	0.5	7	14 17	16	30	Acute heart failure
1460	9.2	18F 23I	0.5	7	14 16	17	31	Acute heart failure
60	13.2	16I 20I	0.05	2	15 133	40	55	Acute heart failure
56	15.1	23I 19F	0.05	7	14 123	60	74	Acute heart failure
1194	9.2	16F 19I	0.005	7	27 30	31	58	Sacrificed
Streptococcus viridans								
81	10.7	20I 24F	0.5	7	22 60	55	77	Acute heart failure
62	12.0	18F 22I	0.5	7	14 124	15	29	Acute heart failure
Non-coagulating Staphylococcus								
745	25.0	21F 31I	0.5	7	14 18	27	41	Acute heart failure

*F = Femoral, I = Iliac

one of two dogs. (See tables I, II.) It is interesting that in all of these seven dogs which did not show endocarditis each one had at least three separate blood cultures positive for the organisms injected. In two (the Staph., No. 98 and a Strep. vir. injected, No. 83) the blood cultures were followed over a number of weeks and observed to become negative. Dog No. 98, it will be remembered, had three fistulas. Two (Nos. 1042 and 1277) came to autopsy within a few days after a positive blood culture. No nidus of infection was found either in the heart or at the fistula site. The remaining three (No. 1293, 1361 and 1318) were accidentally killed approximately one month after the last blood culture, which had been positive, was taken. Whether or not bacteremia existed in these animals at the time of death is not known. This tendency for the bacteremia to disappear has been observed by previous investigators.^{5,6} It should be noted that this tendency seems more marked in the case of the Strep. viridans (and Staph.) than in the Strep. hemolyticus. In dogs dying with endocarditis, the bacterial count in the peripheral blood tended to rise progressively until death (figure 7).

PATHOLOGY

In gross appearance the valvular lesions were soft friable vegetations projecting from the heart valves or rough ulcer-like lesions on the valves (figure 4). No involvement of the mural endocardium was seen. In dogs having large arteriovenous fistulae for long periods of time (six weeks or more) the atrio-ventricular valves almost always showed small, hard, smooth nodules along the edges where the chorda tendinea are attached. These showed no inflammatory reaction grossly or microscopically. There were no involvements of the pulmonary valve in any dog and only one with tricuspid involvement. Five dogs showed lesions indistinguishable from



Fig. 4. Examples of valvular lesions.
A. Fungating type. B. Perforating type.

acute rheumatic valvulitis in the human being. It is interesting that four of these were on the mitral valves and one on the tricuspid valve. This observation agrees completely with the original series (10 dogs) in which the rheumatic-like lesions in seven dogs were limited to the tricuspid and mitral valves. Five of the dogs of the present series had vegetations at the site of the suture. Further work seems to indicate that this may be due

TABLE II
Fistula Dogs Injected with Bacteria not Showing Endocarditis

Dog No.	Weight (kg.)	Length of fistula (mm.) and type	Amount of culture injected (cc.)	No. of Days Injected	Time (days) between fistula and 1st Bact. Inj.	Survival (days) after 1st Inj. of Bact.	Survival after second fistula	Cause of death
Streptococcus hemolyticus								
1293	7.0	13F 18I	0.05	7	22 25	63	85	Sacrificed
Streptococcus viridans								
83	12.3	18F 25I	0.5	7	21 26	137	158	Sacrificed
1361	11.8	17I 15F	0.05	7	15 18	61	76	Sacrificed
1042	6.8	10I 13I	0.05	7	14 19	28	42	Sacrificed
1277	12.0	15F 19I	0.005	7	15 18	31	46	Sacrificed
1318	10.1	17F 13I	0.005	7	16 20	60	82	Sacrificed
Non-coagulating Staphylococcus								
98	7.4	13I 22F 13B*	0.5	13	38 102 107	88	126	Sacrificed

*Brachial

TABLE III
Control Fistula Dogs
(No bacteria injected—sacrificed)

Dog No.	Weight (kg.)	Length of fistula and type	Observation time after 1st fistula	Observation time after 2nd fistula
449	8.6	20I 20F	136	131
91	12.5	24I 20F	169	162
68	14.5	28I 19F	174	166
58	10.5	22I 19F	175	167
59	22.4	31I 16F	202	90
63*	10.2	20I 17F	76	68
69*	26.9	27I 20F	48	41
100†	21.0	23F 26I	253	142

*Died of acute heart failure.

†This dog lived 142 days with bilateral fistulae. It was then injected with bacteria in connection with another experiment. Endocarditis and glomerulonephritis were induced demonstrating that it was susceptible.

TABLE IV
Intact Control Animals—No Evidence of Endocarditis
(injected daily with 0.5 cc. of a 24-hour broth culture)

Dog No.	Weight (kg.)	No. of Days injected	Observation time after 1st injection	Cause of Death
Streptococcus hemolyticus				
1060	5.3	23	23	Distemper?
1502	13.2	18	18	Distemper?
989	6.8	15	38	Sacrificed
963	6.9	14	88	Sacrificed
1490	10.4	22	45	Sacrificed
24EP	7.1	5	60	Sacrificed
65EP	5.4	5	60	Sacrificed
69EP	10.1	5	60	Sacrificed
59EP	10.0	5	60	Sacrificed
63EP	11.2	5	60	Sacrificed
56EP	8.1	4	60	Sacrificed
Streptococcus viridans				
1406	12.3	42	53	Sacrificed
1408	12.8	42	52	Sacrificed
1254	13.3	42	52	Sacrificed
1327	8.8	42	47	Sacrificed
1362	10.0	40	70	Sacrificed
Non-coagulating Staphylococcus				
198	7.0	50*	117	Sacrificed
163	7.1	50*	92	Sacrificed

*During the last 34 days of this period these dogs both received daily 1.0 cc. of the broth culture.

All of the "EP" dogs which were injected 5 days received a total of 2.0 cc. of the culture on the fifth day.

to not allowing time for sufficient healing before starting the injection of bacteria. A number of the Streptococcus injected dogs showed acute glomerulonephritis.

Professor B. J. Clawson, Department of Pathology, University of Minnesota, who made microscopic examinations of sections from all of these dogs, has made the following comment about them. "It may be said

that endocarditis found in these dogs is primarily a bacterial type with scattered small lesions resembling rheumatic endocarditis. The two anatomic types of lesions, bacterial and rheumatic endocarditis, have been found to be a common observation in human subacute bacterial endocarditis. The question whether the two types of lesions represent different stages or manifestations of bacterial endocarditis or whether the two lesions are two separate etiological entities has stimulated a great deal of discussion. Most observers believe that in human cases two separate diseases are present. The endocarditis in the dogs exhibits a marked similarity to that seen in man. The finding of the two anatomic types of endocarditis, bacterial and rheumatic-like in the dogs where obviously there is but one cause shows that the rheumatic-like vegetations in these animals are but a manifestation of the valvular reaction in bacterial endocarditis."

Dr. Clawson has a full report on these dogs and others in preparation.

Five bacteria injected fistula dogs were found to have a typical acute proliferative glomerulonephritis. Two of these had beta streptococcic endocarditis, one had an alpha streptococcic endocarditis and two were injected with the latter organism but did not have endocarditis.

The pathologic findings on these animals are summarized in table V.

HEART AND ADRENAL HYPERTROPHY

Hypertrophy of the right and left ventricles, weighed after trimming off the atria and epicardial fat, was found in all the dogs except the normal controls. Of all treated groups, the least hypertrophy was seen in the normal bacteria injected group. All dogs with fistulae showed definite evidence of enlargement. It is interesting that in the endocarditis group the two dogs showing the least hypertrophy were animals which had their fistulae the shortest periods of time. In the original

TABLE V
Types of Lesions Found on Microscopic Examination
(Courtesy of Prof. B. J. Clawson)

Dog	Valves involved and type of lesion			Acute glomerulonephritis
	Bacterial	Rheumatic	Fibrinoid	
Streptococcus hemolyticus				
779	Aortic	0	0	0
779	Mitral	Mitral	0	—
718	Mitral	0	0	0
1460	Mitral	0	0	0
60	Aortic	0	0	Grade +++
60	0	Mitral	0	—
56	Aortic	0	+	0
56	Mitral	0	+	—
1194	0	Mitral	0	Grade +
Streptococcus viridans				
81	Mitral	0	+++	Grade +
62	0	Tricuspid	+	0
Non-coagulating Staphylococcus				
745	Mitral	Mitral	+++	0

All other dogs reported were negative except No. 1042 and 1318, both Strep. viridans injected, these had Grade I acute glomerulonephritis. It is not known whether or not another site of chronic infection existed.

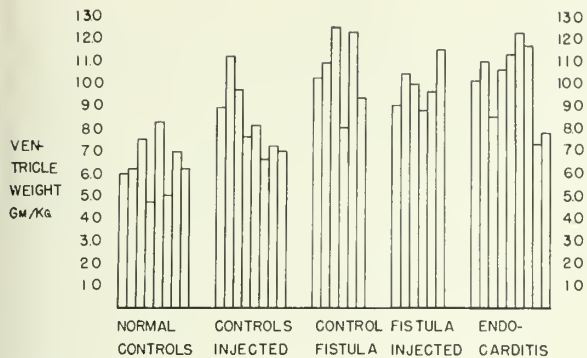


Fig. 5. Ventricle weights of normal and treated dogs.

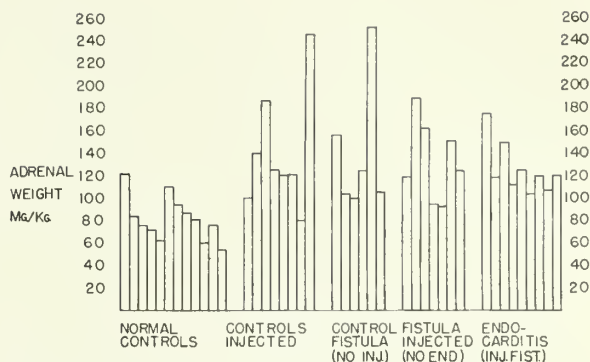


Fig. 6. Adrenal gland weights of normal and treated dogs.

series, the dog (No. 591) which had the largest ventricle (9.9 gm./kilogram) had one of the smallest fistula loads (bilateral femoral) which was carried the longest period of time, 350 days.¹¹ It is obvious that the ventricular hypertrophy is the product of the fistula load and time (figure 5). X-ray examinations of these dogs' hearts showed a marked increase in area of the silhouette. These results will be reported elsewhere.

Hypertrophy of the adrenal was also seen in all animals except the normal group. Both macroscopically and microscopically it could be seen that hypertrophy was

limited to the cortex. This hypertrophy apparently occurs much more rapidly than the cardiac hypertrophy because the dogs which died in the shortest period (29 to 30 days) after the fistulae were made showed marked adrenal hypertrophy (107 to 118 mg.) but only minimal evidence of cardiac enlargement (7.7 to 8.5 gm.). (See figure 6.)

Statistical analysis of the adrenal gland and ventricular weights show all test groups to differ significantly from the control groups (table VII).

TEMPERATURE AND SEDIMENTATION RATES

The rectal temperatures in dogs infected with the bacteria employed in this series of experiments showed as a rule only moderate rises. (See figure 7). There was much overlap of the peaks in the control periods and the troughs in the infected periods. Terminally, there was usually a marked rise (104-106° F.) in temperature.

With the onset of infection there were progressive increases in sedimentation rates.

HEART FAILURE

Of the dogs dying with endocarditis, the immediate cause of death was usually acute heart failure. These dogs all had lungs of a liver-like consistency and blood-tinged froth in the trachea and bronchi.

Dog No. 59 (figure 8) developed ascites approximately one month after construction of the second fis-

TABLE VI
Summary

	Endocarditis and positive blood culture	Positive blood culture only	Negative blood culture and no evidence of endocarditis
Normal controls—bacteria injected	0	0	12
Control fistulae— not injected	0	0	7
Fistulae— Strep. hemol. injected	6	1	0
Fistulae— S. virid. injected	2	5	0
Fistulae— Staph. injected	1	1	0
Total (34)	9	7	19

TABLE VII
Table of Adrenal and Ventricle Weights
(Weights are given in milligrams or grams per kilogram of body weight)

Groups	Number of Dogs	Mean weight		Standard deviation (σ)		Standard error (E)		Significance (t)	
		Adr. (mg.)	Vent. (Gm.)	Adr.	Vent.	Adr.	Vent.	—	—
Controls	13	81.2	6.3*	17.0	1.2	4.7	0.42	—	—
Injected intact controls	8†	139.6	8.5	52.7	2.0	18.6	0.71	3.0	2.7
Control Fistulae (no inj.)	7	138.3	10.1	52.9	1.9	20.0	0.72	2.7	3.9
Fistulae injected (no endoc.)	7	118.5	9.8**	37.6	0.3	14.2	0.12	2.4	7.7
Endocarditis	9	125.3	10.1	22.9	1.8	7.6	0.60	4.9	5.2

*In the controls 8 ventricle weights were observed.

**In the fistulae injected, 6 ventricle weights were observed.

†Because of additional procedures, the epinephrine-pitressin (EP) dogs were not included in the adrenal-ventricle weight portion of the study.

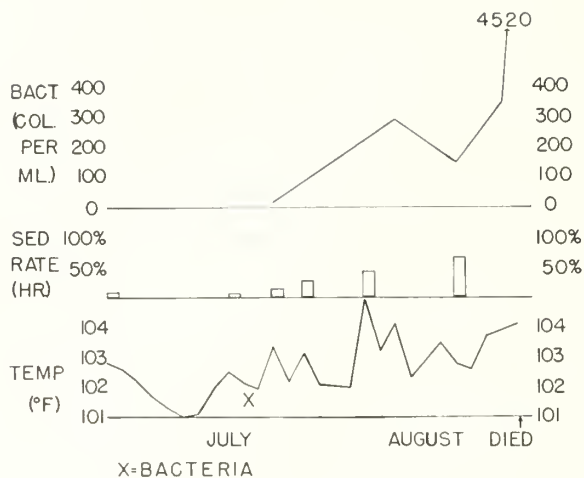


Fig. 7. Temperatures, sedimentation rates and quantitative blood cultures on No. 60.

tula. This animal was given digitoxin, mercaptomerin (Thiomerin) and ammonium chloride. All of these drugs were used in dosage similar to that used in human patients. Its improvement was only slight but it remained alive until sacrificed six weeks later. At this time 4.5 liters of blood-tinged serous fluid were removed from the abdomen.

Several animals exhibiting acute dyspnea responded favorably to intravenous aminophyllin (0.24 gm.), mercaptomerin (Thiomerin—2 cc. or 0.28 gm.) and, in severe episodes, venesection. Dogs in a state of mild or severe heart failure do not tolerate being placed on their backs for long periods. It has been found advantageous to watch the daily weights carefully. If mercaptomerin is administered when there is a significant gain in weight, signs of acute failure can usually be avoided.

DISCUSSION

Nedzel¹³ has reported endocarditis following the intravenous injection of pitressin and bacteria. Visscher and Henschel¹⁴ have demonstrated subendocardial hemorrhage after the intravenous injection of epinephrine and pitressin. In view of this some dogs were injected with epinephrine and bacteria and some with pitressin and bacteria.

Six normal dogs weighing 7.2 to 11.5 kg. were selected. These dogs were not immunized. Three were injected intravenously daily with 1 cc. (20 pressor units) followed in several seconds by $\frac{1}{2}$ cc. of beta Streptococcus hemolyticus culture. Three were injected daily intravenously with 0.5 cc. (0.5 mg.) of epinephrine followed by bacteria as above. Several weeks later one pitressin injected dog died of distemper. The blood cultures and heart valves on this animal were negative. After allowing a recovery period of 30 days, the groups were reversed and the experiment repeated with the four injections being given every four hours all in one day. No dogs showed any positive blood cultures and four

weeks later at autopsy none showed any gross evidence of endocarditis. These are the "EP" dogs in table IV.

In the previously reported endocarditis^{5,7} which occurred in a large fraction of dogs there were several possibilities for adventitious introduction of bacteria. A plausible possibility of infection was contamination in the course of venous pressure determinations done daily using 5 per cent sodium citrate solution. The most frequent organism found producing endocarditis of this series was *Aerobacter aerogenes*. It has been suggested¹² that, since this is one of the few common organisms which can metabolize citrate, such a solution may have favored the survival of this organism in preference to other contaminants. It is also possible that ticks or fleas might have served as vectors or that the deworming procedure may not have been adequate and that intestinal parasites may favor hematogenous infection.

The average survival time of the sacrificed control fistula animals was from 90 to 167 days averaging 143 days as compared with 61 days in the earlier series. This shows rather clearly that it is possible to produce endocarditis with regularity by the introduction of beta hemolytic streptococcus strain in dogs with large arteriovenous fistulae.

The adrenal gland weights in these dogs is in substantial agreement with those observed in the normal, fistula and endocarditis dogs reported previously. Further studies on the relationship of the adrenal gland to the susceptibility to and progress of endocarditis are in progress.

CONCLUSIONS

1. The arteriovenous fistula dogs develop endocarditis with doses of bacteria which have no such effect upon intact animals.
2. Animals with large arteriovenous fistulae have a markedly increased susceptibility to endocarditis and persistent bacteremia after injection of bacteria.



Fig. 8. Dog No. 59, showing marked ascites.

3. Marked cardiac hypertrophy is produced quickly by large fistulae but slowly by small fistulae.

4. Acute glomerulonephritis was observed in three animals with streptococcal endocarditis and in two fistula animals injected with a culture of *Streptococcus viridans* but having no evidence of endocarditis.

5. Endocarditis can be produced with a high degree of regularity with this method outlined.

The authors wish to thank Dr. W. W. Spink for preparation of the bacterial cultures employed in this study as well as for supervision of the blood culture studies. For assistance in a number of emergency autopsies, we wish to thank Dr. C. W. Lillehei, Mr. Frank Roth and Mr. Wayne Adams.

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Meet Our Contributors . . .

GEORGE N. AAGAARD was graduated in 1937 from the University of Minnesota medical school where he now serves as director of postgraduate medical education. On January 1 he will assume his new duties as dean of the southwest medical school of the University of Texas at Dallas.

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JAMES BELLOMO was graduated from St. Louis University school of medicine in 1947, specializes in internal medicine in St. Paul, where he is on the staffs of St. Joseph's and St. Luke's hospitals. He holds memberships in national, county and state medical societies, Minnesota and American Trudeau societies, and is an associate of American Society of Chest Physicians.

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REUBEN BERMAN, a graduate of the University of Minnesota in 1933, is associate professor of medicine at the University of Minnesota, attending physician in medicine at Minneapolis Veterans hospital, serves on the active staffs at Asbury and Mt. Sinai hospitals, and is president of the Minneapolis Society of Internal Medicine.

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DONALD F. SMITH received a master's degree in hospital administration from the University of Minnesota, has served on the staff of the University of Minnesota hospitals for two and a half years, is business manager of the University of Minnesota Variety Club Heart Hospital.

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Editorial . . .

The University of Minnesota Variety Club Heart Hospital

AS INDICATED on a plaque located in the main lobby, this hospital was "Sponsored by the Variety Club of the Northwest, constructed with funds provided by the Variety Club of the Northwest, the United States Public Health Service, and the University of Minnesota." Beneath the plaque there is a leather bound ledger wherein are recorded the names of hundreds of organizations and individuals who also contributed to the hospital.

The facility is part of the chronic hospital bed complement of the State of Minnesota as set up by the Department of Health in its plans for providing hospital facilities for Minnesota. Patients are admitted from the area in which the Variety Club Tent No. 12 has membership. This includes Minnesota, North Dakota, South Dakota, and the western part of Wisconsin. In addition to the half million dollars given for construction purposes, the Variety Club of the Northwest has pledged \$25,000.00 per year for patient care. Already this fund has been of tremendous help to patients who have neither personal nor community resources to draw upon for hospital care.

The hospital is an integral part of University of Minnesota Hospitals. Patients are admitted through the Main Hospitals Admission Office. Both pediatric and adult patients are first given a complete physical examination in either the pediatric or medical clinic. If indicated, they are then referred to the cardiac clinics located on the first floor of the Heart Hospital. Here they may be treated as outpatients or referred to one of the inpatient services. Except for patients attending the Minneapolis School Heart Clinic, direct admission to either the heart clinics or the inpatient services is the exception rather than the rule. All patients must be referred to the Heart Hospital or clinics by their family physician.

The first floor contains the lobby and administrative offices, the x-ray department and the outpatient department.

The x-ray equipment is located in three large rooms along one side of the corridor of the east wing. One room has routine radiographic equipment for fluoroscopy, spot and regular films. The second room has special equipment for angio-cardiography, and the third room is used for heart catheterizations. Beyond the catheterization room is the gas analysis room where oxygen contents and capacities are done. Opposite the x-ray rooms there are the office and reading room for the radiologist, patients' and doctors' dressing rooms and a laboratory used for pediatric research.

The outpatient department has a waiting room, eight examining rooms, a fluoroscopic room, laboratory, ECG,

and BMR rooms. The Minneapolis School Heart Clinic is held on Tuesday and Wednesday mornings and the Pediatric Heart Clinics on Monday and Thursday mornings of each week. The Adult Clinics are held on Monday, Wednesday, and Friday afternoons. Among other teaching aides, a new Educational Electron Cardioscope has recently been purchased for teaching purposes and will be used in the clinics by both services. One examining room was designed especially for teaching purposes with built-in benches around the wall for medical students.

The remainder of the west wing contains an Occupational Therapy Department, offices for doctors, social service workers, dietitian, a patients' library and a medical staff lounge.

The second floor will eventually be for adult patients. It has thirty-eight beds plus a large and pleasant solarium. Except for two three-bed wards all rooms have two beds. However, due to a shortage of nurses, both medical and pediatric services are now located on this floor, each having nineteen available beds. It is anticipated that the third floor will be opened for patients on October 1, 1951.

The third floor has forty beds. The rooms consist chiefly of three and four-bed wards with several two and one bedrooms. In the Variety Club Theater located on this floor, full length movies are shown each week together with other types of entertainment. The medical and nursing staff may use the theater for conferences and seminars when it is not being used for recreational purposes by the patients. There is a dining area in the rear of the theater for both pediatric and adult ambulatory patients.

The chief resident has an office located adjacent to the nursing station as does the head nurse. Behind each nursing station is a conference room which has a large blackboard and bulletin board, a large conference table and leather upholstered chairs. Both the medical and nursing staffs use these rooms for teaching purposes.

Each patient floor has a serving kitchen. Food is transported from the Main Hospitals in electrically heated carts. The tray carts are set up in the serving kitchens and the food is served from the food cart directly outside the patient's room.

Plans are underway to convert at least one large third floor room into quarters for infants who require formula. At present infants with congenital heart disease are treated on a pediatric station in the Main Hospitals.

Original plans called for a three story building. However, additional funds were provided by the National Heart Institute and a fourth floor was added. This floor will be devoted exclusively to research.

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Transactions New York Acad. Sc., 13:31, Nov., 1950.

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On the pediatrics inpatient service the cases of congenital heart disease have equalled those of acute rheumatic fever and other collagen diseases. In addition, a small number of non-rheumatic heart disease cases have been seen. The cases of congenital heart disease have entered the hospital for either medical or surgical treatment. The lesions most commonly treated surgically are 1. patent ductus arteriosus 2. coarctation of the aorta 3. tetralogy of Fallot and 4. stenosis of the pulmonary valve. Children with rheumatic fever are treated in this hospital during the acute phase of the disease and then are discharged to their homes or to the convalescent pavilion at Glen Lake Sanatorium.

A review of the adult cases seen by members of the Department of Medicine would include: 1. congenital heart disease 2. rheumatic fever 3. rheumatic valvular disease 4. subacute bacterial endocarditis and 5. those patients who are evaluated as candidates for mitral valve surgery. To date a large part of the total number of cases seen on this service have been diagnosed as sub-

acute bacterial endocarditis. The staff is instituting research projects dealing with coronary artery disease and hypertension and consequently will be interested in seeing more of these cases than have been seen to date.

The American Legion and Women's Auxiliary, Department of Minnesota, provided five hundred thousand dollars for a Research Professorship to study the causes, prevention, and treatment of rheumatic fever and heart diseases especially as these affect children. The Clark Professorship provides for research in cardiac and cardiovascular disease as related to the older age groups. Research activities are underway in both areas.

With such extensive research and clinical facilities located within this hospital, the sponsors of the hospital and research program and the people of the Upper Midwest who contributed may well be proud of their efforts. They have provided the site and material needed for the ever increasing attack on cardiovascular disease.

DONALD F. SMITH, Minneapolis
Business Manager, Variety Club Heart Hospital



SCENES AT THE HEART HOSPITAL. Above, a little patient tries an oxygen mask on visitor Loretta Young. Left below, nurse and patient in the adults' section. Right below, a play group in the children's section.



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Radiation Therapy and Management of Cancer of the Uterine Cervix, by *Simcon T. Cantril, M.D.*, 1951. Springfield, Illinois: Charles C. Thomas. 196 pages. \$5.00.

In this well-printed 196 page manual Dr. Cantril discusses the natural history and complications of cervical cancer with regard to radiation therapy and includes reproductions of the League of Nations 1937 clinical staging diagrams. Radiation therapy is considered from the fundamental standpoints of the Stockholm, Paris and Manchester techniques, and the adjustment of technique to meet the needs of the individual case is emphasized. Although broad outlines of treatment are set down, he stresses that correct application requires judgment which can be gained only through experience. The complications of radiation therapy are discussed and short sections on treatment of cancer in the cervical stump and in pregnancy are given. An excellent bibliography is included and a survey of the results of treatment from world wide sources is tabulated. The book is well done and deserves recommendation to radiologists, gynecologists and practitioners concerned with cancer of the uterine cervix.

S. C. Von D.

Explorer of the Human Brain, the Life of Santiago Ramon y Cajal, by *Dorothy F. Cannon*, 1950. 303 pages, 11 illustrations. New York: Henry Schuman. \$4.00.

This touching portrayal of the life of Cajal begins with a memoir by Sherrington. Then follows a fast-moving sketch of the evolution of a problem boy to a renowned scientist. His career is traced through medical school, which was mixed with literary idols, physical prowess and philosophy,—and on to a lieutenancy in the medical corps, with service in Cuba. His interest in the microscope alternated with despair and illness and even thoughts of suicide.

During the cholera epidemic of 1885 he brought out a monograph on this microbe, prophylactic inoculation and immunity. Although interested in bacteriology he was more interested in pathology, to which he returned sporadically, but finally chose histology as his specialty. From his facile hand and logical mind there issued an astonishing array of new discoveries in neuroanatomy, despite his feeling that he was merely gleaning in a field already harvested. He became the most expert Golgi technician and ultimately evolved new silver impregnation methods that are used the world over. By these and other technical methods he bolstered his theory of the dynamic polarity of neurons and emphasized the importance of the richness of interconnections of neurons. In morphogenesis he is known for the neurotropic theory of the control of the growth of axons. His contributions to the establish-

Book Reviews

ment of the neuron theory were critical and led him into a monumental study of nerve degeneration and regeneration. Explanatory footnotes assist the lay reader on these technical points.

His civic duties as an educator and reformer are not neglected; neither are his scientific battles in upholding the neuron theory, nor the strained relations that arose between him and his pupil, Rio Hortega, in connection with the types of neuroglia.

He was an expert photographer. As amusement he investigated and practiced hypnotism and came to realize its curative value.

The numerous honors bestowed upon Cajal, including the Nobel prize (1906), bespeak his genius. The volume closes with a selected bibliography of his works and of the numerous sources used in compiling this inspiring book. A.T.R.

Clinical Tropical Medicine, by *R. B. H. Gradwohl, M.D., Luis Benitez Soto, M.D. and Oscar Felsenfeld, M.D.*, 1951. St. Louis: The C. V. Mosby Company, 1647 pages. \$22.50.

The book was written by 57 contributors residing largely in the Americas and including several authorities in the field of tropical medicine. The larger part of the book was apparently written during World War II. Its publication was delayed, and in spite of revision many portions are now out of date.

There are 73 chapters. All the common and most of the uncommon tropical diseases of man are considered comprehensively. There are 473 illustrations, nearly all of good quality. Most chapters end with a complete bibliography. From the clinical, pathologic and parasitologic points of view the book as a whole is good. As a result of its delayed publication, however, the book has several deficiencies as viewed in 1951. For example, the treatment of amebiasis does not include adequate discussion of new developments such as chloroquine, aureomycin, bacitracin, terramycin and milbimis. Recent evidence of an exo-erythrocytic phase of malaria parasites in hepatic cord cells is inadequately treated. The treatment of malaria is not well done. The use of pentaquine plus quinine, which appears most effective in curing vivax malaria, is not mentioned. The diagnosis of schistosomiasis japonica by means of rectal biopsy is not mentioned.

W.H.H.

The Diagnosis and Treatment of Endocrine Disorders in Childhood and Adolescence, by *Lawson Wilkins, M.D.*, 1951. Springfield, Illinois: Charles C. Thomas, 408 pages. \$13.00.

This book is written for the clinician aiming to distinguish true endocrinopathies from conditions which simulate them and to explain newer diagnostic methods applied to the study of various symptom complexes. The author's effort to discuss fundamental scientific background adequate for the reader's understanding concerning the physiology and relationships of hormones in the production of clinical disorders avoids the complexities of endless details. The context embraces the relationship of extrinsic and intrinsic factors essential for normal growth and development, clinical and developmental studies, tests and hormonal, functional and associated methods as well as clinical treatises concerning specific disorders: thyroid, sex abnormalities, adrenal, pancreatic and pituitary.

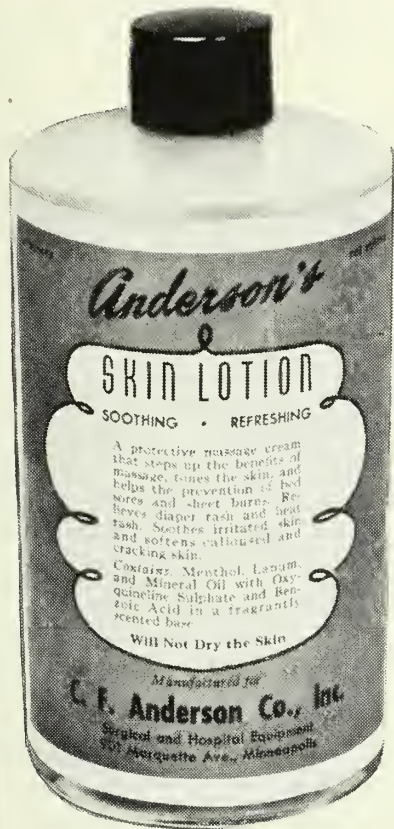
Of 73,000 new admissions to the Harriet Lane Home, 997 patients were referred to the author's clinic because of the possibility of endocrine disorder. It is particularly of interest that of this group, 233 revealed a lesion of the endocrine glands and of the hypothalamus whereas there were constitutional variations of somatic or sexual growth and development in 309 cases. Marked obesity of dietary and constitutional origin without endocrine disorder involved 236 patients whereas 207 had other abnormalities not of endocrine origin. Of those with endocrinopathies, the diagnosis of panhypopituitarism was ventured in only 11 cases, patients with dwarfism not attributable to hypothyroidism numbered 144; the thyroid was the gland most frequently involved with 146 cases.

J.C.M.

Symposium on Steroids in Experimental and Clinical Practice, edited by *Abraham White*, 1951. New York: The Blakiston Co., 415 pages. \$7.50.

This book is a report of a research conference. It is a valuable document for those investigators interested in steroid physiology and use in the clinic who were not privileged to attend the meeting. However, it will not be of great use to the non-specialist because the book necessarily presents a great deal of rather raw data, statistically untreated, and therefore difficult to interpret and to evaluate. The book does provide a wealth of suggestions for further study and presents interesting if not conclusive comparisons of therapeutic activity of numerous steroids in connection with such diverse conditions as arthritis, male infertility and cancer. It also constitutes a progress report on numerous metabolic investigations. A feature of interest to students of geriatrics is the material presented on steroid excretion in relation to age.

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News Briefs . . .

North Dakota

A TEAM of physicians and surgeons made a tour to key points in the state during the latter part of August, to gather information bearing on the possible establishment of a four-year medical school at the University of North Dakota.

Members of the survey group include Dean W. F. Potter of the University medical school; Professor A. L. Lincoln of the University sociology department; Dr. Robert Lewis, dean of the University of Colorado medical school; Dr. Harold Lueth, dean of the school of medicine at the University of Nebraska; and Dean John Scott of the University of Alberta medical school.

Places surveyed during the tour were the state hospitals at Grafton and Jamestown, veterans hospitals at Fargo and Minot, the state tuberculosis sanatorium at San Haven and the Good Samaritan hospital at Ruby, as well as the clinics and other medical facilities of these communities. The deans said they plan to confer and work on their reports until October before turning the results over to the state.

* * *

SOME 35 North Dakota doctors met in Bismarck on September 15 for the fifth annual state convention of the American College of Physicians. Dr. Howard Wakefield of Chicago spoke on "Your American College of Physicians." Other speakers were Dr. G. D. Icenogle, Bismarck; Dr. Thomas Pederson, Jamestown; Dr. E. A. Haunz, Grand Forks; Dr. F. T. Lytle, Fargo; Dr. Robert Fawcett, Devils Lake; and Dr. Lester Wold, Fargo.

* * *

DR. H. MILTON BERG and Dr. John R. Williams, both of the Quain and Ramstad clinic at Bismarck, were speakers at the meeting of the Rocky Mountain Radiological society in Denver, Colorado in August. They presented a discussion and scientific exhibit on coproliths.

* * *

DR. H. B. FITZ JERRELL retired in September as a member of the staff of the State Hospital, Jamestown, ending a medical career of fifty years. A native of Indiana, Dr. Fitz Jerrell has served at the Jamestown institution since 1948.

Minnesota

DR. GEORGE N. AAGAARD, director of postgraduate medical education at the University of Minnesota, member of THE JOURNAL-LANCET editorial board, and guest editor of this issue of the journal, has been named dean of the Southwest medical school at the University of Texas at Dallas. Dr. Aagaard will take over his new duties January 1, 1952. He was named to his present post in March 1948.

* * *

FIFTEEN ALUMNI of the University of Minnesota's college of medical sciences were presented with outstanding Achievement Award medals by President J. L. Morrill at special services on October 8. These alumni include Dr. Fred L. Adair, Raymond B. Allen, Frank E. Burch, Earl R. Carlson, Albert J. Chesley, Olaf J. Hagen,

Arild E. Hansen, Alma C. Haupt, Herman E. Hilleboe, Pearl Melver, James E. Perkins, Edith L. Potter, William P. Shepard, Albert M. Snell and Edward L. Tuohy.

* * *

EIGHT heart research grants totaling more than \$120,000 were made to University of Minnesota scientists by the federal public health service. The largest, \$30,000, went to Dr. Ancel Keyes to study the way activity and diet affect aging. Among other grants were Dr. Ivan D. Baronofsky, \$16,541, to study heart defects; Drs. Joseph T. King and Maurice B. Visscher, \$17,998, to study aging and diet; Dr. C. Walton Lillehei, \$19,619, to study heart and kidney inflammation; and Dr. Jerome T. Syverton and associates, \$18,727, to study rheumatic fever.

* * *

DR. J. A. MYERS, chairman of THE JOURNAL-LANCET board of editors, will be one of the speakers at the fourth annual postgraduate course in diseases of the chest, held at the Hotel New Yorker on November 12 to 17, and sponsored by the American College of Chest Physicians.

Notices . . .

Annual Cerebral Palsy Clinic

The fifth annual North Dakota Cerebral Palsy Clinic will be held on October 15-16 at the North Dakota Medical Center in Grand Forks with Dr. Meyer A. Perlstein, Chicago, present as consultant pediatrician. Cases should be referred for selection as soon as possible to Dr. D. T. Lindsay, Director, Crippled Children's Services, Bismarck, North Dakota.

★

University of Minnesota Postgraduate Courses

A continuation course in Roentgenology of Chest Diseases will be held October 29 to November 3. The material for the course, which is intended for radiologists, will include detailed anatomical and pathological studies of the chest presented by means of lectures and demonstrations.

A course in Chest Diseases, directed to lay people interested in this field, will be presented October 22 to 24, in conjunction with the Minnesota Public Health Association.

A course in Fractures and Traumatic Surgery for general physicians and surgeons will be presented November 8 through 10. Speakers will consist of members of the faculty of the University of Minnesota and the Mayo Clinic.

A course in Child Psychiatry for General Physicians and Pediatricians will be held November 26 to December 1. Dr. Reynold A. Jensen, associate professor, Departments of Psychiatry and Pediatrics, University of Minnesota, is chairman for the course.

★

Minneapolis Society of Internal Medicine

The October meeting of the Minneapolis Society of Internal Medicine will be held at 6 p.m. on October 24 with dinner in the Colony Restaurant in the Medical Arts Building, followed by a scientific program at 8 p.m. The following papers will be presented: "Use of Cortisone in Rheumatic Diseases" by Paul J. Bilka, and "Systemic Scleroderma" by Ephraim B. Cohen. All physicians are invited to attend the dinner and scientific meeting.

★

Omaha Midwest Clinical Society

The Nineteenth Annual Assembly of the Omaha Mid-West Clinical Society will be held October 29 to November 2, at Hotel Paxton, Omaha, Nebraska. Panel discussions will be held on dermatology, interpretation of roentgenograms, blood dyscrasias, and fractures and orthopedic problems. Papers will be presented by a distinguished list of guest speakers.

Members of the American Academy of General Practice who attend these sessions will receive credit toward their fifty hours of formal postgraduate study required every three years. For further information write the executive office of the Society, 1031 Medical Arts Building, Omaha, Nebraska.



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1. Fauley, G. B., Freeman, S., Ivy, A. C., Atkinson, A. J., and Wigodsky, H. S.: *Arch. Int. Med.* 67:653, 1941.
2. Upham, R., and Chaikin, N. W.: *Rev. Gastroenterol.* 10:287, 1943.
3. Collins, E. N.: *J. A. M. A.* 127:890, 1945.

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American College Health Association News . . .

THE *Proceedings of the Twenty-ninth Annual Meeting* of the American College Health Association has been mailed to the Health Service and the Library of each member institution. This 56-page booklet contains brief, but comprehensive, reports of activities of the Association and the committees, panel discussions, and a number of interesting and informative papers presented at the annual meeting. The work of compiling the material, of editing it, and watching over its transformation from the typewritten manuscript to the printed page has been ably done by Dr. Charles E. Shepard, executive secretary of the editorial committee, and has earned for him the deep gratitude of the Association membership.

* * *

THE UNIVERSITY OF CINCINNATI, Cincinnati, Ohio, reports a vacancy for a woman physician in the Student Health Service. Interested applicants should contact Dr. L. B. Chenoweth, Director of the Student Health Service, at the university.

* * *

WHEATON COLLEGE, Norton, Massachusetts, has been accepted for membership by the executive committee. Final approval of membership will be made by a vote of the council and representatives of institutions at the next annual meeting in May, 1952, at Boston. Wheaton College is a private college with an enrollment of 543 women, and is accredited by the New England Association of Colleges and Secondary Schools and the Association of American Universities.

* * *

THE INDIANA COLLEGE HEALTH ASSOCIATION meeting in April at the Indiana State Board of Health elected Dr. Sayre Miller, Purdue University, president; Mrs. Catherine Rodewald, Valparaiso University, vice-president, and Miss Esther Bradford, staff nurse, Taylor University, was re-elected secretary-treasurer.

* * *

CAMPUSES throughout the country are again in full swing, with fall semesters under way, and Student Health Services are facing the old and perennial problems as well as new ones which develop in an ever-changing environment. New ways are being devised to approach such problems, and new methods are being initiated in the study and administration of health services and health instruction and education in colleges. The pages of the *JOURNAL-LANCET* are available for the promulgation of these activities, and articles and news items are solicited to utilize to the utmost this means of communication for the membership of the Association. Material for publication in the *JOURNAL-LANCET* should be sent to the Executive Secretary of the Editorial Committee, Dr. Charles E. Shepard, 2002 Tasso St., Palo Alto, Calif., or to the Secretary, Dr. Edith M. Lindsay, School of Public Health, University of California, Berkeley 4, Calif.

MASS THROMBUS OF THE LEFT AURICLE

(Continued from page 443)

atria are enormously dilated and the left atrium is almost completely filled by anamortem thromboses. The right auricular appendage and atrium contain adherent anamortem thrombi. The root of the aorta shows a minimal amount of atheromatous streaking."


CONCLUSION

A case is reported of massive thrombus of the left auricle associated with mitral stenosis. This case illustrates the classical signs of cyanosis of the upper portion of the body with marked distension of the veins of the upper part of the body and the cadaveric appearance of the legs.

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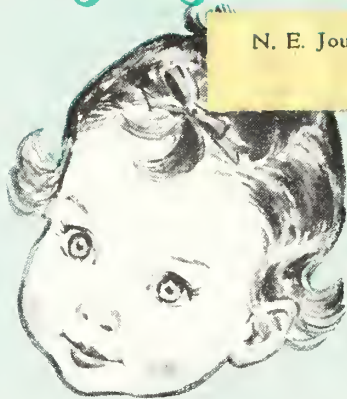
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Rapid Clinical Response



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Cortisone in Allergic Asthma*

J. S. BLUMENTHAL, M.D.†
Minneapolis, Minnesota

ALL is not asthma that wheezes.¹ Though pert, this is not true. By definition all is asthma that wheezes but all asthma is not allergy. We are here discussing allergic asthma. The mechanism of asthma is dependent upon bronchial obstruction. It is a functional condition of the bronchi "in which periodic or spasmodic attacks of dyspnea with a prolonged expiratory phase are associated with wheezing, cough and expectoration of tenacious sputum."² Allergic asthma must, therefore, be differentiated from all other conditions causing wheezing and cough—bronchitis, cardiac asthma of left heart failure, inflammatory lung lesions, and wheezing due to pressure of an enlarged thymus, enlarged glands, bronchogenic tumors, aneurism, and foreign bodies. This differentiation is extremely important most especially in conditions where Cortisone and ACTH would be, in fact, contraindicated.

The history of asthma is a long one. As far back as the 5th century B.C.,³ there are references in Greek writings to conditions resembling asthma but no real differentiation is made between this condition and dyspnea. Helmont⁴ and Willis⁵ in the 17th century clearly emphasized the spasmodic nature of asthma and in the last of the same century, Sir John Floyer⁶ was the first to note that the cause was contracture of the muscular fibers of the bronchi. Shakespeare⁷ knew the condition we call asthma. He refers to "wheezing lungs" in *Troilus and Cressida* (vi) and in the same work uses the term "tisick" when Ponderus says "a whoreson tisick, a whoreson rascally tisick so troubles me—that I shall leave you one of these days." (v, iii). As noted from the text, he must have believed the condition to be due to syphilis. To this day the laity in the Appalachian mountains still speak of asthma as pthithic. Again Sam-

uel Johnson says "my diseases are an asthma and what is less curable, seventy-five."

It was not until 1811 that Robert Bree in "Disordered Respiration"⁸ indicated that hypersensitivity was the true etiologic factor in allergic asthma. He himself was an asthmatic which, as usual, made him the more aware of the symptoms and signs of the disease. He writes "hair powder has been observed in many instances to bring on, first sneezing, then by association of muscles, more powers are put in action to expell irritating matter, which may possibly have only touched some points of the trachea uncovered by mucus." He further notes "an itching of the skin, of the breast and neck, is frequently a symptom in the asthmatic paroxysm, sometimes preceding the violence of the fit and generally declining as the agony of respiration increases." That there is nothing really new under the sun that someone else has not observed and probably recorded is pointed out by Feinberg⁹ for 120 years later a medical journal records the "new" sign of allergic asthma "itching of the chin, neck and chest." It was Salter,⁹ however, in 1859, who placed this conception of sensitiveness on a firm clinical foundation. He also stated that attacks of asthma are caused by contraction of circular muscles around small bronchi; that heredity is an important factor; that attacks may be provoked by many of the allergens we speak of today—foods, animal emanations, drugs. He well described the consequences and complications of asthma—thickening of bronchial musculature, bronchiectases, pulmonary stasis, atelectasis, passive congestion, right heart hypertrophy and dilatation, cor pulmonale, emphysema and the typical asthmatic physique.

The treatment of asthma dates to the era B.C. It would be hard to find any condition in which more drugs and procedures have been tried. The very multiplicity of drugs throughout the centuries speaks for itself but

*Presented at the University of Minnesota general staff meeting March 16, 1951.

†Clinical assistant professor, Department of Medicine, University of Minnesota Medical School, Minneapolis, Minnesota.

real progress is linked with the development of the concept of and research in anaphylaxis and allergy.

In 1910 Barger and Dale¹⁰ isolated histamine beta imidozolethylamine from ergot and in 1911¹¹ found histamine in the intestinal mucosa. Its precursor, histidine, is a common cell constituent. Best and McHenry¹² reported it is found most often in barrier tissue such as skin and intestinal mucosa. Histidine may be converted to histamine by the removal of a carboxyl group not only by antigen antibody reaction but also by bacterial action.¹³

Dalton¹⁴ in a recent paper on the role of the eosinophile in allergy, suggests that it is not the antigenic protein itself that calls for the eosinophilia but the antibody. He theorizes that antibodies being chemotactic for eosinophiles produce a localized eosinophilia at the site of the shock tissue, and as eosinophile production is increased a circulating eosinophilia usually develops. At the local site of antigen-antibody reaction, eosinophiles are broken down which releases histamine.

Histamine tends to act on cells that are enervated by the autonomic nervous system and is known to produce constriction of smooth muscle, dilation and increased permeability of capillaries and to act as a secretagogue on the glands of exocrine secretion. It appears in the blood immediately after administration of an antigen, and in the guinea pig the phenomenon of anaphylaxis and the administration of histamine seem to be identical.¹⁵

While, as pointed out by Dragstedt¹⁶ histamine release is at least a major factor in the causation of allergic symptoms, it is probably not the only factor. It is because of this that Sir Thomas Lewis¹⁷ called the factor "H substance," and said, "I shall speak of an H substance, and in using it shall mean any substance or substances liberated by the tissue cells which exerts on the minute vessels and nerve endings an influence culminating in the "triple response." The relationship between the amount of histamine activity in the blood and the symptoms is not as direct as one would desire. The identification of histamine in the blood is always difficult, as Dragstedt has repeatedly pointed out. As Katz¹⁸ has shown, there is always the problem of differentiation between histamine bound to cells and histamine in the free state. He¹⁹ added horse serum in vitro to the blood of a rabbit sensitized with that serum and noted that the cell-free plasma showed a great increase of histamine. Rose and Brown²⁰ got essentially the same results and repeated the experiment with use of egg sensitive rabbits with the same effect. While we thus have evidence from these experiments as well as others^{21,22} that there is a transfer from the bound to the free states, we as yet do not have definite evidence that the reverse is also true. There are indications that it is.²¹ This change in the state of histamine makes it hard to assay its exact role in allergy. In the main, however, the histamine theory is plausible, though the antihistamines have proven of very little practical help in the treatment of asthma.

In discussing the treatment of allergic asthma, it would be well to review here again a concept of what takes place in the patient. As in all patients with allergic symptoms, we first must have a so-called asthmatic state—a state defined by Rockemann¹ as an inherited one in which a patient is more likely to develop these symptoms than do others in exactly the same environment. It is the soil in which allergy in the usual sense can flourish. We have further the capacity in these individuals to develop sensitiveness and to produce or react to an H substance so as to cause a variety of symptoms of vasomotor origin. In asthmatics, allergens—be they ingestants, contactants, inhalants, bacteria or injectants—acting on such a person whose bronchi are sensitized causes the production of antibodies. The reaction, we may assume, of the antibody and antigen causes the release of an H substance or toxic product which in turn causes the symptoms of asthma.

In the treatment of asthma as in all diseases the ideal approach would be to attack the fundamental basis, that is, the X, Y or Z factor that makes a person develop, say, coronary disease, or ulcer, or mental diseases or asthma. Unfortunately, we know as little about that factor as does the cardiologist, the gastro-enterologist or the psychiatrist. The next mode of attack would be to avoid the allergen—the most specific method at present available. Here again, even if we can identify the allergen, the economic and social factors often make avoidance impossible or impractical. In our present complicated society, it is very difficult to do what on the surface seems very simple. How easy is it, for instance, to avoid tobacco, or wheat, or corn or even dust—unless one is a hermit. I well recall a patient, Mrs. Nelson, who had come to me with a long history of asthmatic attacks. She had avoided all foods but coffee and cookies, and still had her attacks. The procedure seemed self evident from the food angle. I told her to eat all else and avoid coffee and cookies. Lo and behold—no asthma! I was very proud but unfortunately at the next office visit she had her old trouble—a recurrence of wheezing and coughing. Mrs. Nelson could not stay away from her coffee klatches. "One lives not by bread alone." Fred Allen, describing a rice diet to reduce his high blood pressure said, "I ate so much rice that in three weeks I was doing my own laundry." Beyond that, the allergic cannot get away from himself and changes of environment all too frequently result in changed allergens and changed sensitivity.

