THE BATTLE CREEK SANITARIUM SYSTEM

THE

Battle Creek Sanitarium System

History, Organization, Methods

BY

J. H. KELLOGG, M. D., *Superintendent*

BATTLE CREEK, MICHIGAN
1908

"*Nature alone can cure; this is the highest law of practical medicine, and the one to which we must adhere. . . . Nature creates and maintains; she must therefore be able to cure.*"

—*Dietl* (*1845*).

"*Diseases are not entities that have entered into the body; they are not parasites that take root in the body; they merely show us the course of the vital processes under altered conditions.*"

—*Virchow* (*1847*).

Gage Printing Co. Ltd.
Battle Creek, Mich.
PRINTERS AND ENGRAVERS

FOREWORD

THIS little brochure is presented to the medical public in response to the request of many physicians for a concise epitome of the Battle Creek Sanitarium System.

After mature consideration it has seemed proper to comply with this request because of the surprise and interest manifested by hundreds of physicians who have visited the institution,—surprise because what they found was so far different from what they had expected to find, and interest because of the number of practical applications of the latest resources of scientific medicine here systematically employed, the use of which is difficult or impossible without the facilities, apparatus, and trained assistants afforded by a specially equipped establishment.

An earnest effort has been made to present a picture of the work carried on at the Battle Creek Sanitarium as nearly as possible as it is daily seen in actual operation.

The existence throughout the country of institutions which have adopted the name "Sanitarium," although really nothing more than medical boarding-houses, has given to the medical profession as well as to the laity many wrong impressions concerning the character of a thoroughly scientific and up-to-date sanitarium. It seems but just that the profession, at least, should know that there "is a difference," that the name has been widely exploited and in numberless instances most unworthily represented, and that there is a wide contrast between a scientific sanitarium and the growing multitude of institutions which imitate the name without duplicating the thing itself.

The generosity of the original founders of this institution in devoting all earnings to its equipment, operation, and betterment, and the altruistic spirit which has always dominated its management, have rendered possible the building up of a scientific medical philanthropy in which the attempt is made—

First.—To put into actual, effective, and systematic use every practical method which modern medical science has provided for the accurate determination of deviations from the normal standard of health in structure or function, and for the estima-

MAIN BUILDING, DEDICATED 1878, WITH FIRST ADDITION MADE IN 1884.

tion of the amount of such variation, so far as possible expressing these variations by means of coefficients, so as to make exact comparisons possible.

Second.—To make available in most approved form every rational curative means known to medical science, so that the same may be brought to bear in any individual case, giving special prominence to physical therapy, or so-called physiologic therapeutics.

Third.—To combine with the special professional, technical, and institutional advantages of the modern hospital, the luxuries and comforts of the modern hotel, adding the genial atmosphere, security, and freedom of the home, characteristics which constitute the genuine sanitarium.

Fourth.—To organize and carry forward various lines of research having for their purpose the improvement of the conditions of human life, especially in relation to diet and nutrition.

Fifth.—The organization and maintenance of various charities, especially hospitals and dispensaries for the treatment of the sick poor.

It is, of course, impossible to present on paper anything like a realistic picture of a work which is necessarily so extensive in volume and so complex in detail; but it is hoped that the numerous accompanying photo-reproductions may aid the reader in forming a definite conception of the Battle Creek Sanitarium System as it is seen in daily practice.

CONTENTS

CONTENTS

THE WATER CURE—1866.

THE BATTLE CREEK SANITARIUM—1876.

HISTORY

FORTY years ago a little band of men who believed in altruism and human progress purchased a small two-story farmhouse in a fine grove in the edge of the village of Battle Creek, and opened a water-cure under the name of "The Health Reform Institute."

Reorganization.

Ten years later the enterprise, after having passed through various vicissitudes and having failed to achieve any considerable degree of success, was placed in the hands of the present management, with twelve patients and a half dozen small two-story wooden buildings.

The new management inaugurated new policies, and introduced new methods and principles. The empirical methods of the oldtime water-cure were replaced by rational hydrotherapy, and as rapidly as possible new methods, appliances, and apparatus were added, in the effort to create an institution which would show in practical operation all the resources of rational and physiologic medicine.

The management of the new institution sought, by the aid of the various means of precision afforded by scientific medicine, to perfect, and thus place upon a rational basis, those natural curative agencies which, having chiefly originated with the laity, were formerly employed almost exclusively by empirics.

Those physicians who came in contact with the institution soon recognized the new order of things, and generally gave much appreciated encouragement. At that time there existed no institution which combined the comforts of the home and the hotel with the medical advantages of the hospital and the added facilities and equipment requisite for the administration of baths of every description, electricity in its different forms, medical gymnastics, and other rational agencies, with careful regulation of diet.

Origin of the Name.

The new management and new policies demanded a new name. The word "sanatorium" was then defined by Webster's dictionary as a term used in England to designate a health resort

THE MAIN BUILDINGS BURNED FEBRUARY 18, 1902 for invalid soldiers. A change of two letters transformed "sanatorium" into "sanitarium," and a new word was added to the English language.

The various changes effected, including radical improvements in the equipment, the establishment of a training school for nurses, and the organization of a corps of scientifically trained physicians, rapidly won the confidence of both the profession and the public, so that within a few months one hundred patients were under treatment; and the management began the erection of a building especially adapted to sanitarium work, the first of the kind, and capable of accommodating two hundred guests.

Within a year the new structure was dedicated (1878), and for twenty-four years thereafter new structures were added, at intervals of four or five years, to accommodate the growing family, which in the summer of 1901 numbered some seven hundred guests.

Fire and Reconstruction.

The fire of February, 1902, consumed the main building and the hospital. The brick and wooden structure was replaced by an up-to-date and absolutely fireproof building, symmetrically planned, and amply equipped to meet the increased needs.

The gradual growth of the institution is shown by the following figures:

The total number of patients during the first year was................	106
Ten years later, the total number of patients during the year (1876-7) was	208
After another ten-year period, the total number of patients for the year (1886-7) had grown to	825
During the year 1896-7 the number of patients was..................	1,584
During the year 1906-7 the number was	2,800

The above figures represent less than half the actual number of guests. The actual number of patrons during the year 1906 was 7,006.

The care of this multitude of patients requires eight hundred to a thousand persons, including thirty physicians and two hundred nurses and bath attendants. Most of the patrons of the institution are persons who are suffering from chronic disease, especially gastric and nervous disorders. Insane persons, epileptics, and persons suffering from tuberculosis or other communicable diseases, are not received. The guests always include a considerable number of persons who are below par physically

WHAT WAS LEFT FEBRUARY 18, 1902.

LAYING THE CORNER STONE OF THE NEW BUILDING, MAY 11, 1902 from overwork or other cause and visit the institution for the purpose of increasing their efficiency by general health culture and training.

The Physiologic Method.

The *Physiologic Method,* sometimes referred to as "the natural method," was thirty years ago almost entirely in the hands of empirics. Through the application of the scientific method to the various hydriatic and other procedures of the natural method, they have been rescued from empiricism and have been organized into a rational system. The physiologic method consists in the treatment of the sick by natural, physical, or physiologic means, scientifically applied.

The application of the physiologic method requires much more than simply a knowledge of the technique of baths, electricity, movements, etc. It especially requires a knowledge of physiology, and an intelligent grasp of all the resources of modern medical science. For, while the physiologic method depends for its curative effects upon those natural agencies which are the means of preserving health, and which may be relied upon to prevent disease as well as to cure it, it recognizes and employs as collateral and supplementary remedies, all rational means which have by experience been proved to be effective as adjuvants or palliatives.

The Physiologic Method Deals with Causes.

The physiologic method concerns itself first of all with causes. In the case of chronic maladies, these will generally be found in erroneous habits of life, which, through long operation, have resulted in depreciation of the vital forces of the body and such derangement of the bodily functions that the natural defenses have been finally broken down, and morbid conditions have been established.

Chronic disease is like a fire in the walls of a house which has slowly worked its way from the foundation upward, until the flames have burst out through the roof. The appearance of the flame is the first outward indication of the mischief which has been going on; but it is not the beginning. It is rather the end of the destructive process.

As Hericourt, the learned author of "Les Frontiers de la Maladie," has so well pointed out, the man who is recognized to be suffering from chronic disease, even though the malady

Dedication Exercises

The Committee Representing the State of Michigan

extends to you a cordial invitation

to be present at

The Dedication of the Battle Creek Sanitarium

at

Battle Creek, Michigan

Sunday, May 31st 1903

Aaron T. Bliss, Governor, Chairman
Perry F. Powers, Auditor General
Charles Smith, Senator Thirty-second District
Committee.

may be said to be in an incipient state, has really been ill for some time, as the existence of the disease is evidence of the long-continued insidious operation of subtle causes which have gradually consumed the patient's vital capital, wiped out his margin of safety, and established definite and often permanent pathological conditions. Disease, then, is not the chief object of attack, but the causes of disease.

The physiologic method does not undertake to cure disease, but patients. It recognizes the disease process as an effort on the part of the body to recover normal conditions,—a struggle on the part of the vital forces to maintain life under abnormal conditions and to restore vital equilibrium.

No Routine.

As regards the methods of dealing with individual ailments, the Battle Creek Sanitarium System offers no panaceas and claims no secret methods or processes. There is no routine or "course of baths," no violent heroic measures, no empirical formulas for any disease or class of maladies. The "system" is simply a rational plan of leading the invalid out of suffering and inefficiency into health, comfort, and useful activity. Its claims as a system are based (1) upon the working plans which thirty years of experience have developed for the utilization of all rational curative measures, especially those of a physiologic character, combined (2) with the complete supervision and control of the life of the patient, and (3) the application of methods of precision in the study of vital conditions, normal and pathological.

At the outset of his course of treatment, the patient is instructed that his recovery will depend very largely upon himself; that curative power does not reside in the doctor nor in the treatment, but is a vital force operating within the patient himself. The physiologic method is based upon this fact, so well stated by Dietl, the eminent pupil of the great Rokitanski: "Nature creates and maintains, therefore she must be able to heal."

It is the Blood that Heals.

Great pains are taken to render the patient intelligent in relation to these facts and principles. He is taught that it is the blood that heals; that most chronic disorders are the result of deteriorative changes in the blood; that some abnormal content or some deficiency has led to minute functional or structural

DEDICATION OF THE NEW MAIN BUILDING, MAY 31, 1903.

NEW MAIN BUILDING.

changes which, slowly advancing during a long period, have finally resulted in so great a disturbance that attention is called to the fact by symptoms, so that he discovers that he is ill; that the chronically sick person is in a state of low vital resistance, and hence that his treatment necessarily requires, first of all, the exact regulation of all his habits, and the establishment of natural conditions of life. The simple life and return to nature are the ideals constantly held up before him. He must work out his own salvation; he must "cease to do evil and learn to do well;" he must cease to sow seeds of disease, and by every means in his power cultivate health.

He is thus made to understand that the successful treatment of his case is as much a matter of careful training as is the preparation of a boat crew or a fine trotting horse for a race.

ROOF GARDEN, MAIN BUILDING.

DISPENSARY AND OFFICE BUILDING.

THE BATTLE CREEK SANITARIUM SYSTEM

THE Battle Creek Sanitarium was a pioneer in the system of managing chronic invalids by scientific training under conditions made the most favorable possible for tissue change and constitutional renovation.

There was naturally much prejudice and misconception to be overcome, especially at the beginning, but the conquests of the physiological laboratory and the findings of clinical experience based thereon, have placed this modern therapeutic method, the culmination of ages of experience and research, upon a sure foundation.

The Sanitarium the Workshop of Physiologic Medicine.

Physiologic medicine has come to stay. It is now recognized that the sanitarium, with its scientifically appointed laboratories, is its workshop, where alone all the resources of this newest and most rational of methods of healing may be employed.

The application of this system in a scientific and efficient manner requires a large corps of nurses and assistants who are trained in the technique of hydrotherapy, massage, manual and mechanical Swedish movements, graduated exercises, medical gymnastics, electricity in its varied forms, thermotherapy, mechanotherapy, phototherapy, rational dietetics, the out-of-door method, and various other physical and physiologic agencies, in addition to the methods of ordinary hospital practice. It is only by this concentrated fire from a well-trained therapeutic battery that those Gibraltars of disease commonly called incurable maladies can be made to capitulate.

Trained Assistants.

To conduct a sanitarium on a thoroughly physiologic and scientific plan requires a corps of workers, or "health trainers," averaging for the whole year one and a half to two persons per patient treated. Without the greatest vigilance, the number will increase even to three or more for every patient. For example, at the Battle Creek Sanitarium the number of persons employed is never less than eight hundred, and often rises in the busiest

WEST HALL.

SOUTH HALL.

EAST HALL.

season to more than one thousand. In the summer season the number of patients and employees is about equal. In the winter season the number of patients is about half that of employees. Large numbers of attendants must be in training in preparation for the busy months.

The Business Side.

To do all that can be done for a chronically sick person to assist him to recovery, to surround such a person with every possible advantage known to modern medical science, requires an expenditure for facilities, attendants, and running expenses far beyond any possible income except under one condition, viz., that many of those engaged in the work shall be willing to make a partial contribution of their services, receiving at most merely nominal wages, barely sufficient to meet the actual cost of living on a very simple basis. Physicians, managers, nurses,—everybody concerned in the enterprise, must be interested in it from a scientific and philanthropic standpoint, and willing to consider as chief compensation the satisfaction of seeing men and women restored to health, who, without the services rendered, would have little prospect but the grave.

The Main Buildings.

These consist of four large buildings, chief of which is the central structure dedicated May 31, 1903. This building, which affords rooming accommodations for about 400 guests, contains also offices for the thirty physicians, treatment rooms capable of handling more than 1,000 patients, dining-room accommodations for an equal number, a gymnasium 120 by 66 feet. The bath buildings are three-story and basement, and with the gymnasium are joined to the main building by a semicircular corridor. Within the semicircle is a great Palm Garden, which connects the gymnasium with the lobby of the main building, as shown in the accompanying ground floor plan.

The construction is brick, iron, stone, and Portland cement. There are no wood floors nor partitions. The floors are solid slabs of artificial stone, reinforced by strong iron cables. The partitions are of mackolite. The floors are surfaced with Italian terrazza mozaic.

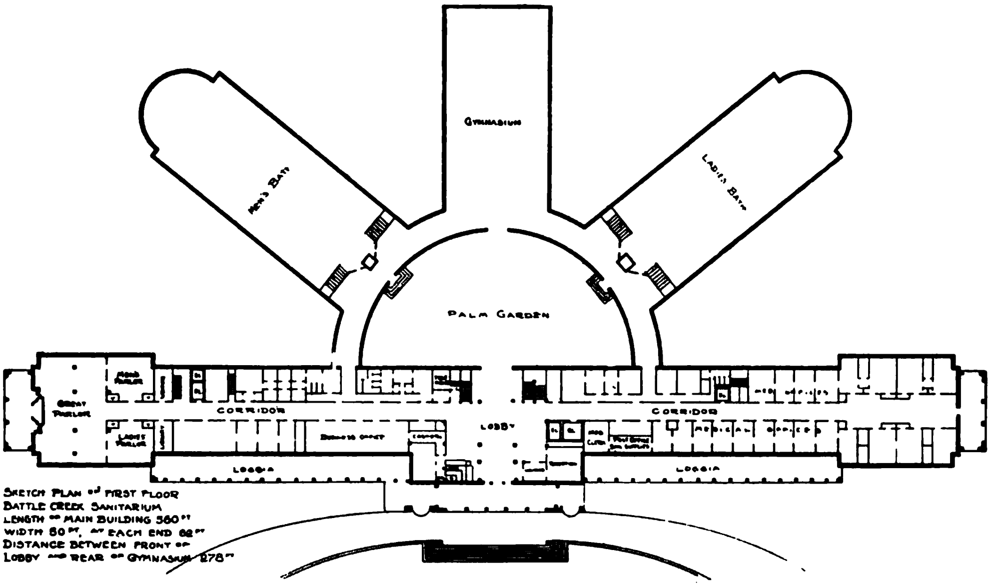
The building being frost-proof as well as fire-proof, it is easy to maintain a uniform artificial climate in the cold months,

THE LOBBY.

THE MAIN PARLOR.

with a day temperature of 70° F. and a night temperature of 55° to 60° F.

A most efficient ventilating system supplies more than one hundred and fifty thousand cubic feet of warm fresh air per minute. The fresh air is admitted warm to the corridors, and distributed by means of individual ducts, connecting each room directly with the open air. The ventilation system is automatic and always works. The duct is of sufficient capacity to give each patient's room an ample supply of air for five or six persons. The air of the building is always and everywhere fresh and



GROUND FLOOR PLAN.

pure, and free from odors of every sort. This is chiefly due to the location of the kitchen and dining-room at the top of the building. The heavy masonry construction of the building and the stone floors render it cold in summer as well as warm in winter. There being no wood floors and no carpets, there is freedom from dust (rugs are used instead of carpets). The wide corridors and simple style of structure secure free movement of air. There are pleasant parlors and ample foyers on every floor. There are also porches and balconies on each floor and a large roof garden, which in summer time is partly covered with awnings and used for outdoor sleeping.

The building has been erected and equipped at a cost of nearly seven hundred thousand dollars, and no pains or expense

THE PALM GARDEN.

has been spared to make it in every way thoroughly fit for the purpose for which it is used.

A Tropical Corner.

A large palm garden (40 x 60 ft.) is separated from the great central lobby by a glass partition, and its fresh, genial atmosphere and delightful tropical plant life make it a favorite place of resort. The corridor leading through the center of the palm garden is the shortest route from the main lobby to the great gymnasium.

The sight of bunches of bananas ripening on huge stems towering more than twenty feet in height suggests the tropic delights of Florida in the midst of the splendid health-winning, pure, winter air of Michigan.

Patients are fond of gathering under the wide-spreading palms to chat over their lunches served on trays while enjoying the tropical scene and the pure fragrant air.

A Recognized Philanthropy which Pays No Taxes.

The institution is incorporated under a statute of the State of Michigan which provides for the organization of hospitals and other charitable institutions, and pays no taxes.

Shortly after the great fire which destroyed the main buildings of the institution the Battle Creek Business Men's Association and Board of City Aldermen, by request of the Sanitarium Management, appointed a committee consisting of three of the leading business men, a leading clergyman, and the president of the City Bank, to look into the affairs of the institution. The two pages which follow present the essential portion of the committee's summary of their findings respecting the object, character, work, and administration of the institution:

REPORT OF THE CITIZENS' COMMITTEE

"Summing up the results of our investigations, we have to report as follows:—

"1. The Sanitarium is organized under the provisions of Act No. 242 of the Public Acts of the State of Michigan as a philanthropic and charitable institution.

"2. The Articles of Association of the Battle Creek Sanitarium, so far as they relate to the questions involved in our investigation, provide as follows:—

"'The objects of said corporation and other matters germane and auxiliary thereto, are as follows:—

The Charitable and Philanthropic Objects of the Organization.

"'To found a hospital or charitable asylum within the State of Michigan for the care and relief of indigent or other sick or infirm persons, at which institution may be received also patients and patrons who are able to and do pay for the benefits there received, and which institution shall devote the funds and property acquired and received by it from time to time from all sources, exclusively to maintaining itself, improving its condition and facilities and promoting its purposes, by such sanitary, dietetic, hygienic, and philanthropic reforms and efforts as are germane or auxiliary thereto; all of its said purposes being undenominational, unsectarian, philanthropic, humanitarian, charitable, and benevolent, and in no manner directly or indirectly for private profit or dividend paying to any one.'

"3. It is therefore clear:—

"a. That no profits of the institution can ever accrue or be lawfully paid to any private party or parties whatsoever.

"b. That no funds of the institution can be lawfully sent outside the State to build or support other enterprises of any kind.

"c. That any and all revenues of the institution must be devoted to philanthropic and charitable work within the State of Michigan, and to developing and extending the facilities of the institution itself, and for these purposes only.

"d. That all of the property of the institution is held in trust for the above philanthropic and charitable purposes only.

"e. That title to any of the property of the institution can never be passed to any private party or parties whatsoever, but can only be transferred at the expiration of the statutory limit of the corporation to the trustees of another corporation organized for the same purposes and under similar restrictions. . . .

"The revelations made by our investigations have been a surprise to us. Not only were we personally unaware of the wholly philanthropic nature of the institution, under the law, but we were also unaware of the vast amount of charitable work performed by it, and the wonderful sacrifices made by the managers and employees generally. There are over eight hundred of these employees—physicians, nurses, helpers, etc. Dr. Kellogg donates to the Sanitarium all the services he performs for it, including all surgical and professional fees. He receives no salary or compensation whatever, and has not for years; on the contrary, he contributes annually from his private resources thousands of dollars. The large corps of physicians receive no professional fees, and only weekly wages so small that their services are practically a charity. This is also true of the hundreds of nurses and helpers. They are a band of sincere people conscientiously devoting themselves to a great work for humanity, and not for personal gain. . . .

"The more deeply we have gone into the investigation, the more convincing and overwhelming the proofs have become of the straightforward management, the lofty purposes, the widespread beneficence of the institution, and above all, of the personal devotion and wonderful self-sacrifice of the nearly one thousand persons employed in it, from Dr. Kellogg down to the youngest helper.

"Respectfully submitted,

"S. O. BUSH,
"I. L. STONE,
"GEO. E. HOWES,
"W. S. POTTER,
"NELSON ELDRED,
"Committee."

AN EXAMINING OFFICE.

THE LADIES' RECEIVING OFFICE.

MEN'S CORRIDOR.

WOMEN'S CORRIDOR.

THE EXAMINATION OF PATIENTS

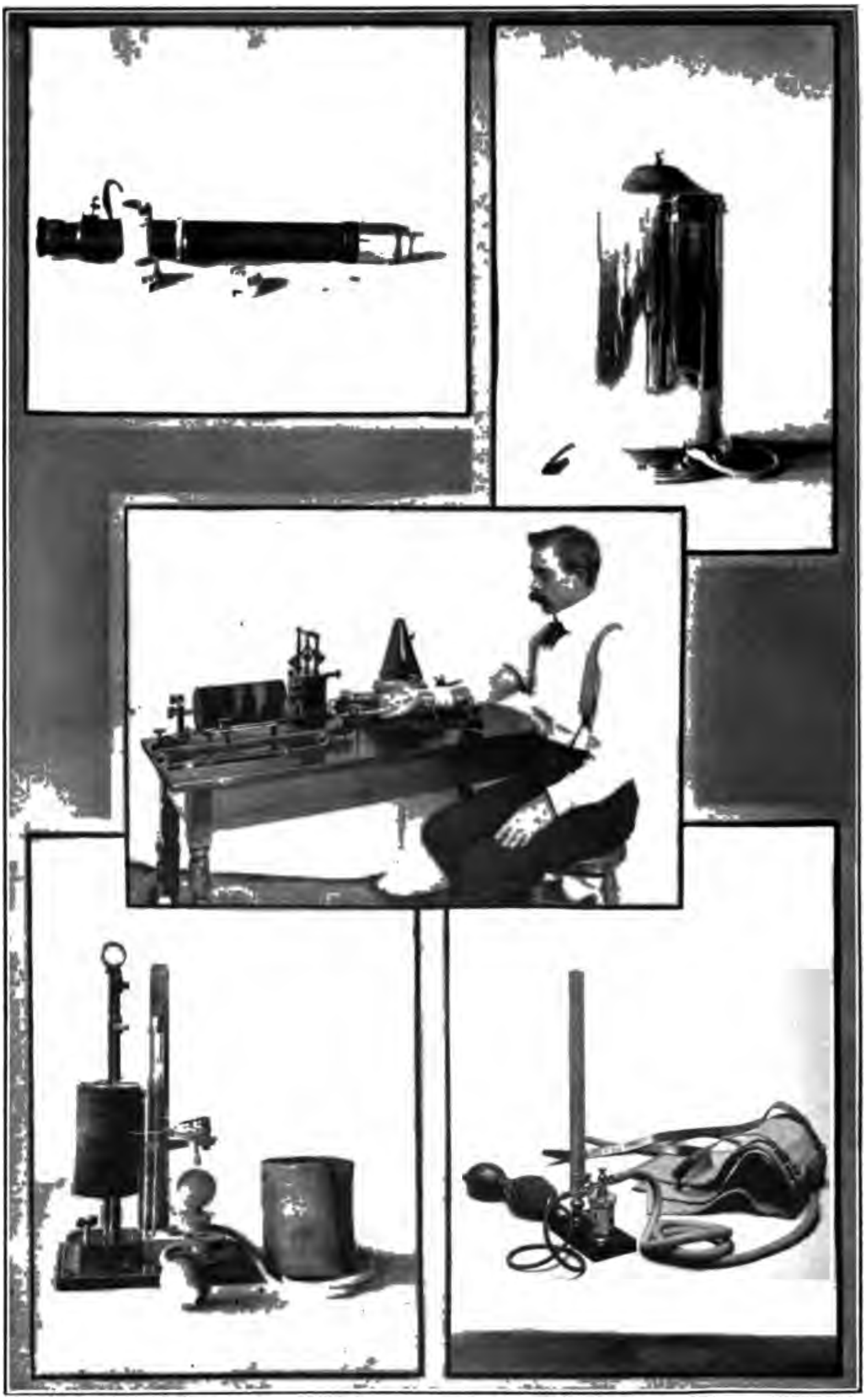
THE application of the physiologic method requires for its foundation much more than an answer to the question, What disease has this patient? Is it rheumatism, dyspepsia, locomotor ataxia, neurasthenia? etc. It demands a minute inquiry into the exact vital status of the individual; a determination of the degree of activity and efficiency of each of the great bodily functions. It requires a complete inventory of the patient's vital assets.

To accomplish this, the patient must be tested and calipered by every means known to science, and the results must be reduced to the most exact mode of expression, to coefficients when possible, for convenience of comprehension and comparison.

These examinations must be made, not once, but many times, being repeated at frequent intervals, so that the effects of treatment may be recognized, and any necessary modifications may be made.

Initiation of the Patient.

The patient, on his arrival at the Sanitarium, after having selected his room, visits the medical office, where his name and address are taken by the receiving physician, and a few general facts respecting his case ascertained, sufficient to make clear the general character of his case; that is, whether it be surgical or medical, and if medical, whether the services of a specialist will be required, and if so, which department is indicated. The patient is then assigned to the particular one of the thirty physicians employed in the institution who is especially qualified by training and experience to best deal with his particular case, and there is placed in his hand a blank prescription booklet which bears his name and number, together with the name of the physician to whom he is assigned. In this booklet will be recorded the various prescriptions for hydrotherapy, phototherapy, electrotherapy, mechanical and manual movements, walking, swimming, and other exercises, hours for rest, suggestions concerning



INSTRUMENTS EMPLOYED IN DIAGNOSIS.

diet, including the quantities expressed in calories of proteids, carbohydrates and fats, and general suggestions. The book also contains blanks for the records of the daily meals, of strength and weight tests, and a blank program on which the physician will indicate the hours for the various treatments, exercises, and measures to which the patient is to be subjected during each day.

The physician designated takes the patient in hand, and listens to his own account of his ailments. Assistance is often rendered by the letter of introduction which the patient often brings from his home physician. In this examination the aim is not simply to discover symptoms but to learn the exact state of the fundamental vital processes,—what is the condition of the patient's metabolism? Does metabolic insufficiency exist? Is an abnormal degree of tissue destruction taking place? To what degree is the functional efficiency of each vital organ or set of organs diminished, especially as regards muscles, heart, lungs, stomach, blood, liver, kidneys? All known means are brought to bear to discover any possible organic changes in the brain or nerves, heart, liver, kidneys, arteries or other vital parts. Special emphasis is laid upon certain points which are of particular interest in the application of hydriatic and other physiologic methods.

The patient removes his clothing, or so much of it as is necessary, and is subjected to a minute physical examination.

Then examination of the viscera is made so far as they are accessible by physical means, inspection, palpation, auscultation, percussion, etc.

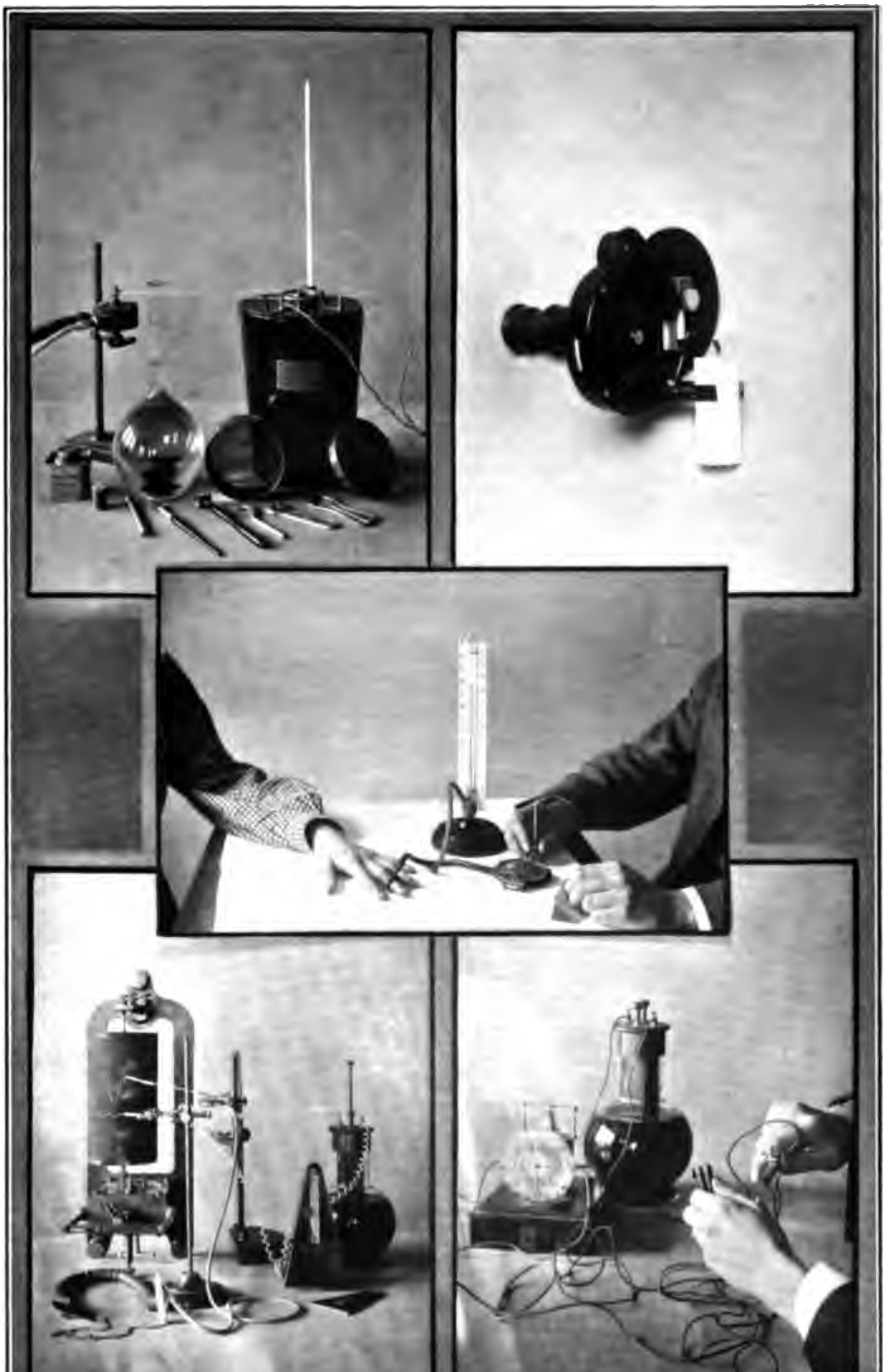
In cases which indicate the necessity therefor, an internal examination is made.

The patient is referred to experts in various departments as the indications may suggest.

Skiagraphy and photography render valuable service.

Examination of the Skin.

In making the physical examination, first attention is given to the skin, note being taken not only of the color of the skin, as indicative of anemia, chlorosis, Addison's disease, jaundice, metallic poisoning, certain drug effects, etc., and of the presence or absence of common skin maladies, but also of its texture and appearance,—whether it is dry or moist, etc. The effects of mechanical and thermic stimuli are studied. Special note is taken of the indications of intestinal autointoxication, concern-



INSTRUMENTS EMPLOYED IN DIAGNOSIS.

ing which the skin rarely fails to give accurate and reliable information. In the employment of hydrotherapy, the study of the skin is particularly important, for the reason that a bloodless, hide-bound skin, dry and rough to the touch, not only indicates a deficient peripheral circulation, but is also necessarily associated with an excessive accumulation of blood in the viscera. An anemic skin generally means a congested liver, and the same condition of other viscera. Hydriatic and other physiologic methods are the only means by which this condition of the skin can be permanently improved, hence the only means by which visceral congestion can be definitely removed.

Examination of the Mouth and the Tongue.

Careful inspection of the mouth affords information not only in relation to the teeth, but of the body in general, for decay of the teeth or disease of the gums is very frequently a local indication of general vital deterioration; and an infected state of the mouth may be an efficient and continuing cause of intestinal or gastro-intestinal autointoxication. The condition of the tongue and the breath is an important indication in relation to intestinal autointoxication, a condition of primary importance in the etiology and the therapeutics of chronic disease.

Bacterial cultures are made in cases in which there is reason to suspect infection of the mouth with pathogenic bacteria. The throat, nose, tonsils, and pharynx are inspected especially with reference to local infection and a possible relation to intestinal autointoxication or other systemic disease.

The Dentist and the Dental Nurse.

A dental surgeon is prepared to give the teeth and gums any needed professional attention, and a well-trained dental nurse is ready to give daily or weekly aid to patients, as may be needed, in cleansing or polishing the teeth or administering other mouth treatment under professional supervision.

Testing the Lungs and the Heart.

The lungs are examined by the ordinary means, including determination of the lung capacity. In addition, determination is made, by means of dynamometers, of the strength both of the diaphragm and of the muscles of the chest. Imperfect aeration of the blood is not infrequently the result of weakness of the respiratory muscles, although the actual lung capacity may be

BLOOD EXAMINATIONS.

ample. Many feeble invalids live in a state of half asphyxiation, notwithstanding a splendid lung capacity, because of deficient respiratory activity.

In addition to a stethoscopic examination and a careful noting of all the indications of cardiac or circulatory disturbances, a determination is made of the blood-pressure, both systolic and diastolic.

Specialists in genito-urinary diseases of both sexes make such examinations as may be indicated, and prescribe such treatment as each individual case may require. The same is true of other special disorders, medical or surgical.

An earnest effort is made to keep fully abreast with the latest advances of the profession in every department. Of the thirty physicians on the staff of the institution, one or more may nearly always be found absent at some of the great medical centers of this country or Europe, looking into some new laboratory discovery or some recently perfected surgical procedure which may be utilized in behalf of the thousands of sick people who annually come for relief. The management recognizes the fact that for quite a large proportion of their patrons the visit to the Sanitarium is a *dernier resort,* and hence feel keenly the responsibility resting upon them to see that no one whose case is curable by any known means or combination of means goes away disappointed.

Study of the Blood-Pressure.

The arteries are examined for evidence of degenerative change, note being taken of the condition of both the arteries and the veins. Sphygmographic tracings are made of the pulse, and cardiographic tracings are made when there is any indication therefor. The growing prevalence of arteriosclerosis, and the recognition of the important part which this disorder plays in a large number of chronic maladies, give to this feature of the examination an importance which has come to be fully appreciated only in recent times.

This research is especially important in the employment of the physiologic method for the reason that this method is the most efficient remedy for disorders of blood-pressure. These conditions are purely symptomatic, and can be relieved only by dealing with their causes. It is now generally recognized that drugs which raise or lower blood-pressure are only palliative in their effects, and, on the whole, do more harm than good. Most

Dr. E. K. H.

