The Rockefeller Foundation

Annual Report

1922

The Rockefeller Foundation
61 Broadway, New York

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Members

[1] Died January 25, 1922.

THE ROCKEFELLER FOUNDATION

OFFICERS, MEMBERS, AND COMMITTEES

1923

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[1] Resigned July 2, 1923.

THE ROCKEFELLER FOUNDATION

President's Review

To the Members of the Rockefeller Foundation:

Gentlemen:

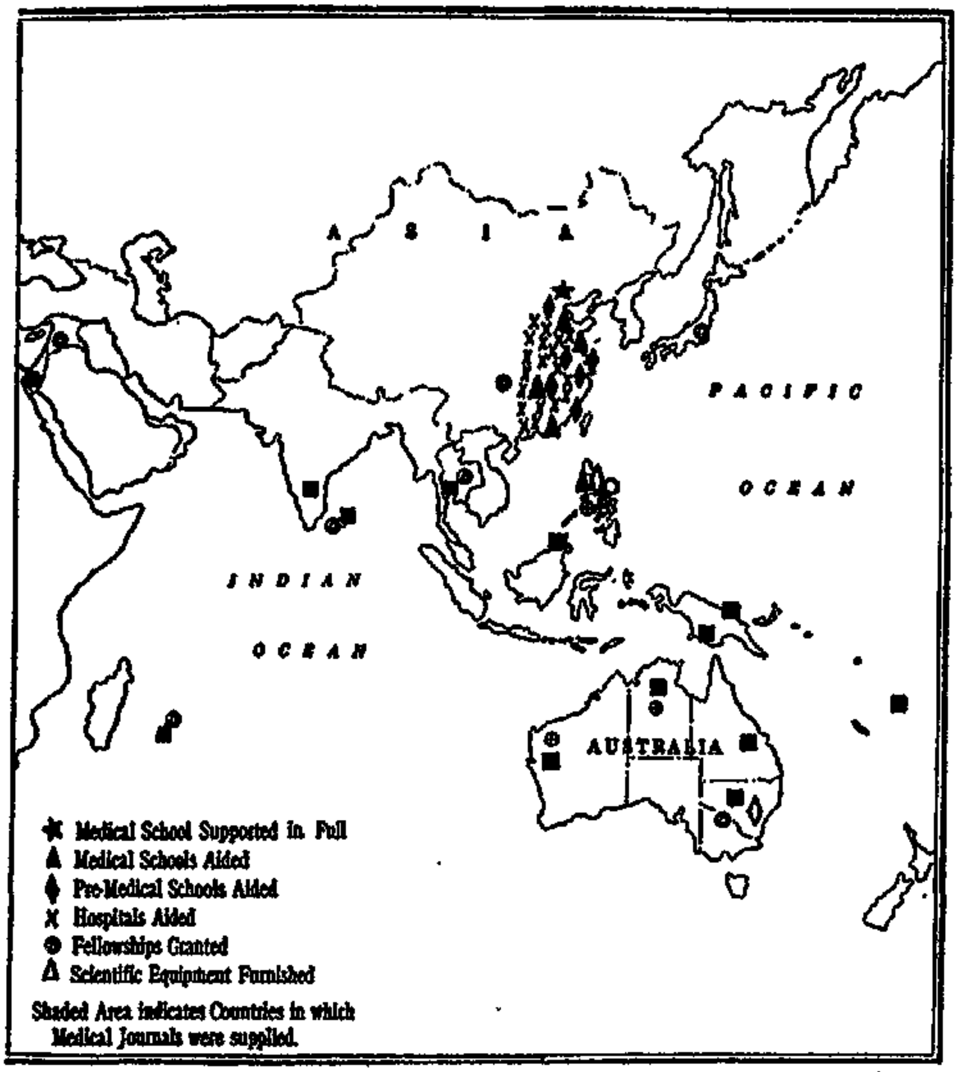
I have the honor to transmit herewith a general review of the work of the Rockefeller Foundation for the period January 1, 1922, to December 31, 1922, together with the detailed reports of the Secretary and the Treasurer of the Foundation, the General Director of the International Health Board, the Director of the China Medical Board, and the General Director of the Division of Medical Education.

Respectfully yours,
GEORGE E. VINCENT,
President.

Fig. 1.—Map of World-wide Activities

The Rockefeller Foundation is concentrating its resources upon a comparatively limited range of activities within the closely related fields of public health and medical education. The public health program graphically presented on this map is carried on through the International Health Board. Work in the field of medical education is in charge of the Division of Medical Education, except the work in China which is done through the China Medical Board.

Campaigns for the *relief and control of hookworm disease* were carried on in twenty-one governmental areas throughout the world. Sixty-six demonstrations in *malaria control* were supported in ten southern states, and field studies in malaria control conducted in six other countries. Aid was extended to full-time *county health departments* in 163 counties in the United States, and similar work aided in Brazil. Activities for the *eradication of yellow fever* were carried on at the invitation of the government in Mexico and in other countries. French health agencies were assisted in *antituberculosis work.* Contributions were made to the development of schools of hygiene and other agencies for *training health personnel* in Brazil, Czechoslovakia, England, the Philippine Islands, Poland, and the United States. The sum of $32,840 a year for five years was given to the *Health Section* of the *League of Nations* to maintain an



of the Rockefeller Foundation in 1922

international epidemiological intelligence service, and $60,080 a year for three years for international exchange of health personnel. *Other public health activities* include: financial co-operation in a demonstration of rural health administration in the province of New Brunswick, Canada; temporary financial aid, with advice and counsel, in establishing a public health laboratory service in several American states and Central American countries, and a department of health in Czechoslovakia; the lending of experts as consultants.

For the promotion of *medical education*, the Foundation assisted medical schools in various countries, furnished *scientific equipment* and English or American *medical literature* to eighty-two European institutions, and made a study of medical schools and the needs of medical science in Europe.

In China, *one medical school was supported in full*, and aid was given to *three other medical schools*, a number of *hospitals*, and the *premedical science teaching* in six institutions.

Fellowships were provided for 237 individuals from 23 countries. A leading *health authority* and a *commission* of medical scientists from France were *entertained*.

PRESIDENT'S REVIEW

The Year in Brief

During the year 1922 the Rockefeller Foundation, either directly or through its departmental agencies, the International Health Board, the China Medical Board, and the Division of Medical Education, (1) endowed chairs of medicine and of surgery in Hongkong University; (2) pledged $1,125,000 toward new buildings for the College of Medicine of the State University of Iowa; (3) contributed to the current maintenance of two medical schools in Canada; (4) completed the buildings, strengthened the faculty, and wholly financed the Peking Union Medical College; (5) agreed to appropriate $300,000 toward laboratories and premedical teaching in two Chinese institutions and in one missionary university in Peking; (6) helped nineteen hospitals in China to increase their efficiency in the care of patients and in the further training of doctors and nurses; (7) promised to co-operate in the rebuilding and reorganization of the medical school of São Paulo, Brazil, and of the medical school of Siam in Bangkok; (8) made a survey of medical schools in Austria, Czechoslovakia, Germany, Hungary, Poland, and Switzerland, and studies of English and Scotch methods of clinical teaching; (9) sent eminent medical men as visiting professors or consulting officers to China, the Philippines, Brazil, and Salvador; (10) arranged for a commission of medical scientists from Strasbourg to visit the United States and England; (11) gave emergency aid in the form of medical literature, laboratory supplies and apparatus, fellowships and stipends to promising investigators and teachers in the Pasteur Institute of Paris and in many other European centers; (12) pledged two million dollars toward the site, building, and equipment of a school of hygiene in London; (13) co-operated with state boards of health in maintaining institutes and instruction for health workers; (14) shared in thirty-four county-wide and thirty-two town demonstrations of malaria control in ten southern states and continued field studies and surveys in the United States, Porto Rico, Nicaragua, Brazil, Palestine, Australia, and the Philippines; (15) co-operated with the Mexican and other governments in steadily restricting the prevalence of yellow fever; (16) resurveyed centers of hookworm infection in four southern states, and carried on control work in twenty-one foreign governmental areas; (17) took part in promoting full-time health service in 163 counties in eighteen states of the United States, and in several counties in Brazil; (18) agreed to support for five years the disease-reporting service and for three years the international exchange of health personnel program of the Health Section of the League of Nations; (19) provided fellowships in public health, medicine, nursing, chemistry, and physics to 237 advanced students from twenty-three countries; (20) by consultation and providing of personnel aided public health administration in the United States, Australia, Brazil, Canada, Central America, Czechoslovakia, France, the Philippines; (21) contributed to mental hygiene projects, demonstrations in dispensary administration, hospital information service, surveys of nursing education and hospital management, the organization of tuberculosis work in France, the training of French health visitors, and other undertakings in the fields of public health and medical education.

The First Decennium

The Rockefeller Foundation was incorporated May 14, 1913, under a special charter granted by the State of New York and with an initial endowment of $100,000,000, the gift of Mr. John D. Rockefeller. Administration was entrusted to an original board of nine members, who were given the power to add to their number and to choose their successors. A few weeks later the Rockefeller Sanitary Commission, which had since 1910 been combating hookworm disease in the Southern States, was reorganized as the International Health Board and became a departmental agency of the Rockefeller Foundation. In 1914 a similar subsidiary, the China Medical Board, was created to administer a program of medical education in the new Oriental republic. The rapidly developing work of the Foundation in aiding medical schools in many countries led the trustees in 1919 to set up a Division of Medical Education. Through these agencies the Foundation has co-operated during its first decade, chiefly in public health projects and the improvement of medical education, with governments and institutions in sixty countries.

During the first year or two, while the trustees were considering questions of policy, gifts were made to a variety of institutions and projects, for example, the Palisades Interstate Park, a Wild Life Refuge in Louisiana, the American Academy in Rome, an investigaton of industrial relations, and to various other objects which no longer fall within the scope of the Foundation's work. By the terms of gift, the founder retained the right during his lifetime to direct the distribution, in fulfilment of the purpose of the charter, of $2,000,000 of the income annually. This resulted in numerous appropriations to a wide range of charitable and religious societies up to

July 19, 1917, when Mr. Rockefeller waived his right of designation and left the unrestricted control of the entire principal and income in the hands of the trustees.

With the outbreak of the World War, the Foundation was one of the first American agencies to send a relief commission to Belgium and other Continental countries, but as soon as the Commission for Relief in Belgium and the American Red Cross assumed responsibility the trustees withdrew their own agents and made contributions for relief through these societies. The war program of the Rockefeller Foundation included medical and surgical research and instruction through the Rockefeller Institute, the Medical Division of the National Research Council, and other centers; welfare work for soldiers and prisoners through the agencies equipped for this purpose; food and clothing supplied in part directly but chiefly through the Commission for Relief in Belgium, the American Relief Administration, and the American Red Cross; and a war emergency campaign against tuberculosis in France. The total sum spent by the Foundation on war work was nearly twenty-two and one half million dollars.

From the outset the example of the Rockefeller Institute for Medical Research, the success of the International Health Board in applying scientific knowledge, and the interest of the Foundation in aiding Western medicine in China suggested policies which have been consistently developed. Public health work in co-operation with governments called for a supply of specially trained men and women. The dependence of sound preparation for preventive medicine upon an efficient general medical education became increasingly clear. Thus the Foundation has come to concentrate its attention and resources upon the closely related fields of public health and medical education. Even in these large spheres it has concentrated upon activities which are described and illustrated in this Review.

During the past ten years the Rockefeller Foundation has received from Mr. John D. Rockefeller a total of $182,704,624. Its total disbursements have amounted to $76,800,000, representing the income from year to year and $17,500,000 appropriated from principal. In addition it has pledged future income to the extent of $15,600,000.

Medicine an International Product

Modern medicine has been likened to a river whose many tributaries have, during the centuries, flowed from all quarters of the world. From Egypt, Babylonia, India, China came rivulets of mingled superstition, empirical art, and positive knowledge. Greece was a copious spring from which a growing volume of insight, skill, and wisdom welled even from Homeric times down into the early centuries of the Christian Era. Rome was a sandy plain absorbing rather than augmenting the stream of medical lore which found three channels, through southern Italy, Byzantium, and the Arab civilization, into the deepening current of the Renaissance. Thence, flowing on into modern times, the medical tradition has become a broad river swollen by tributaries from Italy, France, Holland, Britain, Germany, Scandinavia, Russia, the United States, the British dominions, Japan, and other countries.

A mere enumeration of the names famous in the history of medicine affords striking evidence of its international character. Hippocrates, Aristotle, and Galen, the Greeks; Rhazes and Abbas, the Persians; Avenzoar, the Arab; Mondino and Morgagni, the Italians; Vesalius, the Belgian; Paré, the Frenchman; Harvey, Hunter, and Jenner, the Englishmen; Boerhaave, the Hollander; Johannes Müller, the German; and the moderns, Pasteur, Koch, Lister, Virchow, Ehrlich, Manson, Metchnikoff, and Reed. Since 1901 the Nobel prize for contributions to medical science has been awarded to eighteen men of twelve different nationalities: four to Germans, two to Frenchmen, two to Russians, two to Danes, and one each to an American, an Austrian, a Belgian, an Englishman, an Italian, a Spaniard, a Swede, and a Swiss.

Obviously, international co-operation in creating medical science depends upon communication of ideas from worker to worker and from country to country. Hippocrates, Celsus, and Galen produced a body of medical literature. Arab authors transmitted it to Western Europe. Today every leading country is producing a copious literature in the many departments of modern scientific medicine. To the prompt interchange of information which this printed matter makes possible is in part due the rapid contemporary progress in medical research and practical procedures. The interruption of this traffic in ideas during the World War was a serious thing. The Rockefeller Foundation is helping to restore such commerce to something like its normal state by the distribution of medical periodicals in Europe.

Quite as important as the circulation of the printed page are personal intercourse between leaders of science, and the migration of advanced students. The early pioneers in medicine set an example of itinerant pursuit of knowledge and experience. Hippocrates, born in Cos, studied at Athens and traveled frequently in

Thrace, Thessaly, and Macedonia. Galen, a native of Pergamus, received his medical education at Alexandria and finally made Rome his headquarters. Vesalius left his birthplace in Brussels to study or teach at Louvain, Paris, Venice, and Padua, and to travel in Spain and Palestine. Medical students from many nations used to resort to the famous schools of Italy, France, and Holland. In the nineteenth century the rapid progress of German medicine drew physicians and advanced students from abroad to many German and Austrian universities and clinics. Berlin, Vienna, Paris, and London each attracted representatives from parts of the world where medicine was less advanced—Southern Europe, Central and South America, the United States, Japan, and the British dominions.

The formation of international scientific associations has helped to create a sense of solidarity among medical scientists. Since 1867, seventeen international medical congresses have been held in the chief capitals of Europe and one in Washington. The Rockefeller Foundation, by granting fellowships for study outside the holders' own countries, by inviting commissions from foreign nations to visit the United States and other countries, by enabling the Health Organization of the League of Nations to finance the intermigration of health officers, and by other methods, is helping medical scientists and practitioners of all nations to work together more effectively.

From Magic to Microbe

Auguste Comte in his *Positive Philosophy* asserted that every body of knowledge passes through two stages, the theological and the metaphysical, into a third, the positive or scientific. In the first stage happenings are attributed to the action of spirits and divinities; in the second, to abstract entities; while in the third, causal connections are ignored and the scientific mind is content merely to record the fact that certain things always occur simultaneously or in sequence. There is enough truth in Comte's so-called law to make it suggestive and useful, although his statement is too precise and mechanical.

The growth of medical science has followed in a general way Comte's law. The practice of medicine has often been a function of sorcerers, magicians, priests, and astrologers. The very term "medicine man" is significant. Among primitive people today, the healing art is saturated with superstition, fear of evil spirits, faith in the efficacy of amulets, charms, weird potions, and grotesque cures. But the ignorance, superstition, and credulity about disease and its cure displayed by the great populations of Europe and America should make for humility. The advertisements in many newspapers, the flourishing of palpable quacks, the prevalence of preposterous cults, the crazes which sweep through whole nations, are striking evidence that our civilization is only on the border line of the scientific stage. Higher education itself seems far from guaranteeing immunity against the attacks of a primitive credulity.

Greek medicine appears from the outset to have been relatively free from superstition. After the Renaissance, medicine began a steady advance. Anatomy flourished with Vesalius; with Harvey physiology was revived; Morgagni and Bichat created pathology; von Baer reorganized embryology; the theory of organic evolution gave an impetus to medical research; with Pasteur and Koch bacteriology came into its own; biochemistry has assumed a fundamental rôle. In spite of many survivals of mysticism and metaphysics which will long persist, modern medicine has entered the scientific stage.

Methods, Spirit, and Scope of Modern Medicine

Medical science, in common with other sciences, relies upon observation, comparison, and experiment, or upon a combination of these methods. The anatomist by observation and comparison, that is, by dissection of human and animal bodies and by examination of the living, maps and describes the intricate structure of organic forms and studies the laws of growth and development. The physiologist by physical means, by chemical analysis, by observation of men, and by experiment upon animals gains insight into the nature of vital processes. The bacteriologist by observing through the microscope the minute plants and organisms which live in blood and tissues, by introducing them into animals under varying conditions, and by comparing results discovers definite and verifiable facts about the causes of health and disease. The pathologist studies by microscopic methods, by examination of morbid growths, by experimentation upon animals, the nature and effects of organic diseases. The results which each man secures and the methods he employs are made public and are then tested by other investigators. Mere personal opinion and unverified assertion have no place in modern scientific medicine.

Upon the physician falls the task of discovering the cause or causes of disease in individual patients and of helping them to regain a state of normality or health. This is often a much more complicated and difficult thing than the duty laid upon the laboratory scientists. The bedside

LOUIS PASTEUR
1822–1895

Fig. 2.—Crystallographer, mycologist, biochemist, pathologist, immunologist, founder of modern bacteriology, although never receiving a medical degree, Louis Pasteur, whose centenary is now being celebrated, has had perhaps more influence on medical science and public health than any other man in modern times. It can be said without exaggeration that millions of human lives have been saved by his discoveries. The Pasteur Institute of Paris, which he founded, is receiving aid from the Rockefeller Foundation during the period in which it is recovering from the effects of the War

practitioner must apply knowledge supplied by anatomy, physiology, pharmacology, biochemistry, pathology, bacteriology, to which he must add his own personal experience, data derived from records of many cases, and the summarized observations and conclusions of other clinicians. Medicine in this sense is obviously an art based upon science rather than an exact science in itself. When the doctor has at his disposal in a given case all the data that modern methods can furnish, temperatures, blood pressures, blood counts, chemical and bacteriological tests, X-ray plates, reports of similar cases, his own recorded or remembered experience, the testimony of his own trained senses, he must interpret all these facts by a careful process of logical reasoning and organize them into either a final judgment, or into a tentative hypothesis, which is subject to further tests by later developments. This calls for careful preparation, the scientific attitude, sincerity, and constant hospitality to new knowledge and improved methods.

The spirit of modern medicine is, then, scientific; it seeks to be open-minded toward new truth, provided this can be rationally related to the great body of firmly established and organized knowledge about nature, life, and mind, about which all scientific men agree. Scientific medicine cannot accept ideas which are merely mystical, or imply unknown and unverifiable physical or chemical properties, or invoke supernatural intervention, or are in other ways clearly fantastic or beyond the reach of any available demonstration or experiment. So also modern medicine refuses to be labeled with the name of any school or cult. It is committed to no "pathy"; it knows no panacea; it is prejudiced only in favor of conclusions drawn by soundly reasoned processes from exact and verified facts. It recognizes the intricacy of its problems; it realizes that only a beginning has been made; it does not hesitate to admit ignorance or to suspend judgment. Its constant aim is the discovery of truth and its application to human need. These ideas, it must be admitted, are the conscious principles of a relatively small number of the medical men of the world. But the modern scientific spirit is permeating the great body of practitioners who have in the past too much relied upon dogmatic diagnosis, rule-of-thumb, "shot-gun" prescriptions, and a cheerful bedside manner. The personality and attitude of the physician toward his patients ought to be important sources of power and success but they should supplement rather than take the place of the scientific method and spirit.

The scope of modern medicine is as wide as the range of influences, physical, biological, mental, and social, which affect health. It has been asserted with some reason that in its preoccupation with the diseases of the body, scientific medicine has too much neglected the psychic and social factors. The rapid spread of cults which invoke various forms of mental suggestion, is probably due in some measure to the failure of modern medicine to include in its scope the relations of physical and mental states, to study these in a scientific spirit, and to utilize the healing powers of rationally controlled suggestion. Recent progress in psychiatry, the war-time experience with disorders of the mind, the rise of mental hygiene, and the increased attention being given to these subjects in medical schools and at professional meetings are evidences that the mental aspect of disease is being recognized more fully. So too with the social factor. Health nurses or special visitors of a few leading hospitals now visit the homes of dispensary callers and hospital patients and make reports to the medical staff about housing, family relations, and economic status—factors which often have a vital bearing upon the condition of the patient. Thus modern medicine is coming to appreciate that its problem is not merely the body of the sick man, but the larger whole which includes his mental states and his physical and social environment. Perhaps the most important and significant extension of the scope of modern medicine is into the field of prevention by providing immunity through vaccination against many communicable maladies, by co-operating largely with public health authorities, by insisting on frequent examinations to detect incipient defects and diseases, and most of all by urging conformity to the laws of personal hygiene and the seeking of positive, vigorous, abounding health.

Public Opinion and Medical Progress

In democratic countries like the United States, Great Britain, Canada, and Switzerland, the popular estimate of the social value of science, the general esteem in which scientific men are held, the willingness of legislative bodies and of private citizens to supply funds, and the readiness of leaders and people to accept and apply the results of scientific research are determining factors in the progress of knowledge. Unless the leaders of opinion and a substantial proportion of the adult population appreciate the aims and methods of science, understand something of the value of evidence, are familiar with reasoning processes, and are prepared to recognize the authority of disinterested experts, science cannot attain the place it deserves or render the service of which it is capable. Chemical, electrical, and mechanical engineers have won distinction and recognition because their work is tangible and convincing both to the trained leader and to the man in the street. The medical scientist, with vastly more complex problems to solve, must ask for the support of a much more intelligent, imaginative, and sympathetic form of public opinion. For example, as preventive medicine gradually restricts or eliminates certain common diseases, the maladies which remain may be those relatively much more difficult to deal with. Unless the public appreciates this fact, doctors in the future may be plausibly but quite unjustly charged with being less efficient than their predecessors.

On the whole, the response of popular governments, of democratic publics, and of individuals to the demands of modern medicine has been encouraging. Medical schools, teaching hospitals, and research institutes have been improved, multiplied, and supported by private gifts and public grants. Public health activities have been widely extended; their efficiency has steadily increased; appropriations for them have rapidly mounted. Yet in spite of these evidences of at least popular acquiescence there are disheartening instances of an almost benighted ignorance. If there is any one thing that has been repeatedly demonstrated to the complete satisfaction of all well-trained minds capable of dealing logically with evidence it is that vaccination for smallpox affords an extraordinary immunity against that disease. In autocratic Germany before the war, thanks to a strict enforcement of vaccination, smallpox was almost unknown. In the United States, on the other hand, the disease is widely diffused; in some regions it is almost endemic. From time to time it breaks out in towns and cities. It is not uncommon for individuals and groups to resist vaccination. Occasionally the law is defied and remains unenforced. Anti-vaccination societies carry on fanatical campaigns of misrepresentation, offering misleading statistics, invoking the authority of discredited physicians, citing unverified cases, and making emotional appeals. The very sincerity of such agitators is at once an evidence of mental instability in the population and an added danger to sound thinking and wise social policy.

The question of animal experimentation, a vital necessity to medical research, has a direct bearing upon the relation of public opinion to scientific progress. If the anti-vivisectionists could have their way they would forbid by law procedures which have saved and will in the future save untold numbers of human lives by making possible modern surgery and our present knowledge of such diseases as diabetes, smallpox, tuberculosis, diphtheria, cerebrospinal meningitis, tetanus, puerperal fever, syphilis, rabies, bubonic plague, relapsing fever, cholera, and yellow fever. The only protection which medical science and social welfare have lies in the public opinion to which legislatures must in the long run defer. If the leaders of opinion, educational institutions, the press, the platform, women's clubs, popular forums, party organizations, and thinking citizens generally will take a positive, aggressive interest, secure the facts, select and trust experts, reason clearly, and have the courage of conviction, modern scientific medicine will be appreciated and the common welfare promoted. There can be no serious doubt as to the outcome, because in spite of a noisy minority the great body of public opinion is sound.

The Training of Doctors

The growth of scientific medicine during the last fifty years has radically changed the prerequisites, subject matter, organization, methods, equipment, duration, and cost of medical education. Knowledge and technique have enormously increased. Demands upon the time and energy of teachers have grown heavy and exacting. The expenses for laboratories, teaching hospitals, salaries, and supplies have mounted rapidly. Under the new conditions the earlier apprenticeship system has disappeared, although close association between the student and his teachers is valued and is retained in the best contemporary schools. The proprietary medical college manned and managed by a group of practicing physicians has been unable to maintain itself in competition with privately endowed or publicly supported schools. Private practitioners, however, still constitute the great body of clinical teachers in most medical schools the world over.

The new conditions have produced the typical modern center for teaching and investigation, the unified university medical school in a stimulating scientific and cultural environment, controlling its laboratories and hospitals under the direction of full-time staffs. Only a few university schools throughout the world have reached or approximated this standard. The tendency, however, in all advanced countries is toward this university type. Traditional preconceptions, the vested interests of practitioner professors, unfamiliarity with new ideas and methods, and lack of funds are the more obvious obstacles to progress. A leading aim of the Rockefeller Foundation is to further the development of medical schools of the university type by diffusing information, training personnel, and, in important centers, by making appropriations toward endowment or buildings or both.

The idea of teaching the medical student all that is known about health and disease is on the face of it absurd. There is complaint already that too much is being forced upon him, and that he has no time to think for himself. It is agreed that the undergraduate medical course should not seek to give a complete education but to ground the student in the fundamentals of knowledge and technique and inspire in him the scientific spirit and a sense of social obligation. These necessary limitations are resulting in the development of graduate teaching. The time seems to be coming when all the surgical and other specialties and advanced laboratory work will be taught as graduate subjects.

The raising of standards, with consequent lengthening of the medical course and the increase of its cost to both individual students and to society, gives rise to a number of serious questions. The shortening by two years of the combined elementary and secondary school period is advocated by some in order to reduce the age at which a doctor may begin his career. The granting of more scholarships to promising students is urged. There is agitation for a shorter, less expensive type of training to maintain the supply of general practitioners, on the theory that many superficially trained doctors will settle in rural districts which now lack resident physicians. Other people foresee a system of local hospitals serving surrounding areas by outpost dispensaries and visiting nurses. While some differentiation may be expected between doctors who go into general practice immediately and those who pursue graduate studies in the specialties, there is no reason to suppose that in advanced countries the standards of medical education will be lowered. The tendency at present is in quite the opposite direction.

From Brussels to Bangkok

The Foundation's constructive program in medical education during 1922 included an agreement to contribute $1,125,000 toward the building project of the State University of Iowa; contributions to the maintenance funds of the medical schools of the Université de Montréal and the University of Alberta, Canada; completion and maintenance of Peking Union Medical College; annual gifts to the medical schools of Shantung Christian University, Yale-in-China, and St. John's University, Shanghai; the endowment of chairs of medicine and of surgery in Hongkong University Medical School; an agreement to assist the Siamese government to reorganize its medical school in Bangkok; a similar proposal to the medical school of São Paulo, Brazil; the lending of expert administrators or teachers to the São Paulo school as well as to Peking Union Medical College, the University of the Philippines, and the medical school of Salvador. Besides all this, surveys of medical schools were made in Austria, Czechoslovakia, Germany, Hungary, Poland, and Switzerland.

In addition to the twelve schools mentioned in the first paragraph of this section, the Foundation has during recent years made substantial contributions to eight others. The Free University of Brussels is receiving three and a half million dollars for the construction of a modern medical center. Five millions have been given to University College and to University College

Hospital Medical School, London, to enable them to improve their equipment and teaching efficiency. In Canada a half million was contributed to the medical school of Dalhousie University, Halifax. A million was added to the medical endowments of both McGill University, Montreal, and of the University of Toronto. The University of Manitoba, Winnipeg, received a half million for a similar purpose. Gifts of a million each have been pledged toward the important projects which are being carried out by Columbia University and the University of Chicago.

The essential features of the Foundation's policy with respect to co-operation in a program of development for a medical school are: (1) upon request a first-hand survey by representatives of the Division of Medical Education; (2) if favorable action is recommended, the formulation of a project which has the complete approval of the local authorities and leaves to them full administrative responsibility; (3) a promise by the Foundation to contribute a part of the sum needed, provided the rest is secured from other sources; (4) on the conditions being met, the payment of its pledge by the Foundation, whose relation to the undertaking thereby terminates.

The different ways in which the Foundation may come into relations with a medical school vary from the making of an official visit to large gifts for buildings or endowments. Between these limits lie the sending of information about buildings, organization and administration, emergency provision of literature and laboratory supplies, temporary resident fellowships, the lending of experts, the training of teachers, and the making of appropriations for specific purposes. If all such contacts, services, and contributions be taken into account, the Rockefeller Foundation since its creation in 1913 has had direct relations with perhaps one quarter of all the medical schools of the world.

The Medical Schools of the World

A tentative list of the medical schools of all countries has been prepared by the Foundation. The geographical distribution of the 445 schools is indicated by the map on page 341. The United States has 82; next come the British Isles with 43, followed by France 32, Russia 28, Germany 25, China 24, Italy 21, Japan 20, India 18, Spain 11, Mexico 11, Brazil 10, Canada 9, Netherlands 8, Poland 5, Switzerland 5, Belgium 5. Fifty-four other countries support from one to four medical schools each. Not only do standards differ greatly between countries, but even within national areas, notably in the United States, medical schools are of distinctly different grades as measured by personnel, equipment, resources, and ideals. In spite, however, of great variation in quality, all these centers of teaching are more or less directly dominated by the aims and methods of modern medicine. It is one aim of the Rockefeller Foundation to hasten the development of international co-operation in medical education by all available means.

Modern Medicine in China

To one medical school—the Peking Union Medical College—the Rockefeller Foundation through the China Medical Board sustains a unique relation. This institution, reconstructed upon foundations laid by a group of missionary societies in 1906, and administered by its own Board of Trustees, is entirely supported by the Foundation. This medical center is the chief feature of a program by which the China Medical Board seeks to promote scientific medicine in China. The important developments during 1922 were connected with premedical education. Offers were made to two Chinese institutions, Southeastern University, Nanking, and Nankai College, Tientsin, and to the missionary university in Peking, to contribute toward science laboratories and equipment, to lend visiting professors, to grant fellowships for further training of Chinese teachers, and to add to maintenance funds. In previous years the Board made somewhat similar arrangements with St. John's University, Shanghai, Hunan-Yale School, Changsha, Fukien Christian University, Foochow, Ginling College, Nanking, and Canton Christian College. Because it is important for the success of the Peking Union Medical College that it should draw students from a wide range of preparatory schools and colleges, the Board has adopted a policy of aiding not only foreign but Chinese institutions.

In the Peking Union Medical College, in the premedical school, and in the nurse training school, the total registration of undergraduates in September, 1922, was 124. During the previous year fifty-eight graduate students registered for special courses or served as assistants. In addition to the courses conducted by the regular staff of forty-nine foreign and twenty-seven Chinese teachers, special instruction was given by distinguished visiting professors from the University of Vienna, Harvard, Northwestern, and Johns Hopkins Universities, and from the Rockefeller Institute for Medical Research. The cost of maintaining the College and its hospital for the year 1921–1922 was $547,533.

Hospitals well equipped, adequately staffed, and advantageously located are essential to the introduction of modern medicine in China.

Many missionary hospitals and a few under Chinese control are serving the cause not only by caring for patients, but by raising the professional and ethical standards of Chinese practitioners, and by educating the Chinese public in the meaning of scientific medicine. To come into closer and more sympathetic relations with the public, the Peking Union Medical College has recently appointed a co-operating committee of prominent Chinese to aid in interpreting the College to the community.

Recently the X-ray department of the Peking Union Medical College has helped a number of hospitals to install new equipment or to readjust old apparatus. The services of an advisory architect have been made available for hospital administrators. In 1922 the Board aided directly nineteen hospitals, of which one was Chinese. Since 1914 gifts totaling $690,920 have been made to thirty-two different hospitals. For all purposes the China Medical Board has since its organization disbursed $13,292,504.

While the Peking Union Medical College was being rebuilt a considerable number of fellowships for study abroad were granted to Chinese and to missionaries on furlough. But as soon as facilities for advanced study were available in 1921, fellowships were granted for study in Peking and aid for foreign study limited to students who show capacity for advanced work which Peking cannot provide, or who are in training for influential teaching positions. Other activities of the Board have included grants for translating medical books into Chinese and for improving the journal of the China Medical Missionary Association, for office and secretarial field service, and for popular educational work.

The Foundation has so far almost wholly refrained from undertaking work in preventive medicine in China. The International Health Board's co-operation in a hookworm project at the Pinghsiang colliery in Central China served chiefly to demonstrate the difficulty of permanent accomplishment under existing conditions. The absence of stable and efficient central and provincial governments; popular ignorance of modern medicine; peculiar biological, social, and economic conditions; and the lack of trained personnel, make public health progress at present extremely difficult. The problem is not, however, being ignored. A member of the staff of the International Health Board is attached to the Peking Union Medical College, where he gives instruction to undergraduates in hygiene and public health, administers the health service of the College, conducts special courses in school hygiene, and spends part of his time in the field studying health conditions. With the gradual growth of Western medicine in China, progress in public health may be expected.

Aid to European Medical Scientists

"We need food not only for our bodies but for our minds," wrote a Russian medical professor in acknowledging the receipt of periodicals and books provided by the Rockefeller Foundation. Save for a small contribution to a committee in Austria for food packages for medical scientists, the Foundation has left to other organizations the task of emergency relief and has concentrated efforts upon helping to maintain the continuity of scientific work by filling gaps in medical libraries, contributing apparatus and supplies to laboratories, supplementing the stipends of productive research men, granting fellowships for foreign study, and inviting commissions to make international visits.

During the years of the war, the medical libraries of Central Europe received almost no publications from the Allied countries, which in turn had only fragmentary information as to recent scientific progress in Germany and Austria. There was danger that valuable time and precious materials would be wasted upon unconscious duplication of results or that fruitful ideas would come to naught because they could not be related to others which would give them significance. Primarily in the interest of modern medicine as an international product, the Rockefeller Foundation began in 1920 to assist in the distribution of British and American medical journals to European medical centers. Losses in exchange were made good and the pre-war purchasing power of library funds thus restored.

During 1922, journals to the number of 1,323 subscriptions were sent to 216 medical libraries in 12 different countries as follows: Austria 12, Belgium 6, Czechoslovakia 22, France 23, Germany 55, Hungary 3, Italy 30, Poland 38, Portugal 2, Roumania 2, Russia 2, and Jugoslavia 21. In a number of places committees of scientists arranged for the abstracting and circulating of periodicals and thus utilized them to the utmost.

The wearing-out of apparatus and the depletion of current supplies in scientific laboratories were inevitable results of the war. The medical schools of Vienna, Gratz, Budapest, Innsbruck, and Prague were among the first to suffer acutely. To these the Foundation made grants which were wisely and economically administered by local committees. Surveys made during 1922 showed that German and Polish laboratories were approaching the conditions from which Austria had suffered two or three years earlier. It was decided, therefore, to extend the scope of emergency laboratory aid.

Serious as were the problems of literature, equipment, and supplies, the question of personnel was absolutely vital. It was feared that the continuity of scientific progress might be interrupted, because young men either would be unable to go on with their studies or could not be trained to the old-time efficiency. To assist the Pasteur Institute of Paris to recruit and educate research assistants the Rockefeller Foundation pledged in 1921 the sum of $75,000 to be paid in three instalments during 1921, 1922, and 1923. Fellowships for foreign study (see page 56) have been awarded to men and women in Austria, Belgium, Czechoslovakia, England, France, Netherlands, Hungary, Jugoslavia, and Poland. Their appointment, training, and return undoubtedly had an encouraging influence on the maintenance of standards and the progress of medical science.

Until the autumn of 1922 it had not seemed necessary to grant fellowships to men for study in their own countries, but the plight of medical scientists in Germany and increased cost of research menaced the quality, if not the very existence, of German medical science. Representatives of the Foundation after a first-hand study recommended a program of emergency relief which was adopted by the trustees in December, 1922. Under this plan a committee of German medical scientists will apportion to a group of exceptionally promising investigators and teachers sums of money to be supplied by the Foundation to be used for moderate increases of personal stipends and for necessary apparatus, supplies, books and periodicals. The German Government has agreed that this money shall be free from all taxes upon either institutions or individuals. Again it should be noted that this is not a project of general relief for a needy class, but a selective program in the interest of medical science throughout the world.

Medical Education and Public Health

The strengthening of medical schools, and emergency aid for medical scientists have a direct bearing upon the essential task of preventing disease, which is one of the leading ideals of scientific medicine. The dependence of this movement upon the knowledge, skill, and social spirit of the medical profession is too generally overlooked. Statistics of births, deaths, and sickness furnish the facts by which public health policies and procedures are guided. The data are supplied almost exclusively by practicing physicians. If they are competent diagnosticians and conscientious in making reports, the resulting statistics are trustworthy; otherwise they are incomplete and misleading.

If doctors are familiar with modern laboratory tests, they may not only safeguard their individual patients but by prompt notification of contagious diseases protect the community. The extent to which a public diagnostic laboratory is utilized is one index of the intelligence, alertness, and social-mindedness of the profession in the area which the laboratory serves. The success of campaigns to improve water and milk supplies, to reduce infant mortality, to make medical examinations of school children, to establish special clinics, to introduce or extend public health nursing is conditioned in large measure upon the attitude of local physicians.

It is immensely to the credit of the profession that doctors have been among the pioneers and leaders in the development of preventive medicine. They had the imagination and faith to realize that the chief purpose of medicine must be to keep people well, rather than to rest content with alleviating or curing diseases which might have been avoided. During the last fifty years scientific medicine has discovered the causes of many maladies and has learned how to protect individuals and communities against them. Many diseases formerly dangerous may now be discovered in their earliest stages and effectively controlled. Then, too, knowledge about the normal conditions of healthy living has so increased that people may be measurably helped to maintain sound minds in sound bodies. Furthermore, practical methods of applying science to disease prevention have been elaborated so that not only striking reductions in death-rates but other evidences of positive well-being have been manifested. It is primarily to medical schools that society must look for the training of men and women who as the doctors of the future may be counted upon to preach and practice the gospel of health.

The Training of Health Staffs

Emphasis upon the preventive side of medicine in medical schools is gradually changing the attitude of the medical profession as a whole, but it cannot turn out public health administrators ready to head city and state departments of health. The too prevalent idea that any practicing physician is capable of discharging the duties of a health officer needs to be vigorously combated. Such a post ought to be filled by a person who in addition to a basic medical preparation has had specialized training for what has become a distinct profession. This training includes lecture courses and laboratory and field work in the causes of contagious diseases and methods of controlling them, in sanitary engineering, vital statistics, administration, and other subjects.

Only recently have special schools been organized to give training of this kind. The leaders in the public health movement have been doctors with sufficient imagination, character, and devotion to train themselves by the often wasteful method of trial and error. So little satisfied are they with the school of experience that they welcome heartily the new institutions.

The International Health Board has from the outset been impressed with the need for trained sanitarians. It has welcomed opportunities to co-operate in establishing schools of public health. During 1921 a request was received from the British Ministry of Health, to share in the creation of such a training center in London. Negotiations resulted in an agreement by the International Health Board of the Rockefeller Foundation to give $2,000,000 for land, building, and equipment for a school which the British Government has undertaken to maintain. A site on Gower Street near the British Museum and University College Medical School has been purchased, and a committee is at work upon a scheme of organization and plans for a building. This School of Hygiene in London will occupy a strategic position. For teaching purposes it will command the great scientific resources, public health records, and the well-trained experienced personnel of the unusually efficient health services of Great Britain. By virtue of the position in the British capital, the new institution will exert an influence throughout the Empire. It seems likely, also, to serve as a training center for prospective health officers from many other nations. Similar institutions which have been assisted during recent years are the School of Hygiene and Public Health of Johns Hopkins University, the School of Public Health of Harvard University, and, on a smaller scale, institutes of hygiene in Prague and Warsaw, and a department of hygiene in the São Paulo medical school, Brazil. For all these enterprises the Foundation has appropriated or pledged nearly ten million dollars.

It will of course be many years before these professional schools can supply the demand for trained leaders. Many members of a specialized health department staff, such as statisticians, sanitary engineers, nurses, bacteriologists, laboratory technicians, and inspectors, will be prepared in other university departments, in special schools, or as apprentices in the service. Meantime a large number of men and women now in active health work must be given additional instruction in connection with their duties. Hence the organization of special local institutes for instruction and demonstration and for personal contact with well-known leaders. In 1922, the Board contributed toward the expenses of such institutes in five states and continued to support an experimental correspondence course for local health officers, the success of which was sufficient to suggest the offering of a similar course for public health nurses.

Closing in on Yellow Fever

Definite progress was made during 1922 in the International Health Board's campaign to drive yellow fever from the world. The comparatively small number of reported cases of the disease were confined to Mexico, to a restricted area in northern Brazil, to points on the West Coast of Africa, or to ships en route from one of these countries. The Mexican authorities warmly welcomed and supported the co-operation of the Board. To one familiar with the history of yellow fever, the fact that for a whole year Central America, the West Indies, and all but one country of South America were free from the scourge which for nearly two centuries ravaged these regions, is strikingly significant. It is hard to realize that this latest phase of the fight on yellow fever began only five years ago.

The earlier stages of the campaign are well known. Following the discovery by Ross that malaria is transmitted by the mosquito, American Army medical officers, headed by Walter

Reed, in 1900 proved conclusively that yellow fever is spread only by the infected female Stegomyia mosquito. By depriving the Stegomyia of access to water in which to lay her eggs, and by screening houses against such mosquitoes as matured, General William C. Gorgas, first in Cuba and later in the Panama Canal Zone, achieved a notable control of yellow fever. Inspired by these triumphs, Dr. Oswaldo Cruz succeeded in ridding Rio de Janeiro of the disease, a feat soon emulated by Dr. Licéaga at Vera Cruz. In succeeding years yellow fever was gradually restricted to certain seed-beds whence from time to time it spread over considerable areas.

The fear lest the opening of the Panama Canal might carry yellow fever to the dense population of the Orient, and General Gorgas' faith that the menace might be entirely removed resulted in a decision of the Board to undertake a campaign of eradication. In 1916 General Gorgas visited Central and South America, made a report, and recommended systematic efforts to put an end to the disease in well-known endemic centers, such as Guayaquil in Ecuador, Merida in Yucatan, and an area in north Brazil. He also advised investigation of suspected foci in Venezuela and on the West Coast of Africa. Measures were promptly adopted. Dr. Hideyo Noguchi, of the Rockefeller Institute for Medical Research, made investigations in Guayaquil and Merida, discovered the yellow fever germ and prepared a vaccine and a serum which have since given encouraging results. In November, 1918, a campaign was begun in Guayaquil with the result that since June, 1919, no case has been reported there. Meantime General Gorgas organized national yellow fever commissions in the chief countries concerned. Epidemics were checked in Central America. A serious outbreak in northern Peru was promptly controlled. General Gorgas was at the head of a commission on its way to West Africa when he died in London in July, 1920. Gradually the remaining sources of infection in the Caribbean region were traced to Mexico, and the Mexican Government invited the co-operation of the Board. It is too early to predict a complete victory, but the successors of General Gorgas share his faith that it will in time be won.

Controlling Malaria at Low Cost

The disease which in 1753 an Italian called malaria because he thought it came from "bad air" has a long and sinister history. It is believed that the ancient Egyptians knew it. Hippocrates clearly described it. The decline of Greece and Rome is attributed largely to malarial fevers. In 1640 cinchona bark was introduced into Europe from Peru and was gradually employed as a specific remedy. Various medical men studied the disease and connected it with marshy areas. One suggested the possibility that the mosquito might be involved. In 1820 an alkaloid called quinine was obtained from cinchona bark. Knowledge about the malady grew until in 1880 Laveran, a French army surgeon, discovered the organism which causes malaria. Ross, in 1897, demonstrated the transmission of the malaria organism by mosquitoes. MacCallum's studies completed the knowledge of the life cycle of the parasite. Contributions from many other sources rapidly confirmed and expanded Ross's results. Experiments in control of mosquitoes by use of oil and larva-consuming fish were carried on. By 1910 a technique had been worked out for the prevention of malaria through drainage, screening, and other methods of mosquito control, and through the use of quinine.

Gorgas employed these methods in Panama. Ross, at Ismailia in Egypt, and Watson, in the Federated Malay States, achieved striking results. Italy introduced a wide distribution of quinine supplied free by the government. In 1912 the United States Public Health Service began studies and experiments in Mobile, Alabama, in conjunction with the State Department of Health. The work was later extended to Louisiana. A demonstration was made in 1914–1916 in a cotton-mill town in North Carolina, following a successful effort to control malaria in a lumber camp in Mississippi. During the war the Public Health Service efficiently discharged the duty of protecting forty-three areas in the vicinity of army camps in fifteen states.

Practically all of these projects were directly supported by government. Many of them had to be carried through almost regardless of cost for the sake of industrial or military ends. The question as to whether a small city, a town, or a rural area could be protected against malaria at a cost which the local population could afford remained to be answered. It was to test the possibility of effective control at a low per capita expense that the International Health Board began in 1916, in co-operation with state and federal authorities, a series of demonstrations in small towns in Arkansas and Mississippi. The net result of these experiments was so encouraging, that for the season of 1920 widespread demonstrations were begun under the joint auspices of the local governments, state health departments, the United States Public Health Service, and the International Health Board. The program for 1922 included thirty-four countywide malaria control demonstrations and thirty-two town demonstrations in ten states. All the demonstrations have afforded cumulative proof that under normal conditions an average community can practically rid itself of malaria at a per capita cost of from 45 cents to $1 per year. In addition, the Board conducted experiments in mosquito control by use of fish and by screening under a variety of conditions, and tested the curative and protective possibilities of quinine.

Hookworm Disease as an Educator

The relief of a disabling malady prevalent throughout areas inhabited by nine hundred million people of the world is sufficiently important in itself. But the control of hookworm infection has another and even more significant value. It is an effective means of educating people in the meaning of public health work and of persuading them to support more comprehensive measures for preventing other diseases as well. For the facts about hookworm disease are fairly simple and easy to understand. Even an illiterate person may with the aid of charts, pictures, microscope, and oral explanation follow the course of the tiny, burrowing larva as it makes its way from the soil where it has hatched from an egg, through the skin of a man into the blood, which carries the parasite into the lungs. From there it penetrates to the throat, is swallowed into the digestive tract, and at last burying its hooks in the walls of the intestine, clings to its host, impoverishing his blood and robbing him of vitality. The eggs which the worms lay pass out to infect the soil and to start another life cycle. The method of administering a vermifuge by which the parasites may be eliminated is simple. The worms themselves may be put under the microscope to convince the sceptical. This device, to be sure, is not universally successful. In the remote regions of a foreign country, for example, a doubting observer refused to admit the actuality of the squirming organisms. "At the cinema," he said, "I see lions and tigers, but they are not really there." Not only the cure, but the prevention of hookworm disease through sanitation and latrines can be made clear and convincing. Experience with anti-hookworm campaigns in many countries has proved that the disease can readily be used as a means of educating the public in the possibilities of preventive medicine.