The next specific mode of attack would be specific desensitization with increasing quantities of the offending allergen. In this connection, it should be noted that a member of our own staff, Dr. Henry Ulrich,²³ was a pioneer in the use of specific desensitization—a fact that is here too little recognized. This is, of course, the method most frequently and successfully used now if the avoidance is not practical or possible. The difficulty is that too frequently patients have serious reactions or respond incompletely to treatment. It is in this group of asthmatics that we use non-specific or palliative methods too numerous to mention—all too often of very little help—the antihistamines, the iodides, the sympathetic

stimulants, the parasympathetic depressants, the anti-bariums, etc., etc. It is this group of patients that is referred to psychiatrists, sloughed to other doctors and climates. These are the unfortunates who wander from state to state, doctor to doctor, hospital to hospital. It is this group—the miserable, pathetic, semi-invalid, perennial asthmatics that need more help—the allergic group which the allergist has been unable to do much for with the usually successful allergic management—and who go on to the serious asthmatic complications.

As asthma must be regarded as primarily a disease of adaptation, Selye's²⁴ concept of the general adaptation syndrome would be of benefit. The antigen stimulates the reticulo-endothelial system, especially plasma cells, to produce antibodies. The reaction of the allergen and antibody results in toxic products which directly or indirectly stimulate the hypophysis to produce ACTH. It is interesting to note that treatment with desensitization gets results at least in part by stimulation of increased production of ACTH.²⁴ Abelson and Moyes²⁵ in a recent article in the *Lancet* give evidence pointing to the possibility that the therapeutic action of ephedrine in allergic conditions is partly due to the release of pituitary adrenocorticotrophic hormone. The secretion of ACTH can be increased also by a wide variety of stimuli,²⁴ inanition, anoxia, heat, cold, trauma, bacterial toxins, foreign proteins. It can also be increased by histamine, thyroxin and estrogens. Normally both mineralocorticotropic and gluco-corticotropic stimuli affect the adrenals proportionately. If the response is too violent or the gluco-corticotropic production is inadequate, allergic reactions result. As gluco-corticoids mitigate the response of shock organs to allergic stimuli and mineralocorticoids increase the responsiveness the degree of sensitivity would depend on the balance between gluco and mineralo hormones. How the gluco-corticoids diminish sensitivity in cells is not understood.

Immediately after the announcement that Cortisone relieved the symptoms of rheumatoid arthritis it was natural as indicated by Selye's concept to assume at once that all the so-called collagen diseases and hypersensitive states would be similarly affected—notably the allergic diseases and in particular asthma. White²⁶ has shown that animals that have had an adrenalectomy show extreme susceptibility to anaphylactic shock. Pretreatment of these animals with Cortisone or ACTH gives them protection.²⁷ Rose and his associates²⁸ had demonstrated on rats the direct relationship between adrenal cortex and the metabolism of histamine and its specific enzyme histaminase. The tissue and blood histamine was markedly increased and the mechanism for the destruction of histamine impaired following adrenalectomy.²⁹ They also demonstrated that the ability of histamine aerosols to produce dyspnea was blocked in four patients by ACTH therapy.^{30,31} Segal³² noted that the abnormal sensitivity of the asthmatic patient to injected histamine was lessened or abolished by treatment with ACTH on repeated injections; but Curry³³ noted no such protection against histamine or methacholine by single doses of 50 to 100 mg. of ACTH—an observation also made by Herschfus.³⁴ These studies would indicate that ACTH prob-

ably does not relieve bronchial spasm through an anti-histaminic or anticholinergic action. Cortisone and ACTH as reported by Kendall³⁵ are powerful tools with which it is possible to study problems related to the etiology and treatment of a large group of diseases. Though Cortisone and ACTH can produce profound changes in the person with these conditions, the mechanism of action is still very imperfectly understood. It is certainly not a deficiency as no such deficiency of Cortisone has been noted in asthma, or other conditions in which it is of such dramatic though temporary benefit. Sayers³⁶ suggests that Cortisone acts by (1) interference with the release of or toxic action of anaphylactogenic substances produced in antigen-antibody reactions, (2) alteration in cell permeability through its action on hyaluronidase, or (3) suppression of responses in mesenchymal tissues. It is easy to see that these types of action would definitely influence allergic manifestations.

When Cortisone is given to rabbits, Rogan^{37,38} noted a delay in the development of all elements of connective tissue response. This effect would, of course, interfere with the connective tissue reactions seen not only in hypersensitivity but also in disease activity and wound healing. Taubenhaus and Amromin³⁹ also noted an inhibition effect of cortisone on collagen formation and fibroblasts—the opposite effect from that of desoxycorticosterone.

White²⁶ believes that Cortisone acts in the hypersensitive state by (1) alteration in the relative concentration of antigen and antibody in the tissues, (2) alteration in the tissue factors which influence the combination, or (3) alteration in the tissue response to antigen antibody reaction.

Be all this as it may, it is sufficient to state that there is early in the course of treatment with ACTH or Cortisone physiological changes due to induced hyperactivity of the adrenal cortex; a fall in the eosinophile count; leukocytosis; sodium and chloride retention and associated water retention or excretion; elevated serum carbon dioxide-combining powers; decreased sodium and chloride in the sweat; increase in urinary histamine; corticoids and 17 keto steroids; increased gluconeogenesis with hyperglycemia; a diabetic-type of dextrose tolerance curve and increased deposition of liver glycogen; decreased inorganic serum phosphorus; increased uric acid excretion; increased serum cholesterol; increased calcium excretion; a negative nitrogen balance.^{40,41,42,43} In considering the effect of ACTH in allergic persons, in particular,^{44,45} we must also consider the euphoria induced, and the increased appetite and neuropsychiatric changes. Interference with the acetyl choline cycle as reported by Torda and Wolff^{46,47} with at times deficiency and at other times enhancement of in vitro synthesis is another important factor. Large doses of steroids have also been reported, by Selye,⁴⁸ as hypnotic in effect while Archer⁴⁹ in a recent letter in the *Journal of the American Medical Association* stresses the relationship of the pituitary adrenal axis to fat metabolism and to fatty infiltration of the liver—changes also associated with pregnancy and jaundice—conditions which at times benefit arthritis as well as asthma.

While the conditions treated with ACTH and Cortisone have included almost all serious ones the body is heir to, some of the most dramatic results have been reported in the field of allergy with nearly 100 per cent encouraging though temporary results. Rose treated six patients with severe asthma.⁵⁰ The first two patients received 150 mg. of ACTH daily for two days and 100 mg. daily for two more days. The next four received 100 mg. daily for three days, 75 mg. daily for two days, and 25 mg. the sixth day. He reports complete success in relief of asthma in four patients within 48 hours. The other two patients while not completely free of symptoms were decidedly improved. Though apparently only remissions, the results were certainly striking for the type of patients reported. Bordley⁴⁴ treated five patients with severe asthma with daily doses of 30 to 100 mg. of ACTH given at six hour intervals. Here also marked relief was obtained in four to 48 hours. Total ACTH given varied from 360 to 775 mg. Not only was the asthma relieved but in two patients nasal polyps disappeared though they recurred in 23 days and one month, respectively. Randolph⁵⁰ reports thirteen cases of very serious asthma, two seasonal ragweed asthma and eleven perennial advanced cases of this disease. The majority would certainly be included in that terribly discouraging class of asthmatics referred to by Rockeman as "intrinsic"; and were further complicated by nasal polyps and aspirin sensitivity. As he points out these cases were chosen because of their difficulty as diagnostic and therapeutic problems. Ten of these eleven severe asthmatics obtained marked relief of symptoms and remissions from one week to five months following treatment with ACTH. Total dosage was 125 to 325 mg. One patient could not be treated with the usual method and dosage due to fluid retention. The degree of relief varied from 50 per cent to complete relief—the more satisfactory results being in patients with no clinical or x-ray evidence of emphysema, empyema or scarring. Even in those having recurrence of bronchial asthma after treatment, symptoms were "readily relieved following the inhalation of small amounts of epinephrine spray"—in decided though temporary contrast to the pre-treatment condition. Their general status improved markedly—a condition not due to suggestion as placebos did not work in the same manner. Haddon Carryer⁵¹ treated three patients with hay fever and asthma caused by ragweed pollen. Each patient experienced relief on the day Cortisone was started and two remained free of symptoms until three or four days after it was discontinued. The third had no recurrence while under observation. The hay fever symptoms were also relieved but not as markedly or quickly as the asthmatic. The relief was accompanied by a decrease in nasal secretion and decrease of nasal mucosa pallor. No undesirable side effects were noted. Howard⁵² reports on his experience in 19 asthma patients with ACTH and in five with Cortisone. In 15 of the 19 patients treated with ACTH there was complete remission of symptoms within a few hours to 11 days. The duration of remission varied from three to 263 days. The four that did not respond completely included one in the sixth month of pregnancy,

one that had asthma in humid days only, and two in whom inadequate doses were given in error. In their experience, Cortisone compared unfavorably with ACTH in alleviating signs and symptoms of asthma. Only one patient of these five had complete relief while the other four had only 25 to 50 per cent improvement.

Because of these reports, it is to be understood that the privilege of being able to use ACTH through the help and courtesy of Dr. E. Flink, was greeted with great enthusiasm and anticipation. The first patients, I decided, would be really "tough ones"—whom I had followed, and used up my total therapeutic armamentarium as well as that of other men in the field. Since the material was given every six hours the patients were hospitalized. This made it possible to follow the response to treatment, especially the eosinophile count (to be certain that the adrenals did respond). This was done in spite of the fact that, as is well known, hospitalization and rest are often great therapeutic agents, in themselves, and could very easily confuse the response. In these people, however, because of the length of previous observation, I believed I could easily detect real improvement.

Illustrative case. This patient, female, married, age 49, a former nurse and present hotel proprietor, gives a history of asthma since 1943. She has also had a perennial stuffy nose in 1947 and 1948 but no asthma at that time. The condition is aggravated by hard work, dust, colds and cold air. Partial relief is at times obtained by aminophyllin, ephedrin, and adrenalin. The past history is not remarkable but for irrigation of the sinuses in 1949. The physical examination, x-ray, and electrocardiograms were negative. Routine blood and urine were not helpful. This patient has been under my care since January, 1950 and the usual procedures including elimination diets, sedation, desensitization with dust, fungi, vaccine, histamine, antihistamine, antihistamine, and antibiotic drugs were tried but in May, 1950 she became very seriously incapacitated by her condition and a trial of ACTH was advised. ACTH was given for 96 hours in a total dose of 360 mg. with no marked effect. The total eosinophile count showed the adrenal response by a marked drop from 1609 to 680 to 90 to 0. As a matter of fact, she required repeated administrations of adrenalin and aminophyllin while being given ACTH as well as after treatment. The drug was given every six hours.

As I reported⁵³ it was difficult for me to understand the effect of ACTH in this and two other cases of asthma treated in this manner. The dosage was given as reported; the response of the adrenals was definitely indicated by the eosinophile count. It also seemed that if relief was to be obtained it should occur fairly soon just as had been reported. Furthermore these cases did not have emphysema or other pulmonary pathology. At any rate here were three cases of severe asthma that did not respond to ACTH—a rarity at least at that time in the literature of this remarkable drug. Perhaps more prolonged or more intensive treatment was indicated. Perhaps Cortisone would be of greater benefit.

As would be deduced from the effects of the hormone and confirmed by the literature,⁵⁴ absolute contraindications to the use of Cortisone are few but should be used with caution in diabetes mellitus, psychotic disorders, cardiac failure, during major surgery, severe infections, myocardial infarction, pulmonary embolus, cerebral accidents and probably because of its effect on connective tissue, in tuberculosis, syphilis and peptic ulcers. Equally important is the question of the effects of long continued administration and large dosage. As pointed out by Kendall and others, the answer is not a simple one. In general, however, the response is neither rapid nor long continued. The effects are reversible when the hormone is discontinued. Beyond that, it is neither necessary nor desirable to give large doses for a prolonged period of time.⁵⁵ The immediate undesirable effects reported are fluid retention, moon face, acne, hirsutism,⁵⁶ irregular menses, changes in mood or psyche, nervousness, fatigue, transient paresthesias, weakness, hypercoagulability, minor changes in carbohydrate metabolism and nitrogen balance.⁵⁴ These are usually not marked and are easily controlled by a reduction in dosage compatible with comfort. While the weakness noted at times has no constant relation to low serum potassium, it is at times desirable to give potassium chloride when the level is below normal. Low sodium diets will usually control fluid retention though very infrequently diuretics may be indicated. Estrone or progesterone will frequently prevent the most annoying of the symptomatic side effects in menopausal women. Above all, suboptimal dosage will minimize these undesirable features as well as the danger of poor healing, missing new clinical symptoms such as active infections, pain, fever, peritoneal irritation from perforated ulcers,^{57,58,59} as well as the changes of hyperadrenocorticism.⁶⁰

As Cortisone became more available and less expensive, the opportunity presented itself to give this hormone to ambulatory patients. This avoided the expense of the hospitalization necessary with ACTH and eliminated the effect of hospitalization alone on these patients, thus simplifying the evaluation of therapy. Cortisone was given to these severe, chronic perennial asthmatics. All the usual specific and non-specific allergic therapeutic measures had been tried with little or no or very temporary effect. The initial dose was 200 mg. (100 mg. intramuscularly in each buttock). Thereafter the dosage was 100 mg. daily for six days. In the second and third week the dosage was reduced to 100 mg. three times a week. Here we discontinued the treatment to see if we could get a remission. If none was obtained or if symptoms recurred gradually, treatment was again started. The dosage depended upon the response of the individual patient. No attempt was made to have the patient completely free of symptoms as long as he was comfortable. In this type of patient a little relief for a prolonged period was a great accomplishment. The weight, blood pressure and urine and cholesterol levels were followed. For a time the eosinophile counts and vital capacity were taken but we soon found, as have others, no correlation to the symptoms. After obtaining a satisfactory effect, Cortisone was given by mouth in equivalent doses and

with apparently equivalent results in all but two patients. In these two the dosage was increased by 20 per cent. The Cortisone acetate in the same form supplied for injection was mixed in milk or fruit juices to hide the extremely bitter taste. The overall therapeutic and hormonal effects of Cortisone when given orally do not differ from those produced when given parenterally. Subjective relief is often noted in six to eight hours after injection. As the duration of action of the orally given hormone is partially dissipated within 12 to 14 hours, it was given in two divided doses—in the morning and at bedtime. When the hormone was available in tablet form of 25 mg., it was so given.⁶¹ At the end of a six week period, an attempt was again made to stop therapy to see if a remission could be obtained.

TABLE I

Number of patients	30
Ages	15 to 62
Males	22
Females	8
Duration of asthma	3 to 32 years
Diabetics	2

In this series, 30 patients with allergic asthma—chosen for their extreme severity, chronicity, and failure on the usual allergic regimes for years—Cortisone acetate was given in the manner described. I wish to stress that patients with marked emphysema, bronchiectasis, cor pulmonale or psychoses were not included. Two asthmatic patients with diabetes mellitus were treated. The ages varied from 15 to 62. Twenty-two were men and eight were women. The duration of the disease varied from three to 32 years. The apparent causation of the allergy ran the gamut of allergens. Psychic factors were present, as in all asthmatics, to a greater or lesser degree.

The initial results in these 30 cases were to me, at times, startling—and to the patient often under the euphoria of the hormone, almost miraculous. Expressions, especially at the first response to the treatment, were such as "I never felt better in my life" — "I feel great." Within a few days to a week there was a marked diminution in the wheezing with a feeling of well-being and increased energy. Within the second to third week, the cough lessened and almost completely disappeared. Many with nasal polyps noted a clear nose for the first time in many years with regression of the polyps. Several remarked on the fact that "I can smell things now." The maximal initial improvement developed by the end of the second or third week and as the dosage was reduced, the euphoria decreased, and the enthusiasm was not so great but still satisfactory. Minor flareups of wheezing or coughing did occur in some patients.

TABLE II

Results—	
Good	22
Fair	8
Poor	0

Results were evaluated according to the patient's own description and judgment and the overall picture includ-

ing objective findings. Those who experienced 50 per cent relief or more were considered to have fair results. Patients who had mild to practically no symptoms were considered to have had good results.

By this criteria the results of treatment were good in 22 and fair in 8. In the eight that had only fair results, there was a more or less persistent cough though no frank asthmatic attacks.

CASE REPORTS

Case 1. This patient is a male, professor of art, age 48, with a history of severe asthma since the age of 18 and hay fever since the age of 9. Asthma occurred only during the hay fever season for four weeks starting August 15th. He received pollen desensitization in 1935, 1936 and 1937 with excellent results. He then went to New York and had no difficulty. He returned to Minnesota in March 1947 and had no hay fever or asthma until the spring of 1948. At that time he contracted a "bad cold" and a few days later had severe asthmatic attacks which lasted until the warm weather. Since that time he has had asthma of a very severe nature associated with a persistent cough only in cold weather but aggravated by tobacco, coffee, tea, coal dust, grain dust, and emotional upsets (mostly humorous!). He has been so incapacitated that he could not step outside of a warm room without difficulty. To get to his classes he had to be taken in a previously warmed car and immediately to a warm room. The only relief he obtained was from heat and rest. Drugs of all types including aminophyllin and adrenalin were of no help. He had had desensitization and nasal surgery with no benefit and refused to have skin tests as he had them so many times before. In other words, he had the "whole works" as far as allergic regime and therapy in the usual sense was concerned. He was really desperate and could think only of the idea of moving to a warm climate—an idea which was very difficult to accept even if it would be of permanent benefit as the status of his work made that almost impossible. Physical examination revealed a very intelligent, cooperative male and was negative except for wheezing rales in the chest. Routine laboratory tests were negative including x-ray of the chest and electrocardiogram. The eosinophile count was 990/cu. mm. Cortisone was started with an initial dose of 200 mg. intramuscularly. The dose was reduced then to 100 mg. daily. Three days later he had very little wheezing but still retained the cough. He complained of a mild weakness but felt energetic and had a feeling of well-being. The cough had almost entirely disappeared at the end of the second week during which the dose had been reduced to 100 mg. of Cortisone three times a week. At this time he felt perfectly normal. His weight, urine and routine laboratory work were unchanged. Because of his feeling of well-being and energy, he had to be cautioned against over exertion as he had shoveled snow for the first time in years and took long walks. At the end of three weeks, I attempted to stop Cortisone but within six days he began to cough again and had a few wheezing spells. He was then given 50 mg. of Cortisone orally and has remained practically symptom-free except when he exerts himself in cold weather. As soon as it gets warmer, I intend to stop medication again when I believe he will get along well.

Case 2. This patient is a female, secretary, age 23 when first seen in consultation on June 8, 1949. At that time she had had asthma for one and one-half years, so severe as to require hospitalization at frequent intervals and ephedrin more or less constantly. She had also had severe asthma as a child from the age of 10 through 14 but this had subsided for no apparent reason. There were no known aggravating factors of any kind except that "colds" seem to start the attacks though she had a persistent cough at all times throughout the whole year. She seemed worse when in damp or long closed places. Family history was negative. Physical examination revealed a well developed female with no significant physical findings except wheezing rales in both lungs. X-ray of the lungs was negative as was the electrocardiogram. Routine laboratory work revealed nothing of note except an eosinophile count of 12 per cent. Routine skin tests—intradermal—revealed significant findings especially as to foods and fungi. On elimination of positive

factors and desensitization to alternaria and penicillium, the patient markedly improved and had no symptoms for the first time in many years until October 1, 1950, when she had a severe upper respiratory infection with a high fever. At this time she began to have severe asthma necessitating hospitalization. Under usual management of oxygen, antibiotics, aminophyllin, fluids, she recovered sufficiently to leave the hospital. She continued to have almost continuous episodes of asthma and coughing in spite of all I could do by the usual methods previously found successful. Because of this failure, Cortisone was started in the usual way. Within three days she felt much better—had no asthma but a very slight cough. She developed a marked euphoria—all was well with the world including especially her doctor! She had unlimited energy. In the second and third week the euphoria lessened but the feeling of well-being persisted. Cortisone was discontinued at the end of three weeks but the usual allergic regime used previously including fungi desensitization was continued. There were no side effects, no change of consequence in the usual laboratory tests or weight. She has had no asthma, no cough and feels good.

The side effects in this series of patients followed for two to eight months were not many and certainly not serious and at times very desirable. Increased appetite was noted in 24 though this had a tendency to decrease with decrease in dosage. Euphoria — mild and quite

TABLE III

<i>Side Effects—</i>	
Increased appetite	24
Euphoria	18
Acne	1
Edema (transient)	3
Glycosuria	2
Furunculosis	1
Change of shock tissue	1

pleasant — was noted in 18. This also decreased after the first three weeks, though the feeling of well-being remained. Severe acne was noted in one. Transient edema was mild to moderate in three and here no medication was required except a reduction in sodium intake with a later reduction in dosage of Cortisone. The only cases of glycosuria were in our two diabetics in whom the insulin requirements were more than doubled during the first three weeks. When the dosage was reduced the insulin requirement returned to the pre-treatment level. One case of furunculosis developed but subsided with the use of penicillin. One case of asthma had a change of shock tissue and developed a severe urticaria which also responded to Cortisone therapy. Certainly in the doses used here in asthmatics, we had no difficulty, no side effects severe enough to warrant discontinuing therapy although dosage had to be reduced below the optimal level.

TABLE IV

<i>Remissions—</i>	
2 months to 6 months (after 3 weeks' treatment)	3
2 months to 4 months (after 6 weeks' treatment)	2
6 weeks (after 9 weeks' treatment)	1
4 to 5 weeks	2
2 to 4 weeks	6
Less than 2 weeks	16

On the dose schedule used all our cases responded satisfactorily. An attempt was made at the end of three weeks to stop treatment to see if a remission could be

attained. Three asthmatics did not require further Cortisone up to the present. The rest noted increasing cough at first and later recurring wheezing within a few days. Two patients have remained comfortable when Cortisone was stopped at the end of six weeks treatment. The others have had to resume treatment. One, after nine weeks treatment, resumed Cortisone after six weeks remission and sixteen after less than two weeks. The great majority gradually were getting worse after three to four days lapse.

While the psychic factor is very important in all asthmatics, and interviews with the doctor very often have a marked effect on their symptoms even with placebos, I believe I followed those patients long enough to evaluate the effect of the hormone itself. This is especially true now that oral medication is used, but we must always remember that many asthmatics have prolonged remissions for often no apparent reason.

TABLE V

Subsequent Dosage—

25 mg. daily	2
50 mg. daily	22
75 mg. daily	1

Five are in remission and are getting no Cortisone. Two were maintained on 25 mg. daily; twenty-two on 50 mg. daily and one on 75 mg. daily. Occasionally in exacerbations, the dosage was increased for a few days to as much as 100 mg. daily and then again reduced. On these doses we noted no apparent deleterious effects.

An interesting problem was the effect of treatment with Cortisone on direct skin tests. Contrary to expectation and some reports⁴⁴ but in agreement with the results of others,³² no apparent consistent effect was noted. It is to be noted that Stoerk⁶⁰ found that while Cortisone failed to prevent the anaphylactic type of hypersensitivity in guinea pigs, the animals vaccinated with dead tubercle bacilli failed to give a positive tuberculin skin reaction when Cortisone was given before injection of tuberculin. Massell et al⁶¹ gave ACTH to 11 patients with acute rheumatic fever with favorable results in all but one yet ACTH had no effect on skin reactivity to streptococcal products. Vital capacity measurements also did not correlate with effects of treatment. Cholesterol levels were taken but contrary to reports,⁶² I found no consistent elevation.

COMMENT

As in rheumatoid arthritis and other conditions in which ACTH and Cortisone have been used the full therapeutic possibilities in asthma will have to await time and experience. The beneficial effects are usually contingent upon continuing therapy as in rheumatoid disease but in a condition as fluctuating in its cycle as asthma, it would seem that a large number of even perennial asthmatics should have prolonged remissions without any hormone. While there are no apparent serious effects from short periods of treatment with comparatively small doses used in allergic patients, we must have a great deal more knowledge as to the consequences of prolonged or repeated use. So far all adverse effects have

been temporary—disappearing on hormone withdrawal or on lowering dosage. In this connection it has long been observed that in cases of Cushing's syndrome resulting from unilateral tumor of adrenal cortex the other adrenal cortex may undergo atrophy but its function returns even years later after the tumor is removed.

I have attempted to keep dosage at as low a level as was compatible with comfort and have attempted to stop treatment at intervals. If recurrence takes place, a new course of treatment can be started with results equal to the original. As pointed out by Hench in arthritis the interrupted course method might provide a more physiologic response. This should be even more applicable in a condition such as asthma where there are repeated natural remissions and relapses or seasonal exacerbations when treatment might be started or dosage increased. None of these patients to date have had asthma of greater severity than before taking Cortisone.

SUMMARY

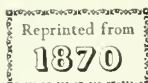
1. Thirty patients with severe, perennial asthma were treated with Cortisone both parenterally and orally in gradually decreasing doses.
2. The response to treatment was good in 22 and fair in 8.
3. There was a prolonged remission in 5 cases but 25 had to be maintained on doses of the hormone varying from 25 to 75 mg. daily—orally.
4. The side effects noted were mild and did not necessitate stopping therapy.
5. From this study of severe asthmatics it would seem that some of these patients may get an induced remission on initial large doses with a gradual reduction of dose later.
6. It would appear that some severe asthmatics require relatively small maintenance doses of Cortisone to keep them under adequate control for long periods with relative safety.
7. It must be emphasized that treatment with Cortisone is still very expensive.
8. In seasonal or periodic allergic conditions, it appears that courses of Cortisone therapy should be very satisfactory. It must be realized, however, that Cortisone is a very potent agent and should be used in our present state of knowledge only in those conditions that do not respond to usual simple, time tested and non-harmful measures which usually are of great help. Cortisone offers a method of getting a remission in some cases of asthma more consistently than any other regime.
9. A very definite disadvantage with Cortisone therapy is the need of prolonged administration in some cases. Again I wish to emphasize that there are grave potential dangers in the use of Cortisone and as pointed out here and emphasized in a recent Bulletin of the University of Minnesota Hospitals⁶⁴ on the Schwartzman Phenomenon, it would be advisable to give the hormone in the smallest possible dose over the shortest period of time consistent with good results. Again it should at present be used in major and not minor disabilities.

10. The best method of treatment in the usual asthmatic patient as in most allergic diseases, is still the avoidance of the allergen or specific desensitization. Cortisone often provides the opportunity to employ more specific therapy while the patient is in a better nutritional and psychiatric state.

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MEDICAL REGISTRATION

"AT THE RECENT MEETING of the State Medical Society, at Winona, the subject of registration was pertinently brought to the notice of the members, and its urgent importance was at once recognized and acknowledged; but, as the time of the Convention was being rapidly taken up by business of an immediately pressing nature, it was left to us to present the matter to the profession of the State in such manner—by letter, circular, or otherwise—as might be deemed most effectual.

No method, perhaps, can be so generally practical, can so readily reach the medical men of the State—whether members of the Society or not—as by a few suggestions submitted through the medium of this journal. The appropriate time has come, and it is eminently necessary that the steps for complete organization be taken as early as may be, so that by the time the State Society meets in February next, the registration may be well-nigh or entirely completed, and the 'MEDICAL REGISTER OF MINNESOTA' issued during the early summer of next year, under the supervision of the committee of publication, if thought best."

Northwestern Surgical and Medical Journal (The Journal-Lancet) 1:15, 1870.

ACTH and Cortisone in Ophthalmology*

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ACTH AND CORTISONE are not a panacea for ophthalmic diseases, but they do offer therapeutic promise in several apparently unrelated ocular conditions. Articles on the ocular effects of these hormones from both the clinical and experimental standpoint are becoming so numerous that it is almost impossible to keep abreast of them all. I should like to summarize briefly not only some recent reports in the literature but also to give impressions gained from our experience with the use of these substances at the University of Minnesota Hospitals and the Minneapolis Veterans' Administration Hospitals.

It has been found experimentally that these agents block in the eye the inflammatory reaction which would occur normally to irritants such as jequirity and glycerin.¹ In addition, the inflammatory response following injection of horse serum into either the anterior chamber or the vitreous of previously sensitized rabbits was greatly reduced if one of these agents was administered.² Reaction to bacteria injected into the anterior chamber of rabbits previously sensitized to the bacteria was greatly diminished if cortisone was given.¹ In all of these conditions, the congestion was less, the exudate into the anterior chamber (protein and cells) was decreased, the tendency to posterior synechiae was lessened, and in the sections studied histologically after horse serum injection into the vitreous, the infiltration of inflammatory cells was much reduced. It is interesting that after the effects of the cortisone or ACTH had worn off, the eyes showed as much inflammatory reaction to subsequent injections of the irritants, protein or bacteria, as the controls.¹ In other words, the blocking effect was temporary, not permanent.

Another observation of fundamental importance is that made by Woods¹ that the inflammatory response seems to be blocked whether it be a response to an irritant or a true allergic or anaphylactic response. The exact mechanism whereby the inflammatory response is blocked is unknown.

CLINICAL USE OF HORMONES

Diseases of the conjunctiva. I have had no experience in treating with these agents disease limited to the conjunctiva. Most diseases of the conjunctiva we encounter are not of serious nature and respond well to antibiotics, or simply run their course and recover spontaneously. I would not favor topical cortisone therapy in conjunctival disease unless other methods of treatment fail.

Improvement in allergic blepharoconjunctivitis due to atropine from topical cortisone administration has been reported.³ The response of vernal conjunctivitis has been variable, some eyes showing improvement; others no change.^{3,4}

Diseases of the cornea. Experience has shown that one of the ocular diseases showing a striking improvement from use of these hormones has been a non-specific, parenchymatous keratitis often called a keratitis profunda, or when it assumes a round shape, a disciform keratitis. In this disease local cortisone drops are often highly effective. Not all cases will respond, however. This statement holds for any of the diseases we will mention, and this variability in response to conditions appearing so similar clinically points to some deficiency in our understanding of disease mechanisms versus disease pictures.

Another condition in which the response may be dramatic is phlyctenular keratoconjunctivitis.⁵ Topical cortisone has proved highly effective in most cases of this type. The treatment of choice in this condition is probably topical cortisone. Superficial vascularizing keratitis should also be included among the corneal diseases in which topical cortisone is of considerable value.

There are other corneal diseases in which there is as yet insufficient evidence to render a worthwhile opinion on the benefits of these drugs. Improvement in some cases has been reported. These are acne rosacea keratitis, striate keratitis following surgery and marginal corneal ulcers. Corneal diseases in which there is probably no benefit to be expected are dendritic keratitis, old corneal scars, and the corneal dystrophies. I have seen no reports on the treatment of trachoma or central corneal ulcers with these agents. Where the inflammatory response may be beneficial to the eye these hormones should be used with caution or not at all.

Diseases of the sclera. Rivaling keratitis profunda for its dramatic response to topical cortisone therapy is episcleritis. Sclerokeratitis has also responded well to these agents. One patient was observed who had a case of bilateral episcleritis which could be kept under control with ACTH but not with cortisone either topically or intramuscularly. This experience points to the as yet little understood differences between these two substances in the treatment of ocular disease. In most cases, however, topical cortisone should remain the treatment of choice in scleral disease.

Diseases of the uvea. Many cases of acute iridocyclitis respond well to either ACTH or cortisone. Non-granulomatous iritis seems to respond better than the gran-

*Presented as part of the Symposium on ACTH and Cortisone at the annual meeting of the North Dakota State Medical Association, Bismarck, North Dakota, May 21, 1951.

ulomatous type.⁶ Some cases of either type do not show any response whatsoever. The reason why one case may respond and another show no response, when the two appear very similar clinically is not known. These agents can be expected to be of but little benefit to those patients who have already suffered much ocular damage from repeated attacks of iridocyclitis. Whether these agents will prevent the development of blindness in patients seen during one of their early attacks, who would otherwise develop blindness as the years went by from repeated attacks, remains to be seen. I have seen no favorable effects of these agents on the uveitis of Boeck's sarcoid. The response of sympathetic ophthalmia is variable. In some cases a dramatic response has been obtained. However, these hormones, at least at the present, should not in any way influence our decision on the question of enucleation of an injured eye. Postoperative iridocyclitis which occasionally follows cataract extractions or other intraocular procedures, has in several cases responded well. It has been reported that cortisone inhibits the formation of granulation tissue.⁷ Hence, there is some question as to whether it should be used in the postoperative period. Experiments are under way at the University of Minnesota on rabbits to determine if cortisone has any significant effect on corneal wound healing. The experiments have not yet been concluded but it would appear that wound healing is inhibited to some extent. We have used cortisone postoperatively in two patients where the indications for its use were strong and have found no alteration in the clinical course of wound healing. My impression is that where indicated these agents should be used in the postoperative period.

Choroiditis has not responded as encouragingly as has iridocyclitis although good results have been claimed in some instances. Systemic administration of these agents should be used in treating diseases of the posterior uveal tract.

Diseases of the retina and optic nerve. Most diseases which affect the retina are of a degenerative nature and no benefits can be expected from the physiologic effects of ACTH and cortisone. Macular degenerations are unresponsive. There is no reason to believe that disciform degenerations of the macula will respond favorably either. The hormones have been tried in retinitis pigmentosa⁸ but no conclusions can be drawn as yet from the reported cases. It seems unlikely that any benefit can be expected.

In assessing the effect of these substances upon the course of optic neuritis we are at once confronted with the wide variability this disease may show in its course even without treatment. There are insufficient reports in the literature on the treatment of this disease with these substances to justify any conclusions. However, a patient in which other methods of treatment have failed and in which the vision is seriously impaired, may well be given a course of ACTH or cortisone intramuscularly.

DOSAGE AND METHOD OF ADMINISTRATION

Generally speaking, we have seen that the anterior segment lesions of the eye show a much better response

than do lesions of the posterior segment to hormonal therapy. Consequently in most cases in which these hormones are indicated, since the systemic side effects are eliminated and an adequate concentration of the hormone reaches the affected tissue, topical cortisone is usually the treatment of choice. We have been using a solution of cortisone containing 8 mg. per cc. of normal saline. Adequate concentration in the aqueous apparently results from similar concentrations, although the concentration in the aqueous is increased if 1:3000 zephiran solution is added.⁴ We have not used the zephiran preparation. We have used the normal saline suspension over a period of months in a few patients without any detectable deleterious effects. Leopold and his coworkers³ have used subconjunctival injection of cortisone, 1.25 mg. per injection with no undue reactions. They felt that a few cases which did not respond to topical cortisone did respond to subconjunctival injection. Retrobulbar injection of cortisone is not recommended at the present time.

Knowledge of systemic physiologic effects of these hormones is necessary before using them intramuscularly. The dose of ACTH may vary from 10 to 50 mg. every six hours depending upon the severity of the inflammation and the response obtained. Cortisone, being more prolonged in its action may be given in a single daily dose of 100 mg. Occasionally 200 mg. a day may be needed.

Whether these hormones are administered locally or systemically they should be tapered off gradually, not stopped suddenly. This is particularly true of cortisone.

SUMMARY

ACTH and cortisone block the inflammatory response. In many ocular conditions it is apparently the inflammatory response which is responsible for the damage to vision, hence in these conditions the hormones offer great benefit. They do not control the underlying etiology of the disease, however, and if this is not cured spontaneously by the patient or by the doctor's treatment, the inflammatory response reoccurs on withdrawal of hormonal therapy. In our experience ACTH and cortisone have been of most help in the treatment of inflammatory conditions of the anterior segment. They can be expected to be of no benefit in the degenerative ocular conditions. They are a means of controlling, not curing, ocular disease. We must not abandon our tried methods of treatment, especially atropine and local heat. The hormones are best used in conjunction with these measures. Topical cortisone is the method of administration to be favored, in most cases.

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(Continued on page 517)

Fatigue States Associated With Abnormal Carbohydrate Metabolism

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FATIGUE and exhaustion states are appearing in most college health services with increasing frequency and with increasing annoyance to the clinician. In a minority of the cases seeking attention, a definite organic or physiological disturbance can be elicited; the majority, however, present a clinical problem not easy to understand or treat.

In recent years, several authors¹⁻⁵ have drawn attention to a fatigue syndrome in which clinical characteristics were similar. Forty-five such cases have been studied and reported in this paper. These patients seek medical attention, either through academic advisors, or friends, or in some cases through their own initiative.

CLINICAL PICTURE

The histories obtained from cases in this study are almost repetitious; a period of fairly normal environmental adaptation in which the daily mental and physical processes of the individual continue normally.

Frequently initiated with the onset of unusual stress of college life, fatigue develops insidiously. Early in the syndrome the fatigue occurs in the mid-afternoon with fairly complete recovery after the evening meal or after a night's rest. After a relatively short time, fatigue persists for longer intervals, relieved only after meals. These patients complain frequently of extreme exhaustion, which is seldom overcome by what would be considered a normal period of sleep. The symptoms are aggravated by unpleasant environmental activities (academic or extracurricular work), and are alleviated by pleasant or entertaining activity (movies or dances). The patients' seemingly paradoxical reactions cause lay observers to make cynical, sarcastic remarks, which serve to aggravate the existent state.

During this developmental period, the productive endeavors of the individual begin to suffer because of decreased sustaining effort and ultimately with involuntary indifference. A reduction in thought processes and associations soon becomes apparent. Finally, even the pleasant or relaxing activities fail to interest the patient. These patients in the past have been summed up in the general grouping of psychoneurotics.

The family histories of these patients frequently reveal cases of psychoneuroses, nervous breakdowns, peptic ulcers, hyperthyroidism, diabetes and similar disorders which have some relationship to adaptation.

Physically, little evidence of structural changes is noted. The routine laboratory work-ups to determine

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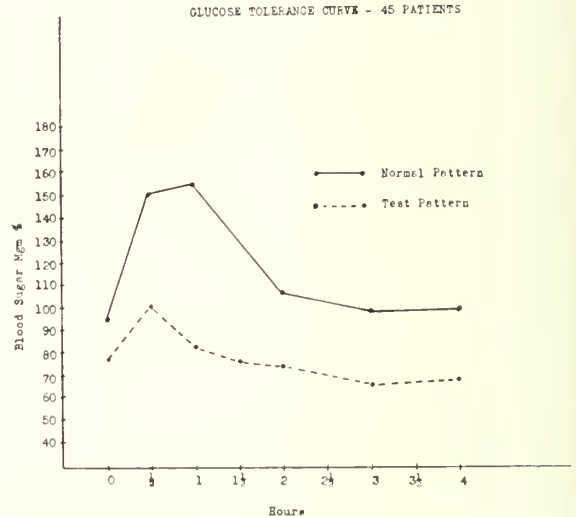


Figure 1.

the presence of organic or infectious disease are negative. Following the clinical observation of postprandial improvement, a study of carbohydrate metabolism reveals flat glucose tolerance curves as shown in composite in figure 1. This is in keeping with the observations of Portis and others. In this syndrome it has been observed that individual blood sugars are frequently normal and that full test patterns are necessary to demonstrate the physiological disturbance.

The causes of hypoglycemia are numerous. The list of such causes, as presented in a standard reference, are shown in tables I and II. In the cases under observation, organic causes have been ruled out through laboratory procedures, and functional hypoglycemia (table II) comes into focus.

The understanding of this reaction on the part of the organism is at present far from clear. Many investigators are adding building blocks to the clarification of such problems, and particularly Hans Selye⁶ with his extensive work on the general adaptation syndrome. Applying the existing facts it is possible to chart nondefinitively the train of events taking place in the animal body (figure 2). It can be seen that an organism subjected to environmental stress (physical, psychic, etc.) must respond in some manner, probably through both neurogenic and endocrine channels. Depending upon the quantity and quality of the stimuli and the intactness of the organism's endocrine and nervous system, adapta-

TABLE I

Etiology of Spontaneous Hypoglycemia*

Hypoglycemia associated with anatomical lesions—"organic"

- A. Hyperinsulinism
 1. Pancreatic islet-cell adenoma
 2. Pancreatic islet-cell carcinoma
 3. Diffuse hypertrophy or hyperplasia of pancreatic islet tissue
- B. Hepatic disease
 1. Toxic hepatitis
 2. "Fatty liver"
 3. Diffuse carcinomatosis
 4. von Gierke's disease
 5. Diffuse intra-hepatic cholangitis
- C. Hypopituitarism (anterior lobe deficiency)
 1. Destructive lesions
 2. Atrophy or infection
- D. Adrenal cortical deficiency
 1. Destructive granuloma—tuberculosis
 2. Primary atrophy
 3. Destructive neoplasm
 4. Amyloid disease
- E. Hypothyroidism
- F. Lesions of the central nervous system, e. g., thalmis

*Cecil, "Textbook of Medicine," 1947.

TABLE II

Hypoglycemia without demonstrable anatomic lesions—"functional"*

- A. Increased secretion of insulin by normal islet-cells—autonomic imbalance?
- B. Decreased secretion of anterior pituitary or adrenal cortical hormones?
- C. Excessive oxidation of carbohydrates in severe muscular work.
- D. Pregnancy and lactation
- E. Idiopathic "postoperative" hypoglycemia

*Textbook of Medicine—Cecil, 1947, seventh edition, p. 710. Spontaneous hypoglycemia, etiological classification modified after Conn. Publisher, W. B. Saunders Co., Philadelphia, Pennsylvania.

tion or dysadaptation will result. Dysadaptation in its total concept encompasses many current medical enigmas.

Application of the schema in figure 2 to the problems of functional hypoglycemia makes possible better understanding of the defects and suggests methods of correction. There are essentially three points of attack therapeutically: (1) removing stress stimuli, (2) correcting the dysadaptation state, and (3) correcting the defective

GENERAL ADAPTATION

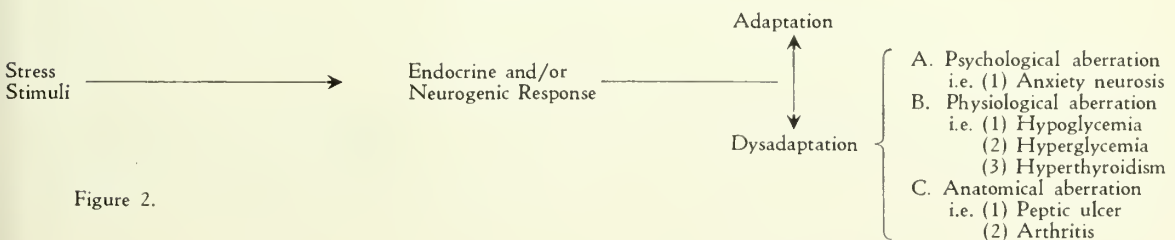


Figure 2.

S. T. HALE Age 33

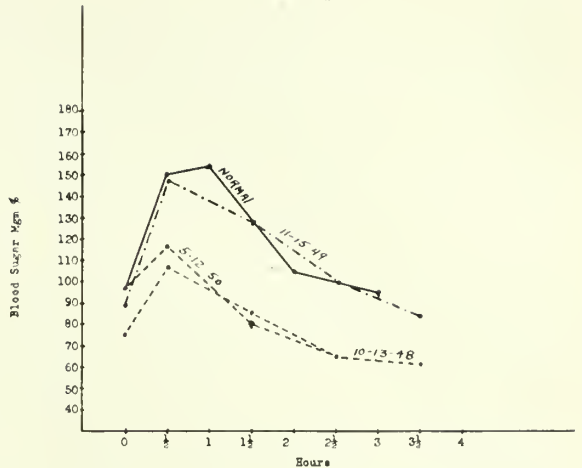


Figure 3.

or inadequate hormone or neurogenic balance. A few individual cases observed in this series are presented to illustrate the above approaches.

Case S. T., male, age 33 (figure 3). This male World War II veteran was first observed in our clinic in the fall of 1948 because of increasing fatigue and inability to concentrate on academic problems. He had had similar problems in the military service and was classified as a psychoneurotic. The present fatigue state was initiated by a heavy academic load and an unhappy love affair. A physical examination was essentially negative. Laboratory tests revealed a flat glucose tolerance curve (10/13/48, figure 3).

This patient withdrew from school on his own initiative and gained employment as a store clerk. On November 15, 1949, the patient was again observed in our out-patient department and found to be totally asymptomatic. A glucose tolerance curve on this date was normal. In the spring of 1950 the patient felt so well that he returned to school. In May 1950 the patient had a recurrence of extreme fatigue, and his glucose tolerance curve was again flat.

Discussion: This case represents the well known improvement of such problems following withdrawal from an excessive stress environment. While the procedure is occasionally necessary to rehabilitate these patients, it is obviously not satisfactory from the patient's standpoint and is frequently not acceptable to them.

Case M. O., female, age 28 (figure 4). This patient presented herself for treatment with a history typical of a functional hypoglycemia syndrome. Many stress stimuli were elicited in the history, revolving around family dissension, financial insecurity, and problems of sexual frustration.

The initial glucose tolerance curve is illustrated in figure 4. The blood glucose levels in this patient on repeated tests were

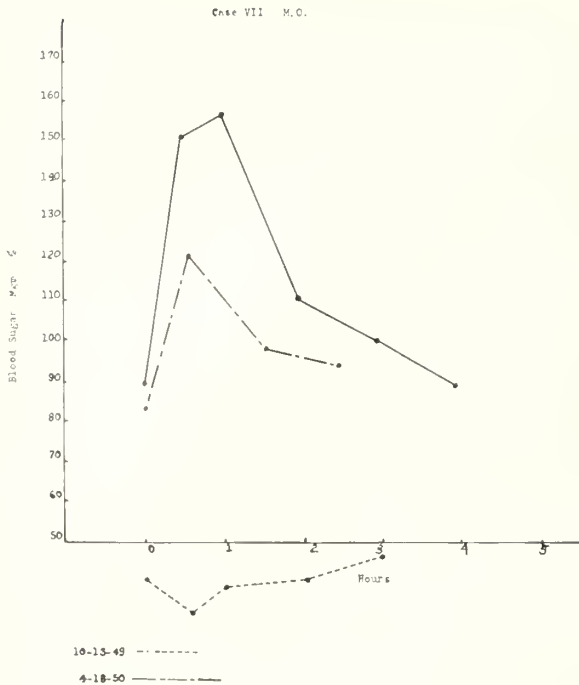


Figure 4.

between 40 to 50 mg. per cent. The chronicity of development apparently prevented frequent attacks of syncope, which could be expected with such low blood sugar levels.

Under psychotherapy, which in this instance is synonymous with the removal of stress stimuli, this patient's fatigue syndrome improved, and coincidentally, the glucose tolerance curve approached normal (figure 4).

Discussion: Psychotherapy which is designed to lessen the impact of stimuli on dysadapted organisms or re-

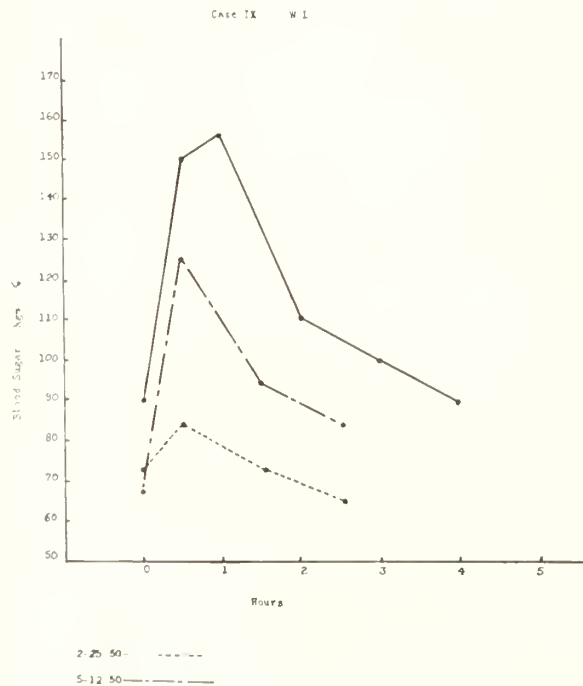


Figure 5.

moval of such stimuli will usually be rewarded with clinical improvement. The basic physiological defect, unfortunately, is not altered by this therapy and these patients experience frequent regressions.

The second point of therapeutic attack on the syndrome has been directed to altering the end result of the stress syndrome. Portis¹ and other workers⁷ and work in our own clinic have demonstrated that the vagus nerve plays a significant role in the development of this type of carbohydrate metabolic disturbance. It is possible to cause a reversal toward normal of flat glucose tolerance curves by the administration of adequate amounts of atropine, interfering with the transmission of vagus impulses. Portis has carried these observations further and has demonstrated a permanent reversal of the flat glucose curve following surgical vagotomy. Medical vagotomy, atropine, in contrast, becomes a very valuable therapeutic tool in treating this type of stress syndrome.