No. 37123

BATTLE CREEK SANITARIUM CLINICAL LABORATORY

REPORT ON BLOOD EXAMINATION

Case of Mrs. E. S. *State* Iowa

			PER CENT
Hemoglobin. Dare			64
Red Cells. No. 3,500,000 per cu. mm.	(Normal { Men - 5,000,000 / Women 4,500,000 })		77
White Cells. No. 16,800 per cu. mm.	(Normal 7,500)		225
One to 208 red (Normal 1 to 666)	**Color Index or Coefficient**		83
Specific Gravity (Hammerschlag)			1049

Blood Pressure. Systolic 125 Diastolic 110

Pulse 96

DIFFERENTIAL COUNT OF 600 LEUCOCYTES

NORMAL ELEMENTS	NUMBER COUNTED	PER CENT OF ENTIRE LEUCOCYTE COUNT	NORMAL PER CENT	PATHOLOGICAL ELEMENTS	
Small Lymphocytes	360	60	(22-25)	Myelocytes	+
Large Lymphocytes	90	15	(3-6)	Normoblasts	
Large Mononuclear Leucocytes			(1-2)	Intermediate	
Transitional Forms	+	+	(1-2)	Megaloblasts	
Polymorphonuclear Neutrophiles	140	23.	(70-72)	Microcytes	+
Eosinophiles	13	2.	(2-4)	Macrocytes	+
Mast Cells	7	1.	(.5)	Poikilocytes	+

Average measurement of red cells 7 1/2 mikrons. (Normal 7½ mikrons.)

Morphology.

Parasites and other pathological elements None present

This test to be repeated in

Remarks

A. W. N. *Analyst*

Date 8/26 1907 12 ~~A.~~ M.

EXAMINATION OF THE BLOOD.

drugs which diminish high blood-pressure ultimately produce secondary low pressure, a still worse condition.

The resources of hydrotherapy render most valuable service both in high-pressure and low-pressure cases. In their application, these measures must be most carefully gauged by the findings of the sphygmomanometer.

In making blood-pressure determinations, both the systolic and diastolic readings are recorded.

These examinations are made by an expert daily at the general medical office at 12 M. to 1 P. M. Patients are examined in their rooms when unable to visit the office.

The large number of blood-pressure determinations which have been made, numbering to date (Dec. 31, 1907) over 29,748, have demonstrated some very important practical facts in relation to the advantages of the physiologic method. A second examination nearly always indicates a marked fall within two or three weeks in high-pressure cases; while an equally favorable rise occurs in cases in which the blood-pressure is abnormally low. This fact, it is believed, demonstrates in a large way the advantages of the antitoxic diet and toxin-free regimen.

When the blood-pressure has been brought down from 250 mm. to 150 mm., or near the normal limit (a not infrequent achievement), by the correction of the patient's habits of life and the application of physiologic measures, and without the use of drugs of any sort, there is good ground for expectation that by carefully following a rational regimen the patient may retain the benefit which has been received, and thus his span of healthful life may be considerably lengthened.

Examination of the Blood.

This includes not only the determination of hemoglobin by means of Dare's instrument, but a determination of the blood-count,—that is, the number of blood-cells per cubic millimeter, and numerous other determinations.

In cases of anemia, suspected malarial infection, and all cases in which other special indications are present, a differential count of the blood is made. The coagulability, the specific gravity, and the alkalinity of the blood are determined; also, when indicated, the opsonic index.

A bacteriological examination of the blood is made in cases in which such an examination is likely to aid in diagnosis, as in suspected malignant endocarditis and other blood infections.

BLOOD LABORATORY.

Blood determinations are made at the same hour daily, so that the findings may be properly comparable. In cases in which there is marked deviation from the normal standard, frequent re-examinations are made.

Gastric Examinations.

In the office examination the physician makes note of the position of the stomach, which is determined by percussion, palpation, inflation, the X-ray, and other means.

Various tests for determining the gastric motility are made use of.

When there is an indication therefor, a test meal is administered; first, the test breakfast of Ewald; later, if necessary, a test dinner or a test supper, the test meal of Boas, or other special meals, as may be indicated. If the patient vomits, an examination is made of the vomited matters.

Between the year 1893, when the work was organized, and the present time, December 31, 1907, the number of complete examinations made is 28,649.

The nature of the test meals and the method of administration are those ordinarily employed, hence need not be described.* A difference exists, however, in one important particular: the test meal, of whatever sort, is made thoroughly aseptic before it is administered. Care is taken also to make the tube thoroughly sterile. Ordinary bread is not used, as it contains immense numbers of bacteria, and often yeasts and molds. Plain water bread, specially prepared in the form of zwieback, so as to be perfectly sterile and wholly free from either bacteria, lactic acid, or other foreign substances, is invariably used.

The chemical technic employed is essentially that of Hayem and Winter, of Paris, very elaborate and tedious, but of all methods the most exact. This quantitative method gives information which can be obtained by no other, and when supplemented by some of the methods of Toepfer, Mett, and Harley, with some devised in our own laboratory, leaves nothing to be desired.

A thoroughly practical and efficient method of estimating the products of carbohydrate digestion in the stomach was

* Methods of Precision in the Investigation of Disorders of Digestion. Read before the Mississippi Valley Medical Association, Oct. 13, 1892. Modern Medicine Publishing Co., Battle Creek, Mich.

GASTRIC LABORATORY.

GASTRIC LABORATORY.


Working Record Gastric Analysis
October 14, 1907.
PHYSICAL EXAMINATION
BACTERIOLOGICAL EXAMINATION
PRELIMINARY ESTIMATIONS
DIGESTION OF PROTEIDS
DIGESTION OF PROTEIDS Con.
DIGESTION OF STARCH
COEFFICIENTS

worked out in our laboratories some twelve years ago, and has been in use since, having been applied in more than 25,000 cases. This estimation of sugar and other soluble carbohydrates is the only means of determining the degree of activity and efficiency of salivary digestion, which, according to Cannon's experiments, continues in the stomach for an hour or an hour and a half after the beginning of a meal, and hence has far greater importance than was formerly believed.

Bacteriological Examination of Gastric Fluids.

The systematic bacteriological examination of gastric fluids was begun in the laboratory of hygiene of the Battle Creek Sanitarium in the summer of 1895, and has been continuously carried forward since. The technique developed at that time is still followed in its essential details. Then it was generally believed that bacteria were constantly present in the stomach in considerable numbers; but by employing a sterile test meal, it was discovered that bacteria are only exceptionally present in the stomach, and that their presence is an indication of the absence of an efficient gastric juice. In achylia, great numbers of bacteria are always found present, ordinarily two or three millions per c.c. of gastric fluid, but occasionally twenty millions or more. This determination is of the highest importance as an indicator for the application of gastric antisepsis and a test of the efficiency of the methods used.

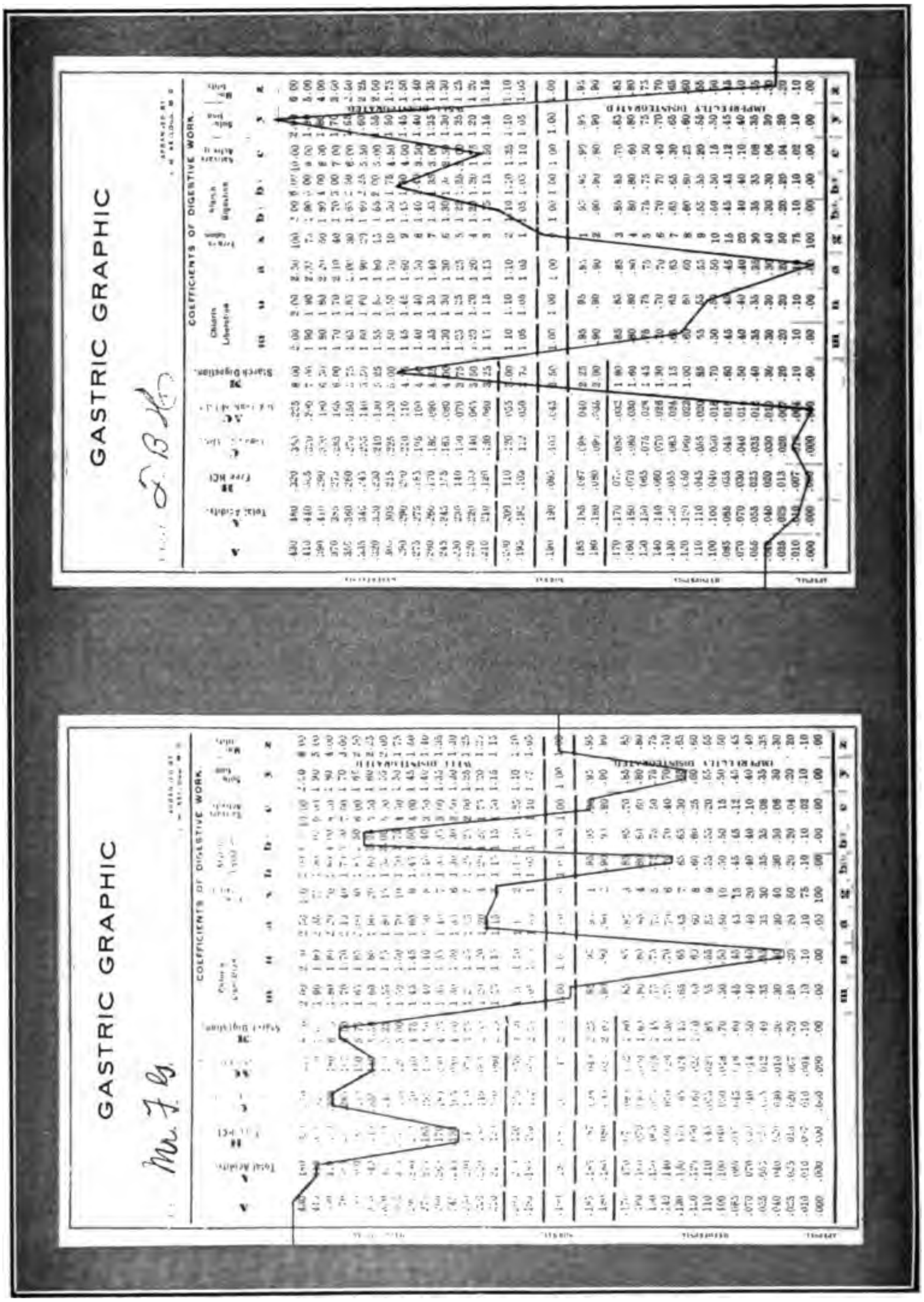
The Gram staining method is employed for direct examination of the bacteria of the stomach contents. This shows at once the presence or absence of pathogenic bateria, and gives an idea of the proportion of anaerobes as compared with aerobes, a matter of primary importance in the therapeutics of this class of cases. A bacteriological examination of the saliva is made in cases in which such an examination is indicated.

The accompanying photo-reproductions of gastric reports (see next page) show the findings in a case of extreme hyperhydrochloria and in a case of achylia.

Examination of the Feces.

Examination of the alimentary residue is scarcely secondary in importance to examination of the gastric contents after a test meal.

Examination of the fecal residue gives us definite information respecting the changes which the food has actually under-


GASTRIC GRAPHIC
GASTRIC GRAPHIC

REPORT OF FECAL EXAMINATION

PHYSICAL

Color Yellow *Odor* Putrid

Form Soft

Amount 62 *Gram, air dried.*

Foreign Substances and Parasites Coarse, undigested food material

Mucus: Shreds Many *Flakes* *Strings*

Connective Tissue 0

CHEMICAL

Reaction Faintly alkaline

Total Nitrogen *Fat* Normal

Bile Normal *Blood* 0

Starch Conversion + *Fermentation* 0

BACTERIOLOGICAL

Anaerobes 35,000 *Millions per gram (dried)*

Aerobes 32,200 *Millions per gram (dried)*

Gram Stain + Many cocci; very many bacilli.

Special Colon bacilli +

MICROSCOPICAL

Starch 0 *Fat* Few *Nuclei* —

Food Remnants Cellulose; vegetable hairs

Mucus + *Parasites* 0

Yellow Ca. Salts Many *Phosphates* 0

Fatty Acids Few *Other Crystals* 0

Pus 0 *Blood* 0

Epithelium 0 *Misc.*

Gastric Digestion Normal *Pancreatic Digestion* Normal

Intestinal Motility 24 hours

Remarks Muco-membranous colitis; evident intestinal autointoxication.

E. H. R. *M. D.*
Analyst.

June 23, 190 7

LABORATORY FOR FECAL EXAMINATION.

gone while passing through the entire length of the alimentary canal. The presence of undigested foodstuffs, of unabsorbed fats, proteids, or carbohydrates, of bacteria swarming in numbers vastly greater than the normal, are important facts which have, until recently, been almost wholly left out of consideration. The examination of the feces for tapeworm and other parasites, though essential, is of small importance when compared with the determination of undigested or unused foodstuffs, and the presence of parasitic bacteria in numbers fifty to a thousand times greater than the normal.

Methods in Fecal Analysis.

The method and technique employed differ in several important particulars from that of Schmidt. Raw meat is not employed because of the varying but enormous numbers of putrefactive bacteria which it contains. When a meat ration is employed, the number of bacteria found is from one hundred to one thousand times greater than with a normal sterile ration. The Schmidt ration also contains a great excess of protein. A sterile ration is employed, the amount of food being carefully proportioned to the size of the individual. The average normal ration is about 2,000 calories, of which one-tenth (200) is proteid, three-tenths (600) fat, and the remainder (1,200), carbohydrates.

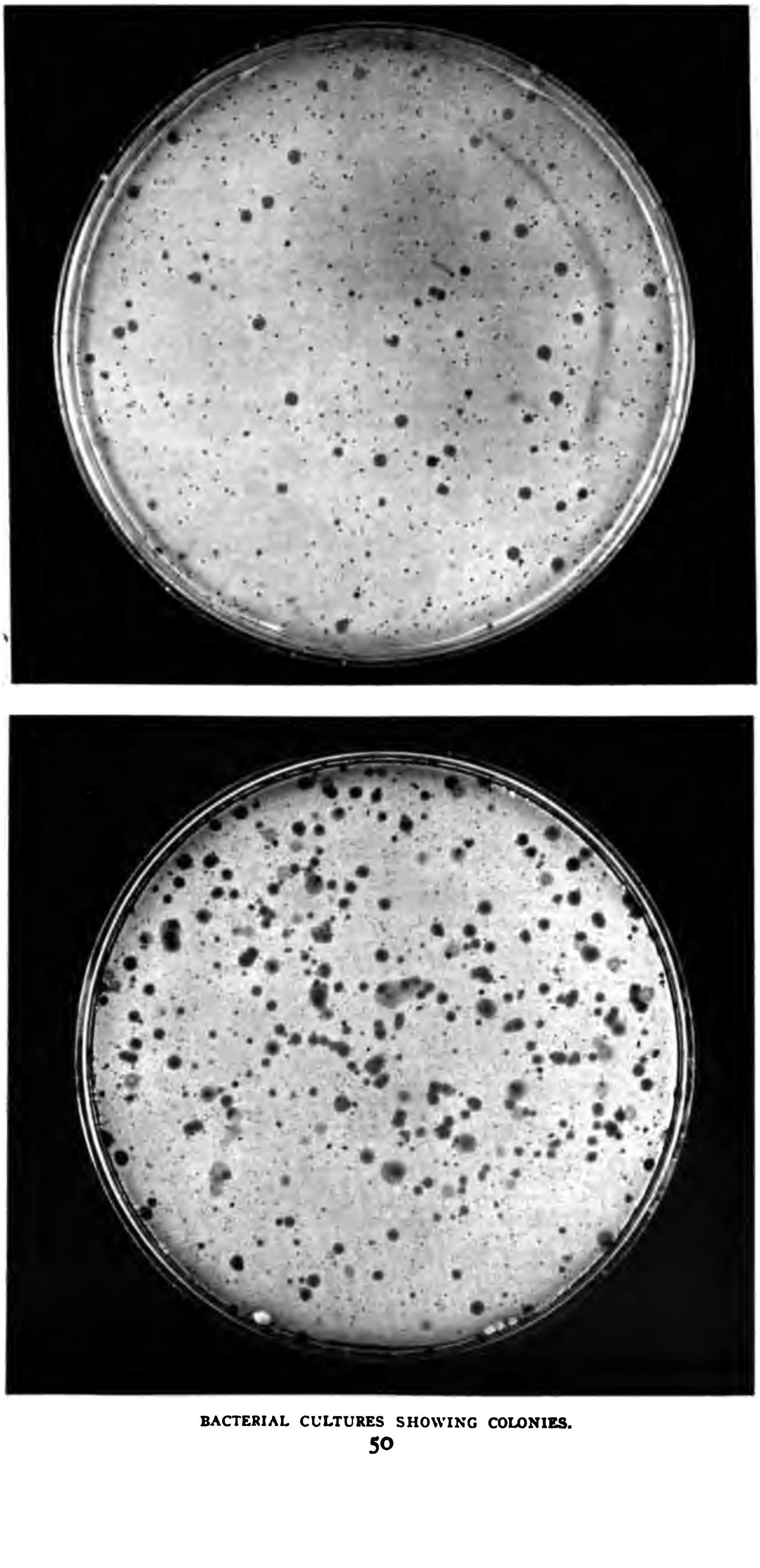
This ration is given for three days. In addition, charcoal is given the first morning to test the motility of the intestinal canal. At noon of the last day a capsule containing raw meat hardened in alcohol and bits of catgut is swallowed to test the activity of the pancreas and the stomach.

The stool is inspected each morning. A bacterial count, and microscopic and macroscopic examinations are made of the first day's stool, and a thoroughgoing examination is made of the stool of the fourth day.

Determinations Made in Fecal Examinations.

The several determinations worked out by means of the test ration and the fecal examination relate to:—

1. The intestinal motility; that is, the length of time required for the foodstuffs to pass the entire length of the alimentary canal. The normal time is twenty-four hours, seven of which are occupied in passing from the stomach to the cecum, fourteen hours from the cecum to the ascending colon, and three



BACTERIAL CULTURES SHOWING COLONIES.

hours in making the transit of the transverse and descending colon and rectum.

2. Disintegration and absorption of foodstuffs. The presence of food in masses which can be readily distinguished by the naked eye is evidence of insufficient mastication and imperfect digestion and absorption, conditions which greatly favor intestinal autointoxication.

3. The digestion of fat.

4. The digestion of carbohydrates.

5. The digestion of proteids.

6. Gastric digestion.

7. Pancreatic digestion.

8. Number of bacteria per gram of dried fecal matters determined by means of plate cultures, both anaerobic and aerobic.

9. The character of the bacteria present, whether pathogenic and of what species.

10. The number of putrefactive bacteria per gram of dried feces.

11. The amount of indol and other putrefactive products, determined by distillation of feces and quantitative analysis of the distillate.

12. Catarrhal and inflammatory conditions of the large or small intestine.

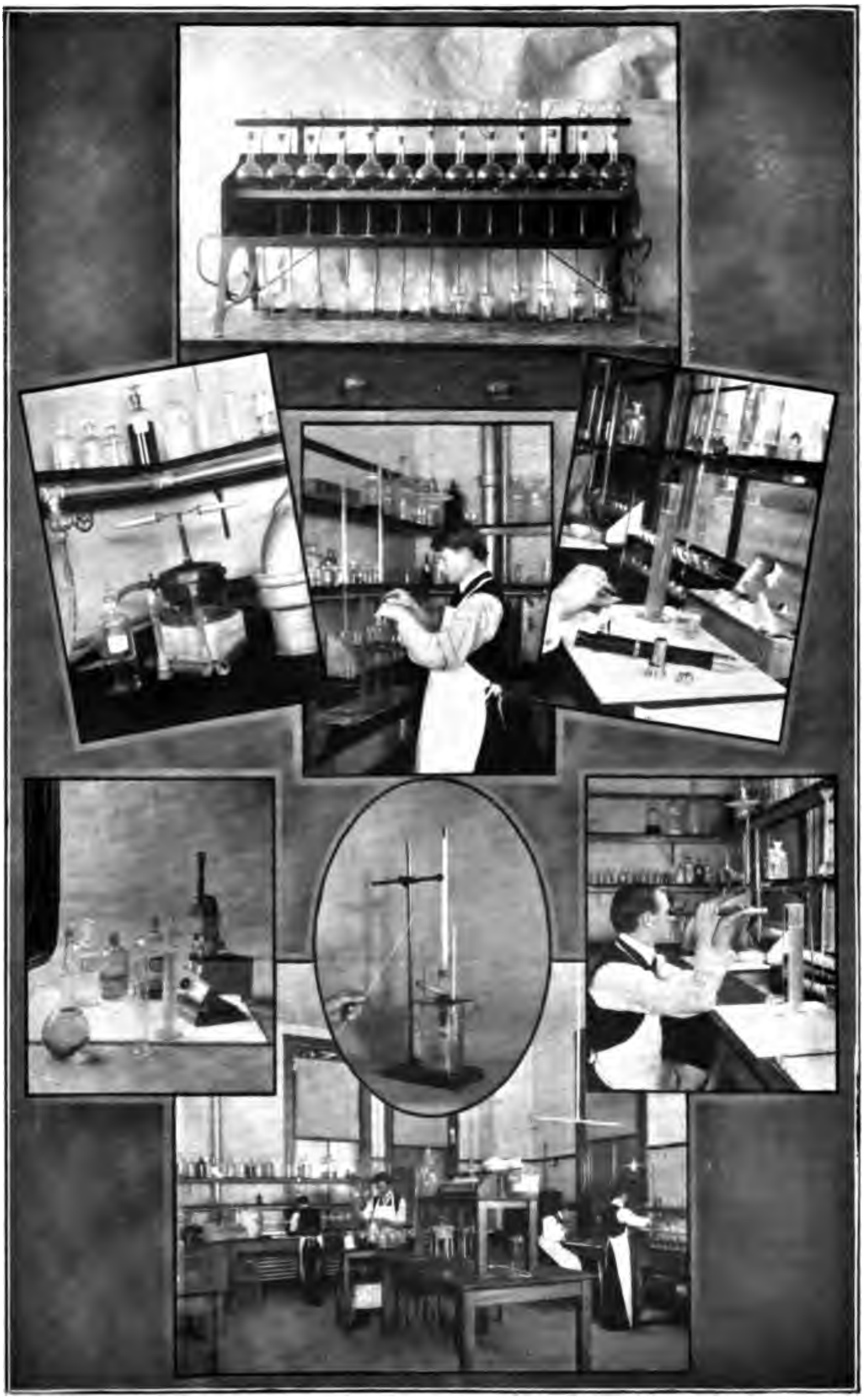
13. Parasites of various sorts.

The accompanying photo-reproduction (see page 47) shows the findings in the fecal examination of a case in which there was pronounced intestinal autointoxication and muco-membranous colitis.

As illustrative of the variation in the bacteria in different pathological conditions and the enormous increase in conditions of disease as compared with the number in health, the following typical records have been selected from examinations recently made in our laboratories:—

Typical Records of Bacterial Count in Feces.

	Millions per Gram (Dried)		
	Anaerobes	Aerobes	Diagnosis
Normal Adult...	50	150	
Mrs. M. G.....	8,960	10,000	Colitis, autointoxication.
Mrs. A. G.....	5,600	7,000	Neurasthenia, colitis.
J. R.	10,000	12,000	Chronic rheumatism, colitis.
N. I. S.........	4,500	8,400	Catarrhal jaundice, hyperhydrochloria.
Miss M. R.....	14,000	15,500	Gastric neurasthenia.
S. H.	9,000	10,500	Neurasthenia, chronic catarrhal gastritis.
Mrs. A. B......	6,580	9,494	Chronic gastric catarrh, autointoxication.



LABORATORY FOR URINARY EXAMINATION.

	Millions per Gram (Dried) Anaerobes	Aerobes	Diagnosis
Mrs. F. B.......	9,333	14,000	Exophthalmic goiter, enteroptosis.
Mrs. R. J.......	11,200	12,400	Exophthalmic goiter.
E. W. Z........	15,400	14,000	Gastric neurasthenia.
Mrs. G. G......	16,500	20,800	Pyosalpinx, enteroptosis, constipation.
Mrs. J. B. H....	14,000	10,500	Progressive muscular atrophy; colitis.
R. E. W.	9,380	11,070	Gastric neurasthenia.
Mrs. G. S. B....	12,300	25,500	Hyperacidity, constipation, ovaritis.
Mrs. W. M.....	22,500	19,800	Chronic intestinal autointoxication.

Strassburger and others have shown that the number of living bacteria found in the feces represents only about one per cent of the actual number present. The dry weight of the fecal matters daily discharged from the bowel is twenty to forty grams, so the figures given in the foregoing table, which represent the number of living bacteria found in a single gram of dried feces, enormous as they are, must be multiplied by at least 2,000 to represent the actual number of bacteria produced in twenty-four hours and to give a proper conception of the enormous quantity of toxic material developed in the intestine when putrefactive processes are active.

The bacteria count is positive in its indication when high, but not always when low. The estimation of indol by means of the colorimetric methods of Herter and Amann, and simultaneously of the indican of the urine, affords a reliable method of measuring the presence and extent of putrefactive processes in the intestine.

In cases in which a pathologic condition of the feces is found, a macroscopic examination of the stool is made regularly twice a week, or in some cases even daily, a chemical and bacteriological examination being made at less frequent intervals, until the normal condition is established.

The Urinary Examination.

As ordinarily made, urinary examinations give comparatively little information; for, as is well known to physiologists, the solid substances found in the urine have two sources of origin; first, the foodstuffs; second, the tissues. No examination of the urine can be considered as exact and resting upon a scientific basis which does not take account of the ingested substances, as well as of those resulting from tissue metabolism. The first urinary examination is made at once on the patient's arrival.

The patient is then put upon a balanced test ration for three days, during which time all the urine is collected. The second

No. 36072

SANITARIUM LABORATORY

EXAMINATION OF URINE FOR

M L. P.

PHYSICAL		MICROSCOPICAL	
		CHEMICAL	
Collected during (hrs.)	24		
Quantity . . . (c.c.)	2400		
Color	Straw	Amorphous Urates	
Deposit	0	Uric Acid Crystals	
Odor	Normal	Calc. Oxal. Crystals	Few
Specific Gravity	1031	Amorphous Phosphates	
Total Solids . . (gm)	173.34	Triple Phos. Crystals	
Freezing Point		Other Crystals	
Refractometer (Daily Valence)	26.192		

CHEMICAL		ORGANIC	
Ac. Terms H_3PO_4 . (gm)	2.40		
Total Nitrogen . (gm)		Casts . . (No. in field)	0 — 1
Urea . . . . (gm)	48.00		Granular
Uric Acid . . . (gm)		Pus Cells . (No. in field)	
Ammonia . . . (gm)		Blood Cells (No. in field)	
Creatinin . . . (gm)		Spermatozoa (No. in field)	
Chlorides . . . (gm)	5.28		
Phosphates . . (gm)		Epithelia	Few
		Mucus	
Sugar . . . . (gm)	120.00		
Phenylhyd. test		Bacteria	
Diacetic Acid	0	Yeast Cells	
Acetone	0		
		Misc.	
Albumin . . (% Vol.)	Trace		
Albumin . . . (gm)			
Bile			
Indican	+		
Diazo Reaction			

E. L. E. *M. D.*, 8/29 *1907*

day, ten grams of salt are given in three equal portions. A searching examination of the urine is made by the most exact methods known to physiologic chemistry. These examinations are made in connection with the three-day research during which the fecal examination is made.

The Three-Day Research.

The morning after his arrival, the patient begins what is termed, for convenience, *the three-day research*. During these three days, he takes a prescribed dietary, which is proportioned to his height, and in which the number of calories of each of the urea or of total nitrogen, can be much better appreciated. The dietary of the patient is not only sterile, but is free from uric acid, urea, creatinin, and other tissue wastes, so that there is no question respecting the origin of the several constituents of the urine examined.

Special tables are reserved in the dining room for those who are undergoing the three-day research. A physician is in constant attendance at these tables during meals to assist the patient in arranging his bill of fare in accordance with his prescription, and to see that he takes the entire ration, or, if not, that the fact, and the amount of the deficiency, is indicated.

Test for Renal Efficiency.

The administration of chlorid of sodium on the second day is for the purpose of testing the efficiency of the kidneys. Achard, Widal, and others have shown the value of this means of measuring renal efficiency. When the kidneys are healthy, nearly all the salt ingested reappears within the same twenty-four hours. When the kidneys have been seriously damaged by disease, and especially when acute nephritis or any other cause of chlorid of sodium retention is present, the chlorids of the second day may not be at all increased, or the increase may be very small. There are, of course, exceptions to this rule in chronic cases. Nevertheless, this test often gives most valuable information, especially in cases of Bright's disease with acute exacerbation. In diabetes insipidus and diabetes mellitus, when the chlorid of sodium content of the urine is very low and does not increase after the administration of salt, the case is certainly one requiring grave consideration.

BACTERIOLOGICAL LABORATORY.

The Bacteriological and Opsonic Index Determinations.

The department was equipped and put into operation some twelve years ago, after a visit to the Pasteur Laboratory of Paris, and other European laboratories, and was placed in charge of an expert who had been trained under Pasteur, in the Pasteur institute.

The discoveries of Wright, of England, added to those of Metchnikoff, have introduced a new method of estimating vital resistance which promises to prove of great importance.

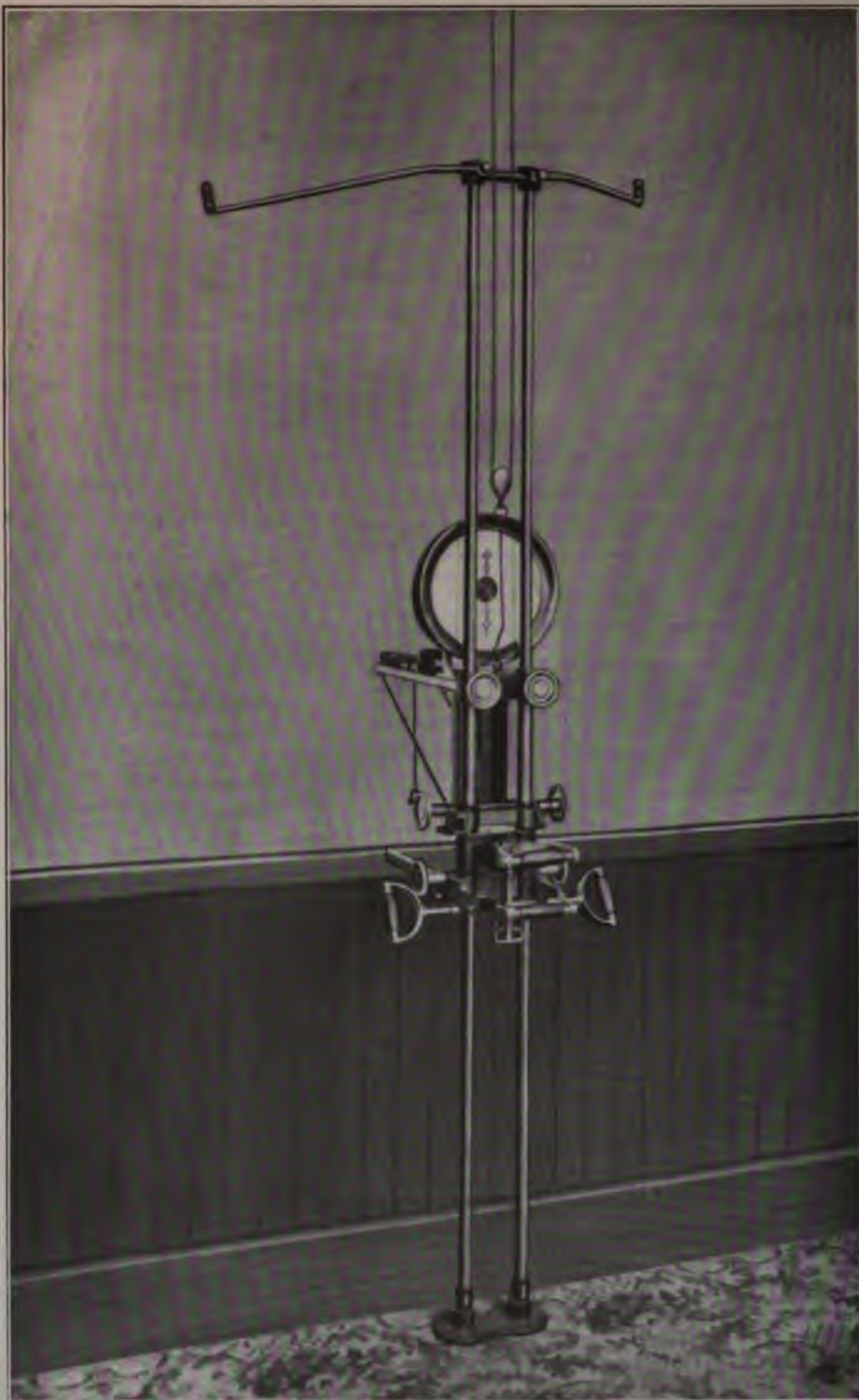
A department for utilizing this discovery is in operation in the Sanitarium laboratory, and is under the supervision of a physician who has had the advantage of special training for this work. This department is found exceedingly helpful in diagnosis and is a necessary guide in the application of the serum treatment in cases requiring the use of this method.

The Clinical Laboratory.

In addition to the ordinary sputum and similar examinations which are made in the department, special researches are made for the purpose of determining the presence or absence of bacteria in the blood and other tissues, and original studies are constantly in progress. A large amount of work is done for the general public and the profession of Battle Creek and vicinity, as the Sanitarium Clinical Laboratory is also the official laboratory for the municipality of Battle Creek.

Hundreds of examinations are annually made of milk, drinking water, and food supplies of various sorts for the Health Department of the city, in addition to special examinations of specimens relating to typhoid fever, pneumonia, diphtheria, and other maladies. The report of this department for the year ending Dec. 31, 1907, showed the following work done:—

Chemical examinations of gastric fluids	2503
Bacteriological examinations of the blood	32
Examinations of the blood, for Widal reaction	140
Bacteriological examinations for diphtheria	192
Bacteriological examinations of sputum for tubercle bacillus	392
Chemical and bacteriological examinations of milk	1285
Chemical and bacteriological examinations of water	52
Blood examinations for blood-count and hemoglobin	5932
Examinations of blood for malarial plasmodia	32
Determinations of the opsonic index	423
Urinary examinations (complete quantitative)	6282
Examinations of feces (bacteriological, microscopical, chemical)	1903



THE DYNAMOMETER.

Anthropometric Examinations.

In the office examination a careful note is taken of the condition of the patient's muscles, his general state as regards weight, etc., but the examination does not stop at this point. By means of a specially constructed dynamometer, the strength of each one of the larger groups of muscles is tested. The patient's weight is carefully determined, and various coefficients are worked out.

The physiologic method recognizes in deteriorated muscular strength both a cause and a consequence of various abnormal states, and hence undertakes to remedy this condition by means of various forms of exercise—passive, active, and active-passive.

The intelligent application of this means requires first of all a careful measurement of the patient's muscular capacity. The strength of the lungs cannot be determined by testing the arms; neither can the strength of the abdominal muscles be measured by determining the strength of the grip. The strength of each of the thirty great muscular groups of the body must be determined and charted in order to get an exact picture of the sum total of the patient's muscular ability.

An attempt to accomplish this, after some years of experiment, resulted in the construction of the Universal Dynamometer, which is in use in many gymnasiums, including those of the leading universities of this country, and has been for years in use by the United States government in its military schools.

The comparative study of the measurements obtained from several hundred persons rendered possible the preparation of a table of strength coefficients of considerable scientific interest.*

The Strength Graphic.