In the year 1922 the International Health Board had a part in hookworm control activities in twenty-two governmental areas in the United States, the West Indies, Central America, South America, and the Far East. Since 1911 the Board has co-operated in sixty-nine states and countries. In fifty-four, control measures were carried out; in fifteen others only surveys were made. The policy of the Board in this work has been: (1) to undertake control measures only on the invitation of a government which (2) bore from the first at least a small part of the expense, and agreed (3) to take on each year an increasing proportion of the cost until it finally (4) assumed entire responsibility for the continuance of the project. In order to measure the progress of control the Board in the last three years made re-examinations of school children in sixty-six counties in the Southern States and compared results with those of the original surveys, which were made between 1910 and 1914. On the average a reduction of 47.5 per cent was shown. In one county a decrease of 94 per cent had taken place; in several, over 80 per cent; in only one was an increase disclosed.

Simple and well-understood as hookworm control may seem to be, the fact is that new knowledge is constantly leading to the adoption of new methods. The Board's staff in the field constitutes in a true sense a body of research workers who are always on the alert for information and improved methods. From time to time experts are sent out to make special studies which throw new light on the problems of sanitation, treatment, and education. Important field studies in Trinidad and Porto Rico show that hookworm larvae cannot travel far through the soil and do not live more than six weeks. This localizing of infection and self-sterilizing of the soil have a fundamental bearing on the problem of sanitation.

The County as a Health Unit

Hookworm control has been so successful as an educator of the public that it has ceased to be a separate project in the United States and has become one item in a larger undertaking organized as a task of local government. Two hundred and fifteen counties in this country and six similar areas in two states of Brazil now have full-time county health departments. This rural health work reaches all parts of the county through control of contagious diseases, visiting nurses in homes and schools, medical examination of children, sanitary inspection, special clinics, and by health education for old and young. The typical staff is made up of four whole-time workers—a health officer, a nurse, a sanitary inspector, and a clerk. The usual cost of this service is about $10,000 per year. Many populous and well-to-do counties spend more; a few get on with less.

Comparisons of relative declines in urban and country death-rates in recent years, the contrast disclosed by physical examination of city and country children, and studies of sanitary conditions on farms, all revealed disquieting tendencies. The idyllic myths about the pure water of the old oaken bucket, the salubrious country air, the invigorating exercise of bucksaw, spade, and hoe, had to be rudely revised in the light of facts. The health program is only one item, but an essential item, in the national effort to make country life wholesome, happy, and rewarding to the millions who produce the food and staples of the whole population.

During 1922 the Board gave money to the health budgets of 163 counties in the United States and of six counties in Brazil. In most cases the Board's share in budget and responsibility is being gradually transferred to state and county. The gradual spread of the county health unit idea is based upon the sound principle of local support with only partial and usually temporary aid from central departments and voluntary agencies. There is a temptation to impose from above a system and to maintain it by large government subsidies or private gifts. Up to a certain point such stimulus and guidance may be useful but the danger is that the project will not take root in the local life. In a democracy permanent progress depends upon the slow process of convincing whole communities and getting them to recognize an activity as a collective duty. The Board seeks not to take the place of government agencies but to help them educate their constituencies to recognize that a given health project is desirable, feasible, and economically possible.

Promoting International Hygiene

Not only is the scientific basis of preventive medicine an international product, but the application of it has called for increasing co-operation among the countries of the world. The first European conference to consider health problems was held in 1851. Twelve nations were represented. Concerted measures against cholera, plague, and yellow fever were adopted. Thereafter at intervals of a few years other congresses were called to insure better teamwork in preventive medicine. In 1902 an International Sanitary Bureau was established in Washington by the Pan American Union. Finally in 1908 a permanent International Office of Hygiene was established in Paris under the auspices of thirteen nations. Voluntary associations have also a part in this common battle against disease. The League of Red Cross Societies, with headquarters in Paris, includes public health activities in its international program. The medical congresses already mentioned have had an important bearing on the spread of public health knowledge and practice. The work of the Rockefeller

Foundation which is described in this Review lies largely in the field of international hygiene.

The most significant development in this movement is the recent creation under the League of Nations of a Health Organization which has the direct support of fifty-two nations and the sympathetic co-operation of the United States. The new body has reached a working agreement with the International Office of Hygiene in Paris and will doubtless have cordial relations with the International Sanitary Bureau. The program of the League's Health Organization includes the gathering of vital statistics, prompt notification of epidemics, standardizing of vaccines and sera, international conferences and exchanges of health officers, securing of better health conditions for sailors on shipboard and in ports, co-operation with League mandatories, with the Commission on Opium, and with the International Labor Office.

The International Health Board has made appropriations to the League of $344,440, to be used over a period of three to five years in a demonstration of the feasibility and value of an international epidemiological service and an international exchange of health officers. The first of these interchanges of health officers has taken place. Sanitary officials of Belgium, Bulgaria, Czechoslovakia, Italy, Jugoslavia, Poland,

and Russia to the number of twenty-one met in Brussels October 8, 1922. After a series of lectures, conferences, and demonstrations the officers visited various health districts in Belgium. Then they went to Italy, where a similar plan was carried out. The whole program lasted for about ten weeks. It is expected that these interchanges between different countries will take place three or four times a year and will promote efficiency and a sense of professional comradeship across national boundaries.

Advanced Students from Twenty-Three Countries

Mention has been made in the foregoing pages of the fellowships in public health, medical education, and nursing by means of which the different agencies of the Rockefeller Foundation are providing advanced training for men and women who are preparing themselves for careers in these fields. During 1922 the total number of fellowship holders was 237. Of these, 164 were appointed directly through departments of the Foundation, while seventy-three were selected and supervised by special committees of the National Research Council. The list does not include 105 fellows studying at the Peking Union Medical College, nor *bourses* for 157 health visitors in France and for 7 French nurses in London hospitals. The International Health

Board granted 79 fellowships, the China Medical Board 63, and the Division of Medical Education 22. Twenty-three countries were represented in these three groups, as follows: China 64, Brazil 20, Czechoslovakia 16, United States 12, Poland 10, Canada 8, Philippine Islands 4, Australia 3, Austria 3, Hungary 3, Nicaragua 3, Syria 3, Colombia 2, Japan 2, Jugoslavia 2, Siam 2, Ceylon 1, Costa Rica 1, England 1, Mauritius 1, Mexico 1, Peru 1, Salvador 1. Of the 73 American fellowships administered by the National Research Council, 29 were assigned to chemistry, 26 to medicine, and 18 to physics. From its inception in 1915 to December 31, 1922, 431 fellows have studied under this fellowship plan.

The fellowship policy of the Foundation aims at flexibility, selection, and specific preparation. No fixed number of fellowships is assigned to any one subject or country. Only candidates of exceptional promise are chosen, to whom positions in government or institutional service have been assured on the completion of their studies. The International Health Board, in helping to create institutes of hygiene in Prague and Warsaw, grants fellowships for the training of the staffs of the new schools. In the same way the China Medical Board prepares Chinese to assume teaching responsibilities in the Peking

Union Medical College and other schools in China, and the Division of Medical Education will educate future professors in the reorganized Royal Medical College, Bangkok, Siam. The Foundation's experience shows that progress in its chosen fields is limited chiefly by lack of capable, well-trained personnel. The fellowships are being used to overcome this obstacle.

Working Through Non-Governmental Organizations

The plan of co-operation with governments has been emphasized. The Foundation also works with voluntary institutions and organizations of many kinds. From time to time temporary committees are created for special tasks. To these and to more permanent organizations the Foundation makes contributions for specific purposes and for limited periods. Occasionally aid is given for a test of some project with the understanding that if it proves successful it will be supported by funds from other sources. During the year 1922 the Foundation has co-operated directly and through its Boards with the following agencies which work in the fields of medical education and public health:

French Health Agencies. The International Health Board in withdrawing its antituberculosis commission from France has transferred to the

Comité National de Défense contre la Tuberculose and to five nurse training schools certain functions and temporary appropriations. Since the commission began its work in France in 1917, it has co-operated in the establishment of more than 300 dispensaries, provided special courses for 228 doctors, helped to train 289 health visitors, carried on educational work in sixty-five departments, and expended a total of $2,119,945.

Committee for the Study of Nursing Education. Under the auspices of this Committee, named in 1919 by a conference representing all phases of opinion on the problem of nurse training, a thorough study of the functions and education of both bedside and public health nurses has been made by Miss Josephine Goldmark. The Foundation called the original conference and paid the expenses of the survey, but did not participate in the work and is not responsible for the recommendations, which may be summarized as follows: (1) the public health nurse should have a training equivalent to, but not identical with, that of the bedside nurse; (2) present standards of knowledge and efficiency should be maintained; (3) a subsidiary grade of nursing service should be provided, under careful restrictions; (4) the status, equipment, and teaching personnel of the nurse training school should be improved and the pupil nurses relieved of hospital drudgery; (5) the course should be shortened from three years to twenty-eight months; and (6) university schools of high grade for the training of leaders, i. e., teachers and administrators, should be developed.

Committee on Training of Hospital Executives. Appointed at a conference called by the officials of the Rockefeller Foundation, this Committee asked Dr. Willard C. Rappleye, now superintendent of the New Haven Hospital, to make a study and prepare a report. This was published in April, 1922. It shows (1) the need, as a basis for the training of superintendents, of an understanding of the place and functions of the modern hospital; (2) the duty of the hospital with respect to the prevention as well as the cure of disease; and (3) the intimate relation which the hospital should sustain to the community it serves.

Committee on Dispensary Development, New York City. Appointed by the United Hospital Fund and supported by the Foundation, this Committee has sought to (1) demonstrate improvements in dispensary service, (2) increase the interest of the medical profession and laymen, and (3) stimulate financial support for new projects. Plans for co-operation with the Presbyterian Hospital were developed, field studies have been made, local stations for health examinations established. The outstanding feature of this Committee's program is:

The Cornell University Pay Clinic, which undertakes to furnish a high grade of medical service at fees which can be met by individuals and families unable to afford the usual private rates for the medical service which their conditions require. The clinic aims to be self-supporting except so far as teaching requirements for students are concerned. In the year ending October 31, 1922, 22,536 different individuals paid 114,108 visits to the clinic. During the first ten months of the demonstration 719 physicians referred 1,110 patients to it. While the point of complete self-support has not been reached, it is believed that with some readjustments in plan and rates the budget can be balanced. The need and demand for service of this kind have been demonstrated.

National Committee for Mental Hygiene. Besides contributing to the general budget of this organization, the Foundation made special appropriations for the support of surveys and uniform statistics of mental deficiency and mental diseases.

Hospital Library and Service Bureau, Chicago. A small contribution was made to this agency which disseminates information with regard to hospital construction, equipment, organization, administration, relation to the community, and so forth.

National Research Council, Washington. Certain fellowships supported by the Foundation are administered by special committees of the Council (see page 56). The Foundation is also contributing through the Council for a transition period to the budget of the Concilium Bibliographicum of Zürich, which it is hoped will become a part of a comprehensive international bibliographical service.

American Medical Association. The Foundation shares with the Association the annual deficit involved in the publication of a Spanish edition of the *Journal of the American Medical Association* for circulation in Spanish-speaking countries.

In fulfilment of ten-year pledges made in its early years appropriations were continued to certain institutions whose work no longer falls within the scope of the Foundation's program. Those appear in the summary of appropriations for 1922 on page 80.

Applications for Aid

During 1922, applications to the Foundation for aid numbered 835. This total does not include a large number of appeals made to the departmental agencies within their own fields. The lists of individuals and organizations whose requests have been declined either by the officers or the Executive Committee are laid before the trustees, but it does not seem courteous or just to make these details public. The Foundation has consistently adhered to the policy of declining to make gifts or loans to individuals, to invest in securities which have a philanthropic rather than a business basis, to assist in securing patents or aiding altruistic movements which involve private profit, or to support propaganda which seeks to influence public opinion on social, economic, or political questions.

TABLE 1: APPLICATIONS FOR AID RECEIVED AND ACTED UPON DURING 1922

Classification	RECEIVED	GRANTED	DECLINED	PENDING
1. Public Health	77	2	74	1
2. Medical and nursing education and subsidization of medical research (including granted fellowships)	171	40	125	6
3. General education (including educational projects and research other than medical)	83		82	1
4. Foreign relief or reconstruction	37		37	
5. National movements in fields other than 1 and 2	11		11	
6. Campaigns to influence public opinion	17		17	
7. Local churches and institutions	133		132	1
8. Personal aid (including loans, gifts, medical treatment, education)	153		153	
9. Financing or promotion of books, plays, inventions, etc.	50		50	
10. Investigation, reward or purchase of alleged medical discoveries	67		67	
11. Miscellaneous	36		36	
TOTAL	835	42	784	9

Finances for 1922

The following table presents a summary of receipts and expenditures for the fiscal year 1922:

TABLE 2: RECEIPTS AND DISBURSEMENTS IN 1922

Receipts		*Expenditures*		
Balance from 1921	$7,359,001	Public Health		$9,447,270
Refunds on appropriations	6,960	Medical Education		6,103,130
		Miscellaneous		191,966
Income during 1922	8,836,309	Administration		169,042
Appropriated from principal fund	6,000,000			$15,911,408
		Balance		
		Payable on 1922 and prior appropriations	$4,377,427	
		Available for 1923 appropriations	1,913,435	6,290,862
	$22,202,270			$22,202,270

The balance of more than seven millions carried over from 1921 included refunds on appropriations of 1922 and previous years which were not all called for. Every effort is made to forecast the sum needed for each activity in a given year, but it often happens that the entire amount set aside is not used. At the end of the year such unexpended remainders are returned to the treasury. In the aggregate these refunds amount to a considerable sum. The income for 1922 approached nine millions, but even these combined resources were inadequate. The trustees voted therefore to spend six millions from the principal funds. Thus the total amount available for disbursement was more than twenty-two millions, of which almost sixteen millions were paid out. Of the remainder, nearly four and one half millions were mortgaged by outstanding obligations, leaving almost two millions for use in 1923 in addition to the income for that year. Of the sixteen millions disbursed twelve millions were for buildings and endowment, and four millions for the operating or current expenses of the institutions aided. A table on pages 76 to 78 gives an analyzed statement of the total expenditures of the Foundation for its first ten years, ending December 31, 1922. On pages 79 to 81 are summaries of expenditures for the year 1922 and of funds and property.

The Well-Being of Mankind Throughout the World

The foregoing pages have described the movement for scientific medicine and public health from an international standpoint. It must be owned that there is today a suggestion of irony in smooth phrases about co-operation, understanding, and good-will among the nations. Suspicion, distrust, detraction, hatred, and threat of war are all too prevalent in the relations of the peoples of the world. Scientific comradeship and common tasks of hygiene seem almost negligible as bonds of unity. But the difficulty of a task is no excuse for not attempting it. Because it is not possible to predict the early dawn of a millennial peace, there is no good reason for not taking steps which seem to lead toward even a remote era when nations may substitute generous rivalry for deadly conflict. To stimulate worldwide research, to aid the diffusion of knowledge, to multiply personal contacts, to encourage co-operation in medical education and public health are the means by which the Rockefeller Foundation seeks to be true to its chartered purpose, which is to promote, not the exclusive prosperity of any one nation, but "the well-being of mankind throughout the world."

THE ROCKEFELLER FOUNDATION

Report of the Secretary

To the President of the Rockefeller Foundation:

Sir:

I have the honor to submit herewith my report on the activities of the Rockefeller Foundation for the period January 1, 1922, to December 31, 1922.

Respectfully yours,
EDWIN R. EMBREE,
Secretary.

SECRETARY'S REPORT

The review by the President outlines the policies by which the Rockefeller Foundation is being guided in its work, sketches its present program, and describes the results aimed at and accomplished during the year 1922. The following report depicts the organization and the agencies through which these results were reached, and outlines the methods by which the programs of the several departments were carried out.

Organization

The following are the members and officers of the Rockefeller Foundation for 1923:

MEMBERS

John G. Agar
Wallace Buttrick
John W. Davis
Simon Flexner
Raymond B. Fosdick
Frederick T. Gates[1]
Harry Pratt Judson
Vernon Kellogg
John D. Rockefeller
John D. Rockefeller, Jr.
Wickliffe Rose
Julius Rosenwald
Martin A. Ryerson
Frederick Strauss
George E. Vincent
William Allen White
Ray Lyman Wilbur

EXECUTIVE COMMITTEE

George E. Vincent, *Chairman*
Wallace Buttrick
Raymond B. Fosdick
Vernon Kellogg
Wickliffe Rose
Edwin R. Embree, *Secretary*

[1] Resigned July 2, 1923.

OFFICERS

John D. Rockefeller, Jr.	*Chairman, Board of Trustees*
George E. Vincent	*President*
Edwin R. Embree	*Secretary*
Norma F. Stoughton	*Assistant Secretary*
L. G. Myers	*Treasurer*
L. M. Dashiell	*Assistant Treasurer*
Robert H. Kirk	*Comptroller*
Chase Andrews	*Assistant Comptroller*
C. C. Williamson	*Director of Information Service*

The Foundation holds regular meetings in February, May, and December. The executive committee meets frequently during the intervals to execute programs within general policies approved by the trustees. Eighteen meetings of the executive committee were held during 1922.

Departmental Agencies

The Foundation accomplishes its work largely through departmental organizations that are devoted to special functions and depend upon the Foundation for funds. These with their members and officers are:

INTERNATIONAL HEALTH BOARD

George E. Vincent, *Chairman*

Hermann M. Biggs[1]	Vernon Kellogg
Wallace Buttrick	T. Mitchell Prudden
David L. Edsall	John D. Rockefeller, Jr.
Simon Flexner	Wickliffe Rose
Raymond B. Fosdick	Victor C. Vaughan
Frederick T. Gates	William H. Welch
Edwin O. Jordan	

Edwin R. Embree, *Secretary*
Florence M. Read, *Assistant Secretary*

[1] Deceased June 28, 1923.

F. F. Russell, M.D.	*General Director*
John A. Ferrell, M.D.	*Director for the United States*
Victor G. Heiser, M.D.	*Director for the East*
H. H. Howard, M.D.	*Director for the West Indies*

CHINA MEDICAL BOARD

George E. Vincent, *Chairman*

Wallace Buttrick	Harry Pratt Judson
Simon Flexner	Vernon Kellogg
Raymond B. Fosdick	John R. Mott
Frederick L. Gates	Francis W. Peabody
Frank J. Goodnow	John D. Rockefeller, Jr.
Roger S. Greene	Wickliffe Rose

William H. Welch

Edwin R. Embree, *Secretary*

Margery K. Eggleston, *Assistant Secretary*

Roger S. Greene	*Director*
Henry S. Houghton	*Acting Resident Director in China*

DIVISION OF MEDICAL EDUCATION

Richard M. Pearce, M.D., *General Director*

Alan Gregg, M.D., *Associate Director*

Assistance to Other Agencies

In addition to the work carried out through the departmental organizations described above, the Rockefeller Foundation has contributed during the year to the accomplishment of work undertaken by other and unaffiliated organizations.

An analyzed statement of the total expenditures of the Foundation for its first ten years, ending December 31, 1922, is given on pages 76 to 78. On pages 79 to 81 will be found a summary of payments made by the Rockefeller Foundation for all purposes during the year 1922. This tabular summary outlines, in terms of expenditures, the work described in terms of aims and results in the President's Review. In many instances these payments involved sums expended on account of appropriations made in former years. On the other hand, they represent in some instances but partial payments on many of the appropriations, made during 1922, which will provide for continuing work during succeeding years. For a full statement of the finances of the Foundation, see the Report of the Treasurer, pages 355 to 419.

TABLE 3: SUMMARY OF THE EXPENDITURES OF THE ROCKEFELLER FOUNDATION FROM MAY 22, 1913, TO DECEMBER 31, 1922

PUBLIC HEALTH		
International Health Board		
Regular Program in Control of Hookworm, Malaria, and Yellow Fever, and in County Health and Laboratory Service	$5,600,989	
Tuberculosis in France	2,119,945	
Fellowships and Public Health Education.	348,952	
Administration	777,683	
	$8,847,569	
Schools of Public Health		
Johns Hopkins University	7,096,088	
Harvard University	1,250,534	
	$8,346,622	
Hospital, Dispensary, and Nursing Studies and Demonstrations	$313,502	
Mental Hygiene	390,227	
Social Hygiene	41,353	
Infantile Paralysis including Gift to New York City Department of Health	154,565	
Other Public Health Education and Demonstrations	95,000	
	$994,647	
		$18,188,838

MEDICAL EDUCATION

China Medical Board		
Regular Program of Aid to Medical and Premedical Schools and to Hospitals	$1,566,230	
Fellowships and Scholarships	265,141	
Peking Union Medical College, Land, Buildings, and Equipment	8,513,882	
Operation	2,059,094	
Shanghai Medical School, Land and Expenses	346,937	
Administration	541,220	
	$13,292,504	
Belgium—Fondation Reine Elisabeth	80,972	
Canada—Alberta, Dalhousie, Manitoba, McGill, and Toronto Universities, and Université de Montréal	2,336,387	
England—London Medical Center	4,690,215	
France—Pasteur Institute	55,000	
Central Europe—Laboratory Equipment and Scientific Journals	125,394	
Hongkong—University of Hongkong	293,750	
United States		
University of Chicago[1]	190,281	
Rockefeller Institute for Medical Research	3,422,043	
Studies in Medical Education, Visiting Commissions and Exchange Professors	155,715	
Fellowships for Medical Scientists	51,372	
Administration—Division of Medical Education	23,226	
	$11,424,355	
		$24,716,859

WAR WORK

Y. M. C. A., Knights of Columbus, Jewish Welfare, Y. W. C. A., and Other Camp and Community Welfare	$10,956,298	
Medical Research and Relief	678,084	
Humanitarian Aid including American and International Red Cross	10,664,159	
		22,298,541

[1] Assistance to medical education as well as to other education in the United States is a part of the work of the General Education Board, which is a separate corporation and has made contributions to many American medical schools. The Foundation has at the initiative of that Board joined with it in pledges to medical schools of the universities of Chicago, Columbia, and Iowa. To December 31, 1922, payments have been made only on the pledge to Chicago.

BIOLOGY, PHYSICS, AND CHEMISTRY.		$263,906
FOUNDER'S DESIGNATIONS[1]		
Gifts made during the period May 22, 1913 to July 19, 1917, upon the designation of Mr. Rockefeller		5,678,599
MISCELLANEOUS		
Palisades Interstate Park	$1,000,000	
American Relief Administration Feeding of European Children	1,000,000	
American Red Cross—Other than War Work	110,000	
American Academy in Rome	90,000	
Bird Refuge presented to the State of Louisiana	256,133	
Bureau of Municipal Research, 1914–1919	173,000	
Scientific Studies in Governmental Problems, 1914–1918	127,500	
Colorado State Committee on Unemployment, 1915	99,985	
Mayor's Committee on Unemployment in New York City, 1915	10,000	
Studies in Industrial Relations, 1914–1918	56,159	
Committee of Reference and Counsel of the Foreign Missions Conference of North America	423,880	
New York Association for Improving the Condition of the Poor	295,000	
Wellesley College—Buildings,[2] 1915–1916	750,000	
Other gifts, in no case over $10,000, not included in above classifications	56,000	
Office Furniture and Books for Library	55,466	4,503,123
ADMINISTRATION		1,107,174
		$76,757,040

[1] In connection with an early gift the Founder reserved the right to designate charities, within the chartered purpose of the Foundation, to which a part of the income should go. This right was formerly relinquished in 1917, since which time no payments on account of such designation have been made.

[2] The gift to Wellesley, as most of the others included in the classification "miscellaneous," was made in the early years of the Foundation before the present policy of concentrating upon definite fields of activity had been adopted. Gifts to educational institutions within the United States are a part of the program of the General Education Board, which is a separate corporation; they are not now regarded as within the scope of the Rockefeller Foundation.

NOTE: In addition to figures reported above, the Foundation has paid out to specially designated charities income amounting to $4,850 annually on funds held for the time being in trust for Mr. and Mrs. Rockefeller. The residuary estate of Mrs. Rockefeller received by the Foundation, amounting to $487,689, has been paid out in full in appropriations to the General Education Board, the Young Men's Christian Association, and the Fifth Avenue Baptist Church of New York City.

TABLE 4: SUMMARY OF THE EXPENDITURES OF THE ROCKEFELLER FOUNDATION FOR THE YEAR 1922

I. PUBLIC HEALTH	
A. International Health Board	
1. Regular program in control of Hookworm, Malaria, and Yellow Fever, and in County Health and Laboratory Service	$1,287,017
2. Tuberculosis in France	230,198
3. Fellowships and Public Health Education	154,250
4. Administration	170,912
B. Studies and Demonstrations	
1. Mental Hygiene	64,083
2. Hospital, Dispensary Service, and Nursing	141,657
C. Schools of Public Health	
1. Johns Hopkins University	6,165,118
2. Harvard University	1,209,034
D. Other Public Health Education and Demonstrations	
1. New York University—Hygiene Laboratory	25,000
2. Common Service Committee—(For Correlation of Service of Health Agencies)	5,696
3. National Health Council	10,000
	$9,462,965
II. MEDICAL EDUCATION	
A. China Medical Board	
1. Regular program of aid to Medical and Premedical Schools and to Hospitals	$217,417
2. Peking Union Medical College	
(a) Buildings and Equipment	219,741
(b) Operation	623,944
3. Fellowships and Scholarships	30,510
4. Administration	115,302
B. London Medical Center	3,689,293
C. Canadian Medical Program	658,784
D. Hongkong Medical School	293,750
E. Central Europe: Journals and Apparatus	78,308
F. Pasteur Institute	25,000
G. University of Chicago—Interest on pledge	47,706
H. Fellowships for Medical Scientists	30,167
I. Assistance to Medical Schools in Brazil	13,828
J. American Medical Association (Toward publishing Spanish Edition of Journal)	7,782

K. Studies in Medical Education, Visiting Commissions and Exchange Professors	$ 28,373
L. Administration—Division of Medical Education	23,226
	$6,103,131

III. MISCELLANEOUS

(Chiefly payments on previous pledges)	
A. American Academy in Rome—(Payment on ten-year pledge made in 1914)	$10,000
B. Committee of Reference and Counsel of the Foreign Missions Conference of North America (Payment on ten-year pledge made in 1914)	30,000
C. Concilium Bibliographicum, Zürich	27,914
D. National Information Bureau—(Membership for 1922)	1,000
E. National Research Council—(Fellowships in Physics and Chemistry)	82,260
F. New York Association for Improving the Condition of the Poor—(Ten-year pledge made in 1914)	20,000
G. Johns Hopkins University—(For Special Investigations)	750
	$171,924

IV. ADMINISTRATION

A. Maintenance of Executive Offices and Treasurer's Office	$169,042
B. Furniture and Fixtures, and Books	4,346
	$173,388
	$15,911,408

Funds and Property

As of December 31, 1922

PRINCIPAL FUNDS		
General Fund		$165,204,624
Special Funds:		
Gifts of Laura S. Rockefeller	$49,300	
Gifts of John D. Rockefeller	37,000	
Henry Sturgis Grew Memorial Fund	25,000	
Arthur Theodore Lyman Endowment	5,500	116,800
		$165,321,424

LAND, BUILDINGS, AND EQUIPMENT

In China: Medical School Lands, Buildings, and Equipment	$8,850,106	
In New York: Furniture and Equipment of Offices	39,326	$8,889,432

UNDISBURSED INCOME

General Income (For offsetting liabilities see below)		$6,290,862
Special Income Accounts:		
Estate Laura S. Rockefeller	$65	
Henry Sturgis Grew Memorial	5,665	
Arthur Theodore Lyman Endowment	1,041	6,771
		$6,297,633

UNPAID APPROPRIATIONS AND PLEDGES

Balance due on appropriations payable in 1922 and prior years		$4,377,427
Appropriations and pledges which become effective in 1923 and following years:		
1923	$9,717,521	
1924	2,683,933	
1925	1,131,846	
1926	1,941,309	
1927	135,260	15,609,869
		$19,987,296

INTERNATIONAL HEALTH BOARD

Report of the General Director

INTERNATIONAL HEALTH BOARD

Report of the General Director

To the President of the Rockefeller Foundation:

Sir:

I have the honor to submit herewith my report as General Director of the International Health Board for the period January 1, 1922, to December 31, 1922.

Respectfully yours,

WICKLIFFE ROSE,

General Director.

INTERNATIONAL HEALTH BOARD

OFFICERS AND MEMBERS

George E. Vincent, *Chairman*
Wickliffe Rose,[1] *General Director*
Hermann M. Biggs[2]
Wallace Buttrick
Simon Flexner
Raymond B. Fosdick
Frederick T. Gates
Edwin O. Jordan
Vernon Kellogg
T. Mitchell Prudden
John D. Rockefeller, Jr.
Victor C. Vaughan
William H. Welch

Edwin R. Embree, *Secretary*
Florence M. Read, *Assistant Secretary*

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[1] See footnote 2, p. 87.
[2] Deceased June 28, 1923.

PERSONNEL OF STAFFS DURING 1922[1]

ADMINISTRATIVE STAFF

WICKLIFFE ROSE,[2] *General Director*
JOHN A. FERRELL, M.D., *Director for the United States*
VICTOR G. HEISER, M.D., *Director for the East*
HECTOR H. HOWARD, M.D., *Director for the West Indies*
L. W. HACKETT, M.D., *Associate Regional Director (for Brazil)*
FREDERICK F. RUSSELL, M.D.,[2] *Director of Public Health Laboratory Service*

FIELD STAFF

ANTIGUA

D. L. SISCO	Hookworm resurvey

AUSTRALIA

(including Papua and Late German New Guinea)

W. A. SAWYER	Consultant in Public Health to the Commonwealth Department of Health
W. C. SWEET	Hookworm control
A. J. LANZA[3]	Industrial Hygiene
F. F. LONGLEY[3]	Sanitary Engineering

BRAZIL

L. W. HACKETT	Direction of work in Brazil and Paraguay
G. K. STRODE	Hookworm control
ALAN GREGG (resigned)	Hookworm control
F. L. SOPER	Hookworm control
N. C. DAVIS	Hookworm control
J. H. JANNEY	Organization of county health departments
M. F. BOYD	Malaria surveys
E. H. MAGOON[3]	Malaria surveys

[1] Personnel employed by Government in co-operative work not listed.
[2] Dr. Russell became General Director on March 1, 1923, when Dr. Rose became President of the General Education Board and the International Education Board.
[3] Special Staff Member.

Mrs. Ethel Parsons[1]	Public health nursing service
W. G. Smillie	Director and Professor of Hygiene, School of Hygiene and Public Health, São Paulo

BRITISH HONDURAS

E. I. Vaughn	Yellow fever control

BRITISH NORTH BORNEO

C. H. Yeager	Hookworm control

CEYLON

W. P. Jacocks	Hookworm control
J. F. Docherty	Hookworm control
G. G. Hampton	Hookworm control
C. N. Leach	Hookworm control

CHINA

J. B. Grant	Associate Professor of Hygiene and Public Health, Peking Union Medical College Public Health Surveys

COLOMBIA

F. A. Miller	Hookworm control
W. M. Monroe	Hookworm control

CZECHOSLOVAKIA

S. M. Gunn[1]	Public health administration

DUTCH GUIANA

W. C. Hausheer	Hookworm control

FIJI

S. M. Lambert[1]	Hookworm control

FRANCE

L. R. Williams[1] (resigned)	Commission for the Prevention of Tuberculosis in France
Miss F. Elisabeth Crowell[1]	Commission for the Prevention of Tuberculosis in France
S. M. Gunn[1]	Commission for the Prevention of Tuberculosis in France

[1] Special Staff Member.

GUATEMALA

E. I. Vaughn	Hookworm control Yellow fever control
J. E. Elmendorf, Jr.	Hookworm control Yellow fever control

HONDURAS

D. B. Wilson	Hookworm control

INDIA

J. F. Kendrick	Hookworm control

JAMAICA

B. E. Washburn	Hookworm control
D. L. Sisco	Hookworm control

MAURITIUS

G. G. Hampton	Hookworm control

MEXICO

J. H. White [1]	Yellow fever control
M. E. Connor	Yellow fever control
B. W. Caldwell [1]	Yellow fever control
E. J. Scannell [1]	Yellow fever control
W. M. Monroe	Yellow fever control

NICARAGUA

D. M. Molloy	Organization of public health activities Hookworm control Yellow fever control
F. E. Hulse [1]	Malaria control investigations
E. M. Knights [1]	Public health laboratory service

PALESTINE

P. S. Carley	Malaria survey
J. J. Mieldazis	Malaria survey

PANAMA

F. C. Caldwell	Hookworm control

PHILIPPINE ISLANDS

C. N. Leach	Public health administration
W. D. Tiedeman [1]	Malaria survey

[1] Special Staff Member.

Miss Alice Fitzgerald [1]	Public health nursing service

PORTO RICO

R. B. Hill	Hookworm control
J. L. Rice [1]	Hookworm control
H. W. Green [1]	Malaria control investigations

SALVADOR

C. A. Bailey	Hookworm control Yellow fever control

SIAM

M. E. Barnes	Hookworm control
H. R. O'Brien	Hookworm control

TRINIDAD

J. L. Rice [1]	Hookworm control
J. L. Hydrick	Hookworm control

UNITED STATES

Alabama

W. G. Smillie	Organization of county health departments Direction of training base
N. H. Rector [1]	Co-operative Demonstration in Malaria Control
H. W. Nightingale [1]	Co-operative Demonstration in Malaria Control
M. C. Balfour [1] (resigned)	Co-operative Demonstration in Malaria Control
A. S. Bedell [1] (resigned)	Co-operative Demonstration in Malaria Control

Arkansas

H. A. Johnson [1]	Co-operative Demonstration in Malaria Control

California

P. W. Covington	Organization of county health departments
L. G. Lenert [1]	Malaria surveys

Illinois

P. W. Covington	Organization of county health departments

[1] Special Staff Member.

J. J. Mieldazis[1]	Co-operative Demonstration in Malaria Control

Indiana

G. P. Paul (resigned)	Organization of county health departments
J. L. Hydrick	Organization of county health departments

Kansas

P. W. Covington	Organization of county health departments
A. J. Warren	Organization of county health departments
Louis Schapiro	Organization of county health departments

Kentucky

P. W. Covington	Organization of county health departments

Louisiana

P. W. Covington	Organization of county health departments
Hugo Muench, Jr.[1]	Organization of county health departments
	Malaria control investigations
L. J. Petritz (resigned)	Malaria control investigations
J. J. Mieldazis[1]	Malaria control investigations
A. R. Wingate[1]	Co-operative Demonstration in Malaria Control

Missouri

P. W. Covington	County health work

North Carolina

H. A. Taylor	Malaria surveys
W. H. Dumont[1]	Malaria surveys

Oregon

P. W. Covington	Organization of county health departments
A. J. Warren	Organization of county health departments

[1] Special Staff Member.

Tennessee

A. H. Fletcher[1]	Co-operative Demonstration in Malaria Control

Texas

A. P. Harrison	Organization of county health departments
E. W. Steel[1]	Co-operative Demonstration in Malaria Control

YELLOW FEVER ADVISORY COUNCIL[2]

Henry R. Carter, M.D., Assistant Surgeon General, United States Public Health Service

Juan Guiteras, M.D., Formerly Secretary of the Department of Health and Charities, Republic of Cuba

Hideyo Noguchi, M.D., Rockefeller Institute for Medical Research

Joseph H. White, M.D.,[1] Assistant Surgeon General, United States Public Health Service

AT HOME OFFICE

C. W. Wells	In charge of fellowships
J. L. Hydrick	Assistant to Director for the United States
W. P. Jacocks	Assistant to Director for the United States

ENGAGED IN SPECIAL HOOKWORM RESEARCH

S. T. Darling[1]
G. C. Payne

ON STUDY LEAVE

P. W. Covington
G. C. Payne
Louis Schapiro
F. L. Soper

ON SICK LEAVE

(for whole or part of year)

W. T. Burres
F. C. Caldwell
G. C. Payne

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[1] Special Staff Member.
[2] Not Staff Members; appointed to serve in an advisory capacity.

TABLE OF CONTENTS

I

The History and Objects of the International Health Board

More than thirteen years have gone by since the creation of an organization known as the Rockefeller Sanitary Commission for the Eradication of Hookworm Disease. Plans to this end, long maturing in the mind of Mr. John D. Rockefeller, took form in a letter of October 26, 1909, addressed to a group of men[1] who responded by accepting membership in the proposed Commission. Its object may perhaps best be described by extracts from the letter itself:

October 26, 1909

Gentlemen:

For many months my representatives have been inquiring into the nature and prevalence of "Hookworm Disease," and considering plans for mitigating its evils. I have delayed acting in this matter only until the facts as to the extent of the disease could be verified and the effectiveness of its cure and prevention demonstrated. . . .

Knowing your interest in all that pertains to the well-being of your fellow-men, and your acquaintance with the subject, I have invited you to a conference in the hope that it may lead to the adoption of well-considered plans for a

[1] Dr. William H. Welch, Dr. Simon Flexner, Dr. Charles W. Stiles, Dr. Edwin A. Alderman, Dr. David F. Houston, Mr. Walter H. Page, Dr. H. B. Frissell, Mr. John D. Rockefeller, Jr., Mr. Frederick T. Gates, Mr. Starr J. Murphy, Dr. P. P. Claxton, Mr. J. Y. Joyner.

co-operative movement of the medical profession, public health officials, boards of trade, churches, schools, the press, and other agencies, for the cure and prevention of this disease. If you deem it wise to undertake this commission, I shall be glad to be permitted to work with you to that end and you may call upon me from time to time for such sums as may be needed during the next five years for carrying on an aggressive campaign, up to a total of one million dollars ($1,000,000). . . .

Very truly,
(Signed) John D. Rockefeller

The Commission so created determined to attack the problem along three main lines:

1. To make a survey showing the geographical distribution and intensity of hookworm disease in the United States;
2. To cure the sufferers;
3. To remove the source of infection by stopping soil pollution.

More than a million persons in the United States were microscopically examined for the disease during the five-year experimental period of the Commission's life, and of these 441,408 were treated. Six hundred and fifty-three counties were surveyed, and more than 250,000 houses were inspected. The interest of physicians was enlisted by bulletins, letters, lectures, demonstrations, and personal interviews. The foundations of education were laid among the people by demonstration and the printed page. The press gave open-minded support to the campaign.

Photograph Excised Here

Fig. 3.—Administration Building, School of Public Health, Harvard University

In 1910 two counties appropriated $241 for the support of dispensaries; three years later this number had increased to 208 with budgets amounting to $43,649. During the whole period of operation, 1910–1914, appropriations totaling $110,000 were made by 556 counties.

In a letter of August 12, 1914, announcing the approaching termination of the five-year period, Mr. Rockefeller wrote: "The work thus far accomplished would seem to have brought about in all of the Southern States a very general knowledge on the part of physicians, health authorities, and the public, regarding the prevalence of hookworm disease and the method of treating and preventing it. The chief purpose of the Commission may thus be deemed to have been accomplished."

But Mr. Rockefeller's interest in public health did not cease. On May 14, 1913, the Rockefeller Foundation, a permanent institution, endowed by its founder with one hundred million dollars, received its charter by legislative enactment of the State of New York; and on June 27, of the same year, the Foundation created the International Health Commission[1] "to extend to other countries and peoples the work of eradicating hookworm disease as opportunity offers,

[1] The name of the International Health Commission was changed to International Health Board in 1916.

Fig. 4.—Controlling yellow fever by antimosquito measures. *Upper left:* officer and assistant inspecting rain water container to see that it is free from mosquito larvae; *Upper right:* inspector and fisherman depositing small native fish in a cistern to consume the mosquito larvae; *Bottom:* a tank at the headquarters office in Salvador for storing fish before distribution

and so far as possible to follow up the treatment and cure of this disease with the establishment of agencies for the promotion of public sanitation and the spread of the knowledge of scientific medicine."

Principles and Practice

In the course of almost ten years of co-operative service with government authorities, hookworm infection the world over has been measurably diminished; progress has been made toward reducing the ravages of malaria; and a relentless campaign is still being waged against yellow fever wherever its danger flag appears. From the outset, however, the Board has maintained the conviction that public health is essentially a function of government. No private and temporary agency, whatever its resources, could or should discharge responsibilities which, by their nature, belong to the constituted authorities of the commonwealth. Private enterprise, therefore, may be best employed in awakening public opinion and thereby encouraging state and county officials to establish permanent agencies for public health work. Responsibility for the control and cure of any one disease has never been assumed by the Board; but aid has been given in control and cure where such steps might be expected to demonstrate a need and suggest a possible program.

Photograph Excised Here

Fig. 5.—A group of hookworm offices in various countries in which the International Health Board is co-operating with the government in conducting hookworm campaigns. *Upper left:* the office at Kandy, Ceylon; *Upper right:* main offices of the Ankylostomiasis Commission, Surinam, Dutch Guiana; *Lower left:* national department of health building, Honduras; *Lower right:* office at Brisbane, Australia

Lastly, it has been clearly recognized that continued advance in preventive medicine the world over depends upon an adequate supply of skilled public health servants. Research has been aided in special cases where it might lead to the more effective application of existing knowledge to the control of disease. Training schools for health officers, nurses, and visitors have been promoted; contributions have been made toward the establishment of schools of public hygiene. And, finally, the fruits of these enterprises have been made accessible to a broader circle by means of international fellowships.

The demonstration and cure of disease arouses a public sentiment which expresses itself in legislative appropriations for specific and general health purposes. Progress on the administrative side, in turn, creates a demand for technically trained men and women to carry out new programs. Thus public enlightenment, government machinery, and technical education and research are bound up in a sure sequence which may be traced in some of the activities of the Board during 1922.

II

The Campaign against Yellow Fever

The attention of the Board was first vividly directed toward the menace of yellow fever as a

Photograph Excised Here

Fig. 6.—Entrance to the public health exhibition in the Royal Gardens, Bangkok, Siam, held, November 25 to December 9, 1922, under the auspices of the Siamese Red Cross Society, attended by more than 220,000 persons

Photograph Excised Here

Fig. 7.—A section of the public health exhibition, Bangkok, Siam, illustrating the cause and methods of prevention of hookworm disease

result of a trip which the General Director took to the Far East in 1914. On every hand he found concern lest the opening of the Panama Canal might involve the introduction of the disease into the East by ships routed through a then-infected area. General Gorgas was consulted; and the following extract from a memorandum of a conversation on July 14, 1914, gives a glimpse of the imaginative power with which General Gorgas approached a problem of difficulty and magnitude. "'The Commission,' he said, 'could not undertake a better piece of work than this. Here is a disease that has commanded an unusual amount of attention; one in which all tropical and semitropical countries are now keenly interested. Its eradication would command the attention and the gratitude of the world. And the thing can be done! . . .' He left with the understanding that the discussion of the subject would be continued with a view to maturing a plan of organization and of work for the accomplishment of this end."

The Outlawry of Disease

Twenty-five years ago yellow fever menaced the Western Hemisphere from Santos, Brazil, to Washington, D. C., and Cairo, Illinois; on the west coast it ranged from southern Peru to northern Mexico. Gorgas exterminated the infection from Cuba and Panama; Oswaldo Cruz and his colleagues brought it under control in Santos and Rio; Wolferstan Thomas, Converse, and the Brazilian authorities drove it out of the Amazon Valley; Connor freed Guayaquil. During the past year Hanson has completed the conquest of the infection in Peru, while Lyster, White, and their colleagues, working with government authorities, have seemingly exterminated the disease in Central America and have the situation well in hand in Mexico. At the end of 1922, the only infected areas remaining in the Western Hemisphere appeared to be eastern Mexico and a narrow coastal zone in eastern Brazil from Ceará to Bahia. No other infectious disease has been so completely subjected to human control as has yellow fever, since the day when the Stegomyia was found to be its intermediary host.

Epidemic Conquered in Peru

The epidemic which overran the province of Piura from March to August, 1920, and broke southward through the control barrier into the provinces of Lambayeque and Libertad, brought between 15,000 and 20,000 cases of fever in its train. It was conquered in Piura by August, 1920; in the southern districts by August, 1921. Nevertheless, Dr. Henry Hanson remained at the Government's request until the end of July, 1922, in order to complete a campaign of control and investigation which, all told, covered 700 miles of coastline and included approximately 1,000,000 house visits. With Stegomyia index reduced to a safe figure, and with a small supervisory staff left to guard against recurrence of the disease, Dr. Hanson returned to the United States in July, 1922.

A Summons from British Honduras

Records for sixteen years from 1905 showed no case of yellow fever in British Honduras. In August, 1921, however, three cases appeared almost simultaneously in St. John's College, a Catholic institution just outside the capital city of Belize. The Governor's notification to the International Health Board was immediately answered by the dispatch of fresh vaccine and serum; and within a few days Dr. Vaughn was moving from Túxpan, Mexico, to the center of infection. The outbreak was definitely checked in mid-November after twenty cases in all had appeared.

Control of inspection during 1922 alternated between Dr. Vaughn and resident medical authorities until September 1, when the participation of the Board came to an end. On this date the Stegomyia index has been reduced to a low

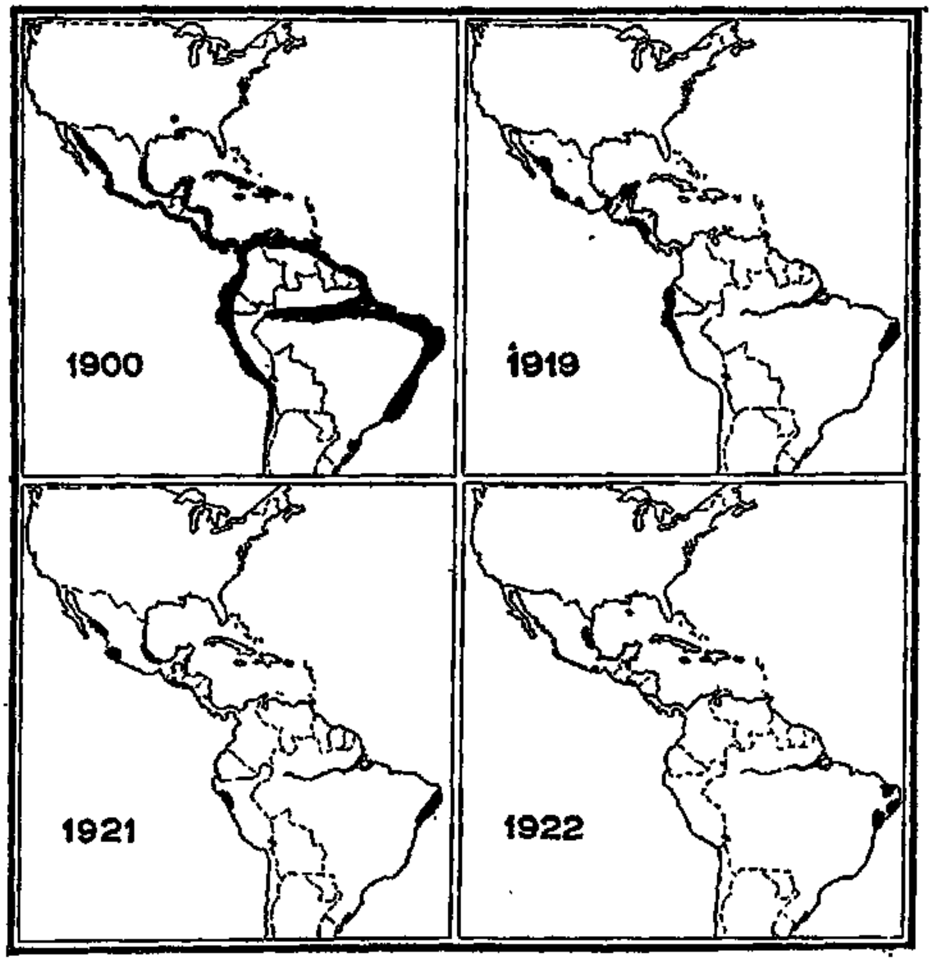


Fig. 8.—Yellow fever in retreat. Map of western hemisphere showing steady reduction of infected areas

figure; but special measures of vigilant inspection will be required.