The end product of this syndrome can be further attacked through proper dietary management. The utilization of a high protein*, low carbohydrate diet brings into play a metabolic process not involved in the stress syndrome with definite improvement in the patient's symptoms and in the abnormal glucose tolerance curves.

*Casein added.

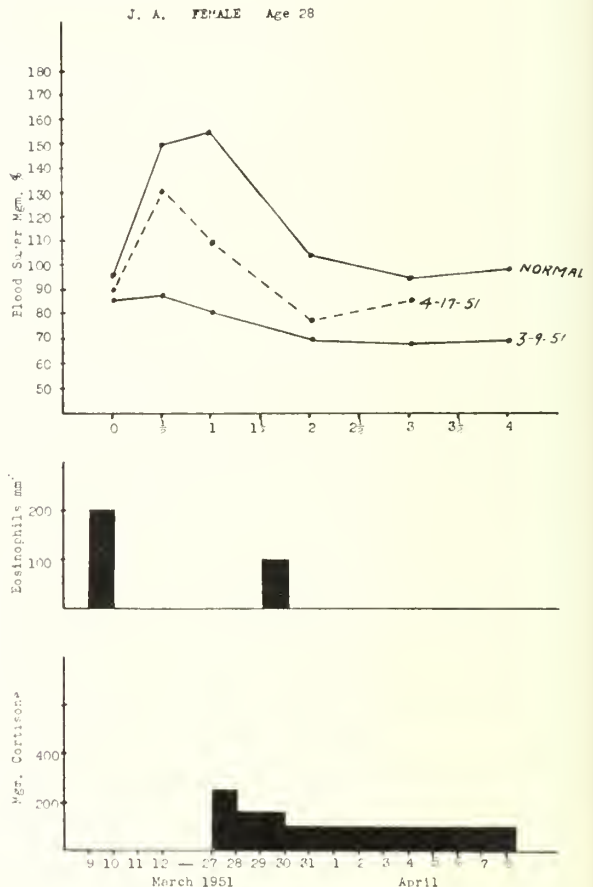


Figure 6.

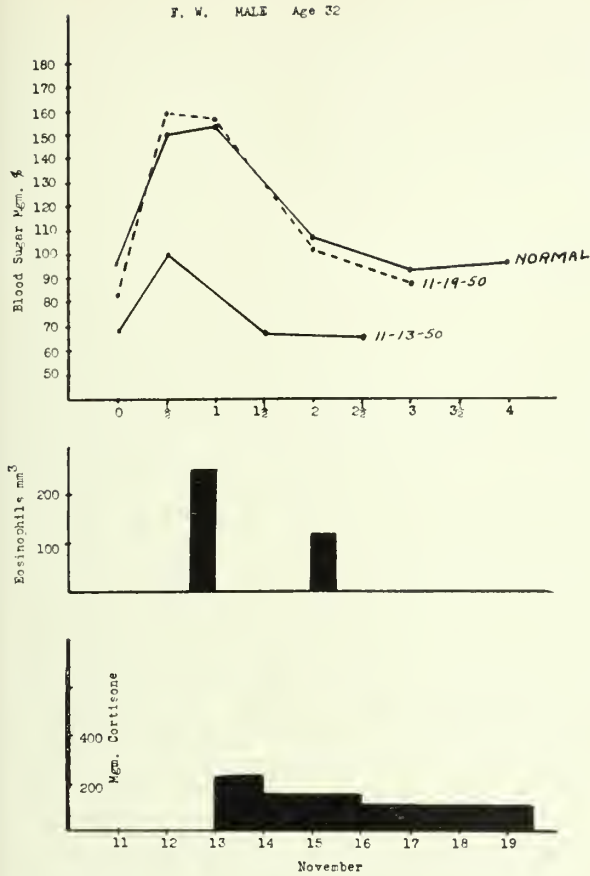


Figure 7.

Case W. L., male, age 22 (figure 5). This was a typical fatigue state with a flat glucose tolerance curve on February 25, 1950. Following a multiple feeding, high protein diet*, this patient manifested progressive symptomatic improvement and on May 12, 1950, a glucose tolerance curve was reverting toward normal.

The secretory or neurogenic defect which causes certain persons to dysadapt is currently unknown. Volumes of literature now exist which suggest that the organism's ability to react to stimuli without untold effects may be ultimately related to adrenal cortical function. It is, therefore, logical to investigate the reaction of cortisone on the particular type of stress syndrome. Several cases have thus been treated and studied, and at the present time the results are so variable and unpredictable that satisfactory conclusions cannot be drawn. The following three cases are presented briefly to illustrate the problem.

Case M. G., male, age 30 (figure 6). This was a typical fatigue state with loss of libido, slowed cerebration, disinterest in social and academic life, and a flat glucose tolerance curve. He was given a course in cortisone, following which he developed euphoria, return of libido, and he again took an interest in academic and social life. The interesting observation was the fact that the glucose tolerance curve was not altered. The effect lasted about 9 to 10 weeks.

Case F. W., male, age 32 (figure 7). This was another typical case of prolonged fatigue with hypoglycemia. Following cortisone therapy, this patient's glucose tolerance curve returned to normal. However, there was absolutely no symptomatic change.

*Casein added.

Case J. A., female, age 28 (figure 8). This was a known case of fatigue with functional hypoglycemia for ten years, having been studied previously in many clinics. This patient gave the interesting history that she had felt fine during two pregnancies and that during the past few years, she planned all strenuous activities on the first two days of her period. This patient was given cortisone and during the therapy the patient became very irritable, depressed, and fatigue was more prominent than ever. The glucose tolerance curve showed some improvement after the cortisone therapy. Following the cessation of cortisone, the patient was started in on stilbesterol with prompt and satisfactory symptomatic improvement.

SUMMARY AND CONCLUSIONS

Such problems are not simple from a diagnostic or therapeutic viewpoint. With the increase in noxious stimuli in the world, it can well be anticipated that such problems, as set forth in this study, will become increasingly prevalent.

The inability of certain humans to respond normally to an excess of stimulation has been presented with particular reference to the symptoms of fatigue and the accompanying abnormal carbohydrate metabolism. When the syndrome is well developed, three medical approaches are possible: (1) removal or lessening of the stimuli (change in environment, psychotherapy, or sedatives), (2) altering the end results by medical vagotomy (atropine), or (3) by altering the intrinsic secretory or neuro-

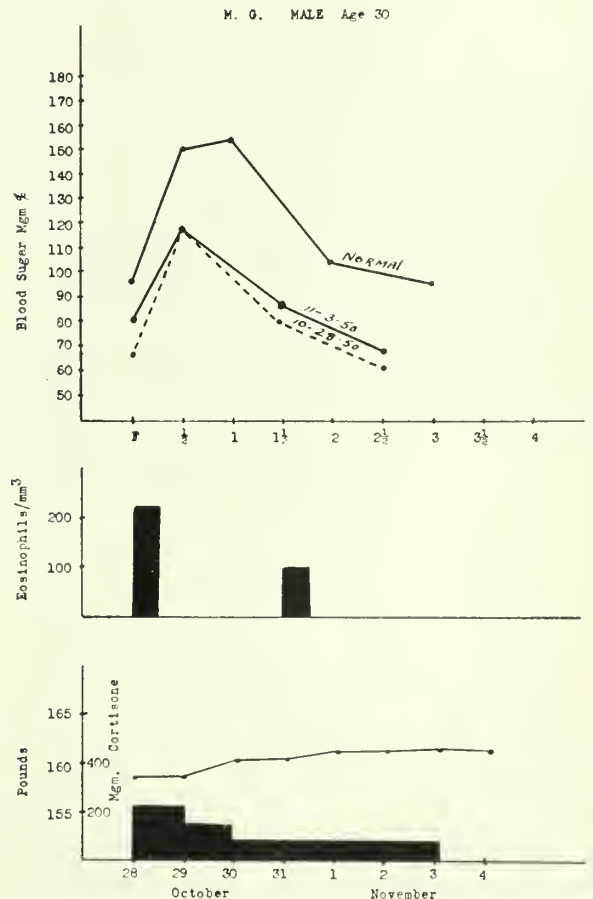


Figure 8.

(Continued on page 518)

Early Diagnosis of Malignant Lesions of the Genito-Urinary System*

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Fargo, North Dakota

J. C. AINSWORTH DAVIS, the British urologist, concludes the preface of the third edition of his recently published urological text with this statement: "It is the duty of the profession to realize once and for all the harm that could be done by the treatment of urinary symptoms without the realization of their underlying cause."

The early diagnosis of urogenital cancer may be simplified greatly if two simple rules are followed relentlessly: whenever an abnormal swelling, either visible or palpable, is present or unusual bleeding occurs, *investigate*.

In carrying out the first of these rules, the knowledge of anatomy common to all medical practitioners and a calm, unhurried mind are both required. In the second instance, a differential diagnosis of hematuria is necessary. We must not confuse bleeding with (1) hemoglobinuria, (2) urinerous discoloration from pyridium or phenolsulfonphthalein medication, (3) urine colored by the ingestion of beets. Hemoglobinuria may be ruled out by noting microscopically the absence of red blood cells.

Pain in the early diagnosis of cancer is not important, but urogenital pain must be interpreted to localize properly as well as make a prognosis in those lesions which have progressed beyond their early stages.

Renal pain, as is well known, emanates from the autonomic nervous system via the tenth, eleventh and twelfth thoracic nerves. Rarely is it referred to the neck and shoulder via the phrenic from the diaphragmatic irritation of a large tumor. Ureteral pain follows its anatomical course, is usually in the lower half, and is referred to the ipsi-lateral testicle. Vesical pain is referred to either suprapubic, retropubic or penile areas.

In this paper, diagnosis of the forthcoming lesions will be stressed. Treatment will be considered in detail only when directly applicable to general practice. Otherwise, mention of urological application will be cursory.

Malignant lesions of the genito-urinary tract will be considered in the following order, or from above downward anatomically: adrenal, renal, ureteral, vesical, prostatic, penile, urethral, epididymal and testicular.

Adrenal tumors

*Read at the meeting of the North Dakota State Medical Association, Bismarck, North Dakota, May 19 to 22, 1951.

The material contained in this paper was obtained from the urological service of Veterans Administration and St. John's Hospital in Fargo and from the teaching service of the University of Minnesota's department of urology.

The clinical incidence is unusual and types are divided into cortical adenoma, carcinoma and medullary types, most of which are highly malignant, including the extremely virulent tumor neuroblastoma in children. In cases of sudden intermittent paroxysmal hypertension a medullary adrenal tumor should be borne in mind after ruling out hyperthyroidism, chronic nephritis or essential hypertension. Cortical tumors may cause no constitutional changes, but on the other hand may be responsible for precocious puberty, masculinizing of a female, feminizing of the male, or pseudo hermaphroditism. A discussion of the diagnostic value of aortography or perirenal insufflation technique has no place here as they are highly technical urological procedures. However, given a patient fitting one of the above syndrome categories, and using meticulous palpation of a kidney displaced by the enlarged adenoma may supply a valuable lead. In the absence of palpability, an intravenous pyelogram may reveal the downward renal displacement.

Carcinoma of the kidney

The large proportion of all kidney tumors are malignant and fall into one of three types: (1) cortical, or hypernephroid type, (2) papillary tumors derived from mucous membrane of the pelvis and calyces (urothelium of Melicow, (3) adenocarcinoma of childhood known as the Wilms' tumor. The latter will be considered first. The Wilms' tumor is one of the commonest cancers occurring in children under the age of five and an extremely potent killer. The mother first notices a grapefruit or football sized mass producing an asymmetrical distension of the child's abdomen. This must be distinguished urologically from polycystic disease, hydronephrosis and occasionally is confused with splenomegaly or ascitic fluid. Regarding the latter differential, the Wilms' tumor is a localized enlargement though extensive and may be balloted in the flank posteriorly. Nowhere in all the field of urogenital cancer is the earliest possible diagnosis quite so important in relation to cure. Transperitoneal or thoraco-lumbar nephrectomy with or without preceding irradiation is indicated immediately the diagnosis is established.

The commonest of all renal neoplasms is the Grawitz tumor usually known as hypernephroma. The classical symptomatic triad of palpable mass, costovertebral angle, pain and hematuria is well known. With the extent of palpability, the potential rate of cure progressively decreases. An early diagnosis of hypernephroid carcinoma of the kidney, therefore, must depend upon an immediate pyelographic investigation of painless hematuria.

Renal neoplasms must be differentiated diagnostically from simple cysts encroaching on the parenchyma. Often the only certain way to do so is by surgical exposure of the kidney itself.

Here a word may be timely on the roentgenologic preparation of patients for intravenous pyelograms. There is a universal tendency on the part of the x-ray technician, the practitioner and even the specialist to underhydrate these patients. On the urologic service of our Fargo Veterans Administration Hospital and St. John's Hospital, 16-hour dehydration is required of all patients undergoing intravenous pyelography. The resulting pictures are often difficult to differentiate from those made by the retrograde method.

An additional, though infrequent sign of renal cortical tumors, is the presence of a left-sided varicocele which does not disappear in the recumbent position.

As regards treatment, Foley has long advocated nephrectomy, accomplished radically with the removal en bloc of the kidney and all its perinephritic fat (Gerota's fascia).

Seven to ten per cent of renal tumors occur as papillary transitional growths of the renal pelvis. The histopathology of these cases may be identical to those of the urinary bladder and their natural history bears out such a resemblance. Occasionally these tumors which may appear anywhere within the calyceal or infundibular region of the collecting system by reason of metaplasia, may develop into squamous cell carcinomata. It is a mistake not to consider these lesions as extremely malignant neoplasms. They spread via the pedicle lymphatics and also by direct cellular implants down the urinary current to the bladder itself. It therefore appears evident that an upper urinary tract investigation is mandatory in all bladder tumors. The diagnosis rests on the presence of a demonstrable filling-defect within the collecting system as visualized by intravenous pyelogram. The treatment is the radical extirpation of kidney, ureter and cuff of urinary bladder.

New growths of the ureter

Winsbury-White states new growths of the ureter are distinctly rare. However, the recent increase may be accounted for on the basis of a more accurate diagnostic acumen. The diagnosis of primary ureteral neoplasm is not overly difficult provided the conditions are borne in mind. The presence of hematuria and hydronephrosis should lead one to suspect the possibility at the outset. Either a large irregular ureteral filling defect in the absence of pelvic pathology or actual papillary projection extruding from the ureteral orifice conclusively establishes the diagnosis. A vesical lesion overlying a ureteral ostium must not be confused with one extruding from the meatus itself. The type of ureteral efflux is often helpful when the picture is in doubt. Blood clot and non-opaque stone must be differentiated and are usually smaller and more uniform in casting of the negative shadow. The treatment of either benign or malignant tumors of the ureter is the same, that is, nephro-ureterectomy, followed by deep therapy because of the fact

that nearly 50 per cent of the growths metastasize to the regional lymphatics.

Vesical carcinoma

Nowhere in the genito-urinary system can the diagnosis of such a condition be made with such facility, yet its treatment is fraught with variable difficulty. Seventy-five per cent of all vesical cancers present an initial gross hematuria, which will be demonstrated by one hundred per cent in the course of the disease. The diagnosis is confirmed cystoscopically, a diagnosis which in experienced urological hands requires no biopsy. The question is asked, especially by the pathologist, why no biopsy? First, there is a mistaken conception in the minds of a few that vesical papillomata are benign lesions. The Army Institute of Pathology classifies these tumors as carcinoma grade I. The majority of urological clinicians as well as uro-pathologists now feel it is a conservative attitude to consider all transitional cell neoplasia as a malignant lesion and to so treat it. The second reason for negating biopsy is that fact that in the same papillary carcinomatous lesion, a grade II neoplasm may be present at the top of the mushroom configuration whereas its stalk may be comprised of grade IV cells. To recapitulate briefly, the presence of a profuse, port wine, painless hematuria together with cystoscopic findings mean a visualized diagnosis of vesical cancer. Palpation of the vesical base by way of the rectum or vagina will often be informative when performed bimanually under anesthesia.

Above 95 per cent of vesical carcinoma is epithelial in origin, a condition which, fortunately, metastasizes fairly late. Their gross pathology assumes two main points, the papillary type above a well defined stalk and ulceroinfiltrating type. The latter type is more insidious, bleeding late and more often found to be inoperable when diagnosed. The main urological techniques in vogue today for the treatment of vesical cancer include both transurethral and suprapubic electro-coagulation (misnamed fulguration), segmental resection, radon implantation and cystectomy with ureteral intestinal anastomosis. Much urological interest has resulted in refinements of the latter technique and it is being employed much oftener than formerly in multiple, recurrent, non-metastasizing types of growths.

Carcinoma of the prostate

One out of five men past 55 is destined to develop cancer of the prostate gland. At Memorial Cancer Hospital in New York City it is felt that a hard mass in the prostate of a man past 50 should be considered malignant until proved otherwise. Frequently patients present themselves to the doctor complaining of the typical symptoms of benign prostatic obstruction: that is, frequency, loss of urinary force, nocturia and even complete urinary retention. The most valuable step in the detection of prostatic cancer is a careful rectal palpation of the gland itself. Stony hard nodular induration with loss of glandular borders and absent median sulcus invariably point to malignant pathology.

Not infrequently painful metastases first point to the primary situation. Cancer of the prostate spreads first

and foremost to the lumbar spine, pelvic bones, and upper portion of the femur with its attendant backache and often intractable sciatica. The x-ray picture is usually of a diffuse osteoblastic reaction with an increased bony density of the involved region. Most important in the differential diagnosis of metastatic carcinoma of the prostate is the primary bone lesion of Paget's disease. Whereas this condition produces lesions indistinguishable from metastatic cancer, there occurs a rise in the serum alkaline phosphatase. The latter produce elevations in the serum acid phosphatase. Significant urinary bleeding is unusual in prostatic cancer. Treatment in early cases is radical perineal resection. In the remaining cases hormonal management with orchiectomy and estrogen therapy produce a marked repression of the cancerous growth for an indefinite period until pituitary inhibition is overcome. It is now generally considered that from 40 to 60 per cent of prostatic cancer cases outlive their malignancy to die of geriatric causes while under adequate hormonal management of their tumor.

Carcinoma of the penis

Carcinoma of the penis seldom occurs in a man under 40 and is virtually nonexistent in males circumcised in infancy. The commonest sites for penile carcinoma are on the glans itself, frenulum or the inner surface of the prepuce. In the presence of a nonretractable phimosis, the detection of a palpable nodule or indurated area necessitates further investigation, with either dorsal slit or full circumcision. Biopsy in this malignant lesion is important for absolute diagnosis and will usually reveal a squamous cell epithelioma. Metastases occur in the femoral or inguinal lymphatic channels, but contrary to expectancy, comparatively late. Palpable inguinal lymphadenopathy occurs early but has been found upon biopsy or surgical resection to be mainly inflammatory cells from the secondary infection imposed on the necrotic portion of the neoplasm. Treatment is amputation, partial or radical, with or without lymph node dissection, depending upon the extent of the lesion.

Carcinoma of the testis

Classifying tumors of the testis was long a confusing job for the urologist until the Army Institute published its monograph on genito-urinary pathology which helped materially to clear away much of the haze surrounding the subject. In the main they recognize four distinctly

separate cellular types of malignant lesions: (1) teratoma or terato carcinoma, (2) seminoma, (3) embryonal cell carcinoma and (4), the arch killer of their group, the chorio-epithelioma. A pathological differentiation of the cell type is beyond the scope of this paper, but it suffices to say that any painless, translucent enlargement which appears outlining the scrotal sac bears investigation from the standpoint of potential carcinoma. Investigation here implies but one procedure: surgical exploration of the scrotal contents. Commonly the practitioner as well as urologist is misled regarding testicular tumors which may have an inflammatory process superimposed which appears clinically as an epididymitis. This tumor occurs most commonly between the ages of 20 and 40, and therefore is considered a young man's disease. The chorio-epithelioma has a hormonal production associated with it and often is seen together clinically with gynecomastia.

Inguinal orchiectomy with or without the radical para-aortic lymph node dissection is advocated to be followed by deep x-ray therapy. The prognosis is the best in the seminoma.

Miscellaneous carcinomas

Carcinoma of the epididymus is a rare lesion and clinically indistinguishable from testicular tumor. Cancer of the seminal vesicle is unknown, and that of the male urethra practically nonexistent. The female urethra is heir to a lesion somewhat similar to a caruncle in appearance but which when palpated through the vaginal wall is fixed, indurated and often nodular. This lesion is an epithelioma of high malignancy for which radium only affords any degree of palliation. Cancer of the scrotum in the male and the vulva in the female are usually squamous epithelioma; both necessitate wide radical excision and the latter especially, offer a poor prognosis even when treated early.

SUMMARY AND CONCLUSIONS

1. The diagnostic importance of all abnormal urinary tract bleeding has been emphasized.
2. The differential diagnosis of hematuria has been stressed.
3. A discussion of urogenital pain has been given.
4. The principal cancers of the genito-urinary tract have been described and their earliest diagnostic symptomatology elaborated.

DOCTORS v. CLERGY CRICKET MATCH

THE annual Cricket Match between Doctors and Clergy will be held at the Warwickshire County Cricket Ground on Saturday, September 8th, 1951.

Wickets will be pitched at 12-0 noon and drawn at 7-30 p.m.

Tickets may be obtained at the office of the Local Medical Committee, 154, Great Charles Street, Birmingham, 3.

Lunch may be had on the ground from 12-30 p.m.

Teas and refreshments will be obtainable at 4-30 p.m.

Will members kindly reserve this date and bring as many friends as possible with them?

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Difficulty in Removing T-Tubes From Bile Ducts

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T-TUBES are usually removed manually from bile ducts with ease and dispatch at the bedside or in the office and with a minimum of discomfort to the patient. Seldom are there any accidents at the time of withdrawal and the fistulous tract rarely fails to heal promptly. Current literature contains reports of tubes pulling apart but little is said about any difficulty in removing them. My own experience indicates that tube withdrawal is difficult at times and occasionally requires special means to accomplish it.

In former times, when T-tubes were removed quite routinely a few days to a few weeks after operation, they left the bile tract with greater ease, no doubt, than they sometimes do now after a sojourn there of 12 to 18 months or even longer. Present day long term use of these tubes gives ample time for scar tissue to form in abundance around them, if it is going to, while they remain undisturbed in place. Under these conditions, it is not to be wondered at that they occasionally become entangled sufficiently in scar tissue to make their removal difficult. The following three cases illustrate such difficulty.

CASE REPORTS

Case 1: The common duct was divided completely during a cholecystectomy for gall stones on September 21, 1936. Two weeks later, October 5, 1936, the widely separated ends were united over a T-tube by means of a single row of interrupted chromic catgut sutures. The long arm of the tube emerged from the duct through the anastomotic suture line and reached the skin surface through a stab wound. A second undesirable feature of this repair was the considerable degree of tension under which the duct ends were approximated.

Because of these undesirable factors, an unusually long term employment of the T-tube was planned, and it was left undisturbed in situ for longer than 32 months. It remained patent all this time without irrigation except when examined at irregular intervals of several months at the office. The patient permitted bile to escape daily from the long arm of the tube after leaving the hospital; but after a short time she neglected doing this for intervals as long as several days or weeks.

Her postoperative course was satisfactory at all times. At the end of the 32 month period of T-tube employment it was thought that the danger of stenosis at the site of repair was past and that the forces of scar tissue contracture, if any, had expended themselves completely against the inlying tube and would no longer threaten its patency after removal.

Accordingly, an attempt was made to withdraw the tube by hand at the office on June 2, 1939. At the end of considerable effort it appeared to be held in place solidly. A second and similar attempt the next day likewise failed. Another method was now employed with the patient in a hospital bed. The long arm of the T-tube was hitched under considerable tension to the framework of a cradle. Its elasticity was good and a steady pull was maintained for six hours which was estimated to equal several pounds. This caused the patient so much discomfort that

it was discontinued for the night. The next morning, several hours later, a nurse pulled on the tube with her hand without undue force and it came away promptly and easily. It had then been in the duct for 973 days. It was still of excellent quality and completely free from deposits of any kind.

The fistula healed promptly and the patient has remained well during the twelve years which have now intervened.

Case 2: Three years after a cholecystectomy for gall stones symptoms recurred which were similar to those present before operation. A second operation on January 13, 1947, revealed a large and inflamed common duct which contained no stones. Drainage was established by means of a T-tube, size 24 F. Its horizontal arm lay loosely in the much larger duct. Its long arm traversed the abdominal wall through a stab wound. Continuous drainage of bile for ten days after operation gave complete relief of symptoms. Thereafter bile was permitted to escape externally for about one half hour daily. This practice was continued for nearly four years with no recurrence of symptoms. The patient herself chose to retain the tube so long because she had felt so much better since it had been inserted. At no time was it irrigated except when she was examined at irregular intervals of several months.

During the first week in December, 1950, when the tube had been in the duct nearly four years, bile stopped escaping freely externally and soon none came when the tube was opened. No symptoms of any kind appeared but the patient decided that the tube should be removed since it was plugged.

An attempt to remove it at the office on February 19, 1951, failed, and repeated steady pulls of considerable strength and duration gave no indication of success.

The patient was now placed in a hospital fracture bed equipped with an over-head frame. A cord was hitched to the long arm of the T-tube and vertical traction of nearly two pounds instituted by means of two pulleys and a two-pound weight. At the end of three hours the tube came out satisfactorily; this was on February 20, 1951, just 1498 days after it was inserted.

The horizontal arm, 7½ centimeters in length, was only partially filled with bile sediment but it was obstructed completely. The entire external surface was finely granular with bile deposits; the adjacent long arm of the T-tube was involved likewise for a distance of four centimeters. The quality of the rubber was fair. Its elasticity and pliability remained free from any change which contributed to the difficulty of removal. After the tube was out it was found to sustain jerky pulls amounting to three to four pounds. A somewhat stronger pull of this kind caused it to break in two.

The patient has remained well since the tube was removed five months ago.

Case 3: The patient is a woman whose gallbladder was removed October 24, 1949, when she was 50 years of age. It was very large with thick edematous walls which were under considerable tension from locked-up, thin, bile-stained fluid; also present in the gallbladder were 30 stones.

The common duct appeared normal on inspection and palpation.

Immediate recovery was satisfactory but troublesome symptoms recurred within six weeks after discharge from the hospital. They consisted of right upper abdominal quadrant pain, nausea, vomiting, anorexia, fever and loss of weight. About three months later a mild jaundice developed but the stools were always well colored by bile elements.

A stone in the common duct was suspected and was looked for on March 29, 1950. None was found but the duct was

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large and distended with bile. The head of the pancreas was enlarged and hard and evidently the cause of the partial obstruction. The question of malignancy remained unsettled.

Sounds could not be passed down the duct into the duodenum. The latter was opened and a rubber catheter, size 12 F, was finally passed upward to the liver through the papilla of Vater. Larger ones were subsequently passed up to size 18 and then a No. 14 T-tube was placed in the common duct. The lower end of its intraductal portion reached to the ampulla of Vater but did not extend through the orifice of the papilla. The long arm of the T-tube was brought out of the abdomen through a stab wound lateral to the operative wound.

For several months bile was permitted to drain from the tube daily for 10 to 20 minutes and then this procedure was carried out at longer intervals. No irrigation was ever instituted except when the patient was examined a few times post-operatively. Recovery was prompt and complete.

At the end of 11 months an unsuccessful attempt was made to remove the T-tube in the office by hand traction. Two days later the patient returned to the clinic dressing room where a two-pound weight was hitched to the long arm of the T-tube as was done in Case 2. Success was surprisingly prompt this time, the tube coming out at the end of 15 minutes. This was on February 28, 1951, just 336 days after it was placed in the duct.

The quality of the tube was excellent. No change was noted. No bile deposits were present anywhere. Although its lumen measured only 3 mm. in diameter, it remained wide open. The length of the short arm was 9 centimeters. Its long arm sustained jerky pulls repeatedly amounting to four to five pounds.

The patient has remained well since the tube was removed.

DISCUSSION

Present day T-tubes are one-piece devices which are equally reliable whether made of red, gum or synthetic rubber. They become plugged eventually with bile deposits like tubes made of any other kind of material such as vitallium and polyethylene. None possesses an immunity against plugging so that all have to pass or be removed from bile ducts at some time.

T-tubes belong to the list of surgical supplies which are often neglected in operating rooms to the point where their quality is impaired by age and their assortment as to size entirely inadequate.

From such a poor stock of tubes one is sometimes selected hurriedly, particularly in an emergency, and employed without due inspection and examination. Under such unfavorable conditions, a tube of improper size, either too large or too small, may be used. Buxton and Burk¹ report a case of this kind in which one was forced into a bile duct with resulting blood supply impairment and gangrene.

Pioneer bile duct surgeons of 30 and 40 years ago evidently quite often used T-tubes of undependable qual-

ity, because they registered many complaints about their breaking and pulling apart, especially where the long and short arms were joined together. This hazard was given quite regularly as one of the reasons why T-tubes should be discarded completely from bile duct surgery. Opinions of this kind were expressed as late as the 1920's by prominent surgeons such as L. L. McArthur² of Chicago.

Complaints about the alleged unreliability of tubes made of rubber are unusual today but still they appear now and then. Ten years ago Pearse³ first became quite a severe critic of rubber in bile duct surgery when he began using vitallium tubes in repair work. Contrary to the experience of nearly all his contemporaries, he found rubber too prone to early decay when placed in bile ducts. Clute⁴ heartily agreed with him and likewise became most enthusiastic over the then alleged advantages of vitallium devices.

Recently Pearse⁵ renewed his attack on rubber but for a different reason than he gave in 1941. He is now of the opinion that rubber, after prolonged contact with bile ducts, sometimes becomes irritating and causes extensive narrowing and sclerosing, but admits lack of corroborative evidence. Nevertheless, Cole⁶ and some of his associates subscribe to it, and so a few surgeons still keep up a controversy unsuccessful in converting any considerable number to their changing impressions.

Rubber tubes continue to enjoy a great vogue in bile duct surgery as they have done for nearly 60 years. The T-tube, and similar varieties, have the distinct advantage of certainty and timing in their removal. If of good quality when introduced into bile ducts they remain free from any noteworthy impairment and strong enough to come away in one piece months later. Traction amounting to two to three pounds is all that is required, even in the most refractory cases. Good tubes never pull apart within this limit and they usually come out promptly. Occasionally, however, a steady pull of a few hours is required but never in excess of the amount stated. Even poor tubes may stand up well under steady and limited traction of this kind.

SUMMARY

Three cases are reported in which difficulty was encountered upon attempted manual removal of T-tubes from bile ducts. Success was attained by the employment of a prolonged pull of less than two pounds applied with the aid of an overhead frame.

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Problems in the Management of Severe Diabetes*

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THE invitation to address you on the subject of problems in the management of severe diabetes gave me much pleasure but at the same time caused me considerable embarrassment since I thought that Dr. Haunz had covered this in admirable fashion, but on re-reading Dr. Haunz's contribution¹ I found that he had concerned himself with the "extremely severe brittle diabetic" and not with severe diabetes. There is a great difference between the severe and the "brittle" diabetic. I wish to make it clear that I am in complete accord with Dr. Haunz's method¹ of obtaining "blood sugar profiles" and using multiple injections of regular insulin in appropriate doses and have no comments except laudatory ones to make on his work. Any physician who guides a number of diabetics must necessarily acquire impressions about the handling of severe cases and I shall present my ideas on this subject.

MILD AND SEVERE DIABETES

It is generally accepted that the severity of diabetes is directly proportional to the size of the required dose of insulin. The simplest and the most apt definition of diabetes is that it is a disturbance of carbohydrate metabolism brought on by an absolute or a relative deficiency of insulin. The acknowledgment of this meaning of diabetes necessarily validates the conception of the degree of severity of the diabetes in terms of imperative insulin need for the preservation of life.

A canvass of any series of diabetic patients shows that they do equally well and cannot be differentiated from each other on the basis of appearance or accomplishment irrespective of the amount of insulin they are receiving. They may use no insulin at all, but may only restrict their diet; they may employ small doses of insulin, or they may use up to hundreds of units daily. The point is that, regardless of the quantity of insulin administered these people are in reality normal persons. In other words, there is no difference between severe and mild diabetes as gaged by the size of the required dose of insulin. Dr. Haunz² endorsed these concepts when he advocated the acceptance of insulin-resistant diabetics as life insurance risks. In 1948, one of my patients, aged 33, who had had diabetes under my care for fifteen years, was granted life insurance although he was using 108 units of insulin every day. This is the beginning of the answer to our prayer.

The label, "severe diabetes," standardized according to the insulin requirement is, in my opinion, only giving

lip service to the human urge for definitions. My concept of severe diabetes includes the existence of a threatening complication such as retinitis, nephritis, coronary thrombosis or gangrene. Unfortunately not a great deal is known about the prevention or treatment of such ailments. It should not be forgotten that insulin has set aside equally important afflictions in diabetes, such as malnutrition, acidosis, coma, cataract, carbuncles and tuberculosis. In our efforts to accomplish more we should not minimize what has been achieved because of the problems created by the extended life span of the diabetic.

OBJECTIVES OF TREATMENT

The treatment of diabetes may be summarized under three headings:

1. Control of blood sugar and glycosuria without polyuria or hypoglycemia
2. Maintenance of normal nutrition, but no overweight
3. Avoidance of nerve tension

At this time I shall discuss only the control of blood sugar and glycosuria without polyuria or hypoglycemia, and allude only incidentally to the maintenance of normal nutrition and avoidance of nerve tension.

MANAGEMENT OF BLOOD SUGAR LEVELS

Ideal control of diabetes calls for maintenance of the blood sugar at normal concentration without episodes of hyper- or hypoglycemia and a constantly sugar-free urine. While these criteria are generally accepted it is freely acknowledged that they can be fully achieved only in those diabetics who require no insulin, or very small amounts.

A prolonged, marked glycosuria with its attendant polyuria and dehydration, is responsible for the diminished resistance to infectious processes, arteriosclerosis, formation of cataract, malnutrition, acidosis and coma; nocturia, bed-wetting and pruritus vulvæ are immediate and easily rectifiable results. Hyperglycemia without glycosuria is not a cause for these complications in diabetes (Mosenthal).³

Both hypoglycemia and hyperglycemia result in deterioration of the insulin-producing cells of the pancreas. Judging the matter from the point of view of experimental diabetes, Lukens⁴ concludes that: "Good control of the diabetes which avoids hypoglycemia and which disregards occasional hyperglycemia should be adequate in man."

From the practical point of view, for the maintenance of good health in the diabetic it is evidently required

*Read before the sixty-fourth annual meeting of the North Dakota State Medical Association, May 22, 1951, at Bismarck, North Dakota.

that the urine contain so little sugar that polyuria is not induced. Hypoglycemic attacks should be avoided. Hyperglycemia, provided the polyuria and glycosuria are controlled, apparently do no harm. One patient who had received as much as 98 units of insulin a day for the control of the urinary sugar, had high blood glucose figures because hypoglycemic reactions would result when further attempts were made at lowering the glucose in the blood. At the end of one year this patient showed a sugar-free urine while receiving no insulin whatsoever over a period of weeks. Evidently, in this case, the hyperglycemia was no barrier to the recovery of insulin activity approaching the normal.

DIABETES DIETS

Ample proteins, about 100 grams, are advisable. The maintenance of a satisfactory hemoglobin and red blood cell count, as well as normal levels of serum proteins, depend upon the protein intake. Fifty-eight per cent of the protein food is gradually changed to sugar, thus providing glucose to the body a little at a time which the diabetic is better able to assimilate than sugar or sugar-containing foods which result in an explosive rise of blood sugar and should be avoided. A carbohydrate intake of 150 grams per day provides all the starch necessary to produce a normal sugar tolerance curve in non-diabetics and furnishes an adequate daily ration of all the known starchy foods except those containing sugar. A low starch diet simplifies the management of diabetes and promotes good nutrition. Personally, I can see no advantage in the high starch diet except for laborers and children. As will be mentioned later, the under-utilization of sugar is largely controlled by a low starch diet.

The quantity of fats should be in inverse proportion to over- or underweight. The finding of Stetten that 30 per cent of absorbed glucose is changed into fat has neutralized the claims of those who advocate the extreme limitation of fats in the diet.

Strict observance of not only the amounts of carbohydrates eaten (proteins and fats need not be meticulously measured) but also of the timing of meals is essential. One of the most frequent causes for hypoglycemic reactions is a delay in eating breakfast, lunch, dinner or the intermediate snacks that have been established as necessary.

The avoidance of hypoglycemic reactions calls for some additional precautions. A meal of long-acting starchy food such as a sandwich and a glass of milk, should be urgently insisted on before engaging in hard physical exertion such as golf, tennis, prolonged gardening, etc. A radical diminution of insulin dosage is usually necessary when there is sustained exposure to the sun as in a Florida vacation.

ACTION OF INSULIN

The action of insulin is unique insofar as it is the only hormone that has all these four effects: (1) increases glycogen assimilation in the liver, muscles and skin, (2) promotes change of glucose into fat, (3) accelerates

combustion of glucose, (4) inhibits mobilization of glucose from liver glycogen.

The relative activity of the functions of insulin may be gathered from the observations of Stetten⁵ who found that of ingested glucose in normal animals, 3 per cent was deposited as glycogen, 30 per cent was deposited as fat—and by inference 67 per cent underwent combustion.

In diabetic animals all of these were markedly diminished. Although it is acknowledged that the high blood sugar of diabetes provides stimulation akin to that of insulin, it is not sufficient for the maintenance of life.

The loss of insulin effects 1, 2 and 3 will cause under-utilization of glucose while that of 4 will result in over-production of sugar.

OVER-PRODUCTION AND UNDER-UTILIZATION OF SUGAR IN DIABETES

The question whether diabetes is caused by over-production of glucose from the liver or under-utilization of glucose by the tissues, has been debated for a long time. Graham Lusk championed under-utilization and was not doubted until about 1910 when Carl von Noorden proposed the over-production hypothesis. A curtailment of insulin production because of disease of the beta cells of the pancreatic islets or a rise in the antagonistic influence upon insulin through derangements of pituitary, adrenal, thyroid or sex gland activity, might result in either over-production or under-utilization of glucose. This is perfectly evident when the action of insulin is studied.

Soskin⁶ showed by very difficult and ingenious experiments that, without altering the insulin supply the liver could take care of ingested glucose, and offered this as proof that over-production is the cause of diabetes mellitus. I admire these experiments beyond words and would accept them and Soskin's conclusions were it not for the fact that after the administration of glucose there develops a marked arterio-venous blood sugar difference in the blood vessels of the forearm indicating that there is assimilation of glucose by the peripheral tissues. In diabetic subjects this arterio-venous blood sugar becomes smaller and may disappear entirely, pointing to an under-utilization.

The determination of the existence and degree of over-production and under-utilization is a simple matter. Over-production may be judged by the fasting blood sugar. In the fasting state all of the previously ingested sugar has either been eliminated in the urine or has been utilized by the tissues, and the blood sugar value represents the rate of production by the liver. This holds true only if the subject has not been receiving insulin. Under-utilization is measured by the height and duration of sugar tolerance tests.

DIMINISHED UTILIZATION OF SUGAR

A normal fasting blood sugar, followed by a high, prolonged blood sugar curve, is a common finding in persons who are classed as diabetics. These individuals are usually regarded as mild diabetics and they are,

though the intensity of their diabetes may change. Their diabetes consists purely in under-utilization and they do not suffer from over-production of glucose. I have collected about 25 such cases which, temporarily at least, have been classified under the caption: "When diabetes is not diabetes." The outstanding example is a man, now 77 years old; glycosuria was discovered 42 years ago and traces of sugar are occasionally found in the urine. He is on a full diet including sugar and sugar-containing foods. During the past year three blood sugars, obtained about two hours after breakfast, were 92, 74 and 105 mg. per cent. He has never received insulin. Four glucose tolerance tests were carried out, the first in 1923 and the last in 1949.

TABLE I
True venous blood sugar values in four
sugar tolerance tests

	1923	1929	1937	1949	Normal
Fasting	97	90	82	101	100 or less
Highest after sugar ingestion	265	195	192	194	150 or less
2 hours after sugar ingestion	230	189	119	150	100 or less

Summation of glucose tolerance tests in a case that persistently has not shown over-production but gives evidence of diminished utilization, the blood sugar curve being high and prolonged.

Under-utilization of glucose as the sole impairment of carbohydrate metabolism is often a mild, non-progressive diabetes and is readily controlled by dietary restrictions without the use of insulin.

OVERPRODUCTION OF GLUCOSE *Case Report*

J. J. U., aged 39, in 1935 proved to have a diabetic glucose tolerance curve characterized by a high fasting blood sugar and subsequently a high prolonged curve. The fasting blood sugar at least indicated an over-production of glucose. He was treated by diet only but within a year insulin became necessary, which the patient at first refused but later submitted to taking it every other day. The every-other-day dosage was begun four years after the diabetes was first demonstrated. When the required dosage became greater than 20 units every other day, it was suggested that the insulin be taken daily. The patient's own idea was that he continue the insulin on alternate days and asked that we give it a trial. This was done and for the last twelve years he has been receiving insulin every other day, the dose reaching 60 units ten years ago, and has been maintained at a level between 60 and 86 every other day since that time. There have never been any hypoglycemic reactions and the diabetes is under good, but not perfect control.

Many doctors and physiologists have been asked for an explanation of this state of affairs but so far no satisfactory answer has been furnished. Finally, an interpretation occurred to me. This individual might be regarded as suffering mainly from over-production of glucose from the liver which was controlled by the constant effect of the protamine zinc insulin given every other day, and that under utilization was of minor importance.

OVER-PRODUCTION AND UNDER-UTILIZATION *Case Report*

D. P., aged 79, had had diabetes, readily controlled, for five years. During the last three months he became insulin-resistant and showed large amounts of sugar in his urine while receiving as much as 50 units of regular insulin three times a day before each meal. A fasting blood sugar showed a level of 428 mg.

per cent. This might be regarded as the true representation of over-production since he had not received any but regular insulin the previous day. He was given 20 units of regular insulin and within three hours the blood sugar dropped to 119 mg. per cent and at four hours it was 133 mg. per cent. This was a surprising event and showed that apparently small doses of insulin brought about a normal blood sugar within the expected time and that the elevated blood sugar due to over-production was readily controlled. He finally required 240 units of protamine zinc insulin given before breakfast and before dinner, a total of 480 units a day, for full control of his diabetes. These large doses were apparently necessary because of a combination of over-production and under-utilization of sugar. He never had any hypoglycemic reactions.

USE OF INSULIN FOR THE CONTROL OF DIABETES

There are about as many methods of using the various kinds of insulin as there are doctors engaged in the treatment of diabetes. When I have cooperative patients I prefer to treat them by office management so that their usual conditions will prevail and adjustments after hospitalization will not be necessary. The comparatively low-starch, high protein diet I have mentioned previously, is the one used, largely because it provides full nutrition and minimizes the problem of under-utilization.

Protamine zinc insulin is then begun and gradually increased, if necessary, until the urine passed in the morning becomes sugar-free. If the afternoon or evening specimen contains sugar, then either regular insulin is added to the protamine (NPH is equivalent to two parts regular and one part protamine), or globin insulin is added by separate injection to the protamine insulin in the morning. Enough globin insulin is added to control the urinary sugar in the evening specimen.

In my opinion, the globin insulin has sharper and more incisive effect on the blood sugar than other insulins with so-called intermediate action. The globin insulin, to my mind, acts a good deal like three separate injections of regular insulin.

In one case, following through this procedure, we found that 80 units of protamine insulin were required to render the morning urine sugar-free and, subsequently, the addition of 80 units of globin insulin served to control the evening urinary sugar. This patient took such doses for a considerable time while in New York, then later went to California where she kept the same dosage for some months at least.

The small doses of protamine insulin, under 30 units, nearly always control the mild cases. Some of them may be given higher doses up to 70 or 80 units for control of both morning and evening urine, though usually this is productive of reactions in the early morning and is not something to be undertaken lightly. However, when the over-production of sugar is very marked as in the case I have cited, the large doses of protamine insulin are effective without running the danger of hypoglycemic reactions. These cases are, of course, controlled by appropriate blood sugar determinations so that hypoglycemia shall be prevented.

In the enthusiasm for newer insulins I feel that protamine insulin has become somewhat neglected. The value of the dose under 30 units is universally acknowledged. I would like to call attention to one finding

which Dr. Morton Mark and I⁷ made some years ago, that protamine insulin was very much more efficacious in the treatment of tuberculosis complicating diabetes, than multiple doses of regular insulin. Whether or not the intermediate insulins will have an equally good effect upon this infection, has not been determined.

CORONARY THROMBOSIS, NEPHRITIS, GANGRENE

These are arteriosclerotic manifestations. The type of lesion found in the kidney brands the arteriosclerosis of diabetes as different from that usually found in the aged. Hypercholesterolemia does not often exist in the treated diabetic and cholesterol is a doubtful etiological factor. The marked increase in glycogen content of the heart and kidney in diabetics who have not received insulin, contrasted with a lowered glycogen content of the liver, skin and muscle, points to a special feature of the diabetic metabolism that may have a bearing on the early development of arteriosclerosis in the heart and kidneys. The significance of this is not clear. We are completely ignorant of what special steps to take for the prevention of coronary thrombosis or nephritis.

RETINITIS

The effect of insulin upon the eye is a matter that has been debated vehemently. Marked fluctuations in blood sugar do influence visual acuity. A prominent lawyer, aged 54, who deemed himself perfectly healthy, consulted his oculist because of sudden development of near-sightedness. One per cent sugar was found in the urine. It cleared up promptly by dietary correction alone, vision returned to normal and has remained so for a year. Insulin, through its effect upon the blood sugar level may bring about the same result. Such changes due to osmotic causes are commonly experienced. The idea that insulin is instrumental in producing retinal hemorrhages, is a different matter but it is widespread and leads to many off-the-cuff statements. Thus far there has been no convincing evidence of the hemorrhagic effect of insulin. Two cases may serve as evidence: the first, a man aged 40, has had diabetes for 24 years, beginning

at age 16, and has received insulin for 23 years; his eyes are normal. The second, a man aged 70, has had diabetes for 20 years, never receiving insulin; three months ago he consulted his ophthalmologist who found an advanced diabetic retinitis. One or two swallows do not make a summer but these are two cases of long duration that point to the harmlessness of insulin as an etiological agent for diabetic retinitis.

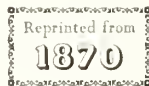
On the other hand it is well known that hypoglycemic reactions so frequently induced by over-action of insulin, may result in cerebral hemorrhages and it is only natural to suspect them of being a cause of retinal bleeding. The so-called insulin reactions should be avoided at all costs.

Diabetic retinitis has been ascribed to a lowering of the serum proteins. In a series of determinations I have not succeeded in verifying this. Hypoproteinemia was demonstrable in only a minority of cases and then mostly in those with a concomitant nephritis.

The control of the hemorrhagic tendency by vitamin P, vitamin C and other vitamins and by the use of lipotropic agents, such as choline and methiomine, has proved disappointing.

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TETANUS CURED BY CURARE

A solution of fifteen centigrammes (2.15 grains) was used hypodermatically and upon the wound wherefrom the tetanus originated and three times repeated.—ANALI CHIMICA.

Northwestern Medical and Surgical Journal 1:131, 1870

The Digestive Tract in Medical Literature

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IT would hardly be wise or even possible to record advances made in the study of functions and disorders of the digestive tract in the last century without considering the background of observations made in the centuries preceding. Among those who have gathered historical data are Garrison and Morton,¹ Cunha,² Wilbur,³ Hurst,⁴ Goldstein,⁵ Riesman,⁶ Boas,⁷ Bettmann,⁸ Pennington,⁹ Rosser,¹⁰ Bassler,¹¹ White¹² and a host of others. These men presented reviews of the medical investigations of various periods in the past and, although such material may be fragmentary, piecing together the fragments was made much easier by drawing upon the information which they collected.

EARLY LITERATURE

Probably one of the earliest records concerning this system of the human body is contained in Ebers' Papyrus,¹³ so called because it was purchased by Professor Ebers of Leipzig after its excavation in Thebes in 1858. Written about 1550 B.C. by an unknown author, it is only of interest in this review because it seems to contain the earliest description of cancer of the stomach and some intestinal parasites and their remedies. Then in the sixth century B.C. a learned physician, Herophilus,¹⁴ described and named the duodenum. About the same time a contemporary² of his in Alexandria made extensive studies of the pancreas of living animals.

Two centuries before Christ another physician in Alexandria, Serapion,¹⁵ found that infusions of cascara bark produce purging. About this same time Aesclepiades¹⁶ recommended and used opium in the treatment of abdominal pain, colic and diarrhea. The first description of fistula-in-ano and the method used in treating it dates to about 30 B.C., the description being by a Phœnician physician² then practicing in Rome.