The accompanying photo-reproduction of the graphic blank (see page 61) shows how the results of the dynamometric examination are made visible to the eye. Anthropometric measurements, such as are employed in scientific gymnasia, are also made in each individual case.

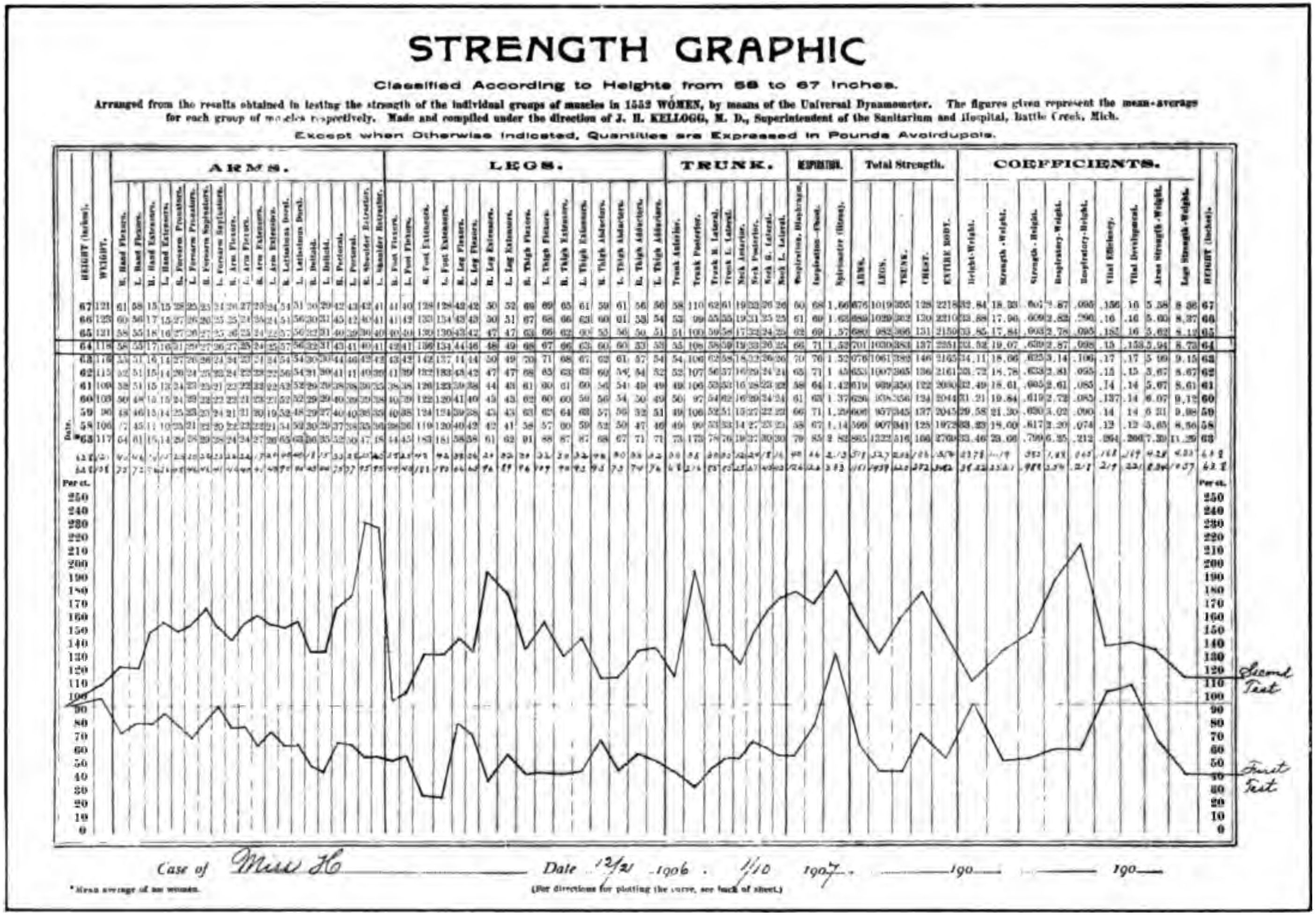
Examinations of 29,166 cases (Dec. 31, 1907) have been made in this department. The standard figures were of course worked out from data obtained from healthy persons. The compilation

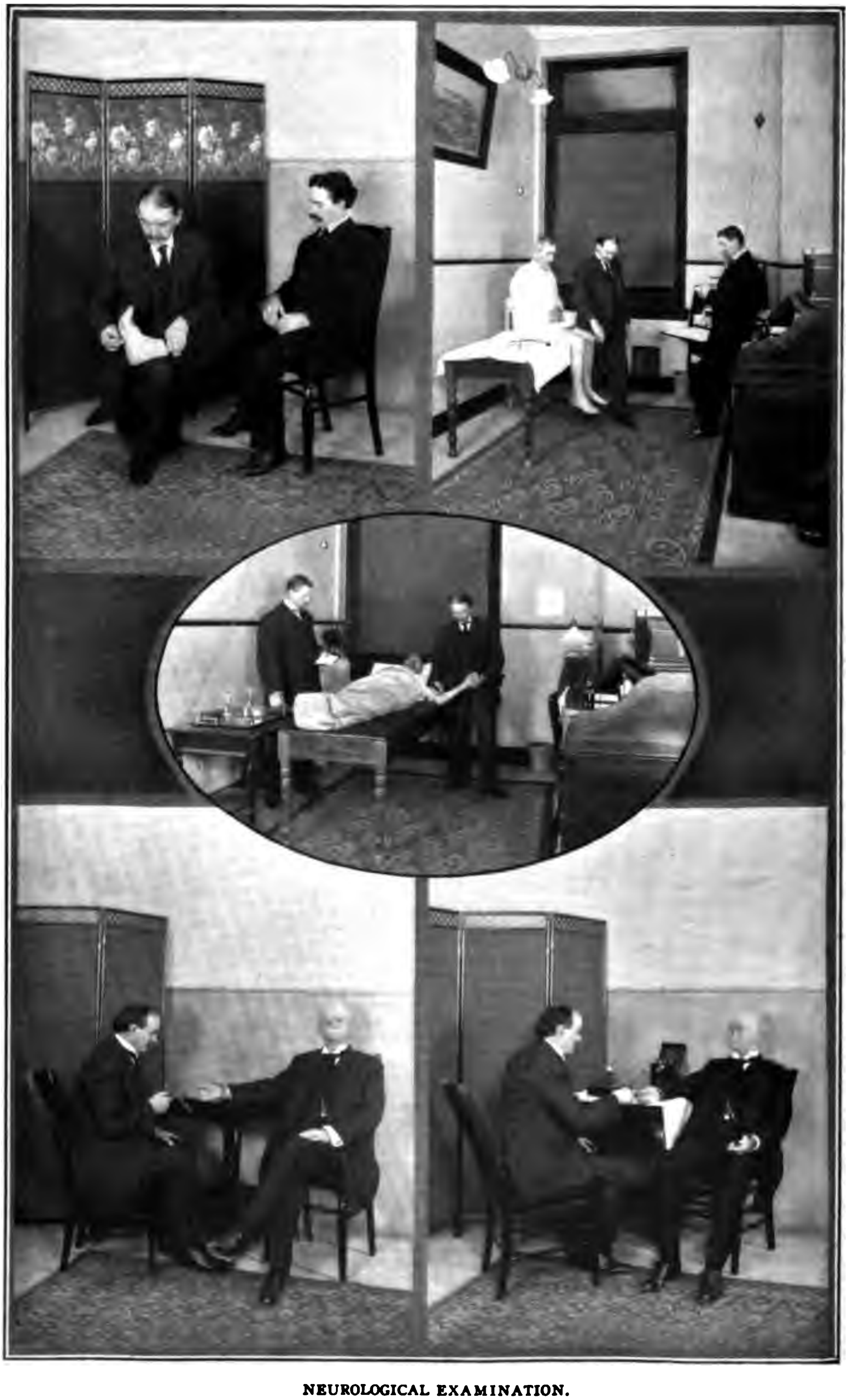
---

* "A New Dynamometer for Use in Anthropometry," "Physical Coefficients." *Modern Medicine,* 1895. Battle Creek, Mich.

"The Value of Strength Tests in the Prescription of Exercise." *Modern Medicine,* 1896. Battle Creek, Mich.

TESTING THE MUSCLES.


STRENGTH GRAPHIC
Classified According to Heights from 58 to 67 Inches.
Arranged from the results obtained in testing the strength of the individual groups of muscles in 1552 WOMEN, by means of the Universal Dynamometer. The figures given represent the mean-average for each group of muscles respectively. Made and compiled under the direction of J. H. KELLOGG, M. D., Superintendent of the Sanitarium and Hospital, Battle Creek, Mich.
Except when Otherwise Indicated, Quantities are Expressed in Pounds Avoirdupois.
ARMS.
LEGS.
TRUNK.
Total Strength.
COEFFICIENTS.
Second Test
First Test
Case of Miss H.
Date 12/21 1906. 1/10 1907. 190 190
*Mean average of 60 women.
(For directions for plotting the curve, see back of sheet.)



NEUROLOGICAL EXAMINATION.

of this data has made possible the preparation of a table showing the strength of various groups of muscles as compared with those of homologous muscles, or muscles of the opposite side in the same individual, and in average individuals of the two sexes.

For ready comparison with the normal standard the results are plotted upon the graphic blank, which is shown in reduced form. By means of this graphic record it is possible to determine at a glance the relation of the strength of any group of muscles to the normal for an individual of given height and sex, as well as the totals for the legs, arms, or any other given part, or for the body as a whole.

Under training, the gain in strength, as shown by the dynamometer, is often very rapid, a gain of 500 pounds in a week being not uncommon. In some instances, persons have been known to gain over 1,000 pounds in total muscular strength in a week.

The Study of the Physique.

In the anthropometric examination, note is taken of the physique and the figure, the condition of such important groups of muscles as those of the back and abdomen, and the respiratory muscles. When necessary, outlines are taken of the body by means of a special device for the purpose, by which deviations from the normal type are graphically shown.

The correction of these deficiencies and deformities is essential to a permanent cure in many forms of chronic disease. A flat chest and a bulging abdomen are almost always associated with intestinal catarrh, constipation, indigestion, gallstones, colon disease, appendicitis, pelvic disease, congested liver, movable kidney, or some other pathological condition which is in part at least the result of muscular weakness or deficient development.

Neurological and Psychological Examinations.

A careful psychological and neurological examination is essential in many cases. Such examinations may afford valuable information in a very large number of the chronic cases which come under observation in an institution like the Sanitarium. For example, neurasthenics are often greatly disturbed by paresthesias and other symptoms which do not indicate organic change of any sort, and which quickly disappear under appropriate treatment.

DENTAL DEPARTMENT.

THE DENTAL NURSE.

MEN'S RECEIVING OFFICE.

A great point is gained in being able to assure such persons by careful neurological and psychological tests that their brain and nerves are sound organically, and that the clamoring sensations which they experience are only the reflected complaints of disordered viscera, or the outgrowth of disturbed metabolism.

Modern neurological and psychological researches have developed a number of new methods by which the structural and functional conditions of the central nervous system may be tested. By subjecting the patient to the proper tests, it is possible to determine with accuracy the actual condition of his leading cerebral and spinal centers, and the extent of deviation from the normal standard may be thus recognized and recorded.

In these examinations the chronometer, kymograph, and various other delicate calipering and measuring devices of the psychologic laboratory are appealed to,* and often with the most interesting results, in showing the variations in the rate of nerve transmission, or the recognition of impressions of various sorts, the time required for judgment or decision, the reaction time with various forms of stimuli, etc.

These tests are exceedingly valuable to the physician employing the physiologic method, in enabling him to know the ability of the patient to respond to the various powerful therapeutic agencies which are at command for utilization in his case. Hydriatic agents are like artillery: they are big guns, capable of accomplishing great good if accurately aimed, but may be equally effective for mischief when used without intelligent direction.

The thoroughgoing examination of the nervous system includes tests for the determination of ten coefficients, as follows:—

1. Psychic reaction.
2. Vasomotor reaction.
3. Pain recognition.
4. Stereognosis.
5. Tactile recognition.
6. Thermic recognition—hot.
7. Thermic recognition—cold.
8. Weight.
9. Location.
10. Pressure.

* "A New Ataxiagraph," by W. H. Riley, M. D. *Modern Medicine*, March, 1896. Battle Creek, Michigan.

Convenient graphic blanks representing the various regions of the body are utilized in recording the pathological conditions which can be graphically represented.

The Photographic Department.

An extensive photographic department is maintained, experienced photographers being constantly employed. The business of this department is to make photographs of pathological conditions when required, as an aid to the medical record, to take photographs of patients when desired by them, and to make slides, photographic enlargements, and other paraphernalia for use in the school of health and other educational departments of the institution. Most of the photographs with which this book is illustrated are the product of this department.

PHOTOGRAPHIC DEPARTMENT.

THE SANITARIUM SYSTEM OF VITAL COEFFICIENTS

WITHIN the last fifty years the laboratory methods introduced by Lehmann, Claude Bernard, and their successors, have steadily moved forward. One after another, great fields of physiologic and pathologic inquiry have been opened up and mastered. The indefinite methods of expressing and recording varying degrees of functional activity have given place to the exactness and precision of mathematical expression by means of coefficients.

The thoroughly rational character of the physiologic method, and the absolute necessity for accuracy in diagnosis and prescription in the practical application of the Battle Creek Sanitarium System, have led the management to lay hold of every new contribution to the coefficient method as rapidly as laboratory research and discovery have advanced in this direction. Every new "index" or "coefficient" of value has been eagerly seized upon when brought forward, and utilized if found of practical worth. A considerable number of valuable coefficients have been worked out in the Clinical Laboratory of the institution.

At the present time some scores of coefficients are utilized. The employment of these coefficients makes possible the mathematical expression of nearly every vital condition, so that with a little explanation it is possible to enable the patient as well as the physician to appreciate just the percentage amount of his deviation from the normal standard of health.

All patients are not obliged to submit themselves to the crucial tests required to obtain all the necessary data for working out every one of these coefficients, but many of them are worked out for each case, and all the determinations are made in any case in which this exhaustive research is required.

Each patient is given a report of the findings obtained in relation to his several coefficients, so that as examinations are repeated from time to time he may be able to see for himself in what direction his case is progressing and at what rate.

THE RECORD VAULT.

STEREOPTICON SLIDE RACK.

The Coefficient Card.

The value of this coefficient system to both physician and patient, especially in dealing with a large number of patients, cannot be overestimated. The coefficient card is like the chart and compass of the mariner. Both the patient and the physician have the satisfaction of knowing the exact situation all the time. This relieves suspense, gives a foundation for correct prognosis, and gives prompt warning to the physician when the patient is losing ground, indicating the need of a change of treatment or regimen, or possibly of the incurable nature of the case.

The value of this exact data in diagnosis and prognosis cannot be overestimated. It renders the physician most excellent service in enabling him to note slight changes for the better or worse which by other means could not be recognized, so that he is never in the dark as to the direction of the patient's progress.

A careful study of a score or two accurately determined coefficients gives so comprehensive a view of a patient's actual condition that the physician need very rarely, if ever, make the mistake of offering a patient encouragement of improvement when his case is not one in which such a result can be obtained.

Advantages of the Coefficient Method.

When the patient knows that he has been calipered and tested by instruments of precision employed in every way to aid exact examination and diagnosis that art and science have rendered possible, he is relieved of the distress of uncertainty and suspense, and goes to work with a will to cooperate with his physician in doing the things necessary to bring his coefficients to the normal standard.

A systematic application of methods of precision in diagnosis, combined with the efficient curative processes of modern physiologic therapeutics, soon effects changes which are as readily recognizable by the patient as by the physician. The patient is encouraged by having something definite to aim at, and goes in for a systematic health training with the same spirit of thoroughness that has enabled him to succeed in business or in social life. He expects results and gets them.

In general, the normal coefficient is 1.00. In a few instances, the coefficient relates wholly to pathological conditions, and hence the normal is .00. Slight departures from the normal are within physiologic limits.

Coefficients which measure the extent of departure from normal by figures lower than normal, that is, 1.00, are indicated by a.

Coefficients which measure the pathological state by figures above normal (1.00) are indicated by b.

Coefficients in which the normal state is represented by zero (.00), pathological conditions being represented by the elevation of the figures above zero, are indicated by c.

Coefficients which indicate a pathological condition when either above or below normal (1.00) are designated by d.

Of the many coefficients which have been devised, the following are of the greatest practical use:—

BLOOD.	Normal
1 Hemoglobin	1.00 a
2 Color index	1.00 a
3 Red cells	1.00 a
4 White cells	1.00 a
5 Alkalinity	1.00 a
6 Coagulability	1.00 a
7 Specific gravity	1.00 d
8 Lymphocytosis	1.00 d
9 Myelocytosis	.00 c
10 Polymorphonuclear leucocytosis.	1.00 d
11 Eosinophilia	1.00 b
Opsonins.	
12 Tubercle bacillus	1.00 a
13 Pneumococcus	1.00 a
14 Typhoid bacillus	1.00 a
15 Streptococcus	1.00 a
16 Staphylococcus	1.00 a
17 Diphtheria	1.00 a
18 Colon bacillus	1.00 a
Blood-Pressure.	
19 Systolic	1.00 d
20 Diastolic	1.00 d
21 Mean	1.00 d
22 Cardiac endurance	1.00 a
DIGESTION.	
Salivary.	
1 Quantitative	1.00 d
2 Qualitative	1.00 a
3 Salivary activity	1.00 a
Gastric	
1 Solution	1.00 a
2 Motility	1.00 a
3 Carbohydrate digestion	1.00 a
4 Proteid digestion	1.00 a
5 Pepsin	1.00 a
6 Rennin	1.00 a
7 Hydrochloria	1.00 d
8 HCl secretion	1.00 d

	Normal
9 Fatty acids	.00 c
10 Bacteria	.00 c
11 Capacity	1.00 d
Intestinal.	
1 Motility	1.00 d
2 Disintegration	1.00 a
3 Digestion of fat	1.00 a
4 Digestion of carbohydrates	1.00 a
5 Digestion of proteids	1.00 a
6 Gastric digestion	1.00 a
7 Pancreatic digestion	1.00 a
8 Bacteria	1.00 b
BRAIN AND NERVES.	
1 Psychic reaction	1.00 a
2 Vasomotor reaction	1.00 a
3 Pain recognition	1.00 d
4 Stereognosis	1.00 d
5 Tactile recognition	1.00 d
6 Thermic recognition—hot	1.00 a
7 Thermic recognition—cold	1.00 a
8 Weight	1.00 a
9 Location	1.00 a
10 Pressure	1.00 a
11 Reaction time	1.00 a
URINE.	
1 Oxidation	1.00 a
2 Demineralization	1.00 b
3 Dechlorination	1.00 a
4 Acidity	1.00 b
5 Alkalinity	.00 c
6 Nitrogen-urea	1.00 a
7 Nitrogen-ammonia	1.00 b
8 Nitrogen-uric acid	1.00 d
9 Nitrogen-extractive	1.00 b
10 Urea-uric acid	1.00 b
11 Phosphaturic	1.00 d
12 Sulphaturic	1.00 a
13 Chloruric	1.00 d
14 Combe's (Auto-intoxication)	1.00 b

	Normal
15 Baumann-Morax (Auto-intoxication)	1.00 b
16 Amann's (Auto-intoxication)	1.00 b
17 Hepatic	1.00 b
18 Hepatic glycogenic	.00 c
19 Renal efficiency	1.00 a
20 Urotoxic	1.00 b
Refraction.	
21 Differential index (δn)	1.00 a
22 Urinary depuration (Vδn)	1.00 a
23 Proportion of abnormal waste to normal waste	1.00 b
24 Mean specific molecular volume of constituents	1.00 b
25 Rate of renal circulation	1.00 a
Cryoscopy.	
26 Freezing point (Δ)	1.00 a
27 Mean molecular weight of constituents	1.00 b
28 Total molecular diuresis	1.00 d

PHYSICAL DEVELOPMENT.	Normal
1 Weight-height	1.00 a
2 Strength-height	1.00 a
3 Strength-weight	1.00 a
4 Respiratory-height	1.00 a
5 Arms-strength-height	1.00 a
6 Legs-strength-height	1.00 a
7 Trunk-strength-height	1.00 a
8 Diaphragm-height	1.00 a
9 Arms-weight	1.00 a
10 Legs-weight	1.00 a
11 Endurance	1.00 a
12 Height	1.00 d
13 Sitting Height	1.00 d
14 Chest Measurement	1.00 a
15 Chest Expansion	1.00 a
16 Waist Measurement	1.00 a
17 Waist Expansion	1.00 a
18 Upper Arm	1.00 a
19 Lower Arm	1.00 a
20 Thigh	1.00 a
21 Calf	1.00 a

A full appreciation of the value of the coefficient method requires a careful study of the significance and the indications of each coefficient. A more extended summary of the coefficient method will shortly appear in a separate publication.*

It is rare that all of the above coefficients are worked out in any individual case. Some are employed only in special researches, but twenty or thirty coefficients are worked out in every case, and forty to fifty in the majority of cases, the special direction given to the research depending upon the special character of the malady from which the patient is suffering. The purpose of the application of this coefficient method is not alone to ascertain the character of the patient's malady, but to be able to ascertain and record the exact degree of deviation from the normal standard, so that small changes for better or worse may be readily recognized.

* See *Modern Medicine* for 1908. Modern Medicine Publishing Co., Battle Creek, Michigan.

BATH ATTENDANTS.

THE SANITARIUM SYSTEM OF HYDROTHERAPY

THIS system of using water therapeutically has been worked out at the Battle Creek Sanitarium during thirty-five years of scientific work.

The crude, but thoroughgoing methods of the original system of Priessnitz, which prospered among the hardy mountaineers of Austrian Silesia, were much too strenuous for more delicately organized and pampered American invalids. This fact, together with the crass empiricism which characterized the use of water in the first half of the last century, when water-cures were for a time almost a fad, brought water into general disrepute as a curative means, and greatly hindered the scientific development of this invaluable agent.

Organized Hydrotherapy.

The older system lacked greatly in adaptability, because of the want of means of accurate adjustment to different grades of vitality and various peculiarities of temperament. Many new methods have been devised to fill in the gaps, and have made possible a perfectly graduated course of hydriatic procedures by which the tonic effects of cold water are made available to the feeblest patient as well as the strongest.

The Battle Creek Sanitarium system of hydrotherapy gives due prominence to hot as well as to cold applications. As first introduced into this country, hydrotherapy was essentially a "cold water cure," as it was popularly called, and thousands were more or less damaged by the routine and drastic procedures of those days, while many other thousands failed to derive from hydriatic measures the benefit which they might have received under scientific management, and as a natural result the whole system fell into disrepute, and water as a curative agent acquired a bad reputation, which in uninformed quarters still clings to it.

The Battle Creek Sanitarium System for the first time correlated with the use of water in all possible forms the use of electricity, medical gymnastics, massage, dietetics, phototherapy, and all other physiologic measures of cure, by this means greatly

ELECTRIC-LIGHT BATHS.

SOUTH CORRIDOR (SECOND STORY).

NORTH CORRIDOR.

SOUTH CORRIDOR.

MEN'S BATH DEPARTMENT.

NORTH CORRIDOR (SECOND STORY).

ELECTRIC-LIGHT BATHS.

NORTH CORRIDOR.

LADIES' BATH.

SOUTH CORRIDOR (SECOND STORY).

WALKING LEG-BATH.

CORRIDOR IN MEN'S BATH.

MEN'S SWIMMING POOL.

increasing its efficiency, and constituting a practical and organized system of physiologic therapeutics in one place and under one management.

Here was first developed an organized and systematized assemblage of all known curative agents, especially those of a physical nature, in actual practical operation. Elsewhere most of the same agents may be found in use singly, and hence less effectively, and, as a result in many cases, unsuccessfully. Here all work together in therapeutic concert, and are thus able to achieve success in cases in which less systematic and thoroughgoing therapeutic attempts have failed.

Hydriatic Equipment.

Two complete buildings are devoted to this department,—one for men, the other for women. They are both connected with the main building and with the great gymnasium by a semicircular corridor, the gymnasium standing between. Each of the buildings has three stories and basement. The well-aired and -lighted basement is devoted to rectal and bowel applications and classrooms; the first floor, to all forms of general and local hydriatic applications. At the east end is a fine swimming-pool, which is maintained at a temperature of about 78° F. A smaller pool has a temperature of 60° F.

The Electric-Light Bath.

On this floor are found the various forms of the electric-light bath,—one of the most important additions to modern therapeutics, and one of the many outgrowths of the experience of the Battle Creek Sanitarium. Here also are various sprays and douches, including several fine steam douches, by which most excellent revulsive effects can be produced, and a giant douche which pours down a perfect torrent of water at a temperature a little above 50° F., thus giving a range of effects suited to every possible case.

That hydrotherapy has won a definite and permanent place in modern rational therapeutics can no longer be questioned, and the Battle Creek Sanitarium claims recognition as the pioneer in scientific hydrotherapy among the medical institutions of this country. Here have been developed a great number of additions to the methods and the technique of this invaluable therapeutic method.

HYDRIATIC PROCEDURES.

Physiologic Tonics.

As a tonic, cold water has no superior. The cold spinal douche often accomplishes marvelous results and in a wonderfully short space of time in certain classes of neurasthenics. The tonic sitz baths, cold mitten frictions, salt glows, towel rubs, wet sheet rubs, wet and dry packings, compresses, and full baths of various sorts, including Nauheim baths, electro-hydric baths, shallow and neutral baths, are only a few of the numerous hydriatic procedures which are daily in effective use as a part of the Battle Creek Sanitarium System.

Electro-Hydric Bath and Massage.

The second floor of each of the treatment buildings is devoted chiefly to electrical baths, massage, and local applications of heat by means of the electric thermophore, the photophore, and the fomentation. A large semicircular room is devoted to manual Swedish movements.

The Physiologic Effects of Hydriatic Applications.

In scientific hydrotherapy, every therapeutic application of water is based upon a knowledge of the physiologic effects of the given application as worked out by careful laboratory research.

These researches have shown that both heat and cold may be employed in such a way as to produce profound effects, both excitant and depressant, not only upon the skin, with which the applications are brought in direct contact, but upon every organ and function of the body. Most profound effects may be produced by suitable applications, upon the heart and circulation, the absorption of oxygen by the lungs and oxidation processes in the tissues, heat production and elimination, absorption and metabolism, liver action, renal activity, gastric and intestinal secretion and motility, hematogenesis, phagocytosis, and general vital resistance. By suitable applications, either hot or cold, or hot and cold in alternation, most profound reflex effects may be produced, inducing vasodilatation or vasoconstriction in every important bodily viscus, thus exciting or depressing activity of the heart, the brain and the spinal cord, the stomach, the intestines, the bladder, the kidneys, the uterus, or any organ the function of which it may be desirable to influence.

A complete description of the principles and technic of the system of hydrotherapy which has been developed and is in

LADIES' BATH AND SWIMMING POOL.

CENTRAL CORRIDOR.

SOUTH CORRIDOR.

practical operation at the Battle Creek Sanitarium may be found in a volume entitled "Rational Hydrotherapy."* This system includes more than two hundred applications, of which the following list represents the principal ones which are in daily use:—

Partial List of the Two Hundred Hydriatic Applications in Daily Use at the Battle Creek Sanitarium.

SPRAYS.—Cold, cool, neutral, warm, hot, alternate, revulsive, simultaneous.

JET DOUCHE.—Cold, cool, neutral, warm, hot, alternate, revulsive, percussion.

VAPOR DOUCHE.—Alternate, revulsive.

IMMERSION BATH.—Cool, tepid, neutral, hot, graduated, effervescent (Nauheim), saline, alkaline.

SITZ BATH.—Cold, cool, tonic, neutral, hot, revulsive, graduated.

HALF BATH.—Hot, tepid, cool.

SHALLOW BATH.—Cool, tepid.

FOOT BATH.—Hot, cold, shallow, running, revulsive

LEG BATH.—Warm, hot, revulsive, walking.

PACKS.—General, half, trunk, hip, leg, chest, throat, spinal, wet girdle, cooling, neutral, heating, sweating, shower, hot blanket, dry blanket, hot and cold, hot and heating, cold and heating, alternate.

SPONGING.—Hot, tepid, cool, alternate, saline, alcohol.

RUBS.—Oil, dry hand, centripetal, alcohol, witch hazel, dry shampoo, wet mitten, towel, half sheet, wet sheet, salt.

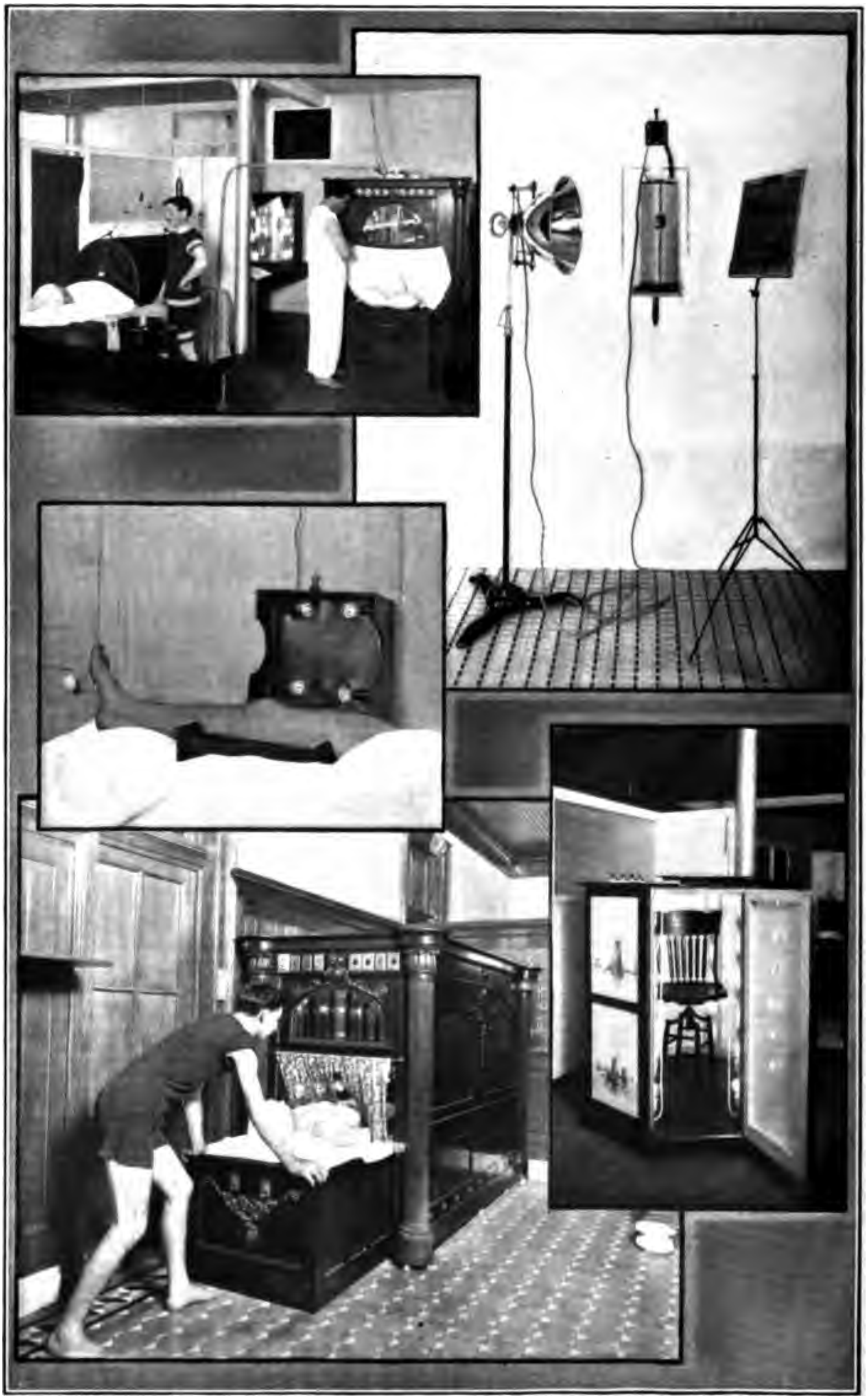
FOMENTATIONS to various parts of the body.

COMPRESSES TO VARIOUS PARTS.—Cold, cooling, heating, hot and cold, alternate, revulsive, proximal.

ELECTRO-HYDRIC BATH.—Sinusoidal, galvanic.

AIR BATH.

* F. A. Davis Co., Philadelphia, Pa.



PHOTOTHERAPY.

HOT-AIR BATH.

RUSSIAN BATH.

VAPOR BATH.

TURKISH SHAMPOO.

SWEDISH SHAMPOO.

ENEMA.

COLOCLYSTER.

IRRIGATION.—Rectum, vagina, bladder.

GRADUATED TONIC APPLICATIONS—

- Wet hand rub.
- Friction.
- Cold mitten friction.
- Effervescing rub.
- Cold towel rub or salt glow.
- Half sheet rub.
- Sheet rub.
- Ice rub.
- Shallow bath.
- Nauheim or effervescing bath.
- Pail douche.
- Spray.
- Jet douche.
- Plunge.
- Swimming.

LOBBY OF LADIES' BATH DEPARTMENT.

THERMOTHERAPY.

PHOTOTHERAPY AND THERMOTHERAPY*

THIS department employs both the solar light and the electric light. In summer-time solar light is used both direct and after filtering through a blue glass screen (to diminish its intensity when required). In winter-time the arc light is chiefly relied upon as a source for the actinic rays.

Within the last thirty years electricity has won its way to the front rank as a therapeutic agent.

The electric light is one of the most important applications in the curative art.

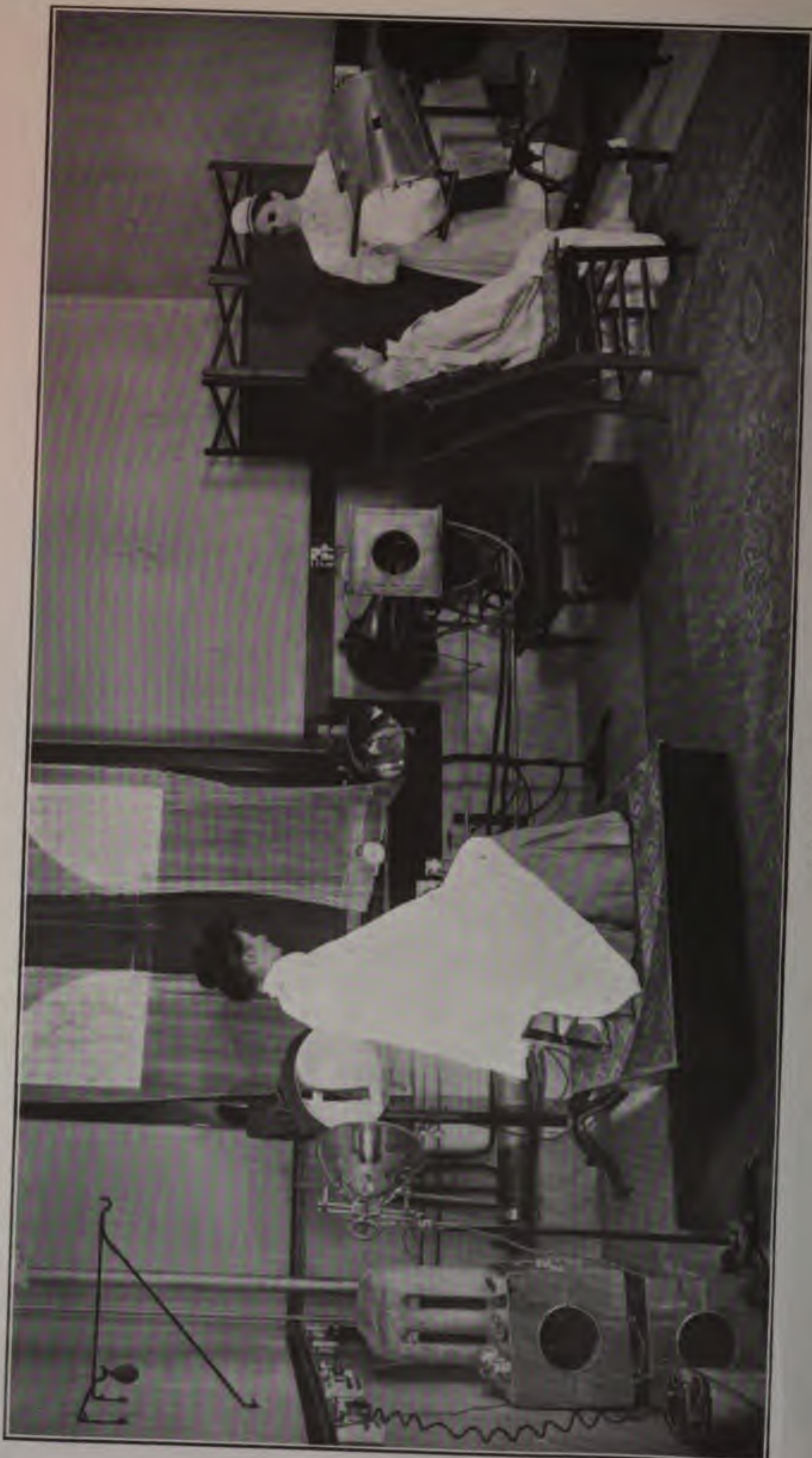
The electric light is applied by means of the photophore, the incandescent electric-light bath, and the arc-light bath.