Maintaining the Ground Already Won

In spite of the fact that the rest of Central America is apparently rid of yellow fever, there has been no lapse in supervision. In Guatemala, control of Stegomyia breeding is strict and successful. In Salvador a marked decrease in the percentage of breeding has taken place as against the figures for 1921. In Nicaragua the problem is merely one of unceasing vigilance. Yellow fever commissions of the several governments experienced in the technique of control are continuing an intergovernmental co-operation which was previously found to be the only effective way of combating the active disease. No case was reported during 1922 from British or Dutch Guiana, Venezuela, Colombia, or Ecuador; neither has any case of yellow fever been recorded in the Caribbean littoral for the last three years.[1] Presumably that region, together with the Amazon Valley, is now free from infection. In the interest of certainty, however, competent persons will be sent by the Board during 1923 to make a thorough inspection of the entire region.

Further Reduction of the Frontier

The campaign in Mexico has been vigorously pressed during the past year. It is now practically certain that a virulent outbreak occurred in 1921 among the troops in barracks at Huejutla, state of Hidalgo, originating among troops at Chapapote Nuñez, just west of Túxpan. After smoldering twelve to twenty months in this almost inaccessible country, the epidemic passed through El Hijo, Tempoal, and Tantoyuca down

[1] In March, 1923, an epidemic appeared in Bucaramanga, Colombia, which later proved to be yellow fever. Control measures were promptly instituted. Up to July 1 there was no evidence of infection in ports on the Caribbean littoral.

the river to Pánuco, which showed cases in July, 1922. Altogether fifteen cases appeared among the population, four fifths of whom were transient residents from the highlands, and therefore highly susceptible. The outbreak in Pánuco was arrested, and by late autumn it had ceased to be a factor in the situation. Tampico, Ciudad Victoria, and Túxpan, however, did not escape, and from August to December disclosed twenty cases, of which twelve were fatal. Yet by the middle of December, 1922, Tampico was absolutely clean, with a Stegomyia index of less than 5 per cent; the incidence of Ciudad Victoria had been brought low enough to eliminate risk of spread; and the chance of infection from Túxpan was remote indeed. The results of the campaign may be largely ascribed to the splendid efforts of

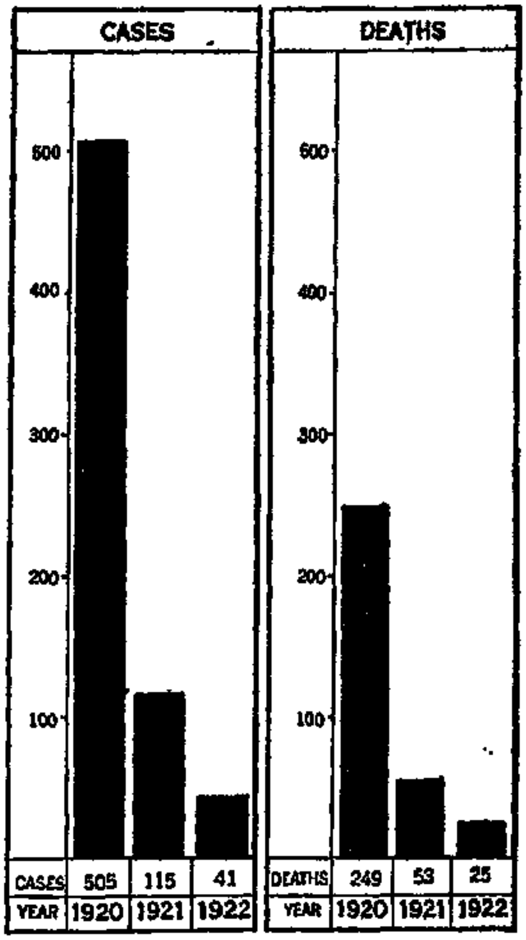


Fig. 9.—Yellow fever cases and deaths in Mexico, 1920–1922

the Mexican Government and Mexican people.

Aside from these infected spots, where every effort will be made to maintain an index of 5 per cent or better against a fresh appearance of the fever, Gutiérrez Zamora and Papantla are being reduced, and the Vera Cruz, Merida, Colima, and Mazatlán areas are well in hand. In Yucatan, under Connor's direction, the Stegomyia index was cut down from 50 per cent to 8.5 per cent and subsequently was still further reduced. On the whole, indications are favorable. Official figures of cases in all Mexico have fallen from 505 in 1920, and 115 in 1921, to forty-one during 1922. Continued supervision under the co-operative effort of the Mexican Government and the International Health Board during the coming year may be reasonably expected still further to reduce these figures.

The federal health service of Brazil has been engaged for the past three or four years in an effort to complete the work of yellow fever control. A considerable outbreak occurred in the state of Ceará during 1922. Fortaleza, its capital, seemed to be the focal point, and in that city several deaths occurred, including two Americans. In spite of all difficulties, the Government is eager to keep the work of control in hand, fully aware that unless effective measures are established and maintained, the continuance of the disease will be a menace not only to neighboring countries of the southern continent, but also to the lives of Brazilians and the material well-being of their country.

The Situation Changes in West Africa

Following a preliminary survey of a commission of the International Health Board in 1920, it was decided in May, 1921, to send a second commission, adequately equipped and trained, with the special object of proving the existence or non-existence of yellow fever. Before it could be assembled and necessary governmental arrangements could be concluded, the first point of its inquiry seems to have been determined by the outbreak of an epidemic in Grand Bassam, Ivory Coast, in August, 1922. Twenty cases, with three deaths, were reported, together with one death in Togoland; and there have been rumors of sporadic cases in Dahomey, Gold Coast, Gambia, and French Sudan. These fresh developments, if verified, will doubtless have a bearing upon the character and objects of the commission.

III

Malaria at Home and Abroad

The joint arrangement whereby state departments of health, the United States Public Health

Service, local communities, and the International Health Board have shared in carrying out demonstrations in malaria control was continued through 1922 and will be followed in 1923. New demonstrations were undertaken during 1922 in 32 towns in 8 states, and on a county-wide scale in 34 counties in 5 states. Realizing that success depends to a great degree on enlightened public opinion, an intensive effort has been made to spread knowledge of the fact that malaria can be controlled with immense benefit to the community and the individual at small per capita cost—in some areas as low as 45 cents.

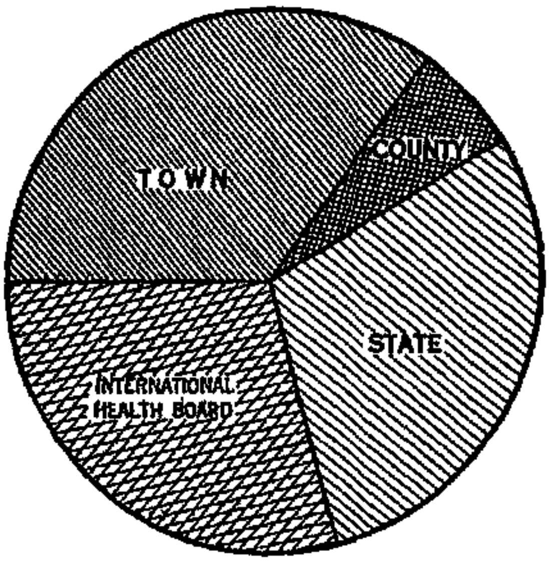


Fig. 10.—Sources of specific appropriations, amounting to $166,048, for county and town malaria demonstrations in 1922, not including cost of general supervision or malaria control work by forty-four county health departments

The fruits of this joint work are more and more apparent. Eight states now employ full-time supervisors assisted by technically trained personnel. Surveys or demonstrations were begun in 1922 in California, Missouri, and Illinois, and requests for surveys were received from Florida and Oklahoma. For the last two years, those engaged in control measures in the Southern States have been brought together at the time of the Southern Medical Association meetings, in order that there might be an interchange of experience. This has been a valuable conference, and it will doubtless be repeated in 1923. In these indirect and direct ways, the Board plans to aid states in the maintenance and extension of work already accomplished.

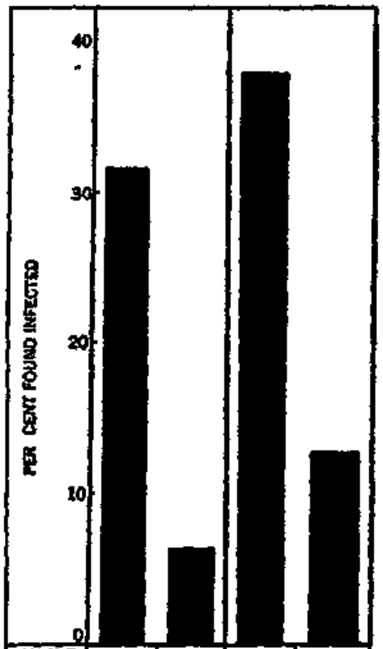
Experiments in the Field

The joint investigation at Mound, Louisiana, by the Bureau of Entomology of the Department of Agriculture, and the International Health Board, in the abundance, distribution, and natural infection of Anopheles mosquitoes, was continued during 1922. During 1923 further light will be sought on the possibility of eliminating breeding conditions in the bayous by impounding of the water followed by fish control; on the effect of screening in the reduction of malaria; and on the effect of location of houses with respect to mosquito prevalence. Further tests will be made to determine the preference, if any, of the female Anopheles for certain hosts, especially to ascertain the percentage feeding on domestic animals and on man, respectively, where both are equally accessible. Dr. Taylor, in Pamlico County, North Carolina, found that administration of quinine in a selected area where local conditions made other measures impracticable, brought about a reduction of malaria of 80.0 per cent among the white population, and 66.5 per cent among the colored.

Malaria Survey in Italy

In response to official invitations, the General Director visited Italy early in April, 1922; conferred with government authorities, the Italian Red Cross, and a number of individual scientists and organizations interested in malaria control and took advantage of opportunities to visit certain field work stations. Malaria is the outstanding health problem of the country. With approximately two million cases a year, the disease is not only a vital factor in the life and health of Italy, but a matter of serious concern on the economic side as well. The situation of the country well within the Anopheles belt, the presence of marshes, canals, and sluggish streams choked by vegetation, the migratory character of agricultural labor, a singularly virulent and hardy type of mosquito (*Anopheles maculipennis*), and unfavorable housing conditions,—all conspire to create a problem of the first magnitude.

Government agencies, assisted by various voluntary organizations, have been fighting malaria, but so far have confined their efforts to the distribution and administration of prophylactic quinine on a generous scale. An apparent decrease has taken place in the malaria morbidity rate, but scientists and public health authorities have been anxious to secure the co-operation of the International Health Board in a series of field experiments to test the efficacy of present methods of control and the possibility of adapting other tried methods to Italian conditions. In conformity with this request, a representative will be sent to Italy during 1923 to make a survey.



PER CENT INFECTED	31.6	6.3	37.9	12.7
YEAR	1921	1922	1921	1922
	WHITE		COLORED	

Fig. 11.—Reduction of malaria cases in a selected area in Pamlico County, North Carolina, effected by means of the standard quinine treatment. Figures are based on blood examinations

The Board is also co-operating with the Government of Palestine in investigating the various malaria problems of that country. The several variations in altitude and the prevalence of cistern breeding of Anopheles, are two phases of malaria which can be advantageously examined in that area. In 1922, the Board participated in an extensive malaria survey of the towns of Beisan, Tantura, and Sanour. At the same time an irrigation survey and plan for reclaiming the Beisan and Sanour swamps was made. The Beisan swamps, created in 636 A. D. when the Emperor Heraclius cut canals in order to flood the fields against the besieging Mohammedans, have existed ever since that date. No record exists of any attempt to drain them until the British arrived after the War.

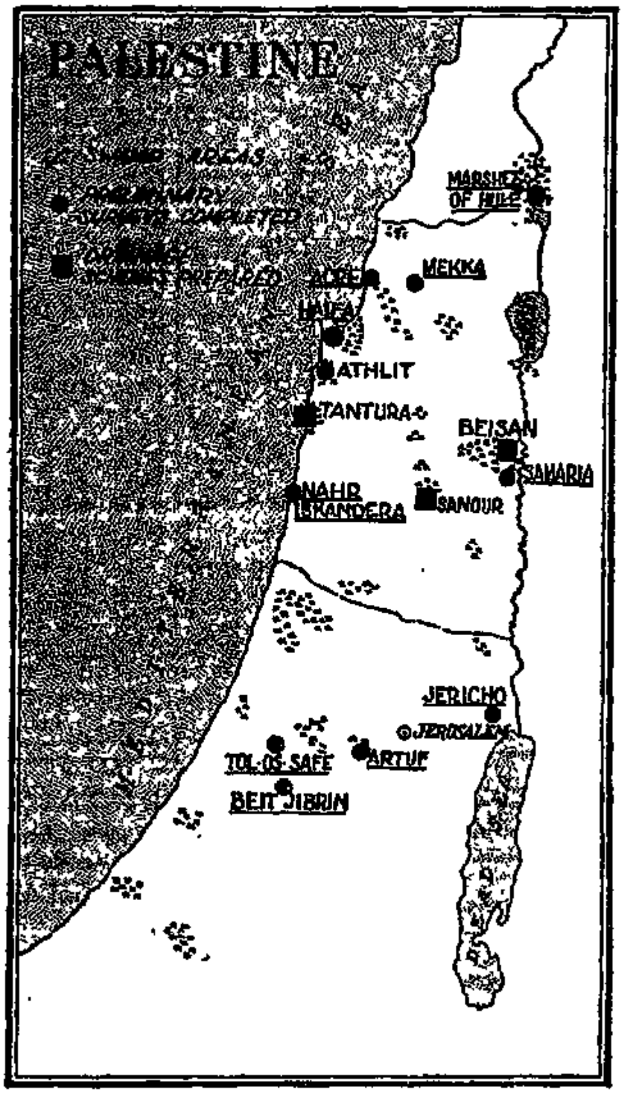


Fig. 12.—Map of Palestine showing location of areas in which malaria surveys and drainage plans were made in 1922

The first problem, therefore, lies in the field of engineering, and its solution rests upon the decision of Government.

In Brazil field studies of four selected areas were inaugurated. Preliminary surveys showed a high rate of infection and indicated that malaria shows no preference for a particular age, race, or sex. Control measures will be instituted during 1923. Malaria control, begun in Aguirre, Porto Rico, in 1921, was continued in co-operation with the Insular Department of Health and the Central Aguirre Sugar Company. Production of larvae was curtailed by various means such as drainage, oiling, and fish distribution.

Intensive measures of control in the tropical La Puebla-Rivas district in Nicaragua, begun in 1921 and continued through 1922, resulted in an almost complete elimination of Anopheles from the experimental area. This test showed that simple, inexpensive measures already employed in the Southern States can be successfully followed in tropical areas. A survey is under way in the Philippines to determine the feasibility of applying antimosquito measures to a small area.

IV

French Authorities Carry on Against Tuberculosis

For more than five years since September, 1917, the Board has worked with the French Government and existing agencies in a comprehensive campaign against tuberculosis. War had increased the tuberculosis mortality, and had prevented the increase of facilities to attack it. Indeed, there were but twenty-two tuberculosis dispensaries in the country, with provision for not more than 8,000 beds. During these five years of common service a careful survey of the situation has been made. At the end of 1922, there were 421 dispensaries at work, of which 301 were created on the initiative or with the coöperation of the Board. Six schools for visiting nurses are in operation on an apparently permanent basis. An educational campaign making use of mobile exhibits, pamphlets, plans, and newspaper publicity has been conducted on a country-wide scale.

In 1922 the Board continued operations in a number of departments which had been granted subventions but not entirely organized in earlier years; made supervisory inspections in forty-five departments to improve the administrative and technical phases of the work; made an examination of existing dispensaries; provided fifty-five scholarships for postgraduate study; and maintained fruitful relations with the Ministry of Hygiene and the Comité National de Défense contre la Tuberculose.

It was agreed from the outset that the work should eventually be assumed by the French authorities; and their response has been wholehearted. In the face of known difficulties which would seem to make the acceptance of further obligations impossible, the Conseils Généraux of the various departments have increased their previous appropriations, and the National Assembly has voted an additional three million francs to be spent for dispensaries and laboratories. The entire continuation campaign is now in French hands, with the single exception of the division of public health visiting, where every attempt is being made to improve the teaching facilities of the existing schools. Encouraging progress has been made, and the October, 1922, session of the School of the Comité National in Paris opened with a record registration of 108 pupils. Steps have been taken to insure the employment of only trained workers as public health visitors; a scheme for a national pension fund is under consideration by the authorities; and the time is well within sight when the remaining measure

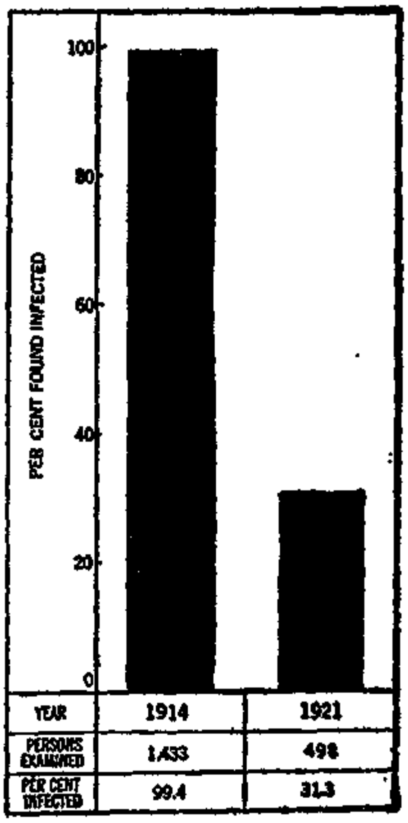


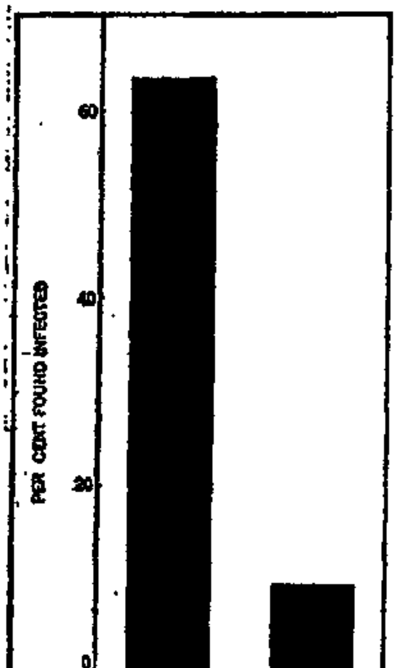
Fig. 13.—Reduction in rate of hookworm infection among school children in Grady County, Georgia, from the date of the original survey in 1914 to the resurvey in 1921

of the Board's responsibility for a program begun in 1917 will be turned over to the permanent control of Government.

V

Hookworm Control and Public Health

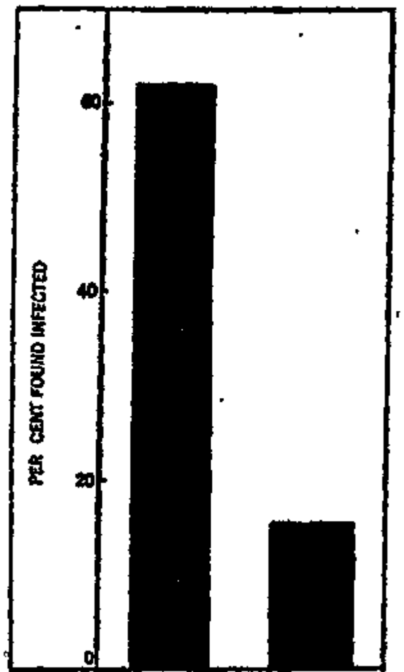
The relation between the reduction of hookworm disease and the spread of knowledge of public health is very direct; for the relief and control of this disease is a striking object lesson in the control of disease in general. In its nature, causes, and cure, it is easily understood by the common man, and its effects upon his own health and the health of the community are plainly demonstrable. When he has seen this one disease treated and dramatically brought under control, he is prepared to give heed and support to the control of diseases that are less simple and less tangible.



YEAR	1913	1922
PERSONS EXAMINED	829	504
PER CENT INFECTED	62.9	9.3

Fig. 14.—Reduction in rate of hookworm infection among school children in Pamlico County, North Carolina, from the date of the original survey in 1913 to the resurvey in 1922

The Rockefeller Sanitary Commission undertook its first specific task in hookworm control in Richmond County, Virginia, in 1910. Funds were supplied by the Commission, but the direction was by the Virginia State Board of Health. From the outset the Commission realized that co-operation of state and national health departments was not only a formal condition precedent to effective work, but a factor of indispensable value in itself. For the menace of hookworm, which threatens more than half the world—900,000,000 people live in areas of infection—can only be dispelled by spreading knowledge of the disastrous consequences of the disease and of the elementary practices of hygienic living.



YEAR	1914	1920
PERSONS EXAMINED	1,796	200
PER CENT INFECTED	61.8	15.5

Fig. 15.—Reduction in rate of hookworm infection among school children in Lee County, Alabama, from the date of the original survey in 1914 to the resurvey in 1920

The Final Stage in the United States

In May, 1921, in conformity with its policy, the International Health Board transferred its part in the hookworm campaign in the United States to government authorities. The work it supports is now being administered largely as part of county health programs. During the last three years resurveys of ground covered between 1910 and 1914 were aided by the Board in sixty-six counties. An average reduction

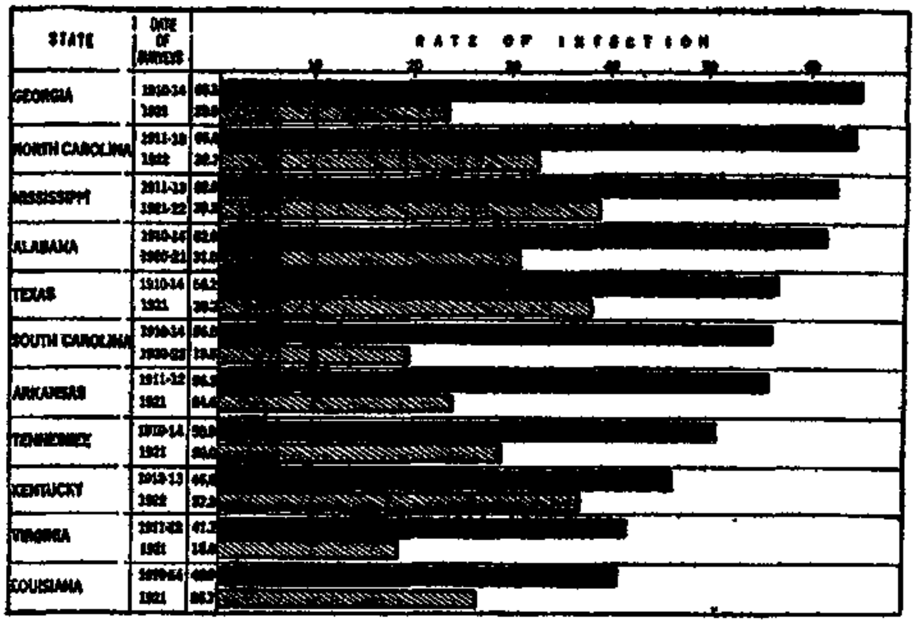


Fig. 16.—Average rates of infection among school children in Southern States at time of original hookworm surveys, compared with the present rates as shown by resurveys conducted in 1920, 1921, and 1922

in infection of 47.5 per cent was indicated. Typical results in selected counties are shown in Figs. 13, 14, and 15. Additional resurveys will be made from time to time in order to ascertain whether progress is being maintained, and in these the Board plans to co-operate. Common service over a period of years has strengthened ties between the Board and government organizations so that withdrawal from one particular field merely releases the energies of the Board to assist state and local authorities in other public health enterprises not so thoroughly established.

Brazilian Authorities Assuming Control

Equally gratifying has been the manner in which federal and state authorities in Brazil have responded to evidence of the public health needs of the nation. In 1916, when the International Health Board's work began, there were neither federal nor state appropria-

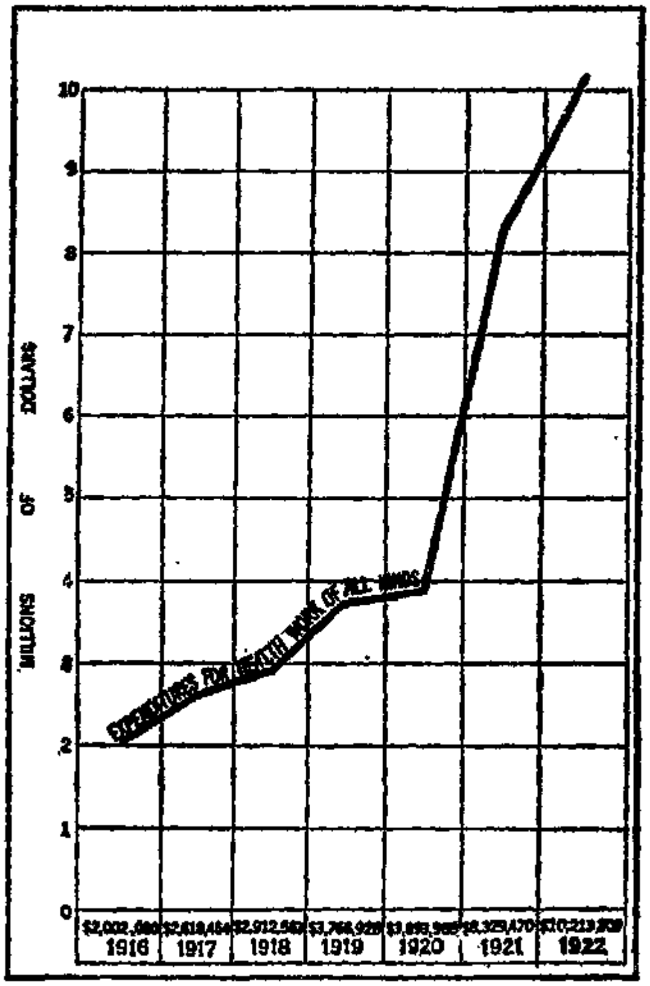


Fig. 17.—Increase in expenditures, 1916–1922, for health work of all kinds in fourteen of the twenty states of Brazil for which information is available

tions for rural sanitation. In 1917, something over $12,000 was contributed for this purpose; and by 1922 the available yearly appropriations had increased to more than $2,000,000. This striking response to an obvious need has allowed the Board to extend its own activities to other fields: to demonstrations in malaria control; to assisting the growth of county health organizations; and to aiding in the creation of a public health nursing service. So far as the control of hookworm disease is concerned, practically the entire populated area of Brazil has been drawn into a program of rural sanitation assisted by federal authorities.

Special circumstances make it advisable for the Board to continue its support to the São Paulo Instituto de Hygiene for a period of two years more until its value to state authorities can be thoroughly demonstrated. Meanwhile, the Instituto is co-operating with the state sanitary service in research and in the training of personnel.

Agreements with Colombia and Paraguay

An arrangement made in 1920 with the Government of Colombia, whereby the Board agreed to lend financial assistance in rural sanitation for five years on a diminishing scale, has been marked in the main by success. The financial depression has resulted in a temporary reduction of Government's program. On the other hand, both people and Government have entered energetically into the spirit of the enterprise. A capable sanitary staff has been created, and actual sanitation has been kept well in advance of field clinics. Progress in this sphere has stimulated discussion of a general public health scheme, and the need of a public health laboratory and training center is clearly realized.

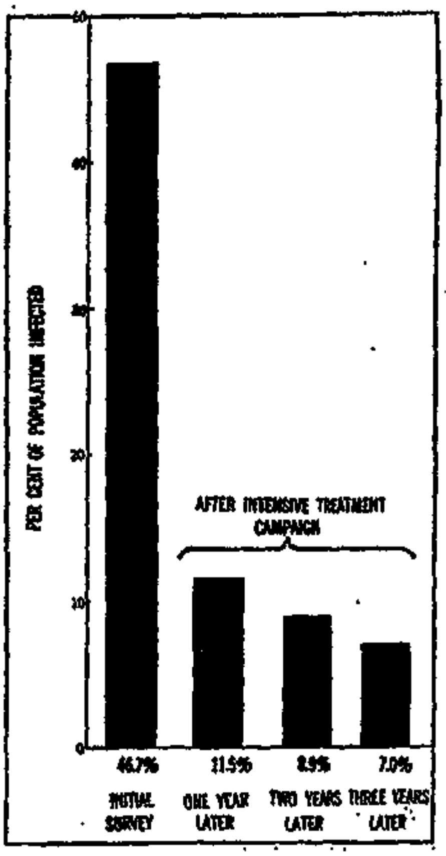


Fig. 18.—Reduction in hookworm infection rates on four estates in the Vere area, Jamaica, resulting from treatment campaigns

These developments in Colombia have encouraged the Board to enter into a similar five-year program with the Government of Paraguay in a program of rural health advancement which will include control of hookworm disease.

Progress in the West Indies

In **Jamaica**, in the face of serious obstacles, the work has been measurably successful. Government effort has increased hand in hand with a more vigorous public opinion. There has been a marked reduction in typhoid fever and dysentery wherever latrines have been introduced. The opinion is therefore beginning to prevail in government circles that hookworm control should be included as part of a comprehensive public health program. A qualified full-time sanitarian has been put in charge, provided with authority and equipped with the necessary funds.

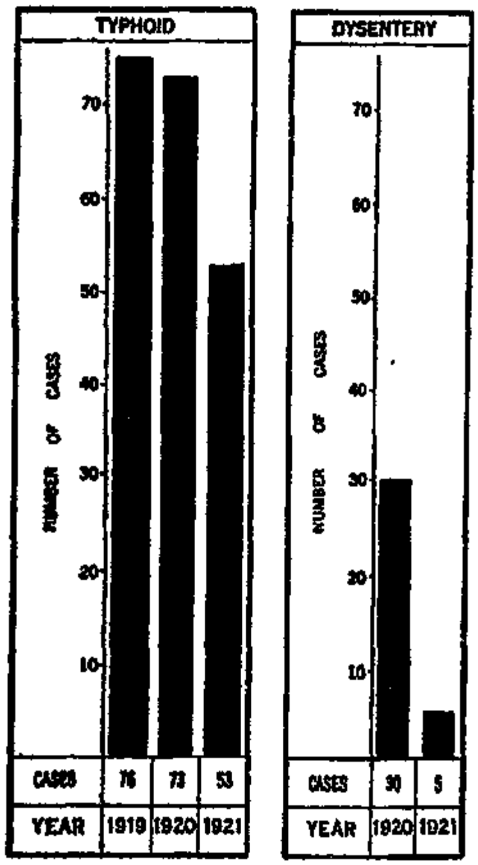


Fig. 19.—Reduction in number of admissions to the Spanish Town hospital, St. Catherine Parish, Jamaica, for typhoid and dysentery, following a sanitary campaign conducted in the town during the latter part of 1920

Operations begun in 1921 in **Porto Rico** have resulted in more than one thousand cures of uncinariasis a month during the year 1922. Sanitation measures throughout the island are well ahead of the curative program. The representative of the International Health Board has been made director of the government division of anemia work; but he will eventually be succeeded by a medical officer more directly representative of the Government. In response to a request of the authorities, the extent of the Board's co-operation will be increased.

Uncinariasis work in **Dutch Guiana** during 1922 aroused marked interest among the East Indian population. The Board's film, "Unhooking the Hookworm," which has been shown widely, has had much to do with awakening the interest of the free Javanese. An influential member of a Javanese settlement was temporarily employed on the staff of the Board to work among his own people, many of whom voluntarily constructed latrines.

In **Trinidad** and **St. Lucia**, the Board is still engaged in aggressive programs. The respective governments and people have been so active that definite terminations can now be set for the co-operative activities of the Board in these areas. In view of this prospect, the Board is now able to accept the invitations of the governments of Dominica and St. Kitts and Nevis to conduct infection surveys on these islands.

Owing to war conditions, work was closed in **Antigua** in 1917. No hookworm control measures have been in force since that time, and no sanitary measures have been carried on by the Government since 1920. However regrettable these circumstances may be in themselves, they afforded material for an interesting resurvey during 1922 by the Board's representatives. Three of the typical heavily infected districts examined showed a reduction in the infection rate from 29.8 to 20.2, or 32 per cent, together with an increase from zero to 7.1 per cent of homes with latrine accommodation. The exact educational value of the earlier campaign is hard to estimate, but it is interesting to note that of the latrines found more than one third had been constructed on private initiative.

Increased Government Effort in Central America

The growth of the movement in **Honduras** for a public health campaign, especially against uncinariasis, must be largely ascribed to the efforts of Dr. Brizio, who has worked untiringly toward this end during the past ten years. In April, 1922, he was made director-general of the Department of Public Health, with almost unlimited authority. A corps of sanitary police has been formed to enforce excellent existing sanitary laws which have long been a dead letter, and the Government intends to establish a national public health laboratory during the coming year. A general survey of three typical regions was concluded in June, 1922. The rate of infection was found to be unusually high, and in certain areas the presence of the round-

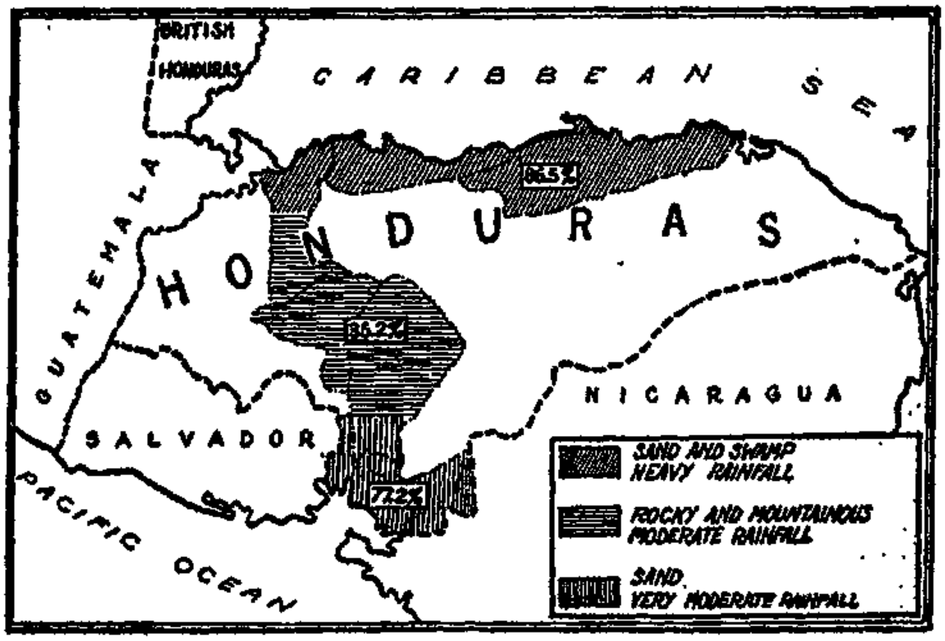


Fig. 20.—Hookworm infection rates in Honduras as disclosed by preliminary surveys in three typical regions, made in June, 1922

worm (*Ascaris lumbricoides*) in a high percentage has complicated the problem. A department of uncinariasis, with the co-operation of the International Health Board, has begun its work. Numerous applications for treatment were at once received; more than five thousand persons presented themselves within the first thirty-one days. The medical profession, the church, and the press have joined hands with Government and with the Board in giving cordial support to the work.

In **Costa Rica, Nicaragua,** and **Salvador** the responsibility for hookworm control has been transferred to special government departments, and other lines of health work are being undertaken. Public health laboratories have been established and are gradually widening the scope of their activities.

The work in **Guatemala** shows slow progress. A central laboratory has been created, and field stations have been operating in districts hitherto not reached. Education is proceeding step by step with treatment, and in a few localities it has shown encouraging results. The central government is keenly alive to the situation and has given some indirect aid to the program. Its direct financial contribution, however, has been slight.

In **Panama** progress is retarded by labor difficulties and a lack of energetic effort on the part of local authorities. Nevertheless presanitation, with the Government's support, is making advances and the hookworm program should show results during the coming year.

The Hookworm Campaign in the Far East

Surveys conducted in the **Philippines** during 1922 showed that infection had apparently increased during the past ten years, and fresh measures have been undertaken by the Government Health Service. The hookworm survey of **Australia** and its dependencies was completed in the latter part of the year and a permanent control plan was immediately inaugurated. Curative measures were applied within the twelve months to more than 50,000 persons in **Fiji** where excellent results were obtained by mass treatment with carbon tetrachloride. Permanent agencies under government control have now assumed direction of the work which had been instituted in northern **Siam.** A comprehensive survey of the whole kingdom is under way.

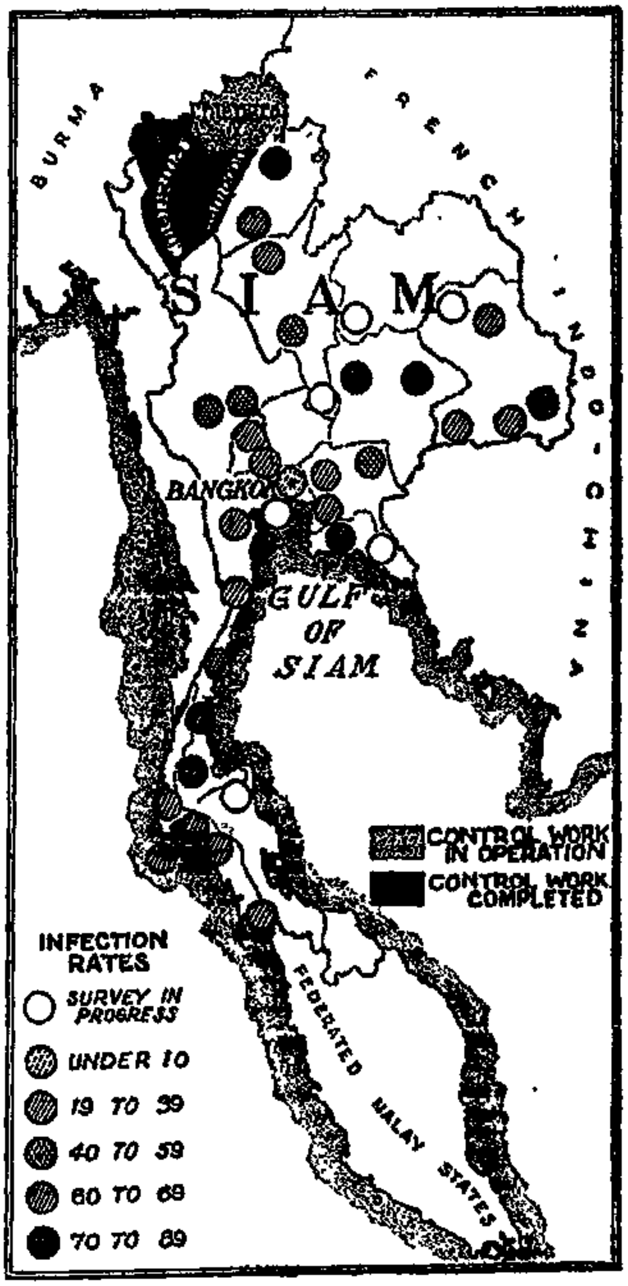


Fig. 21.—Map of Siam showing progress of hookworm survey and control campaigns at the close of 1922

The Board is co-operating in the first stages of operations in **Mauritius** and is assisting in a thoroughgoing program of education and treatment in **Ceylon** where striking progress has been made with demonstrations in hospitals and public dispensaries. As these institutions will become permanent centers of curative work, they should play an important part in reducing the mass infection of the island. The Board concluded its co-operative activities in **British North Borneo**, leaving government authorities with the situation well in hand.

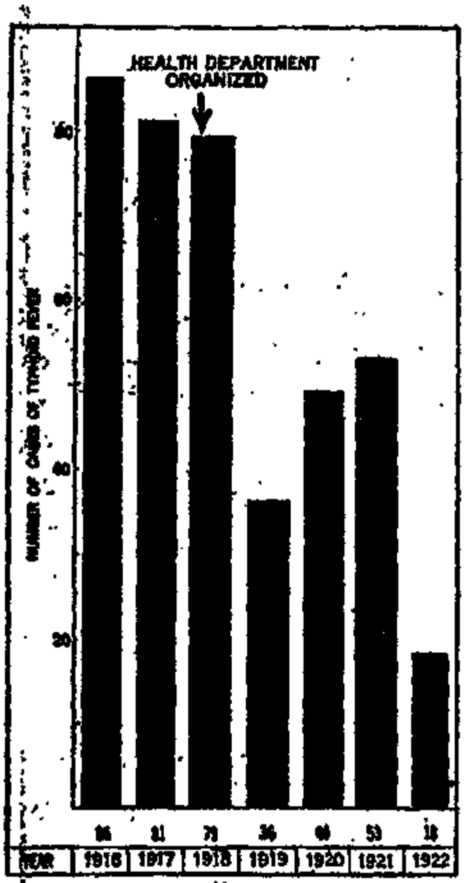


Fig. 22.—Reduction of number of typhoid cases in Harrison County, Mississippi, resulting from the work of the County Health Department established in 1918 following activities supported by the International Health Board

India's Gigantic Task

Out of forty million people living in Madras Presidency alone, it is estimated that more than thirty-six million are infected with hookworm disease. A widespread campaign of popular education is under way, and hospitals are incidentally giving treatment for the disease to all patients as a routine measure. A convincing experiment was undertaken among 298 students of the Madras Medical College who were skeptical of the prevalence of the disease, but were willing to be examined. Two hundred and forty-one were found infected; and it is safe to assume that as many qualified doctors, with improved health, will advocate hookworm control in those districts in which they undertake private practice.

Improving the Technique of Hookworm Control

Field studies have produced valuable results during the year 1922. Dr. Smillie, assisted by Drs. Klotz and Pessoa, made studies to determine the ascaridol content of oil of chenopodium, and the efficiency of ascaridol as compared with oil of chenopodium in the treatment of hookworm disease. Other studies were made by Dr. Smillie of carbon tetrachloride as an anthelmintic used alone, or in combination with ascaridol. It was discovered that these drugs are complementary in their action and apparently can be used together without increasing the toxic effect of either one. This has led to the outline of a simple, practical, and efficient method of treatment. The use of carbon tetrachloride is so recent that its limitations are not yet well understood, but thoroughgoing pharmacological investigations are under way. Studies to determine the practical value of these drugs in the treatment of hookworm disease have been carried on in the field by Drs. Washburn and Sisco in Jamaica, Dr. Hausheer in Dutch Guiana, Dr. Leach in Ceylon and in the Philippine Islands, Dr. Hampton in Ceylon and in Mauritius, and Dr. Lambert in Fiji. Colonel Clayton Lane has independently continued in London investigations begun in 1921 in Assam, with a view to improving his levitation method of fecal diagnosis.

The experiments of Caius and Mhaskar in India during 1921 showed that betanaphthol is a powerful vermifuge. Later experiments in India and elsewhere, however, have indicated that the drug has toxic qualities which are particularly dangerous in the field wherever malaria is prevalent.

At the Source of the Disease

Knowledge of the life history of the hookworm has been considerably extended since the discovery by Baermann in 1917 of a method for isolating the larvae from the soil. Dr. Cort, who in 1921 began a series of investigations in Trinidad, carried his experiments further in Porto Rico during 1922, with confirmation of the earlier results. He and his associates have been able to show that it is a common thing in nature for the larvae to complete their second moult and lose the sheath in the soil, and that such larvae are infective then as well as when sheathed. Their studies also indicate that while swine are to be regarded as important disseminators of the parasite, the activities of chickens are on the whole more beneficial than harmful.

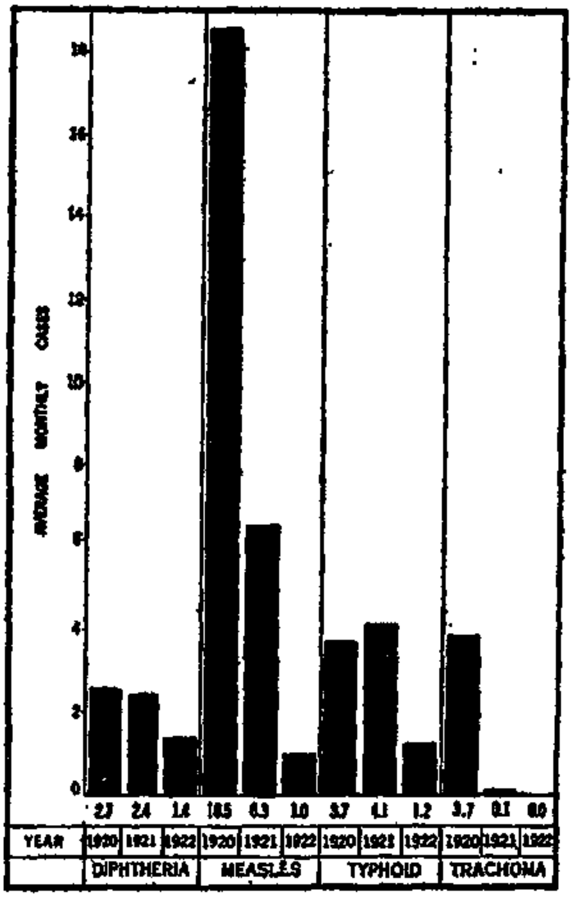


Fig. 23.—Average number of cases, by months, of certain communicable diseases in Harlan County, Kentucky, since the inauguration of the County Health Department in 1920

In one area it was found that mass treatment produced more than 90 per cent reduction in human infection, which in a period of six or seven weeks produced an equal reduction in soil infestation. The larvae, as Cort's studies have shown, do not live longer than six weeks under the conditions prevailing in summer in Trinidad, British West Indies. The finding that hookworm larvae can develop and migrate to the surface when buried three feet deep in sandy loam soil shows the limitations of burial as a means of disposal. Experiments conducted by Dr. Hampton in Ceylon show that larvae buried to a depth of 12 inches will find their way to the surface of the soil in about five days. Similar experiments will be continued with the help of the Board during 1923, as calculated to throw valuable light on more effective methods of control. In general, the investigations of the past year have contributed greatly to the exactness of our knowledge of the problems of control and have indicated quite clearly the direction which the improvement of remedial measures should take. The problems have been simplified, but many details still remain for investigation, particularly as to the choice of methods for preventing soil pollution.