In the first century A.D., Celsus¹⁷ wrote of gastric ulcer and may have been one of the first physicians to use diet in the treatment of ulcer. In that century, too, one of the two Plinys (father and son)¹⁸ described congenital pyloric stenosis, its symptomatology and made some anatomic drawings of this condition. Dioscorides¹⁹ wrote a textbook on materia medica in which he described hypersalivation, bleeding gums, fetid breath and the diarrhea of mercury overdose. He recommended tartar as an emetic to rid the stomach of poisonous substances rapidly. In the latter part of the second century Rufus²⁰ of Ephesus described the liver and its lobes and wrote in much detail about sensory and motor nerves and their influence upon the gastro-intestinal ailments.

Galen's²¹ influence began about this time. He described massive gastric hemorrhage and its differentiation

from the hemoptysis of tuberculosis and made suggestions for its treatment.

In the third century the Chinese surpassed their Eastern colleagues in almost every field of science. Nothing of great note, however, so far as the gastro-intestinal tract is concerned, came to light and again interest shifted to the Western World. In the sixth century Alexander of Tralles²² wrote an extensive treatise on intestinal worms. In the eighth century a Persian physician named Rhazes²³ who practiced in Bagdad appeared to be the greatest clinician of that time. He wrote a book entitled, "How to cure stomachache in one hour."

In the tenth century Abu Mansur Muwaffak,²⁴ a Persian physician, described the use of sodium bicarbonate for treatment of diseases of the stomach. The works of Ibn Sina,²⁵ a renowned philosopher and great physician who lived in the first half of the eleventh century, contain pages of description of mediastinal abscess pressing on the esophagus and causing dysphagia. A chapter was devoted to emetics and purgatives. Fever accompanying intestinal disturbances caused by drinking polluted water was described. An entire chapter was devoted to lovesickness and its effect upon the stomach.

In the twelfth century little that was original was written but much translation of previous writings was done. Maimonides,²⁶ a great Jewish physician who lived during this time, described hemorrhoids and their treatment.

John of Arderne²⁷ of London recorded an operation for the cure of anal fistula as early as 1376.

The fifteenth and sixteenth centuries probably constituted the transition period from medieval to modern times. It was during this time that Fernelius²⁸ described acute appendicitis and rupture of the appendix. One Mathius Frelrich,²⁹ a priest in a small German village, described the association of cirrhosis of the liver and chronic alcoholism. About this time Paracelsus³⁰ made the discovery of hydrochloric acid in the stomach. He extracted laudanum from opium and praised its virtues in cases of colic. He used arsenic and copper in treatment of the anemias and potassium and sodium sulfates as purges. The sixteenth century was the period of the great anatomists, including such men as Eustacchi³¹ and Falloppio.³²

Harvey's³³ discovery of the circulation of the blood in the seventeenth century marked a milestone in the progress of medicine. The writings of this century carried many names of great men including Wirsung,³⁴ Brunner³⁵ and Malpighi,³⁶ who described various structures of the digestive tract. Descartes³⁷ was the first to describe the peristaltic action of the musculature of the stomach. It was Van Helmont³⁸ who called attention

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to the fact that the gastric juices contained varying ferments, each with a definite function in regard to certain types of foods. Sydenham³⁹ described various types of dysentery which he had encountered.

In a small book⁴⁰ published in 1664 in Fleetstreet, London, which I borrowed from the Surgeon General's Library and which I was asked to guard with my life because it was the only one in existence, details are given concerning an instrument for cleansing the stomach and of diverse new experiments on the virtue of coffee and tobacco and how much they conduced to preserve human health. Some German workers wrote of "die Magen-boerste" or "die Magen krätzer."

In the eighteenth century Spallanzani⁴¹ made many important contributions. He devoted almost his entire life to the study of gastric juices. The work of Vater,⁴² Lieberkühn,⁴³ Meckel⁴⁴ and Wrisberg⁴⁵ are familiar to all physicians. Morgagni⁴⁶ described acute yellow atrophy of the liver and the occurrence of gumma of the liver in syphilis. A contemporary of Morgagni's in England was Baillie⁴⁷ who gave a description of the anatomy and pathology of gastric ulcer and the ulceration of Peyer's⁴⁸ patches in typhoid fever, further defined cirrhosis of the liver and described transposition of abdominal viscera.⁴⁹ The nineteenth century apparently was the era of cellular pathology with Virchow⁵⁰ as its greatest exponent. It was during this time that Bright,⁵¹ in addition to studying renal diseases, did much work on pancreatic diabetes, steatorrhea and atrophy of the liver and described echinococcus invasion of the liver. Addison⁵² gave the first description of pernicious anemia. It was about this time that Beaumont's⁵³ classical contribution "Experiments and observations on the physiology of digestion based upon studies of the gastric fistula of Alexis St. Martin" appeared. This undoubtedly constituted a landmark in medicine. There followed the work of Bernard⁵⁴ of France with his researches upon gastro-intestinal physiology, de Graaf⁵⁵ of Holland and Pavlov⁵⁶ of Russia. All three of these men continued their studies on gastro-intestinal physiology, each one basing his work on that of his predecessor.

It might be mentioned here that Wencker⁵⁷ made some interesting studies on gastric fistulae as early as 1735, and the work of Corvisart⁵⁸ and Leroux⁵⁹ of Paris on Magdeline Goré, who had a fistula for many years, appeared in 1802.

Parsons⁶⁰ wrote an interesting article on the relations of the brain and stomach in 1840.

Physick⁶¹ of Philadelphia used a stomach tube for gastric lavage in cases of poisoning as early as 1805. It is recorded that Monroe *secundus*⁶² had used a similar instrument in 1767. This same Physick⁶³ performed an operation in which he constructed an artificial anus in 1826. Dupuytren⁶⁴ of Paris wrote of such an operation in 1828. In 1826 Lembert⁶⁵ of Paris described the suture which played an important part in the development of modern gastro-intestinal surgery. In 1828 Abercrombie⁶⁶ described duodenal ulcer. In 1842 Curling⁶⁷ of London called attention to the fact that duodenal ulcer occurred following severe burns. In 1835 Brodie⁶⁸

of London delivered important lectures on disease of the rectum. In 1834 Andral⁶⁹ described two cases of gastric syphilis.

PERIOD FROM 1847 TO 1897

Hurst⁷⁰ wrote in 1911, "No branch of medicine has made more rapid strides in the last fifty years than that which deals with diseases of the alimentary canal." This same statement could be applied to each of the last two periods of fifty years and has been repeated in one form or another many times by medical historians of the last half century.

Starling⁷¹ wrote many years ago, "Every discovery, however important and apparently epoch-making, is but the natural and inevitable outcome of a vast mass of work, involving many failures, by a host of different observers." When one considers the fact that Brinton⁷² in 1858 said concerning pathologic processes in the stomach, "The exact physical information is almost denied us. The aids to diagnosis afforded by auscultation in the disease of the thoracic viscera and by chemistry in things of the urinary apparatus hardly finds any parallel in the maladies of an organ which does its work without any sounds or movements and only delivers its products from the body after a complex series of changes and admixtures." One can well speculate that, had it not been for Beaumont's⁵³ original contributions on the physiology of the digestive tract, the subsequent and now living physiologists such as Carlson,⁷³⁻⁷⁷ Ivy and Farrell,⁷⁸ Babkin,⁷⁹ Best and Taylor,⁸⁰ Necheles and his associates,⁸¹ Mann⁸² and others of their successors might never have made their contributions.

In 1847 Bruch⁸³ described the first case of gastric sarcoma. In 1849 Rokitsansky⁸⁴ discussed hemorrhagic erosion of the stomach. In 1853 Virchow⁸⁵ advanced a hypothesis that the formation of peptic ulcer was dependent upon vascular disease. In 1857 Middeldorpf⁸⁶ of Vratislavae performed the first operation for tumor of the esophagus and two years later, the first operation for gastric fistula.⁸⁷ In 1865 Krauss⁸⁸ made the first comprehensive study of duodenal ulcer. In 1867 Kussmaul⁸⁹ encouraged the use of the stomach tube for gastric lavage in cases of pyloric obstruction and so is commonly given credit for the invention of the stomach tube. His study consisted of 80 cases of duodenal ulcer in which 90 per cent of the patients were men. Interestingly, only nine years before, Brinton⁷² stated that the incidence of duodenal ulcer was almost negligible.

In 1872 Billroth⁹⁰ performed the first resection of the esophagus. In 1875 O'Hara⁹¹ gave the details of a case of penetrating ulcer of the duodenum. In 1878 Von Volkmann⁹² carried out the first excision of the rectum for carcinoma. In 1878 Lindstedt and Waldenström⁹³ recorded a case of volvulus, apparently the first case of this type recorded.

One of the outstanding contributions to knowledge of the stomach was made in 1879 when Ewald⁹⁴ with Boas⁹⁵ described a suitable test breakfast. In 1883 Chvostek wrote that children not infrequently harbor ulcers which are more often duodenal than gastric, and yet Pepper⁹⁷ said that all are agreed as to the rarity of duo-

denal ulcer and that it was doubtful if more than 70 authenticated cases were on record. In 1893 Perry and Shaw⁹⁸ found 70 cases of duodenal ulcer in a series of 1,765 necropsies performed at Guy's Hospital, London, and only ten were found in cases in which the patient had been burned severely. In 1886 Riegel¹⁰⁹ called attention to the fact that hyperchlorhydria was an important factor in the development of chronic ulcers. In 1882 Zenker¹⁰⁰ suggested that most, if not all, cancers have their origin in simple ulcers.

In the years from 1885 to 1895 the importance of the position of the viscera in the abdominal cavity was discussed a good deal and in 1885 Glénard¹⁰¹ made mention of so-called enteroptosis and in 1889 Einhorn¹⁰² advocated use of gastrodigraphy. He used a soft rubber stomach tube supplied with an incandescent light with wires through the tube to a storage battery for visualization of the stomach. Aaron¹⁰³ discussed this method of examination in 1898, describing it as a valuable adjunct to knowledge of gastro-enterology. He gave as its advantage the fact that by it the position of the stomach, as well as its size and dilatation, could be determined. He discussed the possibility of noting tumors in the stomach and tumors in organs encroaching upon the stomach. Yet Virchow¹⁰⁴ in 1890 mentioned that changes in position of the abdominal viscera were detectable in the majority of persons and Meinert¹⁰⁵ in 1895 stated that the majority of women and 5 per cent of men had gastroptosis. It must be remembered that these observations were made before the introduction of roentgenography.

In 1891 Chiari¹⁰⁶ made the first comprehensive study of gastric syphilis. In 1888 Hirschsprung¹⁰⁷ gave a comprehensive account of hypertrophic pyloric stenosis. In 1896 Einhorn¹⁰⁸ discussed gastric achylia. In 1890 Fenwick¹⁰⁹ discussed the relationship of achylia to pernicious anemia. In 1893 Codivilla¹¹⁰ of Bologna carried out the first gastro-enterostomy for a benign lesion of the stomach, an operation later used and recommended by Moynihan¹¹¹ and W. J.^{112, 113} and C. H. Mayo.¹¹⁴

A great discovery of the end of this half century was made in 1895 when Röntgen¹¹⁵ gave his epoch-making work to the world, a discovery which was to revolutionize knowledge of the digestive tract.

PERIOD 1897 TO THE PRESENT

The change of emphasis on different portions of the digestive tract occurring from decade to decade is noteworthy. In the transactions of the American Medical Association of 1849 a third of the articles dealt with the subject of botany. In the Surgeon General's catalogue of 1888 there are twelve pages of references to articles concerned with conditions of the mouth and yet in what I consider the most complete work of all time on the subject of gastro-enterology, the three volumes by Bockus,¹¹⁶ no mention of mouth lesions is made. In his presidential address before the Section on Stomatology (the predecessor of the present Section on Gastro-Enterology and Proctology) at the sixtieth annual session of the American Medical Association, Briggs,¹¹⁷ in discussing the status of stomatology, emphasized the work of

Fletcher and rather bemoaned the lack of interest in the specialty since the "germ theory took possession of us."

As scientific interest in the relation of lesions of the mouth to gastro-enterology waned, studies were centered upon the stomach and duodenum. The men whose names immediately come to mind in connection with this era of gastro-enterology include Sippy,¹¹⁸ Billings,¹¹⁹ Murphy,¹²⁰ W. J. Mayo¹²¹ and C. H. Mayo,¹²² Eusterman and Balfour,¹²³ Moynihan,¹²⁴ Judd,¹²⁵ Deaver,¹²⁶ Mann,¹²⁷ Lahey,¹²⁸ Finsterer,¹²⁹ Carlson,⁷³⁻⁷⁷ Crohn,¹³⁰ Boles,¹³¹ Einhorn,¹⁰² Berg,¹³² Rehfuss,¹³³ Hurst and Stewart,¹³⁴ Boas,⁹⁵ Ewald,⁹⁴ Palmer and Humphreys,¹³⁵ Ivy and Farrell,⁷⁸ Schiff and his associates¹³⁶ and a host of others.

There followed then a period of great interest in intestinal disorders and the list of the names of men exhibiting special interest in this field has become so large and is increasing so rapidly that it becomes almost impossible to keep track of that field alone. Sippy,¹¹⁸ Hurst and Stewart,⁷⁰ Bensaude and his associates,^{137, 138} Manson-Bahr,¹³⁹ Brown,¹⁴⁰ W. J.¹⁴¹ and C. H. Mayo¹⁴² Judd,¹⁴³ and Sistrunk¹⁴⁴ did fundamental work and later Logan,¹⁴⁵ Jordan,¹⁴⁶ Alvarez,¹⁴⁷ Kantor,¹⁴⁸ Milton¹⁴⁹ and Sidney Portis,¹⁵⁰ Mayo and Wakefield,¹⁵¹ Sullivan and McKell,¹⁵² Berg,¹⁵³ Althausen,¹⁵⁴ Balfour and McIndoe,¹⁵⁵ Crohn and his associates,¹⁵⁶ Aaron,¹⁵⁷ Brown and Garvin,¹⁵⁸ Mackie,¹⁵⁹ Paulson,¹⁶⁰ Felsen,¹⁶¹ Dixon,¹⁶² Brown and Pemberton,¹⁶³ Collins and Jones,¹⁶⁴ Cave and Thompson,¹⁶⁵ Cattell,¹⁶⁶ Zubiran,¹⁶⁷ Bonorino Udaondo,¹⁶⁸ C. W. Mayo¹⁶⁹ and others contributed to present knowledge of the intestinal tract, both from the basic scientific standpoint and from the standpoint of clinical medicine—both medical and surgical. My own interest has been centered in this part of the digestive system for nearly a quarter of a century. The developments of greatest interest have included a satisfactory classification of the various forms of ulcerative colitis and studies of etiology of some types of ulcerative colitis and their medical management and of the problem of when to give surgical treatment. The preoperative and postoperative care of patients who undergo intestinal operations of various kinds has formed a very large chapter consuming the interest of many. A work of outstanding value is Alvarez's¹⁴⁷ "Mechanics of Digestive Tract," in which he elaborated his gradient theory which was established in fact by many subsequent workers.

The subject of diverticulosis and diverticulitis presented in a splendid article by Giffin¹⁷⁰ in 1913 has been thoroughly studied by Lunding,¹⁷¹ Rankin,¹⁷² Brown and Marcle,¹⁷³ Dixon and his associates,¹⁷⁴ Bergen,¹⁷⁵ Rosser¹⁷⁶ and many others, and is now a clearly defined entity and its significance, inception, progression and complications are well understood.

Recently, interest in the appendages of the digestive tract has been heightened. Men who have made the greatest lasting contributions to the studies of the functions of the liver are, among others, Mann and Bollman¹⁷⁷ and their associates.¹⁷⁸ Since the last World War, interest in the infectious diseases of the liver has been heightened.

Those who have given a particular stimulus to studies of the pancreas as it relates to gastro-intestinal function include Elman and Akin,¹⁷⁹ Comfort,¹⁸⁰ Whipple,¹⁸¹ Lagerlöf,¹⁸² Babkin,¹⁸³ Dragstedt and his associates.¹⁸⁴

Let us return now to a more detailed discussion of the contributions of the last half century and to do this one must delve again into the earlier researches.

Esophagus and stomach. An electric esophagoscope was invented by Leiter¹⁸⁵ in 1880, and von Mikulicz-Radecki,¹⁸⁶ one of the most distinguished of Billroth's¹⁸⁷ pupils, was the first to use it. He contributed much to knowledge of cancer of the digestive tract through surgery. In 1886 he described a plastic reconstruction of the esophagus after removal of the cervical portion for carcinoma.¹⁸⁸ Much important work on the esophagus was done in the intervening years, including dilatations of the cardia as described by Jackson,¹⁸⁹ Sippy,¹⁹⁰ Plummer,¹⁹¹ Vinson and Moersch,¹⁹² McIver, Benedict and Cline,¹⁹³ and others. The introduction of the flexible gastroscope by Schindler¹⁹⁴ in 1932 marks an important step in the accumulation of knowledge of the stomach. Schindler made gastroscopy a "method"¹⁹⁵ in his discussion of the problems and technics of gastroscopy as early as 1922.

In 1897 Pavlov⁵⁶ perfected a gastric pouch and obtained pure gastric juices by this means. Reports of research based on his work which followed would fill many large volumes. In 1897 Schlatter¹⁹⁶ performed the first excision of the stomach and esophago-enterostomy and in the same year Baldy¹⁹⁷ was the first in America to perform total gastrectomy.

In 1897 and 1898, Cannon¹⁹⁸ reported a monumental work on visualization of the gastro-intestinal tract showing that bismuth, opaque to roentgen rays, could be of great use in roentgenology in investigations of the digestive tract.

Since gastric and duodenal ulcers as a rule produce symptoms so clear-cut that diagnosis seems relatively easy it would seem that such symptoms would have been widely recognized years before they were, but, the confirmation by roentgenography runs rather parallel with recognition of the ulcer syndrome. In the early 1900's it was established that duodenal ulcer was a common lesion. In 1900 Ewald¹⁹⁹ classified three types of ulcer. In 1904 Rieder^{200,201} reported studies of the alimentary canal with opaque mediums. In 1905 Hemmeter²⁰² made the first roentgen-ray diagnosis of ulcer. In 1910 Haudek²⁰³ described the "niche." In 1911 W. J. Mayo²⁰⁴ called attention to the "anemic spot," the result of traction on the anterior wall of the duodenum, as a point of ulcer formation. In 1912 Aschoff²⁰⁵ emphasized the fact that the ulcer could be of mechanical origin. Mann²⁰⁶ pointed out that gastrojejunal ulcers occurred where the stream of food ejected impinged on the intestinal mucosa. Hurst,²⁰⁷ Stewart²⁰⁸ and Sippy²⁰⁹ called attention to the influence of hydrochloric acid in production of ulcers.

In subsequent years, Mann,²¹⁰ Ivy²¹¹ and Dragstedt²¹² stressed the importance of the chemical properties of the gastric juice in duodenal ulcer. In the years 1915

to 1923 Rosenow²¹³ called attention to the importance of bacteria in duodenal ulcer. In 1918 von Bergmann²¹⁴ emphasized the great importance of derangement of the nervous system as a significant etiologic consideration in the formation of peptic ulcer. Draper²¹⁵ emphasized the importance of the constitutional basis of ulcer and stressed certain anthropometric relationships and in later years Rivers²¹⁶ emphasized the importance of three factors: trauma to tissue, the aggression and defense factors and systemic factors. He called attention to the value of a duodenal extract in 1935. Fogelson²¹⁷ stressed the importance of mucus and prepared a substance for treatment known as mucin. Kosaka and Lim²¹⁸ reported on the preparation of enterogastrone in 1930 and Ivy²¹⁹ and his associates have since given it clinical significance. Dragstedt and Owens²²⁰ in 1943 emphasized the importance of vagus control in ulcer formation. Kalk²²¹ gave much food for thought in his investigations of the hereditability of diseases of the digestive tract, and Bauer and Hauer^{222,223} on the constitutional factor in gastro-intestinal disease, as also have Macklin²²⁴ and Rucker.²²⁵ Ryle's²²⁶ life history of peptic ulcer has been of unusual value.

Although many treatments and diets have been described, the so-called Sippy²²⁷ diet, presented in 1915 for the treatment of peptic ulcer, established a standard which has been followed with only slight modifications through the years. The diet of Meulengracht²²⁸ used in the treatment of hematemesis has assumed considerable importance in recent years.

While undoubtedly others have had gastro-abdominal fistulas which have been studied, the three men who became famous because it was necessary for them to live with their stomachs opened and connected with the surface of the body are, Beaumont's⁵³ Alexis St. M., Carlson's Fred V.²²⁹ and Wolf and Wolff's Tom.²³⁰ Intensive functional investigation of the activities of the stomach were carried out in all three cases, but the studies on Tom made by Wolf and Wolff are of special interest. Not only the natural activities of the organ—its secretions and motions and associated variations of blood flow, its responses to different stimuli and its effects on various foodstuffs—but also the influence of many agents commonly employed to alter these functions were examined critically.

Among the important studies on the secretory curve of the stomach are those of Wilhelmj and his associates.²³¹ He discussed the physiologic control of the normal human gastric secretory curve with an improved gastric test meal and in other contributions discussed the gastric secretory curve²³² before and after the Mann-Williamson operation.

Vanzant²³³ found that the normal range of gastric acidity varied considerably from youth to old age, basing her study on observations of 3,746 individuals. She found that the gastric acidity of man between the ages of twenty and forty years averaged from 45 to 50 degrees. Then for some years it ranged from around 30 to 35 degrees and after that it rapidly went down. In women it was around 35 degrees throughout life.

Mann and his associate²³⁴ produced peptic ulcer in dogs in almost every animal operated on by the following technic. The pylorus is sectioned and the distal end inverted. The jejunum is transected a few centimeters distal to the ligament of Treitz; the distal end is anastomosed to the pylorus, and the proximal end is anastomosed to the ileum from 30 to 60 cm. from its termination. By these procedures the gastric content is expelled from the stomach into the jejunum without becoming mixed with the secretions of the duodenum which have drained into the ileum. Forssell's²³⁵ important anatomic studies of the gastric mucosa, and Mahlo's²³⁶ studies of gastric mucin cannot go unmentioned. Palmer²³⁷ and Rivers²³⁸ classified the pain mechanisms of ulcer.

Schiff and his associates²³⁹ emphasized the factor of azotemia in bleeding lesions of the upper part of the gastro-intestinal tract.

The work of Sandweiss and his associates²⁴⁰ would indicate that the pituitary-thyroid-gonad mechanism plays a role in human peptic ulcer. As a result of their studies, urogastrone has been used in experimental study of the treatment of peptic ulcer. Probably the greatest stimulus to the further investigation of suitable therapy for peptic ulcer comes as a result of the work of Dragstedt²²⁰ and his supradiaphragmatic section of the vagus nerve.

Possibly the man who has done most to crystallize knowledge regarding the diagnostic and therapeutic aspects of peptic ulcer is Eusterman.²⁴¹ He has reported many large series of cases. A notable one is that in which he reported the incidence of gastrojejunal ulcer after gastro-enterostomy. Sixty-seven ulcers of this type were found in 4,793 cases. In this group 228 secondary operations were necessary because of previous faulty operative technic, operations when a lesion was not present, lack of thoroughness at operation and formation of new ulcers. He has also distinguished himself with his writings on gastric syphilis. Bonorino Udaondo²⁴² of Buenos Aires gave a comprehensive account of this condition in a sizable monograph. Osterberg and his associates²⁴³ have shown the importance of pepsin in duodenal ulcers, and indicated that the amount of ferment is related to the severity and intractability of the ulcer.

While much has been learned about the early diagnosis of new growths in the stomach since the advent of the roentgen ray, the greatest contributions to the management of this condition have been made by the surgeons and those interested in this field are too numerous to mention in this review. The work of Anschütz and Konjetzny²⁴⁴ on gastritis and precursors to gastric carcinoma, Puhl's²⁴⁵ histopathologic study of gastric lesions, Katsch,²⁴⁶ Henning²⁴⁷ and Gutzeit's²⁴⁸ work on gastritis, Westphal and Kuckuck's²⁴⁹ gastric photography, and Hurst's⁷⁰ studies on the ulcer and cancer problem are of lasting importance.

Schindler²⁵⁰ made a worth-while contribution in an analysis of cases in which gastroscopy was performed and the patient underwent operation on the stomach, and he has given much information in his gastroscopic observations of carcinomas of the stomach. His mono-

graph on gastroscopy, published in 1937, presented a landmark to those who are interested in direct visualization of gastric lesions.

In the last several decades much has been learned about the para-esophageal hiatal hernias and in this connection, the contributions of Akerlund,²⁵¹ Schatzki,²⁵² Knothe,²⁵³ Vinson and Moersch,²⁵⁴ Harrington²⁵⁵ and many others can be read with profit.

In like manner the recent experiences of Sweet,²⁵⁶ Clagett and Root,²⁵⁷ Montero²⁵⁸ and others who, by perfection of a transthoracic approach, have been able to salvage many patients with carcinoma of the cardia and lower part of the esophagus and thus have made an outstanding contribution to knowledge of this previously hopeless lesion.

Liver and Gallbladder. In the field of knowledge of the liver the credit for the preliminary work goes largely to Mann and Bollman,²⁵⁹ Sheard,²⁶⁰ Baldes,²⁶¹ Magath²⁶² and their associates. They showed that the liver is the source of glucose in the blood; that while some bilirubin is made in the liver, it is formed largely in the spleen and bone marrow from hemoglobin, with hematin as the intermediary product; that the distribution of uric acid depends upon the liver; that the liver is important, not only in carbohydrate, but also in protein metabolism; that the gallbladder is not only a storage organ but also an assembling apparatus and probably has other important functions such as the absorption of cholesterol; that the gallbladder is a regulator of the flow of bile and possibly also has something to do with the regulation of bile pressure. They also taught much about the basic physiology involved in the various tests of hepatic function. Since their original work, investigators too numerous to mention have added volumes of information concerning function, structure and disorders of the liver. Boyden's²⁶³ research on function and disease of the gallbladder will continue to stimulate interest in this appendage.

Although the surgical extirpation of the diseased gallbladder has become an accepted method of treatment, the work of Lyon²⁶⁴ and his associates cannot go unnoticed. Lyon showed that medical drainage of the biliary tree by means of a suitable duodenal tube is practical. An important contribution concerning formation of bile pigment was made by McNee²⁶⁵ in 1913 in his studies of hemolytic icterus, when he showed that formation of bile pigment is not a function of hepatic cells alone but can take place in other tissues. This work led to a host of other studies in the last decade. Many names assume importance in connection with these studies: Snell,²⁶⁶ Neefe,²⁶⁷ Weir,²⁶⁸ Swalm,²⁶⁹ Aaron,²⁷⁰ Mateer,²⁷¹ Ravidin,²⁷² Bockus,¹¹⁶ Boles,²⁷³ Shay²⁷⁴ and their associates.

Patek's²⁷⁵ dietary treatment of cirrhosis must be mentioned. An exceedingly important contribution was made by Lucké²⁷⁶ when he described the pathology of epidemic hepatitis.

Mateer²⁷¹ and Patek²⁷⁷ pointed the way to a satisfactory treatment of cirrhosis of the liver emphasizing the nutritional diet, adequate intake of vitamin B concen-

trates and the addition of essential amino acids to the diet. Urbach²⁷⁸ and Eusterman²⁷⁹ made fundamental additions to knowledge of xanthomatous biliary cirrhosis. The work of Ratnoff and Patek²⁸⁰ concerning Laennec's cirrhosis is outstanding.

Neefe, Miller and Chornock²⁸¹ painted an excellent picture of homologous serum jaundice and Shay and his associates²⁸² emphasized the role of the liver and the gallbladder in the excretion of the sulfonamides. Snell and Weir's²⁸³ efforts were directed toward adding to knowledge of hepatic function and treatment of hepatic disease.

Pancreas. As early as 1886 Senn²⁸⁴ reported on his experiences with surgery of the pancreas based upon experimental and clinical research. Fitz²⁸⁵ reported on acute pancreatic hemorrhage, gangrenous pancreatitis and disseminate fat necrosis. In 1903 Opie²⁸⁶ presented a monograph on diseases of the pancreas.

Comfort and his associates¹⁸⁰ taught the importance of various tests of pancreatic function and Comfort and Osterberg²⁸⁷ demonstrated the importance of tests for lipase and esterase.

Elman and McCaughan²⁸⁸ showed in 1927 that the collection of the external secretion of the pancreas was incompatible with life and that removing the secretion presented a physiologic corollary to acute pyloric obstruction.

The recent studies on chronic relapsing pancreatitis by Comfort, Gambill, Wollaeger, Waugh and Baggenstoss²⁸⁹ has made physicians aware of a syndrome of disease of the upper part of the abdomen which had not been well understood.

Babkin¹⁸³ demonstrated the mechanism of the secretory activity of the digestive glands by showing that this activity is limited by a nervous and humoral mechanism. He also demonstrated the action of hyperglycemia and hypoglycemia on the vagus and its effect on pancreatic function. Dragstedt and his associates²⁹⁰ found that: (1) Removal of 80 to 90 per cent of the pancreas causes no defect in carbohydrate or fat metabolism or in digestion and absorption of foodstuffs, provided the pancreatic remnant remains in connection with the duct. (2) Removal of from 90 to 95 per cent of the pancreas produces diabetes. Lipocaic is required for treatment. Digestion and absorption are impaired. (3) Complete pancreatectomy causes less severe diabetes which is more difficult to control and moderate impairment in digestion and absorption. Hypolipemia develops. (4) Occlusion of ducts causes similar impairment; hypolipemia is pronounced. Coffey²⁹¹ showed the importance of the pancreas in certain dietetic problems.

Small intestine. Interest in the function of the small intestine has been stimulated by the intubation studies of Miller²⁹² and Abbott²⁹³ and their associates. In his presentation of the twentieth L. L. McArthur Lecture of the Frank Billings Foundation of the Institute of Medicine of Chicago on May 26, 1944, Miller²⁹² reviewed the experiences on intubation studies of the small intestine for the preceding ten year period. He emphasized value of intubation in the study of nutritional problems, of

the action of drugs and of the pathologic physiology of the intestine, and only mentioned its dramatic effects in the management of intestinal obstruction. The contributions which this work initiated would take still another volume to recount. Many of the achievements are mentioned in the Chairman's²⁹⁴ address of the Section on Gastro-Enterology and Proctology of the American Medical Association entitled "Modern concepts of intestinal function," published in the *Journal of the American Medical Association*, September, 1946.

Large intestine. In knowledge of this portion of the gastro-intestinal tract advances made in the last thirty years have been monumental, and adequate classification of the various forms of ulcerative colitis, together with the establishment of etiologic factors in some of them, has been of particular importance. Those interested in the preoperative and postoperative care in cases of malignant or other surgical lesions of the large intestine have reduced the surgical hazards to a minimum by the preoperative use of various substances injected into the peritoneal cavity and of nonabsorbable sulfonamides and the preoperative and postoperative control of fluid balance. In the realm of the functional disorders of the intestine the names of Sippy²⁹⁵ (studies on the irritable colon), Kantor²⁹⁶ and Jordan¹⁴⁶ (the unstable colon), Wakefield and C. W. Mayo²⁹⁷ (sociologic disorders of the colon), Soper²⁹⁸ and Alvarez²⁹⁹ and a host of others stand out.

Since the early studies by Ashford³⁰⁰ on the sprue syndrome much interest in the symptom-complex of so-called nontropical sprue has been in evidence. Castle and his associates³⁰¹ made outstanding contributions. The lack of proper absorption of essential food substances by an impaired small intestine has been demonstrated.

To the study of intestinal obstruction, Orr and Haden,³⁰² Barga,³⁰³ Osterberg,³⁰⁴ Dixon,³⁰⁵ Falconer,³⁰⁴ Ravdin,³⁰⁶ Johnson,³⁰⁷ Coller³⁰⁸ and their associates with their observations on chemical imbalance have added a great deal and a monumental work on this subject was presented by Wangenstein.³⁰⁹

Roentgenography has done much to make diagnosis of intestinal obstruction and lesions an exact science and the work of Fischer,³¹⁰ Weber,³¹¹ Kirklín,³¹² Cole and his associates³¹³ and Rigler and Lipschultz³¹⁴ in this field is unexcelled. Weber and his associates³¹¹ have probably contributed most to roentgenologic knowledge of lesions of the intestine which were difficult, and in many instances impossible, to diagnose until the time of the double contrast method of examination.

As with all other branches of medicine the field of psychosomatic medicine has encompassed much of gastroenterology in the immediate past, and the works of such men as Sullivan and McKell,¹⁵² Portis,³¹⁵ Brosin³¹⁶ and Daniels³¹⁷ can be read with interest and profit in this regard.

Rectum. The history of proctology is well illustrated in Rosser's "The life and writings of Joseph MacDowell Mathews, the first proctologist," published in the transactions of the American Proctologic Society for 1946.

(Continued on page 518)

THIS first letter from Oxford opens a series of informal notes from Dr. Ancel Keys to the readers of THE JOURNAL-LANCET, recording his medical observations during a year of foreign travel. Dr. Keys, who is head of the department of physiological hygiene at the University of Minnesota, is engaged in research studies under a Fulbright scholarship on cholesterol metabolism and its relationship to nutrition and cardiovascular disease. The first of the year he will leave Oxford to carry his study to southern Italy and various cities of the European continent, still later to South Africa or possibly Ceylon. We know our readers will enjoy the delightful style of Dr. Keys' letters and his candid and significant reports on medical matters abroad.

J. A. MYERS, M.D.



Notes from a Medical Journey

October 2, 1951, Oxford, England.

Dear Jay:

Greetings from "this green and pleasant land"! Now being unpacked and equipped with ration and police identity cards, not to mention driver's licenses and a local bank account, I can relax and report to our friends in Minnesota. The peripatetic professor abroad must always write letters.

Here we are in the heart of England, where the Abbey of St. Frideswide rose as a stronghold of Christianity more than twelve centuries ago and where Henry I, son of William the Conqueror, built his Beaumont Palace, birthplace of Richard the Lion-Hearted in 1157. A more recent Henry, our eight-year old son, is a boarder-pupil a stone's throw from the site of Beaumont Palace; he is in New College School which opened in 1379 and where twenty of the sixty boys form the famous choir who still sing in the great fourteenth-century Chapel. Here in the Civil War (of England) Charles I set up his court at Christ Church College and established his Queen at Merton College; from here he rode out to surrender to the Scots in 1646. We are reminded that Cromwell had sent soldiers to besiege Oxford while he made a present of books to Cambridge - from which the Oxonians merely concluded that at Cambridge they were in want of learning!

No country - or its people - can be understood without a knowledge of its history, but here the continuity of past and present is more than ordinarily clear and compelling. The ancient buildings are no mere relics of a forgotten age like the Pyramids; they still house and serve undergraduate and don as they have for six hundred years and today students of all parts of the world walk the cloisters worn by the generations from the time of William Harvey and centuries before. It is easy to develop the long view here.

We are living in a small "semi-detached" house (vintage of about 1920) on Headington Hill 300 feet above Oxford proper. A mile away, also on Headington Hill, is Churchill Hospital where I have my headquarters. The Hospital is the latest transformation of the famous Radcliffe Infirmary about which were built, during the late war, a large number of one-story brick buildings and Quonset huts for an American military hospital and a prisoner-of-war camp. Adjacent is the Warneford Mental Hospital and across the road is the ultra-modern Wingfield-Morris Orthopedic Hospital. The air is reputed to be more

"healthful" up here on the hill and hence this spot has long been favored for the care of the sick.

Dr. John Radcliffe, who died in 1714, was a fashionable physician and medical pioneer whose munificence to Oxford is commemorated in a number of University buildings. So you see, the Hospital also has a long history from the time of Dr. Samuel Johnson, who could drink three bottles of port at a sitting at University College, to those recent dark days when our own airmen bound up their wounds on Headington Hill and the legend of Winston Churchill was busily in the making.

My daily trek to work is to be across the Hill and, incidentally, past the extensive grounds of the Headington School for Girls where our eleven-year old daughter, Caroline, is a boarding pupil. So far I have only poked my head into the laboratories at the Churchill and my principal impression is merely of a good deal of confusion and disarray. It is apparently typical of British laboratories as I knew them twenty years ago at Cambridge where the minds were a lot clearer than the desks and benches and where good work was often done in dingy corners.

We arrived in England the night before the King's operation and this topic has been a major item in the news ever since. What with the fateful elections coming up on the 25th, the Anglo-Iranian crisis, and the King's illness, the press and radio are indeed busy; such continuing dreary affairs as the war in Korea and the trade and dollar balance have been forced into secondary places.

The King's illness has provided the general public with a short course on the anatomy and physiology of the lungs and on the practice of medicine. The laconic bulletins signed by the doctors are elaborated on in lengthy newspaper articles, together with accounts of the comings and goings at Buckingham Palace, biographical sketches of the attending physicians and nurses, descriptions of the arrangements in the Palace suite turned into a hospital (painted white and fitted with duplicate services of electricity, and so on), explanations of the stages of anesthesia and the use of aureomycin (apparently the King is sensitive to penicillin since his sympathectomy two years ago), and the institution of breathing exercises (facilitated by the training of the King when he had to control his stammer for the Coronation. Every word and public gesture of the surgeon, Mr. C. Price-Thomas, is good for a paragraph in the papers. Incidentally, it is typical that Mr. Price-Thomas does not hold the M.D.; as you know, the doctorate is not favored by the surgeons here. But other titles are a different matter and I expect that it will soon be "Sir C. Price-Thomas, Bt."

You probably know that the decision to operate on the King was made on radiological evidence of a "growth on the bronchus of the left lung" and that radical surgery was indicated from a biopsy. A complete pneumonectomy was done with results entirely satisfactory to now. Publically, there is no discussion of the unhappy business of long-range prognosis in such cases but concern and sympathy are manifest in every quarter. There is no doubt that the King is greatly loved by the people who find in him, and in the Royal Family, the qualities of simplicity, kindness and dignity they admire. Everybody - except, perhaps the Royal Family - likes the pomp and circumstance attached to the Royal Family; it is certainly worth the "price of admission" to fifty million Britons and they would feel their lives poorer without it. There is no place for this sort of thing in our country but it makes sense here.

A curious outcome of the King's illness is likely to be effective persuasion to cut down on smoking. The King was a very heavy cigarette smoker until two years ago when the diagnosis of Buerger's disease was made. The concatenation of Buerger's and bronchogenic ——— (careful, sir) in a very heavy smoker is just too suggestive and yesterday I saw in

the paper a first expression of the obvious conclusion, a report of a talk by a leading London doctor warning of the dangers of heavy smoking - but no mention of the King, of course.

Next week the Osler Society meets to commemorate the hundredth birthday of Walter Reed and the theme of the evening in London will be "Man's Experiments on Man." They have thought it fit to invite me to speak; I am honored but a little apprehensive of the assemblage. I shall tell you about it in my next letter.

With all good wishes to you and our friends, and colleagues, I am

Sincerely yours,



Ancel Keys.

Meet Our Contributors . . .

J. ARNOLD BARGEN was graduated from Rush Medical College, serves as consultant in medicine at the Mayo Clinic, is consultant for the St. Mary's, Kahler, Colonial and Worrell hospitals in Rochester. Among the offices he has held are the presidency of the American Gastroenterological Association, and the chairmanship of the section on gastroenterology and proctology, American Medical Association.

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JACOB S. BLUMENTHAL was graduated from the University of Minnesota medical school in 1924, specializes in internal medicine in Minneapolis, serves as clinical assistant professor of medicine at the University of Minnesota.

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ANGUS L. CAMERON, a graduate of Rush medical school in 1916, is a surgeon with the Northwest Clinic at Minot, North Dakota, serves on the staff of Trinity Hospital, and as consultant in surgery at the Veterans Hospital. He is a member of Western Surgical Association, American Association for the Surgery of Trauma, American College of Surgeons, American Association of Anatomists, Minneapolis Surgical Society.

★

BUDD CLARKE CORBUS was graduated from Harvard and Louisiana State medical schools, specializes in urology in Fargo, where he is on the staffs of St. John's and St. Luke's hospitals, and serves as consultant in urology at the Veterans Administration Hospital. He is a fellow of the A.M.A., and holds membership in the North Dakota State Medical Association, American Urological Association, Chicago and Twin Cities Urological societies, North Dakota-Manitoba Urological Society.

★

GARY A. CRONK, a graduate of Syracuse University medical school, serves as instructor in medicine, New York College of Medicine at Syracuse, University physician, Syracuse University, assistant in medicine, Syracuse University hospital and Syracuse dispensary. He holds memberships in A.M.A., American College of Physicians, National Tuberculosis Association, New York Academy of Sciences.

ANCEL KEYS, who holds doctorates from University of California and Cambridge University, is professor of physiological hygiene and director of the Laboratory of Physiological Hygiene at the University of Minnesota.

★

HAROLD L. MASON took his graduate work in biochemistry at the University of Southern California and the University of Chicago, is now professor of physiological chemistry at the Mayo Foundation, University of Minnesota, at Rochester. He holds memberships in the American Chemical Society, Association for the Study of Internal Secretions, American Society of Biological Chemists, Central Society for Clinical Research, American Association for the Advancement of Science, and Sigma Xi.

★

HERMAN O. MOSENTHAL was graduated from Columbia College of Physicians and Surgeons in 1903, has served as president of the New York Diabetes Association in 1934, American Diabetes Association in 1941, has served as professor of medicine, and director of the department of medicine of the New York Post-Graduate Hospital from 1920 to 1925. He was founder of the first diabetes clinic in the United States in 1912 at the Columbia College of Physicians and Surgeons (Vanderbilt Clinic).

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MAURICE B. VISSCHER, a graduate of the University of Minnesota medical school in 1931, heads the department of physiology at that school. He has held office in numerous societies, including the presidency of the American Physiological Society.

★

JOHN P. WENDLAND received his medical degree from the University of Nebraska in 1941, took graduate study in ophthalmology, is instructor in ophthalmology at the University of Minnesota medical school, serves on the staffs of Northwestern hospital, Abbott hospital, is consultant in ophthalmology at Minneapolis Veterans Hospital. He is a member of Alpha Omega Alpha, Minnesota Academy of Ophthalmology and Otolaryngology.

In the interests of continuing medical education, THE JOURNAL-LANCET offers this department of authoritative reviews of important progress in scientific medicine, both in the fundamental and the clinical fields. The editors propose to define medical sciences very broadly, and hope that each subject treated will be of sufficient importance to interest every reader.

Structure and Physiologic Activity of Adrenal Cortical Hormones*

Their Relation to Urinary Steroids

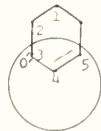
HAROLD L. MASON, Ph.D.†
Rochester, Minnesota

THE PURPOSE of this paper is to present a brief review of the physiologic effects of the various adrenocortical hormones as related to their chemical structures, and to consider the relation of these hormones to some of the steroids which are excreted in the urine. More complete reviews of the physiologic effects of adrenocortical hormones may be found in articles by Ingles,¹ Kendall² and Sprague and his associates.³

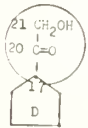
Figure 1 presents the structural formulas of five adrenocortical hormones, and table I summarizes their outstanding physiologic effects. There is a sixth hormone, Reichstein's substance S (11-desoxycortisone), the physiologic effects of which have had very little study. It is perhaps closely allied to desoxycorticosterone in activity.

It will be noted that all of these steroid hormones (including substance S) have in common the following modifications of the steroid nucleus:

(1) At carbon 3 a ketone (C=O) group and a double bond between carbon atoms 4 and 5. This combination is called an α,β -unsaturated ketone group and is here shown within the circle.



(2) A side chain of two carbon atoms attached at position 17 and bearing a ketone group on one carbon atom (number 20) and an alcohol group on the terminal carbon atom (number 21). This combination of ketone and alcohol groups is known as an α -ketol group; it is circled in the accompanying figure.



These two features appear to be essential for marked hormonal activity with respect to salt and water. Progesterone (no oxygen atom at carbon 21) in relatively large amounts has similar physiologic activity in some species.

*Presented at Continuation Course on Cortisone and ACTH, University of Minnesota, Minneapolis, October 4, 1950.

†Division of Biochemistry, Mayo Foundation, Rochester, Minn.

When an oxygen atom in the form of a ketone or hydroxyl group is introduced into desoxycorticosterone at carbon 11, an effect on carbohydrate and protein metabolism becomes evident and the activity toward salt and water metabolism becomes less. These activities are readily demonstrated in animals, but the effects on carbohydrate and protein metabolism in human subjects have been minimal when large doses of compound A (figure 1) have been used. Introduction of a fifth oxy-

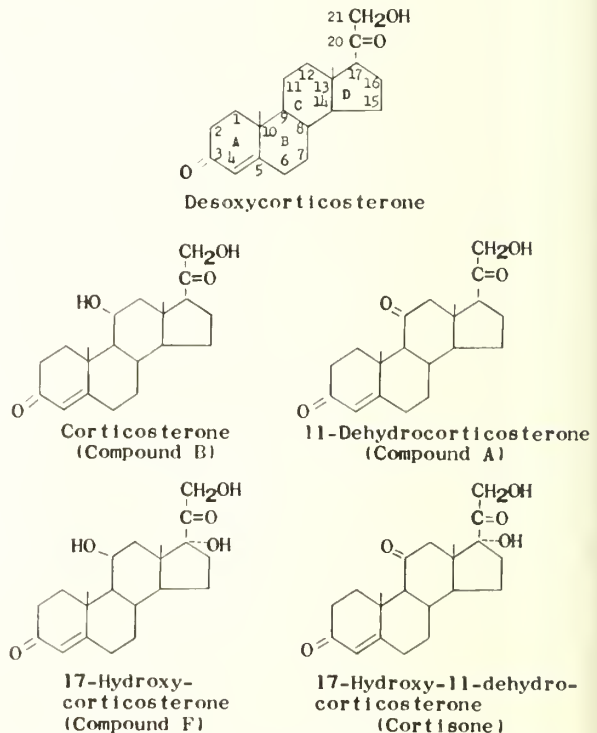


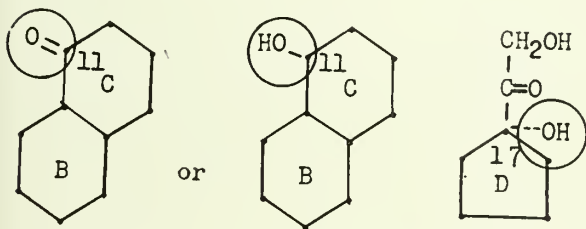
Figure 1. Structural formulas of adrenocortical hormones.

TABLE I

Principal Physiologic Effects of Adrenal Cortical Hormones

Compound	Physiologic effect
Desoxycorticosterone	Affects electrolyte and water balance. Promotes retention of salt and water, excretion of potassium. In excessive amounts it causes depletion of potassium and development of alkalosis.
Corticosterone (Compound B)	Both compounds influence carbohydrate and protein metabolism and have a moderate effect on electrolyte and water balance. May affect fat metabolism.
11-Dehydrocorticosterone (Compound A)	
17-Hydroxycorticosterone (Compound F)	Predominant effects are on carbohydrate and protein metabolism. They promote gluconeogenesis from protein, inhibit utilization of carbohydrate, and increase carbohydrate stores. Effective in muscle-work tests and stress. Compound F causes decrease in number of circulating eosinophils. In large amounts they affect electrolyte and water balance: promote retention of sodium chloride and water, excretion of potassium, development of hypochloremic alkalosis.
17-Hydroxy-11-dehydrocorticosterone (Cortisone)	

gen atom in the form of a hydroxyl group at carbon 17 further intensifies the activity with respect to carbohydrate and protein metabolism and decreases the effects on salt and water balance.



The division of the cortical hormones into groups based on physiologic activity is somewhat artificial but probably is justifiable for emphasis of the predominant physiologic effect of a given hormone. Actually, desoxycorticosterone has been shown to affect carbohydrate metabolism in rats when given in sufficiently large amounts, and conversely, when cortisone is given to human subjects in large amounts (200 mg. per day) it is capable of disturbing electrolyte and water balance to such a degree that edema, hypopotassemia and hypochloremic alkalosis may result. On the basis of experiments on animals such effects on electrolyte and water balance were once thought to be characteristic of desoxycorticosterone. Thus, all of the hormones of figure 1 may have the same physiologic effects, but activity toward salt and water balance is accentuated in desoxycorticosterone whereas activity toward carbohydrate and protein metabolism is accentuated in cortisone and compound F.

Compound A may have some specific effect on fat metabolism, but the evidence for this is too uncertain to warrant discussion.

The physiologic effects of the cortical hormones thus far have been described in rather general terms. The activity toward salt and water balance will be described

in more detail in terms of the effects of desoxycorticosterone. The effects on carbohydrate and protein metabolism will be discussed in terms of cortisone and compound F.