Electro-thermophores of various sorts are also in use. The electro-thermophore consists of pads, compresses, or blankets in which wires are interwoven which are heated by electricity. Scores of these are in constant use.

Phototherapy.

Phototherapy holds a very prominent place in the Battle Creek Sanitarium System. It is here that the incandescent light was first utilized as a therapeutic means. Here the first electric-light bath was constructed. The original model devised and still in use here has been closely followed by those who have employed this bath in various parts of the world. At the present time, this important therapeutic means is recognized and utilized by progressive therapeutists in all civilized countries. Thousands are in use in the leading hospitals and sanitariums of Europe, and the value of this bath is rapidly coming into recognition in this country.

* "Phototherapy and Thermotherapy." A System of Physiological Therapeutics. Vol. IX. P. Blakiston's Sons & Co., Philadelphia, 1901. "Phototherapy in Chronic Diseases," American Electrotherapeutic Association, Sept. 13-16, 1904, St. Louis, Mo. *Archives of Physiological Therapy*, Feb., 1905.



THE ARC LIGHT DEPARTMENT.

ELECTRICAL DEPARTMENT*

ELECTRICITY is not capable of accomplishing half the marvels that are claimed for it by many enthusiastic electrotherapists, but it is, nevertheless, an extremely valuable therapeutic agent, especially when utilized in connection with hydrotherapy, thermotherapy, and other physiologic methods. By itself its usefulness is extremely limited, but in connection with other physiologic measures this agent is capable of securing most excellent results.

The Sinusoidal Current.

The form of electrical current most in use here is the *sinusoidal.* This is a current the peculiar properties of which were first discovered in this institution something more than twenty years ago and described in a scientific paper published soon after and read at a meeting of the American Medical Association.

Dr. d'Arsonval, of Paris, some years later made the same discovery, and to him is due the credit of having accurately studied and described the current and made its properties known to the world.

This current has the advantage of being painless in application, even while producing the most vigorous muscular contractions. It is employed as a means of passive exercise, especially for the development of the muscles of the back in spinal curvatures, and the muscles of the abdomen in cases of enteroptosis. It is also an excellent means of exercising paralyzed muscles when they have not reached a too advanced state of degeneration, and furnishes a convenient method of inducing vigorous passive exercise of the muscles in cases of obesity and diabetes in which

---

* "A Discussion of Electrotherapeutic Methods," International System of Electrotherapeutics. F. A. Davis Company, Publishers, Philadelphia, Pa.

"Electrotherapeutics in Chronic Maladies," International Electrical Congress, St. Louis, Mo., Sept. 22, 1904. *Modern Medicine,* Oct. and Nov., 1904.

"Graphic Study of Electrical Currents in Relation to Therapeutics, with Special Reference to the Sinusoidal Current." Proceedings of the American Electrotherapeutic Association, Chicago, September, 1893.

STATIC ELECTRICAL DEPARTMENT.

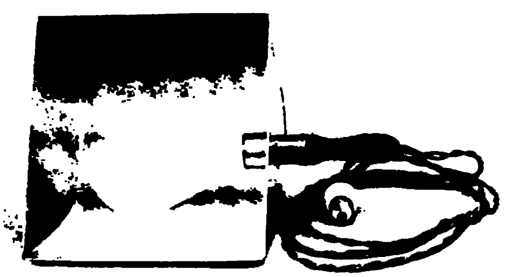
the patient is too feeble to take the requisite amount of exercise in walking or other forms of muscular activity.

The *galvanic* current is largely utilized in appropriate cases; also the *faradic* current. Some of the methods employed in the use of the galvanic current it is believed are rendered more efficient by modifications which have grown out of experience in the use of this agent in this establishment, especially in connection with various hydriatic measures.

The *static* current provided by a large machine (the largest ever constructed) is found extremely useful in certain classes of cases, especially the paresthesias of neurasthenia, insomnia, and certain forms of neuralgia.

The *high frequency* current is utilized in cases to which it is adapted. Although the full value of this form of electrical current is not yet clearly determined, it has certainly proved itself capable of producing some very useful therapeutic results in relieving pain and lowering blood-pressure, and in certain forms of skin disease and certain nervous affections. The apparatus for the use of these measures are the best that can be obtained in the United States or Europe, including Ruhmkorf coils and all accessory devices.

The *X-ray,* though not a form of electricity, may be mentioned here as having its place in the armamentarium of the institution, and daily proving itself of service in an increasing variety of ailments. The limits of usefulness of this comparatively new and most valuable therapeutic agent cannot as yet be fully defined. As an agent in diagnosis, it is constantly brought into requisition, not only in traumatisms, but in the location of the important viscera, and especially in diseases of the stomach and intestines.



SINUSOIDAL ELECTRICITY.

X-RAY LABORATORY.

GYMNASIUM.

PHYSICAL TRAINING

HEALTH winning by means of exercise occupies a very important place among Battle Creek Sanitarium methods. Most women and a large proportion of the men who visit the institution are suffering from deficient development of the muscles, particularly of the abdominal muscles.

As a result of weakness of the muscles of the abdomen, there is prolapse of the viscera, and a lessening of intra-abdominal pressure, which permits an overdue accumulation of blood in the abdomen, to the detriment both of the abdominal viscera and of the body in general.

The stomach, liver, bowels, and other organs contain an excess of blood, while the spinal cord, brain, and lungs are deprived of the blood needed for their proper functioning.

The excess of blood which accumulates in the abdomen, stagnating, loses its oxygen, becomes charged with toxins, and thus the congested organs become diseased; the vital resistance is lowered; infections occur; bacteria flourish in the alimentary tract, especially in the colon; infections of the colon, appendix, gall-bladder, and even other organs result.

The overwhelming quantity of toxins poured into the blood gives rise to cirrhosis of the liver, degenerative changes in the kidneys, arteriosclerosis, and other maladies. It is believed that to this chronic autointoxication may be traced a large share of the chronic ailments from which men and women suffer and die.

Exercise is one of the most important means by which this condition can be corrected. When the abdomen and other trunk muscles can be properly developed, so that the bowels are held up in place and the vessels of the great splanchnic area receive proper support, a fundamental cause of a multitude of human maladies and miseries is permanently removed.

The part which the congested condition of the viscera plays in the production of functional, nerve, and mental disorders has been well shown by many observers, and has been here demonstrated in hundreds of cases in the restoration to health of chronic sufferers who apparently could be relieved by no other means.

MORNING CLASS IN CALISTHENICS.

The methods employed in this department are not gymnastic only, but involve the correction of faulty dress, faulty habits in sitting, standing, walking, etc., by means of daily drills.

The Sanitarium Chair.

As soon as the patient arrives at the Battle Creek Sanitarium, his training begins. He is made to sit erect, with the chest high and the abdominal muscles drawn in, by being provided with chairs in which he is enabled to sit erect without effort. The Sanitarium health chair supports the center of the back so that the chest is held erect.

In the gymnasium the patient is taught to stand correctly, with the chest held high, the chin drawn in, the hips held back, and the abdominal muscles tense. In this position he takes various exercises with the arms, limbs, and trunk, until the muscles of the back are so strengthened that they are able to hold the body in correct position.

For those in whom the muscles are so attenuated that the desired result cannot be accomplished by gymnastic exercises, manual Swedish movements and the sinusoidal electrical current are called upon to accomplish the first stages of the cure.

It is exceedingly interesting to note the rapidity with which the muscles acquire strength and vigor when a variety of means for improving their condition are set in operation and applied several times daily in an effective manner. An application once or twice a week amounts to almost nothing in the direction of development. The applications must be short, efficient, and frequently repeated; that is, several times each day.

Swimming.

Patients are encouraged to learn to swim, not only for the tonic effect of the swimming bath and the aid to respiration and circulation, but especially for the purpose of strengthening the abdominal muscles and thus restoring the normal tone of the walls of the abdomen, and the intra-abdominal pressure, upon which the proper distribution of the blood throughout the body is almost as much dependent as upon the movements of the heart.

The Exercise Prescription.

The accompanying cuts will give something of an idea of how these various measures are put in operation to accomplish the desired end. Careful examination of the program for

MEDICAL GYMNASTICS.

the invalid's day will show how large a part gymnastics play in this therapeutic system. Nothing is left to whim or fancy, and no prescription or exercise is made until the patient's strength has been thoroughly tested and his chart has been made out. With this before him, the physician or physical director assigns work which is suited to each case. The exercises taken in general classes are of such a character as to be suited to nearly all. In addition to this, individual work is marked out which is chiefly depended upon for corrective development.

There are special exercise classes for feeble patients, and the very feeblest are visited in their rooms. Even bedridden patients, not excluding the convalescents of the surgical ward, are visited several times daily and directed in taking various deep-breathing movements which are especially adapted to their individual cases.

The exercises taken before and after breakfast, after dinner, and after supper in the evening, are especially designed to aid digestion by promoting the movement of blood through the abdominal viscera and preventing congestion or stasis in this region.

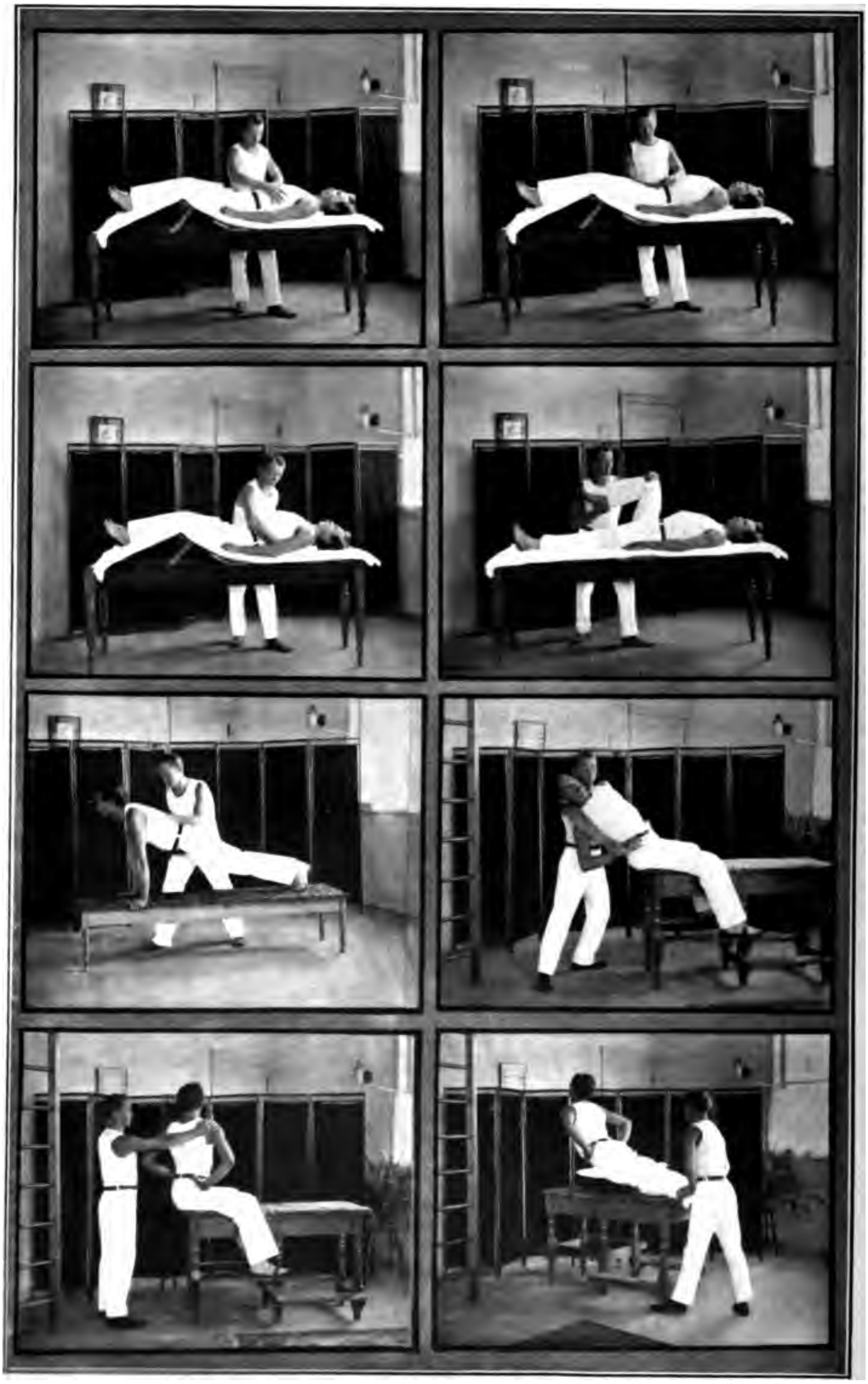
Manual Swedish Movements or Medical Gymnastics.

More than one hundred years ago Ling, of Sweden, by the study of a French translation of an ancient Chinese book, became acquainted with some methods employed from ancient times by the Chinese in training soldiers for war. Taking the Chinese system as a foundation, he developed the most scientific system of gymnastics which the world knows anything about.

Ling, who was an officer in the Swedish army, succeeded in getting his system adopted by the Swedish government, which erected a large building for purposes of instruction; and now for three-quarters of a century this method has been in use not only in the Swedish army, but in the public schools of Sweden, and has resulted in the development of a magnificent race of men and women. Any traveler who has visited Stockholm must have been struck by the remarkably large number of fine, athletic-looking men whom he met upon the streets. It is almost impossible to find a Swede who is not more or less of an athlete.

Every officer in the Swedish army is required to have a practical knowledge of the medical Swedish gymnastics, or the so-called manual Swedish movements.

The system has been in use at the Battle Creek Sanitarium for many years. Nearly twenty-five years ago a physician was



MEDICAL GYMNASTICS.

MASSAGE.

METHOD OF TAKING THE CORRECT STANDING AND SITTING POSITIONS.

sent to Stockholm to become acquainted with the system, and trained Swedish experts were brought to the institution to assist in introducing it. Recently this system has been rapidly growing in favor in this country under various names other than its own. So-called osteopathy is a modification of the Swedish system which has yet to demonstrate its superiority, or its claim to be called a system or a new scientific method.

Swedish Gymnastics for Women.

The Swedish method is especially valuable in the treatment of men and women suffering from sedentary habits. It affords the most satisfactory and efficient means known for developing the abdominal and other muscles of the trunk, especially in connection with the use of electricity and hydrotherapy; and, with special breathing exercises and abdominal movements, produces a most highly beneficial effect upon the abdominal viscera, relieving stasis, emptying the stomach, liver, and other viscera of stagnating blood, and thus improving functional activity.

The accompanying cuts show some of the movements which are found most valuable in connection with the numerous other physiologic measures employed in the Sanitarium system.

The manual Swedish movements comprise an extensive and almost endless variety of most carefully and accurately graduated exercises; some passive, others active, and still others active-passive. These are arranged in graduated series, known as "day's orders," each of which represents the work for one day. Each day the patient makes a little progress, though very feeble patients may not be able to execute the whole order the first day the treatment is given. Special attention is given to deep-breathing exercises.

Mechanotherapy or Mechanical Exercise.

Certain forms of passive exercise may be administered by machinery far more effectively than by the hand. This is particularly true of vibratory exercise. The rapid, steady, and prolonged vibratory movements which can be administered by machinery cannot be even approximated in efficiency by the human hand. Certain kneading and percussion movements may also be administered more effectively by mechanical means than by the manual method.

For more than thirty years this method has been employed in the Battle Creek Sanitarium, and the apparatus found in this

MECHANOTHERAPY—VIBROTHERAPY.

department represents the perfected result of these many years' experience, having been specially constructed for this use. For more than twenty years the institution has maintained a fully equipped machine shop, which has been largely occupied with the work of developing and manufacturing the special apparatus employed in this and other departments.

Various series of graduated movements are prepared for different maladies and conditions, as obesity, constipation, neurasthenia, cardiac cases, etc.

Vibrotherapy.

This mode of passive exercise, certain phases of which have recently been so extensively exploited throughout the country, has been in use as a part of the Battle Creek Sanitarium System for more than a quarter of a century. This department is represented by special vibrators for the hands and arms, vibrators for the feet, the vibrating stool, the vibrating table, the vibrating chair, and sets of vibrating chairs in which several patients may be treated at once.

So many absurd claims have been made for vibrotherapy that doubts will naturally arise in the minds of many physicians respecting its actual value. Experience, however, has demonstrated its efficiency in the accomplishment of certain things.

Each of the three forms of vibration—percutient, lateral, and centrifugal—produces characteristic effects which have been studied by Vigoroux, Martimer Granville, Schiff, Boudet, and other investigators; and it has been shown that this measure is capable of increasing or diminishing nervous sensibility. It may produce fatigue, as does muscular work; or may abolish the sense of fatigue by stimulation of the spinal centers. Applied to the head it may produce drowsiness, and even sleep. Applied to the muscles it may produce contraction or relaxation. It may produce vasomotor changes in the viscera, and even raise and lower general blood-pressure. A thorough discussion of rational vibrotherapy, its physiologic effects and therapeutic indications, will be found in medical papers appearing elsewhere.*

Mechanical Massage.

The vigorous, steady rhythm of mechanical massage and its never-tiring thoroughness are qualities which secure splendid

* See *Modern Medicine* for 1908. Modern Medicine Publishing Co., Battle Creek, Michigan.

MECHANOTHERAPY.

results not to be obtained by manual means. The various forms of kneaders employed adapt this method not only to the abdomen, but to all the fleshy parts of the body.

Patients often express themselves as feeling that they get more immediate returns from the treatment in this department than any other. The neurasthenic who suffers from cold hands and feet finds his extremities glowing with warmth after a few moments' application of hand and foot vibration. The vasomotor spasm has been broken by the rapid mechanical movement. The improved distribution of blood relieves congestion of the brain and spinal cord, as well as the general visceral stasis; and a sense of well-being, comfort, and relief gives place to the depression, nervousness, confusion, and general discomfort which are the natural result of a disordered condition of the circulation.

A great share of the aches and indefinable distresses from which neurasthenics suffer are generally temporarily relieved, and often in a manner which seems almost magical.

The effects which can be obtained by this method must not be judged by the disappointing results produced from the use of various trinkets which are hawked about the country under the name of vibrators, few of which are sufficiently effective to produce any definite results whatever.

THE SANITARIUM CHAIR.

OUTDOOR CALISTHENICS.

OPEN-AIR AND COLD-AIR METHODS

THE open-air method has always been a dominant feature in the Battle Creek Sanitarium System. The large outdoor gymnasium, a few views of which are herewith shown, was the first of the sort in the United States, and is unrivaled in the completeness of its equipment and the thoroughness of the methods employed. The value of the sun as a curative agent has been recognized from the most ancient times, but it is evident that little good effect can be obtained from this source when the body is almost completely covered with clothing. It is necessary that the ordinary clothing be removed, so that nearly the whole surface of the skin may be exposed to the actinic rays.

By this means the circulation of the skin is stimulated. The proof of the effects of the sun's rays upon the skin is to be found in the pigmentation and heightened color which develop rapidly after a few exposures. First exposures are sometimes followed by slight attacks of erythema, which do no harm, but may in fact enhance the beneficial effects.

The skin is capable of holding two-thirds of all the blood in the body. When it is inactive and empty, the necessary result is that the liver and other viscera are congested, and stasis exists in the whole splanchnic area.

The Outdoor Gymnasium.

Exposure to cool air also stimulates the activity of the skin. Exercise with the body relieved of trammels of every sort brings each muscle into normal play. After being well warmed by exercise, the patient enjoys a plunge into the clear fresh water of the swimming pool, just cool enough to be refreshing and invigorating.

During the summer months, manual Swedish gymnastics and a great variety of exercises, some of which, though long used in the Battle Creek system and utilized for a hundred years in Sweden, are just now becoming familiar to the public under

the names of "Osteopathy," "Movements," etc., are administered in the free air of the outdoor gymnasium. Patients chop wood, saw wood, play at basket-ball, bean bags, and other simple games, walk and trot around the running path, take swimming lessons, and engage in all kinds of exercises without other covering than simple trunks, so that the skin becomes hardened, toughened, and in many cases as brown as that of a North American Indian.

The effects of such tanning and hardening of the skin upon the internal organs is in the highest degree beneficial. Appetite and digestion improve, heart vigor increases, hepatic and renal activity are encouraged, normal metabolism is encouraged, and the patient feels daily the growth of new life and vigor under the stimulus of the natural forces by which the body is created and maintained.

Thus all the best advantages of the seashore, camping out, "going fishing," and other forms of recreation are secured, while the patient is protected from excess by the careful guidance of his physician, and has the advantages of medical care, dietetic regulation, etc., in addition.

Daily outings are provided in tallyho or sleigh with plenty of warm robes and foot-warmers in cold weather, and cheerful company.

Air baths are administered indoors by means of electrical fans, which produce a breeze of any required force.

Walking Parties.

Outdoor walking parties are greatly in vogue and are a source of great pleasure as well as profit. These parties are accompanied by a physical director or a naturalist who knows all the birds and trees, and expounds to the uninitiated the teachings of the great book of Nature.

The invalid's dread of cold weather is really a dread of chilling or getting cold,—a dangerous thing for sick folks. That, however, is quite another matter. The invalid should breathe cold air, but he must be kept warm. The ideal is cold air for the lungs, warmth for the rest of the body.

The Arctic explorer requires a large ration, not so much to keep his hands and feet warm, for he clothes himself so warmly that even the searching Arctic cold cannot reach him, but because he breathes cold air.

FRESH-AIR SLEEPING ARRANGEMENTS.

Open-Air Sleeping Arrangements.

Open-air sleeping arrangements are provided for those who can be induced to use them. There are special sleeping porches for ladies. Here those who enjoy sleeping in the open air are snugly tucked away by the nurses, wrapped as warmly as for a sleigh-ride in the polar regions, and protected, if need be, by hot-water bags, or thermo-electric blankets, which furnish heat in any amount and as long as desired,—warmth on tap like water; just touch a button and the bed warms up at once.

Watchful nurses are at hand ready to give any needed assistance.

There are sleeping bags and hoods for those who wish them. They keep the body as warm as toast all night long, and allow the pure cold air to be inhaled without fear of chilling or of "catching cold."

The window tent is an ingenious invention by the aid of which the sick person may have all the advantages of the pure cold air without going out of doors. By this plan the head is outdoors while the rest of the body remains warm and comfortable indoors.

The fresh-air tube is a Sanitarium device for conveying fresh air to the patient from an adjoining window. It works well, and is adaptable to any room and to all possible conditions. The patient may breathe the coldest of winter air while snugly tucked away in his cozy sleeping-room. With this device he gets all the advantages of the pure cold air with none of the inconveniences or possible risks of being out of doors.

Out-of-Door Attractions.

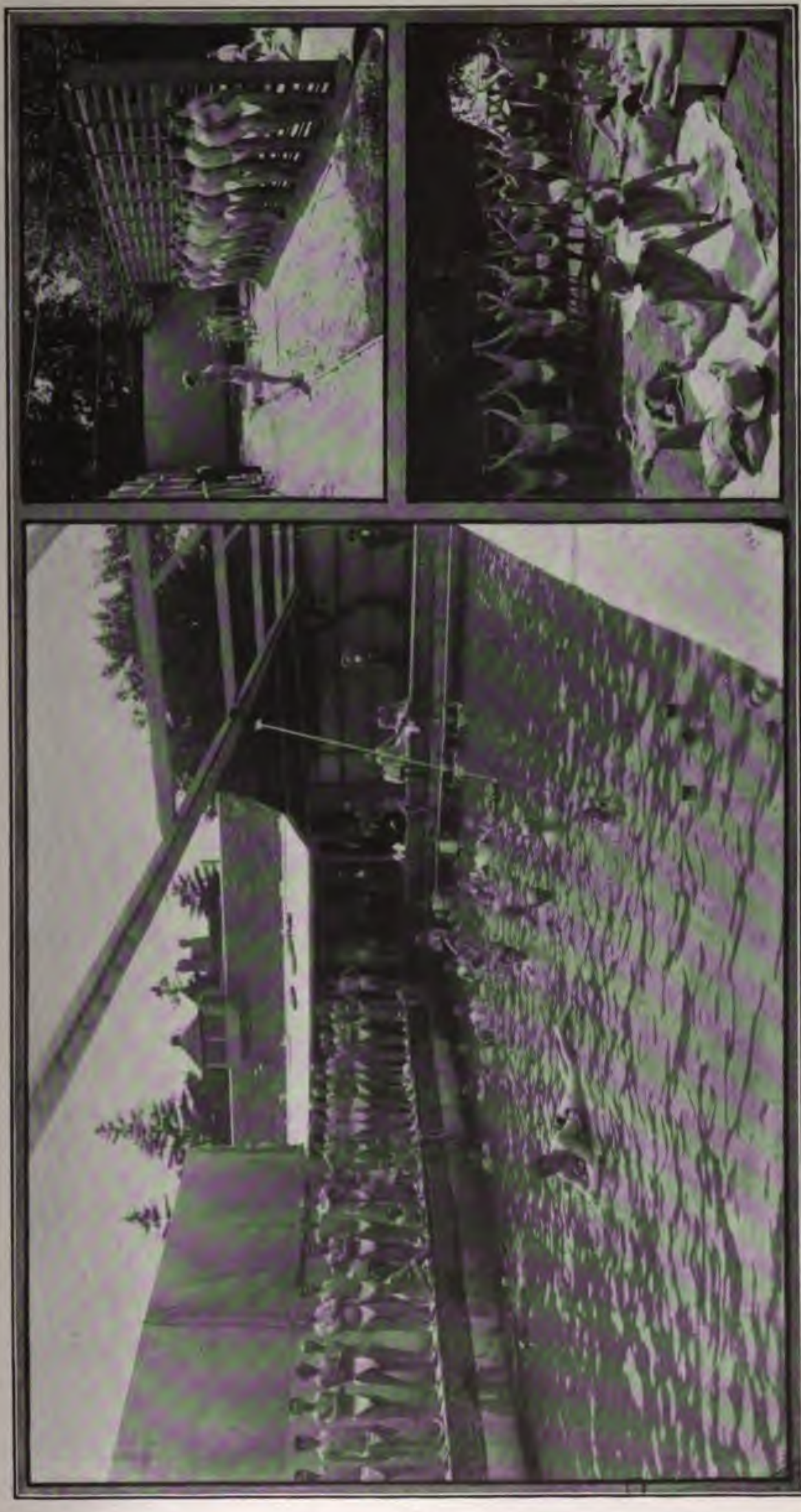
Skating, tobogganing, skeeing, and other outdoor sports invite those who are strong enough to enjoy them. There is always ice, and usually plenty of snow, during the mid-winter season in the Peninsular State.

Many of the patients take to the wheel-chairs for an outing on the long porches. The nurses bundle them up warmly, and back and forth they go under the long porticos, chatting with one another as they pass, enjoying the outdoor life and taking long breaths of vitalizing oxygen.

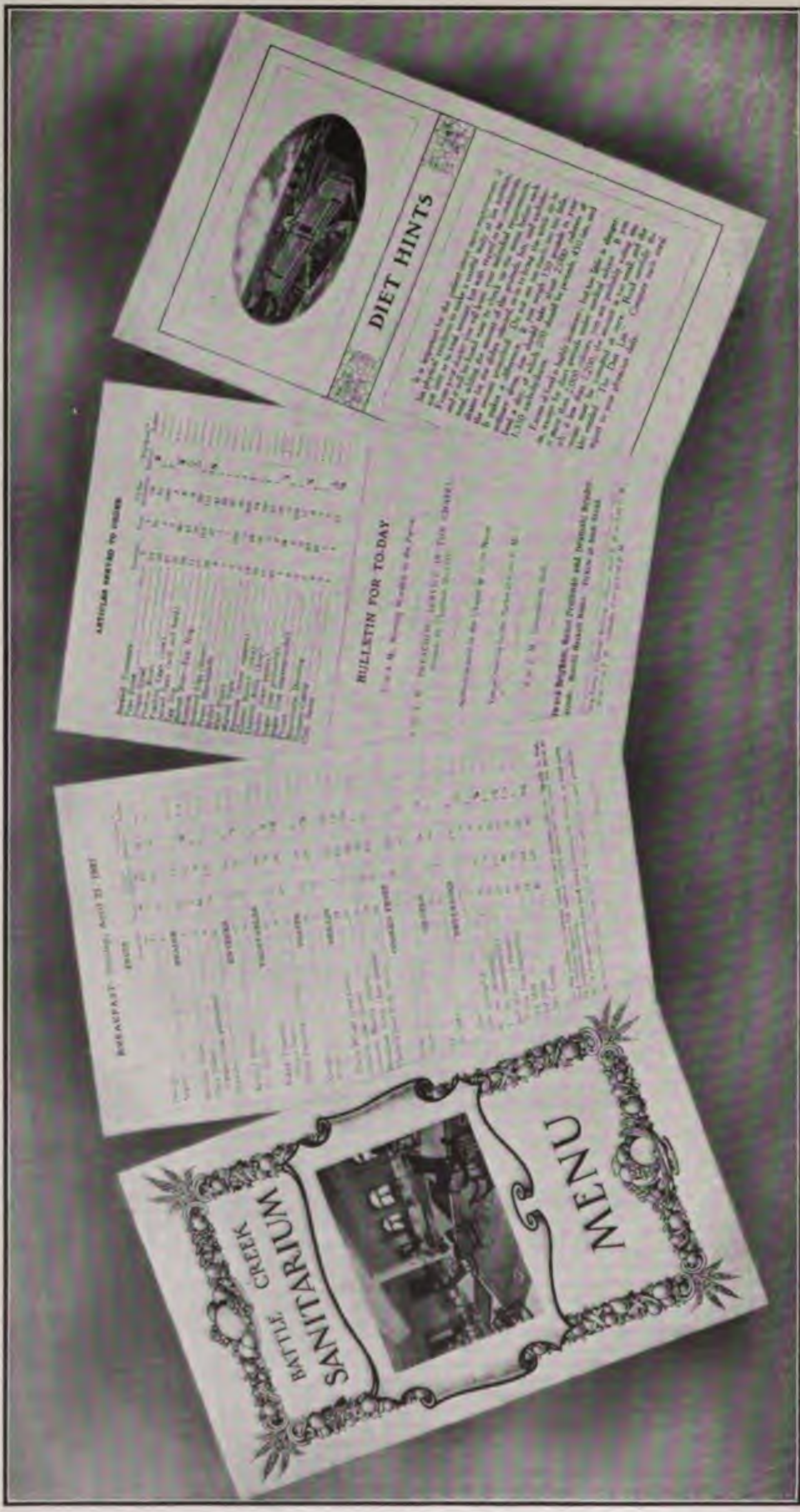
FRESH-AIR SLEEPING ARRANGEMENTS.

OUTDOOR GYMNASIUM.

OUTDOOR SWIMMING POOL.



OUTDOOR GYMNASIUM.


BATTLE CREEK
SANITARIUM
MENU
DIET HINTS
BULLETIN FOR TO-DAY
ARTICLES SERVED TO ORDER

THE BATTLE CREEK SANITARIUM DIET SYSTEM

AFTER many years of patient study of the various practical questions relating to dietetics, a plan has been perfected whereby foodstuffs and food elements may be prescribed and administered with the same precision with which powerful drugs are given. The difficulties in the way of properly regulating the dietary of patients under ordinary circumstances are practically insurmountable. Questions which the patient always asks his physician are, What shall I eat? and, How much shall I eat? It is scarcely possible to ask a physician two more troublesome questions than these if any effort is made to answer the inquiries intelligently and accurately.

The calorie system perfected in the dietetic department of the Battle Creek Sanitarium and the organization connected with it, make it possible to answer these questions with the greatest ease, and with scientific precision. This system consists of the following elements:—

1. A large variety of appetizing foodstuffs numbering several hundred dishes, the composition and caloric value of each of which is accurately known. The application of the calorie method of estimating food values is necessarily the foundation of scientific dietetics. Food is the only source of energy to the body. It is made up of various elements which differ in their energy content and in their food value. When the composition of a food is known, its calorific value, that is, the number of food units which it contains, may be easily determined. By multiplying its percentage value by proper factors, the number of calories per ounce of each food principle may be found. The factor for proteids and carbohydrates is 1.16; for fats, 2.63. By the use of these factors, it is easy to make a list of foods of known energy value per ounce, provided one has at hand a table showing the percentage composition of foodstuffs. Extensive tables of this sort are published by the United States Government. Bulletin No. 28 (Revised) of the Agricultural Department is particularly valuable. The data furnished by this bulletin have served as the foundation for the tables which are in use at the

PROF. FISHER'S DIET INDICATOR.

SERVING ROOM. CULINARY DEPARTMENT.

Battle Creek Sanitarium. Aid was also obtained from the exhaustive works of Koenig and Gautier. The large number of new foodstuffs and food combinations or dishes, made necessary many original analyses and calorimetric tests. The results of calculation have been verified by determinations made with the bomb calorimeter.

It is of primary importance that the composition of a dish, when once determined, shall be maintained at a uniform standard. This requires constant vigilance and supervision, and the service of cooks who have been specially trained for the work, so that food shall be prepared with the same degree of accuracy which the chemist brings to his work. Indeed, the kitchen in such a scheme as this must be organized as a laboratory and conducted under laboratory rules and in harmony with laboratory principles.

2. It is necessary that the food, after having been properly prepared, shall be served in portions of known values and weighed with almost the same care with which the pharmacist dispenses drugs. In no other way can the patient be assured that his dietary conforms to the requirements of his prescription.

This method has now been in use for more than two years. For several very valuable suggestions and modifications of this method, the Sanitarium management are indebted to Prof. Irving Fisher, of Yale University, whose thorough study of this question and ingenious inventions in connection with it have rendered great service to scientific dietetics. The results of Professor Fisher's studies have been embodied in an elaborate paper published in the *Journal of the American Medical Association,* April 20, 1907, and in other scientific papers.

Professor Fisher's Diet Indicator.

Professor Fisher's diet indicator is a most interesting and useful device. By its use in combination with a properly arranged bill of fare and with food "portions" of known value, it is possible to determine mechanically and with great precision the proportion of the several food elements which have entered into any given meal. The full details of this method may be learned from Professor Fisher's paper above referred to.