Proposed Survey in Spain

The General Director of the International Health Board and Dr. Linsly R. Williams visited Spain in February, 1922, in response to an invitation from the Spanish Government. The problem of the authorities is rendered more difficult because of the scarcity of potable water in towns and cities, and the lack of popular education in hygienic living. The typhoid death-rate is 33.6 per hundred thousand as against 3.5 in New York State, and the infant mortality rate 169 per thousand births as against 86 in

Fig. 24.—Some of the activities of a county health department. *Upper left:* inspecting school children for enlarged tonsils; *Upper right:* county health department nurse instructing a young mother in the care of her baby; *Bottom:* negro mothers with babies at a baby clinic. One of the principal activities of a county health unit is the well-baby clinic for the examination of infants and children of pre-school age and the instruction of mothers in child hygiene

New York State. There also seems to be considerable hookworm infection in the mines. In the solution of this latter problem the International Health Board plans to co-operate with the Spanish Government to the extent of conducting a survey. Further action by the Board will naturally depend upon the disclosures of this first study. At every point of discussion the Spanish Government has shown itself anxious to create more favorable conditions in public health.

VI

Extension of County Health Work

The Encouragement of Public Health Agencies

The creation of county health units has proceeded steadily both in the United States and abroad. Practical demonstrations showed the county to be an effective unit of organization for providing adequate health protection for small towns and rural communities, and it was hoped that there might come into being county health services of a permanent character capable of dealing continuously with the problems of the several communities within their jurisdiction. To further the development of such units the Board has provided funds for initial demonstrations. Almost invariably such aid has resulted in the assumption of responsibility by authorities.

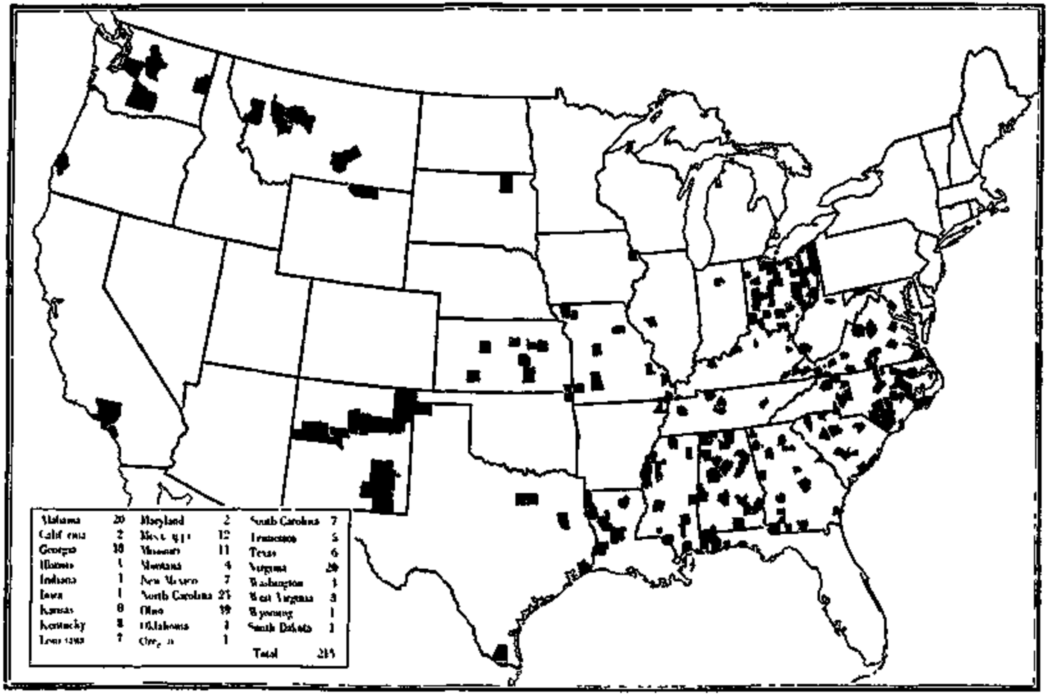


Fig. 25.—County health departments at the close of 1922

Difficulties of a transitional nature have been relieved by financial encouragement wherever necessary.

In the Southern States county health administration developed in connection with programs of hookworm control and rural sanitation, where the necessity for a full-time organization for the county was soon recognized. In the early days, the interest of the county units centered around hookworm dispensaries, the building of latrines, vaccination against typhoid fever, and measures bearing upon the control of filth-borne diseases. Later these services directed their energies to

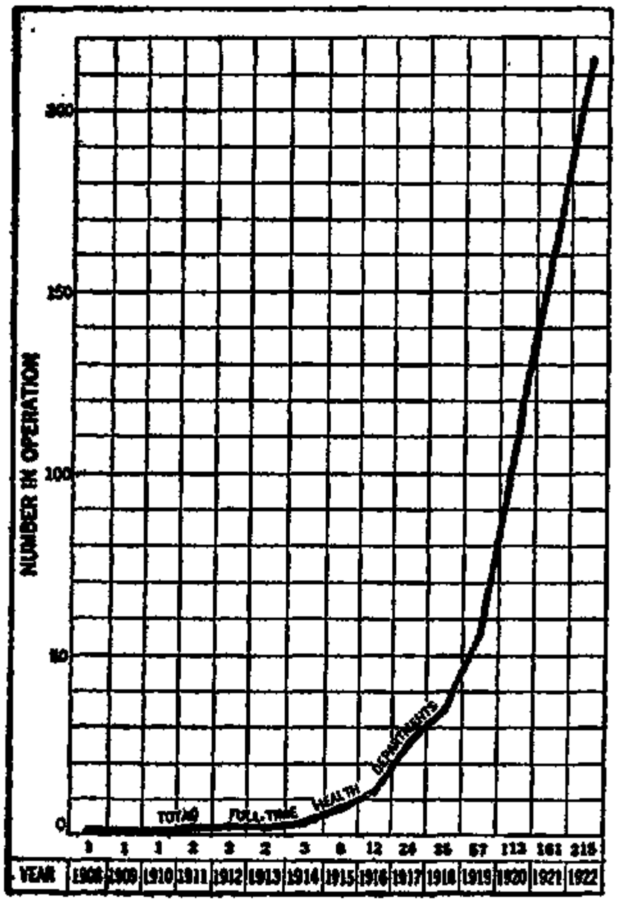


Fig. 26.—Growth in the number of full-time county health departments. Figures indicate the number of departments at the close of each year that had been in continuous operation from the date of their inauguration

the correction of physical defects of school children, to the control of communicable diseases, to infant and maternity health work, to the control of venereal diseases, malaria, and to other tasks.

The record of Troup County, Georgia, is both typical and striking as an evidence of the progressive advantages of organized county health work. Figures for 1917, the year before its health department was organized, showed 486 cases of dysentery. When the department began its work on January 1, 1918, there was not a single sanitary latrine in the county. As a result of the intensive soil pollution campaign the number of cases of dysentery fell to 321, 241, 58, and 29, in 1918, 1919, 1920, and 1921, respectively. In 1922 no cases at all were

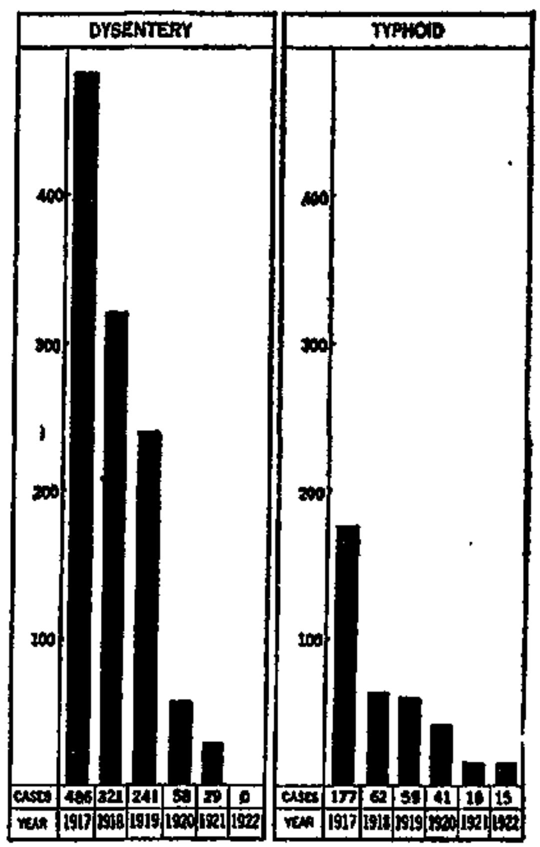


Fig. 27.—Decline in the number of cases of dysentery and typhoid fever, Troup County (Pop. 36,097), Georgia, 1917-1922

reported. Typhoid fever has also practically disappeared from the county. In 1917, 177 cases were reported; in the last two years only fifteen (see Fig. 27, page 141). The county health department wages a fight against all preventable diseases, by soil sanitation, by the use of vaccines and sera, and by the inspection of food establishments and water-supplies. It also provides a public health laboratory service and conducts both health examinations and a program of education in the schools and homes. The expenses of the organization were met at first by joint appropriations of the county, the State Board of Health, and the International Health Board. At present the International Health Board contributes to the work only indirectly through its appropriation toward the support of the Division of

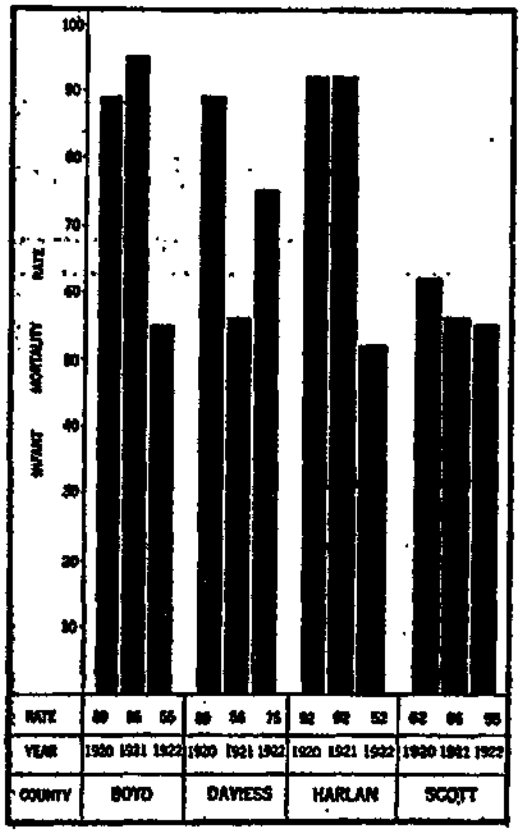


Fig. 28.—Infant mortality rates in four Kentucky counties in which health departments were organized in 1920

County Health Work maintained by the State Board of Health.

The demonstrated value of the county unit is stimulating its development throughout the country. There were at the close of 1922, 215 counties in 26 states employing full-time officers, many of them working on the usual budget of $10,000 a year. The achievements of these units appear in the education of the people, especially those in rural communities, in the principles of health; in the spreading of health knowledge through the machinery of the schools, the press, and personal interviews; in the response of all sections to the obvious value of this work; and in the more accurate collection of vital statistics. All these are progressive advantages. While the Board has followed no predetermined plan of support, it has generally co-operated with the respective states in central administrative budgets providing for salary and traveling expenses of a state director and his secretary, and in additional budgets covering from five to twenty county demonstrations.

A county health organization was established during 1922, in Covington County, Alabama, to serve as a training base for a limited number of new staff members and students in public health whose work will eventually lie in fields where problems similar to those of this region

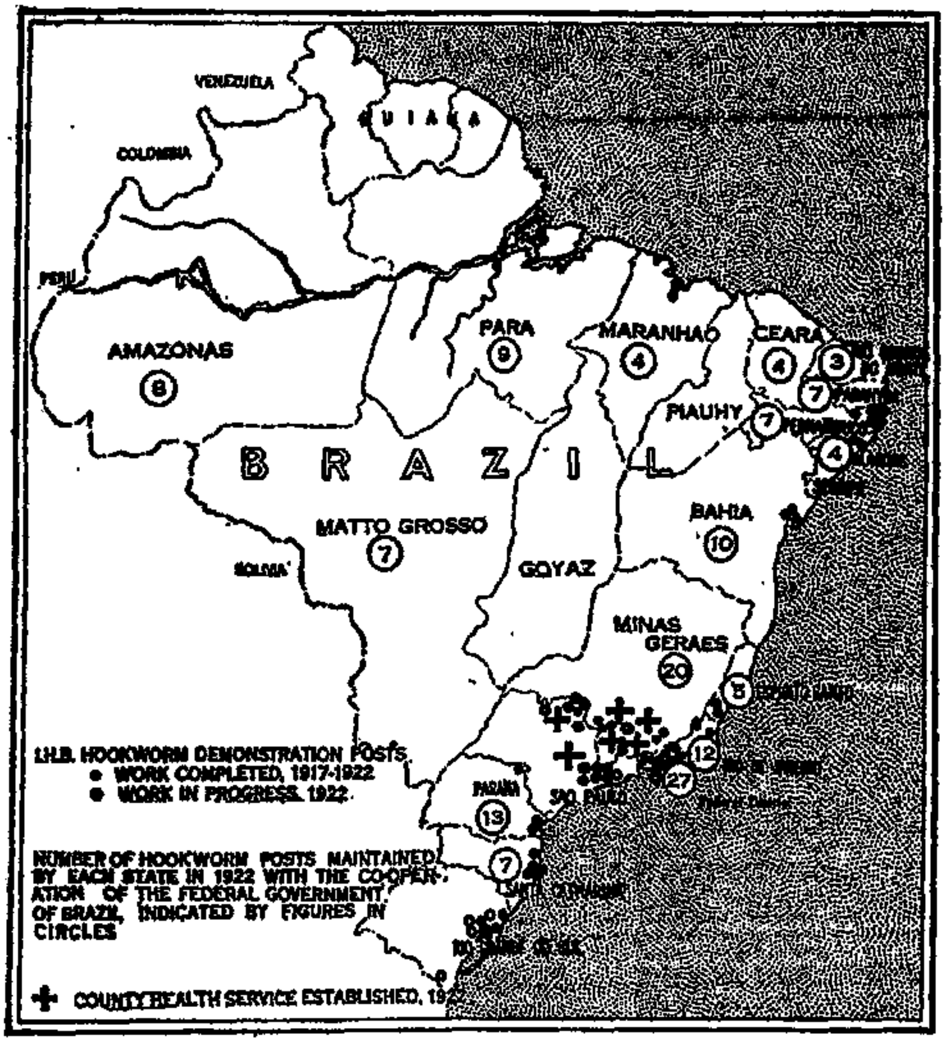


Fig. 29.—Hookworm demonstration posts and county health service in Brazil

must be met. The control of epidemic and endemic diseases, the improvement of sanitary conditions, laboratory diagnosis, popular education in hygiene and instruction in infant welfare work — all fall within the purview of its probable activities. Its budget provides for one full-time county health officer, one full-time public health nurse, an office assistant, and a sanitary inspector. The expense of this experimental unit will be shared by the state, the county, and the International Health Board.

Organization of County Units in Brazil

During the past year there has been in Brazil a marked increase of interest in the development of county health work. The first unit to be established was that of Orlandia (São Paulo) which inaugurated its work on March 1, 1922. Three months later the Sertãozinho unit went into action. The movement has likewise gained a foothold in the state of Minas Geraes; here four posts were opened during the last four months of the year, and it is probable that as many more will be established during the next twelve months. The Board is co-operating in the work, but under an arrangement whereby the extent of financial aid will diminish yearly through a five-year period, until the responsibility is entirely assumed by state and county.

Already the permanent post of Orlandia has done much to justify its creation. A difficult problem in mosquito eradication was met and solved, latrine construction showed marked improvement, and prompt action by the health officer helped materially in checking a serious epidemic of cerebrospinal meningitis. The work of the four units in the state of Minas Geraes has been chiefly centered around hookworm control, but the scope of their activities will doubtless broaden as it has broadened in similar county units in the United States.

VII

The Growth of State Services

State health organizations have been assisted in the development of their services. The success of the Division of Sanitary Engineering of the Ministry of Health in Australia and of similar state divisions in Utah and Missouri are gratifying evidences of the value of such co-operative work. Recent requests for aid from Oregon and Arkansas have been approved; and progress has been made toward co-operation in Montana. Where financial assistance is rendered, it is usually with the understanding that legislative appropriations will be secured to cover the cost of the work after a brief period. Thus the Board is co-operating in a two-year program with the government of the province of New Brunswick; a scheme of public health administration is planned which will include statistical and laboratory services, medical and sanitary inspectors, and a corps of visiting nurses working mainly through the public schools.

Following the report of the Wood-Forbes

Commission, which set forth the needs of the health service in the Philippines, the Board was requested to assist in a reconstruction program. Public health training courses have been started; a central nurses' training school has been projected; and a limited number of fellowships have been granted for study in the United States. The Governor-General has attached a medical adviser to his staff. A consultant in nursing and a director of field experiments in malaria control have been appointed.

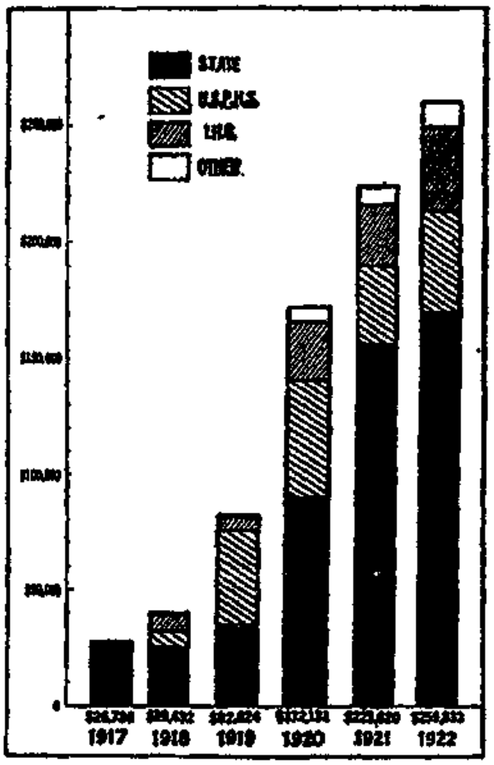


Fig. 30.—Chart showing sources of funds expended by the Alabama State Board of Health, 1917–1922

VIII

Development of Public Health Laboratories

The establishment of public health laboratories is closely bound up with state and county health programs, and with the Board's policy of assisting in the creation of a balanced and complete equipment whereby those units can carry on the work that they are now by degrees assuming.

The Board will co-operate on an increased budget with a number of states in the establishment or development of central laboratories, and with certain others in the development of branch laboratories. In Canada, preliminary surveys show the need of developing both laboratories and training institutes, especially in the central and western provinces. Support has been given to Guatemala and Salvador for the education of personnel for laboratory work. Arrangements are being made for the maintenance of laboratories in Guatemala, Nicaragua, Honduras, and Salvador. Plans have been discussed for the consolidation of the public health laboratories of São Paulo, Brazil, and their development as part of the Institute of Hygiene

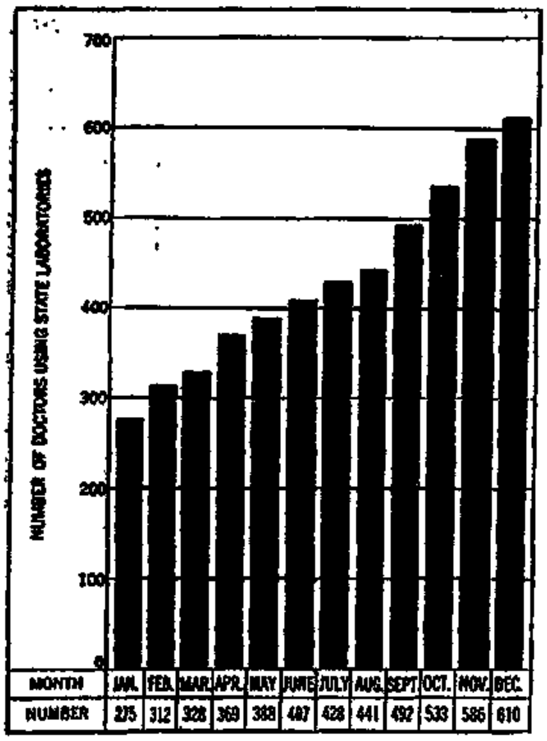


Fig. 31.—Increase in the number of physicians using the laboratory service of the Alabama State Board of Health during 1922

of the São Paulo medical school. In Colombia co-operation may be extended to the Government in initiating a public health laboratory service as an adjunct of the hookworm campaign. Through this means it is hoped that a wide popular interest will be aroused as the basis for government support.

The public health laboratory in Manila, now a part of the Bureau of Science, is to be reorganized, and the Board is lending personnel. In Australia the program for the consolidation of state laboratories has been postponed because of economic depression, but plans have been made for a survey in 1923.

IX

Creating a Public Health Nursing Service in Brazil

Various divisions of the National Department of Health of Brazil, unable to secure trained personnel, have been compelled to employ untrained women in the capacity of visiting nurses. The directors of the bureaus fully recognized the shortcomings of this system, and were anxious for improvement. It has been possible during the past year to assist the Government, not only in the training and supervision of those already employed as nurses, but in the organization of a permanent service of nursing as well.

An emergency course for those already employed was begun in April, 1922. At the end of the year, the opening of the new Government Hospital provided an opportunity for practical work which had not hitherto existed. A special Bureau of Nursing has been constituted under the Department of Health; two zone branch offices have been established in Rio de Janeiro under a well-equipped central office, and it is expected that a national training school for nurses, long under contemplation, will be opened early in 1923. Applications for admission have been numerous and encouraging, but in no sense in excess of the need, for the campaign which has been recently conducted throughout Brazil in order to interpret ideals of nursing to the people, has created a demand which even the new training school can hardly meet. Developments of an important character should take place during the coming year.

X

The Health Program of Czechoslovakia Moves Forward

In the sphere of public health administration the Czechoslovak authorities have shown the qualities of imagination and industry which have been so conspicuously displayed in other branches of the Government. The Division for the Study

Fig. 32.- Public health nursing exhibit at the Brazilian Centennial Exposition. A miniature Ferris wheel carrying six baskets, each showing a public health nurse engaged in a different phase of her work

and Reform of Health Activities in the Ministry of Public Health was created early in 1921. This is a transitional body, acting until its functions can be taken over by a permanent division of the Ministry and by the proposed Academy of Medicine. Nevertheless, in spite of its temporary character, its activities have been numerous and valuable. It has conducted tuberculosis and venereal disease surveys; rural hygiene and public health demonstrations; a study of the nursing situation; educational activities, including typhoid fever and clean milk exhibits; and a project for a survey of the water-supply. It has sponsored a subdivision of public health education in the Ministry, and the creation of a central registry for health affairs in the Republic. It has co-operated with national health organizations and with the American Red Cross Society. The program for 1923, assisted by a larger appropriation from the Government and by additional funds from the Board, contemplates the extension and intensification of present activities.

XI

Co-operation with the League of Nations

While the political implications of co-operation with the League of Nations may be a subject of controversy, its bitterest opponents acknowledge that it has a legitimate function in

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Fig. 33.—Demonstration by American instructor in the emergency course for visiting nurses in the nursing service of the National Department of Public Health, Brazil

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Fig. 34.—First class in public health nursing, Philippine Islands. A training course for public health nurses is one of the first important results of the work of a consultant in nursing sent to the Philippine Islands by the International Health Board at the request of the Philippine Government. Twenty of the forty-eight provinces are represented in this group of thirty students

the co-ordination of effort against disease. An invitation from the Health Organization of the League to the International Health Board has developed into a program whereby the Board will make funds available for putting the Epidemiological Intelligence Service on a broader and more effective basis during a period of five years. Funds have also been voted by the Board for the international exchange of public health personnel. It is anticipated that in a fixed number of years the value of these two services will be recognized by the states represented in the League of Nations, and that with improved financial conditions they will be able to assume severally the cost of these services.

At the fifth session of the Health Committee of the League, held at Geneva during the second week of January, 1923, reference was made to the co-operation of the Board with the League of Nations, and special mention was made by the Medical Director of certain principles of relationship which the International Health Board had emphasized. "It is a fundamental matter of policy," he said, "that the Board should have no views in determining the Health Organization's policy or programmes or any details of its administration. The Board is interested in keeping in close touch with our service with a view to ascertaining how the

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Fig. 35.—A group of health officers from various European countries gathered in London for the second series of international exchanges of health personnel, conducted under the auspices of the Health Section of the League of Nations, with the financial co-operation of the International Health Board

Board may be serviceable and with a view to keeping advised as to all the expenditures made by the Board. It is refraining from giving any views on such details as the appointment of personnel." And in another connection the Medical Director added: "I believe that the attitude of the International Health Board may be rightly summed up by stating that they would not like anyone to think that they are assuming the right to participate in the discussions of the Health Committee because they have made a contribution to its work." These restatements show an understanding of the principles of action which the Board has always considered fundamental in every aspect of its program of assistance and co-operation, at home or abroad.

XII

Broadening the Base of Health Work by Education

Each successive year of the Board's work has served to confirm the principle recognized at the outset: that responsibility for the prevention and control of widespread diseases must be eventually assumed by government; and that this responsibility can be effectively discharged only through men and women trained in the science of public hygiene.

With this conviction in mind, the Board has in the past few years aided in establishing the

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Fig. 36.—A busy day in the public health laboratory, Managua, Nicaragua, established in 1922 by the aid of the International Health Board

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Fig. 37.—Part of milk hygiene exhibit, Prague, Czechoslovakia. A highly successful milk hygiene exhibition was organized by a division of the Ministry of Health in Czechoslovakia under the direction of an International Health Board fellow who in 1920-1921 made a study of public health administration in the United States

Johns Hopkins School of Hygiene and Public Health; appropriated funds toward the development of the Harvard School of Public Health; assisted the Instituto de Hygiene at São Paulo, Brazil; and made its first contribution toward a similar establishment in Prague. In the early part of 1922, after a careful survey of the field, and in agreement with the Polish Government, the Board voted to contribute funds not in

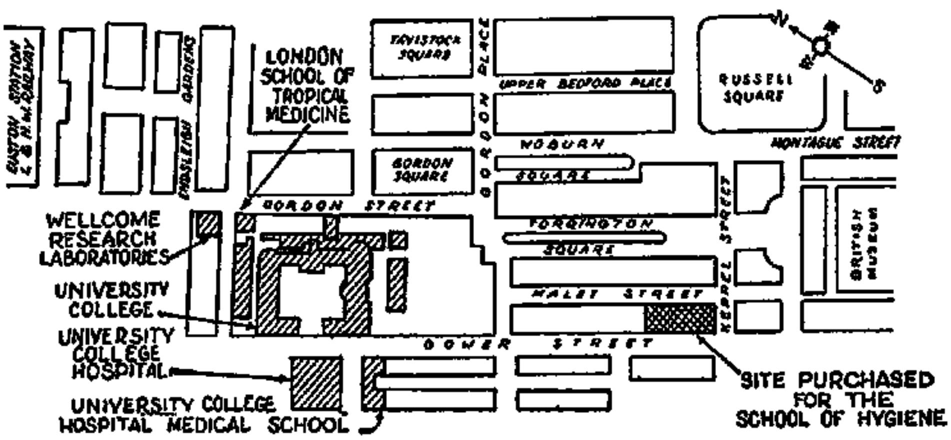

Fig. 38.—Map of a portion of the Bloomsbury district of London showing site of the new School of Hygiene

excess of $212,500 toward a public health building and its equipment in Warsaw, the Government to provide land and annual maintenance. Building operations are already under way, and thus a second permanent establishment for the recreation and extension of sound conditions of health in stricken countries of Central Europe is being developed.

The Board has also agreed to provide not more than two million dollars toward land, building, and equipment for a school of hygiene in London. After conferences with the Minister of Health and others in London in February, 1922, a site was purchased within easy distance of the British Museum, University College and its Medical School, and in immediate proximity to the site of London University. According to the present program, the School will offer instruction in the theoretical and practical sides of public health, with special reference to tropical disease, and with the probable inclusion of the existing School of Tropical Medicine. Progress in an undertaking of this magnitude is necessarily deliberate, but measurable advance should be made with plans during 1923.

XIII

Extension of Training Through Fellowships

It is obvious that funds for land, building, and maintenance alone are not sufficient to create public health services. Therefore in order to aid in the development of leaders in the field of public health, fellowships have been granted to carefully chosen individuals, with special reference to their fitness for important posts as scientists, teachers, laboratory directors, sanitarians, statisticians, nurses, or administrators in the public health service. For the year 1922, such facilities were provided for seventy-nine men and women from nineteen countries throughout the world. In most cases fellowships are predicated upon an assurance of the appointment of recipients to positions in this field upon the completion of their studies. The subsequent achievements of the first students already indicate the promising character of the program.

Publications

During the year 1922 the following reports and publications were issued by the International Health Board:

Annual Report for the Year 1921.
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APPENDIX

I

PROGRESS WITH ANTHELMINTICS

The ideal drug for expelling hookworms has not yet been discovered. Each of the remedies most commonly used has its advantages and its disadvantages. Tests with beta-naphthol early in the year 1921 had suggested that this drug might supplant oil of chenopodium as the drug of choice, but when extensive use of it was begun in the field, thirty-seven cases of severe poisoning with two deaths among 1,064 persons treated in a single locality soon diverted attention to other anthelmintics.

At the close of the year highly promising results were being obtained with carbon tetrachloride and with a combination treatment of this drug with ascaridol, one of the fractions of oil of chenopodium. Until all the properties of these drugs both alone and in combination are satisfactorily determined, however, field workers are justified in continuing to use chenopodium or thymol.

BETA-NAPHTHOL

Studies conducted by Caius and Mhaskar in India, 1918–1920, suggested that beta-naphthol possessed a hitherto unsuspected vermifugal character and that a single treatment with it might remove a higher percentage of worms than either thymol or chenopodium. In an inquiry at the Mudis tea estates in 1921, Kendrick and Mhaskar showed that a single treatment of 50 grains removed an average of 90.3 per cent of the approximately 100 hookworms harbored by each person treated, as compared with 78.6 and 86.3 removed by single treatments up to 2 c.c. of chenopodium and 50 grains of thymol, respectively. Moreover, the efficiency of the drug was not lowered when it was given without purge.

Results of Preliminary Tests. In one of the early tests carried out under controlled conditions, fifteen coolies of both sexes and of varying ages and degrees of health were brought to the laboratory after the evening meal and fasted until the trial drug was administered the following morning. Beta-naphthol and thymol were given in powdered form in a single dose of fifty grains as a maximum, accompanied by twenty-five grains of light magnesium carbonate washed down with a draught of water. Oil of chenopodium was given in single doses up to 2 c.c. An hour later the subjects were given Epsom salts. Thin rice gruel was allowed during the day and more substantial food in the evening.

All stools were saved under surveillance for forty-eight hours from the time of treatment, and the number of worms recovered was noted. Two subsequent treatments were given at intervals of a week to a fortnight, either thymol, beta-naphthol, or oil of chenopodium—the latter in single 3 c.c. doses—being used to remove the worms left by the trial treatment. The results of the test indicated that, in the dosages used, beta-naphthol was a better worm-remover than either thymol or oil of chenopodium.

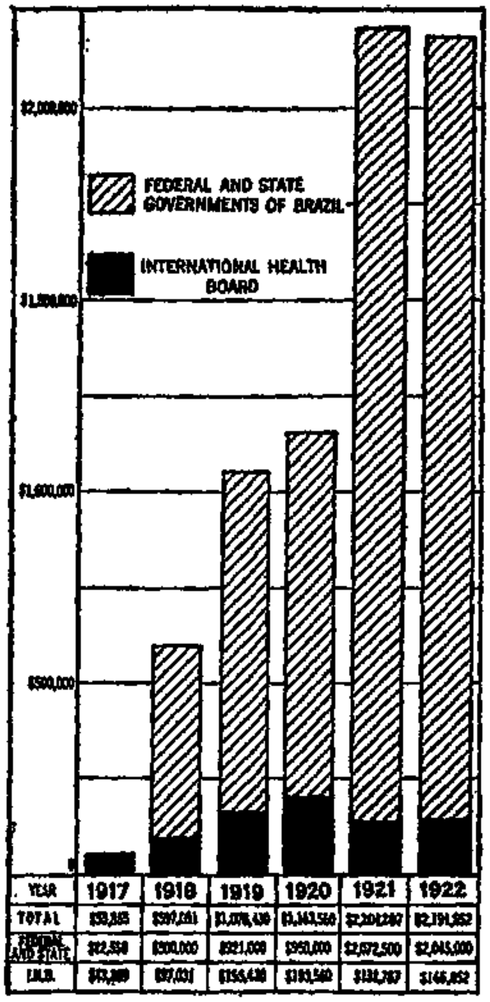

Fig. 39.—Increase in financial support for rural sanitary service in Brazil, 1917–1922, including appropriations of federal and state governments and expenditures of International Health Board, but excluding the budgets of six county health departments inaugurated in 1922

Later field tests on the Mudis tea estates, in which oil of chenopodium was given to 2,198 cases, thymol to 1,606 cases, and beta-naphthol to 872 cases, produced substantially the same results. The conclusion reached was that treatment with beta-naphthol was simpler, safer, more economical, and more efficient than treatment with either thymol or oil of chenopodium. Subsequently, Leach and Hampton, in Ceylon, tested beta-naphthol and obtained fair results, though not so favorable as those of Caius and Mhaskar. In an experiment to test the comparative efficiency of beta-naphthol and chenopodium, Burnell in Brisbane, Australia, found that beta-naphthol in 50-grain doses yielded negative results, while the use of chenopodium in doses of 1.5 c.c. resulted in the recovery of 57 per cent of the worms after one treatment.

Serious Poisoning Produced when Used in Field. Darling, Barber, and Hacker had reported adversely upon beta-naphthol following their tests with this drug in the Orient in 1915–1917. When Gonzaga and Lima, in Brazil, had developed a dosage and method of administering it that held promise of yielding excellent results, Smillie submitted the drug to experimental tests and demonstrated that in efficient dosages it destroyed red blood-cells and when administered to cases with active or latent malaria infection the drug produced toxic symptoms of the most serious nature. In 1921, following the favorable reports from India, he again submitted the drug to test, using the dosage and conditions of treatment recommended by Caius and Mhaskar, and obtained the same unfavorable results as before.

When the campaign workers in India moved to a group of estates on which malaria was very prevalent, their experience was largely a repetition of that anticipated by Smillie. Of 585 males and 479 females treated with beta-naphthol, thirty-seven developed burning sensations in the epigastrium, nausea, occasional vomiting, diffuse abdominal pain, jaundice, diarrhea, or dysentery, great weakness, and pain on micturition. Thirteen cases suffered much more than did the rest, and two of them died. Carminatives were administered, and most of the symptoms disappeared in from three to eight days after treatment.

CARBON TETRACHLORIDE

Interest in the use of carbon tetrachloride, a new vermifuge similar to chloroform in chemical construction and toxic action, as a remedy for hookworm disease has become widespread during the two years that have elapsed since Hall first drew attention to the remarkable anthelmintic properties of the drug. In experimental treatment of dogs and monkeys he obtained almost complete expulsion of worms with no outward evidence of toxicity in doses up to 1.5 c.c. per kilogram of body weight. Later, Smillie and Pessoa tested the drug on dogs in São Paulo, administering massive doses of 6, 8, and 10 c.c. without purge, and found that the only symptoms produced were slight dizziness, abdominal distress, and in one case vomiting. There were no obvious macroscopic lesions of the organs when 3 to 6 c.c. were used. Even 6 to 10 c.c. doses, though they rendered the animals dizzy, did not kill them, and this in spite of the fact that, reasoning from the similarity of carbon tetrachloride and chloroform, one would expect dogs to be not only more susceptible than human beings to the toxic effects of the drug, but particularly susceptible to small doses frequently repeated.

Hausheer, in Dutch Guiana, reported that two treatments in doses of 5 c.c. cured ten dogs, while on another occasion dogs about five kilos in weight took 15 to 30 c.c. on two or three successive days without perceptible clinical symptoms. His experience coincided with the conclusions reached by several others whose observations had been based on symptoms alone, or upon examination of the organs one or more months after treatment; namely, that even in large doses of 10 or sometimes 15 c.c., the drug is non-toxic to dogs.

Possible Ill Effects. However, in São Paulo, Brazil, a few cases of poisoning in the early experimental treatments administered to human beings suggested that the drug might possibly be injurious to the liver and kidneys, and led Meyer and Pessoa to carry out a further series of careful experimental treatments on dogs. In one series of experiments with eight dogs they examined the liver and kidney tissues microscopically after the animals had been killed, and found that although there was no outward evidence of toxicity, doses as low as .05 c.c. per kilo of body weight did, nevertheless, produce definite fatty degeneration of the liver and kidneys. The degree of degeneration was markedly increased when the treatment was repeated at short intervals. Regeneration of the liver was rapid, requiring only twenty to thirty days for complete healing, but the injury to the kidneys could still be plainly seen after the expiration of this period.

Efficiency. Of the fact that the new drug possesses remarkable anthelmintic properties there can be little doubt. It seems to be almost specific for hookworms, at least Necators; and to effect, in addition, a fairly satisfactory removal of other nematodes. It has a selective action against female Necators, differing in this respect from oil of chenopodium. It is not known to be equally effective against Ancylostoma; and it may be significant in this connection that investigators in localities where Ancylostoma predominate have not reported from the use of the drug the same satisfactory results that have been obtained in countries where the worms are mainly Necators. The preliminary experiments indicate that a single treatment with doses as low as 2 c.c. eliminates more than 90 per cent of the hookworms harbored. As the dosage decreases, however, male hookworms and Ascarides are less and less affected by the drug.

Dosage. Doses ranging from as little as 1 to as much as 14 c.c. have been administered by various experimenters. Escobar gave 4 c.c. daily or every third day until nine treatments had been taken—a total of 36 c.c. In some cases he mentions giving as much as 50 c.c. of the drug to a single individual. From the standpoint of efficient worm removal, however, there seems little need for a dosage larger than 3 c.c., while from that of toxicity there is much evidence to show that the higher doses are not without grave dangers. Indeed, it seems altogether probable that ultimately the optimum dose, from the standpoint of toxicity as well as of worm removal, will be found to be about 2 c.c. In practically all the experiments children have stood their proportionate doses better than adults.

Interval Between Treatments. Intoxication may result if the drug is given at frequent intervals. This is because its maximum toxic effect is exerted on the second or third day following treatment. Moreover, the action is cumulative, and Smillie has shown that in dogs repeated small doses as well as large single doses may result fatally. Under no condition should the second treatment be administered until an interval of at least three weeks has elapsed, and there is good reason for questioning whether it is necessary at all. The experimental work has suggested the probability that the worms that resist first treatment will resist the second treatment also and have to be expelled by another anthelmintic.

Method of Administering. Most investigators have administered the drug in capsules, but it may also be given by covering it with water and having the patient swallow it quickly. The latter method saves a great deal of time in dispensing and in administration. It is preferable that the drug shall be freshly encapsulated daily because it

Fig. 40.—Making hemoglobin tests to determine the severity of hookworm disease in Honduras

Fig. 41.—A hookworm dispensary in Ceylon. Since its organization in 1913 the International Health Board has conducted campaigns for the relief and control of hookworm disease in thirty-eight governmental areas

evaporates so rapidly that the proper dose may not be given. The doses have been given either singly or divided into two or three parts and administered at hourly intervals, with nothing as yet to show superiority for the divided dosage.

Purity. It is of course of the utmost importance that only a drug of the highest purity be used. In Fiji, where 42,000 patients were successfully treated with one lot of the drug, three deaths resulted among the 8,000 patients treated with a second lot, which the analysis of the government chemist revealed to be impure. The fact that the drug can be prepared in a high degree of purity makes it all the more important that due diligence be exercised to guard against the use of an impure product.

Preparation of the Patient. Diet restriction is not essential. If the patient is constipated, a mild laxative on the preceding night may be beneficial, and some of the experimenters, notably Lambert, have found a post-purge of much assistance as a means of reducing unpleasant after-effects. The patients may eat within one or two hours following treatment, and may also continue with their usual work or play.

Purgation. From the early experiments one may say that it seems to make little difference whether the patient receives a preliminary purge; the cathartic action of the drug itself eliminates to a large extent the need of subsequent purgation. It is largely immaterial, from the standpoint of worm removal, whether the post-purge is given or withheld. Such experimenters as have administered it have usually done so merely to aid elimination of the drug and reduce its toxicity; until the question is settled it may be advisable to follow treatment with a purgative.

The whole question of the rate and manner of absorption of the drug, however, remains in need of fuller investigation. Smillie believes, for instance, that it is absorbed almost immediately on administration and is largely excreted by the lungs, while Hall thinks it is slowly absorbed, and will, if a vigorous purge is given, be almost completely eliminated in the feces. Until these points are satisfactorily determined it will be difficult to decide whether or not the after-purge is needed, and, if it is, the most suitable interval that should elapse between administering the doses of the anthelmintic and the purge.

Toxicity. In most countries few obvious symptoms resulted from the experimental treatment. Hall, in one of his early articles, reported taking 3 c.c. of the drug without inconvenience to himself, and Leach subsequently gave a dose as high as 10 c.c. to a condemned criminal without producing serious external symptoms. At autopsy of the executed prisoner, twenty-two days later, no macroscopic lesions of the liver were seen. Lambert, in his first 42,000 cases, attributed what few symptoms were produced to failure to take salts. He pointed out that constipation was caused by taking food or alcohol soon after treatment, with the result that in many cases drug absorption followed. He relieved the symptoms by free purgation with magnesium sulphate.

THE ROCKEFELLER FOUNDATION · THE WELLBEING OF MANKIND THROUGHOUT THE WORLD · 1913

Photograph Excised Here

THE ROCKEFELLER FOUNDATION · THE WELLBEING OF MANKIND THROUGHOUT THE WORLD · 1913

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Fig. 42.—Part of the hookworm staff employed in Porto Rico

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Fig. 43.—A scene in a village of Mauritius on treatment day. The villagers are keen to take the hookworm treatment

It was Smillie who first called attention to the fact that in certain cases carbon tetrachloride might be expected to produce fatty degeneration of the liver. He had two such cases in his first series of experimental treatments in man. Both were alcoholics, whose livers had probably already been seriously injured. The symptoms appeared within twenty-four to forty-eight hours after ingestion of the drug and were followed by rapid regeneration and complete recovery. Both cases began with mild symptoms of generalized muscular pains, slight fever, and abdominal distress, within thirty-six hours of treatment. In one case the symptoms were more severe and of longer duration, with the appearance of a slight, transient hematuria on the third day. Subsequently, in the São Paulo treatments, there was a third case of poisoning in a young adult who had consumed a large quantity of alcohol the day before treatment. The drug produced no immediate effects, but after thirty-six hours had elapsed the patient began to have severe symptoms which ran a course very much like that of the other two cases.

Deaths from the Drug. The first 42,000 treatments administered in Fiji were attended by no serious results of any kind. Among the next 8,000 treatments administered following receipt of a new supply of the drug there were, however, in one small area, a number of cases of serious illness and three deaths: the first in an East Indian boy of seven, the second in an East Indian boy of five, and the third in an East Indian woman. In all three cases the livers were examined at post-mortem and showed necrosis and fatty degeneration. From Australia an additional death, possibly also due to carbon tetrachloride poisoning, has been reported—that of an insane girl who was given 2 c.c. and a week later 4 c.c. of the drug, and who died on the third day following the second treatment.

Darling, who has had opportunity to examine microscopically the liver and kidney tissues taken at autopsy from the first child that died in Fiji, reports that "the lesions observed, unquestionably caused by carbon tetrachloride, are like those seen in man in necrosis of the liver from chloroform poisoning after anesthesia, in experimental liver necrosis in dogs following chloroform anesthesia, and after injections of chloroform into the portal vein and hepatic artery." He has also examined the liver of the criminal executed in the Philippines, to whom Leach administered 10 c.c. of the drug, and reports that "it is not a normal liver by any means." Instead, it shows "slight but definite damage from some cause, the changes being of the same nature as those seen in the Fijian boy and in dogs treated with carbon tetrachloride." His experimental work leads him to the conviction that the slight disturbance of function outwardly manifested in cases of tetrachloride poisoning may be out of all proportion to the lesions that may be seen on microscopic examination of the tissues.

It will be evident from the foregoing that the use of the drug is not without dangers, and that care in its administration is necessary. It has a toxic action upon the patient somewhat similar to that of chloroform. The first stages are dizziness, slight nausea, headache, and somnolence. These are usually transient. A later and more serious manifestation is fatty degeneration of the liver, which first manifests itself two to three days after treatment. It is important, therefore, that the patients be kept under observation for at least forty-eight hours after treatment. The condition rarely occurs, however, and is seldom fatal. There is wide variation in individual reaction to carbon tetrachloride, alcoholics being particularly susceptible to the toxic action of the drug.

Advantages. To sum up, then, it may be said that the early experience seems to indicate that carbon tetrachloride is a better drug for the treatment of hookworm disease than chenopodium, thymol, or beta-naphthol. In doses of 2 c.c. for adults it is extremely efficient in the

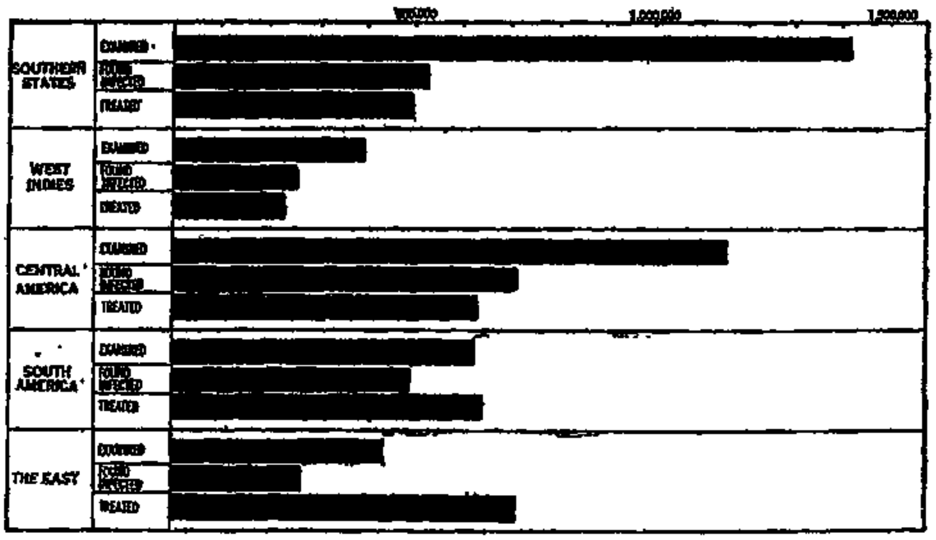

Fig. 44.—Persons examined, found infected, and treated in the Board's world-wide campaign against hookworm disease, 1910–1922, inclusive, by main geographical divisions

removal of worms and there is less probability of serious intoxication or even severe symptoms than by routine treatment with chenopodium in 1.5 c.c., thymol in 3-gram, or beta-naphthol in 4-gram, doses. The only exception to this rule appears to be found in those cases in which the liver has been weakened by alcohol or other causes.