When given in moderate amounts, desoxycorticosterone corrects the excessive urinary loss of sodium and chloride and the abnormal retention of potassium and urea usually observed in the state of adrenal insufficiency. When given in larger amounts there is an excessive retention of sodium and chloride, with consequent edema, and a loss of potassium in the urine. Continued over-treatment leads to increased plasma volume, loss of cellular potassium, which is replaced by sodium, and development of alkalosis. Although alkalosis has been produced in animals, apparently it has not yet been observed in human subjects treated with desoxycorticosterone.

Under ordinary circumstances a fasting adrenalectomized animal becomes hypoglycemic when its carbohydrate stores are depleted, presumably because it is not capable of converting body protein into carbohydrate at a rate sufficient to maintain the blood sugar at a normal or nearly normal level. Administration of cortisone, or compound F in moderate amounts overcomes this disability and enables the adrenalectomized animal to maintain a normal level of blood sugar during a fast. These hormones also promote deposition of glycogen in the liver of an adrenalectomized animal which has been fasted prior to administration of the hormones.

Cortisone and compound F, when given in large amounts, tend to produce a negative nitrogen balance as the result of increased protein catabolism or decreased protein anabolism, or both. Along with the negative nitrogen balance there may be increased excretion of potassium, phosphate and calcium. The extra formation of glucose from protein may result in a relatively insulin-resistant, but reversible, hyperglycemia, glycosuria, and an increased amount of liver glycogen. At the same time that the supply of carbohydrate is increased by these hormones, they also have an inhibitory effect on the peripheral utilization of glucose.

An important function of cortisone and compound F is that of increasing the resistance of the organism to stress (exposure to cold, starvation, burns, wounds, fractures, surgical procedures). Actually, it appears that under the stimulus of stress or of administered adrenocorticotrophic hormone (ACTH), the adrenal cortex secretes greatly increased amounts of compound F rather than cortisone. It is not known what relation, if any, the increased resistance to stress bears to the metabolic effects of these hormones.

Compound F appears to be more effective than cortisone in reducing the number of circulating eosinophils. Indeed relatively large doses of cortisone usually have not had a significant effect on the number of circulating eosinophils.

The effect of large amounts of cortisone (and probably compound F) on salt and water balance has already been mentioned, and is summarized in table I.

THE URINARY STEROIDS

At the present time two types of urinary steroids are being measured in many laboratories. They are known, respectively, as corticosteroids (corticoids, 11-oxysteroids, reducing steroids, formaldehydogenic substances) and 17-ketosteroids. The group known as corticosteroids is known to include intact adrenal hormones, which are present usually in small amounts, and some metabolites of these hormones.

A reaction which is used widely for determination of the urinary corticosteroids, and which is relatively specific for the characteristic α -ketol group of the cortical hormones is illustrated in figure 2. Cortisone is used as an

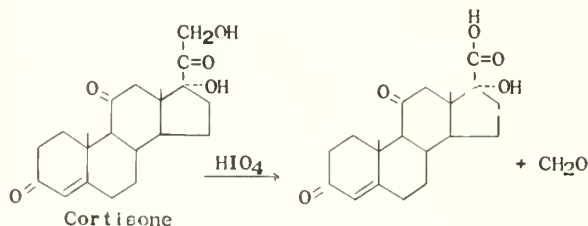


Fig. 2. Nature of urinary corticosteroids.

example of a typical adrenal hormone. Periodic acid cleaves the side chain between the ketone and alcohol group and one molecule of formaldehyde (CH₂O) is liberated for each molecule of hormone. The amount of formaldehyde liberated thus becomes a measure of the amount of hormone present. Changes in the molecule other than in the side chain do not affect this reaction. Reduction of the ketone group of the side chain to an alcohol group still permits cleavage with formation of a molecule of formaldehyde. Thus, the corticosteroid fraction may be thought of as containing intact adrenal hormones and metabolites which are closely related to them.

The 17-ketosteroids which occur most abundantly in normal urine (androsterone, etiocholanolone) arise from products of the testis (testosterone) and of the adrenal cortex. They do not have an oxygen atom at carbon 11 (androsterone, figure 3). The adrenal precursors of these 17-ketosteroids are unknown. However, 17-ketosteroids with an oxygen atom at carbon 11 do occur in smaller amounts in normal urine and their quantity is increased when cortisone or ACTH is given. Thus there appears to be a relation between the cortical hormones which have an oxygen atom at carbon 11 and the urinary 17-ketosteroids which also have an oxygen atom in this position. The sequence of events between secretion of a cortical hormone and excretion of a 17-ketosteroid in the urine is unknown but it may be hypothesized that steps such as those shown in figure 3 are involved. Thus, cortisone may be transformed to 11-hydroxyandrosterone, which is present in normal urine.

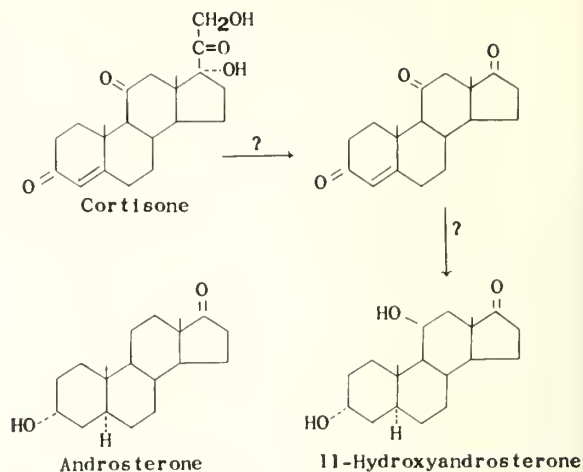


Figure 3. Urinary 17-ketosteroids from cortisone.

SUMMARY

The adrenal hormones discussed all have similar but probably not identical qualitative physiologic properties; quantitatively there are wide variations. Small amounts of desoxycorticosterone suffice for demonstration of effects on salt and water balance. Very much larger amounts of cortisone are necessary for demonstration of similar effects. Introduction of an oxygen atom at carbon 11 endows the molecule with important effects on carbohydrate and protein metabolism and these effects are further intensified by introduction of a hydroxyl group at carbon 17 in addition to the oxygen atom at carbon 11.

The corticosteroid fraction of the urinary steroids consists of intact adrenal hormones, and metabolites which are closely related to them.

The adrenal hormones which have a hydroxyl group at carbon 17 are capable of yielding urinary 17-ketosteroids by metabolic removal of the side chain attached to carbon 17. The oxygen atom at carbon 11 appears not to be removed by metabolic processes and therefore is present in the 17-ketosteroids derived from the adrenal hormones which have an oxygen atom in this position. The adrenal precursors of those 17-ketosteroids which do not have an oxygen at carbon 11 are unknown.

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Editorial . . .



FREDERICK
HUGHES SCOTT
1876-1951

DR. SCOTT—AN APPRECIATION

The death of Dr. F. H. Scott on June 21, 1951 closes a chapter in the history of medical education in Minnesota and the central northwest. Dr. Scott was one of the small group of pioneers in scientific education who came out to the middle west in its raw and boisterous stage to help build the educational institutions which have made a cultivated community out of a frontier society.

Frederick Hughes Scott was born in Toronto, Canada, February 19, 1876. He earned the B.A., Ph.D., and M.B. degrees at the University of Toronto, the D.Sc. degree at University College, London, and was MacKinnon Student of the Royal Society and Sharpey Student at University College. He joined the staff of the Medical School of the University of Minnesota in 1908 as assistant professor, was promoted to associate professor in 1912 and to professor in 1918. He retired as professor emeritus in 1944. When he came to Minnesota Dr. Richard Olding Beard was professor of physiology, and in the reorganization of the University which was accomplished by the late President George E. Vincent a new department head for physiology was brought in, in the person of Elias Potter Lyon, who was also made dean of the Medical School. The late Dean Lyon was one of the select group of Jacques Loeb's pupils and, like his teacher, irradiated and diffused a scientific atmosphere upon which President Vincent counted heavily, and successfully, for the development of a solid center of medical education and research. In this program Dr. Scott played the major role in physiology. As a pupil of Professor A. B. MacCallum in Toronto and of Professor E. H. Starling and Sir William Bayliss in London he brought to the new northwest the spirit and the tools of physico-chemical inquiry into the machinery of the body. First and foremost he was a teacher, but a

teacher of the scientific method as well as of the subject content of his field. In his research his first work was in histochemistry which was followed by work in the cardiovascular and respiratory systems and by studies of water metabolism. His most ingenious and original studies were probably those in the functions of water depots in the body, carried on with one of his students, Dr. Harold Skelton, who unfortunately died at an early age.

Dr. Scott was a quiet, reserved and retiring man, externally somewhat abrupt, but actually of an extremely kind disposition, willing to sacrifice himself in endless time and trouble for his students' problems. The graduate teaching program in physiology at the University of Minnesota occupied much of his thought and time. His former graduate students constitute a long list and occupy many important posts today in scientific institutions. As is true for any successful teacher, his spirit lives on in the work of many minds and his work goes on in their laboratories and classrooms.

Dr. Scott had a more potent influence on his graduate than upon his undergraduate students in physiology. He began his teaching in the period before physiological concepts and methods were of great import to the day to day practice of medicine. He lived through the period of rise of importance of endocrinology, water and electrolyte homeostasis, and many other branches of physiology to medicine. He participated in making the advances in fundamental knowledge which created the change. The students he trained have made and are now making further advances and are assisting in their application.

Dr. Scott spent thirty-six active years at Minnesota under five presidents of the University. He was among a group of perhaps a score of the faculty in 1908 upon whom President Vincent relied in bringing about the transformation of the University from a school with almost no scholarly work being conducted in it, and one whose medical school was only a little better than a proprietary diploma mill, into an institution which has been placed by independent experts among the top dozen American universities. When one writes "finis" on the history of the life of such a man, especially when the man was among one's own major teachers, one cannot refrain from saying in all humility that the world would be a much better place to live in if there were more Frederick Hughes Scotts in it. Neither can I refrain from saying that I am sure I am not alone among his students in recognizing that his sturdy scientific, humanistic philosophy has had a large part to play in moulding our own fundamental scientific philosophies. In the continuum of intellectual life the teacher has his immortality.

MAURICE B. VISSCHER, M.D.

Early Diagnosis of the Acute Abdomen, by Zachary Cope, M.D., 1951. New York: Oxford University Press, 270 pages. \$3.50.

In spite of the deplorable title, Cope's *Acute Abdomen* must be accepted as a minor medical classic. With perfunctory concession to the laboratory and to roentgenography, the author makes his diagnoses of unexpected, catastrophic assaults of abdominal pain by experienced application of his five senses. Since the initial publication 30 years ago, the substance of his discussion has changed very little. His viewpoint is that of the practical general surgeon, and the data upon which definitive opinion is based, and action determined, are derived from the patient's story and the examining doctor's objective findings.

The manner of presentation is, for the most part, simple and straightforward. The language and vocabulary could have been improved through the many editions, but the essential content is eminently applicable to the needs of interns, residents and novice practitioners. Recognition of disease before irreversible bodily changes detectable as deviations from normal laboratory criteria have occurred is the primary responsibility of an examining physician. Cope's little treatise ably aids the conscientious clinician to meet this obligation. J.B.C.

•
A Text-Book of X-ray Diagnosis by British authors. Vol. III, *The Abdomen*. Edited by S. Cochrane Shanks, M.D. and Peter Kerky, M.D., 1950. Philadelphia and London: W. B. Saunders Company. 809 pages, 694 illustrations. Second edition.

This volume includes the subject matter covered in Volume II of the first edition. The urinary tract has also been included here, whereas in the old edition it was included in Volume I on the thorax. The material covered includes the alimentary tract, the biliary tract, the abdomen without contrast media, obstetrics and gynecology, and urology.

An excellent feature is the detailed description of the techniques to be used in carrying out the various examinations and, more particularly, the methods used to demonstrate various lesions. Also included are brief clinical notes and clever suggestions for handling patients, which information is ordinarily gained only through long experience.

A major portion of the book has been completely re-written and in those sections in which the old text has been followed, the subject matter has been brought up to date.

Two new chapters concern themselves with pediatric roentgenology of the gastro-intestinal tract. One of these is devoted to esophageal lesions in infants and the other to the rest of the alimentary tract in infants and children. Esophagitis and diaphragmatic herniation, both in infants and adults, are thoroughly considered in this volume. These lesions are considered from the practical point

Book Reviews

of view rather than from the usual didactic one. An extensive detailed section on the pancreas is entirely new in this edition.

The large section on obstetrical and gynecological roentgenology has been so expanded and re-written that it could scarcely be recognized by those familiar with the older edition. The detailed discussion of hysterosalpingography, including numerous roentgenograms of the normal and pathological female generative tract, is particularly interesting.

The section on the urinary tract includes a preliminary section on techniques of examination, relative value of the various examinations, and the indications and contraindications for these examinations.

The shortcomings of this volume, if such they may be called, are similar to those of any text; namely, that certain important subjects cannot be given the thorough consideration which they deserve. An example of this is the brief consideration given to benign neoplasms of the colon.

The roentgenograms throughout the book are of excellent quality. L.G.R.

•
On the Experimental Morphology of the Adrenal Cortex, by Hans Selye, M.D. and Helen Stone, 1950. Springfield, Illinois: Charles C. Thomas, 100 pages. \$2.25.

In this 100 page monograph Dr. Selye describes in detail a group of animal experiments in which he endeavored to study the important factors regulating the structure of the adrenal cortex. He compares these experimental lesions with similar lesions which develop in man and has correlated these with their "functional significance."

The book is divided into two sections, the first consisting of the different types of procedures and description of the experimental subjects along with the detailed description of the experiments. The second portion is a detailed discussion of the histologic findings in the adrenal glands and their significance.

The material which is represented in this series of experiments illustrates the effect upon the adrenal glands of such factors as non-specific stress situations, variations in diet, various drugs, various hormones and the removal of the various endocrine glands in the animals. The monograph is well written and should be of interest to both the pathologist and to the clinician. W.D.R.

Clinical Sonnets, by Merrill Moore, M.D., 1949. New York: Twayne Publishers. 72 pages. \$2.50.

To all physicians this will be an interesting and amusing book. The author has a unique gift of being able to tailor an exact case history to the form of a sonnet.

J.S.L.

•
Postgraduate Lectures on Orthopedic Diagnosis and Indications, by Arthur Steindler, M.D. Volume I, 1950. Charles C. Thomas, Springfield, Illinois. 289 pages. \$7.50.

Volume I is a series of didactic lectures introduced on a background of orthopedic anatomy, physiology, and interpretation of pain. Of interest to the physician will be the chapters on contractures and on pain. The wide ramifications of these two subjects is met with in every field of medicine. Dr. Steindler covers each in a practical method that will appeal to the practitioner of medicine.

Chapters on the symmetry and asymmetry of the body and on the pathology of gait give one a good understanding of some of the more fundamental concepts involved in orthopedic diagnosis.

The second section of the book is made up of a description of the various skeletal and congenital anomalies which occur in nature. The methods of diagnosis for each anomaly are well outlined and plans of treatment are offered when indicated. The chapters on congenital talipes and on congenital dislocations of the hip are excellent. The value of this book becomes evident if one reads it carefully. J.T.

•
Plasma Clot Suture of Peripheral Nerves and Nerve Roots, by I. M. Tarlov, M.D., 1950. Springfield, Illinois: Charles C. Thomas. 100 pages. \$5.50.

This 100 page monograph on the plasma clot technique of suturing nerve roots and peripheral nerves has been written in response to numerous requests to the author for such a monograph.

The author discusses in a very orderly fashion the need for an improved suture technique for suturing of nerves and follows this by a very adequate discussion of the experimental work leading up to the present technique of plasma clot suture. The technique of accomplishing a nerve anastomosis with plasma clot suture is very adequately described and equipment necessary for carrying out this procedure is also discussed and described. All the pitfalls of the technique of suturing nerves with plasma clot are also pointed out, and the precautions to be taken to prevent failures are also well delineated.

It is an excellent book for any neurosurgeon or general surgeon who is called upon to treat nerve injuries inasmuch as it is a very comprehensive review of the entire field of nerve repair. C.N.

Notices . . .

Regional Meeting of Obstetrical and Gynecological Societies

The Minnesota Obstetrical and Gynecological Society, the North Dakota Society of Obstetrics and Gynecology, and the Wisconsin and Iowa Obstetrical and Gynecological Societies are holding a joint meeting at the Saint Paul Hotel on November 30 and December 1.

The guest speaker on Saturday afternoon, December 1, is Dr. Willard M. Allen, professor of Obstetrics and Gynecology at Washington University, St. Louis, Missouri, who will speak on "Adrenal Dysfunction as Related to Gynecology and Obstetrics." The guest speaker for the banquet Saturday evening will be the Honorable Robert V. Rensch, Judge of District Court, St. Paul, Minnesota.

★

Minnesota Postgraduate Seminars

Minnesota's Professional Postgraduate Seminars have been scheduled at six centers during 1951-1952. Red Wing and Brainerd are scheduled for this fall, Minneapolis and St. Paul for the winter, and Faribault and perhaps one other next spring. During the seminar period two lectures are given one evening a week for eight consecutive weeks, with a staff made up of University of Minnesota school of medicine faculty members who conduct the sessions with talks, films, slides and demonstrations. There is opportunity for free discussion of heart disease, cancer and psychosomatic medicine following each lecture. Physicians interested in refreshing their knowledge and learning of the most recent developments in diagnosis and management of patients with conditions in these three areas of medicine are invited to attend.

★

University of Minnesota Continuation Courses

The University of Minnesota announces a continuation course in *Child Psychiatry* to be presented at the Center for Continuation Study on November 26 to December 1, 1951. The course is intended for doctors of medicine engaged in general practice and in pediatric practice. Distinguished visiting physicians who will participate as lecturers and group discussion leaders are Dr. Reginald S. Lourie, Director of the Department of Psychiatry, Children's Hospital, Washington, D. C.; and Dr. J. Franklin Robinson, Director of The Children's Service Center of Wyoming Valley, Wilkes-Barre, Pennsylvania.

★

A three-day symposium on *Rheumatic Fever* will be held November 29 to December 1 under joint sponsorship of the University of Minnesota and the Minnesota Heart association.

Dr. T. Duckett Jones of the Helen Hay Whitney foundation, New York, will open the sessions Thursday, Nov. 29, with a talk on the natural history of rheumatic fever.

Other lecturers will include Dr. Maclyn McCarty and Dr. George Murphy, hospital of the Rockefeller institute, New York; Dr. Albert Dorfman, University of Chicago medical school; Dr. Morse J. Shapiro, Los Angeles; Dr. Ann G. Kuttner, Bellevue hospital, New York; Dr. Albert H. Coons of the Harvard university medical school, Boston; Dr. Charles H. Rammelkamp, Western Reserve university school of medicine, Cleveland; Dr. Francis F. Schwentker, the Johns Hopkins medical school, Baltimore; and Dr. Chandler A. Stetson, streptococcal disease laboratory, Warren Air Force base, Cheyenne, Wyoming.

All meetings will be conducted in the Minnesota Museum of Natural History auditorium at the University. Dr. Lewis Thomas, Minnesota American Legion heart research professor, is in charge of the program.

Dr. F. B. Carter, Professor and Head of the Department of Obstetrics and Gynecology, Duke university, Durham, North Carolina, will be visiting faculty member for a continuation course in *Gynecology* to be presented January 3 to 5, 1952. Dr. John S. Gillam, Department of Obstetrics and Gynecology, Fargo Clinic, Fargo, North Dakota, formerly a member of the

staff of the University of Minnesota Medical School, will also participate as a visiting faculty member. The course is presented under the direction of Dr. John L. McKelvey, professor and head of the Department of Obstetrics and Gynecology of the University of Minnesota.

A course in Pediatrics will be presented on January 7 to 9, 1952. Dr. Allan M. Butler, Professor of Pediatrics, Harvard Medical School, Boston, will be the guest speaker for the course and will deliver the annual Clarence M. Jackson Lecture, sponsored by the Phi Beta Pi medical fraternity, on Tuesday evening, January 8. For the Jackson Lecture, Dr. Butler will present the subject, "Parenteral Fluid Therapy in Diabetic Acidosis." Dr. Irvine McQuarrie, professor and head of the Department of Pediatrics, will be chairman for the course.

Dr. Harold G. Wolff, professor medicine and associate professor of psychiatry, Cornell University Medical College, New York City, will give the annual J. B. Johnston Lecture at 8:15 p.m. on Wednesday, January 30. Dr. Wolff's subject will be "On the Nature of Pain." He will also participate in a continuation course for physicians in Clinical Neurology which will be presented at the Center for Continuation Study from January 28 to February 9. Other visiting faculty members for the course include Dr. Benjamin Boshes, associate professor of neurology, Northwestern University Medical School, Evanston, Illinois; Dr. H. Houston Merritt, professor of neurology, Columbia University, and director of the service of neurology, Neurological Institute, Presbyterian hospital, New York City; and Dr. Henry G. Schwartz, professor of neurosurgery, Washington University School of Medicine, St. Louis, Missouri. Dr. A. B. Baker, professor and director of the Division of Neurology, is chairman for the course and will be joined by members of the faculty of the University of Minnesota Medical School and the Mayo Foundation.

★

Van Meter Prize Award

The American Goiter Association again offers the Van Meter Prize Award of three hundred dollars and two honorable mentions for the best essays submitted concerning original work on problems related to the thyroid gland. The competing essays may cover either clinical or research investigations; should not exceed 3,000 words in length; must be presented in English; an a typewritten double spaced copy in duplicate sent to the corresponding secretary, Dr. George C. Shivers, 100 East Saint Vrain Street, Colorado Springs, Colorado, not later than March 1, 1952.

★

Urology Award

The American Urological Association offers an annual award of \$1,000 (first prize of \$500.00, second prize \$300.00 and third prize \$200.00) for essays on the result of some clinical or laboratory research in urology. Competition shall be limited to urologists who have been in such specific practice for not more than five years and to men in training to become urologists. For further information write the secretary, Dr. Charles H. de T. Shivers, Boardwalk National Arcade Building, Atlantic City, New Jersey.

★

ACCP Prize Award

The Board of Regents of the American College of Chest Physicians offers a cash prize award of \$250 to be given annually for the best original contribution, preferably by a young investigator, on any phase relating to chest disease. The following conditions must be observed.

1. Five copies of the manuscript, typewritten in English, should be submitted to the executive office, American College of Chest Physicians, 112 East Chestnut Street, Chicago 11, Illinois, not later than April 1, 1952.

2. The only means of identification of the author or authors shall be a motto or other device on the title page, and a sealed envelope bearing the same motto on the outside, enclosing the name of the author or authors.

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(Continued on page 516)

News Briefs . . .

North Dakota

A GRANT of \$27,500 was made on September 28 by the North Dakota Cancer society to Dr. William E. Cornatzer, professor and head of the department of biochemistry of the University of North Dakota medical school, to study metabolism in cancerous tissue with radio-active isotopes. The work will be done in conjunction with various clinics and will make isotopes available for treatment of various types of cancer found in this region. Formerly associated with the Bowman Gray School of medicine, Dr. Cornatzer studied at the Oak Ridge Institute of Nuclear Studies in Tennessee in 1948.

* * *

AT THE ANNUAL MEETING of the North Dakota Urological Society in Fargo on Septemehr 28, 1951, the name of the society was changed to that of the North Dakota-Manitoba Urological Society. The new officers elected at the annual meeting were as follows: Frank D. Naegeli, Minot, North Dakota, president; Earl Stephenson, Winnipeg, Manitoba, vice-president; L. F. Pine, Devils Lake, North Dakota, secretary .

* * *

LEONARD MARTI, Grand Forks, head of the physical education division of the University of North Dakota, was elected president of the North Dakota Public Health association at its meeting in Bismarck on October 1 and 2. Dr. Frank Whelan, Minot, was elected vice president and Lloyd Voker, Grand Forks, secretary-treasurer.

* * *

TWELVE North Dakota pediatricians met at the Bismarck hospital October 13 for a clinic on children's diseases. Dr. F. H. Adams, director of the children's heart clinic at the University of Minnesota, was the principal speaker. Other speakers included Dr. L. W. Larson, Dr. Robert B. Tudor, Dr. R. B. Cochran, Dr. John Williams, Dr. D. T. Lindsay and Mrs. Margaret Watts, all of Bismarck; Dr. Arthur Rathkey, Grand Forks; Dr. W. E. LeVien, Dr. B. A. Mazur and Dr. M. H. Poindexter, Fargo.

* * *

A PANEL DISCUSSION on "Does North Dakota Need a Four Year Medical School" was presented over *The People Speak* program, broadcast by station KSJB, Jamestown, and station KCJB, Minot, on Sunday, June 3. Represented on the panel were Senator J. B. Bridston, Grand Forks, Dr. Edgar Haunz, Grand Forks, member of the medical faculty of the University of North Dakota; Dr. Leonard Larson, Bismarck, trustee of the American Medical Association; and Dr. A. McCannel, Minot, State Board of Higher Education.

DR. DUANE F. PILE of Crosby has been appointed chairman of the state branch of the National Doctors Committee for Improved Federal Medical Services.

* * *

ACCORDING to a recent announcement by Dr. Dean W. F. Potter of the University of North Dakota medical school, the school has been accredited as a two-year school by the American Association of Medical Colleges. THE NEW OFFICERS for 1951-52 of the North Dakota Society of Obstetrics and Gynecology were recently announced. They are: Dr. Don Fawcett, Devils Lake, president; Dr. Robert Woodhull, Minot, vice president, and Dr. C. B. Darner, secretary.

The fall meeting of the society will be held in conjunction with the Minnesota, Iowa, and Wisconsin societies in St. Paul.

New locations and appointments . . .

DR. ARCHIE G. GRAY, formerly of Rolette, has opened a new office in Carrington.

* * *

DR. HARRY J. BURNS, who has been in charge of the Fort Totten hospital for the past two years, was retired from the Indian Service recently. A graduate of Marquette University, Dr. Burns has practiced medicine in civil life, in the army and in the Indian service. He plans to live in Duluth, where he will indulge his hobby of fishing.

* * *

THE PEOPLE of Washburn held a community reception on September 9, for their new physician, Dr. Arnold Kalnins, and his family.

* * *

DR. PHIL R. BERGER, a graduate of the University of North Dakota and the Bowman Gray school of medicine, has joined the staff of the Grand Forks clinic.

* * *

DR. B. A. GIRARD, a native North Dakotan who has been living in Philadelphia, has joined the staff of the Mohall Clinic at Lansford.

* * *

DR. ROBERT BECK, who has been practicing medicine at the Sharon hospital, has accepted a position in the Lahey clinic in Boston, Massachusetts.

* * *

DR. J. H. BARRETTE, who has practiced at Wishek for the past 18 years, has opened a new office in Milnor.

* * *

DR. H. A. OHRT, who has practiced at Kenmare for the past two years, has taken a leave of absence for post-graduate study in general surgery at the Providence hospital in Seattle.

* * *

DR. SAMUEL B. WUTZEL, formerly in private practice in Whitinsville, Massachusetts, has joined the medical staff of John Moses Veterans Memorial hospital in Minot.

DR. HARLAN LARSEN, of Dickinson, now a lieutenant with the army medical corps, has been transferred to duty at Anchorage, Alaska.

Minnesota

JOHN M. RUSSELL, director of the John and Mary R. Markle foundation for financing medical research, spoke before the Minnesota Medical foundation on October 4. on the need of "more intelligent rebels and more creative leaders" in medicine. At the same meeting of the foundation, ten University medical students were presented with \$500 scholarships by Dr. Owen H. Wangensteen, head of the department of surgery. The recipients were Gordon L. Backer, James Schuft, Omar Tveten, James White, Donald Mattson, Vernon Erickson, Emery Johnson, Barbara Ure, Joseph Teynor, and Charles Harris.

* * *

THE University of Minnesota has been given \$16,293 by the USPH national institute of mental health for psychological research. Dr. Ben Willerman will direct a study of security of individuals in groups. The grant is one of 58 projects totaling \$782,761 for basic and applied research in mental hygiene throughout the country.

* * *

DR. OWEN H. WANGENSTEEN, head of the department of surgery at the University of Minnesota, is author of a monograph on cancer of the esophagus and stomach. The 112-page booklet is the sixth in a series on early recognition of cancer published by the American Cancer society.

* * *

THE Charles Bolles Rogers achievement award, a silver bowl, was presented to the Hennepin county medical society August 30, to be given annually to the outstanding doctor of the year in Hennepin county.

* * *

MEMBERS of the Southwestern medical society met with regional editors and journalists September 7 at Worthington. The affair was one of a current series of medical-press conferences which were started in 1949 as part of the profession's public relations activities.

* * *

DR. W. A. MERRITT, Rochester, was elected president of the Southern Minnesota medical society at their annual meeting in Rochester on September 10.

* * *

DR. MOSES BARRON of Minneapolis was named to the national diabetes detection committee of the American Diabetes association. He will help in the formation of plans for national Diabetes week, which will be held November 12 to 18.

* * *

DR. HERMAN HILLEBOE, a University of Minnesota graduate and New York state commissioner of health,

was the principal speaker at a two-day session of the Minnesota Public Health conference September 28 and 29 at the Nicollet hotel in Minneapolis.

* * *

DR. HANS JOHNSON, who has practiced medicine in Kerkhoven for 46 years, was honored with a community-wide appreciation day on August 26. A graduate of the University of Minnesota medical school in 1904, Dr. Johnson served as chief of staff of the hospitals in both Willmar and Benson and was president of the Tri-County Medical association.

* * *

DR. ROBERT L. BENNETT, former University of Minnesota student, and first in the country to receive a master's degree in physical medicine, spoke at the International Poliomyelitis Congress in Denmark early in September. He discussed the role of physical medicine in the treatment of infantile paralysis.

* * *

DR. BURTON A. ORR, a graduate of the University of Minnesota, and a specialist in surgery, will open offices at the Faribault clinic.

South Dakota

CLARK COUNTY friends of Dr. and Mrs. A. H. Christensen honored them at a "golden reception" in the high school auditorium on August 15. Tribute was paid the doctor for his 50 years of service to the community.

* * *

DR. N. W. STEWART, a member of the Homestake Mining Company medical staff at Lead since January 1931, has been named to succeed Dr. R. B. Fleeger as chief surgeon for the company. Dr. Fleeger's retirement became effective October 1. He will, however, continue with the company as a surgeon and staff consultant.

* * *

DR. JOHN J. FEEHAN, a graduate of the University of Nebraska college of medicine in 1943, has opened offices in Rapid City. Dr. Feehan held a residency in surgery at the Denver general hospital for the past four years, and for the past year served as instructor in the department of surgery at the University of Colorado school of medicine.

* * *

DR. CHARLES S. ROBERTS, JR., a graduate of the University of St. Louis medical school, has opened a practice in Lake Preston.

* * *

DR. FRANCIS W. OGG, chief of professional services at the Battle Mountain Veterans administration center at Hot Springs, has been named manager to succeed Col. Carl A. Neves, who retired November 1. A graduate of the University of Kansas medical school, Dr. Ogg has been at Battle Mountain since 1943.

Relationship of Stress to Autonomic Liability

Studies in psychosomatics have shown that functional disorders often are a result of the patient's inability to adjust to emotionally stressful situations (stressor factors).

Nervous tension and chronic anxiety, discharged through a labile Autonomic Nervous System, can cause somatic disturbance.^{1,2} Such states may involve any one of the organ systems or several at one time.^{1,3} The outline below relates gastrointestinal and cardiovascular symptomatology to the exaggerated response of the autonomic nervous system.

	Physiologic Effects of Autonomic Discharge	
	Sympathetic	Parasympathetic
Gastro-intestinal	Hypomotility Intestinal Atony Hyposecretion Reduced salivation	Hypermotility Gastrointestinal spasm Hypersecretion
Cardio-vascular	Rapid heart rate Peripheral vaso-constriction	Slow heart rate Vasodilatation
Functional Manifestations	Palpitation Tachycardia Elevated B. P. Dry mouth—throat	Heartburn Nausea-vomiting Low B. P. Colonic spasm

Data here tabulated is from references 3, 4, 5, 6, 7, given below.

Diagnosis of functional disorder is supported by the following indications of autonomic liability:

- Variable Blood Pressure
- Body Temperature Variations
- Changing pulse rate
- Deviations in B. M. R.
- Exaggerated Cold Pressure Reflex
- Glucose Tolerance Alterations

Therapy in these cases is directed toward: 1) relief of symptoms by drug therapy (so making the patient more amenable to psychotherapy); 2) psychotherapeutic guidance in making adjustment to stressful situations and correction of unhealthy attitudes.

Clinicians who have studied these disorders, including those of the menopause, report that good therapeutic results are produced by combined adrenergic (ergotamine) and cholinergic blockade (Bellafoline) with central sedation (phenobarbital)^{8,9,10}. A convenient preparation of this nature is available in the form of **Bellergal Tablets**. Functional disorders are long-term therapeutic problems; therefore, drug treatment by the following method is recommended: 5 or 6 tabs. per day for the 1st week; then gradually reduce to the smallest dose effective in maintaining the patient symptom free (average: 3 tabs. daily). Interrupt for 1 week out of every month to assess results.

1. Ebaugh, F.: *Postgrad. Med.* 4: 208, 1948. 2. Wilbur, D.: *J.A.M.A.* 141: 1199, 1949. 3. Williams, E. and Carmichael, C.: *J. Nat'l. Med. Assoc.* 42: 32, 1950. 4. Goodman, L. and Gilman, A.: *The Pharmacological Basis of Therapeutics*, The Macmillan Co., 1941. 5. Katz, L. et al: *Ann. Int. Med.* 27: 261, 1947. 6. Weiss, E. et al: *Am. J. Psychiat.* 107: 264, 1950. 7. Alvarez, W.: *Chicago Med. Soc. Bulletin*, 581, 1950. 8. Rakoff, A.: *A Course in Practical Therapeutics*, Williams and Wilkins, 1948. 9. Karnosh, L. and Zucker, E.: *A Handbook of Psychiatry*, C. V. Mosby Co., 1945. 10. Harris, L.: *Canad. M.A.J.* 58: 251, 1948.

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Deaths . . .

DR. FREDERICK H. SCOTT, 75, one of the men who built the University of Minnesota medical school, died July 21 at his summer home on Gull lake, Minnesota.

★

DR. GILBERT SEASHORE, 77, Hennepin county coroner for 34 years, died August 1, at his home in Minneapolis. A graduate of the University of Minnesota, he had also studied at the University of Iowa and did graduate work in Vienna. During his tenures, his office investigated more than 24,000 deaths—murders, suicides, and fatal accidents.

★

DR. JOHN OLSON, Minneapolis., died August 1 at Veterans Hospital. A graduate of the University of Minnesota medical school in 1900, Dr. Olson had practiced five years in Cokato and the last 14 years in Minneapolis.

★

DR. KURT S. TAUBER, 50, Milbank, South Dakota, died August 2. A graduate of the University of Vienna medical school, Dr. Tauber was psychiatric examiner for the Veterans' Administration and formerly taught psychiatry at the University of South Dakota.

★

DR. C. R. SANBORN, 68, a former Minneapolis physician, died August 10 at his home in Carmel, California. A graduate of the University of Minnesota medical school, Dr. Sanborn started his practice in Parker's Prairie, moved to Bemidji and later Minneapolis.

★

DR. FREDERICK C. DE VALL, 72, Garretson, South Dakota, died August 14 at a hospital in Sioux Falls. He had practiced in Garretson since 1904 and in 1924 built the De Vall hospital. He had served as member of the city council, as mayor, and as president of the board of education.

★

DR. JOSEPH FARROW, who practiced at Cavalier, North Dakota, died on August 16 at his home in Spokane, Washington.

★

DR. HARRY B. EWENS, 63, who practiced at Virginia and Eveleth, died August 27 after a three months' illness. A graduate of McGill school of medicine, he came to Virginia following an internship at Northwestern hospital in Minneapolis.

★

DR. JESSE WILLIAM BOWEN, 76, of Dickinson, North Dakota, died October 2. He had been ill for a period of two years. A graduate of the University of Iowa medical school, Dr. Bowen had lived and practiced medicine in Dickinson for 45 years.

★

DR. ARTHUR E. KARLSTROM, 49, a Minneapolis pediatrician, died at St. Barnabas hospital on October 4 after a long illness. A graduate of the University of Minnesota medical school, Dr. Karlstrom had lived in Minneapolis since 1927.

★

DR. ELMER ROBERT BUCK, 81, Sioux Falls, South Dakota, died October 19 at a local hospital. Sioux Falls' oldest practicing physician at the time of his death, Dr. Buck began his practice at Hudson 53 years ago and came to Sioux Falls 39 years ago.

★

DR. JAMES A. BLAKE, 79, Hopkins, Minnesota, died Sunday, October 28. The founder of the Blake clinic at Hopkins, Dr. Blake had practiced medicine in Hopkins for 49 years. Three years ago he was honored at a community dinner for his years of service.

★

DR. JAMES FRANK CORBETT, 79, a physician and surgeon in Minneapolis for more than 50 years, died of a heart attack November 6. Dr. Corbett, who received his medical degree at the university in 1896, taught at the University of Minnesota medical school as well as maintaining a private practice.

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Postgraduate Refresher — Minnesota Chapter, American Academy of General Practice

The Minnesota chapter of the American Academy of General Practice will hold its first postgraduate clinical session November 14 at the Hotel Lowry in St. Paul. This session is planned to carry out the general policy of the Academy, which requires of all its members a minimum of 150 hours of graduate study in each three-year period. The following program, which is held to a one-day period, is open to all Minnesota physicians:

- 8:00- 9:30 Registration
- 9:00- 9:30 Film—Teleclinic
- 9:30-10:00 Is Obesity an Endocrine Problem? by E. H. Rynearson, M.D., Mayo Clinic
- 10:00-10:30 The Acute Abdomen, by Charles Rea, M.D.
(15 Minute Intermission)
- 10:45-11:15 The Rheumatic Fever Child, by Paul F. Dwan, M.D.
- 11:15-11:45 The Rh Factor, by Joseph W. Goldsmith, M.D.
- 12:00- 2:15 Cancer of the Breast, by Irving M. Ariel, M.D., Graduate of the Memorial Cancer Center, New York; Chief of the Cancer Service, Hines Hospital, Chicago; Associate in the Neoplastic Surgery Department of the George T. Pack Medical Group, New York
- 2:30- 3:00 Varicose Veins, a General Discussion, by H. O. McPheeters, M.D.
- 3:00- 3:30 Pre-Operative Medicine and Choice of Anesthetics, by Ralph T. Knight, M.D.
- 3:30- 4:00 The Management of the Older Cardiac Patient, by George N. Aagaard, M.D.
(15 Minute Intermission)
- 4:15- 4:45 Cardiac Decompensation, by John F. Briggs, M.D.
- 4:45- 5:15 Some Problems of Obstetrics and Gynecology, by Leonard A. Lang, M.D.
- 5:15- 5:45 Film—Teleclinic

Officers of the Minnesota chapter include Dr. Albert E. Ritt, president; Dr. Gilbert P. Wenzel, vice president; and Dr. Donald C. Deters, secretary, all of St. Paul.

Conference on Mental Health

Leaders from 12 Minnesota communities—Albert Lea, Anoka, Cloquet, Crookston, Fergus Falls, Little Falls, Mankato, Pelican Rapids, Preston, St. Cloud, Stillwater and Willmar—will meet at the University of Minnesota November 15-17 to discuss mental health.

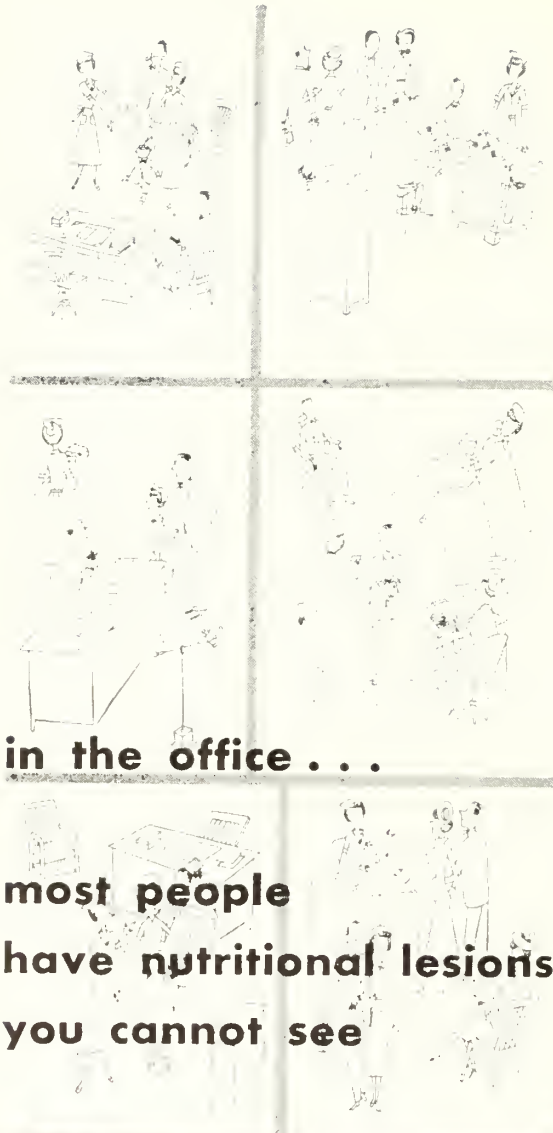
First of its kind ever conducted in the state, the conference will be attended by lawyers and judges, doctors, nurses, clergymen, social workers and educators from the 12 towns. It is sponsored by the University, the Minnesota Medical association, the Minnesota Probate Judges' association and the state department of education, health and social welfare.

The meeting is slated to show community leaders how they can cooperate in tackling community mental health problems.

Dorothea Dolan, Chicago, psychiatric social worker consultant for the United States Public Health service, will talk about "Mobilizing the Community for Mental Health" at the Saturday morning, November 17, session. On the first day, Thursday, November 15, George Williams, director of the Rochester counseling center, Rochester, will speak on "Fostering Mental Health in Our Communities."

Dr. Kurt Reichert, assistant professor of medicine and chief psychiatric social worker at the University; Dr. Richard M. Magraw, psychiatry-neurology-medicine instructor; and a co-worker of Miss Dolan's, psychiatric consultant Louis Jacobs, will also lecture at the conference.

They will cover such topics as mutual problems and opportunities, conference teamwork, emotional problems in adolescence and emotional stresses in mature years. The meetings will be held in the University's Center for Continuation Study.



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American College Health Association News . . .

THE Secretary's office recently received a copy of *A College Health Program* published by West Virginia State College, Institute, West Virginia. This forty-eight page "Progress Report" presents the program and activities of the department of health, physical education and safety at the college in a vitally compelling manner. Charles C. Hawkins, Ph.D., director of the department, makes his report for the five-year period of the program through the use of numerous action photographs combined with a concisely written text; reviews past and present activities and points to future objectives in the development of an overall health program in the college. An excellently prepared administrative organization chart is featured in this interesting and informative brochure.

* * *

EDWIN B. O'REILLY, M.D., is the new Director of Student Health Service at Providence College, Providence, Rhode Island, having replaced Frederic J. Burns, M.D. Mindel C. Sheps, M.D., M.P.H., resumes his post as Director of Student Health Service at North Carolina College at Durham, North Carolina, after a brief absence.

* * *

NORTH CAROLINA COLLEGE AT DURHAM announces an opening for a full-time physician in its Student Health Service. The college has a student body of approximately 1,300. Full details relative to this vacancy may be secured by writing Dr. Mindel C. Sheps, Director, Student Health Service, North Carolina College at Durham, North Carolina.

ACTH AND CORTISONE IN OPHTHALMOLOGY

(Continued from page 483)

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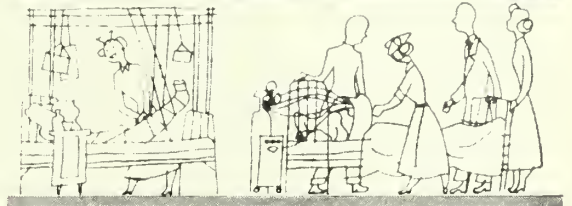
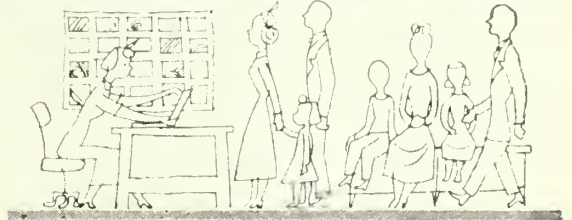
Put off your imagination, as you put off your overcoat, when you enter the laboratory. But put it on again, as you put on your overcoat, when you leave.

—CLAUDE BERNARD

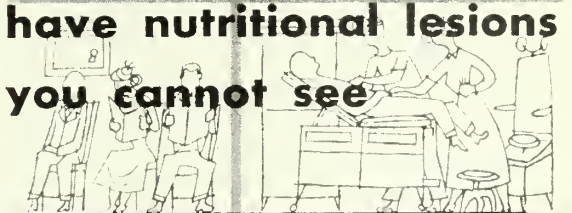
* * *

Percussion and auscultation cannot be learned except at the expense of time and pains . . . The findings of percussion and auscultation depend never upon the disease itself, but always upon the changes produced in the organs . . . Diseases which are entirely different may show the same findings on percussion and auscultation and vice versa, the same disease may show a great variety of findings when we percuss and auscultate, because sound depends not upon the chemical but upon the anatomical state of the organs . . . Everybody should be advised to spend no time or labor learning these methods of examination if he will not take the trouble to study pathology in the cadaver.

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- Surgery of Colon and Rectum, One Week, starting November 26, March 3.
- Gallbladder Surgery, Ten Hours, starting April 21.
- Basic Principles in General Surgery, Two Weeks, starting March 31.

GYNECOLOGY—Intensive Course, Two Weeks, starting February 18, March 17. — Vaginal Approach to Pelvic Surgery, One Week, starting March 3.

OBSTETRICS—Intensive Course, Two Weeks, starting March 3, March 31.

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**FATIGUE STATES ASSOCIATED WITH
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(Continued from page 487)

genic defect. Further study of fundamental defects and the functional problems involved is indicated.

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**THE DIGESTIVE TRACT
IN MEDICAL LITERATURE**

(Continued from page 502)

In the reading of this review it becomes clear that many eminent physicians have worked to increase knowledge of the diseases of the anus and rectum but, by and large, the major efforts along this line have been made by members of the American Proctologic Society.

The subject of vitamins can only be touched upon for it too presents a volume in itself. The studies of Dam,³¹⁸ Butt and Snell²⁶⁶ on the importance of vitamin K in the human economy and the studies of Spies³¹⁹ and Ruffin³²⁰ and their associates on the various fractions of vitamin B have given information of lasting importance.

The work on the administration of the essential amino acids by Elman and his associates,³²¹ Ravdin and his associates³²² and me and my associates³²³ laid the groundwork for present widespread use of these substances in treatment of digestive disorders. The relationship of disorders of the digestive tract to anemia was illustrated by Castle and his associates³²⁴ as early as 1931.

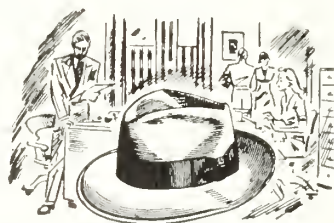
The work of Watson and his associates³²⁵ on porphyrin and porphyrin compounds and their relation to digestive diseases has created considerable interest in recent years.

* * *

EDITOR'S NOTE. *Because of the extensive length of the references cited in this article, we regret that it was impossible to include them in this issue of THE JOURNAL-LANCET. Interested readers will find them listed in full in reprints which may be obtained from the author.*

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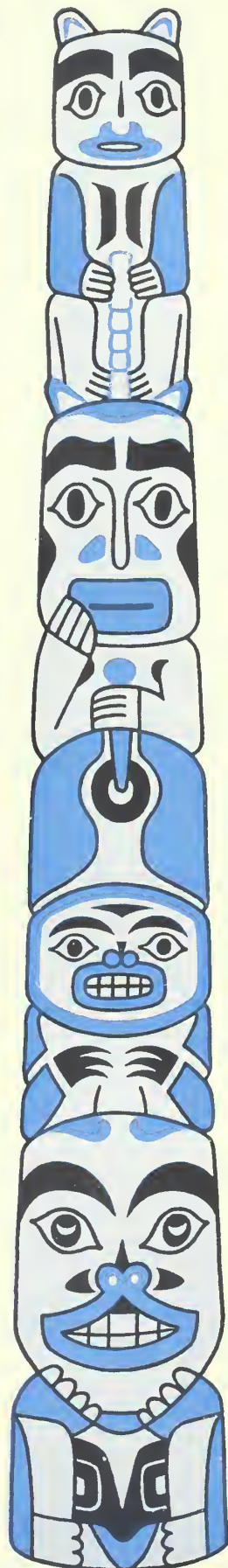
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*Perloff, W. H.: Am. J. Obst. & Gynec. 58 684 (Oct.) 1949



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Volume LXXI, No. 12

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The Journal Lancet

Ureterosigmoidostomy Following Radical Pelvic Surgery*

RICHARD S. RODGERS, M.D., F.A.C.S.
Minneapolis, Minnesota

MEANS of diverting the urine in such a manner as to allow preservation of renal function continues to be a problem when radical therapy for conditions involving the urinary bladder is contemplated. At present it must be acknowledged that a completely satisfactory method which, in permitting an unobstructed flow of urine from the kidneys will also prevent reflux upwards into the kidneys has not yet been devised. Each of the techniques which will be discussed briefly has its favorable attributes but likewise each is prone to result in discouraging failure. The reasons for the varying degrees of success or failure even in the hands of a surgeon who has had an opportunity to perfect his technique with his favorite operation remain to be answered. Thus, it is with a complete awareness of the unexplained successes and failures that this attempt is made to review these various types of operations and to discuss the method which seems to have the fewest objectionable features. Unfortunately, the definitive therapy of many pelvic conditions continues to be postponed because of the lack of a completely dependable means for urinary diversion. In this respect bladder surgery occupies a unique position for the reason that decisions as to type of therapy are colored not by what should be done but by whether the patient will be rendered an invalid because of poorly functioning ureterosigmoidostomies.