The accompanying photo-reproduction of a bill of fare as actually used at the Sanitarium will show how the plan above briefly outlined is carried out. The diet tables and special diet lists employed in operating this system of dietetics are published

WINTER SOLARIUM AND SUMMER DINING-ROOM.

MAIN DINING-ROOM.

in a booklet entitled, the "Battle Creek Sanitarium Diet List," a copy of which will be sent on request to any physician who is interested in scientific dietetics.

By this system it is quite possible to regulate to a nicety the dietary of every patient, to give him just the amount of proteids his case requires, and with equal accuracy to regulate his ration of fat and carbohydrates. This system is indispensable in the treatment of cases of obesity, diabetes, and great emaciation.

The Bill of Fare.

3. The bills of fare must be prepared in such a way as to show for each dish just the number of calories of each food element furnished in each portion served, so that the patient or nurse may be able to select such dishes and such number of portions as will furnish the patient the total number of calories required by his prescription, and the number of calories of proteids, carbohydrates, and fats designated by the physician. The bill of fare, properly checked by the patient or his nurse, becomes a record of the meal, and hence, when delivered to the physician, shows in just what way and to what extent the patient is following his prescription. It is believed this is the first effort ever made to place the menus or bills of fare of a large institution upon an exact and scientific basis for the purpose of controlling nutritive processes in harmony with the known principles of human metabolism. The practical difficulties to be overcome were very great, but the results amply repay the expense and effort required, and it is hoped that the methods worked out may prove of service to other establishments in accomplishing similar purposes.

The Individual Standard Ration.

4. It is necessary to have a standard ration with which to compare the dietary of each patient. The dietetic requirements of healthy persons vary greatly, not only with the sex, but also with the size, and with the occupation; hence a single standard ration is not sufficient. It has been necessary to work out in complete detail the requirements of individuals of different weights. By the aid of the facts developed by the researches of Gautier, Rubner, and Benedict, and especially the comparatively recent studies of Chittenden and Mendel, it has been possible to construct tables which in practical use with several thousand

BANQUET IN THE GYMNASIUM.

DINING-ROOM WAITERS.

cases have been proved to be sufficiently accurate to be of the highest service.

Table Showing Height, Weight, Skin Surface, and Number of Food Units or Calories Required Daily.

Height in inches	Weight in pounds	Surface in sq. ft.	Calories or Food Units: Proteids	Fats	Carbohydrates	Total
MEN						
62	110.0	15.1	165	495	890	1650
63	115.5	15.6	173	519	1038	1730
64	121.0	16.2	181	543	1086	1810
65	126.5	16.6	190	570	1140	1900
66	132.0	17.0	198	594	1188	1980
67	137.5	17.4	206	618	1236	2060
68	143.0	17.8	215	645	1290	2150
69	148.5	18.2	222	666	1332	2220
70	154.0	18.6	231	693	1386	2310
71	159.5	18.9	239	717	1434	2390
72	165.0	19.3	247	741	1482	2470
73	170.5	19.7	255	765	1530	2550
74	176.0	20.2	264	792	1584	2640
WOMEN						
57	78.4	11.9	118	344	688	1180
58	83.6	12.5	125	375	750	1250
59	88.8	12.9	132	396	792	1320
60	94.1	13.4	141	423	846	1410
61	99.2	13.9	149	447	894	1490
62	104.5	14.4	156	468	936	1560
63	109.3	15.0	163	489	978	1630
64	115.0	15.6	172	516	1032	1720
65	120.2	16.0	180	540	1080	1800
66	125.4	16.5	187	561	1122	1870
67	130.7	16.9	195	585	1170	1950
68	137.0	17.4	205	615	1230	2050
69	143.0	17.8	215	645	1290	2150
70	149.0	18.2	223	669	1338	2220
71	155.0	18.6	232	696	1392	2320
72	161.0	19.0	241	723	1446	2410

For example, the patient who eats less than the amount given in this table for a person of his height is insufficiently nourished and must necessarily lose flesh. Since from four-fifths to nine-tenths of all the food taken into the body is used for fuel, a person who is taking an insufficient supply of food is necessarily burning up his own body. It is not an uncommon thing to find emaciated people taking less than half the necessary food requirement, and consequently continually losing in flesh and strength. They are quite unconscious of the fact that they are diminishing in weight simply because they are feeding upon their own tissues.

On the other hand, a person who is taking more than his normal food requirement will probably be gaining in flesh, though this is not invariably the case. The surplus is sometimes worked off through the kidneys, bowels, and other emunctories at the expense of great loss of energy to the system.

By accurately regulating the food supply according to the actual requirements of the individual, any deficiency may be made good so long as the nutritive powers are not completely exhausted.

The height being known, a reference to the table at once shows the proper number of calories and of each sort of food element for a normal balanced ration. If the person is emaciated, from ten to twenty per cent may be added; if he is obese, the amount is diminished one-third to one-half for a time.

By the aid of this system, as will be readily seen, the physician has such complete and easy control of the patient's dietary that he never need be for a moment in the dark as to the exact situation, and can answer easily and promptly questions which without the aid of the system outlined are almost, if not altogether, unanswerable.

The old dietetics was guesswork and experimentation. Sometimes patients were somehow relieved, nobody knew just how; more often there was no relief, or even an aggravation of troubles. There were no clearly defined principles, no precise and definite method.

The new dietetics is based on solid facts which have been demonstrated by laboratory researches, especially those of Pawlow and Chittenden, and are accepted as the latest dictum of science.

Care is taken that the dietary shall not be monotonous. The importance of relish and palatability is fully recognized. Pawlow has shown the importance of "appetite juice" as a dominant factor in digestion, so every care is taken to provide patients with tasty, well-flavored dishes which shall furnish nutritive material in the most easily digestible form and in just the right proportion suited to each individual case.

Pawlow's work, with that of Metchnikoff, Tissier, and Combe, has rendered possible the classification of food products in a new way, and enables us to make application of foodstuffs in the treatment of various digestive and nutritive disorders with a far greater degree of accuracy and efficiency than was possible a few years ago.

Scores of new foods have been discovered and developed, which are each possessed of special and definite therapeutic properties, specially selected to meet certain needs and conditions.

The scores of special dishes and hundreds of special food preparations, each of which has been carefully studied in relation to its nutritive and therapeutic properties, are classified in diet lists which are used by the physicians in arranging the diet prescriptions of individual patients. Additions to these lists are continually being made as the result of the work of the experimental kitchen, which is constantly bringing out tasty and appetizing combinations. The following are the several diet lists at present in use:—

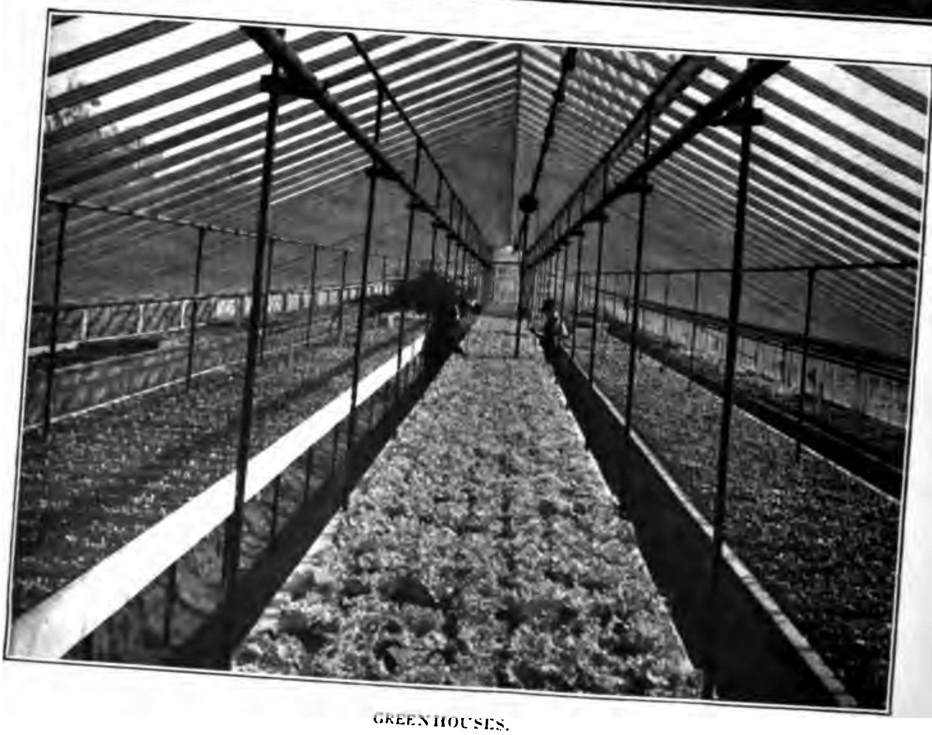
Lacto-cereal diet.
Fruit diet.
Fruit and nut diet.
Fruit-cereal diet.
Dechlorinated diet.
Uncooked foods.
Blood-building foods.
Milk diet.
Fasting diet.
Fat-reducing diet.
Fattening diet.
Dry dietary.
Liquid dietary.
Anti-laxative diet.
Laxative dietary.
Diabetic diet.
Diet for hyperhydrochloria.
Diet for hypohydrochloria.
Cereal and vegetable dietary.
Fever diet.
Diet before laparotomies.
Diet before gastro-intestinal operations.
Special anti-toxic dietary.
Anti-toxic dietary Number 1.
Anti-toxic dietary Number 2.
Anti-toxic dietary Number 3.

All these dietetic advantages are at the command of the patient. The culinary department of the institution is, in fact, simply a large food laboratory in which a score of specially trained cooks and assistants cater to the dietetic needs and fancies of a thousand sick folks daily during the busiest months.

The Diet Kitchen.

A special and well-equipped diet kitchen, from which several hundred meals are sent out daily, is in commission every hour of the day and night.

Visiting physicians are always interested in the "serving-room," where the foods are weighed into portions, to be transported, steaming hot and savory, by the busy waiters to the dining-room. The deftness with which this "apportioning" is done by the use of balances conveniently placed, renders this an interesting sight.



GREENHOUSES.

FOOD SUPPLIES

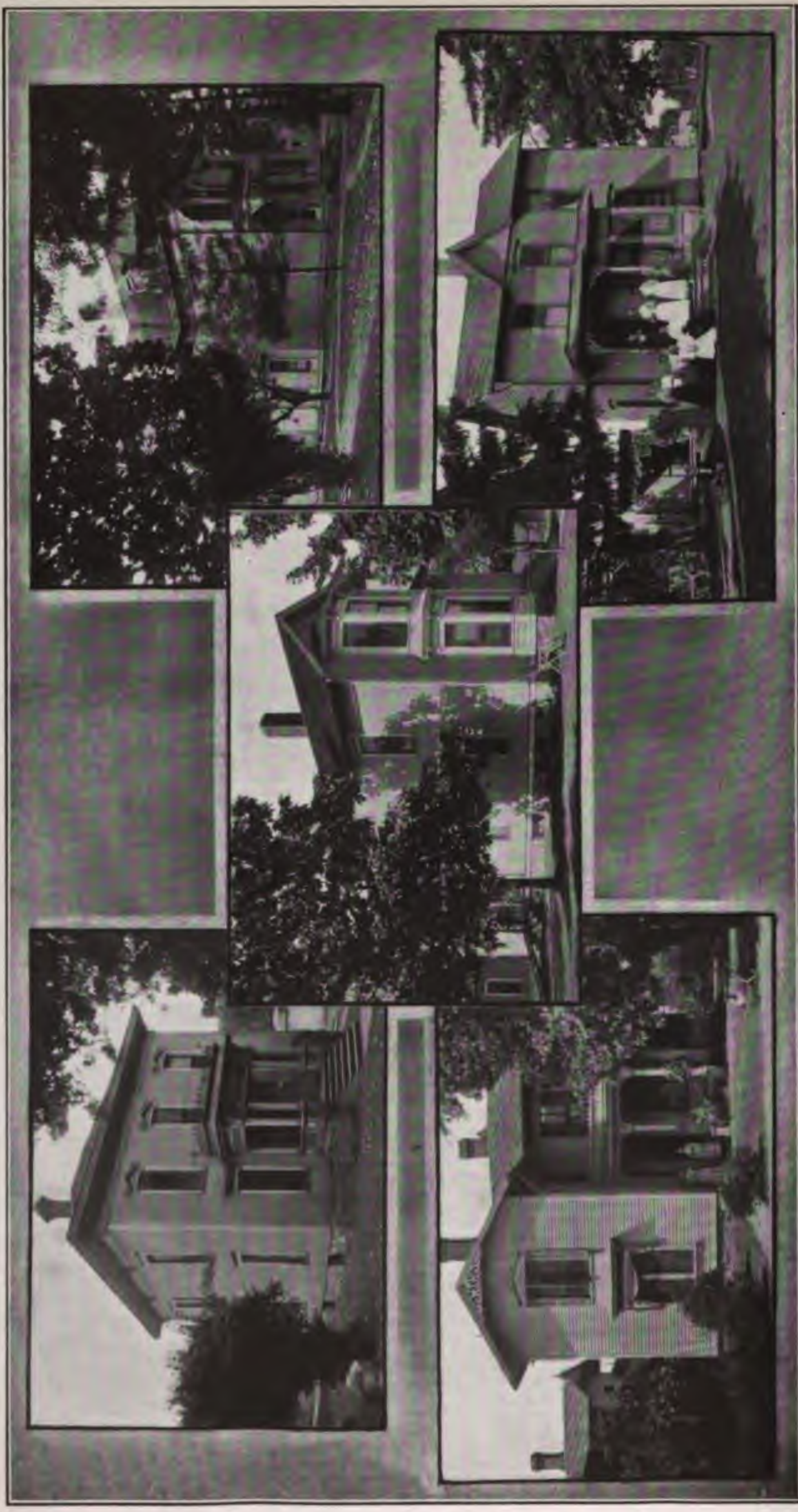
AS THE scientific regulation of the dietary is one of the chief features of the Sanitarium system, the matter of food supplies receives very particular attention.

All milk and cream used in the establishment is carefully pasteurized. Only sterilized butter is used. The milk is provided by certain dairies which are under most careful supervision by State and local experts. The milk is brought in fresh every morning, pasteurized, and separated by means of a centrifugal apparatus. A portion of the cream is sterilized and churned into the best and sweetest butter, fresh daily and free from germs.

The Creamery.

The creamery in which this work is done is on the premises and is presided over by a carefully trained man who knows the dangers from microbes, and how to avoid them, and is under the supervision of the expert bacteriologist of the institution. In dealing with many forms of chronic disease these sterilized dairy products, especially germless butter and cream, are highly important. Buttermilk and kumiss are also supplied fresh daily, with cottage cheese and other milk products.

Unsterilized milk collected with special care is provided for those who find raw milk more digestible than pasteurized milk. Some fifteen years ago an attempt was made to improve upon ordinary kumiss by utilizing special lactic-acid-forming ferments. A study of the observations made at the Pasteur Institute and by Professor Conn, of the Connecticut Agricultural Experiment Station, located at Middletown, Conn., upon milk bacteria, led to the selection of certain ferments which produce pure lactic acid, thus eliminating alcohol, the products of bacterial action upon fats, and other unwholesome products which are found in kumiss, kephir, and ordinary sour milk. Using these ferments with sterilized milk, a product was obtained of superior flavor, the use of which could be prolonged indefinitely without risk of any possible injury through absorption of alcohol and other toxic bodies found in the ordinary sour milk preparations. Roger has recently called attention to the inju-



COTTAGES.

ries which may result from the long-continued use of kumiss on account of the alcohol which it contains, and which often reaches a proportion equal to that in which it occurs in lager beer and other intoxicating drinks. Recent discoveries have added greatly to our knowledge of fermented milk products, and increased our appreciation of their therapeutic value.

Yoghourt, the Bulgarian Ferment.

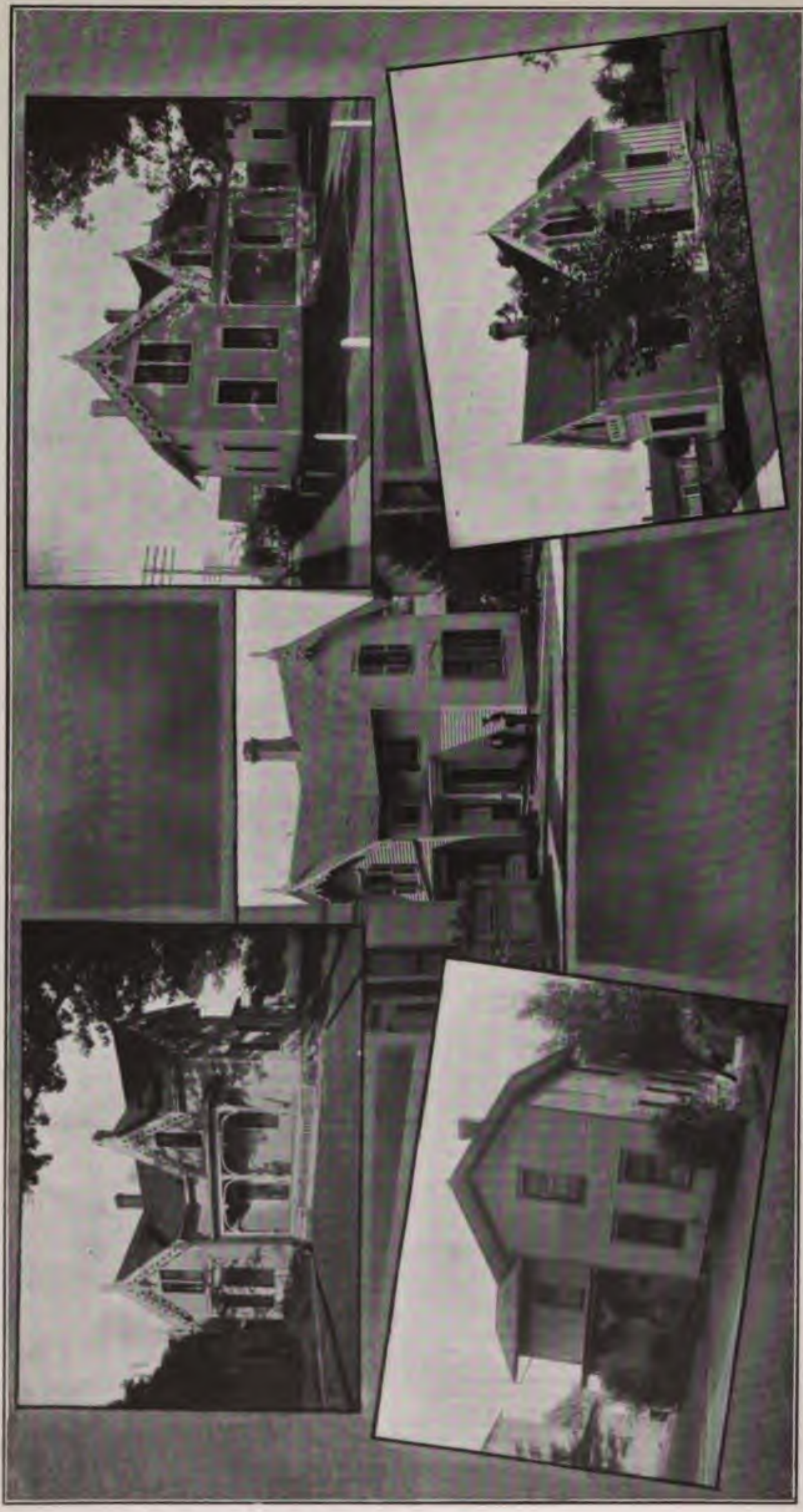
One of the most valuable products of the Sanitarium creamery is *yoghourt,* the Bulgarian ferment which has been studied in recent years by Professor Metchnikoff, of the Pasteur Institute, and Massol, of Geneva. This milk preparation, known in Bulgaria as *yoghourt,* in Turkey as *madzoon,* and in Egypt as *leben,* has been known to Oriental people and extensively used by them from the most ancient times. It is believed by Metchnikoff to be a prime factor in the marvelous longevity of the Bulgarians, who are longer lived than any other known race.

Metchnikoff's Interesting Discovery.

The bacteriological study of this product revealed a new lactic-acid-forming bacillus which has marvelous powers of acid production and most remarkable resistance. Metchnikoff, Tissier, Combe, Escherich, and other European authorities, as well as Herter in this country, have shown that of the two classes of bacterial flora which inhabit the human intestine, aerobes and anaerobes, the aerobes occupy in normal conditions the small intestine, while the anaerobes are chiefly confined to the lower portion of the small intestine and the colon. The aerobes—acid-forming bacteria—are practically harmless in character, while the anaerobes, which grow in an alkaline medium and form alkaline products, are poison-forming and pathogenic bacteria.

Therapeutic Germs.

The bacteria of putrefaction, or so-called "meat bacteria" of Herter, are anaerobes, and produce highly virulent poisons which are believed by Herter and others to be responsible for the numerous morbid conditions that grow out of intestinal auto-intoxication. Metchnikoff has shown that these poisons are the principal cause of arteriosclerosis, premature old age, and of many organic degenerations to which the body is subject. The *bacillus Bulgaricus* found in yoghourt is capable of pre-



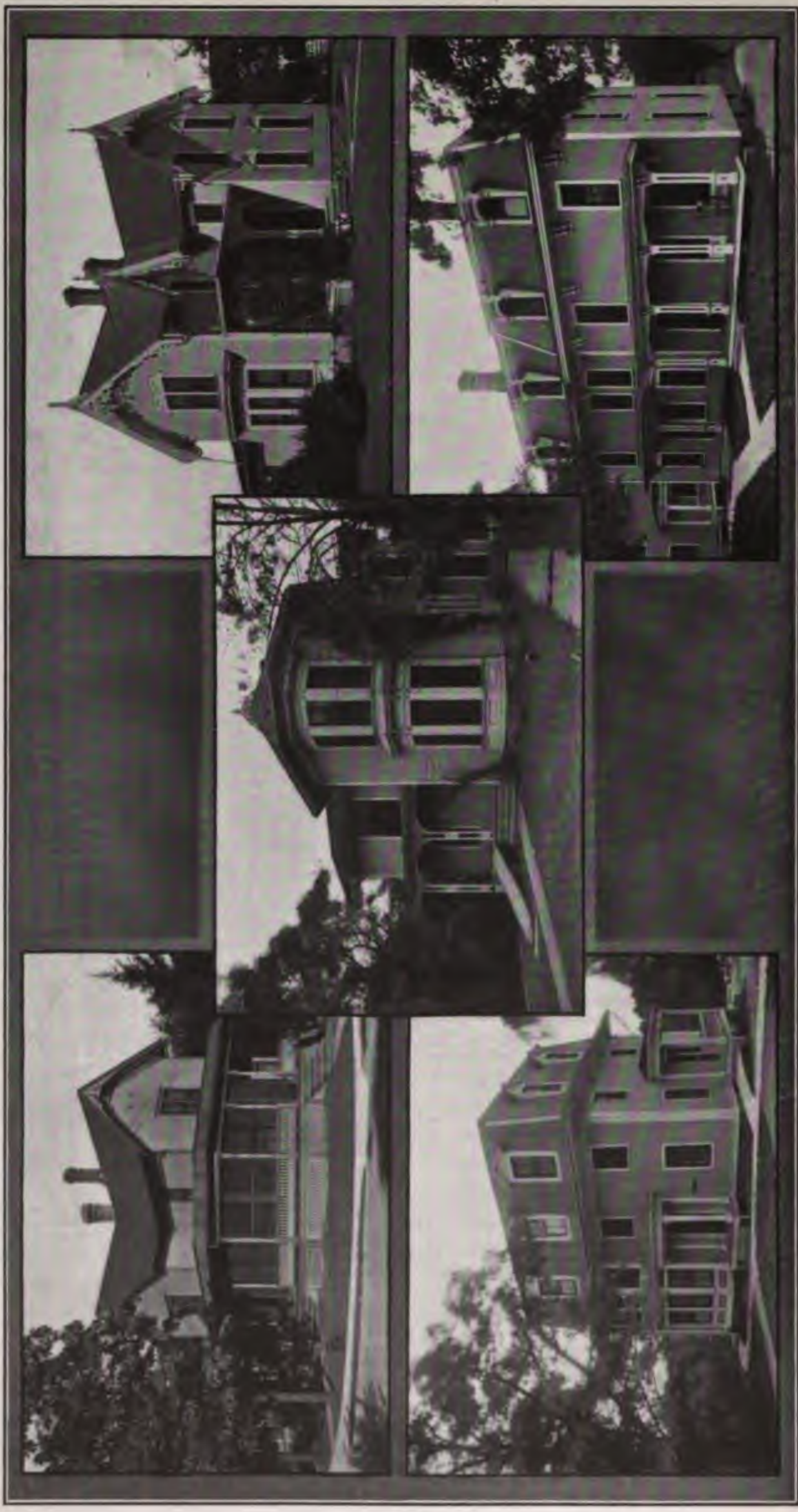
COTTAGES.

venting the growth of these destructive anaerobes by rendering the intestinal contents acid. This bacillus differs from other lactic-acid-forming bacteria in that it is able to thrive in the large intestine, whereas the ferments of kumiss, sour milk, buttermilk, and kephir, being much feebler organisms, can live only in the small intestine, and hence are much less efficient.

Yoghourt has a very agreeable flavor and appearance, and, being a pure lactic product, is free from alcohol, the products of fat decomposition, and various other deleterious substances which are found in ordinary kumiss. The free use of this preparation is exceedingly helpful in combating autointoxication. The Sanitarium table is daily supplied with many gallons of this valuable preparation. Yoghourt cream cheese, another popular product of the Sanitarium creamery, is regularly supplied.

The use of yoghourt from the most ancient times by the Orientals, and its universal use among the Bulgarians and Hungarians, the longest-lived races, and the freedom of these yoghourt-users from appendicitis, colitis, and other intestinal infections, are notable facts which have called the attention of European physicians to this milk ferment, and have led to the scientific investigations first by Massol, later and more completely by Metchnikoff, which have placed its use, both as a curative and a preventive means, upon a thoroughly rational and scientific basis. It has quite superseded kumiss, kephir, and the common lactic-acid ferments on account of the fact that these ferments are able to live only in the small intestine, while the bacillus of Massol thrives in the colon, where it may be found weeks after the administration of the ferment has ceased. The importance of this fact cannot be overestimated when it is remembered that the colon and especially the cecum is the chief seat of the anaerobic infection and ptomain production which are the cause of intestinal autointoxication.

The results which follow the systematic use of yoghourt, especially in connection with the Sanitarium dietary system, are often most striking. Putridity of the stools often disappears in a few days, and with the putridity disappear the accompanying and dependent symptoms,—foul breath, foul tongue, sallow skin, mental depression, insomnia, "biliousness," anorexia, headaches, and a host of aches, ailments and distresses which modern pathologic research has traced to a common origin in intestinal autointoxication.



COTTAGES.

Pure cultures of the yoghourt ferment are prepared for the use of Sanitarium patients by an expert bacteriologist, from cultures brought from Paris. Cultures imported by us from Bulgaria are also used as sources for fresh and energetic cultures. The yoghourt of Bulgaria is, however, a very impure preparation, as several useless and some harmful organisms, including a number of molds, are associated with the essential ferment, so that careful isolation is necessary.

To those who are not able to use milk the ferment is given in capsules or tablets containing 50,000,000 units each, and in the form of yoghourt whey, a by-product of the manufacture of yoghourt cheese. This yoghourt whey is perhaps the most agreeable and certainly is one of the most effective methods of introducing this remarkable therapeutic ferment into the alimentary canal.

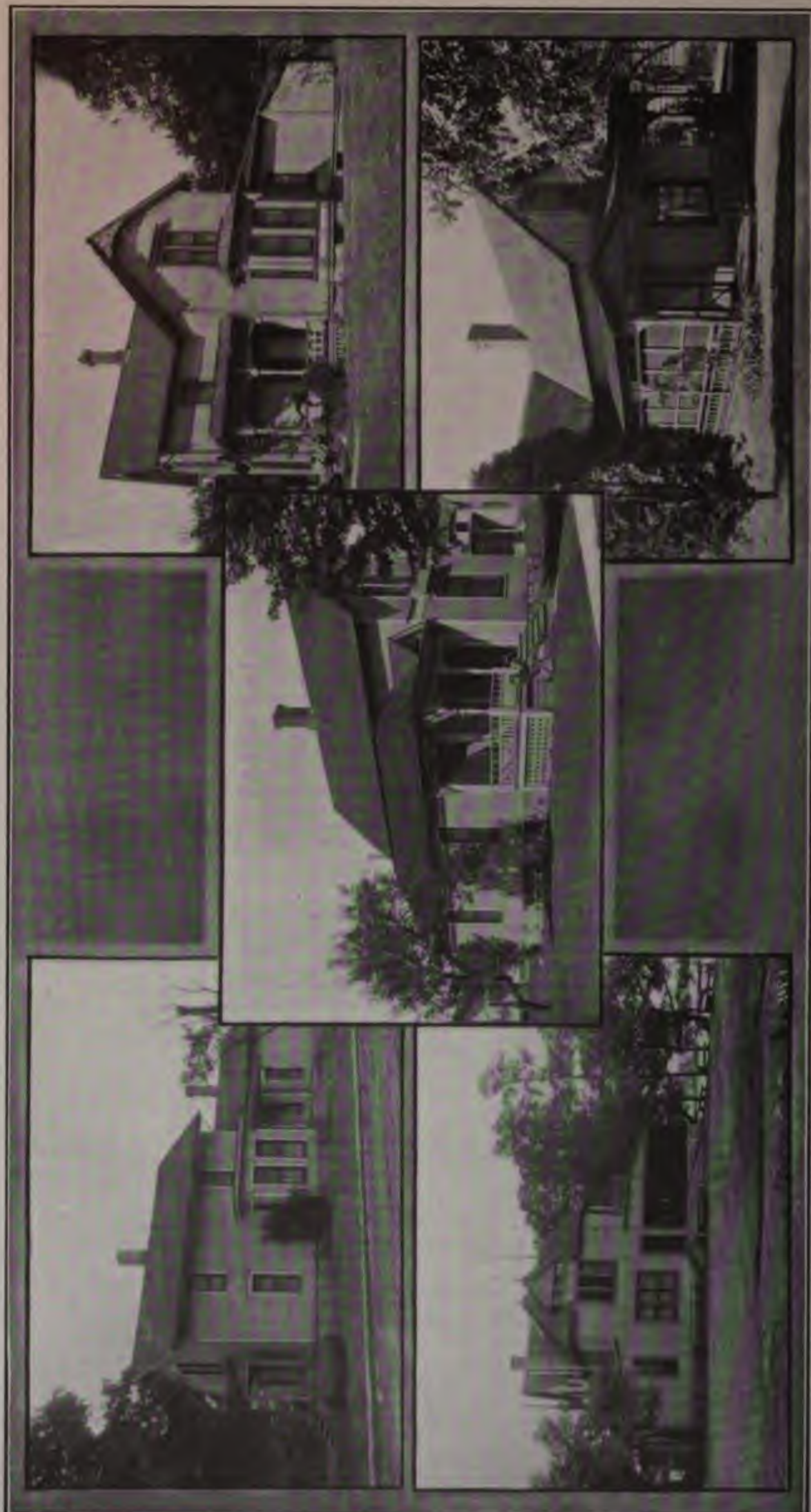
The substitution of a wholesome and beneficent acid-forming flora for the pernicious, toxin-forming, disease-producing flora which Roger, Combe, and others have shown to be responsible for so much systemic as well as local mischief, is one of the most brilliant of modern medical achievements.

Food Specialties.

The choicest of fruits of all sorts, fresh, and canned in glass in the institution cannery, are a specialty much appreciated by the guests. Tens of thousands of gallons of fruit juices and fruits of various desirable kinds are put up in bottles and jugs in the summer and fall. These choice products are much relied upon as means of establishing intestinal asepsis and thus combating the autointoxication which is so often encountered in the chronic cases coming to the Sanitarium for treatment. In addition to these preserved preparations, fresh fruit is supplied in abundance, and fresh fruit juices as well as other raw fruit and vegetable juices are prepared daily and served by special prescription to those requiring these special preparations.

The freshest and finest of green vegetables in season, and breads and cereals in unprecedented variety fill out a bill of fare ample and varied enough to tempt the palate of the most whimsical of invalids.

The thirty years' experience at the Battle Creek Sanitarium has produced a new system of cookery and a novel dietary with hundreds of new dishes, each of which has been carefully prepared with reference to both palatability and digestibility, and



COTTAGES.

which has been studied calorimetrically, so that its food value is known.

The Original Sanitarium Health Foods.

All the so-called Sanitarium health foods are regularly found on the Sanitarium bill of fare, having been originally devised solely for this use. The character of these foods cannot be judged by the numerous imitations and piracies which are lauded by newspapers and signboard advertisements in terms not unlike those employed by the patent medicine vendor. The Battle Creek Sanitarium has no connection whatever with these questionable exploitations. The first thoroughly cooked and dextrinized cereal food preparation was a Battle Creek Sanitarium product. During more than thirty years, experimental work has been steadily carried forward with the purpose to improve the palatability and digestibility of man's natural foodstuffs. The first dextrinized cereal was a granular product. The next important advance was a toasted flaked cereal, in which each grain was spread out into a thin film and toasted slightly brown. The perfection of the methods and machinery for the production of these cereal preparations on a large scale, occupied several years. All the numerous toasted flaked cereals now offered in the market under various titles are made by the same methods, used with varying degrees of success. The original purpose in making the toasted cereal flake was to displace the half-cooked, pasty, dyspepsia-producing breakfast mush, by a thoroughly cooked and easily digestible cereal which might be eaten either dry or moist, and which would enter easily into solution.

That the eating habits of the American public have been materially modified is evidenced by the fact that thirty to forty carloads of toasted flaked cereals are being eaten daily under various names in the United States alone, and the consumption is steadily increasing and is rapidly extending to foreign countries.

The Farms and Hot-Houses.

Three large farms and several hot-houses supply a large part of the fresh garden vegetables, besides quantities of peas, tomatoes, fruits, and flowers. The extensive greenhouses maintained by the institution, comprising more than nine thousand square feet of glass-covered beds, supply the table with an abundance of fresh green vegetables, such as lettuce, fresh tomatoes, and various relishes, besides a profusion of flowers in pots and vases. The use of lettuce, celery, and some other fresh vegetables as supplied in market is always attended, as Metchnikoff has clearly shown, with more or less risk of parasitic infection because of the careless use of night soil and other fertilizers by market gardeners. Such products, when not obtained from the Sanitarium gardens or greenhouses, are always sterilized in the kitchen by immersion in boiling hot water before serving. It is a help to the invalid's appetite to know that the table delicacies placed before him are thoroughly clean.

The Steward's Record.

The following items from the annual report of the steward will give something of an idea of the character and quantities of the food supplies annually provided to feed this great family of invalids and those who care for them:—

Apples	1,959 bu.	Berries	37,632 quarts.
Apricots	1,418 lbs.	Berry juice	1,625 quarts.
Bananas	1,392 b'dles.	Beans	11,042 lbs.
Dates	2,346 lbs.	Peas	11,684 lbs.
Figs	7,246 lbs.	Potatoes	4,585 bu.
Lemons	477 boxes.	Eggs	44,643 doz.
Oranges	534 boxes.	Nut foods	1,374 cases.
Peaches	1,016 bu.	Malted Nuts	5,882 lbs.
Pears	212 bu.	Meltose	14,242 lbs.
Plums	279 cases.	Buns	5,542 doz.
Prunes	5,871 lbs.	Bread	67,698 loaves.
Tomatoes	16,464 quarts.	Granose biscuit	6,821 lbs.
Grapes	20,515 lbs.	Water breads	15,514 lbs.
Grape juice	8,750 quarts.	Flaked cereals	332 cases.
Apple juice	29,524 quarts.	Granola and granuto	2,688 lbs.
Pears (canned)	63 cases.	Zwieback	27,877 lbs.
Peaches (canned)	9,072 quarts.	Cereal coffee	3,137 lbs.
Plums (canned)	1,788 quarts.	Gluten meal and flour	1,566 lbs.