The drug is palatable, making it less difficult to induce patients to accept treatment than the other remedies. Its definite chemical composition makes it preferable to compound drugs of herbaceous origin. Moreover, apart from the economy it effects through the ease and cheapness of its administration, the drug itself is considerably less expensive than either thymol or chenopodium.

In Ceylon it was given to a number of children who had previously been treated with oil of chenopodium on one or more occasions, with the result that it removed all or a large proportion of the worms that had remained after chenopodium treatment. It may also, apparently, be safely given in pregnancy, when other remedies are contraindicated. In Fiji hundreds of pregnant women have been treated with carbon tetrachloride without a single reported case of abortion, and in Ceylon a number of anemic and emaciated children who had fever from various causes were treated with excellent results.

ASCARIDOL-CARBON TETRACHLORIDE TREATMENT

In an attempt to avoid the dangers of the larger doses of carbon tetrachloride, and at the same time to utilize the recognized effectiveness of small doses of chenopodium against male Necators and against Ascarides, Smillie and Pessoa conceived the idea of using small doses of a mixture of three parts carbon tetrachloride to one part ascaridol, giving 0.1 c.c. of the mixture for each year of age up to twenty years. Ascaridol is the active anthelmintic principle of chenopodium, found in the drug in proportions varying from 50 per cent to 70 per cent of the whole. In fifteen cases a single treatment removed almost 98 per cent of the hookworms present. Very mild symptoms were produced, only one or two cases experiencing slight dizziness lasting but a few moments.

The new treatment is being subjected to further study in other countries, where the earlier reports have been uniformly favorable. In the opinion of Smillie the results so far obtained offer the hope that the combination of carbon tetrachloride with ascaridol in a single treatment will prove more effective in the elimination of hookworms and less toxic to the patient than any other method of treatment yet devised. There remain, however, many technical difficulties to be overcome and much additional experimental work to be done before definite conclusions can be announced.

II

MASS TREATMENT

Early Hookworm Campaigns of the Board. When the Rockefeller Sanitary Commission was established in 1909 for the purpose of combating hookworm disease in the Southern States the work of relief and control was carried on at first through the traveling dispensary which provided examination and treatment for all who applied. Later the dispensary gave way to a standard form of organization which conducted a more intensive campaign, carrying the work by house-to-house canvass into every corner of a county and remaining in contact with the infected until all possible cases were cured. The essential features of the latter type of campaign are microscopic examination of specimens of feces from the entire population and treatment of each person found infected until ova are no longer detected by the microscope. An educational program invariably accompanied the curative work, designed to prevent reinfection by stimulating the building of latrines and reduction of soil pollution.

The success of the hookworm control effort in the Southern States brought invitations to extend it to other countries where, first in British Guiana in 1914 and later in many other parts of the world, essentially the same intensive plan of operation was adopted.

Under conditions approximating those found in the United States, and on the basis of the then-existing knowledge of the bionomics of the parasite, this so-called intensive work within well-defined areas offered the most effective plan of operation. It seemed to be calculated to diminish human infection almost to the zero point within a comparatively short period, and, through the educational and sanitary campaign, gave a high degree of assurance of yielding lasting results.

Experience and New Knowledge Modify Procedures. Longer experience in the countries where work was begun nearly a decade ago, and the more recent work in many important tropical countries, combined with the results of recent scientific studies of the life of the parasite have pointed to the desirability of modifications in the plan of conducting hookworm campaigns. It is the lesson of experience that too much stress should not be laid on achieving completeness in the original campaign, for it is now realized that only in the course of years is it possible to reach the goal of freedom from the disease. The primary object of a campaign is still the relief and cure of as many persons as possible, but equally important to that is the demonstration to the population treated and to their untreated neighbors that there is such a disease, that it is easily amenable to treatment, and that it can be prevented by sanitary precautions. The treatment campaign is thus the most practicable entering wedge for the educational work which alone can free any community from hookworm disease.

Limitations of Microscopic Diagnosis. Less emphasis has also come to be placed on completeness in the curative work because the practical limitations of microscopic diagnosis are better understood now than a decade ago. Studies of the accuracy of the examination of feces for ova by microscopic techniques have shown that it may fail to detect

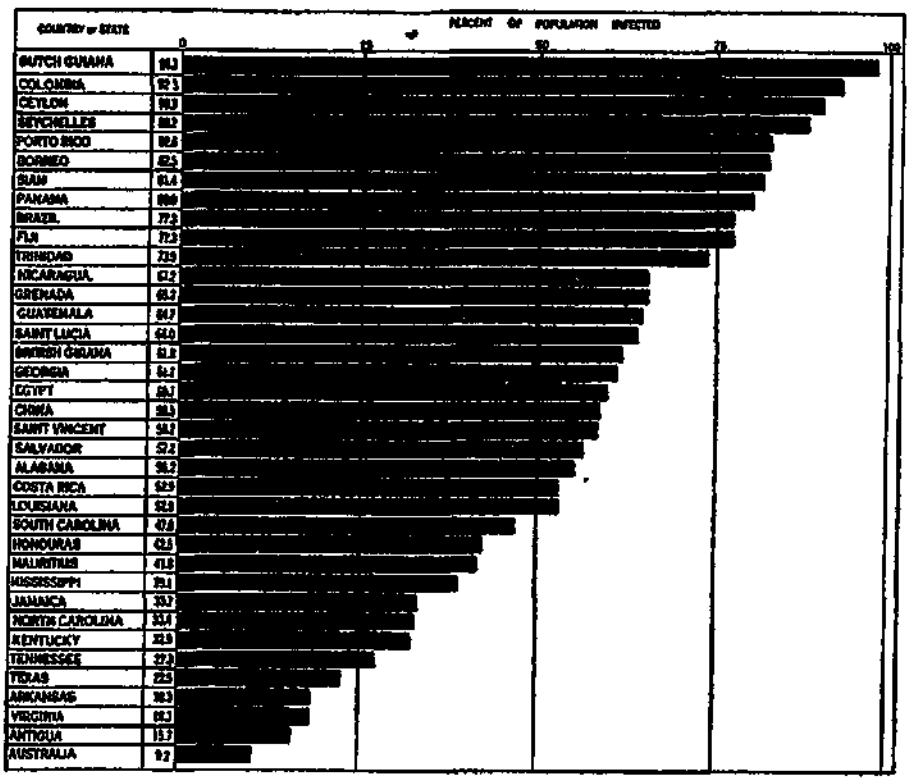

Fig. 45.—Infection rates in various states and countries as disclosed in the Board's treatment campaigns, 1910–1922

infection in a small percentage of cases. This means that some light infections are missed in the original examination and that a considerable percentage of cases reported as "cured" still harbor a few worms and are therefore likely to reinfect themselves and others unless soil pollution can be prevented.

Untreated Cases as Carriers. The simple theory on which a hookworm campaign aims at immediate eradication of the parasite has also to face the fact that however intensive the campaign a certain percentage of those found infected cannot be treated at all but remain as carriers to cause reinfection. Cases reported to the Board as not treated either for medical reasons, or because treatment was refused, or because the patient had removed or could not be located, amounted in the three years 1920 to 1922, to 10.3 per cent of all those found infected. In some countries the proportion ran as high as 25 per cent in certain years, the principal cause being the patient's refusal.

These untreated cases are usually more dangerous as carriers of infection than the cases so lightly infected that they escape detection by microscopic examination or than the light infection remaining after a single treatment by means of an efficient anthelmintic. Reinfection is a slow process even with heavy soil infestation. If all carriers are but lightly infected, therefore, reinfection is less likely to occur, particularly if soil pollution is controlled.

Hookworm Infection versus Hookworm Disease. Until recently the rate of infection, that is, the percentage of the population whose feces are found positive on microscopic examination, has been the controlling fact in treatment campaigns. This infection rate has been used to measure the extent of the problem in a given country or area, as well as to test the effectiveness of the work after a period of years. But it has become quite clear that this rate of infection alone does not distinguish accurately enough between light and severe infections nor does it furnish a satisfactory test of the result of a treatment campaign for the population as a whole.

The importance of an accurate measure of the severity of infection is discussed in the following chapter. The point to be made here is that a difference between light and heavy infections should be recognized in planning campaigns against the disease. A distinction has even come to be made between hookworm infection (the presence of a few worms) and hookworm disease (the result of a severe infection). Smillie finds in general no clinical manifestations of disease in patients harboring less than forty hookworms. Darling is of the opinion that communities in which the hookworm index (average number of worms harbored by adults) is less than fifty do not urgently require treatment. Treatment campaigns consequently should be directed primarily toward the relief of populations suffering from more severe infections. Educational work, introduced and aided by treatment, accompanied by all practicable methods of preventing soil infestation can be relied upon eventually to eliminate even the light infections.

Reduction of Soil Infestation by Mass Treatment of the Infected. The significance of a heavy soil infestation and the importance of reducing it as rapidly as possible have not until recently been fully appreciated. Darling and others have pointed out that there is a close correlation in any area between the severity of infection and the degree of soil infestation. Worms harbored by the individuals in any community are derived from larvae in the soil and the severity of infection is in direct proportion to the degree of soil infestation. Heavy infections do not develop in communities with a lightly infested soil. The larvae do not multiply in the soil nor even live in the soil for more than eight or nine weeks. Infection, moreover, is but slowly acquired, even where soil infestation is high. It is therefore possible to bring about at once a light infection and resulting low soil infestation by treating the whole of the population in a heavily infected area *en masse.*

"If an entire community," in Darling's own words, "could be treated in a few days, the community's environment would suddenly be purified of most of its larval infestation, and the community would be placed in the class of those places which have low indices (average number of hookworms harbored) and low larval indices (degree of soil infestation). A community once placed in this advantageous situation, there is every reason for believing that it could stay in it just as other communities are remaining with low larval indices at the present time. For, once a village has a low index, it cannot acquire a larger one without an influx of heavily infected persons from without."

If only a portion of the heavily infected are treated, the remainder will inevitably keep up soil infestation so that in the minimum length of time severe reinfections will take place. Campaigns must therefore be speeded up, so that reinfection from the still heavily infected cannot occur. "Not only is it more humane," says Darling, "to treat the heavily infected persons first; but by this means the correspondingly heavily infested soil is treated as well, and a source of infection of great magnitude is removed." By rapidly removing most of the worms from a heavily infected population it is possible practically to free the community from the burden of hookworm disease, and so to reduce further soil infestation within the period of life of the larvae already in the soil, that there is no possibility of the rapid recurrence of severe infection. Thus, by treatment *en masse* a great step forward can be taken in soil sanitation and control of the disease without the long delay and heavy expense of securing in advance the construction and use of latrines.

Mass Treatment for Heavily Infected Areas. Confronted by the conditions outlined above and aided by a better understanding of the biological aspect of the problem, the directors of hookworm campaigns in heavily infected tropical countries have in a number of instances dispensed altogether with preliminary microscopic examination of feces. Where it is known that practically every person is infected they have treated the people *en masse* without preliminary diagnosis. Darling and his co-workers of the Uncinariasis Commission to the Orient in 1915–1917 reached the definite conclusion that in tropical regions or mines where a high incidence of infection prevails, "the population should be treated *en masse* by an intensive method and probably without the unnecessary preliminary of examining the stools for ova."

Caius and Mhaskar, in their study of ancylostomiasis in the Madras Presidency, which began in 1916, under the auspices of the Indian Research Fund, found the traditional mode of treatment too costly and time-consuming as well as too stringent for the masses with whom they had to deal, and undertook, therefore, to work out a simple and effective therapy which would not involve interference with people's work, and could safely be used for all persons indiscriminately without previous microscopic

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Fig. 46.—*Upper left:* the "Headman" of a village in Ceylon, with his family. These local authorities have much to do with the success of hookworm campaigns; *Upper right:* a native of the Fiji Islands taking the treatment for hookworm disease; *Bottom:* showing actual hookworms through a microscope to the native people of a tropical country to induce them to take treatment for the disease

examination in each case. The chief aim of this investigation was to find the most efficient drugs for giving mass treatment to large agricultural labor forces.

Brazil. The first application of mass treatment for hookworm control in Brazil was made during the fall of 1920 in a thinly settled, strictly rural community in Santa Catharina. The infection rate varied from 85 to 69 per cent; the people were very ignorant, and the cost per person was seriously high. After some 2,000 microscopic examinations, not more than twelve persons had been found free from all parasites. Mass treatment was therefore adopted, and subsequently extended to other places in southern Brazil. Resurveys of certain communities, the Ilha do Governador, an island in the bay of Rio, and the town of Jacarepagua, the latter in a zone of heavy infection, indicated a very slight reduction in the rate of infection. In the original campaign, in Ilha do Governador 71.2 per cent of the population were found infected, while in the resurvey, the rate was still 69. The average number of hookworms harbored per person, however, among those who had been treated was greatly reduced—from 324 worms for a group of untreated controls, to 14 for the treated cases. Dr. Smillie concluded therefore that hookworm disease, as a disease, had practically disappeared from these communities, and that it was futile as well as superfluous to attempt to eradicate this small number of worms in zones of heavy infection. A standard treatment once a year, even where construction is not practicable, would be an effective prophylaxis, in his opinion.

Siam. Mass therapy has also been adopted in Siam. In survey and health propaganda work all applicants for treatment are required to submit fecal specimens for examination. In the control campaigns, however, omission of the microscopic examination has been found clinically justifiable. In certain changwats (states), a universally high rate of infection is found, not only for hookworms, but also for other intestinal parasites, so that practically every one is benefited by treatment. The relative efficiency of the intensive method of treatment and mass therapy has been put to a thorough test in Siam, where the former was largely used in the campaigns up to 1920. In one aumphur (county) only 500 treatments could be administered in three weeks by the intensive method. Mass treatment was then introduced, and in the next six weeks over 5,000 treatments were given. All subsequent control campaigns have therefore followed the mass treatment procedure.

Fiji. In Fiji it was found that the natives were willing to take the medicine, but refused to submit specimens, so that few stool examinations could be made. Mass treatment was therefore adopted. In the Suva district the aim was to give a treatment to every person except the Europeans, who were invited to come to the laboratory if they desired treatment. Indian and Fijian assistants were used, who could work with little friction among their own races. Through the economies effected by mass treatment, in combination with the use of carbon tetrachloride, Dr. Lambert was able to treat over 50,000 cases in Fiji during a period of about eight months.

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Fig. 47.—Hookworm control unit on inspection tour in northern Siam

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Fig. 48.—A dispenser talking to a group of natives gathered for hookworm treatment in Siam

Techniques having the essential features of mass treatment have also been utilized in Java, Sumatra, British North Borneo, Papua and New Guinea, and Ceylon, though not on the same scale as in Brazil, Siam, and Fiji.

Definition of Mass Treatment. The term "mass treatment," in the technical sense in which it has come to be used in hookworm control, includes two distinguishing features: (1) the omission of preliminary diagnosis; and (2) a single treatment, in the field rather than at a fixed point, of all persons who can be reached in the community or occupational group within a brief period. The term is not applied to the treatment of persons in "masses," or groups, however large, unless these two features are present. In Malaya, for example, Tamils were treated at Port Swettenham in groups of forty, but all of them had previously been examined. In the decade before the War, German colonial authorities in East Africa had a highly developed health service and conducted extensive antihookworm operations. In their official reports they used terms which might be translated as "mass treatment," but it is clear they meant merely treatment in large groups.

The first clear instance of mass treatment referred to in the literature was in 1914, when Schüffner, a leading sanitarian of the Dutch East Indies, treated more than 5,000 coolies on the plantations of Sumatra with oil of chenopodium. Thousands of laborers were examined by the microscopic method and not one was found negative. Infection was therefore deemed general and without examination all coolies were treated forthwith in groups of about 200. Schüffner recommended that all coolies be given a second general mass treatment after three months and a third after nine months.

Economy of Mass Treatment. The economic advantage of mass treatment cannot fail to appeal to all agencies, official and unofficial, engaged in hookworm campaigns. The economies which it effects in personnel and equipment make possible a great expansion of the control work that can be conducted with a given appropriation, and apparently without sacrificing anything in the way of immediate or permanent benefits to the population treated.

The omission of microscopic examination at once eliminates the necessity for a number of microscopists, from one to three of whom are required in a standard control unit. They are naturally a more expensive form of labor than other assistants, since they require a considerable degree of intelligence, general education, and special training. While microscopy is still necessary in the preliminary survey of a new area, and in providing diagnosis for persons who request it, this part of the work is vastly reduced. Microscopic examination involves much record-keeping and a great deal of secretarial work in connection with specimens, follow-up, etc., most of which is eliminated in mass treatment.

The greatest saving, however, is in the time of the nurse. A single nurse or field assistant can by this method care for a much larger number of persons than by the method ordinarily employed. The radius of action

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Fig. 49.—Fighting malaria by the control of mosquito breeding presents great difficulties in a rice-growing country

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Fig. 50.—The Ubiquiteers, "Men from Everywhere," an international public health fraternity organized in 1922 in the School of Hygiene and Public Health of Johns Hopkins University by the holders of International Health Board fellowships. In the year 1921–1922 these fellows represented more than a dozen countries

of the nurse can also be greatly increased. Outlying, sparsely settled areas need not be neglected because of the high cost of operating in such regions. In Brazil it was found practicable under mass treatment procedure for nurses to be stationed as much as a day's journey from the post and not required to return more than once in two weeks. They were, of course, frequently visited by supervisors.

Population More Easily Induced to Take Treatment if Examination Omitted. In regions where the plan has already been tried it has been found that persons who refuse to submit fecal specimens are yet quite ready to take treatment if the preliminary examination is omitted. False modesty, irregular habits of defecation, and other conditions render it difficult to secure specimens for microscopic examination. Uneducated people are glad to take the treatment, once they are persuaded that it is worth taking; and frequently logical arguments or scientific proofs are less effective than good-natured persuasion by a clever nurse, or observation of improvement in neighbors who have been treated.

Many are also deterred from taking treatment under the old intensive method because of the time and effort required of the patient. It was found impossible in Honduras, for example, to keep up the interest of a large element in the population. For the first few weeks after the opening of a dispensary there would be a rush of patients eager to rid themselves of intestinal parasites. But the routine of collecting samples, examination, treatment, the necessity of returning at intervals for re-examination and treatment, the rather stringent limitations on diet, and the perhaps disagreeable vermifuge and cathartic, all combined to make treatment a serious ordeal that weakened the original enthusiasm and led many persons to grow discouraged and abandon their purpose. With mass treatment one dose of an efficacious vermifuge is all that is required. This can be given before interest wanes and if 60 per cent of the population are induced to take treatment at once most of the remainder will be influenced to do so by friends and leaders.

The sheer loss of time is also a factor, for, if not important to the native himself in undeveloped countries, it is often a controlling consideration to managers of large plantations whose employees are to be treated.

Treatment for Other Parasites. Infection with the hookworm is usually accompanied by infection with other intestinal parasites, such as *Ascaris lumbricoides*, *Trichuris trichiura*, *Strongyloides stercoralis*, *Oxyuris vermicularis*, and *Taenia saginata*. A search for these species is seldom made except incidentally in the examination for hookworms. Estimates of their incidence are therefore liable to err on the side of conservatism. Ascaris is probably the most important clinically. In southern Brazil between 60 and 70 per cent of the population are infected with Ascaris, and the infection is heavy among young children who do not harbor a large number of hookworms. With this overlapping of infection from the two main parasites, it may be seen that almost 100 per cent of the population suffer from some variety of helminthiasis, those having hookworm frequently being negative to Ascaris, and vice versa. Under these

Fig. 51.—Staff of a county health department examining school children to discover physical defects

Fig. 52.—A danger to health. An old-fashioned well unprotected from surface pollution

conditions it is evident that, with the proper vermifuge, mass treatment cannot but benefit practically the entire population.

Sanitation. The adoption of mass treatment procedure does not imply any relaxation of effort to prevent soil pollution. Proper sanitation is the only permanent method of preventing hookworm infection. A control demonstration to be successful must result in the introduction of sanitary methods of disposing of night-soil. In many countries, however, and particularly in countries in which soil pollution is greatest and the disease most severe, it has been found exceedingly difficult or impossible to secure the construction and use of latrines either in advance of the curative work or immediately following it. When this is the case it has in the past been deemed inadvisable to undertake hookworm campaigns. Under such conditions mass treatment repeated at intervals will accomplish much, as pointed out above, in the elimination of heavy infections, even in the temporary absence of adequate latrine construction.

Hookworm control campaigns have usually started with a program of education and latrine construction. After latrines have been in use long enough to effect a reduction in soil infestation the treatment campaign is begun. Many of those engaged in hookworm work have come to believe, however, that the benefits are so great as to warrant mass treatment even where the sanitation program cannot be started immediately. The normal degree of soil infestation is reduced in winter or during a prolonged dry season, the larvae being unable to withstand continued cold or drought. Cort has therefore suggested that advantage may be taken of these periods of naturally low infestation to begin a campaign of mass treatment and thus secure a minimum of reinfection even in the absence of soil sanitation measures.

Conditions for Mass Treatment. Mass treatment cannot, of course, be used indiscriminately under all conditions. Its success will depend on intelligent adaptation to circumstances and a wise choice of methods. No standard procedure has been worked out, but many field workers are experimenting and an increasing degree of accord as to the essential features of the new plan may be expected. The Board does not prescribe the methods to be followed in any area, preferring merely to make suggestions and rely upon the judgment of its field directors.

Upon entering a new region it will always be necessary to examine representative groups of the population. If 75 per cent or more of these persons are infected it may be assumed that approximately universal infection exists and that further examinations will add nothing to the information needed. The next step is a short, intensive educational campaign, giving the widest possible publicity to the results of the preliminary survey and offering treatment to everyone without further examination. In regions where mass treatment has been tried no criticism has ever been encountered because of the omission of individual diagnosis. Microscopic examination of feces and hemoglobin determinations should be made, however, either before or after treatment for everyone who wishes them.

Local conditions will always determine whether the dispensary or a more intensive system is to be used. Certain areas it is best to cover rapidly, treating only the willing and returning to treat those who are convinced later by the experience of friends who have taken the treatment.

III

MEASURES OF SEVERITY OF HOOKWORM DISEASE

Reference has been made above (page 179) to the importance, in planning hookworm control campaigns, of adequate information as to the severity of the disease. During the period in which the Board has been engaged in work for the control of hookworm disease, the need of an accurate and reliable measure of severity in the individual case, as well as the degree of infection in the community, has become more and more apparent. The development of scientific knowledge of the disease which has gone hand in hand with the extension of control campaigns has shown that in hookworm disease more than in any other widespread malady it is possible to measure in a quantitative way, and with a high degree of accuracy, the extent to which the individual as well as the community is suffering. The measures of severity in general use, while scientifically accurate and dependable, involve difficulties of one sort or another in their practical application. In the research work carried on with the support of the Board, attention is therefore being given to developing tests of severity that are adapted for use under actual field conditions. It is less important, as has frequently been pointed out, to know that a person is infected than to know whether he harbors the parasite in such large numbers as to constitute a serious handicap to himself or a menace to others. Much of the work of a control campaign requires information as to the degree of severity of the disease and the conditions which may spread the infection in the community. Such information is of fundamental significance, for example, in deciding whether to adopt the mass treatment methods discussed in the preceding chapter or some other form of campaign.

Clinical Manifestations of Hookworm Disease. The most obvious guide to severity, and the first to be used in point of time, was the clinical manifestations of the disease in individual cases. Many of the symptoms are easily recognized and were well-known long before the fundamental facts as to the nature of the disease and the mode of infection were discovered. Until the technique of microscopic examination of stools was developed, primary diagnosis was based exclusively on the symptomatology of the disease. Much importance was attached to a complete description of the symptoms, not only as the means of diagnosis, but also as a measure of severity. In the pioneer work of the Commission for the Study and Treatment of Anemia in Porto Rico, for example, several grades of severity were recognized and for each grade the characteristic clinical symptoms elaborately described. In the simplest form of classification only three grades were recognized: *slight*, *moderate*, and *marked*. In certain studies cases were divided on the basis of symptoms into, *very light, light, moderate, severe*, and *very severe* forms. Still more elaborate classifications based on the intensity of the disease were attempted, but without results of practical value. For purpose of routine treatment microscopic examination of stools for ova soon supplanted clinical diagnosis. Similarly, more exact and reliable measures of the intensity of infection have been substituted for clinical observation.

HEMOGLOBIN INDEX

Anemia the Most Characteristic Symptom of Hookworm Disease. In the symptomatology of hookworm disease anemia has always been a prominent feature. From the earliest times a mysterious anemia of unknown origin, but certainly in many cases caused by hookworm infection, has been observed. The violent epidemic of "miner's anemia" which broke out among the workers during the construction of the Saint Gotthard Tunnel in 1880 first arrested the attention of modern science and led to the discovery that "miner's anemia" the world over was due to hookworm disease. Taking its name from its most prominent symptom, in one place the disease was "miner's anemia," in another "brickmaker's anemia," while in the Southern States it was "cotton-mill anemia." The commission created by Porto Rico in 1904 for the study and treatment of hookworm disease was known as "The Commission for the Study and Treatment of Anemia."

Hemoglobin Index as a Measure of Severity. The ease and relative accuracy with which all grades of anemia can be measured by hemoglobin readings naturally lead to the use of the hemoglobin test as a measure of the severity of hookworm disease. Observations of the blood of persons suffering from the disease were made as early as 1892 when Zappert reported a moderate grade of anemia with a low color index. The Porto Rican Commission from 1904 to 1907 made much use of the hemoglobin index as the best guide to the severity of the disease before and after treatment, although it was pointed out that the number of parasites harbored and the hemoglobin did not seem to bear a constant relation to each other. Boycott, in 1907, on the basis of work done in English tin mines stated that anemia in hookworm disease is generally in proportion to the number of worms present, but warned against marked exceptions to this rule. Dock and Bass and many other writers on hookworm disease have substantially repeated this opinion, although recognizing that anemia is influenced by individual susceptibility and capacity of blood regeneration. According to the present view, held by Dr. Darling and others, there is a direct causal relation between the number of worms found and the degree of anemia, although this relationship does not necessarily hold in every individual case. An infected individual may maintain a normal hemoglobin value for a time, the first twenty-five or fifty hookworms seldom being sufficient to break down the resistance to anemia, but with an increasing number of parasites a point is eventually reached at which compensation breaks down and the hemoglobin index declines suddenly and rapidly. Moreover, in youth and early adult life hemoglobin corresponds but poorly with the number of worms harbored, as was shown by Smillie's Brazilian cases, the reason being that the resistance and recuperative powers of these groups are higher than in the elderly or in very young children. In short, while hemoglobin is not a reliable index of the number of worms harbored, it is one of the best indexes of the amount of actual injury which hookworms produce in any individual case, provided other anemia-producing factors are not present.

Hemoglobin Determinations in the Work of the International Health Board. In the original system of records adopted by the International Health Board for reporting on work for the control of hookworm disease in various countries, two of the six points considered of primary importance were: (1) the degree of severity as shown by the hemoglobin index of persons found infected; (2) the effect of treatment in improving health, to be shown by comparing the hemoglobin index before treatment with the index six months or more after the treatment. Hemoglobin determinations were not required for every individual case, discretion being left to the field director as to when the tests were feasible or desirable. The results of these tests have been reported from time to time in the annual reports of the Board.

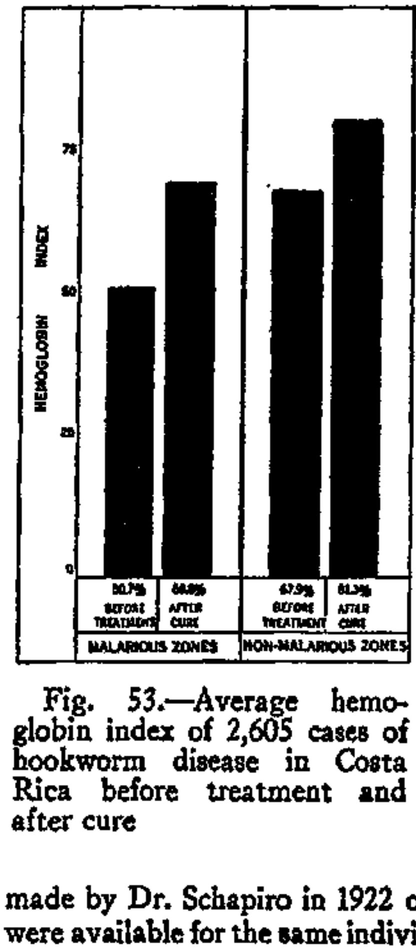

Fig. 53.—Average hemoglobin index of 2,605 cases of hookworm disease in Costa Rica before treatment and after cure

Hemoglobin Index in Costa Rica. Hemoglobin determinations before and after treatment were made a part of the routine procedure of the hookworm campaign in Costa Rica, covering the period from January 1, 1915, to May 29, 1921, and including most of the rural population of the country. An analysis was made by Dr. Schapiro in 1922 of all the cured cases for which records were available for the same individual before and after treatment. These cases, numbering 2,605, were representative of the total population as to sex, age, occupation, and social status. The average hemoglobin index for this group of infected persons before treatment was 64.5, almost 60 per cent of the cases showing less than 69. The hemoglobin is normally some 20 points lower in tropical than in temperate zones. Dr. Schapiro found that for the population of Costa Rica it ranged around 80 per cent. The average hemoglobin deficiency of the infected population was therefore 15.5 per cent. In non-malarious zones, however, the index was 67.9, or an average loss of 12.1 attributable to hookworm alone. In the malarious zones the average was 50.7, or a total hemoglobin deficiency of 29.3 per cent, of which it may be inferred that malaria accounted for 17.2 per cent, or more than one half.

After the cases were treated until no longer positive by microscopic examination, the hemoglobin rose to an average of 78.7 per cent. Improvement was found to be less in male than in female patients, and among children under five greater improvement occurred than any other age group.

WORM COUNTS

Worm Count a More Accurate Test of Severity than Hemoglobin. While it may be concluded that in general and on the average there is a high degree of correlation between the hemoglobin index and the number of worms harbored, exceptions are so numerous and important in individual cases that many workers have come to prefer to rely on worm counts alone for the information desired in regard to the severity of hookworm disease. Knowledge of the actual number of worms present in the individual case, and the average number for the community, seems to be more important for the health officer than a detailed description of symptoms or complete hemoglobin index. Individual resistance to the ravages of the parasite varies, but on the whole the number of worms harbored is a better guide to the extent of the problem than the hemoglobin reading, which is influenced by many other factors. The worm count has been used for different purposes for a considerable period, but the starting point in its use as a method of measuring the severity of hookworm disease before and after treatment was the work of the Uncinariasis Commission to the Orient, 1915–1917 (Drs. S. T. Darling, M. A. Barber, and H. P. Hacker), which brought together most of the data on which the present-day technique has been built up.

Worm Counts for Testing the Efficiency of Anthelmintics. The Porto Rico Anemia Commission made use of worm counts as early as 1905 to test the efficiency of the different anthelmintics in use, as well as to compare the grades of anemia with the number of worms harbored. The Uncinariasis Commission to the Orient, Caius and Mhaskar in Madras, Flu, de Langen, and Weehuizen of the Dutch East Indies Civil Medical Service, and Smillie in São Paulo, have made extensive use of the worm-count method in studying the properties of various drugs used for anthelmintic purposes. In any investigation of the anthelmintic properties of drugs, dosages, or methods of administering the drugs, the worm count has come to be considered indispensable. For such purposes the results are usually stated in the form of the percentage of the total worms harbored that are removed by one or two treatments.

Severity of Disease Before Treatment. Although the studies that have been made seem to indicate that the worm count is slightly more accurate in disclosing infections than microscopic examination of the feces for the presence of ova, it is not proposed to adopt the worm count as the standard method of diagnosis. In planning a treatment campaign, however, it is considered desirable to have information as to the degree of infection, which the mere presence of ova in the stool does not give, and which neither clinical observation nor the hemoglobin index furnish in a satisfactory way. "Heavily infected persons," says Dr. Darling, "and heavily infested soils should receive preferred attention. The grades of infection or the worm index of groups of individuals as influenced by age, sex, or by habits and environment, must be ascertained. This is readily obtainable by the method of worm counting. It is more humane to treat those wretched persons who are suffering from the more severe infections than the more lightly infected ones. Agriculturists, who are carrying a burden of 200 or 300 hookworms, demand our attention before the lightly infected townspeople and mountaineers and others, who may harbor no more than twenty-five worms."[1] The worm count has been used to some extent as a guide in determining the areas in need of urgent treatment campaigns in Australia, New Guinea, the Solomon Islands, Siam, and Brazil. In the Solomon Islands great disparity was found in the worm index of the different islands.

Worm Counts After Treatment. Perhaps the most important use of the worm count is to measure the results of a treatment campaign. Resurveys to determine the permanent effects of treatment have usually been based on the infection rate. The difference between the rate of infection before and after treatment, however, may give an entirely erroneous conception of what has actually been accomplished in the reduction of the disease. This was strikingly shown in tests made by Dr. Smillie of two communities in Brazil three or four years after the original treatment campaign. The *rate* of infection showed only a slight reduction, but comparison of the number of worms harbored showed that the amount of hookworm disease had declined 79 per cent in one community and 95 per cent in the other. Similar results might have been shown by other tests of severity. There is little question, however, that a comparison of the severity of the disease before and after treatment based on a reasonable number of worm counts is the most accurate method available for measuring the lasting results of a curative campaign in any community.

Other Uses of the Worm Count. In experiments conducted in Madras, Dr. Kendrick employed the worm-count method to determine rates of reinfection. Worm counts have also been used to a certain extent for determining the geographical, racial, or occupational relationships of individuals or groups. The species of hookworms harbored by a race or a community are determined by geographical, racial, and climatic conditions, and are limited, of course, to the species of larvae existing in the soil of their immediate environment. The "worm picture" may thus

[1] The Hookworm Index and Mass Treatment; by S. T. Darling. Reprinted from *The American Journal of Tropical Medicine*, September, 1922, v. 2, pp. 397–447.

disclose important information as to the previous environments and even as to the ethnical origin of peoples.

Lambert in the South Seas, and Gregg in Brazil, found the worm-count method to have educational and publicity value in conducting hookworm campaigns. Among ignorant natives the simple procedure of making a worm count, and the sight of a number of parasites that have been preying on their vitals seem to have a valuable psychological effect. The average layman looks upon the doctor who expels and counts worms as a thorough scientist. Consequently a few well-selected lavages in public are found to enhance the prestige of a campaign.

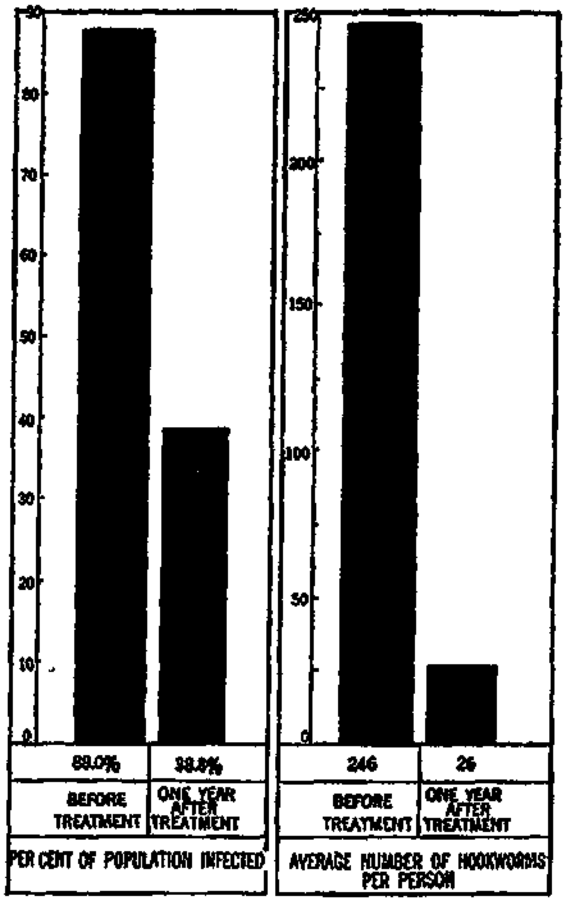

Fig. 54.—Decline in severity of hookworm disease in a rural area of Nicaragua. The *rate* of infection showed a much smaller reduction than the hookworm index, or average number of worms harbored as shown by worm counts

Technique of Worm Counts. The standard methods for making worm counts have been largely evolved by Darling and his co-workers, first in the Orient, then in Brazil. With instruction, native assistants or clerical workers can do much of the routine of washing and counting the stools. But it is always best for the director or other medical man to inspect and check up the work of the assistants. The technique is not difficult, but requires considerable experience in identifying the types and sexes.

Disadvantages of the Worm-Count Method. Serious difficulties are encountered in the process of making worm counts—difficulties which have prevented the method from attaining its widest usefulness as a measure of severity. Persons on whom counts are to be made must be under good discipline, whether self-imposed or compulsory, and willing to co-operate. They must also have sufficient intelligence to carry out directions and be isolated from their fellows for at least forty-eight hours. In order to secure a typical worm index for a community, all ages, both sexes, and all stations of life should be represented in the group, and this is frequently not possible. Children under eight years of age can seldom be used because of the vigorous character of the treatment and because of their lack of knowledge and discipline. The time and expense involved in making a worm count of a reasonably representative sample of the population of a large community is a serious drawback. An added difficulty is the time required of the patient. To keep a native coolie, barely above the subsistence level, away from his work for two days is ordinarily quite impracticable. The most satisfactory counts, apart from jails and hospitals, have been carried out on large estates or plantations in isolated communities where the colonists or coolies were under strict discipline and the owners have heartily co-operated. The Commission to the Orient found it necessary at times to pay the wages of the coolies for the period they were absent from work. As their wages were very small, amounting to a few cents a day in United States money, this was the cheapest means of getting the information desired.

OVA COUNTS

Efforts to Measure Intensity of Infection by Ova Counts. The practical difficulties which arise in the application of the worm-count method have recently led Dr. Cort and his co-workers to make experimental studies of the possibility of determining the intensity of infection by estimating the number of eggs in the stools. Attempts were made at least forty years ago to estimate the number of worms harbored by counting the eggs in a sample of feces. Parona, Grassi, and Lutz in the early eighties made varying estimates of the number of hookworms in the intestines that would produce a given number of eggs per centigram of feces. Leichtenstern (1886) reported, on the basis of several autopsies, that by dividing the number of eggs found in each gram of feces by the number of forty-seven the quotient would give the number of female worms. Baermann (1917) counted 1,141,600 viable eggs in the entire stool of a woman who was found on autopsy to harbor 1,986 worms, of which 1,102 were females, a ratio of about ten viable eggs per female per gram of feces.

In spite of the attention that has been given to the ova-count method, it has never been used extensively because it has not seemed possible to fix a definite ratio of eggs in a sample of feces to the worms harbored. The egg output apparently varies with the species and environmental conditions, as it obviously does with the sex ratio. The number of ova has been found to be diminished by alcohol or salty food in the patient's diet. Variations in the consistency and amount of the feces due to varying habits of diet have a marked effect on the eggs per worm, as Stoll has found.

Smillie's Experimental Work in Brazil. Dr. Smillie in 1921 made an experimental study of the possibility of estimating the number of worms harbored by counting the ova in a miscroscopic field. He selected 135 cases for ova counts, afterwards classifying them on the basis of number of eggs found in the stool. Forty cases gave negative microscopic

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Fig. 55.—Waste irrigation water breeding myriads of mosquitoes. This is frequently the result of a faulty system of irrigation or careless methods of applying the water

Photograph Excised Here

Fig. 56.—A leaking flume—one of the ways in which irrigation causes man-made malaria

results; in the others the ova ranged from *very rare* to *very abundant.* All cases were then given a test treatment and the expelled worms counted. Nineteen of the forty cases negative by the microscopic test yielded hookworms on treatment, with a total of 104 worms.

A definite relationship between the number of ova in the stools and the number of worms harbored appeared when general averages for the groups were employed, but in individual cases it was found that the ova count was not a reliable index of the number of worms in the intestines. One individual having very abundant ova harbored only twenty-three hookworms. Others having so few ova that they were found only after long and careful search harbored from 150 to 200 worms.

Stoll's "Dilution-Count" Method. Stoll, in the series of hookworm investigations carried on under the direction of Dr. Cort[1] by the Department of Medical Zoology of the Johns Hopkins University School of Hygiene and Public Health in co-operation with the International Health Board, after reviewing all previous efforts to discover a method of using ova counts developed a new technique which promises to put the egg-count method on a practical basis. The essential features of the dilution method are as follows: An accurately weighed quantity of feces is thoroughly mixed with a decinormal solution of sodium hydroxide. A quantity of the mixture is then placed on a slide and examined with the low power microscope and the eggs counted. The number of eggs found gives a basis for calculating the number of eggs per gram of feces. Employing this technique and using every precaution against error, Stoll examined the feces collected for one to four days from certain persons in the Utuado Municipal Hospital in Porto Rico where practically all patients are treated for hookworm disease as a matter of hospital routine. The eggs expelled ranged from 187,000 to 5,059,420 per patient per day. The worms harbored ranged from 37 to 1,163 (*Necator americanus*). Of the total of 4,704 worms expelled 51 per cent were females. The average egg output per day for each female worm, based on all cases, was approximately 9,000. Upon experimentation it was found that the number of eggs per gram of feces divided by the factor of forty-four approximated the number of female worms harbored. To calculate the total number of worms harbored it is necessary to discover the sex ratio for the given environment, unless one arbitrarily assumes an equality of numbers between the male and female parasites. Stoll's method gives only the number of eggs per producing female worm harbored. It makes no allowance for very young or non-egg-laying parasites which, according to Dock and Bass, form approximately 7 per cent of the females. Its par-

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[1] On the Relation between the Number of Eggs Found in Human Feces and the Number of Hookworms in the Host; by N. R. Stoll. Reprinted from *The American Journal of Hygiene*, March, 1923, v. 3, pp. 156–179.

On the Use of an Egg-Counting Method in Soil Culture Studies of Hookworm Larvae (Preliminary Report); by N. R. Stoll. Reprinted from *The American Journal of Hygiene*, May, 1923, v. 3, pp. 339–342.

Human Infestation Studies in Porto Rico by the Egg-Counting Method; by G. C. Payne, W. W. Cort, and W. A. Riley. Reprinted from *The American Journal of Hygiene*, May, 1923, v. 3, pp. 315–338.

Fig. 57.—Gold-dredging operations are an important cause of man-made malaria. *Top:* gold dredger in operation in California; *Bottom:* ponds and tiny pools left by faulty methods of dredging become prolific mosquito breeding-places

ticular virtue lies in the regularity of results. All previous methods of egg counting used the direct smear, only a few milligrams being placed on the slide, or flotation, which gives a greater concentration of eggs in the smear than in the average of the sample. Both these methods obviously permit a serious lack of uniformity. The dilution method uses a larger original portion of the stool, thus insuring better sampling in case the eggs are not distributed evenly. From all the evidence he was able to obtain as to the accuracy of this method, Stoll believes that in routine practice it yields counts which on the average involve an error of less than 10 per cent of the absolute number of eggs present.

Egg Counts in an Intensive Campaign in Porto Rico. For a period of three months in 1922 the ova count was tried out by Dr. Rolla B. Hill[1] under field conditions in Hatillo, Porto Rico, under the joint auspices of the Department of Health of Porto Rico and the International Health Board. The results obtained seem to indicate that ova counts based on the Stoll technique, and using only native microscopists, will give more information as to the degree of infection than can be secured in any other way. The most obvious advantage of the ova count is the fact that it is not necessary for the patient to be subjected to controlled conditions. It can also be used with comparatively slight expense, since it is possible to carry it on rapidly by the regular staff of a hookworm field unit without detriment to the campaign. Dr. Hill's experiments even suggest substituting the ova count for microscopic diagnosis, at least in preliminary surveys. In first examinations he found that the egg count gave the same per cent of positives as the centrifuge, when dealing with relatively heavy infections. In the lighter infections, and in examinations after treatment, both methods missed a considerable number of positives. Further experimental work will be necessary to determine whether the ova count can be successfully used as the sole method of examination in a preliminary survey. It may also be found that variations are too great to allow the conversion of egg output into a worm index which can be relied upon as an accurate measure of the severity of infection. Nevertheless the egg output, in the opinion of Dr. Cort and his assistants, will remain the best guide to the concentration of infective material or the potential sources of heavy soil infestation.

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[1] The Use of the Egg-Counting Method in an Intensive Campaign; by R. B. Hill. Reprinted from *The American Journal of Hygiene*, July supplement, 1923, v. 3, pp. 37–60.

IV

PROGRAMS OF MALARIA CONTROL

The immediate object in view when the International Health Board began its co-operative malaria work in 1916 was to discover practical methods of control which the average community could afford. Efforts to control malaria up to that time had been carried through almost without regard to cost for the sake of some military or commercial end. Field experiments were therefore undertaken in selected communities to demonstrate and thoroughly test and evaluate separately a number of control methods, particularly antimosquito measures, the screening of houses, and cure of human carriers by means of quinine. No attempt was made in the beginning to put into operation a comprehensive malaria program, although it was anticipated that the demonstrations would eventually lead to county and state programs in which all the successful control measures would be combined with varying emphasis to meet local conditions. General programs of this kind are now developing rapidly. The experimental demonstrations have been repeated in an increasingly large number of communities, which have in most cases taken over the work and assumed the expense. Special divisions of the state health organization have been created to stimulate and aid the control operations carried on by local health authorities in Arkansas,

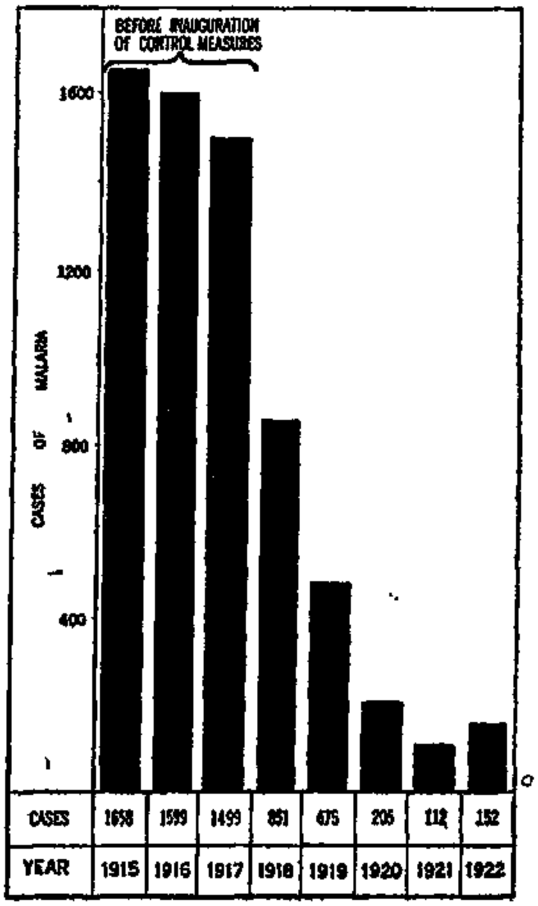

Fig. 58.—Results of malaria control measures in Harrison County, Mississippi, supported by state and federal health organizations

Alabama, Georgia, Illinois, Mississippi, North Carolina, South Carolina, Texas, and Virginia.