The pelvic conditions demanding surgery of such extent that urinary diversion is required may be either congenital or acquired. In the first group extrophy of the bladder is the principal example while the outstanding conditions in the acquired group are intractable vesical inflammation, trauma, and primary and secondary cancer of the bladder.

Following the unsuccessful attempt by Simon in 1851 to produce an uretero-intestinal fistula by means of a transfixing ligature, many ingenious methods for implan-

tation of the ureter into the skin or bowel have been devised. Some have involved exceedingly complicated techniques while others have been amazingly simple. There are only a few original or basic methods for diverting the urine and aside from those involving the discomforts of nephrostomy and cutaneous ureterostomy the choice is reduced to only two. These consist of the various methods of implanting the ureters into the bowel with or without a trough as originally described by Coffey in 1911 and the proposed techniques of direct anastomosis between the ureter and the sigmoid recently advocated by Nesbit and Cordonnier. It is not the purpose of this paper to give a detailed description of all these methods or the innumerable modifications which have been described, for the fact that all of them have on occasion given unsatisfactory results has caused many to be discarded and has stimulated efforts toward the development of more dependable means.

Briefly, the Coffey operation involves the placement of a suture in the severed end of the split ureter which is then introduced into the bowel through a small incision at the lower end of a prepared trough. The suture is brought out distal to the trough and tied, after which the trough is closed over the ureter. The complicating slough or obstruction at the end of the ureter, due to devascularization, was partially corrected by a modification involving burying the ureter in the trough at one operation and establishing the stoma at a second. The disadvantage of this method lies not only in the unpredictable results but also in the necessary postponement of the definitive therapy until the patient has recovered from the preliminary surgery.

Based on the conviction that a direct ureterosigmoid anastomosis would omit many of the disadvantages of the previous operations and that the valve-producing effect of a trough was not only unnecessary but actually deleterious, Nesbit in 1948 and Cordonnier in 1949 described similar methods for transplanting the ureter.

*Presented at a 1951 meeting of the Minneapolis Academy of Medicine.

Although these two operations would appear essentially alike there is actually considerable difference. The Nesbit procedure involves anastomosing the split end of the ureter to the bowel by only one row of interrupted sutures passed through all layers of both structures. On the other hand Cordonnier's method requires rotation and partial fixation of the bowel before joining to it the transversely sectioned ureter by two layers of sutures, the first including only the mucosal layer of the bowel and the entire wall of the ureter while the second gives added security by approximation of the serosal coverings. Both of these operations have the inherent advantage of a carefully executed surgical technique and in the essayist's experience offer the best security against necrosis and leakage. In an effort to avoid kinking of the ureter immediately above the anastomosis it has become my practice to follow the Cordonnier technique except that the ureter is prepared in the manner suggested by Nesbit.

The methods of direct open anastomosis between the ureter and the bowel cannot be regarded as infallible in their results for despite providing reasonable security against stricture and leakage most urologists who have had experience with the operations are dismayed by the frequency with which not only ureteral dilatation but also reflux to the kidney occurs. This condition is well demonstrated in one of the illustrations shown. The one great advantage, however, seems to be the total absence of urinary leakage with its accompanying distressing and unpredictable fistula.

At this point it seems almost paradoxical to state that a perfect anatomical and functional result, as evidenced by excretory urograms, does not guarantee a completely recovered patient from the physiological standpoint. The effect of delivering urine into an organ which has as its main function the absorption of water has long aroused the curiosity of surgeons but the explanation for loss of appetite and weight in a patient whose urograms showed good excretion has not been available until recently. Ferris and Odell have studied the problem in respect to the electrolyte pattern of patients who did poorly despite absence of azotemia and found the explanation to be a state of hyperchloremic acidosis due to chloride absorption through the bowel wall. Alleviation of this condition was partially accomplished by instituting a low salt diet and adding soda bicarbonate to the intake.

In contrast to the number of techniques for uretero-sigmoidostomy which have appeared in the literature is the relatively rare report of patients who have been observed for several years after their operations. It is too early to have recorded the remote status of those upon whom the Nesbit or the Cordonnier procedures were carried out but if the absence of immediate complications is any clue one may be justified in being optimistic. Among the few published observations of patients who have been followed over a period of years there are two which are believed to be representative. Pool and Cook, without recording the surgical mortality, reviewed the status of 100 out of 161 patients who had had uretero-

sigmoidostomy at the Mayo Clinic during the years 1935 to 1948. Approximately one-third of these patients showed dilatation of one or both upper tracts in the pre-operative urograms. Of 69 patients studied postoperatively only two of those with pre-operative normal urograms had undilated excretory passages while all of the pre-operative abnormalities continued to be dilated. Films taken of 43 individuals at the end of six months showed only five normal urograms and of these, three had been normal pre-operatively. Without recording the time elapsed following operation they found that 37 of 63 patients with normal urograms before operation were dead whereas 30 of the 37 patients with abnormal pre-operative urograms had expired.

In a review covering a period of 17 years during which he had done a Coffey type of operation upon 66 patients G. G. Smith reported an operative mortality of 18 per cent. He observed that patients in the younger age group who were operated upon for congenital lesions usually did better than the older patients, most of whom

LEGENDS FOR FACING PAGE

1A. Preoperative excretory urogram showing non-functioning right kidney and early dilatation of left. The filling defect in the urinary bladder is visualized.

1B. Postoperative excretory urogram demonstrating increase of left hydronephrosis and persisting non-function of right kidney following Coffey I type ureterosigmoidostomy.

2A. Preoperative urogram. The right kidney is mildly hydronephrotic and the left kidney appears normal. A filling defect in the right side of the fundus is present.

2B. Excretory urogram taken five months postoperatively. There is reduction in the right hydronephrosis while the left kidney is mildly dilated. The dye is excreted in good concentration. A Coffey type anastomosis was done and a urinary fistula was present for three months postoperatively.

2C. Excretory urogram 15 months after operation. The hydronephrosis on both sides is reduced and the renal function appears excellent.

3A. Preoperative excretory urogram showing upper excretory passages. A filling defect is present in the bladder.

3B. Excretory urogram 10 days postoperatively. The right kidney and ureter are normal. Hydronephrosis is present on the left side. This patient had a mucosa to mucosa anastomosis with a short trough through the bowel wall.

3C. Excretory urogram taken six months after operation. The right kidney and ureter are normal. There has been improvement in the hydronephrosis on the left side.

4A. Preoperative excretory urogram showing normal upper urinary passages. A filling defect is present in the fundus of the bladder.

4B. Flat film of abdomen taken three months after operation showing reflux of air into both ureters and renal pelves. A mucosa to mucosa anastomosis was done.

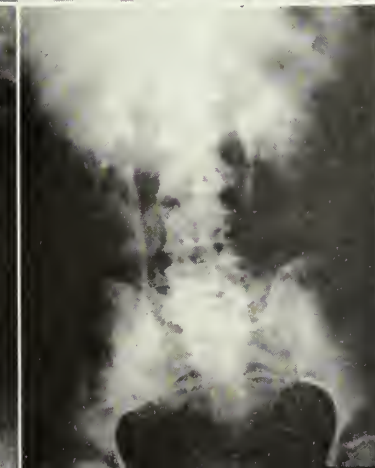
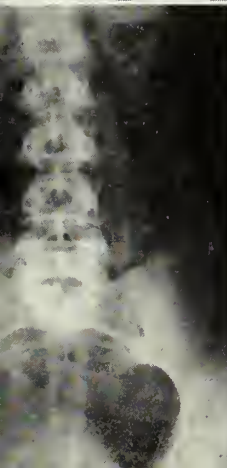
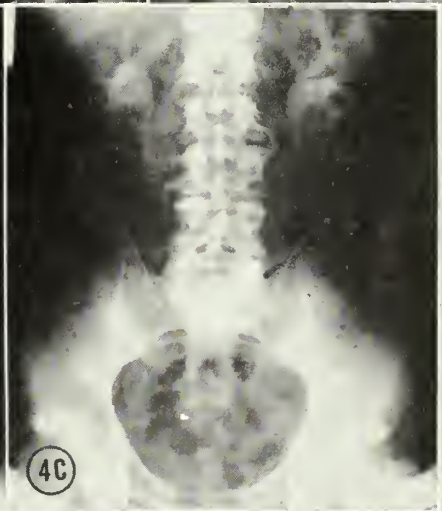
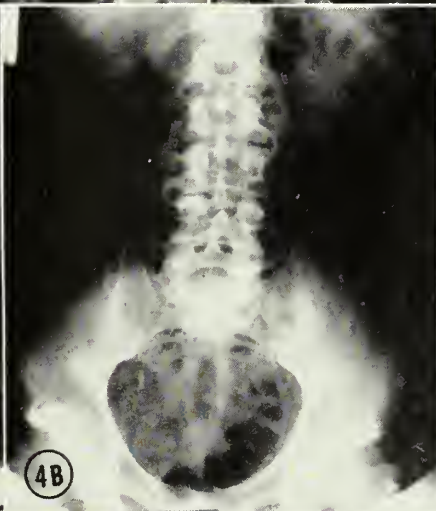
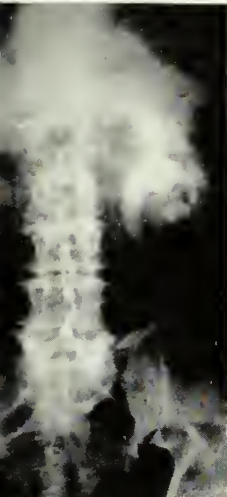
4C. Excretory urogram three months after operation showing moderate hydronephrosis and complete absence of air reflux.

5A. Preoperative excretory urograms. The upper excretory passages are normal. A large filling defect is present in the bladder.

5B. Urogram taken two weeks after operation. The left kidney and ureter are normal but the right is markedly hydronephrotic. This patient has had a remarkable recovery.

6A. Preoperative excretory urogram showing normal right kidney and ureter. The left kidney is mildly hydronephrotic. The bladder shadow is irregular.

6B. Excretory urogram taken five months after operation. The right kidney and ureter are normal and there is increase in the dilatation of the left kidney and ureter.



were afflicted with cancer. Of this group there were 24 patients alive after a period of from a few months to seventeen years following operation. Three of these patients had unsatisfactory renal function and four had undergone secondary cutaneous ureterostomy. In Dr. Smith's series urinary leakage and pyelonephritis were the prominent factors behind the decision to exteriorize the ureters and it was stated that the mortality may have been lowered if this had been carried out on a few additional patients.

The early reports of patients upon whom the open direct type anastomosis has been done show a remarkable freedom from morbidity and among whom there has been no operative mortality. It must be acknowledged that fair comparison can be made only after a number of years have elapsed, yet the reduction in morbidity is so striking that one is now somewhat less reluctant to recommend the radical operation. It is also possible that the improved results may be due to operating upon these patients when their disease was in a relatively early stage; but if such is the case this state of surgical euphoria must have as its basis the reduction in postoperative morbidity and a better immediate anatomical result as demonstrated by the urogram.

During the last two years the author has been privileged to have had under his care six patients with extensive bladder involvement due to cancer. All of them had at least a total cystectomy with some form of uretero-intestinal anastomosis during a combined one-stage procedure. Although there were no operative deaths the two patients who had Coffey I type ureteral transplants experienced stormy convalescences while those upon whom the direct open anastomoses were done had no difficulties as far as their urinary outputs were concerned.

CASE REPORTS

Case 1. Mr. E. S., age 69, was admitted to the hospital on June 16, 1949 because of hematuria. Biopsy of the bladder demonstrated an infiltrating tumor involving the vesical neck and right side of the trigone. An excretory urogram showed dye to be present in the left kidney but the ureter was not visualized. There was no function on the right side.

On June 28 total cystectomy without excision of the regional lymph nodes was carried out, and a Coffey I ureteral transplant was done despite dilatation of both ureters. There was practically no urine excretion from the bowel during the first three days and the blood urea nitrogen rose to 93 mg. per cent. On the fourth day urine in enormous quantity appeared from the bowel and the BUN gradually dropped to 35 mg. per cent. On the 12th day wound dehiscence occurred and secondary closure was necessary. The patient was discharged on the 32nd postoperative day after having regained seven pounds of weight. He returned to his home in Canada and did well until March 24, 1950 when he developed symptoms of gastrointestinal upset. On the following day collapse and death occurred suddenly.

Autopsy revealed a gangrenous loop of small bowel which had apparently herniated in the space between the sigmoid and right ureter. Dr. T. H. Sweetser has recently called attention to this danger following a similar complication. His patient recovered after resection of the herniated loop of ileum. Since observing this complication it has become common practice to obliterate this potential pouch by suturing the transverse portion of the sigmoid to the peritoneum behind it.

Concerning the condition of the kidneys and ureters it was gratifying to be advised that the stomas were patent and the ureters were only moderately dilated.

In retrospect it would seem that this patient might have had a smoother postoperative course had both of these dilated ureters been transplanted by the direct open method.

Case 2. Mrs. R. L., age 69, was admitted to the hospital because of hematuria. She was found to have an extensive vesical carcinoma. Preoperatively the blood urea nitrogen was normal and although the excretory urogram showed satisfactory renal function there was grade I right pyelectasis and ureterectasis. At operation on July 25, 1949 the bladder, urethra, uterus, and anterior vaginal wall were removed along with the iliac and regional lymph nodes. Again the Coffey I technique was used for ureteral transplantation. This patient did well until the rectal tube was removed on the fifth day when her temperature became elevated to 104°. After replacement of the tube the temperature returned to normal but profuse drainage of urine from the abdominal and pelvic wounds developed. This gradually subsided and the patient was discharged on the 34th postoperative day. During her hospitalization the blood urea nitrogen did not exceed 22 mg. per cent and the blood chlorides and carbon dioxide combining power were consistently normal.

On November 3, 1949 she was voiding only once at night and the urograms appeared fairly satisfactory. The patient was last seen on September 14, 1950 when she was found to have recurrence of her cancer. The blood urea nitrogen at that time was 32 mg. per cent.

This patient, although experiencing a comfortable existence while working as a maid for a year following her surgery, may also have had a more benign convalescence with an open type of anastomosis. It is quite apparent that the surgery was not extensive enough and this has been corrected in subsequent cases by the removal of the entire vagina.

Case 3. Mrs. R. C., age 58, was admitted to the hospital because of hematuria. She was found to have a squamous cell carcinoma involving the anterior bladder wall. The blood chemistries were normal and the excretory urogram showed no evidence of ureteral obstruction. Because of the position of the tumor only the bladder and urethra were removed at operation on October 26, 1949. The ureters were transplanted employing the direct open anastomosis but in addition using a short trough in the bowel wall. This patient had a completely benign postoperative course and was discharged on the 14th postoperative day. Since returning to her home she has worked in a restaurant. On several occasions she has appeared quite ill but the symptoms promptly subsided after reducing her salt intake and adding bicarbonate of soda. The most recent x-rays were taken one year ago. To date there is no evidence of tumor recurrence.

Case 4. Mr. F. S., age 62, was subjected to cystectomy, lymph node dissection, and ureterosigmoidostomy on November 13, 1950 because of an infiltrating vesical carcinoma. Preoperatively the urograms and the blood chemistries were normal. The technique used for the ureteral transplant was that of Cordonnier except for splitting the end of the ureter to enlarge the tip and prevent kinking. Postoperatively there was no elevation of the blood urea nitrogen levels and the chloride and CO₂ determinations have been consistently normal.

Case 5. Mrs. O. M., age 38, was referred because of a persistent vaginal discharge. She was found to have a vesicovaginal fistula secondary to a widespread ulcerating carcinoma of the cervical stump. Urograms were normal and there was no evidence of widespread metastasis. On December 29, 1950 all of the pelvic viscera except the rectum were removed and a thorough dissection of the regional lymph nodes was accomplished. The direct open ureterosigmoid anastomosis was carried out and the patient made a smooth recovery. She was discharged on the 14th postoperative day. During the hospital period there was no change in the blood chemistries. Examination of the removed specimen showed extension of the tumor to the right ovary only.

Case 6. Mrs. G. P., age 46, was admitted to the hospital because of gross hematuria and the passage of gravel from the urinary bladder over a period of two months. She was found to have a squamous type of carcinoma involving the base and posterior wall of the bladder. The extent of uterine involve-

(Continued on page 564)

Cerebral Angiography*

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CEREBRAL ANGIOGRAPHY is the procedure in which the intracranial vascular system is visualized roentgenographically following the intracarotid injection of radiopaque dyes. The procedure was first used in 1927 by Egaz Moniz,¹⁸ a Portuguese neurologist. It was not immediately accepted nor extensively used until the few years before World War II when it received widespread acceptance in Europe. It became accepted in this country after the war. Because of the inherent toxicity of the dyes originally used, the risk of the procedure did not at first seem to be worth the added information obtained, but after the great utility of the procedure was demonstrated and less toxic dyes introduced, cerebral angiography as an accessory diagnostic aid in intracranial lesions came into frequent general use. Included in this report are the experiences with angiography at the University Hospitals and Veterans Hospital, Minneapolis.

Before Moniz used angiography in his clinic, he experimented extensively with animals and cadavers. He used many bromine, strontium, and iodine salts before finally selecting a 25 per cent solution of sodium iodide for use on his patients. This drug was not ideal because it could not be sterilized and it had to be freshly prepared before injection. There were also many unpleasant and alarming reactions from it such as pain, headaches, convulsions, and temporary hemiplegias. Using sodium iodide, Moniz had an over-all mortality of 2 per cent. In 1931 Löhr and Moniz simultaneously began using thorotrast, a 25 per cent colloidal suspension of thorium dioxide which has the same viscosity as blood. This drug caused few, if any, immediate side effects and its use became generalized. However, thorotrast is radioactive. It is not excreted from the body but is picked up and retained by the reticulo-endothelial system. Some concern over the radiation effect was felt since sarcomas in rats could be caused by the injection of the drug, but those who used it felt that by restricting the amount of thorotrast to 30 cc., the long term toxicity of the drug would be negligible. No ill effects ascribable to the use of thorotrast were reported by the early workers.^{2,15} However, Jacobson and Rosenbaum¹¹ have reported extensive fibrosis in the reticulo-endothelial system several years following its injection, and MacMahon, Murphy, and Bates¹⁷ reported a patient who developed a sarcoma of the liver twelve years after the injection of thorotrast. Because of this radioactivity, thorotrast is used less and less frequently for cerebral angiography. The mortality after angiography with thorotrast is 1.3 per cent.⁵

Haussler,⁹ in 1940, reported that ethyl triiodo stearate offers good contrast, is excreted rapidly, and has little toxicity when used in angiography. Unfortunately, the drug is not available in this country.

Torkildson and Engeset³ in Sweden, and Gross⁷ in this country began the use of diodrast in 35 per cent solution. This dye fills the smaller vessels better than thorotrast but does not give the excellent roentgenographic contrast obtained with thorotrast. Most patients experience some mild reactions to its injection such as a murmuring sound, a flushing of the face or pain over the side of the head. Very occasionally, demented and confused patients react violently after its injection, and occasionally convulsions have occurred.³ These severe side effects are very infrequent and 35 per cent diodrast is the dye now most widely used.

TECHNIQUE OF INJECTION

The procedure is done under Na luminal sedation and a cervical nerve block with procaine is performed. It is wise to infiltrate the carotid bifurcation thoroughly with novocain solution to eliminate or abolish the carotid sinus reflex. The dye is injected into the common carotid artery through a No. 17 needle. Just before the injection is complete, an x-ray exposure is made to demonstrate the arterial tree, and three seconds later a second exposure is obtained in order to visualize the venous channels. The circulation time from common carotid to internal jugular through the internal carotid is about four seconds, and through the external carotid this time is about six seconds.¹⁴ Some people slow this circulation down by compressing the jugular during the procedure,¹³ others by occluding the common carotid below the needle. So far we have felt that these measures are unnecessary and complicate the procedure. By occluding the carotid Moniz reported that the anterior cerebral artery failed to fill in 30 per cent of cases. Gross⁸ does not occlude the artery and reports 100 per cent filling of the anterior cerebral. The apparent reason for this is that lowering the pressure in one internal carotid allows blood to flow across the midline from the opposite side of the circle of Willis and this non-dye containing blood fills the anterior cerebral. Two injections are made to allow an arteriogram and venogram to be made in both anteroposterior and lateral positions. Dyes¹ and Timins²² have a method whereby anteroposterior and lateral skull x-rays are made on the same injection. Our x-ray plates have a portable Bucky grid attached to them but are changed by hand. Caldas has described a radio carousel whereby six exposures are made in six seconds. Sanchez-Perez²¹ has described a spring box which delivers up to three cassettes as fast as they can be removed. Variable x-ray technique has been employed. In general, the shorter the exposure time the better. The technique of injection of

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the vertebral artery is similar to that of the carotid except for the site of injection.

CLINICAL INTERPRETATION

Aneurysms: The most frequent locations of aneurysms of the cerebral vessels are at the bifurcations of the large basal vessels, such as the junction of the internal carotid with the anterior or middle cerebral artery. Less frequent are aneurysms at the junction of the carotid with the anterior or with the posterior communicating artery or on the internal carotid artery itself.

With arteriography, both the location and size of the aneurysm may be ascertained. Occasionally the size of the aneurysm as seen in the angiogram is considerably smaller than that seen at the time of operation. This is due either to a clot of blood within the aneurysm or to the neck of the sac being only partially filled with the dye. Occasionally the neck of the aneurysm may be so small that none of the contrast media enters the sac in which case the aneurysm is not visualized.

The internal carotid artery enters the cranial cavity through the foramen lacerum. It remains extradural until it reaches the level of the anterior clinoid process. Extradural aneurysms rarely burst because they are well protected by this overlying dural sheath. Clinically they resemble slowly growing neoplasms and must be differentiated from parasellar tumors. An aneurysm in this location (extradural portion of the internal carotid artery) encroaches on the third, fourth, fifth, and sixth cranial nerves so that various combinations of palsies of eye movements and hypaesthesia over the face occur. Occasionally direct pressure by the aneurysm on the optic chiasm or nerve results in visual abnormalities. The aneurysm may produce erosion visible in roentgenograms in the parasellar region. A definite differential diagnosis between aneurysm and parasellar tumor can usually be made preoperatively by angiography.

Aneurysms arising on the internal carotid artery or its branches, after the artery has pierced the dura at the level of the anterior clinoid process, may produce no symptoms until they rupture. They are usually located on the posterior aspect of the carotid siphon.

The surgical treatment of intracranial aneurysms consists of either occluding the stalk or neck of the aneurysm or by trapping the aneurysm by occluding the vessel both proximally and distally to the lesion. If the aneurysm is located below the origin of the posterior or anterior communicating arteries, the therapy of choice is ligation of the carotid artery in the neck which occludes the proximal flow of blood and then occluding the vessel intracranially distally to the aneurysm. Ligation of the carotid artery in the neck does not embarrass an aneurysm arising distally to the communicating vessels. Aneurysms in this location are best treated by an intracranial approach.

Brain Injuries: Löhr¹⁵ has studied angiographically 1000 patients with skull fractures. He classifies brain injuries as (a) "commotio cerebri" and (b) "contusio cerebri." In the commotio cerebri group he found very

narrow constricted vessels on the injured side; he interpreted this as due to brain swelling or possibly to vascular spasm. In the contusio cerebri group he observed an increased resistance to injection of the dye and that the vessels were broad and flat. Angiograms in patients with subdural or extradural hematomas revealed, in the anteroposterior view, the vessels to be displaced away from the lateral wall of the skull. Löhr¹⁵ and Kristiansen¹² state that all acute head injuries should have an angiogram—others,^{3,28} even though they are great exponents of the angiogram, believe that bilateral trephines are more logical in acute head injuries. Most investigators have agreed that in chronic post-traumatic states angiograms are indicated.

Brain Tumors: Brain tumors are localized by (1) displacement of the normal vessels supplying the brain, (2) enlargement of afferent vessels to a tumor or efferent vessels from a tumor area, (3) pathological changes of blood circulation within the tumor itself.³

These basic changes will be described briefly: many intermediate forms, of course, exist. In the anteroposterior view the ascending portion of the anterior cerebral artery is examined for displacement across the midline by a tumor lying laterally in the hemisphere. The horizontal portion of the anterior cerebral is then examined for possible elevation by a tumor mass such as a hypophyseal tumor lying beneath it. The horizontal portion of the middle cerebral artery may be elevated by tumors in the anterior portion of the temporal lobe. This is important in distinguishing these tumors from those in the posterior portion of the temporal lobe which do not disturb this portion of the middle cerebral artery.³ The carotid siphon may be straightened or displaced indicating a lesion in the vicinity of this structure. In the lateral views an upward or downward displacement by a tumor of the pericallosal and Sylvian vessels may be visualized. This displacement occurs appropriate to the location of the tumor, either above or below the major vessels. Centrally located tumors cause direct lateral pressure and will not produce an appreciable shift in the position of these vessels. In the latter case, a stretching of the arteries with elimination of the frequent curves can be significant. Vessels may be displaced in a circular fashion around a tumor. If there are no vessels within the circle, a cyst or abscess or an astrocytoma must be considered.³

Ventricular enlargement, either congenital or acquired, will cause straightening and stretching of all vessels but most noticeably those in the Sylvian group. In addition, the arch of the anterior cerebral artery around the ventricle may be widened.^{3,6,16} The venogram may reveal the carotid veins to be small due to compression resulting from the increased intracranial pressure.

The accuracy of localization of tumors in the posterior frontal and frontoparietal regions by angiography is good. Tumors in these regions may depress the Sylvian group of vessels and localized vascular arches partially encircling the tumor may be visualized. Tumors localized to the Rolandic area may stretch and distort the

callosomarginal artery. The pericallosal vessels as visualized in the lateral view are seldom displaced unless the lesion is located parasagittally. In posterior frontal or frontoparietal tumors, the anteroposterior view may show the anterior cerebral artery dislocated across the midline, but this is not as consistent as in tumors located more anteriorly. In anteriorly placed tumors this dislocation of the anterior cerebral artery is a smooth arc from the base of the skull to the inferior border of the falx cerebri, while in parietal and frontoparietal tumors the dislocation is apt to form an acute angle with the point located at the origin of the frontopolar artery.⁴ The carotid siphon is often pushed downward and backward.

Tumors located beneath the Sylvian vessels elevate this group of vessels. If the tumor is in the tip of the temporal lobe (including meningiomas of the sphenoid wing) the first part of the middle cerebral artery may ascend sharply then arch backward in a plateau. In the anteroposterior view the horizontal part of the middle cerebral artery may rise at an angle to reach the convexity of the hemisphere instead of the normal horizontal course to the lateral wall of the skull. This displacement of the Sylvian vessels will not occur if the tumor is located farther posteriorly.

The carotid siphon may be stretched by tumors in its vicinity. Distortion of the supraclinoid part of the carotid, before it divides into the anterior and middle cerebral branches, is common in tumors of the supra-sellar region or of either the frontal or temporal lobe. The infraclinoid part is seldom disturbed except by tumors in the immediate locality, such as meningiomas of the medial third of the sphenoid wing and by hypophysal tumors.^{3,19}

Tumors in the posterior part of the temporal lobe may elevate the first part of the Sylvian group of vessels in lateral views, although in anteroposterior views the horizontal part of the middle cerebral artery may not be displaced. The exact location may be shown by a concavity of the Sylvian vessels over the tumor. Occipital lobe tumors may produce a straight line elevation of the Sylvian group of vessels and occasionally displace the posterior extension of the pericallosal vessels.

The displacement of vessels as described above is a valuable method of localizing tumors, but the visualization of the tumor circulation not only more accurately defines the tumor's position but it may also make possible a histological diagnosis of the type of tumor. Engeset³ believes that a more accurate histological diagnosis can be obtained by angiography than by frozen sections of the tumor. He feels sufficiently confident with angiography to ascribe a lesion as inoperable from its angiographic appearance.

Glioblastoma multiforme: Tönnes was the first to describe the angiographic appearance of the glioblastoma multiforme. At operation he noticed arterial blood in the veins surrounding these tumors and in angiograms pointed out the frequency of intraneoplastic arteriovenous aneurysms. Because of the rapid circulation through

these tumors due to these fistulae, tumor circulation may be visible in the arteriogram and not in the venogram. Several cases have been reported in which the tumor circulation of glioblastoma were seen on venograms,^{3,10} but the angiographic diagnosis of glioblastoma multiforme from a roentgenogram exposed so late that the normal venous channels are filled is precarious. The circulation of most other tumors will appear on venograms. The glioblastomas have an abundant vascular supply with the vessels irregularly arranged and of irregular caliber. They show irregular concentration of dye in the veins and between the vessels are small irregular spots which may be miliary aneurysms. Large arteriovenous aneurysms and one or two abnormal veins leading away from the tumor area may be visible.¹⁰

Metastatic tumors: The distinction between glioblastoma multiforme and metastatic carcinoma may, at times, be difficult but usually it can be made. Metastatic carcinomas, like glioblastomas, have an abundant vascular supply with frequent arteriovenous aneurysms and irregularity of vessels. The presence of normal vessels arranged annularly about the lesion with just a faint haze of circulation in the tumor in the arteriogram but with a maximum circulation within the tumor visible in the venogram is characteristic.³

Astrocytomas: Astrocytomas seldom show any vascularity in either the arterial or venous phase. Some investigators believe that vascular lakes and intraneoplastic circulation visible in venograms is indicative of an astrocytoma, but most reports do not agree with this. According to Engeset, astrocytomas characteristically show a marked dislocation of normal vessels around the tumor with practically no vessels within the curved enclosed area. Vessels seen in the tumor are usually straight and even.

Meningiomas: Meningiomas present a typical picture on the angiogram. They almost always receive part of their blood supply from the external carotid artery, and if this source of blood in the tumor can be demonstrated, it is practically pathognomonic. If the tumor gets all of its blood supply from the external carotid and the internal carotid alone has been injected, the appearance of the normal vessels circling around the extracortical tumor is often diagnostic. In the arteriogram, when the tumor circulation is filled, enlarged vessels leading up to the tumor but ending in brush-like fans at the edge of the tumor may be seen.⁶ The vessels are all of constant caliber and have constant dye concentration. Because the circulation through meningiomas is slow, the venogram reveals a diffuse accumulation of dye within the tumor sharply demarcating it from the surrounding brain tissue. Arteriovenous fistulas within the tumor are rare, and irregularities in size of vessels are not seen in meningiomas; if these features do occur in what otherwise appears to be a meningioma, a sarcomatous type of meningioma or a metastatic carcinoma must be considered. Furthermore, if there is pathological change visible in the vessels, there is the possibility of the tumor being a glioblastoma multiforme.³

Vascular tumors: Angiomatous lesions may produce Jacksonian seizures or subarachnoid hemorrhages. On angiograms they may be confused with a glioblastoma because they contain large arteriovenous fistulas. However, angiomas rarely cause a shift of the midline structures or a ventricular deformity as do the glioblastomas.

Arteriosclerosis: Cerebral arteriosclerosis is not an indication for angiography in itself, but it produces abnormalities which are sometimes visible in patients suspected of other lesions. There is a loss of the physiological loops and curves of normal arteries; they become straight and there is considerable variation in caliber with narrowed and enlarged regions or even aneurysms. A sudden break in continuity of an artery due to an intravascular block is said to be characteristic of arteriosclerosis.¹⁴

Thrombosis: Carotid thrombosis is an entity which recently has been recognized as a fairly frequent cause of headache, psychic disturbances, hemiparesis, and aphasia. The maintenance of blood supply to the involved areas is insufficient because of poor collateral circulation. No dye can be injected into a thrombosed carotid artery, of course, but an angiogram done on the opposite side may reveal filling of both hemispheres through the collaterals in the circle of Willis. The middle cerebral may not be as well filled on the involved side as in the anterior cerebral artery. Ligation of the carotid artery on one side causes from 80 per cent to 100 per cent increased flow in the opposite carotid. Lohr¹⁵ states that this can be demonstrated in angiograms of the uninvolved side by an enlargement of the

vessel. Reichert²⁰ resects a thrombosed carotid artery feeling that he thereby increases the contralateral flow.

INDICATIONS

The indications for angiography in this clinic are not closely defined because it is felt that the full value and significance of the procedure is not as yet known. In general, it is used whenever it is felt that such study would provide knowledge valuable in diagnosis and treatment of a patient with an intracranial lesion. It can very readily be done as an emergency procedure and certainly has advantages over ventriculography or encephalography in acutely ill patients. In both these latter procedures, the changes in pressure may produce a secondary cerebral edema with aggravation of the patient's signs and symptoms. It is in these cases that angiography is of definite value.

Frequency of complications in patients following angiography has diminished progressively as we have become more accustomed to the procedure. In the first fifty patients in whom this procedure was performed, there were several temporary hemiplegias, some of them had grand mal convulsive seizures immediately following the procedure, and in two patients death followed soon after the intracarotid injection of dye. However, as the procedure has been used more, causes of these complications have been found and in the past 620 angiograms there have been very few complications of a particularly serious nature.

At the present time it is felt that it is a relatively safe procedure to perform irrespective of the condition or age of the patient.

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Whitman Reconstruction of the Hip*

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IN 1921, Whitman reported his operative procedure for un-united fracture of the neck of the femur. This operative technique differed widely from the other procedures used on the hip at that time, but chiefly in the fact that the head of the femur was removed entirely. As he then stated,¹ "The procedure that I present, is called a reconstruction operation, because it is designed to restore, as far as may be, the mechanical conditions required for security and controlled movement."

In 1924, Whitman reported several more cases in which he had included among indications for the operation such conditions as pathological dislocations and subluxations secondary to disease. He further defined a reconstruction operation as a "mechanical adaptation of a hip joint disabled by injury or disease to the essential requirements of locomotion."²

In the Whitman reconstruction operation (figure 1), the head of the femur is removed and the shortened neck is restored by osteotomizing the trochanter, together with the attached gluteal muscles, in an oblique manner in line with the neck of the femur. The reshaped neck is then introduced into the acetabulum and the trochanter reattached along the shaft of the femur with the limb in an abducted position. The reconstructed neck, which offers the new weight-bearing surface, is thus secured in the acetabulum and maintained by muscle pull. The transplanted trochanter, with the gluteal muscles attached, re-establishes the functional muscle length of the gluteal muscles and provides a stable hip for walking.

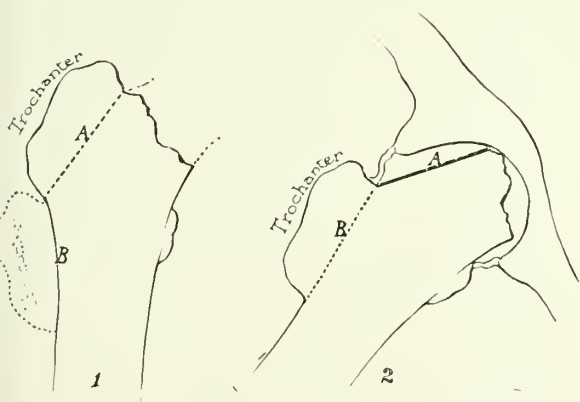


Fig. 1. 1. Shows the osteotomy line A. The reshaped neck is in the acetabulum and the trochanter, B, placed laterally in the femoral shaft.

*Presented at a 1951 meeting of the Minneapolis Academy of Medicine.

Other authors including Rechtman,³ Armitage Whitman,⁴ Lowendorg,⁵ and Krida,⁶ have reported favorable results with this procedure.

INDICATIONS

In reviewing the indications for Whitman's operation in 39 cases performed during the past fifteen years, it is interesting to note that in 31 cases, this operation was carried out for non-union of fractures of the neck of the femur; in four cases, a primary reconstruction was done on fresh fractured necks of the femur in aged individuals; in two cases, the operation was performed for aseptic necrosis of the femoral head following healing of a fracture of the neck of the femur; in one case, for a fracture-dislocation of the head of the femur in a young male, age 34; and in one case, for a pathological dislocation of the head of the femur. It is apparent, therefore, that as Whitman first reported, the prime indication for the reconstruction operation is for non-union of fractured necks of the femur. The procedure overcomes the deformity and pain which is associated with these unstable hips.

The average age of the patients was 63, with the oldest 82 and the youngest 34. Of the thirty-nine cases, five were in men and 34 in women.

OPERATIVE PROCEDURE

The hip joint is opened through an anterolateral incision, which starts in the region of the anterior superior spine of the ilium and is brought downward in a curve to extend about four inches below the greater trochanter and behind the femur. The dissection is carried out in layers between the tensor fascia femoris and gluteus medius muscles, and the neck and trochanter of the femur exposed. The nailing device, if still present, is removed from the lateral aspect of the femur. The trochanter is then osteotomized in an oblique fashion, together with its attached gluteal muscles, and the muscle mass with the block of bone, is reflected upward exposing the capsule. The capsule is incised and the head of the femur extruded. The remainder of the neck of the femur is reshaped into a rounded, smooth end and reinserted into the acetabulum. With the leg abducted, the trochanter is pulled down as far as possible on the lateral aspect of the femur into a bed, previously prepared by removing a portion of the outer cortex, and secured in place by the insertion of one or two short Moore pins. The pins are inserted in a medial and cephalic direction and the wound is closed in the usual manner. A spica and one-half cast is next applied with the leg in abduction and extension and neutral rotatory position.

POSTOPERATIVE TREATMENT

The cast is left intact for about four weeks and is then bivalved from just above the knee to the foot. Following this procedure motion is started in the affected knee. At the end of six weeks the entire cast is bivalved and x-rays are taken. If the trochanter has united with bone to the shaft of the femur, the patient is allowed to remain in bed without the cast, exercising both legs, but always maintaining the operated extremity in an abducted position.

As soon as the patient has recovered sufficient strength and mobility in the extremities, he is allowed to be ambulatory, wearing a webbing belt or corset to protect the position of the shortened neck of the femur in the acetabulum. Ambulation is started in a walker and he is carefully instructed in walking with the affected leg in an abducted position. The shortening of the operated extremity is compensated for by a sufficient elevation of the heel of the shoe. As the patient gains confidence and strength, he substitutes first crutches and then a cane as an aid to walking. Because of the abducted position of the leg and some loss of the range of flexion of the hip, the patient is taught how to sit on a straight chair, bearing the weight on the good buttock and allowing the affected leg to hang in an abducted and flexed position over the side of the chair.

The fate of an un-united fracture of the neck of the femur is well illustrated in figure 2. There is marked



Fig. 2. The femoral neck is completely absorbed and the pins extruded.



Fig. 3. Shows the hip of figure 2, three months after a Whitman reconstruction operation.

absorption of the neck of the femur and the Smith-Peterson nail and Moore pin are seen to be extruded laterally. Figure 3 shows the same patient three months after a Whitman operation. It is to be noted that the oblique manner of excising the trochanter forms an elongated neck which now functions as the weight bearing end of the femur. The trochanter is well attached laterally on the femur and is removed from the roof of the acetabulum where it would impinge if left in place. An x-ray photograph, taken four months after surgery (figure 4), shows the neck fitting well in the acetabulum with the trochanter laterally on the femur. This is in good weight bearing alignment. In figure 5, the same hip is shown 14 months later.

ANALYSIS OF END RESULTS

Thirty-nine Whitman reconstruction operations were performed over the past 15 years. These cases have a follow-up period ranging from two months to nine years. The case observed for nine years is that of a 34 year old male, who had suffered a traumatic fracture dislocation



Fig. 4. 1. Illustrates a hip, four months after a Whitman reconstruction operation.

of his hip. He had an excellent result and walked well unaided with only a minimal limp, having about three-fourth inches shortening on the affected side. The majority of the patients were ambulatory with the aid of a cane and there were several who were more comfortable when walking with crutches. Most of the patients were remarkably, if not completely, relieved of pain. The motion in the operated hip was an extremely variable one. The average range of flexion of the hip was about 30 degrees with limited rotation, abduction, and adduction motions. All the hips remained stable.

Complications: There were two cases of postoperative infections. These cases healed after a period of chemotherapy and left a stable hip with limited motion. Two cases required postoperative manipulation because of dislocation of the neck of the femur from the acetabulum. Both of these cases went on to a good functional result.

Mortality: There was one postoperative death, due to pulmonary embolism, occurring two weeks after surgery. Five other deaths are recorded in this series, ensuing from some two months, to one and a half years later and were due to general old-age debility and cerebral accidents.

Shortening: The amount of shortening in the affected leg was directly proportional to the amount of shortening



Fig. 5. Shows the same hip seen in figure 4, fourteen months after surgery.

of the neck of the femur. This shortening averaged about three-fourth inches and was easily compensated for by a proper shoe build-up.

DISCUSSION

It is not the purpose of this paper to convey the impression that the Whitman operation is the only or best procedure for treating non-united fractures of the neck of the femur. Other reconstructive operations, vitallium cup arthroplasties and osteotomies, have also offered excellent results. The fact is emphasized, however, that the Whitman operation, described in 1921, is so soundly based on fundamental structural and anatomic principles that it still stands today as one of the procedures of choice for treatment of non-union of fractures of the femoral neck. This operation is of short duration and is attended by little or no shock. The convalescent period is also short, for patients are ambulatory in a matter of six to eight weeks. They cannot, however, put on a stocking or shoe on the operative side, but this difficulty is overcome by using two long forceps. The satisfaction of restoring a bed-ridden patient, suffering from a non-union of the neck of the femur, to an ambulatory one, walking unaided or with the support of a crutch or cane, needs no further emphasis.

(Continued on page 560)

Ophthalmic Headache

Headache Among Children

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THIS study was undertaken in an attempt to understand when and where a spectacle correction will give children relief from presenting symptoms. One hundred children between 4 and 17 years of age, sent in for eye examinations were chosen. Those with strabismus, inflammatory processes, or demonstrable ocular pathology were eliminated. Only children whose trouble seemed purely refractive were included.

It soon became apparent that depressed vision was not related to occurrence of symptoms. Children who had refractive errors which, by many standards should produce symptoms, had none. They simply could not see the blackboard. On the other hand, children with only slight errors, or by some standards no errors at all, had many distressing symptoms. In fact, children with refractive errors insufficient to depress their visual acuity presented far more complaints than those with depressed vision, correctable with lenses.

Emotional disturbances in adults are seen not uncommonly as symptoms about the head and eyes. This being true, emotional disturbances in children should produce similar symptoms. Further, though adult ocular and allied symptoms may point strongly to an emotional origin, to unearth and treat the basis is difficult, time consuming, and beyond the reach of the busy refractionist. Treatment also requires some considerable knowledge of psychotherapy. For these reasons it is difficult for the conscientious ophthalmologist to do more than recognize these disorders, advise and where possible, direct such patients to the proper sources of help.

With children, however, the field is much brighter. Children respond to emotional insults no less than do adults. Further, they respond in the same ways, and exhibit the same symptom complexes. The encouraging element here, however, is the relative simplicity of the child's world, which is confined to the home, the school and the playground. Because of these well circumscribed areas of activity, with only a little effort the child's problems can be assigned and quite often much done to relieve symptoms.

With these thoughts in mind further histories were taken in an effort to ferret out the underlying disturbance. All manner of interesting facets were uncovered. One of the parents usually was most eager to discuss the problem, often at the expense of his personal pride. Many times the child would blurt out, with exquisite simplicity, the underlying disturbance. Those cases dis-

cussed are selected for their clarity, and because they seemed to supply an answer to the underlying emotional cause.

INCIDENCE OF REFRACTIVE ERRORS

One hundred children were examined for alleged refractive errors. Ages ranged from 4 to 17. This range was selected for the following reasons. Symptoms referable to the eyes in children under 4 are at best vague and tintured with the parents' undue concern. A clear picture of the child's complaints was hard to establish. Seventeen was taken for the upper limit as children up to this age are still in school and, more important, have not acquired too much of the emotional habitus of an adult. These one hundred children were then separated into two groups, based on acuity of vision. Group I could not see the 20/20 line, but with adequate correcting lenses their vision could promptly be improved to 20/20 or better. Group II was made up of children whose vision was 20/20 without spectacle correction, for whom correcting lenses helped little or not at all, and whose refractive errors were found not to exceed plus 2.00 D total reduced sphere. No further consideration will be given to refractive errors for reasons later to appear. In this grouping the total number of 100 children appears to have divided itself approximately in half, with 46 in the depressed vision group, and 54 in those who can see well without glasses.

TABLE I
Incidence of Refractive Errors

Number of children	100
Age range	4 years to 17 years
Group I:	
Number with refractive errors depressing vision:	
Myopia	29
Mixed astigmatism and hyperopia	17
Total	46
Group II:	
Number of children with error not to exceed + 2.00 D.	
Vision 20/20 without correcting lenses:	
Total	54

INCIDENCE OF SYMPTOMS

During the initial interviews the reasons for requesting an examination were recorded according to what seemed most important to the child or parent. Other symptoms were noted, again in the seeming order of significance.

Group I (depressed vision due to refractive errors) was singularly free of symptoms. This group was mainly sent in because they failed in school vision screening surveys. One child's presenting complaint was headache.

Given as an inaugural thesis before the Minneapolis Academy of Medicine, November 20, 1950.

Group II (vision of 20/20 without spectacles) were sent in mainly because of symptoms related to the eyes or because of apprehension on the part of parents. It is with Group II this study is concerned.

TABLE II
Incidence of Symptoms

Group I: (Refractive errors sufficient to cause loss of vision.) Total	46
This group was seen mainly because they failed the school vision check.	
One child with headaches.	
Group II. Refractive errors + 2.00 diopters or less. Can see well without glasses. Total	54
This group was seen because of symptoms associated with their eyes.	

BREAKDOWN OF SYMPTOMS IN GROUP WITH NORMAL VISION

The chief complaints as given by the child or the parent were put down in order of importance. Patients were asked "What sort of trouble are you having?" Symptoms were then enumerated in order of importance, this being determined by the emphasis placed on them. Extreme care was taken not to ask leading questions or to direct channels of thought. Interrogation was kept general. It was interesting that most of the patients or parents had one major complaint and two or three satellite symptoms they adhered to with much tenacity. Because each patient had from one to four or five areas of concern, the number of symptoms recorded in table III does not equal the number of patients seen.

Upon review of these records, symptoms were tallied under the various headings shown in table III. This chart was then arranged in order of numerical frequency, with commonest complaint at the head of the list.

One group, "children who won't see," was not included. This group will be discussed later but was left out of the above for purposes of clarity.

TABLE III
Breakdown of Symptoms in Group with Normal Vision

Headache	14	Symptoms with movies	2
Parents want check	10	Rings under eyes	2
Eyes hurt	7	Stumbles and falls	1
Slow reader	7	Sees dots, lines, etc.	1
Holds book too close	6	Lids twitch	1
General irritability	3	Nausea	1
Speech defect	1		

HEADACHE

Pain in the head, often in the region of the eyes, was the commonest symptom, appearing as the presenting symptom or as a satellite complaint.

It is easy to assign headache to the eyes or para-nasal sinuses. Parents seem astonished at the thought of an emotional cause. Many times these children have two or three pair of glasses with a low correction which they

will wear only under protest. It is among this group breakage and frequent loss of glasses occurs. Consciously or unconsciously, the children hate their glasses which serve no useful purpose.

What sort of children are they? Commonly they are firstborn, receive a great deal of attention, both loving care and often too much protection and discipline. A new baby enters the family circle. Promptly the firstborn has to share with the new child. The new baby gets more loving care, the firstborn gets more discipline. The child finds that complaining of headaches brings notice and loving care from parents, so his problem is solved so long as he can maintain his symptoms pattern. Parental concern is to the child loving care. Variations of this pattern are numerous. Instead of a new baby, a second or third child becomes ill (rheumatic fever). This child is babied, receives gifts and generally obtains what the firstborn figures is some of the love rightfully his.