THE CREAMERY.

WHO CAN BE HELPED BY THE BATTLE CREEK SANITARIUM SYSTEM

PHYSICIANS and others are constantly asking such questions as these: Can you cure obesity? What can you do for chronic cardiac cases? What can be accomplished by your methods for persons suffering with Bright's disease? What can be done for chronic ovarian disease? intestinal catarrh? chlorosis? pernicious anemia? chronic autointoxication? hysteria? hyperhydrochloria? diabetes? chronic rheumatism? rheumatic gout? and similar affections?

In general it may be said that sufferers from functional disorders rarely fail to recover when willing to devote a reasonable amount of time to the effort.

In cases of structural change, a cure in the absolute sense is, of course, not possible; nevertheless, so great improvement may be secured in many cases that the patient, though he may have been for some time a confirmed invalid and considered incurable, is able to resume the active duties of his business or his profession, to enjoy a comfortable degree of health, and to lead a reasonably active life.

Of the many hundreds of persons who each year enjoy the advantages of the Battle Creek Sanitarium System, nearly all are greatly benefited, and by far the great majority are more or less permanently relieved of chronic disabling ailments which are with rare exceptions incurable under conditions surrounding them at their homes.

Few patients visit the Battle Creek Sanitarium who have not previously made use of all the remedies in ordinary use without permanent relief. The usual story told is that many remedies of various sorts have been employed under the directions of various physicians, and that some degree of relief has usually been experienced as each new remedy has been tried, but that the relief was only temporary, and that a condition has finally been reached in which no remedy available affords appreciable relief, and the attending physician has expressed the opinion that more thoroughgoing and radical measures must be employed.

A case illustrating this point was that of a chronic neurasthenic sent by a professor of materia medica in the medical department of a university. In his letter of introduction the Doctor said, "I have had this patient under treatment for the last nine years; I have given him nearly every tonic in the materia medica. He has steadily gotten worse. I am sending him to you for you to give him the benefit of physiologic stimulation." Under the influence of tonic baths, massage, and a properly regulated dietary, this patient recovered rapidly and was able to return to his business.

Most chronic ailments being due to wrong habits or unwholesome conditions of life, no cure can be permanent which does not correct these habits and conditions. Palliative drugs afford temporary relief, but they cannot cure.

A permanent cure requires a change in the patient, a regeneration of tissue, constitutional reconstruction, such as can be secured in no other way than by the application of the physiologic method. A change of climate or of occupation is sometimes temporarily sufficient, but more often the patient requires the advantage of measures which powerfully influence metabolism, which encourage hematogenesis and leucocytosis, which increase the alkalinity of the blood and assist blood movement.

Blood-Building.

"It is the blood that heals;" hence those measures are most effective in securing definite and permanent results which are capable of favorably modifying the quality of the blood and its distribution.

Hydrotherapy affords a means by which the blood-count, leucocytosis, and blood movement, both general and local, may be influenced in a most positive and certain manner. By it the local blood volume in any bodily part, internal or external, may be increased or lessened to the extent of five or six hundred per cent. No drug can accomplish this.

The blood-count may with certainty be increased twenty-five per cent or more by a general warm application followed by a short cold spray and friction.

The white cell count of the blood may be increased one hundred per cent or more within the same length of time by similar measures.

The blood-pressure may be raised or lowered within two to fifteen minutes by suitable hydriatic applications, massage, or other physiologic means, and to the extent of twenty to sixty millimeters of mercury.

One of the most remarkable characteristics of the physiologic method is that the applications may be repeated as frequently and as many times as may be needful or desirable, and with increasing rather than lessening effect, for the body never becomes habituated to physiologic applications as to the use of drugs. Indeed, the intensity of the vital response increases as the patient improves in general vigor.

The measures by which improvement in the quantity and quality of the blood is secured, are chiefly the following:—

1. By feeding of foodstuffs which are rich in iron and hemagene and those salts which increase blood alkalinity. The great value which attaches to the subtle substances found in the juices of raw fruits and certain vegetables is not overlooked.

2. Special attention is given to the improvement of the digestion by adaptation of the food to the individual's conditions, and the application of such measures as are known to aid gastric secretion and motility.

3. The daily ration is carefully balanced to the patient's needs, so that no energy shall be wasted in the elimination of useless material.

4. All possible sources of autointoxication are suppressed, especially intestinal putrefactions. This is accomplished, not by drugs, but by an antitoxic dietary and various bowel-cleansing processes.

5. Hydriatic measures known to be capable of powerfully stimulating hematogenesis are systematically employed.

6. Application is made of such measures as will increase the opsonins of the blood, an important index of blood quality as well as one of the chief means of defense.

The increase in the alkalinity of the blood which is accomplished by special regulation of the dietary with this end in view, is one of the most effective means of accomplishing this.

The natural resistance of the body must be increased by the application of tonic hydriatic procedures, the superior value of which for this purpose is one of the best-established facts in therapeutics.

Exercise, applications of electricity, massage, and other physiologic means, including open-air and cold-air methods, assist in accomplishing this.

Increasing Vital Resistance.

Laboratory research and clinical experience have shown that vital resistance may be increased—

1. By the application of tonic hydriatic measures.
2. By means of exercise, massage, and whatever promotes blood movement.
3. By the improvement of metabolism which follows suitable applications of electricity as well as hydriatic applications and exercise.
4. By the improved oxidation and elimination of toxins resulting from the breathing of cold air and the outdoor life.
5. By a low-proteid dietary, whereby is secured a very great reduction in the amount of toxic proteid wastes and putrefactive products, thus clearing out the tissues and improving the quality of the lymph which bathes the tissues.
6. By the employment of special food preparations containing antitoxic ferments, such as yoghourt. Yoghourt is also administered in concentrated form in capsules.

Limited Use of Drugs.

Although no exclusive system is acknowledged or followed, drugs are little used, for the reason that in almost every instance their resources have been quite exhausted before the patient arrives at the Sanitarium; and for the further and still more important reason that little permanent good can be accomplished in the majority of chronic cases by any remedy which stops short of the thoroughgoing body reconstruction which can be accomplished only by physiologic means.

Most drugs can be relied upon to accomplish little more than palliation. With this idea, such drugs are employed as may render service, but very sparingly indeed; for it is never forgotten that drugs do harm as well as good, and the limited period of time which the patient can spend at the institution makes it of the highest importance that no time shall be wasted, and that a foundation for permanent health shall be developed as rapidly as possible by such means as effect improved tissue changes.

Intestinal Autointoxication.

First Bouchard, then Roger, Charrin, Metchnikoff, Tissier, and Combe, and later a multitude of eminent European physicians, recognizing the presence in the intestines of putrefactive

OUTDOOR GYMNASIUM.

and other toxin-forming bacteria, attributed to the baneful influence of these toxins a large share of the chronic ailments which appear in the nosological tables as distinct pathological entities, but which are in reality only the varied consequences of one common condition,—intestinal autointoxication. Of the one hundred and sixty different species of bacteria which Roger lists as constituting the flora of the alimentary canal, each one forms its own peculiar product. Many of these products are highly toxic and capable of producing most varied and often destructive effects.

The intestinal bacteria are divided into two classes,—aerobes and anaerobes. Aerobes in general produce harmless acids. The anaerobes are pathogenic and putrefactive organisms derived in large part, as Herter shows, from meat, hence designated by him as "meat bacteria." Intestinal autointoxication is conclusively shown to be due to these "wild" bacteria, the anaerobes, which have no useful function in the body, and are responsible, directly and indirectly, for a multitude of maladies.

The wide-spread character of the mischief attributed to these parasitic organisms by modern pathology may best be judged by glancing over the following brief summary of the symptoms, morbid conditions, and maladies which are the outgrowth of intestinal autointoxication, as given by the eminent Dr. Combe, of Lausanne, in his masterly work, "Autointoxication Intestinale:"

"Drawn features, sad expression, skin yellow or pale, dryness of the hair, ends of the hair split, scaly scalp, sunken eyes, whites of the eyes yellow or dingy, brown discoloration of the eyelids, cheeks, or other portions of the skin; lips red and congested, redness increased during acute attacks, sometimes swollen and hot; chest emaciated, abdomen bulging or contracted; nails soft and brittle, transverse notches indicating acute attacks of toxemia, sometimes white patches on the skin of the neck or armpits; glands in the groin enlarged, movable but not sensitive; general perspiration or perspiration of the hands and feet, especially during sleep. Loss of appetite, irregular appetite, abnormal appetites, often disgust for meat, desire for plaster, sand, twine, earth, ravenous appetite; feeling of tightness at the waist after meals; colic, abdomen swollen, veins of the abdomen dilated, especially about the ninth and tenth ribs. In young children, liver often enlarged. Sometimes contraction of the pylorus; often contraction of the colon. Attacks of vomiting and diarrhea, bilious attacks, attacks of jaundice, pain in the region of the liver, hardening of the liver, hemorrhoids, abdominal dropsy, gall-stones, rapid pulse, symptoms resembling angina pectoris, pulsations throughout the body, sensations of heat, palpitation of the heart, abnormally slow pulse, subnormal temperature, sensation of coldness in the extremities, nosebleed, high blood-pressure, swelling of the eyelids on awakening in the morning, swelling of the ankles, neurasthenic symptoms, migraine, sick headache, loss of memory, especially for proper names. Epileptoid attacks, tetany, mental disturbance, impoverished blood, pernicious anemia, senility, premature whiteness of the hair and beard, incapacity for muscular exercise, dwarfed growth, nanism; various skin diseases, especially prurigo, itching, eczema, and other eruptions, urticaria, acne, and boils."

The essentials of the plan of treatment developed and carried out in this institution in combating autointoxication, as a result of more than thirty years' experience, are the following:—

1. By proper feeding to starve out or hinder the growth of the poison-forming anaerobes. The aerobes or acid-forming organisms feed upon carbohydrates, such as starch, sugar, and dextrins. The sugar of milk and malt sugar are the best of all foods for these acid formers. On the other hand, the anaerobes feed upon proteids. Meat is the substance which best promotes their growth, because it not only supplies the nourishment upon which they thrive, but also introduces in each morsel swallowed many millions of these poison-forming organisms or their spores. Eggs also favor their growth, especially the white of egg, and fish and oysters still more than beef, mutton, and other flesh of warm-blooded animals. Carefully conducted experiments have shown that animal fats also encourage autointoxication,—good butter (especially when sterilized) least of all, and vegetable fats to a much less degree. It is clear, then, that an antitoxic diet must exclude meats of all sorts. In some cases even milk must be discarded because casein dyspepsia (Combe) is present.

Four grades of antitoxic diet are employed. One of the most effective means of combating this infected condition of the intestine is fasting; but this is seldom required, and it is found that absolute fasting is less effective than a strict carbohydrate diet with the total exclusion of proteids and fats for a short period. The latter plan is the outgrowth of practical experience, and when required, which is only in extreme cases, it works exceedingly well, clearing the tongue quickly, and restoring the lost appetite. Proper bulk is secured by use of Japanese seaweed, a substance which, while indigestible, is unirritating and highly hygroscopic, and not acted upon by bacteria. It serves a most useful purpose in collecting and removing the foreign bacteria which swarm in the mucus of the infected intestine. A few days (two to four) of this regimen accomplish more in clearing the tongue and removing symptoms directly due to intestinal autointoxication than two or three weeks of fasting. In fasting, the symptoms of autointoxication often increase because of the development of toxin-forming bacteria in the retained secretions (mucus, bile, and intestinal fluids), which are an excellent culture media for many anaerobes.

After a few days of this regimen, a balanced but low-proteid ration (Antitoxic Diet No. 1) is given the patient, excluding, however, not only meat, but also eggs and milk, as well as other foods (even vegetable) rich in proteids. Fats are also taken sparingly, the only fats allowed being vegetable fats and sterilized butter in moderate amount.

After a week or ten days, the dietary is enlarged to include fermented milk preparations (Antitoxic Diet No. 2), and as the symptoms improve, fresh vegetables, sterilized milk and cream, and other foods in considerable variety are added (Antitoxic Diet No. 3).

The several graduated dietaries employed will be found in the "Battle Creek Sanitarium Diet List," of which mention has already been made.

Antitoxic foods not only deprive the anaerobes of the nutrient essential to their growth and activity, thereby reducing these dangerous elements both in number and in virulence, but feed the acid-forming aerobes, promoting their growth and acidifying the intestinal contents, and thus inhibiting the growth and pernicious activity of the poison-forming anaerobes.

This simple means enables us to bring into therapeutic operation a great biologic principle whereby we combat deadly pathogenic bacteria with friendly bacteria, and by thus changing the flora of the intestinal tract, we eliminate a veritable Pandora's box of disease-producing elements which all curative means heretofore known have been quite powerless to control.

2. Of almost equal rank with the antitoxic dietary as a means of combating intestinal infection, are means for promoting normal intestinal motility. Stasis, except in the rectum, greatly favors putrefaction of the intestinal contents. By hastening the movement of decomposable material along the intestinal tract, the acid-forming bacteria of the small intestine are swept on into the colon while still active, and the poison-forming anaerobes of the lower bowel are discharged from the body in copious loose movements. A very laxative diet is required in many cases. In some cases, to give bulk to the fecal mass, Japanese seaweed is administered with the meals daily for several weeks or even months.

If necessary, the enema is employed as a supplementary meas-

OUTDOOR GYMNASIUM.

ure,—water, soap and water, oil, or all combined, as may be indicated. Manual Swedish movements to empty the colon and strengthen the abdominal muscles are also employed, and special colon massage. Galvanism to the abdomen and the sinusoidal current to the rectum and abdomen are serviceable measures, as are also various hydriatic applications which stimulate peristaltic and lessen portal congestion.

3. The anaerobes, which are the chief agents of intestinal autointoxication, may be successfully antagonized, as shown by Metchnikoff, Tissier, Combe, and many others, by feeding the patient massive cultures of aerobes in the form of buttermilk, kumiss, kephir, and even sour milk. Best of all the fermented milk preparations is yoghourt, a Bulgarian milk preparation which contains the most active and resistant acid-forming bacillus yet discovered (Massol, Metchnikoff). This preparation is in daily use, in dealing with cases of this sort, in quantities of several hundred pints. A certain proportion of patients cannot make use of milk in any form on account of casein dyspepsia (Combe). In such cases the ferment is given in concentrated pure culture, in capsules. By thus sowing the intestinal tract with harmless and friendly bacteria, the "wild" and pathogenic, poison-forming bacteria are driven out. The use of this remarkable ferment has been known in the Orient for many centuries. Its properties have been studied by Massol of Geneva, and especially by Metchnikoff of the Pasteur Institute, and it is now in great vogue among the leading practitioners of continental Europe, although as yet little known in this country.

4. Autointoxication is also combated by all the usual tonic means by which vital resistance may be increased,—tonic baths, outdoor life, massage, electricity, and various other tonic and restorative measures.

5. Certain intestinal antiseptics render service in exceptional cases.

6. These cases very frequently present unquestionable evidence of the existence of colitis, in the passage of characteristic shreds and membranes. Antiseptic irrigation of the colon is often employed in these cases and with most excellent effect.

No class of cases is treated with more satisfaction than these cases of chronic intestinal autointoxication. Under the influence of the combined measures above outlined, improvement quickly appears. The tongue clears, the skin loses its dingy hue, the stools become less putrid, and the bacterial count notably less.

The urine contains a smaller amount of putrefaction products, a gain in weight takes place, and there is a still more marked gain in strength. Depression and various symptoms of neurasthenia disappear, and the patient sees himself getting well. Improvement is often most gratifying even when a pronounced cachexia exists as the result of the chronic intestinal autointoxication which is nearly always present. Even in cases in which arteriosclerosis has developed, or in which there is marked disease of the liver and kidneys, great service may be rendered the patient by the arrest of the disease and the great amelioration of his symptoms, even though a complete cure is impossible. The liver diminishes in size under treatment, the albumen disappears from the urine, the coefficient of renal efficiency rises, edema disappears, the patient gains in flesh, and so long as the prescribed antitoxic regimen is faithfully adhered to this improved condition continues for some time, even years.

Digestive Disorders.

By the aid of the exact methods of gastric analysis originated by Hayem and Winter, the work of this department was many years ago placed upon a sound scientific basis, and has been in continued operation and with increasing success ever since. The remarkable facts developed by the experimental work of Pawlow which have been made available within recent years have rendered possible an additional and very great advancement in dealing with this class of disorders.

Visits to the laboratories of Pawlow and other eminent European investigators aid in keeping this department abreast of the most recent progress in special lines of research.

Careful gastric examination is of course made in every case before a systematic course of treatment is begun. By means of thoroughgoing fecal examinations, information is obtained not only concerning the digestive work done by the stomach, but also respecting pancreatic and intestinal digestion. The hepatic function is also measured; and thus is obtained a thorough knowledge of the whole chylopoietic system. The exhaustive examination of food residues which is made in this laboratory not only throws light of the highest value upon the condition of the digestive process, but reveals in many cases the real cause of functional and organic changes in remote parts of the body.

The importance of thorough mastication is insisted upon. It is often no small task to train a patient out of wrong habits of eating, but when he sees everybody about him "Fletcherizing" each morsel of food to a finish, he soon catches the habit.

Many wrong habits of life must be corrected. In the cases of women a reconstruction of the dress is often required.

The patient must be made to sleep well; the element of worry must be eliminated by the aid of rational psychic and mental therapeutics. Patients are taught that, as Dr. Gulick has so well said, "Worry is nothing but a diluted, dribbling fear, long drawn out." "Fear-thought," to use Horace Fletcher's expressive word, is a most depressing influence, and must be avoided as a mental and moral poison. Exact methods of investigation render possible an accurate prognosis in nearly every case; so that those who are encouraged to remain may generally receive the most positive assurance that good results will be realized. The ability to hold out definite and positive hope of recovery often accomplishes more for the patient than anything else that could be done for him. It enables him to get his eyes off the cemetery and his face set healthward; and the quickly developing evidence of improvement, the detection of which is rendered possible by accurate means of diagnosis, furnishes solid ground on which to base a further growth of confidence.

A factor of the Battle Creek Sanitarium System which is highly essential in the successful treatment of this class of cases is the calorie system of diet. This system consists of the following:—

1. A menu consisting of several hundred dishes having the qualities necessary to render them at once palatable, digestible, nutritive, and adapted to the various maladies and morbid conditions presented by a large and miscellaneous medical clientele.

2. Exact knowledge respecting the caloric value of each of these articles, and of the several food principles contained in each. The building up of such a menu is no small task. The recipe or formula of each dish must be worked over in a laboratory kitchen by experts until perfect as possible to make it. Then the calory estimations must be made by the bomb calorimeter, combined with the usual methods of food analysis. In the beginning, this work was much facilitated by the very exact study of raw and cooked foods made by the U. S. Department of Agriculture. The use of standard tables, however, is necessarily a more or less inaccurate method, and it was soon found necessary to carefully revise and check the estimations of values by means of the bomb calorimeter and original analyses. Foodstuffs are

AN AFTERNOON ON THE LAWN.

THE CHAPEL.

constantly fluctuating in nutritive value and composition, so that it is necessary to employ one or more experts in chemical work to maintain a sufficiently approximate degree of exactness to give satisfactory results.

3. The menu is now ready for use; but its value depends wholly upon scientific accuracy on the part of the cooks. Each formula must be compounded with the exactness of a pharmaceutical prescription. The kitchen must become a chemical and physical laboratory. The cooks must be experts in the culinary art and conscientious so that they can be relied upon to the last degree. The chef must be a man of unusual intelligence, large and varied experience, thoroughly faithful, loyal, and conscientious, and besides this, he must have had special laboratory training such as cooks and chefs usually know nothing about, and generally would be quite unable to receive, because of insufficient education.

Over all must be a dietitian who has probed deep into the science of nutrition and the chemistry and physics of foods and food preparation.

4. With all these requisites, scientific food may be scientifically prepared. The next thing is the apportioning and serving. In the preparation, the nicest care has been taken to make each dish of standard quality and nutritive content; all this painstaking effort will be lost, however, unless the apportioning is done with such mathematical accuracy in measuring and weighing that each patient served will get the exact amount for which his prescription calls. In no other way is it possible to regulate the diet quantitatively. Accuracy in apportioning is secured by means of conveniently arranged balances and specially made measuring cups and dippers. Intelligent and well-trained persons are employed for this work, and a physician is detailed to watch the serving during meal hours.

5. The next problem is the construction of the daily bill of fare. A monotonous or too much restricted dietary is not conducive to the production of "appetite juice." The menu must be varied and the patient must have the liberty of choice. This is accomplished by prescribing for the patient the number of calories of food units in total or for each food principle as the case may require.

For example, a patient who requires 2,000 calories per diem will be instructed to take 200 calories of protein, 600 calories of fat, and 1,200 calories of carbohydrates, rather than a prescription respecting the exact amount of bread, rice, butter, or other foods that he should eat.

The patient, of course, receives general instruction respecting the foods that are specially indicated in his case, and those which should be avoided, as may be necessary; but he is thus allowed much latitude in the arrangement of each individual meal, and so does not feel restricted. The menu is conveniently arranged so that the patient may check each article ordered or eaten, and at the beginning or close of the meal he simply adds up the figures opposite the articles checked, and the total is the number of calories eaten.

Patients are often surprised to find themselves taking only half the amount absolutely needed for maintenance, and see at once the reason why they are losing flesh. They also see at once the only way in which the loss can be made good, and their co-operation is thus secured.

A medical dietitian is always at hand to give advice and assistance to newcomers as may be needed; but the first three days at the diet table during the research period is usually sufficient to initiate the patient into the mysteries of the bill of fare and to get him started in the scientific study of his nutrition.

6. The marked menu is a record of the patient's meal, which may be filed for future reference. The patient records the calorie totals on the blank in his prescription book provided for the purpose. This he shows to his physician, who is thus enabled to keep close track of his nutritive conditions.

Experience during more than two years has shown that it is possible to feed a thousand persons three times a day from a single kitchen, and to know to a very close approximation the number of food units consumed by each.

This is the Battle Creek Sanitarium calorie system in a nutshell. The diet tables employed and extended dietaries, together with tables prepared from the U. S. Government tables of food analyses, are published in the "Battle Creek Sanitarium Diet List," and will be sent to any physician on request. By the aid of this system, the physician may know at a glance whether his patient is taking a high or low proteid diet, too much or too little fat, and whether or not he is following his prescription.

The dry, bloodless skin of the dyspeptic must be made active and vascular, thus relieving the congested stomach and liver. The prolapsed stomach and other viscera must be replaced and retained in position by suitable abdominal supporters and by strengthening the abdominal muscles by massage, special exercises, "movements," and the sinusoidal current. Irritated sympathetic ganglia must be relieved by suitable applications to the abdomen. Derivative and tonic applications of various sorts must be made.

All measures for improving the general bodily health which are applicable to the case in hand must be employed, for we must rely upon the body itself for the actual cure of the digestive disorder.

Specific disorders of the digestive tract require the application of specific means. Those employed in some of the more common conditions will be briefly described.

Hyperhydrochloria or Acid Dyspepsia.

This condition, formerly too often attributed to fermentation in the stomach, is, in fact, rarely accompanied by fermentation. It is the result, as is now well known, of an excessive formation of acid. The following are the essential features of the method employed in dealing with this condition:—

1. A dietary which will suppress the formation of hydrochloric acid and encourage the development of pepsin so as to increase the utilization of the acid formed. This is accomplished by the employment of well-dextrinized cereals in the place of ordinary bread. These are taken in dry form and very carefully masticated. Foods predigested with diastase are found useful in some cases.

Fats are given freely, for Pawlow has shown that they check the formation of gastric acid. It is remembered, however, that fats differ in their digestive properties. Butter often swarms with bacteria and various other micro-organisms, including yeasts and molds, some of which are capable of growing in the stomach even in the presence of an excess of hydrochloric acid; hence it is important that the fats employed should be sterilized. Ordinary dairy butter is not considered as wholesome food, and is never used. The numerous germs gathered from the barnyard incubate in the milk, rise with the cream, and in churning are collected in the butter. Ordinary milk contains from 10,000 to 200,000 bacteria to the drop.

Butter made from cream which has been thoroughly sterilized is tolerated by most patients, although Combe and other investigators have shown that vegetable fats are more easily digested and assimilated than animal fats, and are less likely to

encourage intestinal autointoxication, which is often present in these cases. The butter used on the Sanitarium table is prepared fresh daily in the Sanitarium creamery from cream removed from fresh milk by a centrifugal separator, then sterilized, cooled, and churned. Such care is taken in the preparation of this butter that it may be kept perfectly sweet for months without ice.

Fresh, pure olive oil and nut oils are found very acceptable to many patients, agreeing better even than sterilized butter. Certain nuts and nut preparations are also found of service, especially almonds, pecans, Turkish hazelnuts, hickory nuts, and fresh walnuts.

In cases in which the amount of acid is very great, foods rich in both proteids and fats are employed for a short time, being generally given in liquid form. Dextrinized cream gluten gruel and malted nuts are found to be particularly useful for this purpose. The vegetable fat suppresses HCl secretion, the excess of protein absorbs and neutralizes the gastric acid set free, while the liquid form reduces to a minimum the length of time the food remains in the stomach, thus giving the irritable membrane a therapeutic rest. This end is still further met in extreme cases by giving the foods in frozen form.

Tea, coffee, condiments, pickles, and in some cases, for a time, even acid fruits, are suppressed. Meats of all sorts, bouillon, and meat extracts of every description are carefully eliminated for the reason that they powerfully excite acid formation, as shown by Pawlow,—an observation which has been confirmed by other laboratory investigators as well as by clinical experience.

The use of fresh vegetables is encouraged, the only condition being that they shall be thoroughly chewed, and that nothing shall be swallowed which has not been rendered liquid or semiliquid in the mouth, all fiber or woody material being rejected.

Irritating condiments and sauces are prohibited. Sodium chloride is restricted, and in severe cases a dechlorinated diet is employed for a time.

The patient is required to rest one hour after each meal, avoiding sleep.

The scientific arrangement of the diet system previously described is of great service in these cases. It enables the patient as well as the physician or nurse to see at a glance which articles on the bill of fare contain the food principles required by his condition, thus giving the patient all the latitude possible in selection, while still keeping in line with his prescription.

2. The patient is advised to drink hot water an hour before meals and about two hours after meals, but to avoid much fluid at meal-time.

3. Hot applications are made over the stomach and spine opposite for relief of pain. The moist girdle, combined with a very hot application over the stomach, renders valuable service when vomiting and gas formation are prominent symptoms. The electric-light bath or some other form of vigorous sweating bath, applied two hours before dinner, lessens the formation of acid. The visceral congestion which leads to excessive secretion is also diminished by massage and muscular exercise. General cold applications are employed cautiously, as they stimulate acid formation. Cold applications are of very short duration, and care is taken to secure thorough reaction immediately following the bath.

The most extreme cases of hyperchlorhydria are found to yield to the thorough application of these measures.

Hypohydrochloria or Slow Digestion.

Most of the indications are essentially the opposite of those of hyperhydrochloria.

Highly peptogenic foods must be employed. The foods must be well relished, but condiments render no service, as hypohydrochloria is one of the conditions resulting from excessive stimulation. The stomach is worn out and must be given as easy a time as possible, and its energies must be reinforced by natural agencies, but not by artificial stimulation. The experimental kitchen and food laboratories of the institution, which have been in operation for more than twenty years, are continually turning out new and tasty dishes and food products in which appetizing qualities are produced by developing natural peptogenic and gustatory properties. These are the most powerful of peptic stimulants, and produce no ill effects as do artificial stimulants, such as condiments. The motility is generally low, hence the greatest care must be taken in the thorough mastication of food.

As constipation is commonly present, peristalsis is promoted by the free use of syrupy malt preparations and other laxative foods. Malt extracts are also beneficial by their peptogenic properties.

Prolonged and thorough mastication of appetizing foods develops appetite juice, which Pawlow has shown to be the most important element of the gastric juice.

The ice-bag is applied to the epigastrium for a few minutes half an hour before meals to stimulate the solar plexus and thus increase appetite and secretion. Half a glassful of cool water an hour before eating is generally useful for the same purpose. Appetite generally develops quickly as the result of the increased rate of movement of the intestinal contents and improved assimilation.

Appetite, secretion, and motility are encouraged by short, cold baths beginning with cold frictions and carefully increasing the vigor of the treatment as the patient acquires ability to react and thus to enjoy the application.

Massage of the stomach, both manual and mechanical, massive vibration, the application of the sinusoidal electrical current to the abdomen and sometimes to the interior of the stomach, the moist abdominal bandage applied at night over the stomach, the abdominal supporter when the stomach is prolapsed, phototherapy, the outdoor life, sleeping in cool, fresh air,—these are all effective methods which, when applied simultaneously, rarely fail to effect definite and most gratifying results.

In a great majority of these cases, the stomach never recovers its ability to produce gastric juice in normal quantities, although a few recoveries have been observed under treatment.

Great improvement, and generally a complete practical recovery, may be expected in all cases in which there is not actual degeneracy of the gastric glands or complete loss of motility. Even in these cases great assistance may be rendered the patient by the exact adaptation of his dietary to his condition. This is readily accomplished by the aid of the calory dietary system.

Apepsia—Anahydrochloria.

When the gastric function is wholly suspended, the glands no longer secreting either pepsin or hydrochloric acid, it can hardly be expected that there will be a restoration of normal function. The problem to be solved in such a case is how to enable the patient to tolerate this crippled stomach; rather, how to get along without his stomach; to be well in spite of its inactivity.

In most cases this is possible. The diet must be confined to such foods as do not require gastric activity; hence flesh foods

must be wholly proscribed. Fats, and especially animal fats, must be used very sparingly and in state of emulsion, for Cannon has shown that fats remain longer in the stomach than any other food element; it is known, also, that fats lessen the secretion of gastric acid (Pawlow) and hinder the action of the saliva and gastric juice upon the foodstuffs. Salivary digestion proceeds well in the apeptic stomach.

In cases in which the bacteriological examination of the stomach fluid shows grave infection, it is sometimes found best to confine the patient's diet to yoghourt almost exclusively for a time. Remarkably satisfactory results are often obtained by this plan of feeding in conjunction with measures for building up the general vital resistance. For instance, in a case under treatment, in which twenty-five million germs were found in each cubic centimeter of the stomach fluid, the bacteria wholly disappeared under a sterile and antitoxic diet.

These patients are required to follow permanently a strict antitoxic diet.

The success attained in the treatment of these cases is most gratifying. The patient may be assured of a practical cure if willing to follow instructions carefully and perseveringly. In not a small proportion of cases the evidences of chronic inflammation, mucus, membranes, shreds, etc., disappear in a few weeks, a gain in weight begins, the blood and general appearance improves, the bacterial count lessens, the proportion of anaerobes in the intestinal flora is shown by the gram stain to markedly diminish, and the patient finds ample ground for encouragement that he is on the right road to recovery.

There are, of course, cases of anahydrochloria for which nothing can be done. When the gastric mucous membrane has undergone complete atrophy and chronic intestinal autointoxication has continued its ravages for so long a time that the liver, spleen, kidneys, and other vital organs have been extensively damaged, little more can be done than to lessen the patient's discomfort by exact adaptation of foods to his crippled digestive organs, and by the employment of such sustaining treatment as he is able to receive. Anahydrochloria due to malignant disease of the stomach is also an incurable condition, but much can be done to relieve the sufferings of these patients, when the disease has advanced so far as to render operation inadvisable, by the employment of a bland and strict antitoxic dietary.

Gastric Dilatation.

The diet in general is essentially the same as for hypohydrochloria, only more carefully limited. Nothing should be introduced into the stomach which will tax either its digestive activity or require a high degree of motility. Of course, indigestible materials of all sorts should, so far as possible, be eliminated from the dietary. The most thorough mastication of the food is essential. Every particle which cannot be reduced to a semi-liquid state in the mouth should be rejected.

Hot applications of some sort are made over the stomach and abdomen two or three times a day. These should be followed by ice rubbing and massage. This is necessary to combat the general abdominal stasis which exists in these cases.

General tonic treatment, including cool showers, sprays, plunge baths, and especially swimming in water at the temperature of the sea, are found extremely valuable measures.

It is rare indeed that these patients fail to make a symptomatic recovery except in cases in which the liver or kidneys have become diseased, or in which arteriosclerosis or profound cachexia exists. The general nutrition may often be brought to a very satisfactory state, and sufficient improvement can be secured, even in most unpromising cases, to enable the patient to enjoy excellent health for many years while following a careful regimen.

Mechanical movements, the arc light, the electric-light bath, the electrical bath, and all the dietary and other measures employed in hypopepsia are found helpful in these cases also.

A bacteriological examination of the feces is always made at the beginning of treatment, and it is interesting to watch, from week to week, the lowering count. It is not uncommon to find at the commencement of the course of treatment ten to fifty billion bacteria per gram of dried feces. In two or three weeks, the number is usually one to five hundred times less. As the normal condition is approximated, the symptoms of chronic intestinal autointoxication, which always attend these cases, rapidly disappear, and the patient begins to gain in flesh. Most strikingly rapid progress is frequently made.

In cases in which the gastric dilatation is due to progressive obstruction of the pylorus, a Finney operation or a gastro-enterostomy is, of course, indicated; but when the obstruction is only partial and non-progressive, patients can be kept in very comfortable health for many years without the adoption of surgical measures. Even in cases of inoperable cancer, the patient may often find great relief in proper regulation of the dietary and appropriate treatment.

Combe, Tissier, Bourget, and others have shown that chronic enteritis, muco-membranous colitis, and gastric enteritis are due to anaerobic infection of the intestine, or stomach and intestine. The disease cannot be cured by drugs, nor by any specific remedy, but requires the thorough application of all the measures which have been described as being used in combating intestinal autointoxication (see page 143).

Disease of Gall-Ducts and Gall-Bladder.

Infectious jaundice or inflammation of the biliary passages accompanies intestinal autointoxication, and is a result of an extension of the anaerobic infection of the intestine to the liver through the portal vein and the biliary passages.

Attention is especially given to the gastric and intestinal catarrh with which the disease is usually associated.

Thorough antitoxic treatment is found effective in these cases. The diet and general methods used in intestinal autointoxication are found rapidly effective in these cases, and have effected permanent cures in numerous cases which had been regarded as proper subjects for surgical operation.

The sweating electric-light bath and the prolonged neutral bath relieve itching; so does sponging with very hot solutions of common salt or soda. Water drinking to the extent of three to five pints daily, and abdominal massage are indicated. Gall-stones, if present, are sometimes dislodged and discharged. The chief measures employed are the electric-light bath, neutral saline bath, and very hot saline sponging to relieve itching; arc light to the trunk, fomentations, thermophore, photophore, or other thermal applications over liver and abdomen two or three times daily, followed by heating compress during interval, to relieve pain, encourage leucocytosis, and improve the circulation in the splanchnic area; the enema at 90° to 75° once or twice daily, to aid intestinal antisepsis and to promote hepatic activity; strict antitoxic diet; tonic hydriatic measures to promote general vital resistance.

Simple infectious jaundice is always curable. If there is obstruction due to gall-stones, operation is of course required in addition to the treatment. The operation is much more likely

LADIES' MANUAL SWEDISH DEPARTMENT.

COLON MASSAGE.

to be successful if preceded by treatment to remove the febrile condition and correct the intestinal autointoxication.

After operation it is highly important that the patient should be subjected to a thorough course of treatment to remove the causes which have given rise to the formation of biliary calculi, so that the diseased condition shall not return.