County-wide Demonstrations in Malaria Control. For experiment in the use of separate methods of control the most practicable unit was the town, which could be selected with special reference to the method to be demonstrated. For general programs of control on a permanent basis, however, the county offers a convenient unit of operations, provided it has a full-time health organization. When the malaria control demonstrations began in 1916 only twelve full-time county health units were in operation; at the close of 1922 there were 214. The success of the town demonstrations and the development of county health units have made it possible for the Board to transfer its participation from the town to the county-wide demonstrations, which it is doing as rapidly as practicable. In 1922 aid was given to thirty-four county-wide programs.

Through the town demonstrations the practicability of a variety of control measures has been thoroughly established. The need is now to extend the work as rapidly as possible to towns and rural districts on a county-wide basis. Anti-malaria work in rural communities of wide area and sparse population presents difficulties and problems not met with in towns. It has become increasingly clear that continuity and permanence of the work in the towns and rural districts can best be accomplished by county health departments.

County-wide Malaria Program. During 1922 general programs of malaria control with the county as the administrative unit were inaugurated in Mississippi, Alabama, and Virginia.

The Mississippi program in detail for urban communities consisted of: (1) *Antimosquito work*, including (a) major and minor drainage, (b) brushing and clearing of streams, (c) filling, (d) oiling, (e) fish control, (f) prevention of man-made mosquito breeding-places; (2) *General publicity*, secured by the distribution of literature, the posting of placards in public places, and the co-operation of local newspapers and civic organizations; (3) *Education*, through public and school lectures, demonstration exhibits in schools and colleges, and motion pictures; (4) *Quinine distribution*, aiming to make the standard treatment available in every community, urging its use by placards, and soliciting the co-operation of physicians and druggists; (5) *Compiling statistics* based on (a) malaria surveys, (b) physicians' records, (c) prescription records, and (d) health officers' records.

In rural communities the Mississippi program was confined to: (1) Instructions for proper screening, advocating 16-mesh screens and persuading dealers to handle no other; (2) Instruction in the use of standard quinine treatment and making it available; (3) Instruction in fish control, establishing and maintaining hatcheries and distributing fish under direction of the schools; (4) Co-operation with engineers in an effort to promote general agricultural drainage and to forestall the creation of artificial breeding-places along levees, public highways, railroads, and other

Fig. 59.—Phases of malaria control. *Top:* a ditch within a ditch to maintain a current even with a small volume of water; *Lower left:* one of the drainage ditches constructed in the Mobile, Alabama, demonstration which has been called the best piece of mosquito control work in the South. Sloping sides and round bottom are clearly revealed by the shadow cast across the ditch in the background; *Lower right:* sign erected by the Brewton (Alabama) Chamber of Commerce

public works; and (5) General publicity and education, through illustrated lectures, exhibits, demonstrations, literature, and newspaper articles.

In Alabama county-wide programs in eighteen counties placed special emphasis on the instruction of county health officers, in the identification of species of mosquitoes, methods of drainage, oiling, the use of fish and larvicides, the approved methods of screening, and the principles of quinine administration. Surveys are made by the county health officer and the sanitary engineer of the state health department. All work undertaken in a county is under the direction and supervision of the county health officer, the state malaria engineer acting as his assistant and adviser and checking the work of the local sanitary inspector. The program of education and general publicity work, also under the direction of the county health officer, is similar in scope and method to that followed in other states. In the rural districts the county health officer's function, as in Mississippi, is necessarily confined mainly to educational and advisory relations, special effort being made to promote the organization of drainage projects with malaria control as one of the objects in view. Responsibility for the prevention of man-made Anopheles breeding-places is divided between the state health officer, who endeavors to secure the cooperation of the railroads and the state highway department, and the county health officer who works through the local highway officials and the farmers and manufacturers.

Man-made Malaria. In all the general programs of malaria control the prevention of so-called man-made malaria or man-made breeding-places for Anopheles has received special emphasis. A surprisingly large proportion of the mosquito breeding in malarious districts can be prevented by the simple and obvious expedient of forestalling the creation of artificial breeding-places. Dr. Henry R. Carter estimates that 60 per cent, and in some places as much as 75 per cent, of the malaria is due to man-made breeding-places.

Railroads have been offenders, mainly by leaving borrow pits and interfering with natural drainage. In many cases highway construction has involved the same practices. By the use of improper methods agricultural drainage projects have often created much malaria. The impounding of water for power or other industrial purposes is a prolific source of man-made malaria. Improperly constructed street gutters, leaky hydrants and water-mains, artesian wells, overflowing cesspools, abandoned wells, fire protection water barrels, water troughs, all contribute to the easily preventable Anopheles breeding.

In California a serious malaria problem has been caused by faulty methods of irrigation and gold dredging. Improved methods of dredging are now in general use, but a typical dredge of the old type overturned the gently sloping or level ground of the river valleys leaving behind prolific mosquito breeding-places. The operation of an irrigation system, particularly where the water-supply is plentiful also causes much malaria. Seepage from the canals, often creating marshes a mile or more away, is one of the most serious problems. The excessive use of water, leaky

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Fig. 60.—Inadequate drainage provided in the construction of a state highway

Photograph Excised Here

Fig. 61.—An undrained borrow pit along an improved state highway furnishes an ideal breeding-place for the malaria mosquito. Breeding-places of this kind can usually be prevented if the danger to public health is brought to the attention of highway authorities

turnouts, flumes and dams, and improperly located spillways all result in prolific mosquito breeding-places. As these conditions are the result of carelessness in most instances they are easily remedied by educational measures.

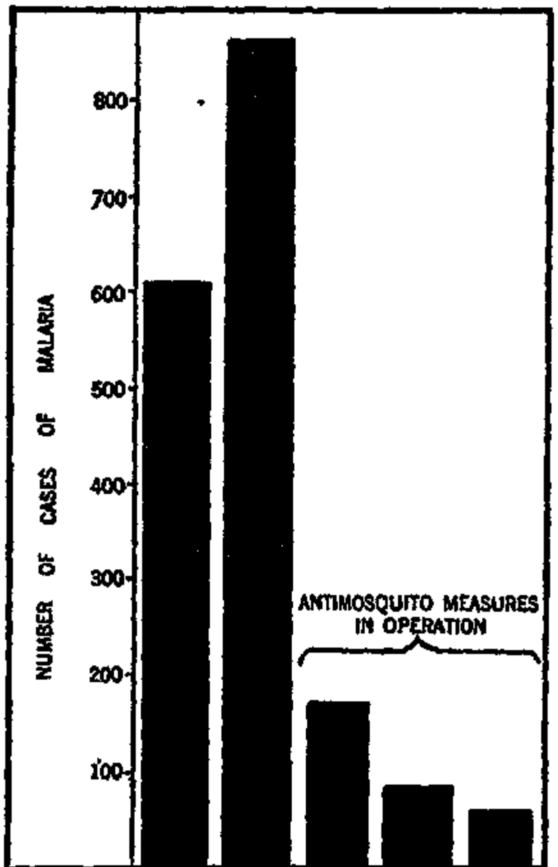
The prevention of man-made malaria is chiefly a problem of education and co-operation under the leadership of the county health officer. Some states have enacted laws applying to railroad, drainage, and highway work, but voluntary co-operation on the part of corporations and highway officials brought about by health officials responsible for malaria control is the method being generally adopted. It is particularly important to secure the co-operation of corporation and public officials because if they create and permit artificial breeding-places on a large scale, the health officers can make little headway in persuading individual property owners to exercise great care in avoiding the creation of breeding-places.

Paris Green as a Larvicide. During 1921 it was discovered by Dr. M. A. Barber of the United States Public Health Service that Paris green serves as a most effective and inexpensive larvicide for the Anopheles mosquito. Dr. Barber and his associates used it in many places with great success during 1922. A mixture of approximately one part of the poison and one hundred parts of road dust, or any fine dust, is thrown into the air by hand so that the wind will carry the dust over the water to be treated. The very small amount of the poison necessary to kill the larvae is not dangerous to live stock or to the person distributing it. The Paris green kills only the Anopheles mosquito in the larval stage; it does not destroy the pupae, nor does it prevent the laying of eggs on the water as is the case with oil. It cannot be relied upon therefore where Culex must be controlled, but its economy commends its use against Anopheles. In Brewton, Alabama, a large pond was successfully controlled for the entire season at a cost of about $5. Effective fish control of the same pond, it is claimed would have required as much as $100 to keep the banks free from vegetation so that the fish could attack the larvae.

Antimalaria versus Antimosquito Work. It has been found by malaria workers throughout the Southern States that it is difficult to carry on antimalaria work without broadening it into an antimosquito campaign. The primary object from the public health point of view is to eradicate or control only the Anopheles mosquitoes, for it is well known that no other mosquito is capable of transmitting the malaria parasite. In most communities, however, experience has seemed to show that for the present it is also advisable to control the annoying mosquitoes—the Culex and Stegomyia (*Aedes aegypti*)—in order to obtain public support for Anopheles prevention measures. "The average layman," writes one county health officer, "while willing to accept the mosquito-borne theory thinks you are splitting hairs too much in laying all the blame on one species of that family. As long as you have mosquitoes puncturing the hide of the average farmer you are going to do very little work in malaria control unless you go after the whole tribe." Freedom from the mosquito

Fig. 62.—Minnow hatcheries maintained by county health departments now a common sight along the highways of many southern states. *Top:* in Houston County, Alabama; *Center right:* road signs like this appear in many parts of Texas; *Center left:* hatchery in Florence, Alabama; *Bottom:* top minnow hatchery in Yazoo County, Mississippi

nuisance makes a stronger appeal to the normal community than the elimination of malaria so that in general it has been found necessary to lay equal emphasis on control of Culex and Anopheles. Culex control in fact is often the more difficult, requiring in some towns 75 per cent or more of the money raised primarily for malaria control. Up to the present time the warfare against Culex mosquitoes has been justified on the ground that it makes the antimalaria work popular and insures a continuous appropriation. But Culex control is not, strictly speaking, a public health problem and with the development of county-wide malaria programs which are not altogether dependent on local sentiment the work may be confined to programs of Anopheles control.



CASES OF MALARIA	610	865	175	88	62
TOTAL COST	—	—	$1,617.41	$250.00	$700.00
PER CAPITA COST	—	—	34c	5c	15c
POPULATION PROTECTED	—	—	4700	4700	4700
YEAR	1918	1919	1920	1921	1922

Fig. 65.—The effect of antimosquito measures on the number of malaria cases in Jacksonville, Texas. This work has the enthusiastic support of the entire community

Dengue Fever in 1922. The case for general antimosquito control received some support in 1922 from the fact that dengue fever was epidemic in many parts of the South. This disease is transmitted by the Stegomyia mosquito, and perhaps by the Culex also, the former usually being classified outside of yellow fever territory as simply a nuisance mosquito. Towns practicing general mosquito control for the elimination of malaria enjoyed comparative freedom from dengue fever in 1922.

Screening Campaigns. An important feature of the county-wide and state-wide malaria programs is the attention given to proper screening. The intensive town demonstrations had shown that under certain conditions, and especially in extensive rural areas, control of mosquito breeding is not practicable with methods in use at present

Fig. 63.—A leaky hydrant may cause serious Anopheles breeding

Fig. 64.—Using Paris green to kill the larvae of the malaria mosquito. It has recently been found by Dr. M. A. Barber, of the United States Public Health Service, that Paris green is an inexpensive and efficient means of controlling the malaria mosquito, especially useful in waters so choked with vegetation that fish cannot reach the larvae

except at prohibitive cost. When this is the case it is still possible to reduce the malaria rate by proper screening of houses. Malaria surveys have usually shown a very small proportion of houses properly constructed and screened to afford protection against the Anopheles mosquito. In one Mississippi county surveyed in 1922 only 44 per cent of the rural homes were well screened: 12 per cent were partly screened and 44 per cent not screened at all.

An effort is now being made throughout the South to encourage the use of screens where Anopheles breeding is not under control and to eliminate the use of all screens of less than sixteen meshes to the inch. The usual methods of education and general publicity—illustrated lectures, exhibitions, newspaper articles, pamphlets, etc. are being used to persuade the public to screen their homes and to buy only 16-mesh screening, and to induce the dealers to handle nothing else. By means of letters and personal conferences the state and county health departments have been successful in enlisting the co-operation of screen dealers over wide areas.

Extension of Fish Control. The value of the top minnow (*Gambusia affinis*) in the control of Anopheles breeding has now been thoroughly demonstrated in many towns throughout the South. Through the county-wide malaria programs fish control is being rapidly extended. During the year many counties have established hatcheries or largely increased the number already in use. The practice has developed of selecting for this purpose suitable ponds located not only at convenient distributing points, but also near the main highways. Conspicuous signs call the attention of the public to the supply of fish and urge the stocking of all ponds, streams, and other breeding-places. Each body of water stocked usually serves effectively as an additional hatchery. In some places it has been found necessary to use exhibits of Gambusia to instruct the public and especially fishermen to protect them. Boy scouts are often very effective in protecting the minnows and stocking numerous minor breeding-places.

Wider experience in the use of fish in malaria control has also served to acquaint health officers and the public with the limitations of the effectiveness of fish. Though a valuable ally, the Gambusia is usually helpless if left to accomplish the task alone. Under most conditions it is necessary to keep down vegetation by cutting or by other means, so that the larvae will not be protected from the fish by barriers which the fish cannot easily penetrate. It has been found necessary also to eliminate the fine floatage such as sawdust, because the larvae escape detection among the small particles of inert matter.

STATISTICAL TABLES

NOTES ON TABLE I

1. Table 1 on the following pages presents a concise statistical summary—by the main geographical divisions of the work, by states and countries, and by years—of the persons examined and treated in the world-wide campaign for the relief and control of hookworm disease aided by the International Health Board. It shows that in the thirteen years from 1910 to 1922, inclusive, a total of 4,016,646 persons have been examined in thirty-seven[1] different states and countries, of whom 2,257,061, or 56.2 per cent, were found infected. Of those infected, 2,724,214, were given at least one treatment; while 1,778,350, or 65.3 per cent, received two or more treatments.

2. Differences between figures which appear in this report and in the 1921 and earlier reports arise (1) from the fact that Table 1 must be prepared for publication each year before final statistical data are received from all areas, and (2) from the further fact that in areas where mass treatment has been followed in previous years the number of persons examined and found infected was estimated on the basis of the findings for those actually examined in preliminary surveys. In the following table the figures represent only those actually examined. It follows, therefore, that for some countries the number of persons treated is in excess of the number of those examined and found infected.

3. Two treatments of a standard remedy remove, on the average, from 88 to 95 per cent of the worms harbored, depending upon the drug used and the method of administration; and it is seldom that they leave more than ten worms in the intestine. Thus, though some persons may remain lightly infected after two treatments, this number is nevertheless adequate to establish what may be termed a "practical" cure. One treatment, similarly, removes from 75 to 90 per cent of the worms.

4. Though the figures have been itemized by states and countries and by years, this has not been done primarily to invite comparison of the results for one state with those for another, or of one year's work with that of another. Too many variable factors affect the results for such comparisons to be entirely valid. For instance, among other reasons, the variations or fluctuations may be due to the density of population or severity of infection in the areas of operation, to size of working staff, or to differences in the plan of work pursued. In other instances, as in British Guiana in 1919 and Dutch Guiana in 1921, the figures may represent results for only a few months instead of a complete year.

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[1] See footnote 3, page 225.

5. The table includes the results of the early dispensary effort aided by the Rockefeller Sanitary Commission in the Southern States. These figures are not itemized by years, but are reported, under the respective states, as the total for the years 1910 to 1914, inclusive. Some of the work for 1914, separately indicated, was aided by the International Health Board. Since 1915, when work by the dispensary plan ceased in these states, the chief effort against hookworm disease has been directed toward the building and use of latrines. Therefore the aggregate figures for examination and treatment are not so large as in previous years, nor do they represent in all cases such thoroughgoing effort in the curative phase of the work.

6. In a number of countries operations were suspended during the war and resumed after its close; in others there have been temporary periods of suspension due to industrial depression, lack of trained directors, or similar causes.

7. Only the results of campaigns aided directly by the International Health Board or Rockefeller Sanitary Commission are included. In a number of countries, as in Brazil, government or voluntary agencies are conducting extensive independent campaigns against the disease, the results of which, if they could be included, would substantially increase the aggregate examinations and treatments.

TABLE 1: *Persons Examined and Treated for Hookworm Disease, 1910 to 1922, inclusive, in World-Wide Campaign Aided by International Health Board. Figures by main geographical divisions of work, by states and countries, and by years*

Division, Country, and State	Persons Examined	Persons Found Infected		Persons Given at Least One Treatment	Persons Given Two or More Treatments	
		Number	Per Cent		Number	Per Cent[1]
ALL COUNTRIES						
All Years	**4,016,646**	**2,257,061**	**56.2**	**2,724,214**	**1,778,350**	**65.3**
1910–1914	1,179,406	458,606	38.9	441,408	213,488	48.4
1914	35,100	17,791	50.8	16,106	11,925	74.0
1915	162,835	93,480	57.4	86,242	60,340	70.0
1916	223,976	133,744	59.7	126,834	93,302	73.6
1917	295,103	183,949	62.3	168,429	137,563	81.7
1918	343,867	217,023	63.1	216,757	164,815	76.0
1919	295,883	175,440	59.4	238,352	199,115	83.5
1920	357,289	208,639	58.4	300,632	241,572	87.0
1921	497,015	315,601	63.5	447,980	230,361	51.4
1922	626,172	452,788	72.3	681,474	425,869	62.5
DIVISIONS						
SOUTHERN STATES						
All Years	**1,413,000**	**518,668**	**36.7**	**498,333**	**239,921**	**49.0**
1910–1914	1,179,406	458,606	38.9	441,408	213,488	48.4
1914	9,211	2,434	26.4	2,264	653	28.8
1915	18,145	3,961	21.8	3,779	931	24.6
1916	22,169	4,569	20.6	4,544	2,939	64.7
1917	37,299	7,834	21.0	7,596	6,293	82.8
1918	44,241	8,074	18.3	7,636	4,681	61.3
1919	26,282	10,266	39.1	9,391	6,689	71.2
1920	44,644	12,732	28.5	12,528	1,554	12.4
1921	31,603	10,192	32.3	9,187	2,693	29.3

WEST INDIES						
All Years	**382,292**	**246,486**	**64.5**	**228,428**	**207,453**	**90.8**
1915	61,604	36,568	59.4	33,648	24,559	73.0
1916	62,642	36,582	58.4	33,077	28,811	87.1
1917	75,779	46,051	60.8	42,739	40,738	95.3
1918	31,314	23,636	75.5	22,057	20,604	93.4
1919	20,350	14,537	71.4	13,534	12,962	95.8
1920	28,890	16,067	55.6	15,274	14,395	94.2
1921	27,402	15,712	63.6	14,443	13,882	96.1
1922	74,311	57,333	77.2	53,656	51,502	96.0
CENTRAL AMERICA						
All Years	**1,156,589**	**715,387**	**61.9**	**633,338**	**470,178**	**74.2**
1914	5,321	2,907	54.6	2,562	578	22.6
1915	83,086	52,951	63.7	48,815	34,850	72.0
1916	131,520	85,235	64.8	82,461	57,534	69.8
1917	127,652	77,585	60.8	71,809	47,204	65.7
1918	173,931	109,193	62.8	95,539	71,316	74.6
1919	175,201	98,857	56.4	86,079	70,061	81.4
1920	148,714	82,272	55.3	70,470	51,016	72.4
1921	138,222	85,444	61.8	71,796	55,634	77.5
1922	172,942	120,943	69.9	103,807	81,985	79.0
SOUTH AMERICA						
All Years	**623,307**	**499,193**	**80.1**	**640,973**	**436,253**	**68.1**
1918	10,490	6,922	66.0	5,894	4,208	71.4
1919	52,775	35,780	67.8	31,233	21,456	68.7
1920	98,956	73,286	75.6	73,901	61,276	82.9
1921	171,764	140,069	81.5	194,598	126,239	64.9
1922	289,322	243,136	84.0	335,347	223,074	66.5

TABLE 1—*Continued*

Division, Country, and State	Persons Examined	Persons Found Infected		Persons Given at Least One Treatment	Persons Given Two or More Treatments	
		Number	Per Cent		Number	Per Cent[1]
The East						
All Years	441,458	277,327	62.8	723,142	424,545	58.7
1914	20,568	12,450	60.5	11,280	10,694	94.8
1916	7,645	7,358	96.3	6,752	4,018	59.5
1917	54,373	52,479	96.5	46,285	43,328	93.6
1918	83,891	69,198	82.5	85,631	64,006	74.7
1919	21,275	16,000	75.0	98,115	87,947	89.6
1920	36,085	24,282	67.3	128,459	113,331	88.2
1921	128,024	64,184	50.1	157,956	31,913	20.2
1922	89,597	31,376	35.0	188,664	69,308	36.7
Southern States						
Alabama						
All Years	86,995	48,852	56.2	48,114	13,372	27.8
1910–1914	74,473	43,718	58.7	43,520	9,857	22.6
1917[2]	564	47	8.3	47	42	89.3
1918[2]	675	79	11.7	79	79	100.0
1919	102	17	16.7	17	17	100.0
1920	4,574	1,335	29.2	1,334	1,227	92.0
1921	6,607	3,656	55.3	3,117	2,150	69.0
Arkansas						
All Years	48,483	8,866	18.3	6,705	1,614	24.1
1910–1914	47,983	8,863	18.5	6,702	1,614	24.1
1918[2]	500	3	.6	3		

Division, Country, and State	Persons Examined	Persons Found Infected		Persons Given at Least One Treatment	Persons Given Two or More Treatments	
		Number	Per Cent		Number	Per Cent[1]
Georgia						
All Years	75,341	46,058	61.1	45,552	14,497	31.8
1910–1914	73,518	45,564	62.0	45,095	14,521	32.2
1919	1,518	373	24.6	336	107	31.8
1920[2]	305	121	39.7	121	121	100.0
Kentucky						
All Years	134,855	44,404	32.9	38,611	872	2.3
1910–1914	128,991	43,635	34.6	37,916	475	1.3
1915[2]	1,833	460	25.1	460	316	68.7
1920	2,541	169	6.6	116	56	48.3
1921	1,490	140	9.4	119	25	21.0
Louisiana						
All Years	74,388	39,342	52.9	38,556	14,858	38.5
1910–1914	68,165	37,720	55.3	37,225	14,524	39.0
1914[2]	2,568	879	34.2	876	324	37.0
1918[2]	1,161	208	17.9	55		
1921	2,474	535	21.6	400	10	2.5
Mississippi						
All Years	280,757	109,809	39.1	108,323	74,496	68.8
1910–1914	184,944	75,813	41.0	74,598	58,687	78.7
1915	4,414	1,422	32.2	1,410	53	3.8
1916	3,780	1,466	38.8	1,455	1,182	81.2
1917	14,874	4,348	29.2	4,223	4,223	100.0
1918[2]	8,468	4,084	48.2	4,069	3,541	87.0
1919	16,036	8,479	52.9	8,471	6,461	76.3
1920	31,198	9,730	31.3	9,730	42	.4
1921	17,043	4,467	26.2	4,377	307	7.0
North Carolina						
All Years	337,179	112,639	33.4	106,828	60,264	56.4
1910–1914	300,457	104,279	34.7	99,075	57,538	58.1
1914[2]	4,837	1,429	29.5	1,321	294	22.3

TABLE 1—*Continued*

Division, Country, and State	Persons Examined	Persons Found Infected		Persons Given at Least One Treatment	Persons Given Two or More Treatments	
		Number	Per Cent		Number	Per Cent[1]
North Carolina—Cont'd						
1915[2]	3,405	898	26.4	802	228	28.4
1917	9,048	2,057	22.7	1,984	1,149	57.9
1918	18,431	3,503	19.0	3,272	987	30.2
1920	728	238	32.7	142		
1921	273	235	86.1	232	68	29.3
South Carolina						
All Years	**101,442**	**47,696**	**47.0**	**45,811**	**22,853**	**49.9**
1910–1914	81,311	42,677	52.5	41,751	21,413	51.2
1914[2]	840	90	10.7	31	4	12.9
1915[2]	3,581	721	20.1	648	230	35.5
1916	6,665	1,991	29.9	1,980	1,206	60.9
1918[2]	931	24	2.6			
1919	4,966	1,057	21.3	327		
1920	2,268	989	43.6	965		
1921	880	147	16.7	110		
Tennessee						
All Years	**81,582**	**22,310**	**27.3**	**21,680**	**16,087**	**74.2**
1910–1914	74,997	21,410	28.5	20,979	15,828	75.4
1915[2]	1,172	116	9.9	116	20	17.2
1916	1,217	49	4.0	48	23	47.9
1917	856	129	15.1	126	71	56.3
1918	127	3	2.4	3	2	66.7
1919	378	17	4.5	9	3	33.3
1920	608	26	4.3	17	7	41.2
1921	2,227	560	25.1	382	133	34.8

Texas						
All Years	**89,482**	**19,947**	**22.5**	**19,942**	**4,861**	**24.9**
1910–1914	63,376	17,790	28.1	17,490	3,588	20.5
1916[2]	2,801	570	20.3	568	357	62.9
1917	7,084	1,058	14.9	1,021	662	64.8
1918	11,025	81	.7	70	51	72.9
1919	3,044	322	10.6	230	103	44.8
1920	2,115	123	5.8	112	100	89.3
1921	37	3	8.1	1		
Virginia						
All Years	**102,516**	**18,745**	**18.3**	**18,660**	**16,394**	**87.9**
1910–1914	81,191	17,137	21.1	17,057	15,941	93.5
1914[2]	966	36	3.7	36	31	86.1
1915[2]	3,740	344	9.2	343	84	24.5
1916	7,706	493	6.4	493	171	34.7
1917	4,873	195	4.0	195	146	74.9
1918	2,923	89	3.0	85	21	24.7
1919	238	1	.4	1		
1920[2]	307	1	.3	1	1	100.0
1921	572	449	78.5	449		
West Indies						
Antigua						
Both Years	**18,599**	**2,919**	**15.7**	**2,634**	**2,566**	**97.4**
1916[2]	7,477	2,229	29.8	2,054	2,031	98.9
1917[2]	11,122	690	6.2	580	535	92.2
British Guiana						
All Years	**71,322**	**44,073**	**61.8**	**39,906**	**35,494**	**88.9**
1915	21,070	13,135	62.3	11,903	10,039	84.3
1916	18,498	9,808	53.0	8,263	6,226	75.3
1917	16,044	9,508	59.3	8,906	8,722	97.9
1918	11,719	8,727	74.5	8,175	7,900	96.6
1919[2]	3,991	2,895	72.5	2,659	2,508	94.3

TABLE 1—*Continued*

Division, Country, and State	Persons Examined	Persons Found Infected: Number	Persons Found Infected: Per Cent	Persons Given at Least One Treatment	Persons Given Two or More Treatments: Number	Persons Given Two or More Treatments: Per Cent[1]
Dutch Guiana						
All Years	**30,202**	**28,133**	**93.1**	**26,145**	**24,974**	**95.5**
1916	4,411	3,900	88.4	3,667	3,414	93.1
1917	13,159	12,045	91.5	11,133	10,664	95.8
1921[2]	924	817	88.4	744	714	96.0
1922	11,708	11,371	97.1	10,601	10,182	96.0
Grenada						
All Years	**31,706**	**20,662**	**65.2**	**20,571**	**15,650**	**76.1**
1915	18,584	11,194	60.2	11,522	8,064	70.0
1916	5,312	4,226	79.6	4,147	2,950	71.1
1917	7,810	5,242	67.1	4,902	4,636	94.6
Jamaica						
All Years	**33,137**	**11,833**	**35.7**	**10,701**	**9,988**	**93.3**
1919[2]	2,842	1,552	54.6	1,346	1,291	95.9
1920[2]	13,748	3,915	28.5	3,605	3,203	88.8
1921	9,807	3,085	31.5	2,754	2,635	95.7
1922[2]	6,740	3,281	48.7	2,996	2,859	95.4
Porto Rico						
1922	**22,413**	**18,504**	**82.6**	**17,223**	**16,957**	**98.5**
Saint Lucia						
All Years	**48,799**	**30,598**	**64.0**	**29,384**	**24,534**	**83.5**
1915	7,924	4,436	56.0	4,106	2,177	53.0
1916	6,008	2,336	38.9	2,201	1,904	86.5
1917	4,601	3,060	66.5	2,962	2,653	89.6
1918	5,004	3,126	62.5	2,892	2,068	71.5
1919	4,350	2,597	59.7	2,547	2,364	92.8
1920	6,373	4,743	74.4	4,656	4,331	93.0
1921	3,181	2,274	71.5	2,225	2,164	97.3
1922	11,363	8,026	77.4	7,795	6,873	88.2
Saint Vincent						
All Years	**21,915**	**12,758**	**58.2**	**11,905**	**11,383**	**95.6**
1915[2]	3,822	1,676	43.9	1,590	1,562	98.2
1916	7,494	4,062	54.2	3,748	3,653	97.5
1917	9,482	6,065	64.0	5,683	5,303	93.3
1918[2]	1,117	955	85.5	884	865	97.8
Trinidad						
All Years	**104,199**	**77,006**	**73.9**	**66,959**	**66,007**	**98.6**
1915[2]	10,204	6,127	60.0	4,527	2,717	60.0
1916	13,447	10,021	74.5	8,997	8,634	96.0
1917	13,561	9,441	69.6	8,573	8,225	95.9
1918	13,474	10,828	80.4	10,106	9,771	96.7
1919[2]	9,167	7,493	81.7	6,982	6,799	97.4
1920	8,760	7,409	84.5	7,013	6,861	97.8
1921	13,490	9,536	70.7	8,720	8,369	96.0
1922	22,087	16,151	73.1	15,041	14,631	97.3
CENTRAL AMERICA						
Costa Rica						
All Years	**346,273**	**183,191**	**52.9**	**167,761**	**117,798**	**70.2**
1915	30,297	19,401	64.0	18,816	12,152	64.6
1916	40,579	22,608	55.7	22,037	9,899	44.9
1917	48,488	29,040	61.7	28,909	19,180	66.3
1918	56,371	29,898	53.0	27,487	19,154	69.7
1919	64,371	29,872	46.4	26,551	22,798	85.9
1920[2]	36,342	10,743	29.6	9,006	6,415	71.2
1921	37,902	18,991	50.1	15,677	12,398	79.1
1922	31,923	21,738	68.1	19,278	15,802	82.0

TABLE 1—*Continued*

Division, Country, and State	Persons Examined	Persons Found Infected		Persons Given at Least One Treatment	Persons Given Two or More Treatments	
		Number	Per Cent		Number	Per Cent[1]
Guatemala						
All Years	**231,756**	**150,050**	**64.7**	**133,171**	**119,126**	**89.5**
1915[2]	25,587	15,001	58.6	13,783	11,851	86.0
1916	39,596	26,665	67.3	25,961	23,618	91.0
1917[2]	13,670	7,198	52.7	6,777	6,552	96.7
1918[2]	32,861	22,299	67.9	19,950	19,057	95.5
1919	44,495	28,752	64.6	25,283	23,639	93.5
1920	21,469	12,605	58.7	11,429	10,402	91.0
1921	25,405	19,020	74.9	14,337	11,185	78.0
1922	28,673	18,310	63.9	15,651	12,822	81.9
Honduras						
1922[2]	**4,903**	**2,083**	**42.5**	**1,547**	**702**	**45.4**
Nicaragua						
All Years	**187,647**	**126,149**	**67.2**	**109,693**	**66,394**	**60.5**
1915[2]	2,192	1,659	75.7	1,298	18	1.4
1916[2]	12,829	9,073	70.7	8,362	1,166	13.9
1917	33,781	18,422	54.5	16,950	5,652	33.3
1918	24,186	16,760	69.3	15,042	9,524	63.3
1919	12,246	5,820	47.5	4,829	2,146	44.4
1920	41,627	28,964	69.6	24,502	17,157	70.0
1921	23,183	16,312	70.4	13,940	11,265	80.8
1922	37,603	29,139	77.5	24,770	19,466	78.6
Panama						
All Years	**145,722**	**116,507**	**80.0**	**104,415**	**78,328**	**75.0**
1914[2]	5,321	2,907	54.6	2,562	578	22.6
1915	25,010	16,890	67.5	14,918	10,829	72.6

1916	30,094	24,193	80.4	23,747	21,340	89.9
1917	16,676	14,088	84.5	13,262	11,126	83.9
1918	16,185	13,656	84.4	11,966	9,537	79.7
1919	15,307	13,490	88.1	11,812	8,313	70.4
1920	13,104	10,050	76.7	8,353	4,009	48.0
1921	5,932	5,014	84.5	4,595	3,151	68.6
1922	18,093	16,219	89.6	13,200	9,445	71.6
Salvador						
All Years	**240,288**	**137,407**	**57.2**	**116,751**	**87,830**	**75.2**
1916[2]	8,422	2,696	32.0	2,354	1,511	64.2
1917	15,037	7,937	52.8	5,911	4,694	79.4
1918	44,328	26,580	60.0	21,094	14,044	66.6
1919	38,782	20,923	54.0	17,604	13,165	74.8
1920	36,172	19,710	54.5	17,180	13,033	75.9
1921	45,800	26,107	56.9	23,247	17,635	75.9
1922	51,747	33,454	64.6	29,301	23,748	97.9
SOUTH AMERICA						
Brazil[3]						
All Years	**508,448**	**393,182**	**77.3**	**538,009**	**348,393**	**63.8**
1918[2]	10,490	6,922	66.0	5,894	4,208	71.4
1919	52,775	35,780	67.8	31,233	21,456	68.7
1920	92,093	67,243	72.2	68,207	56,923	83.5
1921	131,288	101,417	77.2	157,739	92,883	58.9
1922	221,802	181,820	82.0	274,936	172,923	62.9
Colombia						
All Years	**114,859**	**106,011**	**92.3**	**102,964**	**87,860**	**85.3**
1920[2]	6,863	6,043	88.1	5,694	4,353	76.4
1921	40,476	38,652	95.5	36,859	33,356	90.5
1922	67,520	61,316	90.8	60,411	50,151	83.0

TABLE 1—*Continued*

Division, Country, and State	Persons Examined	Persons Found Infected		Persons Given at Least One Treatment	Persons Given Two or More Treatments	
		Number	Per Cent		Number	Per Cent[1]
THE EAST						
Australia[3]						
All Years	**112,278**	**10,333**	**9.2**	**9,986**	**9,770**	**97.8**
1920[2]	5,008	350	7.0	345	345	100.0
1921	56,710	4,741	8.4	4,434	4,421	99.7
1922	50,560	5,242	10.4	5,207	5,004	96.1
Borneo						
Both Years	**15,059**	**12,428**	**82.5**	**22,039**	**18,402**	**83.4**
1921[2]	5,325	4,556	85.6	10,568	9,951	94.2
1922	9,734	7,872	80.9	11,471	8,451	73.7
Ceylon						
All Years	**117,034**	**105,658**	**90.3**	**413,173**	**350,540**	**84.8**
1916[2]	7,645	7,358	96.3	6,752	4,018	59.5
1917	42,828	41,613	97.2	35,675	33,440	93.7
1918	26,424	25,624	97.0	50,374	47,181	93.7
1919	15,542	11,852	77.5	88,602	84,712	95.6
1920	16,961	12,814	75.5	117,337	112,089	95.5
1921	497	422	84.9	20,958	16,533	78.9
1922	7,137	5,975	83.7	93,475	52,567	56.2
China						
Both Years	**14,529**	**8,493**	**58.5**	**6,542**	**2,669**	**40.8**
1918[2]	12,504	7,556	60.4	5,694	2,519	44.2
1919[2]	2,025	937	46.3	848	150	17.7
Egypt						
1914	**20,568**	**12,450**	**59.7**	**11,280**	**10,694**	**85.9**
Fiji						
All Years	**11,041**	**8,534**	**77.3**	**50,220**	**5,754**	**11.5**
1917[2]	3,434	3,088	89.9	3,010	2,877	95.6
1918[2]	3,190	2,887	80.5	2,770	2,674	96.5
1922[2]	4,417	2,559	57.9	44,440	203	.5
Mauritius						
1922[2]	**12,643**	**5,279**	**41.8**	**3,680**	**3,083**	**83.8**
Seychelles						
All Years	**23,819**	**21,004**	**88.2**	**20,251**	**19,386**	**95.7**
1917[2]	8,111	7,778	95.9	7,600	7,011	92.3
1918	10,475	9,113	87.0	8,671	8,449	97.4
1919	3,708	3,211	86.6	3,127	3,085	98.6
1920[2]	1,525	902	59.1	853	841	98.6
Siam						
All Years	**114,487**	**93,148**	**81.4**	**185,971**	**4,247**	**2.3**
1918	31,298	24,018	76.7	18,122	3,183	17.6
1919				5,538		
1920[2]	12,591	10,216	81.1	9,924	56	.6
1921	65,492	54,465	83.2	121,996	1,008	.8
1922	5,106	4,449	87.1	30,391		

[1] Based on the total number of persons receiving at least one treatment.
[2] Represents part-year effort only.
[3] States of Brazil and Australia not indicated separately.

TABLE 2: *Expenditures of the International Health Board for the*

Activity, State, and Country	July 1, 1913–Dec. 31, 1915	1916	1917	1918
Grand Total	**$491,192.99**	**$506,087.48**	**$578,367.75**	**$1,121,862.86**
Relief and Control of Hookworm Disease.	327,794.87	306,574.04	369,988.49	457,953.94
County Health Work	....	....	182.95	2,494.53
Malaria Control	....	54,496.97	39,978.58	26,489.29
Yellow Fever Control	....	41,863.17	9,344.03	46,639.17
Tuberculosis in France............	....	....	51,856.24	433,030.43
Public Health Education.............	....	9,256.74	12,376.63	36,642.82
Public Health Administration...........	....	....	....	....
Public Health Laboratory Service.......	....	....	....	....
Philippine Hospital Ship..............	25,000.00	....	....	12,500.00
Investigation of Sewage Disposal at Rural Homes	....	664.39	5,359.11	4,288.01
Field Staff Salaries, Expenses, etc., not Prorated to Specific Budgets	25,229.15	4,687.45	9,232.30	5,345.82
Miscellaneous.......	30,196.00	27,628.35	18,191.76	23,034.17
Administration.......	82,972.97	60,916.37	61,857.66	73,444.68
Relief and Control of Hookworm Disease	**327,794.87**	**306,574.04**	**369,988.49**	**457,953.94**
United States *	89,565.64	47,565.09	53,446.11	87,284.58
West Indies.......	91,101.16	88,845.12	87,764.12	57,800.06
Central America ...	74,932.01	88,123.29	98,483.25	113,545.86
South America	....	4,779.77	43,309.16	97,031.00
The East.........	56,719.85	77,260.77	84,912.45	97,932.47
Miscellaneous	15,576.21	....	2,073.40	4,359.97
United States:*	**89,565.64**	**47,565.09**	**53,446.11**	**87,284.58**
Alabama..........	4,343.33	....	1,235.97	5,922.09
Arkansas..........	....	....	2,462.59	2,784.41
Georgia...........	22,822.59	....	2,436.95	5,418.95
Kentucky.........	9,766.49	4,866.63	2,200.00	2,064.97
Louisiana.........	529.38	1,813.19	1,278.66	1,317.93
Mississippi........	11,719.14	8,786.77	9,223.36	9,427.52
North Carolina	3,026.99	3,282.34	8,548.71	15,775.89
South Carolina	5,872.56	5,643.52	7,967.22	13,870.12

* In September, 1917, the hookworm work in the Southern States began to be absorbed in the
being longer in some states than in others, it was not possible to announce until the end of 1920
regular functions, responsibility for all efforts directed toward the relief and control of hookworm

Years 1913 to 1922, Inclusive, Covering All Activities

1919	1920	1921	1922	Total
$1,436,355.00	**$1,658,572.61**	**$1,701,185.96**	**$1,864,988.44**	**$9,358,613.09**
509,091.99	621,520.98	457,486.99	497,300.23	3,547,711.53
2,439.25	8,182.77	167,765.19	205,701.78	386,756.47
34,965.08	133,929.02	150,551.39	155,938.84	596,349.17
94,526.42	139,757.40	239,057.53	209,981.99	781,169.71
602,775.78	518,013.51	359,540.31	268,274.49	2,233,490.76
38,367.71	68,373.54	89,094.44	173,332.39	427,444.27
....	....	....	77,917.73	77,917.73
....	....	16,109.70	26,304.39	42,414.09
6,500.00	....	....	....	44,000.00
778.60	....	....	....	11,090.11
21,701.87	26,074.89	38,936.95	61,605.65	192,814.08
46,901.63	51,248.30	59,652.90	17,719.15	274,572.26
78,306.67	91,472.20	122,990.56	170,911.80	742,872.91
509,091.99	**621,520.98**	**457,486.99**	**497,300.23**	**3,547,711.53**
110,860.17	136,019.06	15,730.39	7,510.26	547,981.30
48,457.24	61,857.73	85,541.60	110,039.59	631,406.62
111,684.19	98,303.98	77,920.73	86,960.59	749,953.90
157,555.86	206,486.22	150,422.24	168,548.81	828,133.06
80,014.39	113,472.55	121,805.46	116,734.95	748,852.89
520.14	5,381.44	6,066.57	7,506.03	41,383.76
110,860.17	**136,019.06**	**15,730.39**	....	**540,471.04**
5,283.74	17,256.71	....	....	34,041.84
....	....	....	....	5,247.00
4,604.21	4,525.39	....	....	39,808.09
1,978.40	16,599.03	....	....	37,475.52
1,370.18	....	....	....	6,309.34
15,773.21	20,709.72	....	....	75,639.72
13,924.04	10,463.00	....	....	55,020.97
14,754.86	17,210.63	....	....	65,318.91

programs of the rapidly developing county departments of health. The period of transition that in all the states the county health departments would henceforth assume as one of their and other soil-borne diseases.

TABLE 2: *Expenditures of the International Health Board for the*

Activity, State, and Country	July 1, 1913–Dec. 31, 1915	1916	1917	1918
Relief and Control of Hookworm Disease—*Continued*				
United States—*Cont'd*				
Tennessee	$11,889.72	$5,797.57	$6,585.02	$6,642.20
Texas	8,175.55	9,971.36	5,170.48	9,362.85
Virginia	6,622.97	7,403.71	6,337.15	5,947.86
Administration	....	....	....	8,749.79
County Dispensary Work in the South	4,796.92	....	....	....
Resurveys	....	....	....	....
West Indies:	**91,101.16**	**88,845.12**	**87,764.12**	**57,800.06**
Antigua	5,518.29	9,316.68	4,758.87	....
Barbados (survey)	....	1,651.31	....	....
British Guiana*	23,011.42	18,554.45	19,231.23	16,504.11
Cayman Islands (survey)	....	....	1,795.16	....
Dutch Guiana *	3,260.93	11,672.46	19,168.40	4,389.11
Grenada	17,597.13	10,154.65	7,778.80	1,833.74
Jamaica	....	....	....	3,937.85
Porto Rico	....	....	....	....
Santo Domingo (survey)	....	....	....	....
St. Lucia	10,791.06	6,295.20	6,865.60	8,152.28
St. Vincent	9,169.18	6,825.15	9,384.18	6,383.25
Tobago (survey)	....	....	1,072.22	....
Trinidad	17,376.86	15,104.04	10,898.37	12,301.48
Administration	4,376.29	9,271.18	6,811.29	4,298.24
Central America:	**74,932.01**	**88,123.29**	**98,483.25**	**113,545.86**
British Honduras (survey)	....	4,273.47	....	....
Costa Rica	26,087.66	18,089.98	21,752.31	21,330.40
Guatemala	10,618.22	11,954.29	13,346.70	20,816.27
Honduras	....	....	....	....
Nicaragua	7,962.80	18,430.69	19,418.74	22,454.30
Panama	28,645.96	24,449.62	22,881.75	24,312.26
Salvador	....	10,925.24	21,083.75	17,573.90
Administration	1,617.37	....	....	7,058.73
South America:	....	**4,779.77**	**43,309.16**	**97,031.00**
Brazil	....	4,779.77	43,309.16	97,031.00
Colombia	....	....	....	....

* For administrative reasons British and Dutch Guiana, although on the mainland of South

Years 1913 to 1922, Inclusive, Covering All Activities—Cont'd

1919	1920	1921	1922	Total
$10,201.59	$13,533.22	$........	$........	$54,649.32
22,380.20	14,723.99	....	....	69,784.43
10,012.42	14,965.17	....	....	51,289.28
10,577.32	6,032.20	....	....	25,359.31
....	....	....	....	4,796.92
....	....	15,730.39	7,510.26	23,240.65
48,457.24	**61,857.73**	**85,541.60**	**110,039.59**	**631,406.62**
....	....	....	2,552.67	22,146.51
....	....	....	....	1,651.31
9,984.28	486.37	1,281.02	248.37	89,301.25
....	....	....	....	1,795.16
613.23	570.34	12,917.66	17,786.64	70,378.77
....	....	....	....	37,364.32
9,832.48	18,400.09	16,949.24	23,241.56	72,361.22
....	7,823.35	18,290.86	28,450.98	54,565.19
....	1,077.07	....	....	1,077.07
8,109.32	11,444.57	8,545.88	9,378.80	69,582.71
....	....	....	....	31,761.76
....	....	....	....	1,072.22
15,293.43	16,016.71	17,489.50	17,590.83	122,071.22
4,624.50	6,039.23	10,067.44	10,789.74	56,277.91
111,684.19	**98,303.98**	**77,920.73**	**86,960.59**	**749,953.90**
....	....	....	....	4,273.47
20,492.01	20,219.60	14,061.66	6,355.05	148,388.67
19,514.73	17,126.43	15,362.58	18,467.99	127,207.21
....	....	....	10,736.24	10,736.24
26,164.44	18,745.12	21,479.43	15,894.48	150,550.00
18,565.05	20,061.02	23,496.22	18,675.03	181,086.91
17,162.10	14,973.80	3,520.84	8,283.79	93,523.42
9,785.86	7,178.01	....	8,548.01	34,187.98
157,555.86	**206,486.22**	**150,422.24**	**168,548.81**	**828,133.06**
155,430.38	193,560.95	131,787.27	146,852.50	772,751.03
2,125.48	12,925.27	18,634.97	21,696.31	55,382.03

America, are considered West Indian colonies.