Billy, age nine, is entering the Cub Scouts. Daddy, a sociable chap, is out to clubs, bowling, etc., six or seven nights a week. In the Cub Scouts, any particular "den" requires parent attendance for a high score. Similarly, "achievements" are done in cooperation and with the help of the parents. Briefly, it is impossible for a cub scout to gain competitive honors without parental help. Billy's dad could not find the time or interest to work with him. Billy had a problem—"neglect", at least it seemed so to him. Solution, headache.

Another example is that of an eight-year-old girl, whose mother belongs to an afternoon bridge club. "The girls" spend a pleasant afternoon playing cards for minuscule stakes, with three or four highballs during the course of the game. The mother gets home around five-thirty and rushes to get dinner ready. By now the exhilarating effect of the cocktails has worn off and she is irritable. Briefly, mother has a hangover! After supper she picks at this particular child, scolds her and often sends her to bed in tears. The next morning mother wakes up all contrite and indignant at the way she treated her daughter. She makes a great show of loving the child, buying gifts and generally being as overly kind as she was unkind the previous evening. To the child, mother either hates her, or loves her for no apparent reason, and she does not know where she stands. Solution, headaches.

PARENTS WANT CHECK

This second commonest category is interesting. The children seem happy and symptom-free. The parents have to have the child's eyes checked at periodic intervals. Usually the attendant parent is quite intensely interested and greatly relieved to find the child is normal. Not uncommonly these parents are "up to date" on all popular medical information. In addition, they often have "doctor books" and quite a supply of proprietary cures about the house. It seems these people are anxious about themselves and often project this feeling to their children.

Eyes hurt. This complaint can be looked upon as part of the headache picture but is less severe. These children usually complain that their eyes hurt in school, when they read, or in movies. The symptoms are always associated with use of the eyes. However, note what sort of reading brings on symptoms—studies! Yet the child can spend the entire weekend reading comic books with not a sign of trouble. Further, the child's eyes hurt near someone who will notice his complaint—teachers, parents or over-solicitous relatives. Justifiable concern is shown and the child gets friendly attention. This complaint is often an attention-getting mechanism and crops up under circumstances such as those mentioned under "headaches".

SLOW READERS

Slow readers are a real problem. Elsewhere it is contended that slow readers have some disorder of certain association pathways. Others contend their inability to read is on an emotional basis. Whatever the basic cause, these children are characterized by a repeated and exasperating inability to recognize "of, an, and, the, with, what, when, where, that, then, and than." Longer words like "mountain" and "automobile" they often catch. They are bright children in other respects and their measured intelligence is normal. In their attempts to read they try hard, fail, try harder, fail worse. About this time other mechanisms move in—often in the form of headaches and other allied ocular symptoms. Attempts on the part of the parents to tutor and help these children usually fail. They become impatient, try to use forceful methods and so the child's problem is compounded. The teacher recognizes the slow reader but has so many other pupils she cannot help much. This child then has to be able to read to maintain his social place in the classroom and often to please anxious parents. The one person who can help, his teacher, hasn't the time to work with him. Further compounding the trouble, the child is refracted and found to have a low hyperopic error. With a "these glasses may help" attitude he is given a spectacle correction which he does not like, can see as well or better without, but is forced to wear. Fortunately many schools are recognizing the "slow reader" problem. Much can be done for these children in the form of remedial reading by specially trained teachers. We do not think we have ever seen a slow reader materially helped by giving him a spectacle correction.

HOLDS BOOK TOO CLOSE

This group is akin to those brought in by anxious parents. The children are comfortable, have no trouble, do well in school but like to hold their books or comics 6 to 10 inches from their face. The parents notice this and promptly conclude that either they are nearsighted or have some disturbing ocular disorder.

From the point of view of the parents this concern is quite justifiable. If they hold a book 6 to 10 inches from their eyes, they are promptly made quite uncomfortable and soon sustain such a blurred image they are unable to read. So they rush the child promptly to a physician. When the tremendous accommodative pow-

ers of the child are explained, they are quite relieved. Children often like to hold objects close, why make an issue of it?

GENERAL IRRITABILITY

Most of the children in table III show some irritability although usually this symptom is not outstanding. On three occasions, however, the patient had no specific complaint. The parent reported that the child was recently quarrelsome, mean, cried easily, and had temper tantrums. These children were sent in by other physicians who, after exhaustive workups, could find nothing wrong. It was thought an eye examination might uncover something.

One was a nine-year-old boy whose older brother was rather suddenly inducted into the armed forces. The two boys had shared the same room for three years and were close friends. The older brother, who must have been a wonderful lad, took the patient with him on his paper route, made him slingshots, and was loved and adored as a great benefactor and knower of all things. The child left behind was lonesome!

Another, a ten-year-old girl, sent in for an eye check by her physician. The patient appeared promptly at 3:00 P.M. on Monday afternoon, with both parents. During the entire examination both parents stood, refusing chairs offered them. While the child was in the examining chair, they hovered so close they were actually in the way. They offered only the barest of answers, and when it was suggested this child might have some problem on her mind that was disturbing her, they promptly and without hesitation said, "that couldn't be it," walked out, paid their bill, and left. During the entire study of this child the examiner was acutely uncomfortable. Although it did not come out, this child must be responding to a most distressing situation within the home sphere. General irritability seems to stem from problems set up by unpleasant factors within the home. Neither of these children had any appreciable refractive error.

SYMPTOMS WITH MOVIES

Probably this category belongs with those wherein the parents are most concerned. The parents report that the child blinks, develops red eyes, turns away from the screen or has to leave in the middle of the film because of alleged pain in the eyes or head. The child is relatively free from symptoms elsewhere. It seems the child should not be blamed here, but rather the content of the film. Many children identify themselves with the oppressed character and develop a highly charged emotional reaction with evident symptoms. It is well known many adults cannot watch movies because of the unpleasant emotional reaction.

RINGS UNDER EYES

These two children were symptom-free at the time of examination. No change of any sort could be seen. I believe these should be classified with the group of apprehensive parents.

STUMBLES AND FALLS

The mother stated the child had to have glasses as he stumbled and fell much of the time. The child was five years old and had a negligible refractive error. A

correction was given at the mother's insistence. Since the child's eyes were normal, it is hard to see where the glasses serve any useful purpose.

SEES DOTS, LINES, ETC.

One child, age seven, was a very nervous child. Her parent stated the child played by herself much of the time. The original complaint was that she saw dots and lines, and also other things wholly imaginary. These illusions did not seem to distress the child at all. She had no distressing symptoms as headaches or pains of any sort. During the examination she was emotionally most unconcerned and seemed detached from all that was going on about her. It was felt this child was well on the road to a major psychosis.

LIDS TWITCH

No evidence of any twitch could be seen at the time this child was examined. He was well adjusted and had no complaints. The parents noticed this and brought the child in. He had a low hyperopic correction which did not require spectacles. Parenthetically it is interesting that twitching lids, commonly seen in adults, is rare in children.

NAUSEA

This child was a 12-year-old girl, who also complained of frequent headaches. She was wearing a low hyperopic spectacle correction. The glasses were accepted grudgingly and worn only because of constant parental insistence.

SPEECH DEFECT

One child was brought in by his mother for a recheck on his spectacle correction. A low hyperopic error was found. The mother insisted glasses materially improved the child's stammering. As far as could be ascertained, optically, the child's glasses served no useful purpose. A correction was given at the mother's insistence.

CHILDREN WHO WON'T SEE

For purposes of clarity, this group were not included in the above tables. They were four in number and were sent in because their visual acuity was found to vary from 20/30 to 20/200, or because they complained that they were unable to see. They had little or no refractive error and following examination under cycloplegia their vision promptly improved to 20/20 and remained there.

These children present an interesting attitude during the examination. Following their retinoscopic examination under a cycloplegic very low spherical corrections alternately used improved their vision rapidly.

"Is this better?"

"Yes," and vision moves from 20/60 to 20/50.

"Is this better," and a low minus sphere is added.

"Yes," and the vision improves another line.

The same two lenses used alternately will bring the vision to 20/20 without actually changing anything. Following this the child is told he sees well and how lucky he is that he does not have to wear glasses. The vision stays at this line from that time on.

The background of these disturbances appears to be an acute problem the child is unable to solve. An example of this is the child age 9 who did poorly in

spelling. He was put in a selected group of four children who were given nine words a day when the rest of the class were given eighteen. This small group of four were kept in the same room with the rest of the class at all times. Obviously they were the "dummies". This little chap simply could not stand such an insult. By not being able to see, his problem was conveniently solved.

Another example is that of a 12-year-old girl who was forced by circumstances to sleep in the same room with her older and younger brothers. She developed headaches, and an inability to see. The reasons again seem obvious. The fantasies this adolescent girl entertained disturbed her to the point where she developed headaches and depressed vision. By the simple expedient of getting different sleeping quarters, her symptoms promptly cleared.

The onset of this type of depressed vision is usually quite sudden and is probably a mild form of hysterical amblyopia.

COMMENT

This paper is presented only as a suggestion for further study. The charts given are in no way statistically significant, and the sampling is far too small. It is interesting that myopes occurred in the ratio roughly of 25 per cent, which agrees with ratios of much larger samplings taken elsewhere.

The results suggest (1) that approximately half the children between the ages of 4 to 17 years of age brought to these examiners would not be materially benefited by a spectacle correction. (2) Disturbances of emotional origin are far more significant in the creation of symptoms about the eyes than are disturbances of refractive origin in children of this age group.

These observations can be viewed differently and when so done do not seem quite as unreasonable. We have been advised by a competent psychiatrist that all children at some time have symptoms of emotional origin, which may vary from a few fleeting complaints to a chronic permanent disturbance. Some of them are associated with the head and in quest of demonstrable tissue pathology, sooner or later the sinuses and eyes will be blamed as causative agents. Further, these children will be examined at or near the time their symptoms are of a sufficient order of magnitude to incite the parents to bring them in. *This group is then brought in because of presenting symptoms and not because of depressed visual acuity!*

The other half, the children whose vision is depressed, is sent in for a specific purpose. *They are sent in because they cannot see as well as other children.* These children, no less than others, have emotional disturbances but not of a sufficient magnitude to be sent in for this purpose, or because their symptoms affect other areas than the head and neck. On the basis of sheer probability some children will be sent in whose vision is depressed and who have emotional symptoms simultaneously. Symptoms, however, will appear in this group far less often than in the group sent in solely because of manifest distress.

SUMMARY

1. Approximately 50 per cent of child patients studied were brought in for examination because of unrecognized emotional problems.

2. The wearing of spectacles did not improve the symptom complex in those children having normal visual acuity. Rather, the opposite was true, glasses prescribed for these children only brought into the forefront and often magnified the basic complaint.

3. Symptoms in order of frequency were: Headache,

parents want eyes checked, eyes hurt, slow reader, holds book too close, general irritability, symptoms with movies, rings under eyes, stumbles and falls, sees dots, lines, etc., lids twitch, nausea, speech defect, and won't see.

Symptoms associated with the eyes in children with normal uncorrected vision seem due to emotional disturbances. Children with refractive errors sufficient to depress their visual acuity, have very few symptoms. From these observations it appears refractive errors cause very few symptoms in the children.

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A New Umbilical Cord Clamp*

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FOR several months a new type of umbilical cord clamp has been used with consistently satisfactory results. This clamp is made of aluminum which has been rolled flat from a special aluminum wire. This way there can be no sharp edge as there might be if sheet aluminum were used. On the lower leg of the clamp there are two longitudinal boxes while on the

upper leg there is one which fits between the two lower ones. When the clamp is closed and locked the umbilical cord remains in the clamp in the position similar to an "S".

An important feature is that the size of the locking device is not predetermined. Once the clamp is applied to the cord it may be tightened by putting a little more arch in the clamp. Its overall length is one and a half inches, and the width of the clamp is five-sixteenths of an inch. The lightness of the material is another distinct advantage. The ease of application and sturdiness of its construction make it a very satisfactory instrument. After ascertaining the absence of any abnormality of the cord, the clamp is applied and the cord distal to the clamp is "milked" away for about an inch where a forcep is applied. The cord is then cut. This way there is no spattering of the cord blood which so often is under considerable pressure. After applying an antiseptic to the open end, a piece of gauze with a hole in the center is slipped over the clamp and another square piece of gauze put over the clamp in the conventional manner.

The instrument is similar in design to the urethral catheter clamp described by Cook¹ and is produced by the same manufacturer.²

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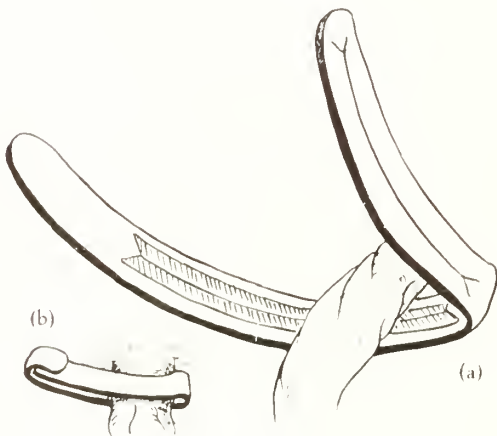


Fig. 1. (a) Before clamping; (b) clamp is tightened by making this longitudinal curve more acute.

*From the Minneapolis Academy of Medicine.

The Civilized Colon*

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AN English humorist remarked that a conservative is a man who will not look at a new moon out of respect for that ancient institution the old one. On the other hand, arch-conservative Dr. Samuel Johnson is recorded by Boswell as having scathed innovators with the epigram: "Truth is a cow which will yield them no more milk and so they are gone to milk the bull." In many directions of medical endeavor we can see practitioners turning away from the new moon and investigators trying to milk the bull. Our highest talents are required to avoid being either reactionary or too naively progressive, as we consider certain gastrointestinal disorders from the psychosomatic point of view.

In the first World War Sir Thomas Lewis established that the commonest organ neurosis was the so-called soldier's heart, otherwise known as "disordered action of the heart," "effort syndrome," and "neuro-circulatory asthenia." As a result of these observations it was finally learned that five-sixths of the cardiac diagnoses by the British Army physicians were incorrect. Five out of six of the patients had cardiac neuroses and one out of six had organic heart disease. It was expected that the same illness would predominate in the second World War but this did not happen. Functional gastrointestinal disorders were found to be much more common than functional cardiac disabilities and a great trend was revealed toward the gastrointestinal tract and away from the heart as a site of common organ neurosis. My own observations before, during, and since the last war suggest that we will see in civilian life, for a little longer at least, the same trend.

A colleague, whose cystoscope may give some of us comfort sooner or later, observes that as soon as the intelligence level permits making a signature instead of an "x", the individual acquires a nervous stomach, constipation and hemorrhoids. Would that all internists were as perceptive! Actually the formation of gastrointestinal neurosis probably goes back to childhood and beyond that into infancy. The anxious and fussy parents are intent that their infant conform in food intake to the absolute norm or a little better so the bottle is urged (the breast cannot be urged—it is automatic). This same little infant, overfed after he is full, is almost certain to be subjected to too-early bowel training; he learns very soon that to defecate on demand will produce love and admiration from his parents. Yet any pride in his little offering is quickly hurt by the parents' obvious feeling that the product is dirty and unwholesome. At this early point his colon becomes confused and doesn't know

whether to go ahead or back up. The stomach similarly gets urged in both directions and the foundation has been laid as early as this for a gastrointestinal neurosis.

The so-called "forgotten period" of childhood from one to five years, and the neutral period from five to twelve years, can be neither forgotten nor neutral insofar as the gut is concerned. During these years occur the great social embarrassment of the child having an accident before strangers, the anxiety about toilets in schools, the anxiety about odors offending others, and of course the great anxiety arising from his learning that the entire subject of excretion is taboo and one not to be mentioned except in secrecy. By the time adolescence arrives, rigid family misconceptions of the digestive functions have assumed the heroic dimensions and Gibraltar-like fixity of adult neuroses.

There are some measurable phenomena which provide a sound footing for the psychosomatic approach to gastrointestinal disease: Harvey Cushing followed up his chance observation of acute ulcer after surgery at the base of the brain with the generalization that ordinary ulcer patients have vagotonia. Since then balloon studies have amply confirmed this. Veterinary experience has shown that calves weaned prematurely almost invariably develop duodenal ulcers. Vagotomy seems regularly followed by a generalized atonia of the digestive tract. Partial vagotomy may increase or decrease tonus, apparently unpredictably (but it usually decreases tonus). Sufficiently strong emotions halt gastric secretion entirely. Radiologists frequently suggest succulent beefsteak to patients under the fluoroscope to soften pylorospasm and make the duodenal cap form. Recent gastric fistula observations in man have shown that fear and depression (which activate sympathetic nerve channels) reduce gastric mucin, while resentment (which activates the parasympathetic chains) induces hypermotility, hyperacidity, and increases pepsin formation. There is precise specificity of the secretion for each emotion. Duodenal secretion, that is to say bile and pancreatic secretions, are found to vary in composition in specific and appropriate ways for different foods suggested under hypnosis. In other experiments, joy, sorrow, and anxiety were found to stimulate the flow of bile. Annoyance stops the flow of bile completely (and parenthetically, annoyance almost always precedes gallstone colics according to Schindler). These effects have been shown to depend upon sphincter and duct spasms. All noxious stimuli applied to the mucosa of the colon cause it to secrete mucus—its only protective mechanism aside from evacuation. The human colon has been observed to blush very appropriately with certain stimuli, at the same time as the face and neck area.

*Read at a 1951 meeting of the Minneapolis Academy of Medicine.

With these observations we may formulate an artificially simple but helpful scheme to help us understand how functional upsets occur: the emotions start in the cortex and provide acute and chronic stimuli through the hypothalamus to the autonomic nervous system, both sympathetic and parasympathetic. The organ selected by the autonomic nervous system (in a symbolic way, perhaps), depends to some extent on the nature of the exciting emotions. This organ is activated to motor and secretory hyper-excitability, operates badly and thus produces a "syndrome". While we are elaborating this controversial thesis we must remember that our phenomena occur only in some of the individuals who have such emotions: we must remember that we cannot measure the intensity of the emotions *except by their production of symptoms*, and we must remember that we are deliberately paying no attention to diet, to protoplasmic variations between patients, to infections, and to other factors of demonstrated significance. We must remember that psychotherapy can stop the vomiting due to brain tumors.

The functional gastrointestinal states are best considered as syndromes. I would like to list some of these, make some remarks about their causes and present two abbreviated case histories illustrative of the psychosomatic factors at work in ileitis, a disease often thought not to be psychogenic in any part.

The common lump in the throat which all of us have felt in moments of sadness is produced by spasms of the muscles in the anterior neck. It seems to be the same feeling which we call "globus hystericus" in nervous patients. In this group, the prevailing state of mind is fear of death. The symptom commonly occurs in an acute panic and may be constantly present between panics. I think that the panic and fear of death and sadness add together to constitute a true depression in many of these patients.

Proceeding farther down this unhappy canal, we see cardiospasm. The history in each patient (if looked for) in the initial attack is of a specific annoyance, caused by a superior, at home, on the job, at church, or in the community. The annoyance must be swallowed because it is caused by a superior and cannot be questioned. Even though the patient doesn't rebel at swallowing the annoyance, the muscles in the lower end of the esophagus do so, and spasm is the result. The air swallower is a tense and excited, annoyed and apprehensive individual who achieves calmness by swallowing his strong emotions. He usually complains of pains in the left chest, and the air-swallowing is quite easy to observe fluoroscopically with no particular preparation.

Peptic ulcer is the most common of the so-called organic gastrointestinal diseases. Organic and common as the disease is, certain personality traits are found rather specifically in the ulcer patients, long before their disease occurs; and in milder forms the same specific traits are present in those who have what we call "nervous stomachs"; (ulcer symptoms without x-ray evidence of ulcer). Activation of a real ulcer crater probably occurs

when the personality difficulties are severe enough to bring the patient several weeks of continuous tension.

This peptic ulcer personality has been described by many and the composite picture is as follows: The patient is:

- A. Acquisitive, receptive, and dependent.
- B. He needs to be appreciated and to be cared for so much that he resents it and harshly represses it.
- C. He over-compensates in energetic activity, and is apparently very independent.
- D. The energetic activity is according to rigid rules, i. e., he is perfectionistic, because he is insecure. (The need to be appreciated and to be cared for.) The rigid rules laid down by his elders care for him.
- E. He fears failure because of his inadequacy and insecurity and constantly anticipates failure.

Apparently the stomach and duodenum rebel at serving the function of receiving love—at being fed emotionally. The situation is an abnormal stimulus, abnormal secretions follow as described above, and a crater is formed.

Little is written or known about functional illnesses and emotional changes relating to the jejunum and ileum and I would like to go along to the unhappy colon for a moment now, then to return to the mid-portion of the gut before closing.

In colitis there is too much spasm, too much peristalsis; there is secretory confusion—too much or too little mucus. The word "diarrhea" itself is inseparably bound to the concept of anxiety. Diarrhea is a response to fear at every age level. Patients with colitis often are emotionally immature and fearful. Many of these people are the slack, hypotonic individuals who become intestinal martyrs, connoisseurs of feces, and slaves of pill bottles, if their disease is mild and not actually requiring medical assistance. They have severe marriage problems. The men are tied to their mothers and are those of whom we say "no guts." The women are tied to both fathers and mothers and can not leave the safety of the family. These patients have diarrhea at the times when they withhold or fail to give valuable emotional gifts such as love.

Constipation frequently is attended by an anxiety about offending others with odors. Constipation often expresses lack of cooperation and often is seen when a patient shows spiteful resentfulness against his circumstances. We see this in dissatisfied women. The deep attitude is that "I have received nothing; I shall give nothing." These patients superficially feel a right to demand and take rather aggressively "because they always give sufficiently." (They have been taught in infancy that bowel and bladder contents are valuable to parents.) When the constipated patient has hemorrhoids, both shame and fear of pain inhibit the defecating reflexes. The rectal ampulla fills, the sphincters become hypertonic and the veins engorge. Then viscerovisceral

reflexes mistakenly make the sphincter tighter. The reflex is fixed by fear of more pain and never again relaxes. Incidental splitting of the mucosa to form fissures and erosions worsens the condition, the spasm produces local anemia, and thus healing is prevented.

Most of us have chuckled about the witty and understanding description of the spastic colon in Beckman's *Treatment in General Practice*. Beckman emphasizes that mucous colitis, spastic colitis, nervous diarrhea and spastic constipation, are names referring to symptoms of one same fundamental state: over-irritability or over-responsiveness of the lower gut. Actually the whole tract is so often over-active in one function and another that to name the condition for a single dysfunction is misleading. On my own records I would prefer to label the situation "irritable gastrointestinal tract" and add to this the symptoms suffered by the individual patient—such as duodenal ulcer, spastic constipation, and the like. One has a clinical impression that entire families show this trait and that in such families he must be on the lookout for acute appendicitis, gallstones, ulcers, organic colitis, gastritis, congenital pyloric stenosis and so on, more than in the average family.

Proctologists and internists have short shrift for the theory that mucous colitis is an early stage of ulcerative colitis, correctly rejecting this over-simple idea for many good reasons. However, there is a simple relationship that is easily defined between these two conditions, and one which relates them to diverticulosis, diverticulitis, and hemorrhoids as well. All these occur in individuals with hyperexcitable digestive canals. A certain stimulus such as leaving home for marriage may produce acute ulcerative colitis in one patient, acute regional ileitis in another patient, a third will have enough constant spasm in the colon so that he presses out diverticuli, while passage of hard stools by the fourth patient causes a rosette of hemorrhoids. Most individuals, of course, have mature enough emotions to weather this particular stressful period without having any kind of an upset at all.

Burrill B. Crohn, the famed gastroenterologist, has stated that regional or terminal ileitis does not arise from deep or strong conflicts, that it is not affected by psychic affairs, although he subscribes to functional etiology in the case of ulcerative colitis. It seems illogical to me to divide ulcerative enteritis so sharply at the ileocecal valve and at the ligament of Treitz, and propose that the two end portions of the gastrointestinal canal are subject to psychogenic ulceration, whereas the middle portion or small bowel is not.

My own small experience with ileitis leads me to feel that it arises in much the same type of situation which seems to surround ulcerative colitis. The following two cases illustrate this. In each of them the individual was making an effort to free himself from parental domination directed against his marrying and each individual failed in his effort.

The first case occurred in a young woman, an attractive college graduate, who first was seen for sudden fever and abdominal pain which required surgery. An acute edematous inflammatory terminal ileitis was found, and no resection was done. She was dangerously ill for two weeks but was up and around in four weeks with only medical management. During the severe illness she regressed psychologically to the point of lying all day in the fetal position and expelling foul stools like a baby, even in the presence of the doctor, and at one time in the presence of a young man who had attended her socially. At all times she could have had a bed pan in ten seconds merely by asking her nurse for it. This behavior stopped abruptly after I scolded her for making so much work for the nurse when she could just as well use the bed pan. After this event I learned that she had been kept from marrying by the moral suasion of her parents who disapproved of her choice, and she had reached a point of seeing several other young men, none of whom deeply interested her, before she became sick. At the time she broke her engagement a mild but persistent diarrhea occurred and lasted until admission to the hospital.

The second patient was a young scientist of great promise who had mild persistent diarrhea. Careful study revealed no cause, until a barium enema spilled through the ileocecal valve and demonstrated early ileitis. This patient had been referred to me by his friend who was some 60 years old. The friend brought him into the office each visit, always entered the examining room with him, telephoned me after each visit to learn about the reports of every test and quite completely dominated him. I learned that the diarrhea started on the day before his marriage two months before I saw him. The older man had pursued him to the point of driving north to the resort where the couple was honeymooning, "to be with them," as he said. He would call to take the young man to work before the couple had gotten out of bed in the morning and would make their breakfast; in generalization, he refused to give up his substitute son who had given him more gratitude than his own children. This young man's diarrhea cleared up the day he decided to accept a job with a large eastern company. I have not been able to have the ileum re-examined by x-ray, but I suspect the scarring persists. Only anti-spasmodics were given to this patient, and they did only a moderate amount of good.

Episodic diarrhea is interpreted by Sperling as a symbolic attempt of a patient to separate himself from a needed parent or parent substitute to whom he clings but whom he gives up in the diarrhea. "He reduces the needed object to worthless feces." Another interpreter would say he offered the feces instead of the gratitude he previously gave. Alexander stresses the meaning of diarrhea as an expression of the need to give and give much, generously.

Personal histories such as these, if they are found to occur regularly, seem to offer explanations of symptoms as well as avenues of therapy. I am struck personally

with the rather large proportion of patients having gastrointestinal tract disease of these types who do well with conventional therapy for a while and then unpredictably terminate the regime and have a relapse. Insight gained from such histories should at least allow holding the patient more faithfully to his therapy which really is a self-imposed set of restriction in so many cases.

In closing, I would like to include a short poem by Phyllis McGinley which appeared recently in *The New Yorker*, entitled: "Don't Shake the Bottle, Shake Your Mother-in-Law"*

When I was young and full of rhymes
 And all my days were salady,
 Almost I could enjoy the times
 I caught some current malady.
 Then, cheerful, knocked upon my door
 The jocular physician,
 With tonics and with comfort for
 My innocent condition.
 Then friends would fetch me flowers
 And nurses rub my back,
 And I could talk for hours
 Concerning my attack.
 But, now, when vapors dog me,
 What solace do I find?
 My cronies can't endure me.
 The doctors scorn to cure me.
 And, though I ail, assure me
 It's all a state of mind.

It's psychosomatic now, psychosomatic.
 Whatever you suffer is psychosomatic.
 Your liver's a-quiver? You're feeling infirm?
 Dispose of the notion you harbor a germ.

*Reprinted by permission. Copyright 1948, Phyllis McGinley

Angina,
 Arthritis,
 Abdominal pain—
 They're nothing but symptoms of marital strain.
 They're nothing but proof that your love-life is minus.
 The ego is aching instead of the sinus,
 So face up and brace up and stifle that sneeze.
 It's psychosomatic. And ten dollars, please.

There was a time that I recall
 If one grew pale or thinnish,
 The pundits loved to lay it all
 On foods unvitaminish,
 Or else, dogmatic, would maintain
 Infection somewhere acted.
 And when they'd shorn the tonsils twain,
 They pulled the tooth impacted.
 But now that orgies dental
 Have made a modish halt,
 Your ills today are mental
 And likely all your fault.
 Now specialists inform you
 While knitting of their brows,
 Your pain, though sharp and shooting,
 Is caused, beyond disputing,
 Because you hate commuting
 Or can't abide your spouse.

It's psychosomatic, now, psychosomatic,
 You fell down the stairway? It's psychosomatic.
 That sprain of the ankle while waxing the floors—
 You did it on purpose to get out of chores
 Nephritis,
 Neuritis,
 A case of the ague?
 You're just giving in to frustrations that plague you.
 You long to be coddled, beloved, acclaimed,
 So you caught the sniffles and aren't you ashamed!
 And maybe they're right. But I sob through my wheezes.
 "They've taken the fun out of having diseases."



MEDICAL NOTE

"IN AN OLD WORK, published in 1667, by 'JOHN FRENCH, *Dr. in Physick*,' you can find the following formula, which may be useful to some of our friends located in towns where each quack who arrives has more work than he can do.

'A WATER OF WONDERFUL EFFICACY, NOT UNDESERVEDLY CALLED THE MOTHER OF BALSOM

Take turpentine, lignum aloes, oblibanum, of each five ounces,
 Cinnamon, lily leaves, of each half an ounce,
 Pepper-wort, balsom, of each two ounces.

Mix them well together, and distill them according to art, in a gentle fire, and there will come a clear water, good in all diseases, wherein the balsom is usually applied.

1. It takes away the pimples in the face. 2. It takes away all blemishes in the eyes.
 3. It comforteth a cold head, and helpeth the memoration faculty. 4. It retardeth gray hairs.
 5. It cleareth the spirits. 6. It strengtheneth the digestive faculty. 7. It healeth the nerves.
 8. It preventeth the palsie. 9. It expelleth all wind out of the body, and giveth a good favor to the whole body, etc., etc.' "

Northwestern Medical and Surgical Journal (THE JOURNAL-LANCET) 1:77, 1870

This is the second in a series of letters to Dr. J. A. Myers and the readers of the JOURNAL-LANCET from Dr. Ancel Keys, head of the department of physiological hygiene at the University of Minnesota, during a year of study and travel abroad. Other letters will follow in subsequent issues.



Notes from a Medical Journey

October 23, 1951, Oxford, England

Dear Jay:

Autumn colors are glowing and there are drifts of golden leaves on the footpaths but on every side a profusion of flowers reminds us that this is not late October in Minnesota. The chrysanthemums -- many of the types grown only in greenhouses at home -- are just now coming into full bloom to compete with the dahlias and asters. But the outdoor season is drawing to a close and the busy period of indoor work, concerts, lectures and meetings is under way.

As scheduled, the Osler Club met in London to commemorate the centenary of Walter Reed's birth on the theme of "Man's Experiments on Man." Besides a sketch of Reed's life and the yellow fever experiment, there were talks on yellow fever research since Walter Reed, the war-time experiments at Sheffield in which conscientious objectors served as subjects, and my discussion of the Minnesota Starvation Experiment and the work of our Laboratory of Physiological Hygiene. It was all very well received. Although most of our colleagues here have heard of the Minnesota Experiment, few of them have seen, much less read, the Biology of Human Starvation. The price of the two volumes is 6 pounds 10 shillings, which is considered very expensive, and it is no consolation that half of the price is profit to the Oxford University Press.

Last week there were meetings of the Biochemical Society and the Medical Research Society, so arranged in London that we could attend most of the former at the London Hospital and then hurry over to "Bart's" (St. Bartholomew's Hospital) for the M. R. S. meeting, having tea with the first and dinner, preceded by sherry, with the second. Both meetings were well attended and presented a series of respectable but not too exciting papers. As with meetings the world over, the best part was meeting and chatting with kindred spirits, and I was impressed again that medical science, and all natural science for that matter, effectively transcends the boundaries of nationality, race, creed, and politics.

Speaking of politics, the election campaign here is almost over and by the time you receive this all the world will know the results. Actually, the views of the two parties are not as divergent as you might think; Attlee is no more a communist than Churchill a fascist, both sides are firmly committed to an international program based on strengthening the western democracies and no one advocates reducing the social services.

On one point there is complete agreement: neither party has the slightest intention of making any drastic changes in the National Health Act and there is no public clamor, even among physicians, to do so. Some adjustments in detail, such as giving more authority to local agencies, may be forthcoming but I have been unable to hear or read a word in favor of the old system of strictly private practice. The basic issue is really dead and stands as little chance of being revived as there would be of abolishing the Veterans' medical services in the United States.

I regret I shall miss the excitement of election day. Tomorrow I fly to Madrid for a three-day conference at the Institute of Medical Research. I shall discuss nutritional requirements but I am more interested in learning about health problems in Spain and the possibility of finding data on the incidence of atherosclerosis and coronary disease. I am more than ever convinced that the most important clues to the eventual control of so-called degenerative diseases are to be found in the study of populations which differ in the incidence or character of these diseases. It is high time that the public health approach to these problems be vigorously pursued. Anyway, I am going to spend my few days in Spain with these ideas primarily in mind.


My research here is hampered because equipment still awaits Customs clearance. In Britain they are used to waiting, whether it be for elective surgery or the delivery of a new car (the latter takes two or three years!). In the meantime everyone is very pleasant and even the food rationing can be borne. Margaret endeavors to make the week's ration of 20 cents worth of meat flavor the gravy but milk, potatoes, fish and all sorts of baked goods are abundant and cheap and we are not losing weight. If we can stand the cold we ought to be very healthy. Insulation and weatherstripping are unknown here so what little heat is available is dissipated in the attempt to warm the whole countryside.

It seems odd to see the fine fireplaces in the colleges fitted with tiny gas "logs" or still more minute, electric "heaters"; the roaring fires—and the great "joints" of meat -- are gone. But a skillful chef and a well-stocked cellar can still provide suitable physical accompaniment to the learned and witty conversation of high table and senior common room. I am fortunate in this regard because Magdalen College, where I am an honorary resident member of the Senior Common Room, boasts one of the finest chefs and best cellars in England. These are among the non-financial recompenses of the academic people who, otherwise, are about as poor as their counterparts at home. The practicing physicians live better than you might think possible from the scale of taxation; business expenses are deductible as at home. And at the top of the social and economic pile here there are many people who live on a rather grand scale, partly because there is no capital gains tax, partly because they are spending capital. Britain is a long way from economic equalitarianism but the immensity of the gap between rich and poor has certainly diminished.

More equitable distribution has eliminated real grinding poverty and malnutrition and there is no doubt that, on the whole, the population is better fed -- or more rarely, ill-nourished -- than before the war. But it will be relatively slim picking for all until, somehow, the material income -- the national product -- is increased. And no one seems to have anything concrete to say about how this is to happen. In the meantime, there is no surge of interest in emigration; the British like it here. So do we, in spite of fond memories of friends -- and warm houses -- at home.

With best wishes to you all,

As ever,



Ancel Keys

Intussusception*

ARTHUR W. IDE, JR., M.D.
Minneapolis, Minnesota

INTUSSUSCEPTION has been recognized for centuries— in fact, Hippocrates is credited with first using inflation from below as treatment and Praxagoras with first proposing abdominal section in this condition. The latter proposal was renewed in 1676 by Paul Barbette, a surgeon of Amsterdam. In some old books the term "introsusception" was used and at one time it was confused with volvulus. Rokitsky is responsible for the present term, *intussusception*, and also introduced the terms, *intussusceptum* and *intussuscipiens*.

Perhaps the first successful laparotomy recorded for this condition was performed by an unnamed surgeon in 1784 in a case diagnosed by Nuck. In 1825 Fuchsius operated successfully on a case of intussusception. The first successful operation for this condition in this country was in 1831 by Dr. John Wilson of Rutherford county, Tennessee. In 1871 Mr. Jonathan Hutchinson performed the first successful operation for intussusception in a child, a baby aged two years.

Clubbe credits A. E. Barker as the first to put treatment of this condition on a rational basis. The record in the literature at that time recorded a mortality of 78.2 per cent in 73 cases (1888). Barker argued strongly for early operation, but the medical profession was reluctant to accept his viewpoint. In fact, in 1906 operation was considered so hazardous that Harvey Cushing, then a house officer, wrote of postponing operation in a child with intussusception, in hopes that the intussusception might slough and be passed. The surgical texts of the times supported this contention.

In 1905 Hirschsprung of Copenhagen reported on 107 personal cases of intussusception with a 35 per cent mortality rate which contrasted with rates of close to 90 per cent up to that time. Hirschsprung is also noted as one of the foremost protagonists of reduction with hydrostatic pressure, and in this series his mortality with enema alone was 23 per cent in 84 patients. Since that time the strongest advocates of hydrostatic reduction have been in Denmark (Kock and Oerum, Monrad), Sweden, and in Australia (Hipsley), where the teachings of Sir Charles Clubbe were so effective. In America and Britain with occasional exceptions operation has been the mainstay of therapy.

INCIDENCE

Absolute. From 1925 through 1945 there were 95 cases of intussusception among 141,580 admissions to the Cook County Children's Hospital in Chicago (Oberhelman & Condon). Not only is acute intussusception the most common cause of intestinal obstruction in children, but it is, generally speaking, the most serious.

*From the Surgical Staff Seminars, Minneapolis Veterans Hospital, Minneapolis, Minnesota.

Age. Intussusception is primarily an affliction of children, but about 5 per cent of the cases occur in adults (Iason³⁰ Moore³⁸). Perrin and Lindsay⁴⁴ give the following figures from their analysis of 400 cases: 78.5 per cent of their cases occurred under the age of two years; 69.75 per cent under one year. Seventy-eight and five-tenths per cent of those cases under one year occurred in the sixth and seventh month of life. Fifty per cent of all their 400 cases seen between 1903 and 1920 were between five and nine months of age. Their youngest case was one day (other authors have reported cases in the first few days of life). These figures typify those generally reported.

Sex. Intussusception is known to affect males more frequently than females. The proportions reported vary from 2.1:1 (Perrin and Lindsay) to 62 per cent in males compared to 38 per cent in females (Ladd and Gross²⁴).

Season. Seasonal variation is little mentioned except by Perrin and Lindsay, who report January and April as months of greatest frequency. There is apparently no relation to summer diarrhea.

Geographic. There appears to be a general impression^{32,13} that intussusception is more frequent in Australia, Denmark, and England, than in the United States, France or Germany. There is no adequate explanation for this apparent difference.

PATHOLOGY

General. The usual intussusception consists of a firm sausage- or banana-shaped swelling consisting in cross section of three concentrically arranged tubes. The inner two constitute the intussusceptum, and meet at the apex or head. The inner layer is known as the afferent or entering layer, and the second layer as the efferent or returning layer. The third or outer and ensheathing layer is called the intussuscipiens, which meets the returning layer of the intussusceptum at what is called the neck. The mesentery is drawn into the intussusception between the entering and returning layers of the intussusceptum, and the concave surface of the intussusception is usually toward the mesentery. Constriction of the mesentery results, first, in venous congestion with resulting hemorrhage from the apex and especially the first part of the returning layer.

There is also stimulation of the mucous glands with an outpouring of mucus, which together with the extravasation of blood results in the so-called "currant-jelly" stool, which is said to typify this condition. If the process is progressive, further edema of the apex results in intestinal obstruction, although some¹³ state that it is contraction of the intussuscipiens at the neck which produces obstruction. The clinical picture of intestinal ob-

struction, although not necessarily an indication of gangrene, is nevertheless, usually not predominant in the usual acute case of intussusception and is a late phenomenon. The outstanding clinical feature of late cases is toxemia, which is apparently due to absorption of toxins from the gangrenous intussusceptum, particularly the returning layer. It is this layer, kinked as it is at each end, which shows the most pronounced pathological changes.

Serosal thickening occurs in the more advanced processes, and adhesions are formed between the two limbs of the intussusceptum, so that reduction may be impossible. With the more aggressive therapy existent nowadays it is a rare occurrence for the intussusceptum to slough spontaneously and be passed by rectum, but many such cases are reported from previous years with spontaneous cures. Reduction may also occur spontaneously, and a number of surgeons have opened the abdomen only to find evidence that the intussusception had reduced itself.

Method of growth. Leichtenstern⁴⁴ postulated in the instance of ileocolic invaginations that the ileum prolapses with an ever-changing apex while the ileo-cecal valve stands fast. Thus according to his theory growth is entirely at the expense of the entering layer. This theory is not generally held now, because, if so, these intussusceptions should all be readily reducible, and there should not be enough pressure on the appendix to necessitate its removal. However, these two premises are not true. There is the possibility that these intussusceptions may originate by a prolapsing of the ileum, and then grow at the expense of the sheath, but the stiffness of the terminal ileum because of the presence of lymphoid tissue would seemingly make this theory untenable.

Most writers assert that an intussusception grows at the expense of the entering limb; and the apex, since pathological changes are most pronounced here, is generally a fixed point in the bowel. Hellmer²⁶ writes that, while this plan may account for the primary descent of the intussusception, after a time further descent in this manner is checked by the mesentery or mesocolon drawn between the inner and outer cylinders. From here on what he terms the secondary descent begins: The intestine below the intussusception is forced back over the intussusceptum in a retrograde fashion, so that the sheath shortens by a "concertina-like compression and folding" seen particularly in the colon.

Even in those instances in which the mesentery is short, growth is favored by the mesentery borrowing peritoneum from the posterior parietes. This is true especially in infants in whom the posterior peritoneal attachments are loose. As stated by Wangensteen,⁵⁵ the attachments are so loose in infants that the ileocecal valve may protrude at the anus, and cases are recorded in which the intussusception hung between the legs!

Bonomoni⁷ states that the length of the intussusception is determined in part by the length and thickness of mesentery. The length of the intussusception is generally independent of the duration of the illness,³⁶ but

the pathological change in the bowel wall usually correlates directly with the duration, although the rapidity of the process will be more marked in some than others. In other words, the longer an acute intussusception has existed, the closer to gangrene will the process be.

Ravitch⁴⁵ found in his experimentally produced intussusceptions in dogs that an early change in the intussusceptum consisted of slight thickening of the bowel. Microscopically there was sloughing of the tips of the villi and engorgement of the villi with blood. The submucosa was tremendously thickened with edema and hemorrhage. The circular muscle was edematous and fragmented, hemorrhagic and filled with round cells. The longitudinal muscle was consistently noted to be relatively normal. There was a marked increase in the number of goblet cells to account for the outpouring of mucus so noted in this condition. Apparently there is a transformation of mucosa cells to goblet cells. These changes were all progressive in dogs with intussusceptions of longer duration up to and including the forty-eight hour group, which were irreducible. In this group the intussusceptum was almost entirely gangrenous, especially the returning layer. The mucosa was unrecognizable and the inner circular muscle was completely disorganized. In this same group the intussusciptens was relatively normal.

Bacteriology. The results of Ravitch's experimental studies in regard to bacteriology are interesting. He found that cultures taken from the serosal surface of unreduced intussusceptions of up to thirty-eight hours' duration were mostly sterile, but that in the case of forty-eight hour intussusceptions the cultures were positive. Similar cultures taken after reduction were mostly all positive even in the twenty-eight hour group. Ravitch was struck by the fact that even bowel which appeared well preserved microscopically gave positive cultures. He referred to a quotation from D'Arcy Power in 1897: "micro-organisms begin to traverse the intestinal wall when a loop of bowel has been constricted for a period of from four to forty-eight hours, and the more completely the blood supply is arrested, the more rapidly they pass." The positive cultures consisted of the usual intestinal organisms, namely, *E. coli*, alpha *Streptococcus fecalis*, alpha *Streptococcus salivarius*, *Clostridium welchii*, *Proteus vulgaris*, etc. These bacteriologic findings are probably clinically significant and must account in part for the morbidity after operation for intussusception—high fever, abdominal abscesses, wound infections, and postoperative adhesions with intestinal obstruction.

Types. A number of classifications have been employed through the years to denote the types of intussusception and some very complex terms have been devised in an attempt to denote the exact pathology involved. The more complex terminology has been discarded by the majority of writers, however, but there is still some discrepancy in nomenclature. Wangensteen⁵⁵ describes essentially four types: enteric, ileocolic, ileocecal, and colic. In the ileocecal type the apex is the ileocecal valve, and the appendix is within the intus-

susception, whereas in the ileocolic type the beginning of the intussusception is in the ileum and the appendix remains external to the mass. Some authors (Fitzwilliams) have consequently insisted that the ileocolic type should be classified as enteric, since advancement of the process simply results in protrusion of the intussusceptum through the ileocecal valve and into the colon. Most writers, however, consider the ileocolic type as separate.

The incidence of the various types in children is given in the two series of cases below:

	Perrin and Lindsay 1921 400 cases	Clubbe 1921 253 cases
Ileocecal	46.5%	57.6%
Ileocolic	37.6%	31.8%
Enteric	10.1%	8.8%
Colic	5.6%	2.0%

This classification like others probably oversimplifies the problem. For example Clubbe¹⁴ lists for simplicity's sake the ileocolic-colic and enteric-ileo-cecal types, which are distinct varieties of the double intussusception, under the ileocolic classification. In that type classified as enteric-ileo-cecal, an enteric intussusception forms in the ileum, usually within six inches of the valve. When this mass arrives at the cecum, it does not pass through, but pushes the valve in front of it, and the intussusception now increases at the expense of the cecum and colon. Thus after reduction of the cecal intussusception there is still the enteric intussusception to be reduced. Such a tumor will show five concentric rings of bowel in cross-section, and some compound intussusceptions may show seven, whereas the usual simple type shows only three rings.

To give a different aspect of the picture, the figures from a recent publication by Gross and Ware²⁵ are presented. Their figures are derived from a series of 610 cases (1948).

Ileocolic	76%
Ileoileocolic	14%
Jejunioileal or ileoileal	5%
Colocolic	2.1%
Multiple	0.7%
Type not stated	2.2%

It is noted that Gross' figures, in contrast to the two series above, lists the most frequent type as ileocolic, which probably includes the ileocecal type of other writers. In other words, the differences are probably in terminology rather than in statistical incidence.

The incidence of types in the adult is somewhat different.³⁷ Here the small intestine is relatively more frequently involved than the colon. Kassemeyer found in his series that there were 92 cases with only small intestinal involvement compared with 192 cases in which the large intestine was involved.

ETIOLOGY

Demonstrable causes. Demonstrable causes for intussusception in infancy are unusual. A typical series is that of Gross consisting of 610 cases in which a discernible mechanical factor was present in only 5.4 per

cent of the total. These factors were as follows: Meckel's diverticulum, twenty-nine cases; intestinal polyp, four cases; lymphoma of the bowel, two cases; and duplication of the terminal ileum, one case.

In the adult on the other hand, a definite mechanical inciting factor is present in the majority of cases. Such factors may be listed as follows:

1. Tumors. (a) Benign, probably two-thirds. These include lipomas of the cecum and ileum, fibromas, polyps, and aberrant pancreatic tissue in the ileum. (b) Malignant, one-third. A case of carcinoma of the splenic flexus in the intussusciptions is reported.³⁰

2. Meckel's diverticulum is the next most frequent cause, and accounted for 30 out of 300 cases in the series of Eliot and Corscaden, and for one-sixth of the cases in Kassemeyer's series.

3. Other causes in the adult include appendicitis, tuberculosis, intestinal ulcers, postoperative adhesions, and a recently invaginated appendiceal stump in one case.⁴¹

The manner of inception of an intussusception in the presence of a tumor or other mass is readily hypothesized. The tumor acts as a bolus of food, which peristalsis attempts to force on down through the intestine. The base of the tumor becomes inverted when the traction exerted on the tumor is stronger than the resistance of the musculature at the base, which opposes the downward pull. Further traction results in further inversion until what started as a lateral invagination becomes a complete intussusception. The question as to why intussusception should occur at any one special time is worthy of speculation. The "rush waves" of Meltzer and Auer specially increased by an unusually coarse diet may be causative, and Starling's Law of the Intestine is certainly operative; namely, "Stimulation at any point of the gut causes contraction above the point of stimulus, and relaxation below it." Wilms¹¹ believed that an energetic contraction of circular muscle fibers is the initial step in intussusception. A fixed point is thus afforded for the next step, that is, activity of the longitudinal fibers of the next lower lying segment which is thus drawn up to cover the contracted zone.

No readily demonstrable cause (intussusception in infancy). Despite all the various theories which are discussed below, the fact is that the etiologic agent responsible for 90 to 95 per cent of intussusceptions in infancy is still unknown. A discussion of the more widely quoted theories follows.

1. The theory offered by Perrin and Lindsay in their monograph published in 1921⁴⁴ is one of the most popular. These authors noted that the highest incidence of intussusception in the region of the ileocecal valve occurs during the first year of life, and it is at that time when the valve projects farthest into the cecum, and when the lymphoid tissue of the terminal ileum is greatest in amount. Then also is the smallest difference in size between the cecum and terminal ileum, so that the former handles the latter more like a foreign body. Lymphoid tissue is best developed in well and particularly fat

babies, who are especially prone to intussusception. Intussusception is most common between the fifth and ninth months when factors such as teething and change from maternal milk to a supplemented diet with their attendant gastro-intestinal disturbances lead to swelling of the lymphoid tissues. These authors believed that in persistent diarrhea and vomiting of infants the lymphoid tissue becomes smaller, so there is less chance for intussusception.