The fact that ten per cent, possibly more, of adults past middle age, are carrying about stones in their gall-bladders without being in any way conscious of the fact, is evidence that the mere presence of gall-stones is not an indication for surgical operation. The disease often becomes quiescent and so remains indefinitely when the intestinal infection is overcome.

Recent investigations have shown that when gall-stones are formed in the gall bladder they are the result of infection, the original source of the invading bacteria being usually the intestine; hence in these cases it is highly important to give attention to intestinal asepsis. One or two free movements of the bowels are secured daily by the use of laxative foods.

Constipation.

The great majority of cases fall into one of four classes:—

(*a*) Cases of constipation from atony, or from dilatation of the colon,—the very common form,—receive short cold applications externally, cool enemas, abdominal massage, colon massage, manual movements, and laxative diet, which includes vegetable fats, acid fruits, fruit juices, and various laxative preparations of Japanese seaweed and other special products.

The tone of the abdominal muscles is improved by massage, electricity, cold applications, sprays, and douches, short tonic sitz bath, the plunge bath, and especially swimming, gymnastic exercises, manual and mechanical Swedish movements. Enemas—oil, soap, glycerin, etc.—are helpful at the beginning, but are dispensed with as soon as possible, and the bowel systematically trained to normal action.

(*b*) In some cases constipation is due to spasm of the colon, generally marked by a contracted abdomen and oversensitive sympathetic ganglia. The contracted colon can often be felt through the abdominal wall. Temporary spasm of the anus from stricture or rectal irritation, hemorrhoids, etc., may be the cause. Hot enemas, 102° to 105°; hot sitz baths, 104° to 108°, three to five minutes; warm oil enema at night; radiant heat to abdomen two or three times daily, and various other thermic applications to relieve sympathetic irritation and intestinal spasm.

The oil enema, administered at a temperature of 104° and in quantity of one to two or three pints, is better suited to these cases than the water enema. The latter often increases irritation, as shown by the increase in the discharge of mucus. These cases are very often accompanied by intestinal autointoxication, and require special treatment for this condition in addition to treatment directly addressed to relief of the constipation. The lack of gastric acid for sterilizing the food in the stomach renders very important the use of well-sterilized foods. Great benefit is also derived in these cases from the use of the Bulgarian ferment, yoghourt. It is highly important, however, to avoid habituating the patient to mechanical emptying of the colon by means of the enema. Most excellent results are obtained by the use of Japanese seaweed administered with broth three times a day. This preparation, by its powerful hygroscopic properties, prevents excessive dryness of the fecal matters, while at the same time furnishing bulk for the intestine to act upon.

Raw fruit and vegetable juices are often found especially effective in relieving constipation.

(*c*) Cases in which the constipation is due to prolapse of the colon.

In these cases the colon is usually both dilated and prolapsed. The measures above mentioned for overcoming dilatation of the colon are used together with special massage and manipulations for replacement of the colon. Manual Swedish movements are particularly helpful in these cases. A suitable abdominal supporter should be worn. Careful regulation of the dietary, especially the avoidance of large quantities of coarse indigestible material, is important in these cases. The overstretching of the colon is not infrequently due in part to an excessive bulk of fecal matters.

(*d*) Cases of obstruction due to stricture and some other mechanical causes must be relieved by mechanical means.

Here again the greatest service is rendered by a dietary system which is capable of being used as an instrument of precision. By a careful balancing of the daily ration and continuous use of the numerous special laxative foods provided by the bill of fare, definite results are speedily secured. The most obstinate cases often yield very speedily to this combination of peristalsis persuading remedies.

Special movements, so carefully graduated that they may be given to the feeblest patient, are of great service. They are made so carefully progressive that in a few weeks the patient will be able to take very vigorous movements without injury and even with ease.

Diseases of Women.

In no class of cases is the physiologic method more suited and successful than in the treatment of the disorders of women, both acute and chronic. The teaching of Emmet and Peaslee more than thirty years ago made known the great value of the hot vaginal douche. In both acute and chronic pelvic inflammations, the use of the tepid and the cold douche is equally valuable in proper cases.

The hot sitz, the revulsive sitz, the neutral sitz, and the prolonged cool sitz, when properly employed, secure results which could hardly be believed by those not familiar with the hydriatic treatment of this class of disorders.

In acute pelvic inflammations, the hot hip and leg pack, combined with the ice-bag, is a marvelously effective means of relieving pain and controlling inflammatory action, whether the part affected be an ovary, a tube, the uterus, or all of these structures.

Chronic inflammations and exudates left behind by acute inflammation yield to the persevering application of hydriatic measures in combination with electricity, massage, and other appropriate means, which succeed in a large number of cases in which operative procedures are often employed. Pains due to internal adhesions, the result of abdominal operations or other causes, are often cured by the faithful and persistent use of suitable measures, especially thermic and electrical applications.

By the thorough application of these physiologic measures, hundreds of women have been saved from a mutilating surgical operation, and in more than one instance have become the happy mothers of families after the removal of the appendages had been urgently advised as necessary to recovery of health.

Cases of amenorrhea which do not yield to the intelligent application of the combined physiologic method, are extremely rare indeed. It is not more difficult to overcome vasomotor spasm and induce a normal flow of vitalizing blood through the anemic, shrunken uterus of amenorrhea than to cause reddening of any portion of the external surface. The vaginal douche

WHEEL-CHAIR SOCIAL ON LAWN.

ONE OF THE TENT COLONIES.

(both hot and cold), the revulsive sitz, the heating compress, abdominal and pelvic massage, the foot bath, and the Scotch douche, are powerful means of influencing the pelvic circulation.

Swimming, an art little cultivated by women, is wonderfully helpful in overcoming the causes of pelvic disease and fortifying the patient against relapse. Feeble patients must, of course, be carefully trained in preparation for this mode of exercise. Daily instruction is given in swimming, and there are but few patients who do not enjoy this delightful and healthful exercise after a week's training under an expert teacher for a few minutes daily.

Pools of different temperature are provided, so that none are exposed to the risk necessarily attendant upon sea bathing, in which the temperature of the water and other conditions are not under control.

Dysmenorrhea in every form may be wonderfully benefited, and in nearly all cases may be thoroughly cured by systematic local treatment combined with constitutional invigoration.

When some simple preliminary surgical procedure is needed, measures of after-treatment are still usually required to secure permanent improvement through restoration of normal conditions. Surgery alone is by no means uniformly successful in these cases, as most surgeons know by experience.

A careful inquiry will show that in a very large number of cases of chronic invalidism in women in which the therapeutic efforts have been chiefly directed toward the pelvic organs, the real trouble is chronic intestinal autointoxication, and complete relief is obtained only by antitoxic treatment.

Nervous Disorders.

While every case of hysteria is not wholly curable, improvement is always possible, and a complete cure is almost always attainable by intelligent, persevering effort, which includes thorough, all-round health culture and proper psychic management, as well as such physical treatment as may be indicated. The physiologic method provides for every possible indication in this class of maladies.

Various forms of paralysis yield excellent results to the physiologic system when other measures fail. In apoplexy due to degeneration of the cerebral vessels, the advance of the disease may be stayed, and a very great degree of improvement may be secured even in most unpromising cases. Even in cases of paralysis due to degenerative changes of the cord, it is rare indeed that the progress of the disease may not be checked for a considerable time, at least, and in many instances vast improvement may be obtained.

The measures found of special service are the cold mitten friction, the half-sheet rub, the shallow bath, the sinusoidal electric bath, the short electric-light bath followed by a cold towel rub or the Scotch douche, general and special massage, manual and mechanical Swedish movements, the application of the sinusoidal current in such a way as to exercise weakened or paralyzed muscles. Special attention is given to the regulation of the dietary.

In many cases there is high blood-pressure, and often a more or less advanced stage of arteriosclerosis. This especially demands the suppression of colon toxins, which is accomplished by the enema, disinfection of the colon, and an antitoxic dietary to suppress the development of bacteria and bacterial poisons which doubtless are a powerful factor in causing this diseased condition.

Neurasthenia.

This malady of modern life, the result of conditions which are the outgrowth of our perverted civilization, requires a return to nature in habits and such a building up of the natural functions of the body as can be permanently secured in no other way than by the thoroughgoing, systematic application of the physiologic method.

The tonic methods afforded by hydrotherapy are the most effective means known of restoring exhausted nerves. There are no drug remedies which compare with cold baths, which may be perfectly graduated by a series of systematized procedures, beginning with the simple application of cold water after a warm bath (such as the electric arc or radiant heat bath) by means of the hand of the attendant, and progressing through the salt glow, the effervescent salt rub, cold mitten friction, the effervescent friction, the cold towel rub, the wet sheet rub, the dripping sheet, the shallow bath, the Nauheim bath, the cold shower, the horizontal jet, and the cold plunge,—measures gradually increasing in vigor, also modified in duration to suit individual cases.

Massage, manual and mechanical Swedish movements, phototherapy, special feeding, proper psychic management, and the outdoor life are measures which rarely fail of success even in most obstinate cases.

In not a few of these cases the real foundation of the disorder can be shown to be a chronic toxemia, and the colon is most frequently found to be the source of the poisons with which the system is flooded. Bacteriological examination of the feces frequently shows in these cases two to forty billion bacteria to the gram of dried feces, or one hundred to one thousand times the normal amount. A nervous system exposed to the influence of such an enormous amount of toxic matters must necessarily be more or less deranged. The antitoxic dietary of the Sanitarium is admirably adapted to the suppression of toxin formation in the alimentary canal. This special diet system renders easy the regulation of the amount of proteids and other elements with exactitude, and enables the physician, when necessary, to train the patient down to a very low proteid ration without incurring risk of injury, since the isodynamic relations of the ration may be kept always within safe limits.

Insomnia.

It is very rare indeed that this symptom does not speedily yield to the soporific influence of appropriate hydriatic measures. The neutral bath seldom fails to put the most obstinate cases into a restful state within thirty to sixty minutes, and it is not an uncommon thing to see a patient fall asleep within ten or fifteen minutes after entering the bath. Various other procedures are likewise helpful, and success is always expected, even in the most stubborn cases.

Measures long employed in this institution in dealing with this class of cases have within the past few years been introduced into several leading insane asylums in the country, where they are most successfully employed in cases of acute mania with insomnia.

It may be truthfully said that insomnia always yields to the intelligent application of the combined physiologic method, which includes not only the neutral bath, but also the neutral pack, the moist girdle, the leg pack, the neutral douche, and also various electrical applications,—static and galvanic,—massage, and manual movements, with proper dietetic regulation and open-air treatment.

In the great majority of cases of insomnia, the real root of the trouble will be found in intestinal autointoxication. The

blood is filled with toxins, the result of bacterial action in the intestine, the brain cells are excited by these irritating substances, and insomnia is the result. No permanent cure can be accomplished in these cases without correcting the condition of the alimentary canal. The coated tongue and the foul breath which are nearly always present in cases of chronic insomnia, are an evidence of this autointoxication. The use of hypnotics increases the autointoxication, and hence in the end aggravates the disease. This is particularly true of the bromides and allied drugs. A persevering application of the Battle Creek System rarely fails to cure the worst cases of insomnia.

Migraine.

Of the thousands of persons whose lives are made wretched by this malady, there are very few who may not be cured or relieved if the patient can have the benefit of the systematic application of all the required measures,—dietetic, electrical, hydriatic, and such other means as are included in the physiologic system. There is no single method which effects a cure in every case, for cases differ greatly; but by proper adaptation of the appropriate physiologic measures to each individual case, failures are very rare indeed.

In a very large proportion of cases of this class, the suppression of autointoxication by thorough treatment of the colon is followed by the happiest results. An antitoxic dietary is of special importance. In cases in which headache is connected with high blood-pressure, beginning changes in the vascular system are suspected, and antagonized by pressure-reducing measures. When the sphygmomanometer indicates low blood-pressure, pressure-raising measures are employed.

Locomotor Ataxia.

This formidable malady, long considered incurable, yields in the great majority of cases most surprisingly satisfactory results. If the patient has not reached the very last stage of degeneration, muscular control can be regained and nearly every lost muscular movement can be restored, and he can be made able to walk with steadiness. Although the knee-jerk does not return, the disappearance of the ataxic and other unpleasant symptoms gives the patient ample reward for his effort. In the treatment of these cases, it is, of course, necessary to take into consideration the stage of the disease and the condition of the patient.

There is no curative formula for this or any other malady. Each case must be treated on its merits. The chronic autointoxication which clearly exists in some cases may be most successfully combated by means of the electric-light bath, short, carefully administered tonic hydriatic applications, the sun bath, the arc light, and the actinic ray applied to the trunk. The muscular wasting and general weakness may be ameliorated and often made to disappear rapidly under suitable applications of electricity, especially the slowly alternating sinusoidal current, massage, and manual Swedish movements. By special gymnastics the loss of co-ordination and movement is restored, and gradually the patient finds himself returning to a nearly normal condition, able to stand with closed eyes and to walk without staggering, and free from the lightning pains which have made his life miserable.

Bronchial Catarrh.

This obstinate affection usually yields quite readily to the Sanitarium system of management. The chest pack wonderfully relieves cough and pulmonary congestion, while tonic applications train the heart and skin to increased activity and improved nutrition. Massage improves the general circulation and metabolism; suitable applications of electricity develop the muscles of respiration; phototherapy, especially the actinic ray, applied to the chest, relieves local pain and congestion by producing a persistent hyperemia of the skin.

In many of these cases colon infection and autointoxication are found to exist. The improvement of nutrition by correcting the condition of the colon and the alimentary canal in general is not infrequently followed by a rapid lessening of the pulmonary symptoms.

Bright's Disease.

Different forms of chronic disease of the kidneys, commonly known as Bright's disease, if not always curable, yield most encouraging results. In many cases both albumin and casts disappear under treatment. This result may be expected in cases in which the treatment is applied in the early stages of the disease. If more advanced, much may be done to arrest the further progress of the malady and to prolong the patient's life by maintaining activity of the skin through the use of the electric-light bath and the various tonic applications carefully administered, together with a suitable dietary, active and passive exercises, and proper applications of electricity.

The intimate causative relation of intestinal infection to this disease is now most clearly recognized. An antitoxic dietary, and such hydriatic measures as dilate the vessels of the liver and improve its nutrition, while at the same time relieving portal congestion, are capable of accomplishing more than might be regarded as possible. In the majority of cases, the further progress of the disease may be stayed and a very considerable degree of improvement secured, and in not a few cases the recovery is apparently complete.

The employment of the dechlorinated dietary is found to be very important in bad cases, being often followed by the disappearance of dropsical effusions, and general improvement in other particulars.

The recent discovery of the fact that changes in the blood-vessels are present in most cases of chronic interstitial nephritis, renders warm or neutral (not hot) baths, so-called Nauheim baths, and a large variety of other hydriatic applications made to the surface, of great value in promoting the activity of the skin, and so dilating the vessels as to lighten the work of the heart.

In beginning a course of treatment in these cases, exhaustive examination is made of the urine. The coefficient of renal efficiency is determined, with the other urinary coefficients, and the effects of treatment are carefully watched by the comparison of the coefficients week by week. It is certain that life in most cases of Bright's disease may be very greatly prolonged by exact regulation of the dietary and the systematic application of physiologic measures calculated to promote intestinal asepsis and activity of the skin.

The following is a typical daily program for a case of Bright's disease:—

Patient, a man forty years of age, six feet in height, fairly strong and without cardiac complication.

6:30 a. m.—Dry friction in bed.

7:00.—Gentle chest exercises in the gymnasium.

7:30.—Breakfast.

8:15.—Rest for 45 min. in horizontal position in room with windows open, or in the open air; well wrapped in cold weather.

SANITARIUM FAMILY.

NURSES, ATTENDANTS AND EMPLOYEES.

9:30.—Exercise for half an hour in the open air.
10:00.—Electric-light bath for five minutes, followed by cold mitten friction and massage.
11:30.—Manual Swedish movements and breathing exercises for thirty min.
12:00.—Sleep for one hour in the open air or in room with windows open.
1:00 p. m.—Dinner.
2:00.—Rest for one hour in the open air without sleeping.
3:00.—Carriage ride 40 min., or walking in the open air for 30 min.
4:30.—Mechanical Swedish movements—abdominal kneading, vibration, mechanical massage.
5:00.—High frequency current, general application, to lower blood-pressure.
6:00.—Luncheon of fruit or yoghourt.
6:45.—Rest half an hour.
7:45.—Lecture or entertainment.
9:15.—Application of moist girdle and retiring, sleeping in the open air under awning, with windows wide open, or with window tent or fresh-air tube.

Pernicious Anemia.

This grave malady, while not yielding constantly successful results, is by no means hopeless. By means of an antitoxic dietary, chronic autointoxication is successfully combated; and by the application of well-tried hydriatic measures, especially graduated cold procedures, with gentle applications of massage and the judicious employment of electricity, open-air treatment, and other appropriate physiologic measures, success is secured even in very unpromising cases. By the exercise of judicious care, the improvement secured may be maintained, as has been demonstrated by a number of cases which have been kept in good health for years after having been given up as quite hopeless.

The recently published researches of Herter and others leave no room for longer doubt that pernicious anemia is primarily due to bacterial infection of the intestine and absorption into the blood of poisons which dissolve the blood and which interfere with the process of hematogenesis. Herter has clearly proved the relation of the *bacillus aerogenes capsulatus* to this condition; hence the first and most important thing to be done in these cases is to combat the intestinal autointoxication. When the intestine has been largely cleared of the invading organisms, the blood may be rapidly built up and the patient is often quickly restored to the normal condition.

Under the application of the physiologic method of dealing with these cases, which has been gradually developed within the last thirty years in harmony with this view, the blood-count may often be seen to double within a week or ten days' time, and a restoration of the blood-count to the normal sometimes takes place inside of three or four weeks. There is certainly no other method whereby so excellent results can be obtained. One of the greatest of all the advantages of this method of dealing with this class of patients is that when the patient is once restored, he may remain well if he will adhere closely to an antitoxic dietary and so prevent a new infection of the intestine. The great difficulty is that the majority of these cases, returning to the ordinary diet, and especially by returning to the use of flesh foods, reinfect the intestine, re-establishing the anaerobic flora with which flesh foods always abound, and, by reintroducing the deadly *bacillus aerogenes capsulatus,* one of the chief agents of the putrefaction of meat, they soon suffer anew from the well-known symptoms of pernicious anemia. The antitoxic regimen must be followed continuously and permanently. On no other condition can the patient hope to escape a relapse. With this condition he may expect to retain the improvement made under treatment.

Drug Habits.

The morphia, cocaine, and alcohol habits are rarely, if ever, cured by antidotal or substitution methods. The system of dealing with these unfortunate cases which has been developed at the Battle Creek Sanitarium is based upon the successful treatment of many hundreds of individuals, and demonstrates the superiority of the physiologic method in drug addiction. Not only is the withdrawal of the drug not attended with extraordinary suffering, but the craving for the drug is speedily overcome, and when this system is employed in a thoroughgoing way, permanently removed. Incorrigible or objectionable cases are not received.

When a patient of this class is received into the institution, he is put in charge of two attendants,—one for the day, the other for the night. He is constantly under supervision. After a few days of preparation by means of electrical baths and vigorous tonic treatment, the withdrawal of the drug is begun. In this the patient's co-operation is solicited. With a little encouragement he will willingly reduce the dose one-half each day for three days, and at the end of the third day will drop it altogether.

Very rarely is any considerable degree of inconvenience experienced during more than the first twenty-four hours. The attendant stays right by the patient, doing something for him every moment. Gentle friction of the limbs, rubbing of the spine, hot applications to the spine, a neutral bath, head massage, a few spoonfuls of food, an ice-bag over the heart, cool rubbing, an electric bath, an air bath,—unceasingly the nurse applies one thing after another as the varying symptoms indicate, thus not only greatly palliating the patient's suffering, but diverting his mind and relieving the tedium of the passing hours. After a few hours the distressing symptoms grow rapidly less, and in twenty-four to forty-eight hours the patient, with very rare exceptions, finds himself delivered from the galling bondage which has held him fast.

Chlorosis.

This disease, sometimes so obstinate to ordinary methods of treatment, usually yields promptly to physiologic measures. The electric-light bath, the sun bath, the actinic ray of the arc light, followed by short cold applications of some sort, such as the cold mitten friction, the towel rub, effervescent rub, the wet sheet rub, or the shallow bath, quickly change the whole complexion of the case. The spasm of the contracted vessels is relaxed, bringing the glow of health not only to the patient's cheeks, but to the whole cutaneous surface. A general quickening of all the vital functions rapidly replaces the enfeebled tissues by a sounder growth, builds up the blood, restores muscle and nerve tone, and within a few weeks brings the patient to complete recovery.

The out-of-door life, swimming baths, and gymnastics, together with massage and local and general electric applications, are wonderfully helpful in these cases.

The training of the skin by daily exposure in the out-door gymnasium in the summer months and the use of powerful arc lights in winter, is a most valuable aid in cases of this kind.

Perhaps the most important factor of all in these cases is the careful regulation of the antitoxic dietary and the establishment of a low proteid ration. The foundation of this practice is the belief that the deterioration of the blood is only in small part, if at all, due to a deficiency of blood-making elements, but is due to the absorption into the blood from the alimentary canal of poisons by which the blood cells are destroyed and the hematopoietic processes interfered with. The adoption of an antitoxic diet and other means for combating intestinal autointoxication (see page 143) rarely fails to produce prompt and satisfactory results.

MUSEUM AND PATHOLOGICAL DEPARTMENT.

Recovery almost always begins as soon as the patient is placed under treatment. The improvement can be noted from day to day by the rise in the blood-count and hemoglobin. An increase of half a million in a week is very common in the blood-count.

Obesity.

A cure may always be effected when the patient is able to carry out the regimen required. With very feeble patients, massage, manual Swedish movements, and applications of the sinusoidal electrical current may suffice to burn up the surplus fat. Obese patients always get well if willing to work hard and persevere. A pound-a-day loss is a good average rate which can be maintained for a long time and with permanent results. A too rapid loss is not wise.

When an obese person places himself under treatment, a careful history of his case is taken and a thorough physical examination is made. He is then weighed, his height is taken, his weight coefficient determined, and, by means of the dynamometer, the strength of each of his thirty groups of large muscles is determined and plotted on a chart; so it is possible to see at a glance his exact relation to the average person of his own height. His strength coefficient indicates the amount of muscular work which he should do daily. His strength-weight coefficient indicates the degree to which he is handicapped on account of his weight. His height-weight coefficient shows the excess of fat.

The blood-pressure is obtained, both systolic and diastolic, and a cardiac endurance test is applied,—a very important determination in cases of this nature, in which a fatty heart may be easily damaged by overexercise or by excessively hot or cold applications.

Endurance and other physical tests are made, and the results are carefully considered.

The individual patient then receives a carefully adapted prescription, which usually includes the following:—

1. Reduction of the number of calories to a half or a third the amount required for an ordinary person of the same height. For example, suppose a woman's height to be 65 inches; her normal weight should be 120 lbs., but her actual weight is 240 lbs. The number of calories normally required by this woman to maintain her weight and strength is shown by the table to be 1,790 calories; that is, 180 calories of proteids, 402 calories of fats, and 1,208 calories of carbohydrates. The patient is

asked to eat, say, 1,000 calories—about half the daily requirement. The amount of proteid will not be reduced. The reduction will be made in fats and carbohydrates principally. That is, in this case, the amount of proteids would remain 180 calories; the fats will be reduced to 300 calories, and the carbohydrates to 520 calories. Sometimes it is advantageous to eliminate the fats entirely for a short time, but patients generally do better if allowed a moderate amount of fat, as this serves to satisfy their craving for food, and the actual number of calories may be made less when some fat is supplied than when it is discarded altogether.

Occasionally a very fleshy patient, desiring to reduce flesh rapidly, will propose to fast for a few days. If the general strength is good, this may be permitted, but not otherwise. Sometimes the patient objects to the restriction of the food to so small a quantity. Such a patient is told that he may eat as much as he likes, provided he will eat only one article of food. He may select bread, fruit,—almost any article he chooses,—provided he will strictly refrain from eating any other kind of food. Breakfast, dinner, and supper the diet is the same—one dish only. In a short time the monotony of the diet cuts down the quantity to as low a limit as is desirable.

So long as the patient eats less than the actual amount of fat required for the maintenance of a normal person of his height, he is bound to lose in flesh, and the greater the difference between the number of calories he eats and the normal, the more rapid his loss will be.

2. The patient is required to take two cool baths a day of gradually increasing length as reactive power increases. It may be a wet sheet rub, a rubbing shallow, a spray, or a swim. The effect of this cold bath is to burn up a portion of the unnecessary residual tissue which has accumulated in the form of fat.

A prolonged swimming bath, or immersion in a full bath at a temperature of 78° to 80°, prolonged for thirty or forty minutes, with moderate exercise, will so increase heat production as to consume an ounce or more of fat.

3. Patients in whom there is no cardiac indication to the contrary, receive twice daily an electric-light bath or some other form of sweating bath, followed by a cold bath. The bath should be managed in such a way as to secure free perspiration r fifteen or twenty minutes. This also increases oxidation d so results in the burning up of a large amount of fat.

4. If able to do so, the patient is required to walk an increasing distance each day. A patient weighing twice the normal amount will consume an ounce of fat in walking a mile and a half to two miles. This is due to the increased activity of the combustion processes of the body as a result of exercise. Three to ten miles daily soon becomes a cheerful task.

5. Persons who are not able to take active exercise may be exercised vigorously by means of the sinusoidal current. When properly constructed, the apparatus permits of the production of a slowly alternating current which is capable of inducing a painless muscular contraction at each change in the direction of the current. By this means, the muscles of a patient may be exercised as vigorously as may be desired, and thus a large part of the good effects of exercise may be secured even when the patient is unable to walk.

6. Manual Swedish movements are also an important factor in the treatment of these cases. Special days orders are provided for these patients, which are carefully graduated and are so arranged that the effect may be concentrated upon any particular portion of the body, as may be indicated. Special attention is usually directed to the abdomen, externally or internally, or to the hips.

The effect of these special movements is enhanced by various local applications, such as the sinusoidal current to induce passive muscular exercise, and the heating compress to promote disintegration and absorption.

The heart is carefully watched so that it shall not be overtaxed, and the patient is required to report his weight and his dietary each day, while the dynamometer determines whether he is losing or gaining in strength.

The determination of the height-weight and strength-weight coefficients at frequent intervals shows with mathematical exactness the direction and the rate of progress. An obese patient may experience a growth of muscle tissue with a gain in strength while losing fat, but without any change in weight. This will be shown by the improved strength-weight coefficient and the patient will be encouraged to persevere in his work. The reduction of fat is necessarily a somewhat tedious and strenuous process, and the patient needs all the encouragement his case and progress warrant.

CENTRAL TELEPHONE.

NEWS AND BOOKSTAND.

BUSINESS OFFICE.

A careful eye must also be kept upon the urinary coefficients, especially the nitrogen-urea coefficient, and of Bouchard's oxidation coefficient, and the coefficients of demineralization and tissue waste. Too rapid tearing down of the tissues, and especially an exaggerated nitrogen loss, is most undesirable, leading surely to disastrous results. Vigorous measures for fat reduction are safe only when checked and guarded by a careful scrutiny of the metabolic processes, such as is afforded by carefully worked out coefficients.

A constant loss of flesh with a steady gain in strength is a certain indication that the patient is going on well, but a loss of flesh with a loss of strength may give rise to pernicious results, and demands at once a change of program to avoid disastrous results.

In grave cases of obesity the plan of treatment outlined, together with the most careful supervision, is found necessary to achieve definite and permanent results.

The following is a typical day's program for a patient suffering from obesity:—

6:30 a. m.—Water drinking (half pint), plunge or cold shower and swim.
7:00.—Walk 1 to 2 miles.
7:30.—Breakfast on half ration.
8:15.—Lying down for thirty minutes, then leg-raising or walking on all fours for fifteen minutes, or
9:00.—Swedish gymnastics in the gymnasium.
9:30.—Mechanical exercise, vibration and mechanical massage.
10:00.—Water drinking (half pint), electric-light sweating bath, electric thermophore pack, wet sheet pack, or Russian bath, for ten to thirty minutes, followed by cold shower or swim, water drinking (half pint).
11:00.—Rest thirty minutes.
11:30.—Manual Swedish movements—day's order for obesity.
12:00.—Walk in the open air, one to three miles. Water drinking (half pint).
1:00 p. m.—Dinner,—half ration.
2:00.—Rest half an hour.
2:30.—Mechanical movements.
3:00.—Walk one to two miles. Water drinking (half pint).
4:00.—Sweating bath ten minutes, followed by swim for 20 minutes. Water drinking (half pint).
5:00.—Electrical gymnastics, sinusoidal current.
6:00.—Supper, half ration, one pint of liquid food.
7:00.—Calisthenics in gymnasium.
8:00.—Walk one to two miles, or special exercises in room.
9:00.—Water drinking (half pint), apply heating compress.
9:30.—Retiring.

Rheumatic Gout.

Recent studies of this disease have given good grounds for the belief that it is simply one of the protean forms in which chronic intestinal autointoxication manifests itself. That chronic rheumatism and rheumatic gout are not due to uric acid may be regarded as clearly established; but that they are due to poisons generated in the body is nevertheless true, and these poisons are so closely associated with uric acid that it is no wonder that the latter has been mistaken for the real mischief-maker. The writer is fully persuaded that the principal cause of chronic rheumatism is toxins produced in the colon by putrefactive organisms and various toxin-forming germs.

In studying the fecal matters of patients suffering from rheumatism and rheumatic gout, an extremely infected condition of the colon has been constantly found. Six, eight, and ten billion of bacteria per gram of dried feces are common observations. It is no wonder that metabolism should be seriously disturbed and that grave structural changes should take place when such an enormous flood of toxins is continually, year after year, poured into the blood from the colon, as must be the case with such a prodigious putrefactive flora flourishing in the alimentary canal.

The regulation of the dietary is a matter of the first importance in these cases. Indeed, flesh foods must be entirely discarded, not because they contain uric acid, but because the undigested residues of such foodstuffs remaining in the colon promote to a prodigious degree the development and increase the virulence of the colon bacteria, and consequently the development of the pernicious toxins to which this disease is due. This has been clearly shown by Herter.

The patient must be placed upon a strictly antitoxic dietary. Buttermilk and yoghourt may be freely used with advantage. The colon is washed out by large enemas daily, and, if necessary, twice daily for a time, until the bacterial count is reduced to somewhere near the normal point.

The treatment consists of short, hot baths, followed by careful cool rubbings. The purpose of the hot bath is to increase the activity of the skin and to improve metabolism. There is no virtue in prolonged sweating in these cases. Many cases have been greatly damaged by sweating baths and other debilitating treatment at various mineral springs.

All sorts of thermic applications are made to the joints. Most effective are the fomentation, the photophore, and the electric thermophore. A much higher skin temperature can be secured with the photophore than with the hot-air apparatus. The latter is cumbersome and somewhat dangerous, and yet good results are obtained by it. All hot applications are useful.

After the hot application, the heating compress is applied. This consists of a towel, wrung dry out of cold water, wrapped about the affected joint, including the limb for a little distance above and below. This is covered with mackintosh; then thick flannel wrappings are applied so as to secure quick heating and retention of the heat. The heating compress remains until the next thermic application. A hot application of some sort is made two or three times daily.

The development of the wasted muscles is secured by employment of the sinusoidal current, massage, and passive movements. Sun baths and the arc light, and in summer-time the sand bath and open-air treatment are found of great value in these cases through their invigorating effect upon the skin. The effervescing bath (Nauheim), the effervescent rub, the salt glow, and dry friction enter into the program, together with sweating procedures in great moderation. Sweating baths are indispensable in acute rheumatism, but of far less value in the chronic form of the disease.

Cases are very rare in which material benefit cannot be obtained by the application of the measures mentioned above and allied means. The treatment must sometimes be continued during several months to secure the maximum results, but since the recognition of the part played by the colon infection as a causative factor in this disease, the time required to secure large results has been reduced one-half or even more.

Diabetes.

This disease closely resembles obesity in the fact that it is accompanied by general loss of oxidizing power. In obesity the fat is not burned, and in diabetes there is failure to consume the sugar. Essentially the same plan is followed in diabetes as in obesity, only the attention is focused upon the carbohydrates rather than upon the fats, and certain carbohydrates are wholly prohibited. Sugar and dextrose must be omitted from the bill of fare. The cereal starches are given in very small amount only. The potato and other farinaceous roots may be eaten more

ONE OF THE FOYERS AT THE END OF THE CORRIDOR.

THE PHARMACY.

freely, quite freely in the majority of cases. Special gluten breads of different kinds are prepared for patients of this class, and great care is taken to supply an abundant variety of permitted articles. By the use of standardized glutens and the calorie diet system originated here, it is possible to regulate to a nicety the amount of proteids and carbohydrates.

By the use of special soluble carbohydrates given at short intervals, it is found possible to increase very considerably the carbohydrate ration.

By means of a test ration the nature of the case is determined, whether simple or grave. Tests of the pancreatic digestion are made and of hepatic efficiency.

The amount of sugar is quantitively estimated daily or every other day. The patient's weight and strength are watched, while measures calculated to improve oxidation are applied with gradually increasing vigor. These measures are essentially the same as those employed for obesity, but extreme care is exercised not to administer prolonged cold baths, especially in cases in which sugar is found in the perspiration. Prolonged hot baths are also avoided, as well as other depressing measures.

The quantity of urea, as well as that of the sugar, is carefully watched, as having almost equal significance. Emaciated patients, and all cases in which the urea coefficient is high, must be restricted as regards exercise. The attending physician is constantly on the lookout for the slightest appearance of any symptom pointing toward diabetic coma.

The importance of the frequent determination and most careful scrutiny of the coefficients relating to metabolic change in these cases can scarcely be overstated. Neglect to do this while making use of such powerful physiologic means as are needed to definitely influence general oxidation processes may easily lead to fatal mischief by favoring the development of acidosis and other grave complications. Physiologic measures are like steam hammers. They strike smashing blows, but must be accurately aimed, else irreparable mischief may be done.

The results obtained are often most gratifying. Chronic cases are rarely cured entirely, but the amount of sugar is greatly decreased, and, by proper regimen, may be held down to a low point.

Careful attention is given to the correction of intestinal autointoxication, often a dominant factor in this disease.

CARDIO-VASCULAR-RENAL DISEASE—ARTERIOSCLEROSIS

There is no class of maladies in which the physiologic method and especially the combined method of physiologic therapeutics which constitute the Battle Creek Sanitarium System shows its efficiency to better advantage than in the treatment of cardio-vascular-renal disorders.

The three classes of maladies, cardiac, vascular and renal, are considered together because of the constancy with which they are associated, especially in the advanced and secondary forms which are likely to come under the care of the sanitarium physician.

In cases of organic disease of the heart with primary low blood-pressure, most brilliant results are often secured.

The hypotension and resulting passive congestion of kidneys, liver, stomach and bowels and the results which follow this visceral stasis are more amenable to physiologic measures than to any other. Carefully conducted tonic baths, particularly cold rubbings, as the cold mitten friction, cold towel rub, half-sheet rub, and later the rubbing shallow, the spray, and the douche, afford a graduated method by which the tone both of the heart and the vessels may be greatly improved.

The cold precordial compress, especially the cooling coil, affords a means of increasing the energy and efficiency of the heart far superior to any drug yet discovered. This method has been called the hydriatic digitalis, but it is far superior to digitalis in the fact that it increases the energy of the heart without increasing the resistance in the blood circuit. It has no cumulative effect and it does not lose its efficiency by continued use. That this measure is capable of doing harm as well as good, especially in cases of cardiac dilatation, does not diminish its value, but only emphasizes the necessity for expertness and discrimination in its use.

Visceral congestion is combated by the cooling sitz-bath, the wet girdle, the revulsive application to the spine, the salt glow, oil frictions, massage and other measures whereby collateral hyperemia of the skin and superficial parts is established, thus relieving the deeper lying structures.