TABLE 2: *Expenditures of the International Health Board for the*

Activity, State, and Country	July 1, 1913–Dec. 31, 1915	1916	1917	1918
Relief and Control of Hookworm Disease *Continued*				
The East:	$56,719.85	$77,260.77	$84,912.45	$97,932.47
Uncinariasis Commission to Orient	15,504.31	19,406.36	16,572.64	....
Australia..........	....	....	....	....
British North Borneo............	....	....	....	....
British Solomon Islands (survey)...	....	....	....	....
Ceylon...........	2,073.07	21,585.84	30,340.00	36,041.44
China............	....	....	3,981.58	12,400.87
Egypt............	26,074.78	....	....	....
Fiji..............	....	3,386.37	5,776.92	5,579.84
Java (survey)	....	327.66	....	....
India.............	....	....	....	....
Mauritius.........	....	....	....	....
Papua and Queensland............	....	....	4,074.84	18,633.50
Seychelles Islands..	589.06	3,933.29	7,409.69	8,089.06
Siam.............	....	6,147.52	6,458.57	13,042.15
Administration	12,748.63	22,473.73	10,298.21	4,145.61
Miscellaneous:	15,476.21	....	2,073.40	4,359.97
Field Research	....	....	....	....
Research in Life History of Hookworm Eggs and Larvae.........	....	....	....	....
Study of Methods of Diagnosing Hookworm Disease ...	....	....	....	....
Conferences, Health Officers of Southern States.......	....	....	2,073.40	2,990.76
Motion Picture Film on Hookworm Disease.........	....	....	....	....
Lecture Charts	....	....	....	17.40
Salvador, Portable House and Office	....	....	....	945.35
Salvador, Loss from Earthquake.....	....	....	....	406.46
Thymol...........	15,476.21	....	....	....
Dutch Guiana, Care and Storage of Motor Boat and Supplies........	....	....	....	....

* Reports incomplete.

Years 1913 to 1922, Inclusive, Covering All Activities—Cont'd

1919	1920	1921	1922	Total
$80,014.39	**$113,472.55**	**$121,805.46**	**$116,734.95**	**$748,852.89**
....	....	....	....	51,483.31
15,902.95	35,417.41	39,912.29	35,375.57	126,608.22
....	3,106.23	7,440.10	*5,657.41	16,203.74
....	....	1,378.85	225.60	1,604.45
32,497.87	33,779.28	23,689.34	15,041.57	195,048.41
12,187.58	....	....	....	28,570.03
....	....	....	....	26,074.28
....	....	498.64	10,053.55	25,895.32
....	....	....	....	327.66
....	7,810.00	12,496.30	9,883.53	30,189.83
....	5,688.56	....	7,356.43	13,044.99
....	....	....	....	22,708.34
8,291.90	4,643.03	....	....	32,956.03
7,514.66	15,850.03	18,429.18	23,993.28	91,435.39
3,619.43	7,178.01	17,960.76	8,548.01	86,702.39
520.14	**5,381.44**	**6,066.57**	**7,506.03**	**41,383.76**
....	....	....	1,006.35	1,006.35
....	....	3,618.83	5,714.61	9,333.44
43.95	....	500.00	758.57	1,302.52
....	2,488.71	....	....	7,552.87
....	2,817.73	1,584.74	....	4,402.47
....	....	....	....	17.40
476.19	75.00	....	26.50	1,523.04
....	....	....	....	406.46
....	....	....	....	15,476.21
....	....	363.00	....	363.00

TABLE 2: *Expenditures of the International Health Board for the*

Activity, State, and Country	July 1, 1913–Dec. 31, 1915	1916	1917	1918
County Health Work *	$........	$........	$182.95	$2,494.53
United States:				
Alabama......	....	....	....	....
California.....	....	....	....	....
Florida.......	....	....	....	....
Georgia.......	....	....	....	....
Illinois	....	....	....	....
Indiana.......	....	....	....	....
Iowa.........	....	....	....	....
Kansas.......	....	....	....	....
Kentucky.....	....	....	....	....
Louisiana	....	....	....	....
Maryland.....	....	....	182.95	2,494.53
Mississippi....	....	....	....	....
Missouri......	....	....	....	....
New Mexico ..	....	....	....	....
North Carolina	....	....	....	....
Oregon.......	....	....	....	....
South Carolina	....	....	....	....
Tennessee.....	....	....	....	....
Texas........	....	....	....	....
Virginia	....	....	....	....
West Virginia..	....	....	....	....
Administration	....	....	....	....
South America:				
Brazil........	....	....	....	....
Malaria Control	....	54,496.97	39,978.58	26,489.29
United States:				
Alabama......	....	....	....	....
Arkansas	....	11,104.58	4,276.23	4,749.02
California.....	....	....	....	....
Georgia.......	....	....	....	....
Illinois	....	....	....	....
Louisiana	....	....	....	....
Mississippi....	....	43,392.39	35,702.35	21,740.27
Missouri......	....	....	....	....
North Carolina	....	....	....	....
South Carolina	....	....	....	....
Tennessee.....	....	....	....	....
Texas........	....	....	....	....
Virginia	....	....	....	....
Administration	....	....	....	....

* In September, 1917, the hookworm work in the Southern States began to be absorbed in the being longer in some states than in others, it was not possible to announce until the end of 1920 regular functions, responsibility for all efforts directed toward the relief and control of hookworm
** Reports incomplete.

Years 1913 to 1922, Inclusive, Covering All Activities—Cont'd

1919	1920	1921	1922	Total
$2,439.25	**$8,182.77**	**$167,765.19**	**$205,701.78**	**$386,766.47**
....	....	18,231.35	21,915.97	40,147.32
....	....	....	607.22	607.22
....	....	237.75	772.08	1,009.83
....	....	4,338.17	2,790.68	7,128.85
....	....	....	1,927.94	1,927.94
....	....	....	**1,641.66	1,641.66
....	....	....	954.18	954.18
....	4,494.00	6,316.99	13,095.38	23,906.37
....	....	16,316.41	16,057.84	32,374.25
....	....	5,618.28	15,397.58	21,015.86
2,264.25	....	1,762.59	7,168.18	13,872.50
....	....	15,652.72	11,713.47	27,366.19
....	....	600.00	9,391.41	9,991.41
....	957.04	10,837.52	**8,508.03	20,302.59
....	....	14,413.38	7,169.78	21,583.16
....	....	....	4,441.17	4,441.17
....	....	17,651.97	12,302.18	29,954.15
....	....	14,686.42	**14,406.26	29,092.68
....	....	12,765.65	**13,765.65	26,531.30
....	....	13,972.74	11,319.44	25,292.18
175.00	2,731.73	4,164.56	5,089.15	12,160.44
....	....	10,198.70	12,968.13	23,166.83
....	....	....	12,298.40	12,298.40
34,965.08	**133,929.02**	**150,551.39**	**155,938.84**	**596,349.17**
....	8,906.92	7,650.06	15,416.93	31,973.91
13,505.66	7,048.90	4,777.15	6,388.11	51,849.65
....	....	....	3,111.12	3,111.12
....	1,230.86	....	2,017.08	3,247.94
....	....	....	422.80	422.80
....	30,699.94	22,929.88	17,365.78	70,995.60
21,167.37	27,537.43	21,185.61	8,901.06	179,626.48
....	....	1,471.37	2,900.00	4,371.37
....	7,526.13	18,676.30	9,046.96	35,249.39
....	13,942.74	13,321.90	10,892.31	38,156.95
....	1,969.94	1,512.56	**3,666.65	7,149.15
....	11,472.34	10,347.23	2,307.84	24,127.41
....	5,284.84	831.65	6,062.08	12,178.57
....	6,032.20	10,198.68	....	16,230.88

programs of the rapidly developing county departments of health. The period of transition that in all the states the county health departments would henceforth assume as one of their and other soil-borne diseases.

TABLE 2: *Expenditures of the International Health Board for the*

Activity, State, and Country	July 1, 1913–Dec. 31, 1915	1916	1917	1918
Malaria Control—*Continued*				
Foreign Countries:				
Argentina	$........	$........	$........	$........
Brazil	....	....	....	....
Ecuador	....	....	....	....
Nicaragua	....	....	....	....
Palestine	....	....	....	....
Philippine Islands	....	....	....	....
Porto Rico	....	....	....	....
Miscellaneous:				
Conference of Malaria Workers	....	....	....	....
Study of Source of Blood Meals of Anopheles Mosquitoes	....	....	....	....
Yellow Fever Control	....	**41,863.17**	**9,344.03**	**46,639.17**
Yellow Fever Commission	....	41,863.17	7,727.74	....
East Coast of Brazil and Caribbean	....	....	1,616.29	2,897.97
Brazil	....	....	....	....
Ecuador	....	....	....	29,473.98
Guatemala	....	....	....	14,267.22
Mexico and Central America	....	....	....	....
Peru	....	....	....	....
Salvador	....	....	....	....
Epidemic Work	....	....	....	....
Training of Personnel for Commission to West Africa	....	....	....	....
Vaccine and Serum	....	....	....	....
History of Yellow Fever	....	....	....	....
Tuberculosis in France	....	....	**51,856.24**	**443,030.43**
Inauguration of Work	....	....	18,671.74	....
Department of Organization	....	....	....	....

* Reports incomplete.

Years 1913 to 1922, Inclusive, Covering All Activities—Cont'd

1919	1920	1921	1922	Total
$........	$........	$5,661.02	$........	$5,661.02
292.05	....	....	22,043.09	22,335.14
....	4,595.59	....	....	4,595.59
....	425.66	6,662.51	8,091.00	15,179.17
....	....	....	*7,250.11	7,250.11
....	....	....	6,077.50	6,077.50
....	5,445.18	24,914.84	23,978.42	54,338.44
....	1,810.35	245.00	....	2,055.35
....	....	165.63	....	165.63
94,526.42	**139,757.40**	**239,057.53**	**209,981.99**	**781,169.71**
44,271.12	83,717.13	....	....	177,579.16
....	....	....	....	4,514.26
....	....	461.30	469.68	930.98
48,396.77	28,574.98	1,698.06	3,017.05	111,160.84
967.82	....	....	....	15,235.04
....	....	156,562.54	161,221.39	317,783.93
....	....	80,335.63	36,041.68	116,377.31
890.71	3,926.26	....	....	4,816.97
....	23,539.03	....	....	23,539.03
....	....	....	3,000.00	3,000.00
....	....	....	6,000.00	6,000.00
....	....	....	232.19	232.19
602,775.78	**518,013.51**	**359,540.31**	**268,274.49**	**2,233,490.76**
....	....	....	....	18,671.74
....	139,364.76	47,281.28	24,044.27	210,690.31

TABLE 2: *Expenditures of the International Health Board for the*

Activity, State, and Country	July 1, 1913–Dec. 31, 1915	1916	1917	1918
Tuberculosis in France—*Cont'd*				
Public Health Division	$........	$........	$........	$........
Central Administration	....	....	18,292.10	80,037.65
Educational Division	....	....	5,316.39	85,755.19
Medical Division	....	....	9,576.01	267,237.59
Contingent Fund	....	....	....	....
Postgraduate Tuberculosis Courses	....	....	....	....
Public Health Education	....	9,256.74	12,376.63	36,642.82
Department of Hygiene, São Paulo	....	....	179.59	32,788.84
Institute of Hygiene, Czechoslovakia	....	....	....	....
Public Health Institutes	....	....	....	....
Fellowships	....	....	971.85	2,353.98
Adviser in Medical Education	....	....	11,225.19	1,500.00
Schools of Public Health	....	....	....	....
Medical Commission to Brazil *	....	9,256.74	....	....
Study of Teaching of Hygiene and Public Health in Medical Schools	....	....	....	....
Public Health Administration	....	....	....	....
United States:				
Missouri—Division of Sanitary Engineering	....	....	....	....
Utah—Division of Sanitary Engineering	....	....	....	....

* Represents one half total expenditure.
** Reports incomplete.

Years 1913 to 1922, Inclusive, Covering All Activities—Cont'd

1919	1920	1921	1922	Total
$........	$76,191.46	$101,473.08	$99,525.30	$277,189.84
72,394.12	86,310.57	89,575.04	74,747.28	421,366.76
141,053.34	135,920.64	79,839.90	62,422.55	510,308.01
389,328.32	80,226.08	40,621.01	....	786,989.01
....	....	750.00	2,490.94	3,240.94
....	....	....	5,044.15	5,044.15
38,367.71	**68,373.54**	**89,094.44**	**173,332.39**	**427,444.27**
23,582.57	29,929.01	24,727.16	....	111,207.17
....	....	204.51	....	204.51
....	....	3,466.64	3,324.02	6,790.66
13,118.47	38,409.84	60,696.13	114,637.24	230,187.51
1,666.67	....	....	....	14,391.86
....	....	....	55,371.13	55,371.13
....	....	....	....	9,256.74
....	34.69	....	....	34.69
....	....	....	**77,917.73**	**77,917.73**
....	....	....	1,050.00	1,050.00
....	....	....	**636.33	636.33

TABLE 2: *Expenditures of the International Health Board for the*

Activity, State, and Country	July 1, 1913–Dec. 31, 1915	1916	1917	1918
Public Health Administration—*Cont'd*				
Canada:				
New Brunswick	$........	$........	$........	$........
Brazil...........	....	....	....	....
Czechoslovakia	....	....	....	....
Australia	....	....	....	....
Philippine Islands ..	....	....	....	....
League of Nations:				
Interchange of Public Health Personnel ...	....	....	....	....
Public Health Laboratory Service.......	....	....	....	....
United States:				
Alabama......	....	....	....	....
Kansas.......	....	....	....	....
Missouri......	....	....	....	....
Tennessee.....	....	....	....	....
Foreign:				
Guatemala....	....	....	....	....
Nicaragua	....	....	....	....
Salvador......	....	....	....	....
Demonstrations....	....	....	....	....
Administration	....	....	....	....
Miscellaneous.......	30,196.00	27,628.35	18,191.76	23,034.17
Czechoslovakia Public Health Work..	....	....	....	....
Paris Conference on International Nomenclature of Causes of Death	....	....	....	....
Compilation of Mining Sanitary Code	....	....	....	....
Survey Public Health Administration in Massachusetts........	....	....	....	....
Investigation of Powdered Milk ..	....	....	....	....
Medical Commission to Brazil *	....	9,256.73	....	....

* Represents one half total expenditure.
**Reports incomplete.

Year 1913 to 1922, Inclusive, Covering All Activities—Cont'd

1919	1920	1921	1922	Total
$........	$........	$........	$9,000.00	$9,000.00
....	....	....	14,630.10	14,630.10
....	....	....	5,534.47	5,534.47
....	....	....	20,000.00	20,000.00
....	....	....	12,046.83	12,046.83
....	....	....	15,020.00	15,020.00
....	....	**16,109.70**	**26,304.39**	**42,414.09**
....	....	....	**3,340.13	3,340.13
....	....	2,539.88	5,468.14	8,008.02
....	....	....	874.99	874.99
....	....	....	250.00	250.00
....	....	307.50	621.75	929.25
....	....	85.18	2,345.53	2,430.71
....	....	984.34	1,028.72	2,013.06
....	....	....	206.33	206.33
....	....	12,192.80	12,168.80	24,361.60
46,901.63	**51,248.30**	**59,652.90**	**17,719.15**	**274,572.26**
....	12,708.81	20,736.31	....	33,445.12
....	615.30	....	....	615.30
....	....	125.98	77.20	203.18
26.09	1,467.27	....	....	1,493.36
....	500.00	....	....	500.00
....	....	....	....	9,256.73

TABLE 2: *Expenditures of the International Health Board for the*

Activity, State, and Country	July 1, 1913–Dec. 31, 1915	1916	1917	1918
Miscellaneous—*Cont'd*				
Visit of Brazilian Scientists to United States ...	$........	$........	$........	$........
British Advisory Committee......	2,561.36	....	....	....
Field Equipment and Supplies	742.88	....	2,464.68	3,000.00
Surveys and Exhibits	26,478.81	18,371.62	13,854.57	14,970.85
Pamphlets and Charts..........	874.36	....	1,335.66	3,999.49
Library..........	1,844.12	....	....	....
Express, Freight, and Exchange ...	....	....	536.85	1,063.83
Refunds which could not be credited direct to budget..	–(2,279.03)	....	....	....
Visit to England and the United States of French Scientist............	....	....	....	....

Years 1913 to 1922, Inclusive, Covering All Activities—Cont'd

1919	1920	1921	1922	Total
$........	$........	$7,660.12	$........	$7,660.12
....	....	....	....	2,561.36
23,434.94	5,996.96	4,982.25	5,189.62	45,811.33
16,870.71	23,528.78	13,437.76	....	127,513.10
5,499.50	5,873.33	10,153.44	8,869.43	36,578.71
....	....	....	....	1,844.12
1,070.39	557.85	2,557.04	1,469.28	7,255.24
....	....	....	....	−(2,279.03)
....	....	....	2,113.62	2,113.62

CHINA MEDICAL BOARD

Report of the Director

To the President of the Rockefeller Foundation:

Sir:

I have the honor to submit herewith my report as Director of the China Medical Board for the period of January 1, 1922, to December 31, 1922.

Respectfully yours,

ROGER S. GREENE,

Director.

CHINA MEDICAL BOARD

In 1922 the China Medical Board completed its eighth year of work in China. The earlier years had been devoted, first, to study of the field and of the methods of operation most likely to contribute toward the progress of medical science, and, second, to the raising of standards in medical education and hospital practice.

Through the organization of the premedical school of the Peking Union Medical College a demonstration was given of the type of training in the fundamental sciences which has been found necessary in western countries as a preparation for the study of medicine. This was followed by the gradual building up of the medical school proper with a new faculty and new physical equipment. During this stage also grants were made to other medical schools and hospitals, largely under foreign auspices, to help them to effect improvements which they had themselves planned. Through the establishment of fellowships for study in Peking and abroad, efforts were also made to prepare workers who would be able later to take part in a larger development. In these earlier years there was a gratifying demonstration of the capacity of the Chinese as students, as teachers of the medical sciences, and as practitioners, accompanied by definite progress in the elevation of standards in medical education and practice.

With the year 1922 a new phase of the Board's activities began in the initiation of systematic efforts to improve the teaching of the natural sciences in the colleges and universities of China, as an indispensable factor both in the further improvement of medical education and research and in the extension of the opportunities for securing a medical training to a larger number of individuals. The program adopted included proposals for aiding in the construction and equipping of laboratories and for temporary contributions toward maintenance of science departments on a better basis. But probably more important results are to be expected from the provision of fellowships to enable teachers to pursue advanced studies at home or abroad, and of visiting professorships by which institutions in China may secure inspiration and guidance from successful teachers of other countries who will be in residence long enough to gain some understanding of the special problems with which the Chinese universities are confronted.

Finally, in the year 1922 the Board undertook its first significant co-operation with Chinese institutions and it was natural that this co-operation should begin in the fields of physics, chemistry, and biology. In the earlier stages of the development of the modern system of education in China foreign institutions may apparently be of real service as experimental demonstrations, from the successes and failures of which valuable lessons may be learned. In times of financial and political difficulty they possess a relative stability which gives them a great advantage. From them may come some of the leaders who will later achieve large results by working through their own national institutions. The contribution of foreign schools and colleges is therefore recognized by many Chinese leaders in education as an important one, both in quantity and in quality, and this is particularly true in respect to their science teaching, but it is generally admitted that the future of education in China must depend on institutions supported and controlled by the Chinese themselves. Fortunately, in recent years the number of Chinese qualified by academic training and by practical experience to take the lead in education has been rapidly increasing, and these men are now becoming prominent in a few governmental and private universities of real promise.

NOTE: Statistical tables and charts covering the expenditures of the Board since its inception will be found on pages 311–327.

I. PREMEDICAL EDUCATION

The standard requirements in the natural sciences for admission to medical studies involve only courses of a relatively elementary type in chemistry, physics, and biology. Hitherto, however, none of the universities and colleges in Chinese territory has had the staff and equipment to give such courses in all three of these subjects in a really satisfactory manner, to say nothing of the more advanced work in the fundamental sciences from which most of the future development of medicine must come. Unless, therefore, each medical school were itself to maintain under its own control complete departments of physics, chemistry, and biology—a plan which has not worked well elsewhere—the strengthening of the universities, where the sciences can be studied for their own sake and with a broader scope, was urgently needed.

In the spring of 1922 the Secretary of the Board proceeded to China for a preliminary study of the field in preparation for the intensive program for the promotion of science teaching that had been decided upon in the previous year. Later, arrangements were made to co-operate with the Chinese National Association for the Advancement of Education in sending to China Professor George R. Twiss of Ohio State University to investigate science teaching in the middle schools and colleges of the country under the auspices of that association, and to suggest improvements in organization, teaching methods, and equipment. Dr. Twiss's work has been primarily with institutions maintained by the Chinese government and by Chinese private organizations. Finally, in the fall the Board secured the services of Mr. N. Gist Gee, for many years professor of biology at Soochow University, as its adviser on premedical education, to take charge of this branch of its work. Mr. Gee arrived in China in October, 1922, and immediately began a study of conditions in those colleges with which the Board was already co-operating.

Conditional grants for laboratory buildings, equipment, and maintenance for a limited term, were made during the year to two Chinese institutions, the National Southeastern University at Nanking and the Nankai University at Tientsin, and to one mission institution, Peking University, commonly known by its Chinese name of Yenching University to distinguish it from the Peking National University maintained by the Ministry of Education. In each case substantial assurance was received that the funds from other sources necessary to make the Board's appropriations available would be forthcoming.

The National Southeastern University was established in 1921, with the Teachers' College, which had been maintained at Nanking since 1915, as its nucleus.

While the University depends mainly on government funds for its support, it has also received gifts from private individuals, and in recognition of this fact a board of trustees has been organized which includes in its membership a number of prominent business men from the cities of the lower Yangtze valley. Its physical plant, including land, buildings, and equipment, is valued at about Mex. $1,200,000, or about $637,000 gold, and its budget for 1922–1923, including both ordinary maintenance and special expenditures, came to a total of Mex. $601,381, or about $320,000 gold.

The University proper is now divided into a College of Arts and Science, and Colleges of Education, Engineering, and Agriculture, all at Nanking, and a College of Commerce at Shanghai. Below the university grade there are the Teachers' College, which has been retained to train teachers for the grade schools, and a preparatory department. The teaching and administrative staff included 283 persons, of whom

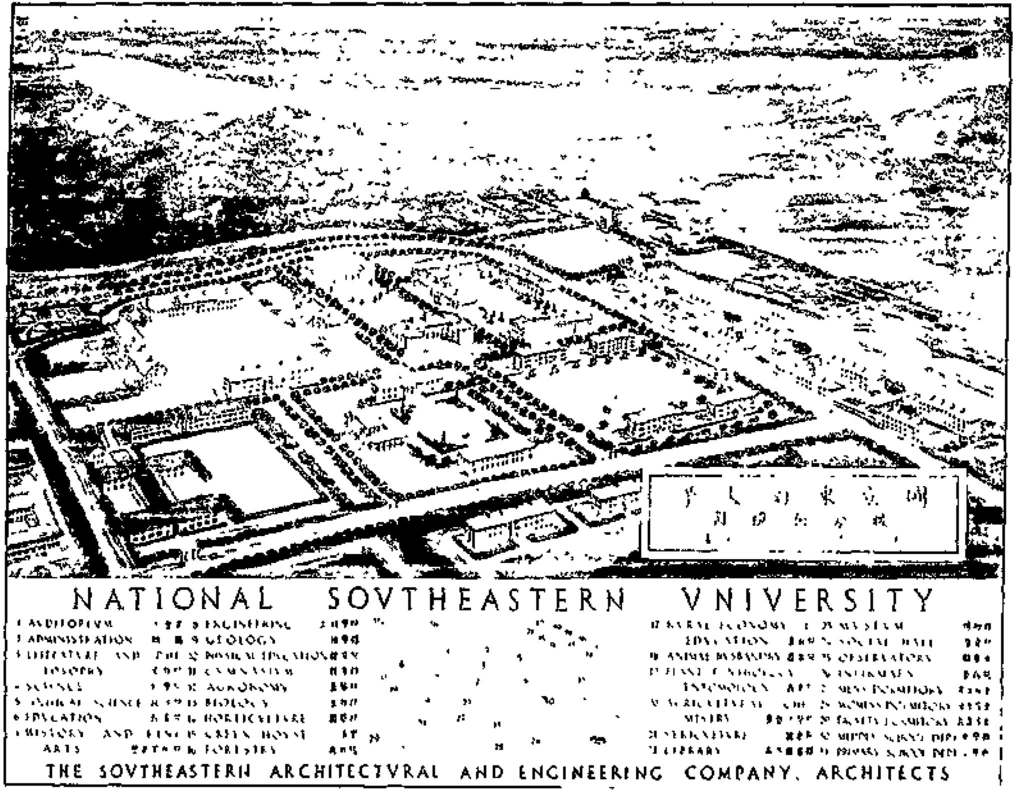

Fig. 66.—Bird's-eye view of Southeastern University, Nanking

eighty-three were employed in the practice schools for middle and primary grades. Of these teachers a large proportion have studied in the best universities of Europe and the United States. Twenty full professors were added to the staff in 1922. A survey of the science departments shows a more nearly adequate staff than is possessed by any other college in China. There are three men with foreign education in the division of botany and three assistants trained in the Nanking and Peking Teachers' Colleges; the division of zoology has two graduates from American universities and three locally trained men; in the department of chemistry there are four teachers with foreign training and three local graduates; and the department of physics has three Chinese graduates of American and British universities, besides an American visiting professor, Dr. O. H. Smith, of Cornell College, Mount Vernon, Iowa, and four instructors or assistants educated in China.

In the fall term there were 718 students of whom 117 were in the university proper, 317 in the Teachers' College, 126 were special students, and 158 were in the preparatory department. The students are a carefully selected group. Only 120 were admitted last year out of some 1,200 candidates. While the majority of the students naturally come from the three prov-

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Fig. 67.—Students at work in the physics laboratory, Southeastern University, Nanking

inces of the lower Yangtze valley, nineteen provinces and two foreign countries were represented in the total registration. Fifty-nine of the students came from the remote province of Szechuan.

The most urgent need of the institution is for modern laboratories and equipment. In 1922 the China Medical Board pledged Mex. $100,000 toward a laboratory building, Mex. $25,000 toward new equipment, and Mex. $6,750 per annum for three years toward salaries of additional teachers, on condition that equal amounts should be secured from other sources for the same purposes. The Board also undertook to provide a visiting professor of physics for one year.

In close association with the University is the Bureau of Entomology of the Province of Kiangsu, which has carried on successful work in keeping down flies and mosquitoes in various localities, and is planning to deal also with insects which attack field crops and fruit-trees. Dr. C. W. Woodworth, of the University of California, has had charge of this work during the past year and is returning for another year of service.

Nankai University, at Tientsin, grew out of what is perhaps the most successful secondary school in China, the Nankai Middle School, organized by a group of public-spirited Chinese citizens, but subsidized by the provincial government. The University, which was opened in 1919, depends wholly on tuition fees and private contributions for its support.

The University is at present in temporary quarters adjoining the Middle School, but it has acquired a new site of about eighty acres, and two buildings were already under construction in 1922, an administration building and a dormitory, which together will cost about Mex. $110,000. The budget now comes to about Mex. $117,000 per annum, which is divided between departments of arts, science, commerce, and mining engineering. Most of this is covered by income from endowment.

Of the twenty-eight teachers in the college, twenty-five are Chinese who have studied abroad, and three are foreigners teaching English, French, and German. In the science department there are two foreign-trained teachers of chemistry, two in physics, and one in biology, besides two assistants.

The student body in the fall of 1922 numbered 325, including twenty-six women. As it has been necessary to limit the classes on account of the large number of applicants a well-selected group of students has been secured. There are 86 students in the arts course, 54 in the science course, 124 in commerce, and 61 in mining engineering.

In 1922 the China Medical Board made appropriations to Nankai College of Mex. $100,000 toward a laboratory building, $25,000 toward new equipment, and $6,750 per annum for three years toward salaries of additional teachers of physics, chemistry, or biology, on condition that equal amounts should be secured from other sources. By the end of the year the sums necessary to make available the grants for building and equipment were practically assured and plans for the laboratories had been prepared. Provision was also made for a visiting professor of physics from the United States for the year 1923–1924.

Peking (Yenching) University is conducted by a board of trustees representing one British and three American missionary societies. The University is still housed in temporary quarters, but during 1922 work was begun on the construction of a fine plant outside the walls of the city. By the end of the year about $600,000 had already been raised for new buildings and a vigorous campaign was under way for $1,000,000 more. The annual budget amounts to about $90,000, of which about half is contributed by the mission boards. A college for women is an organic part of the University, and during the year some

$600,000 was raised for the special buildings required for this department, in addition to the general building funds of the University. A competent faculty is being organized and special efforts are being made to secure strong Chinese teachers who may be able to take a constantly increasing share of the responsibility. There were in 1922 thirty Chinese and forty-one foreign members of the faculty, and 425 students were enrolled.

As a part of its program for the strengthening of science departments in the colleges of China, and also with a view to relieving the Peking Union Medical College as soon as possible of the necessity of maintaining a preparatory department in connection with the medical school, the China Medical Board undertook to aid the University in securing the staff, laboratories, and equipment needed to enable it to prepare students for admission directly to the medical school. A grant of $7,500 per annum for two years was made in 1922 toward the maintenance of the science departments, and at the close of the year a pledge was made of Mex. $150,000 for the construction and equipment of a laboratory building, on condition that the University should provide an equal sum for a second laboratory building with its equipment.

The China Medical Board has been co-operating with the Canton Christian College since 1920 in the development of its science teaching, primarily with a view to preparing students for admission to medical schools. This institution has been more successful than any other mission college in China in securing substantial support from the Chinese community and from Cantonese abroad, many of whom have not only prospered in business but have also retained great interest in the welfare of their native province. The College now possesses buildings valued at Mex. $792,000, and its budget for the year 1922–1923 comes to a total of Mex. $656,737, of which $519,263 comes from local sources. Up to July 1, 1922, it had received Chinese gifts amounting to Mex. $531,000, of which about two thirds was given for permanent buildings.

The number of teachers in the College and affiliated schools last year was 171, of whom 120 were Chinese. Twenty of these Chinese teachers hold foreign degrees. In the college proper there were 107 students, including women, and seventy-three registered as sub-freshmen and special students. The science teachers trained abroad include two biologists, three chemists, and three physicists.

In 1922 the China Medical Board contributed toward the expense of sending to the College a visiting professor of physics, Dr. W. W. Stifler, formerly Dean of the Premedical School of the Peking Union Medical College, besides continuing previous grants towards maintenance expenses of the science departments.

The China Medical Board continued during the year 1922 its co-operation with the science departments of St. John's University, Shanghai, the Fukien Christian University, and the College of Yale-in-China at Changsha.

The colleges under foreign auspices, of which the institutions named above are examples, are for the most part older than the Chinese institutions and have on the whole a larger proportion of science instructors with considerable teaching experience gained both at home and in China. In some cases one or two departments have been raised to a surprising degree of excellence, usually through the efforts of some one individual who has carried a burden of routine work that would have overwhelmed the average teacher. These colleges are therefore in a position to make a special contribution at this stage of the development of the Chinese educational system.

No other new enterprises in the field of premedical education were undertaken by the China Medical Board during the year. Most of the government institutions have suffered from the serious financial situation of the national and provincial governments and have therefore been unable to consider much new development, while many of the foreign mission colleges have been discussing plans for reorganization and concentration of effort involving in some cases rather radical changes.

The leaders in missionary education appear to be convinced of the advisability of coming together to plan for the best use of the funds likely to be available for higher education. One outstanding need appears to be the strengthening of the secondary schools in order that they may serve better both those students who will complete their formal education at that stage and those who are preparing for further study in the universities. Another need is for the division of the very limited resources in men and money among a smaller number of colleges and universities, at least until more financial support can be secured locally. Everywhere the university administrators feel keenly the need of adding both to their annual budgets and to their physical equipment in order to bring their work up to the rapidly rising standards of instruction that are now demanded in China, but it seems difficult to raise the money necessary for such development in all of the existing colleges.

Any radical reorganization will bring many complications but it is gratifying to note the farsighted way in which some institutions are facing these problems. Plans for union and co-ordination of effort between different nationalities and different denominations are being seriously discussed. At one time the difficulties in the way of such co-operation would have seemed insuperable. Now, however, rivalry based on denominational or national differences has become relatively insignificant. There is still more or less conflict between the claims of various localities, and institutional pride in China still seems to operate occasionally in ways contrary to the best interests of the work as a whole, though perhaps less so than in some other countries. But in spite of these difficulties real progress is being made.

II. MEDICAL EDUCATION

The Peking Union Medical College

In the summer of 1922 the Peking Union Medical College completed its first year of work in its new hospital and valuable experience was gained through the operation of the whole of the new plant, with the exception of certain hospital wards, which though ready for use were held in reserve for future expansion.

During the academic year 1921–1922 three classes were under instruction in the medical school proper, and undergraduate clinical teaching was begun with the third-year students. In the fall, with the admission of new students, there were for the first time four classes under instruction. The registration is still small, as will be seen from the following comparative statement of enrollment in all departments for the academic years 1921–1922 and 1922–1923:

	1921–1922	*1922–1923*
Medical School		
Fourth year	..	4
Third year	5	5
Second year	6	9
First year	11	17
Total	22	35
Premedical School		
Third year	18	22
Second year	21	17
First year	24	32
Total	63	71

School of Nursing		
Fourth year	..	..
Third year	..	1
Second year	1	7
First year	8	6
Total	9	14
GRAND TOTAL	94	120

The enrollment of graduate and special students is not easily comparable with the undergraduate registration, as it includes a large number of persons taking short courses of only a few weeks duration, in addition to those spending the whole or the greater part of the year in study. There are also included a few members of the staff taking courses in departments other than those in which they are teaching. In the year 1921–1922 there were fifty-nine such graduate and special students of whom all were in the medical school except six who were taking work in physics, chemistry, biology, pharmacy, nursing, and dietetics. When the last reports were received there had already been 127 graduate and special students registered for the academic year 1922–1923, of whom 110, including voluntary assistants, were in the medical school.

The staff of the college has also been enlarged. Teachers of pediatrics, dermatology, and oral surgery were added, and some of the departments which had been organized previously were reinforced. The increase in staff is shown in the following table:

	1921–1922			1922–1923*		
	Foreign	*Chinese*	*Total*	*Foreign*	*Chinese*	*Total*
Medical school teaching staff...............	33	18	51	38	23	61
Administrative officers, resident hospital staff, and chief technicians.	38	22	60	38	26	64
Premedical school teaching staff............	11	5	16	12	6	18
School of nursing and hospital nursing staff.	26	5	31	28	8	36
	108	50	158	116	63	179

During parts of the year 1922 there were also present the following visiting professors and lecturers: Dr. E. G. Brackett, of Boston, in orthopedics (six weeks); Dr. E. C. Dudley, of Chicago, in obstetrics and gynecology (completing a year's service); Dr. Ernst Fuchs, of Vienna, in ophthalmology (one month); Dr. H. R. Slack, of Johns Hopkins Medical School, Baltimore, in otolaryngology (beginning a year's service); and Dr. Donald D. Van Slyke, of the Rockefeller Institute, New York, in biochemistry (three months). Dr. R. B. Seem, of the University of Chicago, completed in the summer of 1922 a service of a year and four months as superintendent of the college hospital. There were also two honorary lecturers appointed locally, Dr. S. P. Chen, Medical Director of the Government

* To December 31, 1922.

Fig. 68.—Graduate and undergraduate students in special course in orthopedic surgery given by Dr. E. G. Brackett of Boston

Isolation Hospital, in infectious diseases, and Dr. Alice Cook-Willner in otolaryngology.

In the spring of 1922 an exchange of lecturers was arranged with the South Manchuria Medical College, under which Professor Y. Kuno, of Mukden, gave a series of lectures and demonstrations at Peking on the physiology of the pericardium and the pericardial cavity, while Dr. C. W. Young, of the Peking Union Medical College, reported at Mukden the results of his recent studies of kala-azar. In the summer and fall three members of the department of surgery served for short periods in the Shantung Christian University Medical School, assisting in clinical work and in teaching during the absence on furlough of a member of the University staff.

These visits and exchanges have proved very useful in lessening the isolation of scientific workers in China. In particular, the visitors from abroad have done much to stimulate and encourage both teachers and graduate students, while their presence in clinics and laboratories has been an inspiration also to the undergraduates.

The formal graduate courses conducted in 1922 were in the following subjects: physiological chemistry, medicine, ophthalmology, orthopedic surgery, roentgenology, obstetrics and gynecology. A summer course in educational hygiene

Fig. 69.—Students and instructors in special graduate course, Department of Medicine, Peking Union Medical College

was given for school administrators. The graduate teaching offered for 1923 includes a course in general surgery and provision for informal work in pharmacology under the general direction of Dr. Reid Hunt, professor of pharmacology in the Harvard Medical School.

It is hoped that the medical profession of China will derive real benefit from the courses offered to them, but there is no doubt that the teachers themselves will profit from the association thus made possible with men from schools and hospitals in other parts of the country.

While the members of the staff have been largely occupied with their teaching and clinical duties, many of them have found time to pursue studies of their own, the results of which have been published in scientific journals in Europe, America, and China. The papers published in 1921 were assembled in a volume under the title of *Contributions from the Peking Union Medical College*, Volume I, and similar volumes will be prepared annually. A list of the papers published in 1922, which form the second volume, is annexed to this report (see pages 328, 329).

It will be noted that some of the studies in the volume deal with subjects of special interest to medical practitioners in China. In some cases valuable help has been secured from physicians outside the institution, particularly in field work.

Furthermore, facilities are occasionally offered at the college to workers from other institutions to carry on investigations in which they are interested. There is therefore reason to believe that the research activities of the college are being conducted in such a manner as to furnish still another point of mutually helpful contact between the teachers and the profession at large.

Opportunity for discussion of new work by the staff as a whole is afforded by the Staff Medical Society and the Journal Club which meet twice monthly in alternate weeks. Once a month the Medical Society meets with the Peking Branch of the China Medical Missionary Association. A Peking Branch of the Society of Experimental Biology and Medicine was organized by members of the faculty in the fall of 1922 under authority from the parent society, and meets at irregular intervals. The Chinese members of the staff, besides participating in these organizations, take a leading part in the Peking Branch of the National Medical Association of China, a body which now includes a considerable number of Chinese physicians and surgeons with good modern training.

In the fall of 1922 the number of beds available in the hospital was increased from 161 to 196 in order to provide more cases for teaching purposes, and space for about fifty more patients is still held in reserve. The beds are distributed between departments as follows: Medicine, including neurology, pediatrics, and dermatology, 60; surgery 46; gynecology 6; obstetrics 18; ophthalmology 10; otolaryngology 7; isolation 8; admission 11; private (first and second class) 30; total 196.

During the year ending June 30, 1922, 2,653 in-patients were treated, and the total number of days of hospital treatment was 42,555. For the six months ending December 31, 1922, the number of in-patients was 1,520, representing 23,828 treatment days. About one third of the patients have been women, and the women's wards have generally been full, which seems to indicate that there is no serious objection on the part of Chinese women to entering a general hospital.

The demand for treatment in the out-patient department has been so great that it was early found necessary to limit the admission of new patients to three days in the week and to raise the fees in order to conserve the time of the staff for their other duties. Old patients are still seen daily. About 20 per cent of the cases are given free treatment. The total number of visits for the year ending June 30, 1922, was 74,763, of which 15,249 were first visits, making an average of nearly five visits per person. In the six months ending December 31, 1922, the average number of visits per patient increased to about 5.5.

The prejudice against autopsies has not yet been overcome, but gradual progress is being made as a result of the efforts of the staff. Altogether thirty-three autopsies were performed during the year ending June 30, 1922, or 21.5 per cent of the number of deaths. In the next eight and a half months autopsies were secured in thirty-one cases, a proportion of 24.8 per cent to the total deaths. This improvement was due in large part to the more willing co-operation of the authorities whose permission is required in each case. A weekly pathological conference is held by the department of pathology for the students and the hospital staff.

The salaried members of the staff, a group which includes all the faculty except two honorary lecturers, give their whole time to the work of the institution, and have no private practice from which they receive income. Frequent requests are made for the services of members of the staff by persons able and willing to pay reasonable fees, but in order to prevent undue encroachment on the time of the staff it has been found necessary, except in special cases, to limit this class of work, as far as foreigners are concerned, to patients referred by physicians outside the institution. This restriction also serves to prevent undesirable competition with the foreign private practitioners who are established in Peking.

As so frequently happens, calls were made upon the staff for emergency service during the year. After the fighting near Peking in the spring, sixty-five of the severely wounded soldiers were admitted to the hospital. Later a unit made up in part of volunteers from the Language School was sent to Kaifeng, the capital of Honan province, with complete equipment, including portable X-ray outfits, to care for the wounded in that vicinity. An X-ray unit was also sent to Paotingfu, the headquarters of one of the contending armies. The demonstration of the X-ray in these two places led the local commanders to present to the mission hospitals in those cities the funds necessary for the purchase and installation of similar small X-ray plants, and one of the generals decided to purchase an outfit for the use of his own medical corps.

An advisory committee, consisting for the present of eight Chinese gentlemen well known in the community for their interest in education and in philanthropic work of various kinds, was established by the trustees in 1922. This committee promises to be of great service in interpreting to the Chinese people the purposes and policies of the institution, and in advising the

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Fig. 70.—Staff of the Department of Medicine, Peking Union Medical College

officers in matters requiring special knowledge of local conditions. It is hoped that the members of the committee may also take an important part in the promotion of medical enterprises under Chinese control. The following gentlemen have kindly consented to serve on this committee:

Mr. Sun Pao-ch'i, Director General of Customs, Chairman.

Mr. Hsiung Hsi-ling, formerly Minister of Finance and Premier.

Duke Tze Tsan-hsi, in charge of Manchu relief enterprises.

Mr. Tsai Yuan-p'ei, Chancellor of the National University of Peking.

Surgeon General Ch'uan Shao-ch'ing, formerly Director of the Army Medical College.

Admiral Ts'ai T'ing-kan, Assistant Director General of Customs.

Dr. Chang Po-ling, President of Nankai University.

Dr. Chou Yi-ch'un, formerly President of Tsing Hua College.

The health of the students and junior Chinese members of the staff has given the faculty considerable concern. As in other similar groups in China there has been a distressing incidence of tuberculosis in particular, amounting in one year to 7.1 per cent for the Chinese students and staff, and the number of persons whose general physical condition is not satisfactory has been large. For this reason a rigorous physical examination has been instituted for all candidates for

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Fig. 71.—Physics laboratory, Premedical School, Peking Union Medical College

admission. Provision has been made also for systematic physical exercise under competent direction and for frequent outings in the hills during holidays and week-ends. The curriculum is being studied with a view to reduction of required hours, and in some cases it has been necessary to discourage students from remaining in the laboratories after the regular working hours. There is a general impression that the average Chinese student is below the average Anglo-Saxon student in physical development and stamina. A fundamental remedy for this condition must be sought in the homes and in the lower schools, but in the meantime special precautions must be taken to safeguard the health of students who are pursuing an intensive professional course under conditions new to many of them, and in a climate very different from that in which the students from the central and southern parts of China were brought up.

The former hospital building on Hsin Kai Lu, now known as Wenham Hall, was entirely remodeled during the year to serve as a dormitory for men students, and an addition is under construction which will permit the accommodation of 160 men in all. A special suite for four teachers is provided in this building. The old dormitory, Oliver Jones Hall, now serves as quarters for seventy women students and Chinese graduate nurses, besides four of the senior nurses who occupy a separate suite.

The premedical school has been co-operating during the past year with Peking (Yenching) University. Professor C. H. Corbett, of the University, has had charge of the department of physics in the premedical school, and the heads of the departments of chemistry and biology in the premedical school have supervised the teaching of their subjects in the University. Some of the more advanced classes from the University have been taught in the premedical school laboratories. Plans have been completed for the new science laboratories of the University, and it is hoped that all of the premedical work may be transferred to them not later than the fall of 1925. Reference has been made elsewhere to the development of the science departments of other universities and colleges from which it is hoped that the medical school will soon be able to draw well-prepared students.

The School of Nursing maintained in connection with the hospital of the College is making steady progress, and though the registration is still small, the course is already attracting young women of a fine type, with good preliminary education. Middle school graduation or its equivalent is required for admission, and the first year is then spent exclusively in classroom and laboratory work, much of it in physics, chemistry, and biology. The whole course takes four years. It is not assumed that a course of this length should be the standard for all nurses' training schools in China, but the urgent need at present seems to be for highly trained nurses with a broad educational background who will be competent to serve as teachers and supervisors, and it is primarily this need which the school is designed to meet. Since the Chinese middle school has hitherto been at least one year behind the standard of the American high school, and since it is necessary for the present that the nurses in a teaching hospital should speak English well, the nursing course of four years does not seem too long.

Only women are now admitted to the School of Nursing, but there have been under instruction two classes of male nurses who were admitted in the old hospital. The last of these classes is to graduate in 1923. No regular courses for graduate nurses have been offered, but altogether fifty-two nurses trained in China (twenty-three men and twenty-nine women) have lately been employed in the hospital, and have received some instruction in nursing and in English.

Expenditures under the budget amounted in 1921–1922 to Mex. $1,191,214 ($632,654 gold), toward which Mex. $191,538 was secured from hospital earnings, professional fees, rentals, etc. The China Medical Board provided the balance, which, with the contingent fund and expenditures in America, amounted to $547,533.

Other Medical Schools

Plans for further concentration of medical education in China under foreign missionary auspices were under discussion in 1922, particularly with a view to the establishment of a school at Shanghai in which all those interested in teaching medicine through the medium of the English language in central and east China might unite, possibly with some degree of co-operation from a group interested in medical education of the same type for women. The Pennsylvania Medical School of St. John's University at Shanghai and the Hunan-Yale College of Medicine at Changsha were the institutions most affected by this proposed development, which had been recommended by the Educational Commission sent to China by the mission boards of Great Britain, the United States, and Canada in 1921. No final plans had been adopted at the close of the year and the uncertainties regarding the future naturally created some difficulties for the institutions concerned.

In the north, however, arrangements were under way for the union of the North China

Union Medical College for Women, now at Peking, with the Shantung Christian University Medical School at Tsinan, and there is a prospect that most of the women students may be transferred to Tsinan during the academic year 1923–1924. This union will add strength to the Shantung Christian University and will at the same time give the women students the benefit of instruction by a more nearly complete faculty, with better laboratories and hospital facilities.

The Foochow Union Medical College has not admitted a new class for four years and is now closed, at least for the time being.