Perrin and Lindsay believed that the causation of enteric intussusception was probably swelling of an isolated Peyer's patch. They also remarked that idiopathic colic intussusception is limited to childhood, and believed that the cause is excessive development of the mucosal folds studded with lymphoid follicles, which swell with minor intestinal disturbances. These factors together with the relatively narrow lumen of the colon in infancy are emphasized.

2. The neurogenic theory cited by Iason³⁰ indicts peristaltic irregularity on the basis of neuromuscular dysfunction as the cause of intussusceptions about the ileocecal region. He cites Fraser as proving that the innervation of the ileum is sympathetic and parasympathetic, whereas that of the cecum is only sympathetic. This theory does not appear very attractive.

3. Allergic states are mentioned by Ladd and Gross as possibly accounting for disturbances in peristalsis, but they state that suggestive evidence has been accumulated in only a few cases.

4. Other possibilities have been suggested, such as the angle at which the ileum enters the colon—the more obtuse angle, the more likelihood of intussusception—but many of these theories have been investigated and some, such as the one just mentioned, discarded. Ladd and Gross state that "it is well recognized" that intussusception may occasionally occur simultaneously with or shortly after acute enteritis as the result of peristaltic abnormalities. The possible effects of teething and weaning, which coincide with the maximum incidence of intussusception, have already been mentioned. A mobile gut with a "floating cecum" has been indicted by some (Rodda¹⁵) as a contributing factor and finds some support in the literature.

Experimental intussusception. Intussusception was produced experimentally in 1893 by Senn using manual methods and in 1897 by D'Arcy Power with cathartics and other pharmaceuticals. Nothnagel in 1904 produced intussusception by a faradic current. He and Senn noted that development occurred at the expense of the intussusciens without change in the apex.

Ravitch and McCune in 1948¹⁶ reported results of their experiments in which tetanic contraction in the bowel was produced by a faradic current, following which glass rods were used to invert this segment into a distal segment.

GENERAL CLINICAL FEATURES OF INFANCY AND CHILDHOOD TYPES

(The paramount importance of early diagnosis in childhood intussusception warrants this a separate sec-

tion on general diagnostic features. Special pathologic types will be considered later).

(A) *History.* As Clubbe¹¹ states, "the very sudden onset in a previously healthy baby is a peculiarity of intussusception." The infant is seized without warning with severe abdominal pain, which lasts seconds or minutes and then passes off. The child may then resume play, thus reassuring the mother, till a second attack, which occurs from two to thirty minutes after the first one. During the attack the child may assume the knee-chest position, to which Rodda¹⁸ attaches importance. During each attack there is the appearance of shock; the infant appears pale and perspires freely. The obvious analogy is that of labor pains. Wyatt and Chisholm⁷⁸ report that this classical picture of repeated colic occurred in 50 of their 55 consecutive cases. Shortly after the first attack the child vomits and has a normal bowel movement, the result of peristalsis stimulated by the attack. Vomiting may persist, but in most cases it does not. During the first two to ten hours the child usually (97 per cent of the cases, Clubbe) passes bright red blood mixed with mucus (currant-jelly stool). Ladd and Gross state that this occurs in 85 per cent, but may not occur till later. Very rarely blood is vomited. Straining and tenesmus may occur. The picture of shock is variable. Oberhelman⁴¹ states that in his series of 95 children admitted to Cook County Hospital with this condition 30 per cent were in shock or incipient shock. In general, shock is a late manifestation, although rarely, an infant may develop shock with the first attack of pain and remain so with a rapidly gangrenous process.

The classical triad of pain, vomiting, and melena occurred in less than 50 per cent of Gibbs and Sutton's series from the University of Cincinnati,²¹ but two of the three classical symptoms appeared in more than 90 per cent of their cases.

(B) *Physical examination* of these infants revealed a mass in the abdomen in 63 per cent of Perrin and Lindsay's 400 cases. The mass may be in any abdominal quadrant, although only very rarely in the right lower quadrant. Usually it is in the right upper quadrant. The mass is usually described as sausage or oval-shaped, movable, and from moderately tender to not tender at all. It may shift position in a few hours. Occasionally the lump may be felt to stiffen during an attack of pain, and sometimes palpation during intervals free of pain will fail to demonstrate a mass. The abdominal wall is soft in intussusception, something which is explained when one considers that the gangrenous process is ensheathed in the intussusciens, which is relatively normal bowel. The belly tightens up during an attack, however, so that palpation of a tumor may be very difficult, even when one exists. If distention, which is a late sign, is present, or the child resists, anesthesia may be necessary for detection of a mass. Administration of a sedative, such as chloral hydrate by rectum, may be sufficient, however.

Rectal examination should always be done in these cases. A mass which fails of demonstration on abdominal examination may be palpated by the finger in the

rectum. In 25 per cent of Ladd and Gross' cases an abdominal mass could be felt on rectal examination. Bimanual examination with a finger in the rectum may succeed in demonstrating a tumor. Even after definite palpation of an abdominal tumor rectal examination is important; the extent to which an intussusception has progressed, that is, to the rectum or anus, may be determined in this way. The intussusceptum as felt in the rectum has the general shape of the cervix uteri.

Demonstration of a tumor is the fourth cardinal feature in the diagnosis of this disease. Clubbe¹⁴ was so insistent on this point that in only two instances out of 253 operations in this condition did he operate without first having palpated a tumor. Ladd and Gross recommend that, in the event no tumor is felt, palpation should be done under general anesthesia in an operating room set up for immediate laparotomy if the findings warrant. A further reward of rectal examination may be that blood is picked up on the examining finger.

C. *X-ray examination* may be of some help where the diagnosis is in doubt, but it is probably not necessary in many of these cases. Therapeutic barium enema and other insufflation methods will be considered in a later section under "Treatment".

According to Hellmer²⁶ the plain film of the abdomen may be of value. The presence and degree of ileus and of free fluid in the abdomen may be disclosed. Occasionally the apex of the intussusceptum may stand out against the gas in the colon and by its homogeneous nature be differentiated from fecal material. Intussusceptions of the colon may be suspected from distention of the large bowel proximal to the involved segment. The presence of gas in the small bowel in infants up to two or three years of age is apparently difficult to evaluate, since this is a natural occurrence at that age.

Barium enema as both a diagnostic and therapeutic method in intussusception has had a greater vogue in both Europe and Australia than in this country. Ladd and Gross state that they required its use in only 25 of 484 patients to make a positive diagnosis. In 23 of these cases diagnosis was established on x-ray and confirmed by laparotomy. In two cases of the ileo-ileal type the x-ray findings were normal, and the correct diagnosis made only at laparotomy. This is an unfortunate situation, because it is in these enteric cases that there is a less definite clinical picture, and less often the appearance of melena, which, if present, is a late sign. To make things worse, the tumor is small and palpated with difficulty. Fortunately the enteric type is much less common than the ileo-cecal and ileo-colic, both of which with the colic may be diagnosed by barium enema.

PATHOLOGICAL TYPES OF INTUSSUSCEPTION AND THEIR DIFFERENTIAL DIAGNOSIS

The various pathological types of intussusception will now be considered, and an attempt made to give a brief resume of the correlation of the clinical findings with the pathology in each type. Differential diagnosis will be considered.

A. *Ileocecal*. This type is usually not differentiated

from the "caput cecii" type of some of the older writers. Melena is usually present and occurs before twelve hours. The stage of the disease at which the passage of blood begins is of great importance in the topical diagnosis—that is, locating the probable site of the intussusception. Physical examination often reveals the right lower quadrant to appear empty because of the displacement of the cecum (Dance's sign), but this has been deprecated as an unreliable sign. The tumor is usually in the right upper quadrant. In some cases the tumor is long, extending down to the left side of the abdomen, following the course of the colon, and in others only parts of the tumor may be felt, so that an impression of several separate tumors may be imparted. The length of the tumor is independent of the duration of the illness.

B. *Ileocolic*. The ileocolic intussusception is in reality a small bowel intussusception as compared to ileocecal, which is a large bowel invagination. For this reason the clinical picture of the ileocolic type is similar to the enteric types, and the ileocecal is more like the pure colic type. In the ileocolic type melena is almost invariably present but in over half the cases does not make its initial appearance until twelve to forty-eight hours after the onset of symptoms. The tumor may be much like that of the ileocecal type, but may be felt as a small tumor beginning in the right lower quadrant. The ileocolic type is more common over the age of one year, whereas the ileocecal is more common below that age. In common with enteric intussusceptions the ileocolic type produces more severe colic, vomiting, fever, and malaise than the large intestinal types.

C. *Enteric*. In the ileac type the tumor is small, short, thin, very mobile and often lies in the neighborhood of the umbilicus. Usually melena is absent, and, as indicated earlier, systemic symptoms and signs are earlier in their appearance and more severe. Occurrence is more apt to be over the age of one year. The death rate is highest in this type, because the diagnosis is usually made late.

D. *Colic*. In this type melena occurs in practically 100 per cent and within six hours of the onset. The tumor is almost always to the left of the umbilicus, although occasionally it is only in the transverse colon. In half of these cases one is able to palpate a tumor on rectal examination.

Enterocolitis is probably the most treacherous differential diagnoses in the consideration of the preceding four acute types of intussusception. In the latter condition blood and mucus are not mixed with the feces as occurs in enterocolitis, so there is no fecal smell, but rather a peculiar insipid odor which Monrad³⁷ terms almost pathognomonic of intussusception. In enterocolitis there is fever and intoxication from the outset, and diarrhea precedes the passage of bloody stools. Colic is more dramatic in intussusception.

Appendicitis is always to be considered, but is rare under the age of two years, and melena in appendicitis is infrequent. *Mesenteric thrombosis* and *arterial embolism* may be mentioned but occur in older individuals. *Rectal prolapse* may be confused with an intussusception

appearing at the anus, but intestinal obstruction is absent in the former. Furthermore, the examining finger may be inserted between the rectal wall and the descending mass (intussusceptum) an impossibility in rectal prolapse. *Henoch's purpura* may precipitate bleeding into the bowel wall, the formation of a mass and intestinal obstruction; but in this condition other evidences of hemorrhage are usually present, and the constitutional features usually overshadow the abdominal picture. Other conditions to be considered in the differential diagnosis are *simple colic* and *tuberculous adenitis*.

E. *Chronic intussusception*. The discussion thus far has been limited to acute types, but the picture of intussusception is incomplete without mention of chronic intussusceptions. This type is generally seen in the adult with a tumor as the cause, but may be seen in children with no demonstrable cause. Stallman⁵² reported nine cases of chronic intussusception in 117 cases in children. The average age of the chronic type was four years ten months. Intestinal obstruction, bloody and mucous rectal discharge may be late symptoms. An abdominal tumor is usually palpable, however. Other clinical features are colic, vomiting, chronic constipation, wasting and urinary symptoms, especially a peculiar type of pain referred to the penis. The sudden onset and varying consistency of the tumor on different examinations usually render differentiation from tuberculous peritonitis possible, though this may be difficult even at laparotomy.

F. *Recurrent intussusception*. Recurrences of intussusception after initial reduction are unusual—one-half per cent in most series. It is stated that this infrequency is due to adhesions forming postoperatively.

G. *Retrograde*. This type is sometimes found as an *agonal* type in children, but is rare during life. Ladd and Gross's incidence was 0.2 per cent. Antiperistalsis is believed responsible.

H. *Multiple*. Multiple segments of bowel each affected with intussusception have been reported. Some of these, as well as instances of single intussusception, have appeared to be on a traumatic basis (Falor).²⁰

I. *In pregnancy*. Twenty cases in the literature are reported by Chaffin,¹¹ and occurred during pregnancy, labor and the puerperium. The rhythmic pains were confused in a number of cases with those of miscarriage. Maternal mortality was 75 per cent.

J. *Appendiceal*. Christopher in 1938 wrote of 80 cases of appendiceal intussusception up to that time.¹² Huddy²⁹ writes of two stages; the first consists of invagination of the appendix into the cecum with concomitant chronic symptoms of crampy pain, although vomiting, melena, and wasting may be present. The second stage occurs when the inverted appendix is carried forward and the cecum is intussuscepted. In the first stage treatment consisting of removal of the appendix should suffice. In the second stage opening of the cecum and even resection of the cecum may be necessary.

K. *Intussusception in purpura*. *Henoch's purpura* in itself has already been mentioned in the differential diagnosis of intussusception, but Wolfsohn⁷⁶ cites 20 cases in the literature in which the two conditions were com-

bined. The mortality was 60 per cent. Immediate laparotomy is indicated in this condition. Hemorrhage into the bowel wall forms a tumor mass, which serves as intussusceptum.

L. *Invagination of the haustra of the cecum*. This condition is not, strictly speaking, an intussusception but rather an invagination of one of the first three haustra of the cecum between the anterior and posterolateral taenial bands. A number of cases have been reported by Italian authors,^{51,22} who state that the syndrome is difficult to distinguish from acute appendicitis, especially if the invaginated segment becomes gangrenous. Symptoms in favor of invagination include the sudden occurrence of this syndrome with signs of obstruction, absence of fever, and the early presence of a painful cylindrical swelling in the right iliac fossa. Treatment consists of reduction with appendectomy or cecal resection as indicated.

M. *Gastroduodenal intussusception*. Simple prolapse of the antral mucosa into the duodenum is common, but Amendola² reports a rare case in which all coats of the stomach were intussuscepted into the duodenum as far as the ligament of Treitz.

N. *Jejuno-gastric*. In 1948 Aleman¹ stated that over 70 cases of jejuno-gastric intussusception were reported in the literature up to that time. Although these intussusceptions are retrograde, they actually are a separate type. This syndrome occurs after gastro-enterostomy or gastric resection, and may appear in either acute or chronic form either immediately or years after anastomosis and affects both sexes.

Distention, vomiting after meals, and hematemesis occur. The width of the gastro-enterostomy stoma and whether it is posterior or anterior are seemingly immaterial. Three types are described by Aleman: (1) Those involving the afferent loop—descending, 6 cases. (2) Those which are ascending invaginations of the efferent loop—43 cases. (3) The third type consists of a combined invagination of both loops into the stomach and has been regarded by many writers as a prolapse rather than an intussusception. Occasionally intussusception takes place through an entero-anastomosis and on up into the stomach. Growth of these intussusceptions ceases when the neck coincides with the stoma (either gastro-enterostomy or entero-anastomosis). The etiology of this condition is undetermined. X-ray examination with the barium meal reveals the typical filling defect, and in some cases an epigastric mass can be felt. Mortality should be low if the appropriate surgical therapy is undertaken in time. This therapy³⁰ may consist of resection of a gangrenous intussusceptum, simple reduction of the intussusception and anchoring of the involved loop, taking down the anastomosis, or gastric resection.

O. *Intussusception complicating intubation*. Of all the possibilities complicating the use of the Miller-Abbott or other long intestinal tubes, intussusception must certainly be one of the most frequently brought to mind, especially during removal of a somewhat recalcitrant tube. An analysis of the literature reveals this not to be the case, however. Intussusception was not

encountered in a series of 1000 cases intubated at the Presbyterian Hospital in New York and reported by Smith.⁴⁰ Warren and Cattell⁵⁷ make the following statement in 1948: "Intussusception of a sufficient degree to cause obstruction of the bowel, such as occurred in one case reported herein, is a rare complication of intestinal intubation. A similar example has not been found in the literature. The presence of this complication was not appreciated in this instance, and a fatality resulted."

TREATMENT

A. *Surgical.* Surgical therapy is preferred by the majority of writers, particularly in America. Gastric suction is advisable as a preliminary procedure to preclude vomiting and pulmonary aspiration. The child should be kept warm. If the duration has been but a few hours, operation may be begun at once; but if there has been excessive dehydration or blood loss, blood transfusion or other fluid replacement should be given preoperatively, which should result in no more than one or two hours' delay. Some writers recommend blood transfusion routinely as a preoperative measure.

Wyatt and Chisholm⁵⁹ list any one of the following four criteria as indicating immediate surgery rather than preliminary barium studies: (1) shock, (2) severe bleeding by rectum, (3) an antecedent or family history of intussusception, and (4) a flat film of the abdomen showing small bowel obstruction.

Drop ether is favored for anesthesia by most authors, but Gross²⁵ believes cyclopropane is better for the more seriously ill children, and in extremely ill babies uses procaine infiltration of the abdominal wall for exploration. The different surgical procedures will now be discussed:

1. *Simple reduction.* The incision used is usually a generous right rectus muscle-splitting or preferably with lateral retraction of the rectus. The difficult part of reduction occurs in the vicinity of the ileo-cecal valve, and this incision provides maximum exposure in that area. Blind reduction of the intussusception is now performed intra-abdominally through sense of touch by taxis rather than by traction on the intussusceptum. The head of the intussusceptum is milked back to the region of the ileocecal valve, where the rest of the procedure may be carried out under direct vision. There, steadily maintained annular pressure about the intussusception may succeed in reducing the edema, so that complete reduction may be accomplished. If reduction of the last portion of bowel is difficult, Cope³⁰ recommends inserting a finger at the neck of the intussusception between the entering and returning layers and sweeping about in this space. Adhesions are thus broken down and reduction is facilitated. If the digital method fails, rubber-covered forceps may be placed in the same area and opened gently in several places. Some operators advise the injection of glycerin between the two sheaths,³¹ and Brown¹⁹ suggests for easier reduction a longitudinal incision in the neck of the intussusceptum to be sutured transversely after reduction.

2. *Resection.* If on the other hand the mass is irreducible, or thought reducible only after prolonged

manipulation, or if the bowel is perforated or nonviable, resection is probably the procedure of choice. Gross believes that resection is indicated in critically ill babies rather than disengaging the intussusception to release toxic products into the circulation with resultant shock, which may be uncontrollable. He further states that no more than is absolutely necessary should be done at the primary operation for intussusception. The appendix is generally left, and a Meckel's diverticulum or polyp is generally not removed at the primary operation unless absolutely necessary.

Gross prefers the *aseptic Mikulicz type of resection*, in which a spur is formed by suturing the ileum to the ascending colon. The mass is then brought out through the incision, and not removed till after suturing the skin is completed. The spur may then be cut down several days later and the enterostomy closed on the sixth or seventh day. The advantages of this procedure are that it is quick and there is no peritoneal contamination. Decompression of the proximal intestine is immediately accomplished by a catheter through the ileal limb. Gross's resection mortality is 23 per cent by this method.

It is well to observe that the mortality of this disease with resection has been in the neighborhood of 80 to 90 per cent—so high that some authors have refused to countenance resection under any circumstances. As a welcome contrast appear the statistics of Dennis,¹⁶ who in 1947 reported seven *resections with primary anastomosis* (using a one-layered silk technique) without a fatality. These cases were not ones with short histories, so that the achievement is certainly a remarkable one. Clubbe was probably the first to perform successful resection in this condition, having recorded a case in 1896. Of his 16 resections reported in 1921, however, there were only two recoveries, a mortality of 87.5 per cent.

3. *Ileostomy* alone has been reported by some (Mayo³⁵) in cases of extreme distention. Two of Mayo's cases so treated subsequently passed sections of necrotic bowel and recovered after later by-passing procedures, but this method is probably only a last-ditch measure and has no general applicability. *Ileostomy with secondary resection* is also mentioned by some writers.

4. *Lateral anastomosis* about an irreducible intussusception was first successfully performed by Rutherford⁴⁹ in 1909 and independently in the same year by Parry. This procedure restores the bowel continuity immediately and is thought by its proponents safer than prolonged manipulation to effect reduction. Leaving a possibly gangrenous intussusceptum, which this operation entails, however, is a strong objection. Rutherford reported that the tumor disappeared in his cases, but apparently in very few cases has the intussusceptum been observed to slough and pass. Lateral anastomosis with exteriorization of the lesion and secondary resection has also been performed. Montgomery³⁴ modified Rutherford's procedure by adding fixation of the intussusceptum to the intussusceptum by a row of sutures at the neck.

5. *Method of Jasset.* This method consists of suture of the serosa of the invaginating bowel and intussuscepti-

ens followed by resection of the gangrenous intussusceptum through an incision in the ensheathing bowel. The cut edges of the intussusceptum are then sutured as are the cut edges of the intussusciens. This procedure has been attributed to Barker, Maunsell, and Coffey, as well as Jesset. The obvious objection to the method is that peritoneal contamination occurs in a debilitated child, who is least capable of tolerating such an insult. Barnes³ has recently (1947) modified this procedure by first suturing the intussusciens to the parietal peritoneum, so that the procedure is carried out extraperitoneally. His further modification consists of threading a catheter into the ileum through the incision in the intussusciens and bringing the catheter out through the abdominal incision. A safety-valve action is thus provided. The use of this modification is described in only one case. In general Jesset's procedure has been attended with a high mortality.

6. *Fixation of the cecum and ileum.* This procedure is of course used only in conjunction with others, and is designed to eliminate recurrences. Fixation is accomplished in various ways, such as suturing the terminal ileum to the cecum and ascending colon or fixing the bowel to the parietal peritoneal wall. Masson³³ described a method by which he used the appendix to fix the cecum to the anterior abdominal wall. The meso-appendix is first ligated and the appendix is then brought out through a stab wound in the abdominal wall. One or two sutures are used to tack the cecum against the abdominal wall against which the cecum is pulled snugly by traction on the appendix. The appendix drops away by the eighth or tenth day, and there remains a tiny mucous fistula, which disappears after cauterizing with silver nitrate. Masson used this method successfully in 16 cases.

7. *Should the appendix be removed?* The general consensus is that, unless the appendix is badly damaged, it is best left alone in the surgical treatment of intussusception. Removal of an innocuous appendix only adds needless risk to a procedure that is already laden with hazard. If, on the other hand, in a case of ileocecal intussusception, for example, the appendiceal vessels have been badly compressed, and the appendix looks bad, it should be removed.

Deaths following surgery for intussusception usually occur within the first twenty-four hours and are usually on the basis of shock and toxemia. Diarrhea may occur in some cases after surgery as well as after reduction by enema.

The most important single factor in mortality rate is the duration of symptoms. To prove this point Oberhelman¹¹ gives the following interesting figures from Cook County Hospital:

Duration	No. of Cases	Deaths	Mortality (%)
0 to 24 hours	43	1	2.3
24 to 48 hours	19	3	15.7
48 to 72 hours	20	8	40.0
72 to 120 hours	10	5	50.0
Over 5 days	3	2	66.7
Totals	95	19	19.1

B. *Treatment by rectal irrigation.* As stated earlier, treatment of intussusception by the rectal injection of air or water is older than any operative treatment. This hydrostatic method was given its impetus in modern times by Hirschsprung of Copenhagen, who in 1876 reported his experiences. His mortality of 35 per cent was in marked contrast to the then prevalent 90 per cent mortality.

Hirschsprung's successors, Kock and Oerum, and Monrad³⁷ have continued the "bloodless taxis" method. Monrad relied mostly on taxis (under anesthesia) consisting first of compression of the tumor to reduce edema, and then, with the left hand steadying the neck, the apex is grasped with the right hand and the intussusceptum pulled back through the intestine. He never persisted beyond 10 to 15 minutes. He was able to reduce ileac, ileocecal, and colic types, but warned that the method was not applicable in either ileocolic or mixed forms, or in cases over two years of age. He further limited the procedure to the following maximum time durations: Colic, 36 hours; ileocecal, 24 hours; ileac, 12 hours. After reduction he gave a saline enema. Occurrence of a bowel movement was the anxiously awaited proof of reduction. Monrad termed the question of reduction the "Achilles heel" of the bloodless treatment. A false conclusion was nearly always fatal. In 84 cases treated exclusively by this method the mortality was 14.3 per cent. Where taxis and secondary laparotomy were necessary, the mortality was 60 per cent. The combined mortality rate was 19.1 per cent.

The Australian school have been strong supporters of the injection method. Clubbe¹⁴ used it very often as a preliminary measure and considered laparotomy and injection as supplementary methods, impossible to compare. Hipsley,²⁷ writing in Australia in 1937, decried the manipulation method as dangerous and used saline injections alone with a maximum hydrostatic pressure of three feet six inches to effect reduction. His signs of complete reduction were: (1) increased abdominal distention by palpation; (2) increase in abdominal girth by measurement; (3) yellow fecal material in the returned saline solution; (4) flatus in the return; (5) barium in the small bowel if this opaque material was used; (6) charcoal given by mouth returned by enema. His mortality was 4.9 per cent in 1942 cases, which is certainly one of the lowest.

Barium enema reduction has become popular in Sweden. Hellmer²⁶ in 1948 reports 130 cases treated by barium enema used for both diagnosis and therapeutics combined with surgery when necessary. Death occurred in nine of 130 cases. Noteworthy is his recurrence rate of 16.5 per cent when reduced by barium enema. This rate is considerably higher than that following surgical reduction.

Although Scandinavia and Australia have been the strongholds of injection therapy, Ravitch^{16,47} writes enthusiastically in this country at Johns Hopkins University. In his series 33 cases were treated primarily by barium enema with no deaths. In 23 cases reduction was

accomplished by barium enema; in the others surgery was required.

CONCLUSIONS

1. Intussusception is the most frequent cause of intestinal obstruction in infants, but, when the picture of obstruction is present, the process is already far advanced.

2. No universally accepted theory of etiology in the intussusceptions of infancy exists, but that of Perrin and Lindsay is most widely accepted.

3. Duration of symptoms has been shown in one series after another to be the most important factor in the high mortality of intussusception. Consequently early diagnosis is discussed and emphasized.

4. The classical picture of intussusception in infancy consists of colic, vomiting, palpable mass, and melena. Considerable variation is possible, but most of these features are usually present.

5. Treatment in this country has been almost entirely surgical, but in Australia and Scandinavia good results have been achieved by rectal irrigation.

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Editorial . . .

The Importance of Venipuncture

EVERY MEMBER of the medical profession should be interested in venipuncture since he may need to administer intravenously materials, such as blood, plasma and plasma volume expanders such as dextran* and polyvinyl pyrrolidone†. These materials may be stockpiled for use in civilian defense and other disasters but they will do the patient in shock no good unless they can be introduced into the circulation. In order to be certain that personnel experienced in venipuncture are available in a civilian emergency a large number of persons must be taught venipuncture.

In the field of anesthesiology an increasing number of agents are being administered intravenously. These are employed to bring about anesthesia and relaxation and sedation among patients ranging in age from the very young to the very old. It is important that venipuncture of patients about to undergo surgical procedures be accomplished quickly and without the unnecessary pain of multiple venipunctures. The benefit of an easy and pleasant induction with an anesthetic given intravenously will be neutralized largely if the patient is exposed to a series of painful and sanguineous attempts at venipuncture and as a result has hematomas and extremities that are swollen and painful for several days.

In the complex practice of medicine important procedures sometimes are neglected and emphasis is not placed on learning to carry them out skillfully, because, as a rule, the procedures are considered minor ones as long as they can be done with ease. Venipuncture is an illustration that can be pointed to as being a procedure which requires more than a little skill in the ordinary case and when veins are very small and relatively inaccessible it can require a great deal of skill.

Usually a steel needle is used. If the needle is small and the vein is large, almost anyone can do the venipuncture. If a sample of blood is to be withdrawn, a small needle (20 gauge) is quite satisfactory but when shock is anticipated or is present already, then a larger needle (15 gauge) is preferable. When a vein large enough to receive a large needle cannot be found then a small needle should be used and some sort of a pressure device employed to force blood or fluids rapidly through the small needle.

The practice of cutting down on a vein, inserting a cannula and tying the vein off is practiced much more frequently than is necessary if more attention were paid to learning skillful venipuncture. It is unfortunate that the cut-down technic is ever resorted to unless it is absolutely necessary and it seldom is. When the vein is

destroyed and when further venipunctures are necessary then the importance of preserving the veins is realized. We saw one child with leukemia whose veins had been cut down on twenty-two times for transfusions of blood. The father finally brought the child in and we were asked to give him a series of transfusions. A large number of transfusions were required in the period of a year and were accomplished without any further use of the cut-down technic. These final transfusions could have been given much more easily if cut-down technic had not been used previously.

When something other than a steel needle is desirable, the technic of inserting a needle into the vein and passing small polythene tubing through the needle, then removing the needle and administering fluids through the tubing may be employed. Use of this tubing has advantages in that the patient can move the extremity with much more freedom than when a steel needle is in place. More recently a marked improvement has been made by Massa and associates who have developed a "plastic needle." Plastic tubing is fitted onto a metal hub and then a small stylet-needle is pushed inside of the plastic tubing and a little beyond. With this device the indwelling needle and tubing are inserted through the skin and into the vein until blood can be aspirated. The stylet-needle is then pulled back a little way and the tubing is pushed as far inside the vein as desired. The stylet-needle is then removed and fluid is given through the cannula hub. This is the most satisfactory way of handling difficult cases in which fluids must be given over long periods or continuously and there may be only one or two veins that are good for venipuncture. The burned patient, for example, may have only one or two spots where veins are accessible. For these patients the use of the plastic needle is ideal and it usually is inserted as soon as treatment of the patient is begun.

Commander Nirranen of the Naval Dental Corps has developed an artificial arm on which individuals may practice venipuncture and it serves the purpose very well. Exhibits have been prepared to aid in teaching venipuncture but not enough persons realize its importance until they become patients. Then many express emphatic opinions concerning the desirability of skillful rather than awkward venipuncture.

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*Expandex, U.S.A. brand; Intradex, British brand; Macrodex, Swedish brand.

†P.V.P., U.S.A. brand; Subsison, German brand.

The 45th Annual Christmas Seal Sale

The 45th annual Christmas Seal sale again calls attention to the progress being made in the fight against tuberculosis. The map on this page shows the cumulative results of the cooperative efforts made against tuberculosis in the state. Spearheading this campaign are the State Christmas Seal organizations which carry on a continuous campaign of education, and assistance in the intensive state-wide program being carried on through mass x-ray and tuberculin testing surveys.

Help Fight TB



Buy
Christmas Seals

As the map indicates, the past decade has shown a marked change on the face of the tuberculosis map of Minnesota.

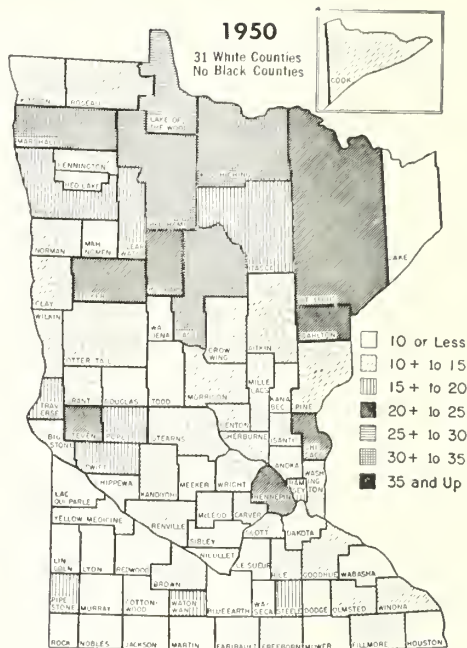
Minnesota now has no *black* counties (those having death rates of 35 per 100,000 and over.) Ten years ago there were 15 *black* counties.

Minnesota now has 31 *white* counties (those having death rates of 10 or less). Ten years ago only four of the 87 counties were *white*.

Only five counties now have a death rate of over 25. Ten years ago 35 counties were in this group.

Seventeen counties now fall in the group with death rates ranging from 15 to 25. The 1940 map showed 37 in this class.

The largest number of Minnesota counties—33—now have death rates ranging from 10 to 15 per 100,000. Ten years ago only 10 counties were in this group.



Period from 1946 to 1950

Three counties which have previously been accredited for tuberculosis control (having had death rates of 10 or less and met other requirements) have lost this status due to an increase in the TB death rate.

Notices . . .

American Heart Association

The twenty-eighth annual meeting and twenty-fifth scientific session of the American Heart Association will be held at the Hotel Statler in Cleveland from Thursday, April 17, to Sunday, April 20, 1952.

Dr. Irvine H. Page, chairman of the program committee, has announced that all those wishing to present papers at the scientific sessions should submit abstracts before January 1, 1952. Each abstract should not exceed 300 words, and should be sent to Dr. Page in triplicate at the Cleveland Clinic, 2020 East 93 Street, Cleveland 6, Ohio.

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Chicago Ophthalmological Society

The Chicago Ophthalmological Society has announced that the Fourth Annual Clinical Conference will be held Thursday, Friday and Saturday, February 21 to 23, 1952, at the Drake hotel. Participants include Drs. Alson E. Braley of Iowa City, Justin M. Donegan, Joseph S. Haas, Peter C. Kronfeld, James E. Lebensohn, Chicago, Irvin H. Leopold, Philadelphia, John M. McLean, New York, Samuel J. Meyer, Maurice D. Pearlman, Chicago, C. Wilbur Rucker, Rochester, Derrick Vail, Chicago and Joseph A. C. Wadsworth of New York City.

Further information concerning the conference may be obtained from Miss Maud Fairbairn, 8 W. Oak Street, Chicago 10, Illinois.

Continuation Course in Electrocardiography

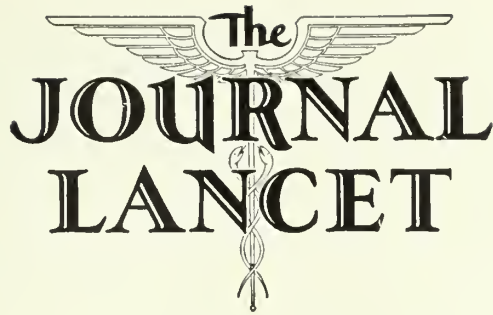
The University of Minnesota will present a continuation course for general physicians in electrocardiography January 21 to 25, 1952. Emphasis will be placed on practical experience in reading electrocardiograms. Each registrant will be given an opportunity to interpret approximately 200 tracings. These will later be reviewed and interpreted by the teaching staff. Illustrated lectures will supplement the practical sessions. The faculty for the course are members of the staff of the University of Minnesota Medical School and the Mayo Foundation.

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E. Starr Judd Lecture

The nineteenth E. Starr Judd Lecture will be given by Dr. Thomas G. Orr, professor of surgery, University of Kansas, Kansas City, Kansas, Thursday evening, March 20, 1952, at 8:15 p.m. in the Amphitheater, Owe Hall (formerly Medical Sciences) sponsored by the medical school. Dr. Orr's subject is "Some Observations on the Treatment of Carcinoma of the Pancreas."

The late E. Starr Judd, an alumnus of the Medical School of the University of Minnesota, established this annual lecture-ship in Surgery a few years before his death.



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Physical Medicine and Rehabilitation for the Clinician, edited by Frank H. Krusen, M.D., 1951. Philadelphia, Pennsylvania: W. B. Saunders Company. 371 pages. \$6.50.

Discussions of the latest developments in physical medicine and rehabilitation have been prepared by Dr. Frank Krusen of the Mayo Clinic and 24 well-known specialists in this field. The four major sections are (1) the therapeutic applications of physical agents and procedures, (2) diagnostic applications of physical agents and procedures, (3) clinical aspects of physical medicine and rehabilitation, and (4) fundamentals of anatomy, therapeutic exercise and physiology as related to physical medicine and rehabilitation.

The book is designed primarily to acquaint clinicians with all the phases of this rapidly expanding specialty of medicine. It should be useful to the internist, the neurologist, the orthopedist, and the general practitioner, as well as the psychiatrist. It is helpful in explaining the correct method of writing prescriptions for physical medicine treatments, and gives specific examples of application of such treatments to many conditions found in daily practice, such as arthritis, neuromuscular and articular diseases, cerebral palsy, hemiplegias, paraplegias, poliomyelitis, and painful disabilities of the back, shoulders, and feet. Practical suggestions for the rehabilitation of such patients are made, including chapters on occupational therapy and liaison with the medical social worker. The book is well illustrated with photographs and diagrams, and contains serviceable bibliographies.

Some aspects of physical medicine which perhaps should have had more detailed treatment are electromyography, speech problems, and vocational rehabilitation. J.C.M.

Autobiography of a Schizophrenic Girl, by Marguerite Sechabaye, 1951. New York: Grune & Stratton. 161 pages. \$3.50.

This small book will be of interest to psychiatrists, psychologists, and psychiatric social workers in that it presents, in an intelligent patient's own words, a graphic description of Renee (the patient) as she gradually loses her grasp on reality. Her intense anxiety on finding herself unable to control her bizarre thinking and feelings is of interest since the sick schizophrenic patient usually cannot relate these experiences in a fashion intelligible to the examiner. The last part of the book is a psychoanalytic interpretation of Renee's illness, limited to concepts of ego disintegration and psychotic ego defenses in schizophrenia.

D.W.H.

Book Reviews

Essay on the Cerebral Cortex, by Gerhardt von Bonin, M.D., 1950. Springfield, Illinois: Charles C. Thomas. 150 pages, 32 illustrations. Publication Number 59, American Lecture Series. \$3.75.

In 150 pages von Bonin has succeeded in compressing a surprising amount of pertinent information on the cerebral cortex in a manner that should be interesting to the general reader and fundamental to the general practitioner as well as to the specialist.

After an historical introduction and a general account of the phylogeny of the cortex, its structure and intercortical connections are discussed. This includes a consideration of the cytoarchitectural areas as well as the significance of the different strata of cells. The major fields according to thalamic connections are outlined. A cortical area connected by projection fibers to a particular nucleus of the thalamus constitutes a "sector". Then follows a chapter on sensations and their relation to the cortex and one on the principal motor connections.

A predictive mechanism is suggested. The closing chapter deals with the relation of the frontal lobe and the hippocampus to emotions.

An important part of the monograph is a selected list of 214 references.

A.T.R.

Clinical Applications of Suggestion and Hypnosis, by William T. Heron, M.A., Ph.D., 1950. Springfield, Illinois: Charles C. Thomas. \$3.00.

This monograph deals with the practical application of hypnosis and suggestion to clinical situations. The book is not a discussion of psychotherapy in general but only where hypnosis and suggestion is concerned. The principles and mechanisms of the procedures are so well explained and easy to follow that the physician reading the book could easily apply the technique in his daily practice. For this reason the text is not recommended for the laity.

The author illustrates with step by step examples of the technique of hypnosis particularly in the fields of dentistry and obstetrics where hypnosis and suggestion have been extensively applied with encouraging results. Hypnotic analgesia and relaxation is produced. Other applications of these principles are left to the ingenuity of the clinician.

An excellent bibliography is appended.

R.B.T.

Illegitimate Sonnets, by Merrill Moore, M.D., 1950. New York: Twayne Publishers, Inc. 125 pages. \$2.75.

EDITOR'S NOTE: It is not often that we have a book of poetry to review in the columns of THE JOURNAL-LANCET. Still less often do we have a reviewer who can employ the same medium in his commentary on the original volume. Here, however, J.L.S. (Dr. John S. Lundy of Rochester) reviews a book on medical sonnets in a sonnet of his own. We present first the review, then the sonnet on which it was based.

THE AUTHOR HIT THE MARK AND MADE HIS POINT . . .

As clearly as it ever has been made.
Much less is lost and more is added to
The tale than ever could have been fore-
cast

By those who have not learned the way
To read between the lines and hear him
say,

"Possibly then (I am not sure of this)
The truth cannot be told; but it can be
Suggested, and the greatest artistry
Is that which out of words, yet out-
side words,
Suggests the thoughts and images to
the brain."

For those whose words come haltingly
or worse,
Smother the truth in lush verbosity,
These sparkling sonnets open wide the
door
To adventurous thought, knife-edged
veracity. J.S.L.

The original sonnet:

AND WHAT IS MORE I SHALL REMAIN
CONCERNED . . .

I am still concerned about the simple fact
That the truth can not be told entirely.

There is not time to tell what happens in
The moment of writing; if one wrote
from dawn
To dark, one would die in the first alcove
of life.

Possibly then (I am not sure of this)
The truth can not be told; but it can be
Suggested, and the greatest artistry
Is that which out of words, yet outside
words,
Suggests the thoughts and images to the
brain.

The Taj Mahal is thus rebuilt again
In every mind that reads or hears of it.
In the midst of literate congestion
The artist is the agent of suggestion.

MERRILL MOORE, M.D.

News Briefs . . .

North Dakota

A DEPARTMENT of biochemistry is being set up at the University of North Dakota medical school with advanced courses available to medical students and to graduate students. A clinical laboratory in biochemistry will provide laboratory facilities for the training of technicians and special laboratory procedures will be available for the hospitals throughout the state. Dr. W. E. Cornatzer, formerly assistant professor from the Bowman Gray school of medicine, has been appointed as professor and head of the department of biochemistry. John P. Davison, Ph.D., has been appointed assistant professor of biochemistry.

* * *

GRANTS-IN-AID totaling \$68,872 have been awarded to Dr. Cornatzer, \$27,400 from the North Dakota Cancer Society for establishing a radioactive isotope laboratory for the treatment of cancer, \$22,572 from the U. S. Atomic Energy Commission for a two year study of the effects of radiation on the functional capacity of tissues, and \$18,900 from the U.S.P.H. for a two year period to study the effects of various drugs and hormones on the phospholipid turnover.

* * *

MILK, food and water analyses can now be made at the Williston laboratory of the Upper Missouri District Health Unit. New laboratory equipment furnished by the State Health Department has been installed and is ready to use, according to Dr. Alan K. Johnson, district health officer. The unit serves Williams, McKenzie, Divide and Mountrail counties.

* * *

THE second annual scientific meeting of the North Dakota Urological Society was held in Fargo September 28, with twenty-one doctors in attendance. The morning session was held at the Veterans hospital, and during the afternoon papers were presented by the local membership. Six Winnipeg physicians were unanimously elected to active membership and the name of the society was changed to the North Dakota-Manitoba Urological Society. The newly elected officers are: President, F. D. Naegeli, Minot; vice-president, Earl Stephenson, Winnipeg, and secretary-treasurer, Louis Pine, Devils Lake.

* * *

THE North Dakota Mental Health work conference was held at the University campus at Grand Forks on November 8 and 9. Among the speakers were Dr. E. F. Hardtkte, Indiana University, and Dr. M. Duane Sommersness, state psychiatrist at Jamestown.

NINE HUNDRED AND THREE initiates were received into fellowship by the American College of Surgeons at the Convocation on November 9, the closing session of the thirty-seventh annual Clinical Congress in San Francisco. The new fellows from Minnesota include Drs. Frank J. Ankner, Milton E. Baker, O. H. Beahrs, Norman B. Bloom, Wilford J. Deweese, William O. Finkelnburg,

David Gavisser, Allan L. Haynes, Walter L. Hoffman, John C. Ivins, Joseph M. Janes, Vernon L. Lindberg, Mancel T. Mitchell, Carleton A. Nelson, Edward W. Sickels, Jacob H. Strickler.

* * *

Those elected from North Dakota are John J. Ayash, and Clair L. Ingalls. Those from South Dakota are Joseph Lovering and Howard L. Saylor, Jr. Those from Montana include David J. Almas, Herbert T. Caraway, Duncan S. MacKenzie, Jr., Edward S. Murphy, and James R. Thompson.

New locations and appointments . . .

DR. ARCHIE G. GRAY, who has been practicing in Rquette, has moved his practice to Carrington.

* * *

DR. ROBERT L. GUNDERSON, a graduate of the University of North Dakota, 1941, and Northwestern university medical school, has opened an orthopedic surgery practice in Denver.

* * *

DR. ANDRE H. LAMAL will open a practice in Watford City. Dr. Lamal is a graduate of Marquette university, and has been practicing in Ashland, Wisconsin.

Minnesota

DR. GAYLORD W. ANDERSON, director of the University of Minnesota school of public health, was elected president of the American Public Health association at the meeting of the organization November 1 in San Francisco, California.

* * *

A \$20,000 GRANT for heart research was made November 13 to the University of Minnesota heart association, the second such grant this year. The grant was awarded by Dr. Thomas J. Dry of Rochester, Minnesota, chairman of the heart group's allocations committee. A previous grant of \$25,000 was made in August.

* * *

THE MARKLE FOUNDATION has awarded a grant of \$10,000 to the University of Minnesota to continue a study being made by Dr. A. B. Baker on the toxic effects of barbiturates on the nervous system.

* * *

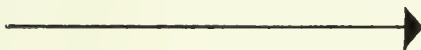
DR. EDWARD L. TUOHY, medical chief and president of the Duluth clinic, has been elected to a three-year term as trustee of the Greater University fund, the University of Minnesota fund-raising project. He was recently awarded the university's outstanding achievement medal for work in the study of old age and its diseases.

* * *

APPROXIMATELY 150 doctors attended the November 11 meeting of the North Central Medical conference at the Radisson hotel, Minneapolis. Dr. Joseph S. Lawrence, director of the American Medical Association's Washington office, was the guest speaker.

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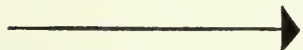
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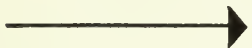
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DR. E. C. KENDALL and Dr. Philip S. Hench, Nobel laureates, were honored by presentation of Regents' Citations by the University of Minnesota at dinner on November 29.

* * *

MEDICAL social workers from Wisconsin, Illinois, Nebraska, Iowa, the Dakotas, Michigan and Minnesota met in a continuation casework course at the University of Minnesota November 19 to 21. Dr. C. Knight Aldrich, associate professor at the university, was a faculty member for the course.

* * *

RAY M. AMBERG of St. Paul, superintendent of University hospital, was elected president of the Minnesota Public Health Association at the annual meeting in October. Re-elected to office were Montreville J. Brown of St. Paul, first vice president; Mrs. H. E. Johnson of Willow River, second vice president; and Dr. W. H. Valentine of Tracy, secretary. Earl H. Sauer of St. Paul is the new treasurer.

* * *

DR. MARVIN J. GEIB has opened offices in Moorhead for medical practice limited to psychiatry. A graduate of the University of Minnesota medical school, he was on the staff of the Fergus Falls state hospital for two years.

* * *

DR. STEPHEN M. BRZICA will join Dr. E. A. Kilbride in the practice of medicine and surgery at Worthington. Dr. Brzica is a graduate of the University of Nebraska medical school.

South Dakota

DR. J. E. BRUNER of Aberdeen, for 44 years a general practitioner in South Dakota, was named the state's "general practitioner of the year" on October 26 by the South Dakota State Medical association.

Born in Glidden, Iowa, Dr. Bruner attended the University of Michigan, later transferring to Rush Medical college, where he obtained his medical degree in 1904. He practiced in Iowa for three years and then began his career in South Dakota in Hecla in 1907.

* * *

DIABETIC detection programs were held throughout the Black Hills area through the week November 13 to 20. Chairmen of the programs are Dr. C. F. Morsman, Hot Springs; Dr. H. J. Borgmeyer, Spearfish; and Dr. H. W. Davidson, Dr. William E. Jones and Joseph N. Hamm, Sturgis, and Dr. Nathan Kriss, Custer, and Dr. Sion Sherrill, Belle Fourche. Dr. D. L. Kegaries is chairman of the Rapid City area.

* * *

AN "APPRECIATION NIGHT" honoring Dr. A. L. Amsberry was given October 22 at the city auditorium at Carthage. Dr. Amsberry has served the Carthage community since 1918. At 85 he is officially retired, but still administers to the ill in emergency.

Wisconsin

DR. JOSEPH C. GRIFFITH, a Milwaukee surgeon, was named president-elect of the Wisconsin State Medical society at the final session of the society's house of delegates on October 2 at Milwaukee. Dr. Griffith, president of the Milwaukee County medical society in 1950, will take office in October 1952 and serve for one year.

Deaths . . .

DR. T. L. CHADBOURNE, 81, died October 16 at his home at Vinton, Iowa, where he had practiced for the past 36 years. Dr. Chadbourne was a graduate of the University of Michigan medical school and was a life member of the Iowa State medical society.

★

DR. ROBERT R. DICKEY, 68, Minneapolis, died Sunday, October 28. A graduate of the University of Minnesota medical school in 1909, he practiced medicine in Minneapolis for 40 years after serving his internship at Asbury hospital.

★

DR. JAMES A. BLAKE, SR., 79, died at his home in Hopkins October 28. A graduate of the University of Minnesota in 1901, Dr. Blake started his practice in Hopkins in 1902, and founded the Blake clinic in 1930. His three sons, Drs. James A., Allen and Paul, were associated with him in the clinic.

★

DR. GEORGE C. BRUTSCH, 50, died Friday, November 9. Dr. Brutsch was a practicing physician in Minneapolis since his graduation from the University of Minnesota medical school in 1931.

★

DR. A. W. ADSON, 64, neurosurgeon with the Mayo clinic, died on Monday, November 12. Dr. Adson studied at Nebraska and Pennsylvania universities and the Mayo foundation, and joined the Mayo clinic as a fellow in 1914.

WHITMAN RECONSTRUCTION OF THE HIP

(Continued from page 529)

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