A definite elevation of blood-pressure, 15 to 30 millimeters, is commonly noted within a week or two after the beginning of treatment in these cases. The albumin which in advanced cases is often found present in the urine quickly disappears. Carefully administered tonic hydriatic applications improve the metabolism, appetite returns, tissue wastes are eliminated, there is increased vital resistance with improvement in the blood and secretions, and the intestinal autointoxication which in these cases is usually a prominent feature, rapidly diminishes as shown by a diminished output of indol in the feces and of indican in the urine. By means of the calorimetric method the estimation of these products is made with accuracy, so that the diminution of the toxemia under a carefully arranged antitoxic regimen with tonic measures of treatment can be readily observed from day to day.

A point in prognosis to which attention is always given is the determination of the excretory efficiency of the kidney, both as regards mineral salts and urea. By the careful determination of a score or more of renal coefficients in connection with a urinary test ration continued for three days, a very close estimate can be formed of the degree of damage which the secreting structures of the kidney have sustained. This is found a matter of much importance, not only from the standpoint of prognosis, but also from that of practical therapeutics. When the ability of the kidneys to eliminate chlorids is found to be diminished, the use of chlorid of sodium is restricted; and where dropsy is present, a saltless diet is administered; and it is often most gratifying to note the rapidity with which the dropsy disappears under this regimen in connection with suitable and carefully graduated diaphoretic measures, such as the electric-light bath, restricted to the legs, the half-blanket pack, and other partial diaphoretic measures associated with the precordial cooling coil, or a cooling chest compress.

In grave cases the observation of the blood-pressure before, after, and even during an application renders possible an exact adaptation of measures to the patient's needs. This precaution is required in not a few cases in which marked cardiac dilatation is present.

Arteriosclerosis.

When symptoms of renal disease are present, especially in connection with evidence of cardiac failure, a searching inquiry is made to determine if possible whether or not the kidney lesion is primary or secondary. This naturally leads to the careful study of the condition of the vessels. High blood-pressure is not regarded as necessarily an evil. Not infrequently, in fact, the blood-pressure, when already much above the normal, may rise 20 or 30 millimeters during the first weeks of treatment with a corresponding improvement in all the general symptoms. The high blood-pressure is of course necessary to the maintenance of the function of the kidneys and other organs in which the blood-vessels are obstructed by degenerative changes. In cases in which extensive calcareous degeneration has not yet taken place, in fact, in the great majority of cases of hypertension, a very marked lowering of blood-pressure is readily secured.

The low proteid and antitoxic regimen generally brings down the blood-pressure from 10 to 30 millimeters within a couple of weeks by lessening the amount of pressure-raising toxins in the body fluids. In cases of beginning secondary hypotension this beneficial effect is obscured by the improvement in the heart action which occurs at the same time as the result of tonic hydriatic applications and hydriatic heart tonics which are employed, the tendency of which is to increase blood-pressure. The diminution or disappearance of dropsy, the improvement in the urinary secretion, the disappearance of mental and nervous symptoms due to cerebral edema, the improved appearance of the skin and the general improvement in the patient's strength and feelings afford, however, in these cases sufficient evidence of progress in the right direction.

Later, as the general metabolism is improved under dietetic regulation and graduated physiologic applications of water, electricity, massage, special cardiac movements (Ling or Schott system), the effervescing bath and other appropriate measures, the blood-pressure gradually falls, sometimes to two-thirds or even one-half the maximum record.

These cases are always highly interesting, and results are rarely disappointing. While a few cases are encountered in which the patient has waited so long that nothing more can be done than to palliate his sufferings and prolong his life for a few months, the renal tissues having become so far degenerated that there is not enough secreting tissue left to do the necessary work required to free the blood from body-toxins, a large number of cases are met in which the improvement in the patient's condition is so rapid and so great as to seem almost miraculous.

It is certainly proper to say that there is no class of cases in which the advantages of the Sanitarium method are more apparent and the need of Sanitarium care and treatment more urgent than in this class of cases. It is proper, however, to emphasize the fact that there is no class of cases in which irreparable injury may be so easily and quickly done by the incompetent or improperly controlled application of hydriatic methods, either hot or cold, as in this class of disorders. For example, the cold cardiac compress is the most efficient means of stimulating the heart's action, but when suddenly applied in a case of lost compensation with extreme cardiac dilatation, the patient may be almost as certainly and as suddenly killed as though shot through the heart with a bullet. In advanced cases of arteriosclerosis, either a very hot or a very cold bath may cause death by apoplexy, and a hot bath may accomplish such grave depression in a case of either primary or secondary hypotension as to cause death either at once or a few hours later. Nothing could be more dangerous than a haphazard or inexpert application of hot or cold baths, or even massage or movements in cases of this sort.

Marked beneficial effects are often observed from the application of the high tension current. The effects, however, of this measure are generally only temporary, consequently it has little curative value except when used in connection with measures which remove the causes of hypertension, especially elimination of the pressure-raising toxins from the circulation.

SURGICAL OPERATING ROOMS.

THE SURGICAL WARD

WHILE surgery is not a chief feature in the Sanitarium, specially favorable conditions are afforded to those requiring surgical attention. To the care of skilled surgeons is added the superior methods of nursing, which greatly lessen the inconveniences and the dangers of grave surgical cases. Up-to-date operating rooms, aseptic wards, and conscientious surgical nurses and assistants make this department successful in saving the lives of hundreds of cases annually; but the physicians take special pride in restoring their patients to health without surgery when possible, considering a cure by non-surgical means a far greater triumph than the most brilliant surgical procedure.

THE MEDICAL CORPS

The medical corps of the Battle Creek Sanitarium comprises more than thirty physicians, and from 200 to 350 nurses and attendants, the number varying somewhat with the season of the year. The physicians are all men and women who have received a thorough modern medical training, graduates of reputable colleges, and possessed of the legal requirements for the practice of medicine.

In addition to the ordinary medical equipment, these physicians have all received special training for five to twenty years or more in the principles and practical application of the Battle Creek Sanitarium system of physiologic medicine. The physiologic method, like surgery, cannot be learned from a book. It depends so largely upon exactness of technique in the employment of agencies which require physical means, instruments, and apparatus, a large training of hand and eye, and the development of the therapeutic judgment by actual experience, that only those who have had special training can hope to obtain in its application the largest and best results.

It must be said, on the other hand, however, that there is no system of therapeutics which compares with the physiologic method in versatility of application and adaptation to emergency conditions of every sort. Every home affords the means

ELECTRICAL DEPARTMENT.

MACHINE SHOP.

LAUNDRY.

necessary for employing the physiologic method, but of course in a restricted way.

The Sanitarium aims to make the largest and most efficient use of natural or physiologic methods possible, and the constant effort toward the accomplishment of this end has developed a broad and more or less complex system, presenting hundreds of measures, means, and methods, each of which has a technique of its own, and indications and contraindications the recognition of which is as essential to success as in the use of drugs of the most powerful sort. These the physician must master.

The leading physicians of the Battle Creek Sanitarium have been actively connected with the institution for ten to thirty years. All have been specially trained for their work in the best medical educational institutions of this country and Europe. None are allowed to take the responsibility of managing cases who have not had at least several years' experience with the Sanitarium system. But the largest experience would enable the physicians of the institution to accomplish little were it not for the aid which they receive from the laboratory experts in working out an accurate and complete diagnosis, and the co-operation of an army of trained nurses and attendants who, with untiring, conscientious skill, carry out their prescriptions at the bedside and in the various branches of the treatment department.

The management of the Battle Creek Sanitarium feels exceedingly grateful for the generous support and co-operation which has been accorded it by the members of the profession in all parts of the United States, as well as in foreign lands, where the most eminent medical bodies accord to the institution the same standing as that of any well-organized public hospital. It will be the most earnest endeavor of the managers and faculty of the institution to make it in the future still more deserving of confidence and patronage, and to maintain its standing as a leading exponent of physiologic medicine.

Any reputable physician who desires to inspect the institution or to investigate its methods of treatment and clinical research, will be cordially received as a guest for a day or two at any time on application to the Medical Office or the Superintendent. A surgical clinic is held each Wednesday.

Letters from physicians introducing patients are often of great service and are always gratefully received. It is the policy and practice of this institution to co-operate with the home or

COOKING-SCHOOL.

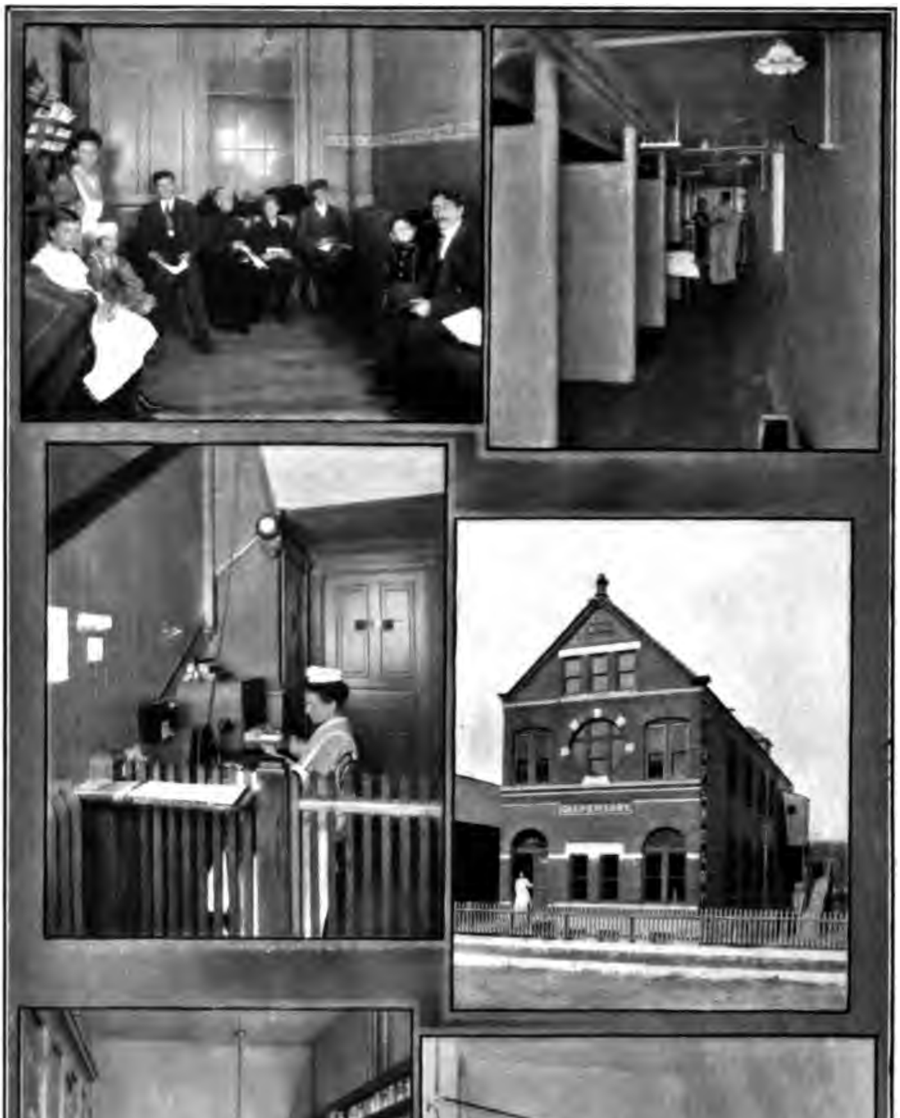
attending physician, not to supersede or antagonize him. The mutual aim and interest is the recovery of the patient in the shortest possible time and to the most thorough extent possible. No method is employed which cannot receive the endorsement of any scientific physician. The members of the medical staff are always ready to send to the attending physician not only a full report of the finding in the case, but also of the measures of treatment prescribed.

THE OBSTETRICAL WARD

The advantage of physiologic treatment and training as a preparation for confinement is a matter which has received increasing recognition during the last twenty-five years, and has led to so large a number of applications from expectant mothers that the management found it necessary to establish several years ago a special obstetrical or lying-in department. This department is in charge of a physician who has had exceptional training and experience in this specialty, having served for a year as house physician in charge of one of the largest lying-in charities in the country.

The after-treatment of these cases by the Battle Creek Sanitarium System is found to be greatly conducive to rapid recuperation and the prevention of the unpleasant sequelæ which sometimes follow confinement under less favorable conditions. The classes of patients which may be specially benefited by this department are: 1. Women who are muscularly weak through lack of original development or sedentary habits. Parturition is a muscular act, and a good muscular development is necessary to insure an easy childbirth and a rapid recovery. 2. Cases in which obstinate or uncontrollable vomiting threatens an unfortunate termination of gestation. 3. Cases of habitual miscarriage. 4. Cases in which from previous experience there is apprehension of puerperal eclampsia. 5. Cases in which there is reason to apprehend abnormalities of any sort threatening either the mother or the child.

The experience of this department has shown that the patient receives very great benefit from the special care and treatment, the regular regimen, the careful supervision of the urine, the stools, the blood-pressure and the blood, and the carefully graduated training of the whole body in preparation for the final crisis. These benefits are shared by the child as well as by the mother.



DISPENSARY AT 888 THIRTY-FIFTH PLACE, CHICAGO.

Such arrangements are made as permit the patient to enjoy all the advantages of the Sanitarium without unpleasant publicity, and the department is supplied with every modern appliance and such conditions as secure the greatest safety to both mother and the child.

THE SANITARIUM AND HOSPITAL TRAINING-SCHOOL FOR NURSES

The nurses employed in the institution are students or graduates of the Sanitarium and Hospital Training-school for Nurses, one of the oldest, largest, and most thoroughly equipped training-schools for nurses in the United States. The school has a faculty numbering thirty capable teachers and lecturers, and a curriculum which covers not only all the ground ordinarily required in the best hospital training-schools, but in addition, the great field of hydrotherapy, electrotherapy, medical gymnastics, phototherapy, thermotherapy, medical dietetics, and other features of the physiologic system.

The nurses have on an average about two classes a day during their three years' period of training. Training is carried forward during the entire year, so that the amount of actual instruction received by the students of this school is more than double that given in most other training-schools.

THE BATTLE CREEK SCHOOL OF HEALTH AND HOME ECONOMICS

The necessity for training a large number of cooks, dietitians, and expert hygienic housekeepers for the work of the institution, to supply recruits for the constantly changing corps employed in these capacities, often numbering a hundred or more, led the management some years ago to establish a special department for this work, which has developed into an educational institution of unexpected proportions and importance. This department presents in its curriculum courses in all the branches usually taught in the best schools of domestic or household science, and covers a broader field, especially in the subjects of nutrition and medical dietetics, and in the application of the latest findings of science to the conduct of the home and the household.

The special advantages offered by this school have already attracted a considerable number of students from distant parts

VIEW ON ONE OF THE SANITARIUM FARMS.

of the United States and England, including graduates from other schools, chiefly persons preparing to fill positions as teachers of home economics in special schools and other institutions.

THE GENERAL ATMOSPHERE

A quiet, unobtrusive, religious atmosphere is maintained in the institution. Morning worship is held daily. A Bible class for the study of the International Sunday-school lesson is held in the parlor Sunday afternoon, and a religious service is also held in the parlor Sunday evening. Vesper service is held in the parlor several evenings of the week.

No theological or sectarian propaganda is carried on. The status of the institution is solely that of a Christian altruistic enterprise.

Large numbers of nurses and many physicians have obtained medical training here for the purpose of devoting their lives to various lines of missionary and altruistic work; seventy-five or a hundred others are constantly under training for this beneficent work.

A PUBLIC CHARITY—NO PRIVATE INTEREST—NO SECTARIAN AFFILIATION

The Battle Creek Sanitarium corporation is a private enterprise conceived and conducted solely for the public welfare. It has never been owned by any church or sect. For many years the institution was closely affiliated with the Seventh-day Adventist denomination because of the fact that the original founders and the contributing members were chiefly members of the denomination named; but the nonsectarian and undenominational character of the work was always fully acknowledged, and was clearly indicated by its charter. An attempt made in recent years by the central committee of the denomination named to bring the institution under denominational control resulted in so marked a failure that at the present time the institution is absolutely free from sectarian affiliation as well as control. The personnel is made up of Christian men and women of various denominations, but there is no church or sectarian control or affiliation.

There are no stockholders, no dividends, and no private interest; the property is dedicated to the public and is held by

DISPENSARY.

trustees for the purposes named in the articles of incorporation (see pages 28, 214).

In a test case brought before the Supreme Court of the State of Michigan for the purpose of determining the status of the Sanitarium and whether it should be required to pay taxes, the decision of the court was in favor of the institution, and no taxes have since been paid.

One of the numerous allied charities worthy of notice is the Haskell Home for Orphans, organized through the efforts of the Sanitarium Management, aided chiefly by the generosity of Mrs. Caroline E. Haskell, of Michigan City, Indiana. In this institution orphan children are reared, trained, and educated in accordance with the simple life principles of the institution. The children are divided into family groups under the care of foster mothers, and have the benefit of up-to-date educational methods, kindergarten, sloyd, manual training, etc. More than five hundred children have been rescued through the agency of the home. Another allied charity is the Bethesda Maternity, a place where deserving poor women may be cared for during confinement. A lady physician of large experience is in charge.

Both of these institutions receive constant financial aid and other essential assistance from the Sanitarium Management.

SANITARIUM HEALTH FOODS

In the effort to meet the dietetic needs of a great variety of patients, the superintendent of the institution from time to time has devised various foods and food preparations, some of which have found general popular favor. Among these were a cereal coffee substitute, various dextrinized and malted or predigested foods, and various toasted flaked cereals. A number of these have been widely exploited by various imitators and piratical schemers. More than a score of these food enterprises have been launched in Battle Creek and vicinity and as many more elsewhere in this country. By ingenious advertising, much after the method of medical quacks, some of these concerns have built up large business interests and have waxed rich by their ill-gotten gains. One party in particular has made some millions by the sale of a cheap mixture of bran and molasses. The numerous varieties of wheat and corn flakes on the market under various picturesque names are all imitations of the original wheat and corn flakes made for the patients of this institution.

Various special foods were for some time manufactured and sold by a department organized for the purpose, but after the fire of 1902 the management disposed of all its interest in the manufacture and sale of foods to friendly parties, who it was believed would conduct the business in an honorable and ethical manner, precautions being taken to secure this. Through clerical oversights and trusting too much to advertising agents, some mistakes were made, the correction of which involved large losses and reorganization. At the present time all the foods which have originated in connection with the Battle Creek Sanitarium, and some of which have at various times been sold by the Battle Creek Sanitarium Food Department, the Battle Creek Sanitarium Health Food Company, the Battle Creek Sanitarium Food Company, the Battle Creek Sanitarium Company, Limited, and the Sanitas Nut Food Company, Limited, are now manufactured and sold exclusively by the Sanitas Food Company, who announce their products under the name of the "Battle Creek Diet System," the only food company doing business in Battle Creek whose products are used or recommended by the Sanitarium management.

The Battle Creek Sanitarium has never at any time had any connection whatever with the manufacture of "Postum," "Grape-Nuts," "Obesity Pills," or any other of the numerous nostrums made or sold by parties advertising from Battle Creek. The prestige of Battle Creek as a health center has made this an attractive place for the operations of various charlatans, and not the least pretentious and predatory of these are the numerous food charlatans who, posing as experts and discoverers, have reaped a rich harvest from the credulity of a confiding public and to some extent at the expense of the Battle Creek Sanitarium, because the profession and the public are generally unacquainted with the facts above stated.

A single one of the food products which have been developed in connection with the institution, viz., Toasted Corn Flakes, is manufactured by the Toasted Corn Flake Company, who have purchased the exclusive rights for its manufacture. A considerable share of all the profits (about one-fourth) of the Toasted Corn Flake Co. and of the Sanitas Food Company, goes into the treasury of the American Medical Missionary Board to be used for the support of the American Medical Missionary College, the Haskell Orphans' Home, the Bethesda Maternity, and various other charitable enterprises located in Battle Creek and elsewhere.

THE KINDERGARTEN

Invalid mothers ought as a rule to be completely relieved of the care of young children during treatment, but there are exceptional cases in which the mother traveling from some far distant State does not feel content to leave the little one behind. To relieve such mothers of care and worry a kindergarten is maintained throughout the year, where children of all ages may be entertained and instructed. This is not a mere nursery, but a scientifically conducted kindergarten in charge of a thoroughly trained and enthusiastic kindergartner. The work of the kindergarten is supplemented by that of competent nurse-maids, which quite relieves the mother of all cause of worry respecting her little ones.

DEPARTMENT FOR THE TREATMENT OF PERSONS OF LIMITED MEANS

Provision is made for the care of the sick poor as well as for those who are well to do. East Hall, one of the large buildings not destroyed by the fire, formerly used as a nurses' dormitory, was immediately after the fire supplied with a complete equipment of Sanitarium appliances. In this building persons who are not able to pay the prices named in the regular rate card receive special rates according as their circumstances may require. The minimum rate in this building is ten dollars a week, or about half the regular rates. Arrangements must be made in advance for special reduced rates, as the accommodations for this class is necessarily not unlimited. The winter season, when the patronage is not so large as in the summer, is the best time to send patients of this class. Worthy persons of limited means receive just the same consideration as the wealthy patrons as regards thoroughness of examination and treatment.

Further provision is made for persons whose means are still more limited. A portion of the buildings purchased from the Battle Creek College, which stand on a beautiful campus just across the road from the main building of the Sanitarium, has been fitted up for use as a dispensary. Here are found not only commodious examining offices, but also two complete suites of treatment rooms—for men and for women. Here the poore patient may receive whatever treatment his case may requi without paying anything either for treatment, medical atten or examination. The case of the poorest sufferer receives the same painstaking, careful investigation as that of the wealthiest patient.

A nominal charge of fifty cents daily is made for treatment in this department, but this is not required of those who are penniless. No applicant is turned away because of inability to pay.

This class of patients are expected to provide their own room and board. Table board prepared by Sanitarium cooks may be had at the rate of fifty to seventy-five cents a day at the cafe.

Several hundred patients are now treated annually in these departments, and as the debt incurred in the erection of the new building is gradually lessened, the number will be proportionally increased.

In addition to the charitable work above mentioned, a large dispensary has been maintained in Chicago for thirteen years. This is located in "The Jungle," or stockyards district, at 888 Thirty-fifth Place. The Battle Creek Sanitarium supports a number of visiting nurses in connection with the Chicago dispensary, as a part of the work of the training school for nurses, but the main expenses of this institution are met by personal donations from members of the management. One or more visiting nurses are constantly employed in caring for the sick poor of Battle Creek and vicinity.

NO BRANCHES AND NO AFFILIATED INSTITUTIONS

The Battle Creek Sanitarium has no branches and is not allied to or affiliated with any other institution in the world. It stands alone in its work as a separate, distinct organization, having its own mission, its own board of management, and supported by its own resources.

The Battle Creek Sanitarium is the only institution which represents in a thorough and up-to-date manner the Battle Creek Sanitarium System of treatment; in fact, it is the only one which is authorized to announce itself to the public as employing the Battle Creek Sanitarium System, as it is the only institution which is fitted up with the necessary appliances and the trained corps of physicians, attendants and nurses which a right application of this system requires.

CONCLUSION

In concluding this attempt to present on paper something of an idea of the methods of dealing with sick people which constitute the Battle Creek Sanitarium System of Physiologic Therapeutics, the writer desires to express the hope that he has at least made clear to the mind of the reader that an earnest effort is made in the work of this institution to represent the art and the science of rational medicine in a worthy and thorough-going manner, and to maintain the highest ethical and professional ideals.

As a last word, the writer desires especially to acknowledge his indebtedness to the members of the profession of the United States for numberless personal courtesies, and especially for an increasing measure of confidence in the institution and its work as it has progressed and developed from the small beginning of thirty-two years ago to the present more fitting and commensurate appointments.

J. H. Kellogg

REPORT OF A COMMITTEE OF CITIZENS

At a meeting of the Business Men's Association of Battle Creek a few days after the fire which destroyed two of the main buildings of the Battle Creek Sanitarium, February, 1902, a committee of five of the leading business men of the city was appointed to confer with the Sanitarium managers to look into the affairs of the institution and its situation and to consider whether the city should undertake to do anything in the way of raising funds, and if so, to formulate plans for the same. The committee consisted of the following persons:—

Mr. S. O. Bush, vice-president of the great Advance Threshing Machine Company, which is so prominently known throughout the country. Mr. Bush is a member of the Battle Creek Board of Trade, and has served the city as president of the Board of Public Works.

Mr. George E. Howes, one of the first members of the Board of Public Works of Battle Creek, a member of the Board of Aldermen for several terms, and mayor of the city for one term.

Rev. W. S. Potter, pastor for the last fourteen years of the First Presbyterian Church, and chairman of the Ministerial Union of the city.

Mr. Nelson Eldred, one of Battle Creek's pioneer citizens. Mr. Eldred has been president of the City Bank since 1877, also mayor of the city for one term, and for many years a member of the School Board.

Prof. I. L. Stone, for many years superintendent of the public schools of the city, and president of the Duplex Printing Press Company, one of the leading industries of Battle Creek.

On the evening of March 17, 1902, a mass meeting was held in the large opera house. Every seat was occupied, as well as almost every foot of standing room. The meeting was called by the Citizens' Committee, and the object of the meeting was set forth in the remarks of the chairman, Hon. W. R. Wooden:

"A number of years ago, a few of the citizens of our beautiful city became imbued with ideas of hygiene and right living, and so enthused were they with these ideas that they started in incipiency a sanitarium for the purpose of promulgating those ideas, and of doing good in the world through their furtherance. We can remember the little, insignificant building that they occupied in the beginning. We have watched their growth in our midst until they became the great and grand institution so recently destroyed by fire. We have all taken pride in the institution and its magnitude. We have taken pride in its management and in their reputation. We have felt, as individuals, a proprietary interest in the institution. We have always referred to it as one of the great, bright marks in our community. At times, when any of us have happened to be abroad in the world, and the place of our residence became known, the subject of the Battle Creek Sanitarium was invariably brought up. Notwithstanding our pride in the institution, and our admiration for it, we have at times been indifferent toward it, too much so. We have given too little heed and thought to its purposes; we have not always given it credit for its great aims.

"Its loss by fire struck us all forcibly. We found after the fire that the institution was left with practically nothing. We found that the institution had upon its hands a large volume of indebtedness, and that beyond all question it would ake practically all of its property and effects left to cancel that indebtedness. We ppreciate the fact that if it is rebuilt and maintained as an institution, of this or ny other community, the money necessary to rebuild it must be raised by donation. It is not sufficient for us to go out into the world and raise the money as an rdinary business enterprise would under similar circumstances, but owing to the ntents and purposes of the institution its trustees would not think it fit and roper to do so.

"We have a Business Men's Association here in Battle Creek, that became nterested in the matter. In considering the question, it was thought advisable to all this meeting for the purpose of enabling all the people of Battle Creek to ntribute to this good cause. We felt that the citizens of Battle Creek wanted 1 opportunity to show their loyalty to Battle Creek, to Battle Creek institutions, nd Battle Creek people.

"One thing that should be considered is the fact that this is one of our institutions. This was here when most of us came, and it should be when we go. Ve should be loyal to the institution because it has been our institution. It s a matter that affects us all, no matter what our occupation or following nay be. It has done more to advertise Battle Creek than all the other institions we have. With its lines running from San Francisco to Cape Town, has carried messages of the thrift and enterprise of Battle Creek. We are all debted to it because of its so doing. It has brought many of our great institutions here—it has brought the attention of energetic and prosperous men to Battle reek. It has brought the attention of men to the benefits of such a community, using these men to come and join with us, and institution after institution has en built up, to which we can give nothing credit but the Battle Creek Sanirium."

The Report.

"We have given much time and careful consideration to the matters submitted to us. We have held several lengthy conferences with the trustees of the stitution, and have, at their request, independently investigated the legal status f the institution as determined by the statutes and the articles of association under which the Sanitarium was organized, and the administration of the affairs of the nstitution as disclosed by its books, and the testimony of its officers and emloyees.

"Every facility for a full and complete investigation has been l books and records of the institution have been placed at have been invited freely to examine any and all documents relating to its affairs, and any persons connected in any way as officers, trustees, or employees, with its administration. And not only has this freedom been tendered us personally, but we have been invited to secure the services of any expert whom we might select to make a thorough and exhaustive investigation, under our direction, of the books and records of the institution.

"We soon became fully convinced, from the facts disclosed to us, that the Battle Creek Sanitarium, both by virtue of its legal organization as a corporation under the laws of Michigan, and, as well, by the faithful administration of its affairs according to the spirit of these laws and its articles of association, is, both in law and in fact, a purely philanthropic and charitable institution; but because of a widespread impression in our community that the institution has been conducted, at least in some degree, for profit, and that in some way or other private gains have been derived therefrom, we determined to make an examination of the books. We invited the Common Council to join us in this investigation, under the guidance of a practical and experienced accountant, so far as might be necessary to settle this question, and also to determine whether any of the funds of the institution are employed outside of the State of Michigan in building up other sanitariums or branches. The Common Council accepted this invitation, and selected Alderman C. A. Caldwell to act in their behalf in connection with Mr. Geo. E. Howes, of your committee, and these gentlemen, securing the services of Mr. F. W. Dunning, as accountant, have personally investigated the books, accounts and records of the Sanitarium, so far as to be fully satisfied on the points in question.

"Summing up the results of our investigations, we have to report as follows:—

"1. The Sanitarium is organized under the provisions of Act No. 242 of the Public Acts of the State of Michigan, as a philanthropic and charitable institution.

"2. The Articles of Association of the Battle Creek Sanitarium, so far as they relate to the questions involved in our investigation, provide as follows:—

" 'The objects of said corporation and other matters germane and auxiliary thereto, are as follows:—

" 'To found a hospital or charitable asylum within the State of Michigan for the care and relief of indigent or other sick or infirm persons, at which institution may be received also patients and patrons who are able to and do pay for the benefits there received, and which institution shall devote the funds and property acquired and received by it from time to time from all sources, exclusively to maintaining itself, improving its condition and facilities, and promoting its purposes by such sanitary, dietetic, hygienic, and philanthropic reforms and efforts as are germane or auxiliary thereto; all of its said purposes being undenominational, unsectarian, philanthropic, humanitarian, charitable, and benevolent, and in no manner, directly or indirectly, for private profit or dividend paying to any one.'

"It is therefore clear:—

"*a.* That no profits of the institution can ever accrue or be lawfully paid to any private party or parties whatsoever.

"*b.* That no funds of the institution can be lawfully sent outside of the State to build or support other enterprises of any kind.

"*c.* That any and all revenues of the institution must be devoted to philanthropic and charitable work within the State of Michigan, and to developing and extending the facilities of the institution itself, and for these purposes only.

"*d.* That all of the property of the institution is held in trust for the above philanthropic and charitable purposes only.

"*e.* That title to any of the property of the institution can never be passed to any private party or parties whatsoever, but can only be transferred at the expiration of the statutory limit of the corporation to the trustees of another corporation organized for the same purposes and under similar restrictions.

"The above being the legal status, the purpose, the obligations, and restrictions of the institution, it remains for the public to inquire whether the trustees have legally and faithfully fulfilled their trust. This the public has a right to know, inasmuch as under the law the institution is a quasi-public one, deriving its powers and its privileges from the public for public purposes.

"To this inquiry your committee has devoted chiefly its time and attention in the manner indicated at the beginning of this report, and we find as follows:—

"*a.* No private individuals or parties whatsoever have, under the present organization of the Sanitarium, derived any profits or revenues therefrom, above extremely moderate wages for their services.

"*b.* No funds or profits of the institution have been sent outside the State to promote or support similar enterprises abroad.

"*c.* The indebtedness of the institution, amounting to $245,109.25, is not due in whole or in part to any of the trustees or to Dr. Kellogg, or to other parties connected with the management, but is owing in part to banks, and the remainder is held in small amounts by 146 different parties not in the management. A complete list of the holders of these notes and obligations has been submitted to your committee.

Report of the Committee of Experts.

"The report of F. W. Dunning, accountant, who, with Alderman C. A. Caldwell and Mr. Geo. E. Howes, made for us a special examination of the books and records of the institution, is as follows:—

" 'BATTLE CREEK, MICH., March 13, 1902.

" '*To the Business Men's Committee.*

" 'GENTLEMEN: Having been informed that I had been selected to act with Messrs. Howes and Caldwell in the investigation of the books of the Battle Creek Sanitarium, I entered into the work with the conscientious determination to satisfy myself, beyond doubt, as to certain questions raised by many persons, viz.:—

" 'Whether excessive salaries or equivalents are paid to Dr. Kellogg and

" 'As to the character and extent of the charitable work done by the institution.

" 'We made a careful examination of the pay-roll, which includes the whole force of employees receiving pay. This roll shows the rates paid to the help in all departments, including those connected with the management. The rates were found to range from $7.50 to $88.67 *per month*, and in the case of the physicians on the staff, $78.00 per month was the highest, and upon that salary the recipient has to support himself. First-year nurses receive their board, room, clothing (such as the usual uniform worn by the nurses), and necessary books for study. Second-year nurses receive $16 per month, with room and board, and third-year nurses,

$20 with room and board. As to Dr. Kellogg, we found that for some years he has received no salary or compensation whatever.

" 'I found that in the year 1899 there was an expenditure of $29,347; in 1900, $30,300; and in 1901, $44,000 for charitable work in this branch. This makes a total of $103,647 in three years.

" 'It is to be noted that the above expenditure for charity now amounting to over $40,000 per year, does not include surgical fees or concessions on account of treatment, nor the large supplies of food sent out in baskets, which range from forty to a hundred and forty per day, to the poor of this city, nor does it include discounts to physicians, clergymen, etc., which are charged to a special discount account.

" 'Your committee was afforded every possible opportunity to examine any and all books and accounts, records, and papers of all kinds, a full and complete investigation apparently being courted by the Sanitarium people.

" 'Very respectfully yours, F. W. DUNNING.' "

"Finally, your committee are constrained to add that the revelations made by our investigations have been a surprise to us. Not only were we personally unaware of the wholly philanthropic nature of the institution, under the law, but we were also unaware of the vast amount of charitable work performed by it, and the wonderful sacrifices made by the managers and employees generally. There are over eight hundred of these employees—physicians, nurses, helpers, etc. Dr. Kellogg donates to the Sanitarium all the services he performs for it, including all surgical and professional fees. He receives no salary or compensation whatever, and has not for years; on the contrary, he contributes annually from his private resources thousands of dollars. The large corps of physicians receive no professional fees, and only weekly wages so small that their services are practically a charity. This is also true of the hundreds of nurses and helpers. They are a band of sincere people conscientiously devoting themselves to a great work for humanity, and not for personal gain. This we do not need to tell those who have made themselves familiar in the past with the Sanitarium and its work.

"It should be remembered, also, that the dispensing of alms to the poor is not the only, nor, indeed, the highest form of charity. The silent influences, unseen, but powerful and persuasive, of a great benevolent institution like the Sanitarium are of far greater value. No such colossal work can be carried on in the spirit which actuates and controls the Sanitarium without results incalculable for the good of humanity.

"We have, many of us, misjudged the Sanitarium. The members of your committee have themselves heretofore supposed that at least some persons connected with it were deriving large personal gains from it. As stated above, we are surprised at what we have discovered. The more deeply we have gone into the investigation, the more convincing and overwhelming the proofs have become of the straightforward management, the lofty purposes, the widespread beneficence of the institution, and above all, of the personal devotion and wonderful self-sacrifice of the nearly one thousand persons employed in it, from Dr. Kellogg down to the youngest helper.

"Respectfully submitted,

"S. O. BUSH,
"I. L. STONE,
"GEO. E. HOWES,
"W. S. POTTER,
"NELSON ELDRED,
"Committee."