These developments illustrate clearly the desire of the mission leaders in medical education to look at their work from a national point of view and to avoid unwise scattering of resources among a large number of inadequately supported schools. That there is room for such concentration is shown by the relatively small number of students and teachers in eight medical schools in China under mission auspices, the total number of their graduates in 1922 being only ninety-one. The total number of students enrolled in 1921–1922 in thirty separate classes was 300, or an average of only ten to a class. Three schools had only forty-six students between them in nine separate classes. While all these schools have a five-year course, not all of them admit

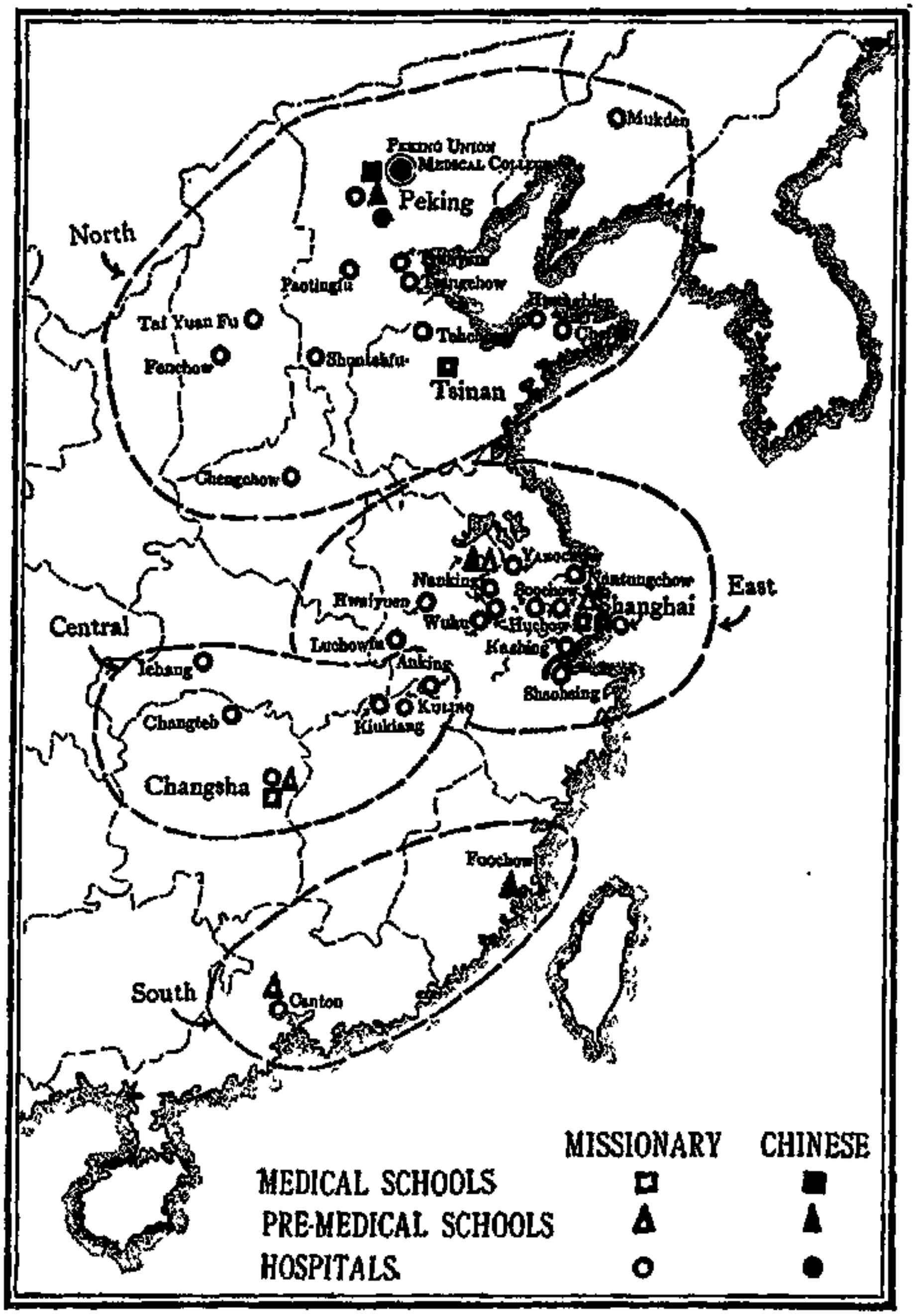

Fig. 72.—Location of institutions which have received appropriations from the China Medical Board

new classes every year, partly on account of shortage of teachers. The total number of teachers was 143 of whom 105 gave all their time to teaching and to work in the school hospitals. Of the thirty-eight part-time teachers some contribute very little to the teaching. While the total comes to a very considerable figure, one of the schools had only six teachers and another only eight, while the largest number was twenty-five. The clinical branches are relatively well supplied, though several schools are without qualified teachers of some of the important clinical specialties; but most of the schools feel more keenly their lack of trained teachers for the fundamental medical sciences, these subjects being usually taught as side-issues by men or women who are primarily interested in clinical work. In recent years the stronger schools have made marked progress toward remedying this defect. Missionary doctors and promising Chinese who have shown special interest or ability in laboratory work have been relieved of clinical duties and have been given opportunities for special study abroad and in China. In selecting new teachers, also, more emphasis is being placed on scientific qualifications, and as a result one now finds here and there very creditable departments of anatomy or pathology, though physiology and its various branches are still scantily represented.

The number of beds for teaching purposes in the hospitals used by these eight schools comes to a total of 1,214, not including an insane asylum with about 600 inmates, to which one school has access. The smallest number in any one institution is sixty-five, and the largest number available for any one school is 272, though in this case the beds are divided between two hospitals, the larger of which is at some distance from the school and from the teaching hospital actually controlled by the school. The best organized schools have 115 to 155 beds conveniently located for regular teaching.

The financial resources of some of these schools are not readily ascertainable, as the salaries of most of their teachers are paid by the missions to which they belong and do not appear in the school accounts. The budgets vary greatly. At one extreme some of the schools have almost no expenditures except the salaries of the few teachers and no income but the meager hospital earnings and tuition fees, possibly not exceeding $25,000, in United States currency, per annum. The most prosperous school has an annual budget of Mex. $178,276 (about $94,700 gold), of which Mex. $32,198 (about $17,100 gold) is supplied from local income, principally tuition fees and hospital earnings, while the remainder is covered by grants from various organizations in China and abroad. As nearly as can be estimated, the total annual expenditures of these schools and the hospitals controlled by them cannot be less than Mex. $900,000, or nearly $500,000 gold.

Much more effective educational work could be done with such a sum if it could be divided among two or at most three schools, but there are many difficulties in the way. In the first place, many of the hospitals used by the schools were established long before they were used for teaching and have become important local institutions in which teaching is even now more or less incidental. Even when they are controlled by the same organizations which control the schools there would be much natural objection to closing the hospitals as part of a plan of concentration. In some cases contributions are received from the local Chinese or foreign community which could not be transferred to an institution in another city, and in other cases the mission constituency at home has a special interest in its original work for a given city or province which might easily be lost if the enterprise were merged in a larger institution in a different part of the country. It is sometimes said also that the closing of a school in a given locality would mean the loss of many promising students who would be unwilling or unable to attend a school in a city remote from their homes. This is doubtless true, but it is also a fact that most of the better colleges and professional schools of China draw an astonishingly large number of their students from remote provinces, and this seems to indicate that many of the most enterprising Chinese students are willing to travel far to get what they want in the way of an education, just as their fathers used to flock to Peking from all corners of the Empire to compete in the higher literary examinations. When the need for more doctors is everywhere so urgent one cannot but sympathize with those who are reluctant to close any existing medical school that is turning out useful practitioners, even if the graduates are few in number and not fully trained according to the best standards. There is now so general a desire for higher standards that there is good ground for confidence that those responsible for the existing medical schools will find some wise solution for the perplexing problem with which they are confronted.

Steady progress appears to have been made in all the medical schools with which the Board has been co-operating; the number of qualified teachers has increased and the student body is better prepared. Year by year the number of Chinese in responsible positions in schools under foreign auspices is becoming larger, and there is reason to hope that the time is not far distant when a majority of the teachers will be Chinese who will be the equals of their western colleagues in scientific attainments, and better qualified to deal with the problems of their own country than foreigners can be.

1. *The Shantung Christian University School of Medicine*

A most striking example of the tendency toward concentration is found in the School of Medicine of the Shantung Christian University. In 1922 another mission, not previously participating, began to contribute to the support of the school, making a total of ten missionary societies aiding in the work as against two eight years ago. While the share taken by some of the societies is small on account of the difficult financial situation which they have to face at home, the broad basis that has been secured gives more security and hope for larger support in the future. A hospital board of managers containing a majority of Chinese, several of whom are influential citizens of Tsinan, has been organized, and through this body more local support is being secured for the hospital. The physical plant was enlarged in 1922 by the construction of a home for the Chinese women nurses of the hospital.

The development of the faculty has been such as to justify great encouragement. Two new teachers began work in the fall of 1922. Three others were under appointment, and one member of the faculty returned after a year of experience in teaching in a junior position at the Johns Hopkins Medical School. There is the further prospect of the addition of five teachers through the co-operation of the missions interested in the North China Union Medical College for Women. The following list of the present faculty will help to give an idea of the way in which the staff is being rounded out:

President:
Harold Balme, F.R.C.S. (Eng.), D.P.H. (Lond.).

Dean:
Samuel Cochran, A.B. (Princeton), M.D. (College of Physicians and Surgeons, N. Y.).

Anatomy:
Laurence Maitland Ingle, B.A., M.B., B.Ch. (Cantab.).
Hui-wen Wang (Shantung).

Histology, Embryology (and Parasitology):
Randolph Tucker Shields, B.A. (Washington and Lee), M.D. (Med. Coll. of Virginia).

Physiology:
Philip S. Evans, Jr., B.A. (Yale), M.D. (Johns Hopkins).

Biological Chemistry:
Peter C. Kiang, A.B. (St. John's), M.D. (Penn.).

Pharmacy:

C. T. Y. Ch'eng (Maryland).

W. Percy Pailing, M.P.S., B.D. (Lond.).

Therapeutics (and Translation):

Thomas Gillison, M.B., C.M. (Edin.).

Bacteriology:

Samuel Cochran, A.B. (Princeton), M.D. (Coll. of Phys. and Surg., N. Y.).

Chi-hsien Chang (Shantung).

Pathology:

Louis H. Braafladt, B.A. (Decorah), M.S. (University of Chicago), M.D. (Rush).

Pao-chang Hou (Shantung).

Public Health:

Charles Titterton Maitland, B.Sc., B.S., M.D. (Lond.), M.R.C.P., D.P.H., D.T.M. & H.

Medicine:

William McClure, B.A., M.D., C.M. (McGill).

Francis Henry Mosse, M.A. (Oxon.), M.R.C.P. (Lond.).

Ernest B. Struthers, B.A., M.D. (Toronto).

Dermatology and Syphilology:

Leroy F. Heimburger, M.D. (St. Louis).

Surgery:

Harold Balme, F.R.C.S. (Eng.), D.P.H. (Lond.).

Edwin Robert Wheeler, M.B., B.S. (Lond.), M.R.C.S., L.R.C.P.

Thornton Stearns, B.A. (Davidson), M.D. (Johns Hopkins).

Surgery and Urology:

Henry Wardel Snarey Wright, M.B., M.S. (Lond.), F.R.C.S. (Eng.).

Gynecology and Obstetrics:

Helena Rosa Wright, M.B., B.S. (Lond.), M.R.C.S. (Eng.).

Surgery, Otolaryngology:
David John Evans, M.B., Ch.B. (Birmingham).
Ophthalmology:
Ta-chih Pa (Peking Union Medical College).
Radiology and Electro-Therapeutics:
John Stanley Ellis, M.A. (Cantab.), M.R.C.S., L.R.C.P.
Translation:
P. Lonsdale McAll, B.A. (Cantab.), M.B., B.Ch. (Edin.).

While it will be seen that the number of Chinese teachers is still small, the policy of the school is to increase it as vacancies occur for which qualified Chinese candidates can be found. At the beginning of the year five graduates from the Shantung Christian University were appointed to internships in the Peking Union Medical College Hospital, all of them being men with considerable knowledge of English, though they had studied medicine in Chinese.

In the spring of 1922, upon the expiration of its previous grants, the China Medical Board made an appropriation to this school of Mex. $33,000 a year for four years.

2. *The Hunan-Yale College of Medicine*

The Hunan-Yale College of Medicine, toward which the Board is contributing under earlier appropriations, has labored under special difficulties on account of the impoverishment of the provincial treasury from which part of its support comes, though it received a somewhat larger proportion of its government grant than some strictly official institutions. Chinese government institutions, including medical schools, in most parts of the country have suffered in the same way, and there is little prospect of immediate relief.

The faculty of this school in 1922 included the following teachers:

Dean:
- Fu-chen Yen, B.A. (St. John's, Shanghai), M.D. (Yale), D.T.M. (Liverpool), M.A. Hon. (Yale).

Anatomy:
- Shueh-yi Li, B.S., M.D. (Syracuse).

Physiology:
- Russell F. Maddren, M.D. (Univ. of Oregon).

Pathology:
- Heng-pi Chu, M.D. (Harvard Medical School of China).

Medicine:
- Edward H. Hume, B.A. (Yale), M.D. (Johns Hopkins).
- John H. Foster, B.S. (Colby), M.D. (Univ. of Pa.).
- George Hadden, M.B., C.M. (Edinburgh).
- Gerald S. Shibley, B.A., M.D. (Columbia).
- Chao-feng Tang, M.D. (Univ. of Michigan).

Dermatology:
- Tsing-liang Li, B.A., M.D. (St. John's, Shanghai).

Pediatrics:
- Louise W. Farnam, B.A. (Vassar), Ph.D., M.D. (Yale).

Preventive Medicine:

Reginald M. Atwater, B.A. (Colorado College), M.D. (Harvard), C.P.H., D.P.H. (Johns Hopkins).

Surgery:

Albert S. Crawford, B.A. (Pomona College), M.D. (Cornell).

Edward Y. Kau, M.D. (Harvard Medical School of China).

Russell F. Maddren, M.D. (Univ. of Oregon).

Gynecology:

J. R. Bromwell Branch, B.A., M.D. (Johns Hopkins).

Otology:

W. S. Thacker Neville, B.A., M.B., Ch.B., M.D., F.R.C.S.

Urology:

Morris B. Sanders, B.A. (Washburn College), M.D. (Harvard).

Obstetrics:

W. Clayton Grosvenor, M.A., M.D., M.Ch., F.R.C.S.E. (Edinburgh).

Ophthalmology:

Fu-chen Yen, B.A. (St. John's, Shanghai), M.D. (Yale), D.T.M. (Liverpool), M.A. Hon. (Yale).

Dentistry:

Harry C. Chang, D.D.S. (Baltimore College of Dental Surgery).

Pharmacy:

George K. How, Phar.G. (Univ. of Maryland).

It will be noted that reference is made above to only a few medical schools, with which the China Medical Board is co-operating. There is also developing a system of medical schools under the national and provincial governments which, working under serious difficulties, have made creditable progress in many cases. As soon as political conditions become more favorable a great improvement in these institutions may be expected, and it is probable that the future of western medicine in China will rest largely with them. There are also a few private schools of some promise conducted under Chinese auspices in different parts of the country.

Finally, mention should be made of the South Manchuria Medical College conducted at Mukden under Japanese auspices with a well-qualified staff and excellent equipment, and of the University of Hongkong, a British institution which has won the recognition of the General Medical Council of Great Britain through its adherence to high standards in medical education. Both of these schools are likely to exercise a powerful and beneficial influence on the progress of scientific medicine in China.

No new enterprises in the field of medical education were undertaken by the Board in 1922, as further development of the teaching of the fundamental sciences seemed necessary before there could be much extension of medical teaching on a sound basis.

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Fig. 73.—Soochow Hospital, out-patient department in the foreground

III. HOSPITALS

With the great improvement that has taken place in hospital standards in China in recent years, the need for participation by the Board in such enterprises on a large scale seems to be passing, but no abrupt termination of its co-operation with institutions which have made effective use of funds previously entrusted to them has been contemplated.

During the year 1922 contributions towards maintenance were renewed on a reduced scale to six mission hospitals and appropriations toward buildings were made to five mission hospitals at Nanking, Soochow, Mukden, Tehchow, and Hwaiyuan.

The Soochow Hospital of the Southern Methodist Mission was completed and occupied during the year. The plant includes hospital and dispensary buildings constructed and equipped at a cost of Mex. $237,000, a hostel for convalescents and light cases awaiting treatment in the hospital or dispensary, and four staff residences. The nurses' quarters are at present in the main hospital building. In this building, besides wards for seventy-five patients, there are two

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Fig. 74.—Public ward for men, new Soochow Hospital

operating rooms, an X-ray suite, two laboratories, a modern laundry and kitchen, refrigerating plant, and animal rooms. The roof forms a great sun-parlor with open air cubicles for patients. Electric current is supplied from the plant of Soochow University; telephones and a nurses' call system have been installed; the building is heated by steam, and hot and cold water are supplied throughout. Both the hospital and the dispensary are of fire-proof construction, being of brick and reinforced concrete with terrazzo floors and steel window-sashes. It is hoped that experience with this modern hospital, the first mission hospital not connected with a medical school to be so completely equipped, will be of great value, since the construction is not too expensive to be widely imitated, in the larger cities at least, in so far as its new features prove to be adapted to Chinese conditions. The staff has been enlarged and now includes Chinese doctors who received their education in the United States. Women nurses are being gradually substituted for men throughout the hospital, an innovation which will be watched with much interest. This hospital enjoys a large measure of Chinese support. Gifts from Chinese toward the building fund amounted to Mex. $24,000.

During the year the Board set apart a sum of $10,500 to be used for extension of X-ray work in China. For some time Dr. P. C. Hodges, roentgenologist of the Peking Union Medical College, has been making a special study of the conditions under which X-ray work must be carried on in the isolated hospitals in China, where expert help is usually not available and great difficulties have to be contended with in varying climatic conditions, and in the absence or irregularity of public electric light plants. Complete units have been designed and built to meet these special conditions at a moderate cost, under the auspices of the X-ray committee of the China Medical Missionary Association. Dr. Hodges has conducted summer courses in roentgenology to prepare men for X-ray service, and he has aided by correspondence and visits in various parts of the country, in planning, installing, and repairing equipment in twenty-four hospitals.

The Board also contributed last year Mex. $3,000 towards a total of $6,000 for the installation of X-ray equipment in the Red Cross General Hospital at Shanghai. This hospital was entirely reorganized early in the year by a group of Chinese physicians and surgeons who are unusually well qualified by education and experience. Most of them were trained in Great Britain or the United States and have also had several years of experience under favorable conditions in China. A nurses' training school has been started under a Chinese graduate of the Johns Hopkins Hospital Training School. Improvements costing Mex. $18,490 have been made in the buildings and equipment and now for the first time the Chinese physicians and surgeons of Shanghai have under their control hospital facilities not inferior to those available for foreign doctors. The hospital has a capacity of seventy-four beds, of which forty-eight are in public wards. The budget for 1922 amounted to Mex. $50,000, of which the Chinese Red Cross Society contributed $10,000.

The organization of this institution, controlled and financed by Chinese and attended by a Chinese staff, is one of the most encouraging developments of recent years in the field of medicine in China. Its success will doubtless lead to similar enterprises in other communities and will serve to make plain to young men in the colleges of China the opportunities for useful service to their country through the medical profession.

A distinct turning-point has been reached in the development of hospitals not connected with medical schools. In recent years there has been a gratifying elevation of hospital standards throughout China. A few institutions in strategic locations have been aided by the Board to take important steps forward by provision for

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Fig. 75.—Administration and private ward building, Red Cross General Hospital, Shanghai

Photograph Excised Here

Fig. 76.—X-ray room. Red Cross General Hospital, Shanghai

additional workers and in some cases by contributions to new buildings and equipment. More generous support is coming from the communities which these hospitals serve and from their friends abroad. The task of providing hospital accommodation for the Chinese people at large is evidently one that must soon be taken up by the Chinese people themselves on a large scale, and the foreign service must be mainly of the nature of experimentation and demonstration as a result of which the people of the country may adopt those features of the modern hospital which have proved their value under actual conditions in China. There are already far more openings for competent physicians and surgeons in fairly well-equipped hospitals than there are men and women to fill such positions. The best way to aid the hospitals, therefore, seems to be to promote medical education. The appreciation of western medicine by great masses of the Chinese people is now so genuine that the energetic and competent doctor will soon be able to secure for himself, at least in the larger cities, the physical equipment that he needs to make his work effective. For these reasons a gradual withdrawal of the China Medical Board from cooperation with hospitals not connected with medical schools seems wise in order that more attention may be devoted to the pressing needs of medical and premedical education.

Fig. 77.—Organic chemistry laboratory, Premedical School, Peking Union Medical College

Fig. 78.—Biological laboratory, Premedical School, Peking Union Medical College

IV. FELLOWSHIPS

Recognizing the necessity of continuing the process of education beyond the period of formal undergraduate instruction, the Board has continued its policy of granting fellowships for graduate study. These grants have been of two general types:

1. Fellowships designed to prepare selected individuals for definite positions, usually as teachers in medical and premedical schools, or to give opportunities for advanced study during furlough periods to persons already engaged in such educational work. These fellowships are usually for study in the United States or Europe, but in some cases the first stages of the work are undertaken in Peking.

2. Fellowships to enable a larger number of physicians engaged in institutional work other than teaching to inform themselves of recent advances in medical science or to prepare themselves for work in the specialties. Hitherto a number of such fellowships have been given for study abroad, but in the future this more extensive type of work will be carried on almost exclusively at the Peking Union Medical College.

During the year 1922, fellowships for study in the United States or Europe amounting in all to $10,400 were assigned to fourteen teachers in medical schools and the science departments of colleges, including four from Peking, four from West China, three from Tsinan, two from Changsha, and one from Mukden; fellowships to the amount of $5,650 were voted to seventeen doctors in mission hospitals, and scholarships to the amount of $1,200 to four foreign nurses. New fellowships and scholarships or renewals were granted to six Chinese doctors, one premedical teacher, one nurse, one pharmacist and one student of medical photography. Of these ten persons, eight were members of the staff of the Peking Union Medical College or were being prepared for such positions, one was from the faculty of Yale-in-China, and one from the Shantung Christian University. The total appropriation for fellowships in the United States and Europe, including travel and tuition in some cases, amounted to $48,000.

Appropriations for fellowships for Chinese at the Peking Union Medical College for the academic year 1922–1923 amounted to $10,000. An appropriation of $6,500 was also made for fellowships for foreign physicians and teachers during the calendar year 1922. The following table shows the number of Chinese and foreigners attending different courses from January to December, 1922:

Departments	Number of Fellows			Approximate Period of Residence	
	Chinese	Foreign	Total	Chinese	Foreign
				Days	Days
Medical School					
Anatomy	3	1	4	203	60
Bacteriology	5	..	5	594	..
Biochemistry	2	..	2	143	..
Hygiene	9	1	10	267	25
Medicine	9	10	19	699	535
Obstetrics and Gynecology	2	13	15	162	149
Ophthalmology	12	10	22	766	463
Otolaryngology	1	1	2	90	183
Parasitology	2	..	2	135	..
Pharmacology	1	..	1	164	..
Pathology	1	..	1	210	..
Roentgenology	6	8	14	113	224
Surgery	5	3	8	274	79
Premedical					
Biology	1	..	1	210	..
Chemistry	1	..	1	180	..
Physics	1	..	..	165	..
Hospital					
Dietetics		1	1	..	30
Hospital Administration		1	1	..	30
Pharmacy	1	..	1	60	..
Social Service	1	..	1	105	..
Unspecified	1	..	1	30	..
Total	64	49	112	4,570	1,778
Deduction for Persons Registered for two Courses	3	3	6	..	..
Net total	61	46	106	4,570	1,778

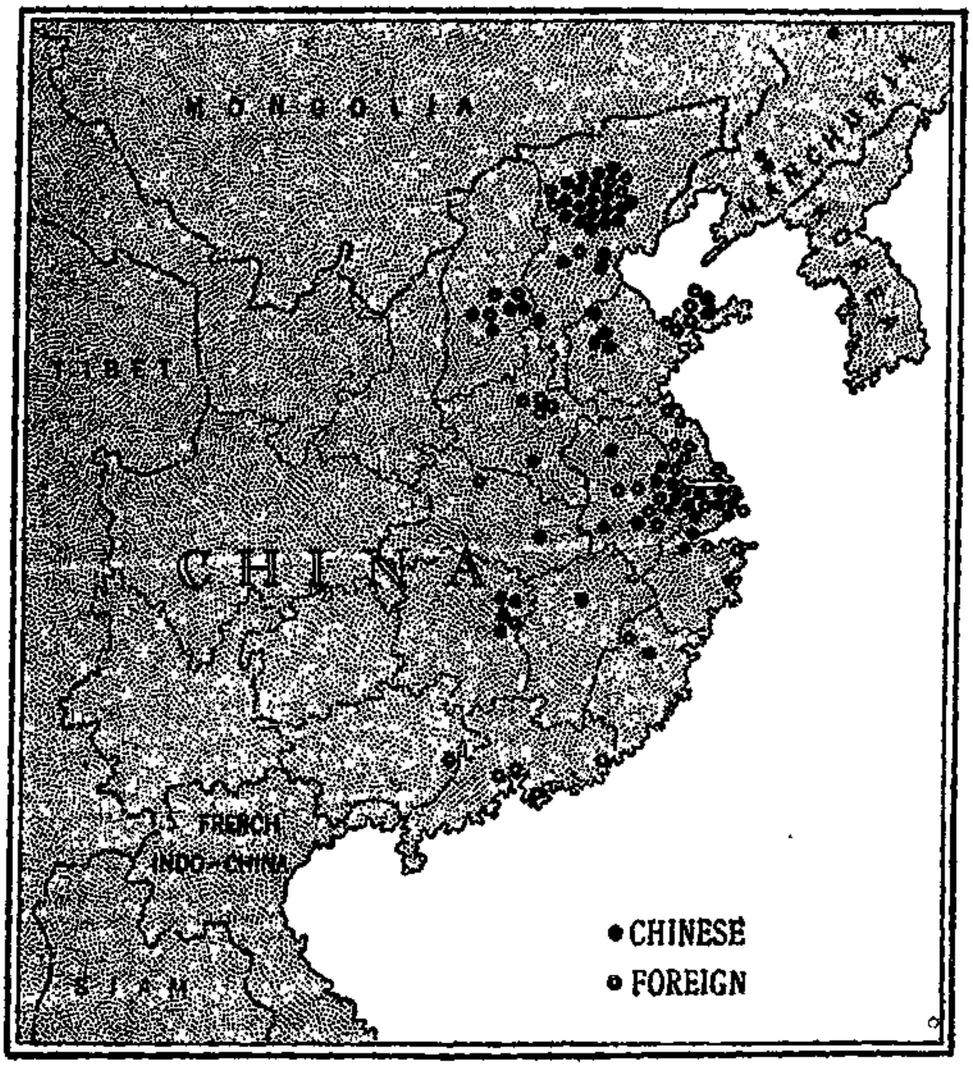

Fig. 79.—Map showing distribution of holders of fellowships for study in the Peking Union Medical College during 1922. Sixty Chinese and forty-five foreigners were provided by the China Medical Board with sufficient funds for study in Peking. In some cases the period of study covered a full school year; in others, not more than one or two months, which were devoted to a special course

V. MISCELLANEOUS

The China Medical Missionary Association plays an important part in medical progress in China, particularly through its *Journal*, its Councils on Medical Education and Hospital Administration, and its Publication Committee. In 1922 the Board pledged Mex. $15,000 per annum for two years and Mex. $10,000 per annum for three years thereafter to enable the Association to secure the services of an executive secretary and to improve its *Journal*, which is to appear monthly hereafter instead of every two months.

The North China American School at Tungchow near Peking renders a valuable service to the American community in North China by providing instruction under healthful conditions to American children through the high school grades. As such schools cannot rely on taxation for support they must appeal to individuals and organizations in the territory which they serve. The China Medical Board and the Peking Union Medical College have depended mainly upon the Peking American School for the education of the children of members of the staff, but since some attend the school at Tungchow a grant of

Mex. $5,000 was made in 1922 towards the general funds of that institution.

A detailed statement of appropriations, receipts, and expenditures for the year will be found in the report of the Treasurer of the Rockefeller Foundation.

In the following pages a graphic presentation is given of the expenditures of the China Medical Board since its establishment in 1914.

APPENDIX

I

Tables and Charts

It will be noted (Table I, Fig. 80) that with the practical completion of the Peking buildings the total expenditures for 1922 fell to the lowest point that had been reached since 1917, the gross expenditures for that year amounting to only a little over $1,200,000. A reference to the exchange chart (Fig. 82) will show also that the price of silver has become very near normal according to pre-war standards.

Medical Education. While silver expenditures for the maintenance of the Peking Union Medical College have steadily increased, gold expenditures for 1921 were considerably less than for the previous year on account of the rapid fall in the price of silver at the end of 1920 (Table I, Fig. 80). Expenditures for other medical schools (Table II, Fig. 81) have decreased, partly because aid given to the Harvard Medical School of China and the allied Red Cross Hospital ceased in 1919, and partly because both the Shantung Christian University and the Hunan-Yale Medical School succeeded in expanding their work to some extent through income from other sources.

Premedical Education. While plans for wider co-operation in premedical work were adopted in 1922, no large payments were called for in that year, and consequently the years 1920 and 1921, when considerable payments were made for buildings for St. John's and Fukien Christian Universities, appear to represent the peak in this branch of effort (Table III, Fig. 81). The year 1923 will probably show an increase, with payments for laboratories for Peking University, Nankai College, and the National Southeastern University.

Hospitals. Disbursements for hospitals reached their maximum in the last two years, but this is due largely to the carrying out of certain new projects postponed during the war, and to delayed settlement of accounts for prior years (Table IV, Fig. 81). A gradual decrease in the relative amounts of such appropriations may be expected.

Fellowships. The expenditures were highest in the period 1917 to 1919 when a number of men, both foreign and Chinese, intended for posts in the Peking school were being supported while studying in the United States. Some of these men received allowances considerably in excess of the usual stipends as they were receiving no salary at that time. The year 1922 shows a noticeable increase owing to the facilities offered at Peking (Table V, Fig. 81). No decrease but rather a gradual increase is to be expected in this kind of expenditure during the next few years.

Unclassified expenditures have included grants to the North China Union Language School for the construction and equipment of permanent buildings, for translation of medical and nursing textbooks and for aid of medical association activities (Table I, Fig. 81).

TABLE 1: *Summary of Expenditures*

	1914	1915	1916	1917
PEKING UNION MEDICAL COLLEGE				
Land, Buildings and Equipment	$.....	$63,951	$222,739	$71,931
Maintenance—Operation	.....	14,905	22,891	48,662
PROPOSED SHANGHAI MEDICAL SCHOOL	.....	....	93,217	126,547
MEDICAL EDUCATION ELSEWHERE	.....	21,606	60,701	91,142
PREMEDICAL EDUCATION	.....	....	....	30,465
HOSPITALS—MISSIONARY AND CHINESE	1,000	1,025	46,452	48,969
FELLOWSHIPS AND SCHOLARSHIPS	.....	10,672	33,264	43,315
UNCLASSIFIED *	.....	600	2,319	3,381
ADMINISTRATION—C.M.B.	38,271	44,864	64,301	33,488
TOTALS	$39,271	$157,623	$545,884	$497,900

* The unclassified appropriations include aid to committees engaged in translation and in the standardization of medical terminology, to the North China Language School where members of the staff of the Peking Union Medical College have studied, and to schools for the children of the staff.

† The increase in this item in the years 1921 and 1922 is due to the fact that a share of the

of the China Medical Board, 1914–1922

1918	1919	1920	1921	1922	Totals
$1,618,807	$2,453,458	$2,772,186	$1,091,069	$219,741	$8,513,882
117,117	355,166	483,060	393,349	623,944	2,059,094
79,022	26,017	23,808	12,259	Cr. 1,288	359,582
92,887	61,428	58,538	34,278	15,484	436,064
....	35,900	142,806	76,514	55,358	341,043
123,686	127,624	60,940	140,630	140,594	690,920
51,318	39,557	29,081	27,423	30,510	265,140
1,957	7,142	14,901	13,626	5,981	49,907‡
45,678	65,108	56,262	113,598†	115,302†	576,872
$2,130,472	$3,171,400	$3,641,582	$1,902,746‡	$1,205,626	$13,292,504

office expenses of the Rockefeller Foundation for information service, bookkeeping department, purchasing department, etc., has been charged against the China Medical Board since January 1, 1921.

‡ Funds returned through the sale of land and materials in Peking and in Shanghai brought in a total of $52,704, reducing the expenditures for the year 1921 to $1,902,746.

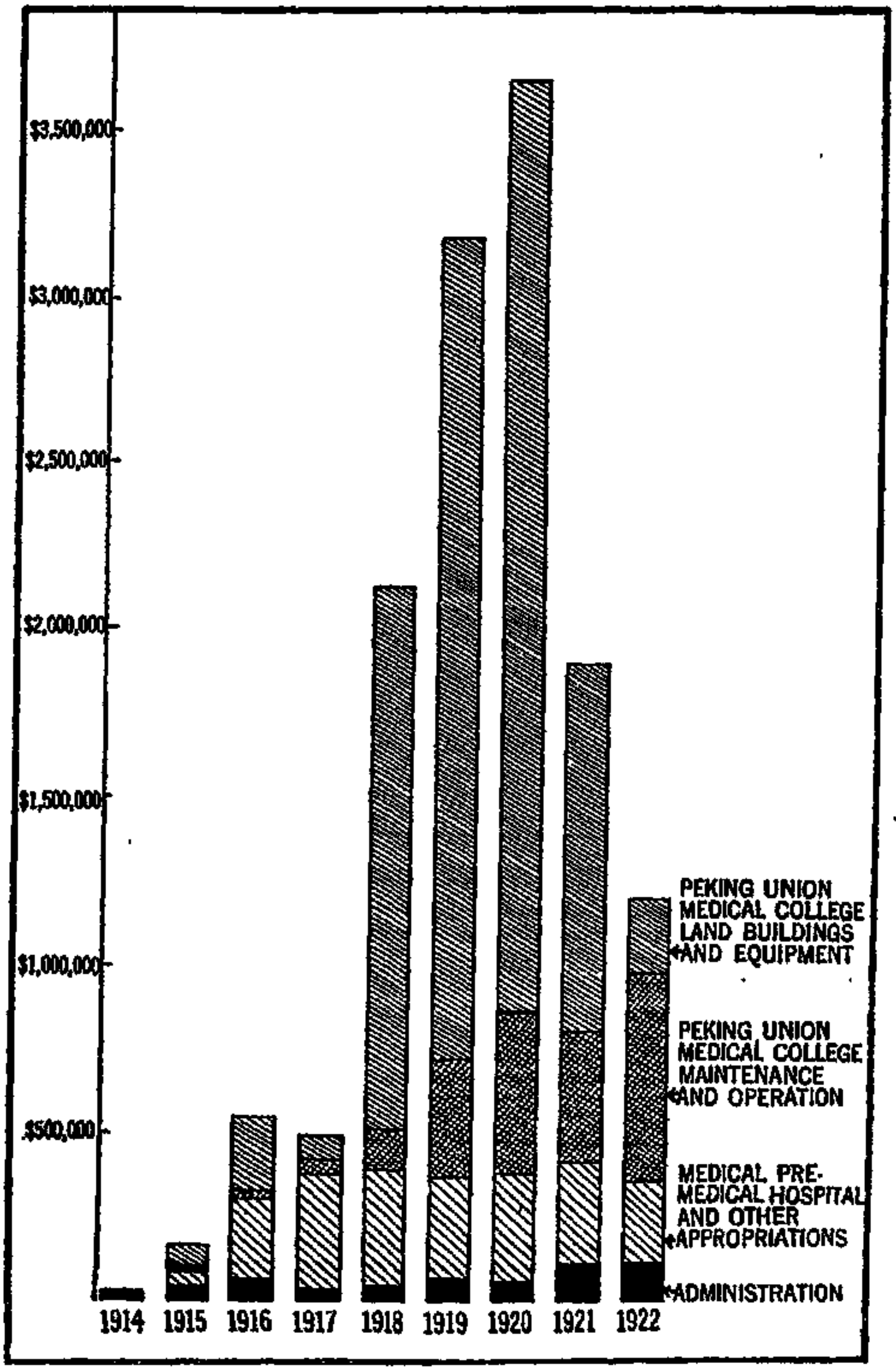

Fig. 80.—Analysis of expenditures of the China Medical Board for the years 1914–1922

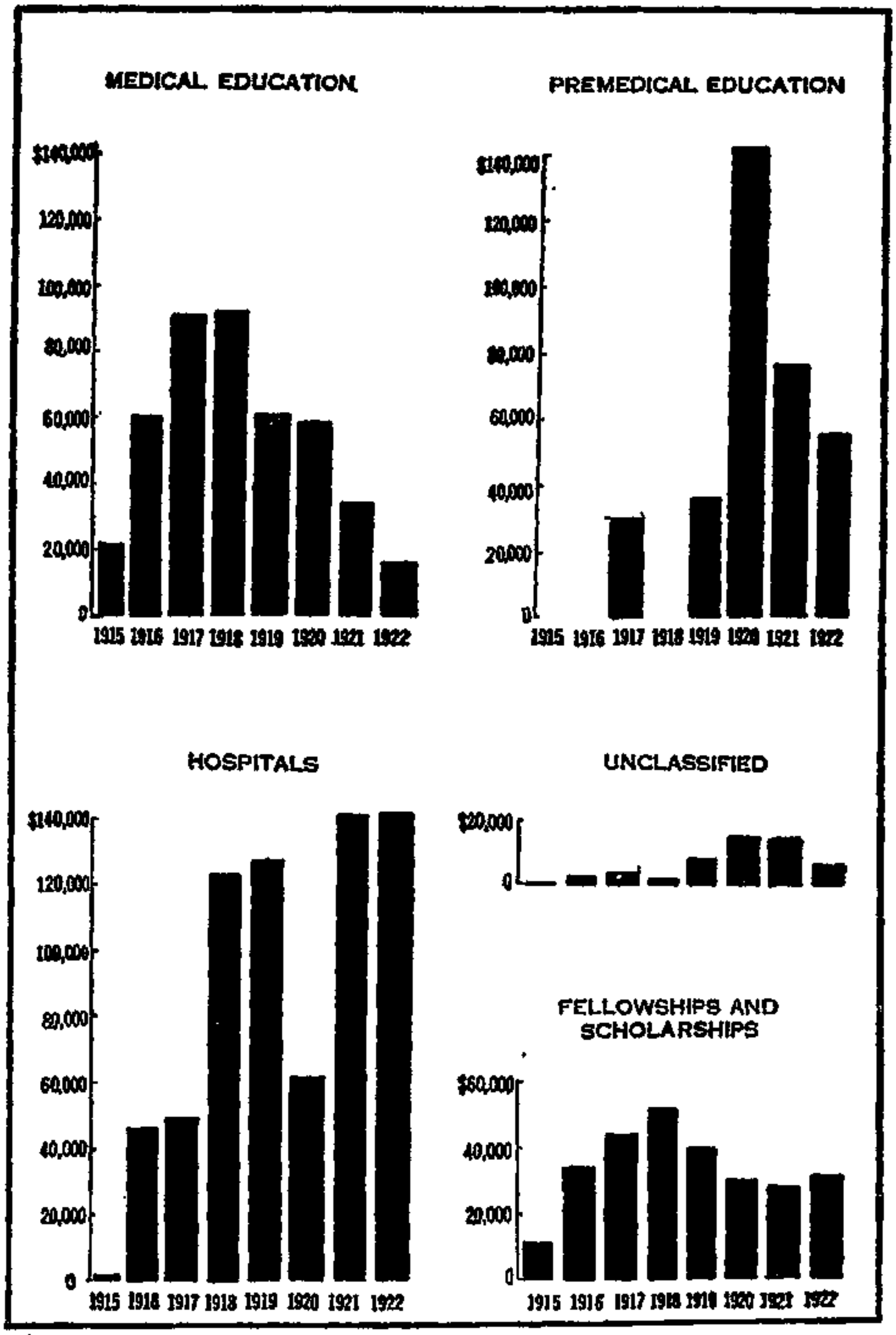

Fig. 81.—Expenditures for purposes other than the Peking Union Medical College, the proposed Shanghai School, and administration, 1915–1922

TABLE 2: *Summary of Expenditures for Medical Education in Shanghai School, 1915–1922*

	1915	1916	1917	1918
A. Mission Schools				
Harvard Medical School of China and Red Cross Hospital, Shanghai.....	$15,000	$11,507	$14,528	$35,338
St. John's University.....	....	1,500	1,500	1,500
Shantung Christian University................	....	30,000	54,914	39,849
Hunan-Yale Medical School..................	6,606	17,694	20,200	16,200
Totals...............	$21,606	$60,701	$91,142	$92,887
B. Chinese School				
National Medical College, Peking...........	....	....	....	....
Total................	....	....	....	....

TABLE 3: *Summary of Expenditures for Premedical Education in*

	1915	1916	1917	1918
A. Mission Schools				
Study of Premedical Education in China........	$.......	$.......	$.......	$.......
Canton Christian College	....	....	....	....
Fukien Christian University...................	....	....	....	....
Ginling College.........	....	....	....	....
St. John's University.....	....	....	....	....
Yale in China...........	....	....	30,465	....
Peking (Yenching) University....................	....	....	....	....
Totals...............	....	....	$30,465	....
B. Chinese School				
Southeastern University..	....	....	....	....
Aid to National Association for Advancement of Education in study of science teaching.......	....	....	....	....
Total...............	....	....	....	....

Schools other than the Peking Union Medical College or the Proposed

1919	1920	1921	1922	Totals
$3,728	$........	$.......	$........	$80,101
1,500	1,500	1,500	1,500	10,500
37,000	40,000	27,291	13,984	243,038
19,200	17,038	....	....	96,938
$61,428	$58,538	$28,791	$15,484	$430,577
....	....	$5,487	....	$5,487
....	....	$5,487	....	$5,487

Schools other than the Peking Union Medical College, 1915–1922

1919	1920	1921	1922	Totals
$........	$........	$........	$5,157	$5,157
....	28,522	5,610	....	34,132
22,700	49,784	45,616	22,700	140,800
....	....	8,300	....	8,300
1,200	63,000	7,180	5,500	76,880
12,000	1,500	9,808	13,153	66,926
....	....	....	5,625	5,625
$35,900	$142,806	$76,514	$52,135	$337,820
....	....	....	$2,737	$2,737
....	....	....	486	486
....	....	....	$3,223	$3,223

TABLE 4: *Summary of Expenditures*

	1914 to 1915	1916	1917	1918
A. MISSION				
AMERICAN BAPTIST				
Shaohsing	$.......	$.......	$.......	$3,937
AMERICAN BOARD (CONGREGATIONAL)				
Fenchow	....	....	....	....
Tehchow	600	9,075	3,691	4,072
METHODIST EPISCOPAL, NORTH				
Peking	....	....	3,200	....
Wuhu	....	....	1,500	900
METHODIST EPISCOPAL, SOUTH				
Soochow	....	1,100	3,000	....
METHODIST, SOUTH, AND AMERICAN BAPTIST, (JOINTLY)				
Huchow	....	....	....	....
AMERICAN PRESBYTERIAN, NORTH				
Changteh	....	825	225	16,594
Chefoo	....	....	1,725	2,250
Hwaiyuen	....	....	....	....
Paotingfu	....	16,160	1,018	9,475
Shuntehfu	....	13,603	....	5,488
CANTON HOSPITAL (UNION)	....	....	4,500	4,500
CHURCH OF SCOTLAND				
Ichang	....	....	....	....
PROTESTANT EPISCOPAL, U.S.A.				
Anking	....	....	....	....
AMERICAN PRESBYTERIAN, SOUTH				
Kashing	....	2,553	....	....
Soochow	425	300	3,125	900
UNITED CHRISTIAN				
Luchowfu	....	536	360	2,992
Nantungchow	....	....	....	603
SOUTHERN BAPTIST CONVENTION				
Chengchow	....	1,350	1,200	900
Hwanghien	....	400	1,050	450
Yangchow	....	550	625	28,575
LONDON MISSIONARY SOCIETY				
Tsangchow	....	....	....	750
MEDICAL MISSION AUXILIARY OF LONDON				
Tai Yuan Fu	....	....	....	....

for Hospitals, 1914–1922

1919	1920	1921	1922	TOTALS
$........	$........	$750	$........	$4,687
....	....	15,000	5,000	20,000
7,893	3,994	5,544	2,127	36,996
....	....	11,250	600	15,050
....	....	4,125	7,326	13,851
600	17,500	13,514	26,213	61,927
....	....	10,000	14,650	24,650
4,838	....	6,225	5,569	34,276
3,491	2,250	4,998	5,700	20,414
750	3,000	1,650	10,163	15,563
7,050	....	3,750	4,575	42,028
2,325	2,400	1,950	1,563	27,329
4,500	10,500	4,500	....	28,500
....	1,125	....	750	1,875
19,800	2,400	7,682	3,525	33,407
....	....	....	....	2,553
900	....	....	....	5,650
13,000	5,000	....	3,382	25,270
3,000	....	....	....	3,603
300	....	....	....	3,750
....	....	....	....	1,900
8,025	....	....	2,000	39,775
....	....	....	....	750
....	1,448	....	1,702	3,150

TABLE 4: *Summary of Expenditures*

	1914 to 1915	1916	1917	1918
A. MISSION—*Continued*				
UNITED FREE CHURCH OF SCOTLAND				
Mukden................	....	....	....	$9,000
NANKING UNIVERSITY HOSPITAL	....	....	$22,250	21,250
WOMEN'S FOREIGN MISSIONARY SOCIETY				
Kiukiang...............	....	....	....	....
Tientsin...............	....	....	1,500	....
HUNAN-YALE MEDICAL SCHOOL HOSPITAL				
Kuling Medical Missionary Association Hospital..	$1,000	....	....	....
Red Cross Hospital, Shanghai*	....	....	....	....
LOSS IN EXCHANGE........	....	....	....	11,050
TOTALS..............	$2,025	$46,452	$48,969	$123,686
B. CHINESE				
CENTRAL HOSPITAL, PEKING.	....	....	....	....
TOTAL................	....	....	....	....

*See Table II, Harvard Medical School of China.

for Hospitals, 1914–1922—Continued

1919	1920	1921	1922	TOTALS
$750	....	$750	$7,423	$17,923
....	....	9,250	18,500	71,250
158	$342	....	....	500
....	....	....	....	1,500
....	....	....	....	1,000
....	....	19,615	19,505	39,120
50,244	7,981	20,077	321	89,673
$127,624	$57,940	$140,630	$140,594	$687,920
....	$3,000	....	....	$3,000
....	$3,000	....	....	$3,000

TABLE 5: *Summary of Expenditures for Fellowships and Scholarships, 1915–1922*

	1915	1916	1917	1918	1919	1920	1921	1922	TOTALS
FOR STUDY IN THE UNITED STATES OR EUROPE...	$10,672	$33,264	$43,315	$51,318	$39,557	$29,081	$24,964	$23,771	$255,942
FOR STUDY IN PEKING AND HONGKONG									
Foreign..............	......	......	......	......	......	......	1,800	4,412	6,212
Chinese..............	......	......	......	......	......	......	659	2,327	2,986
TOTALS............	$10,672	$33,264	$43,315	$51,318	$39,557	$29,081	$27,423	$30,510	$265,140

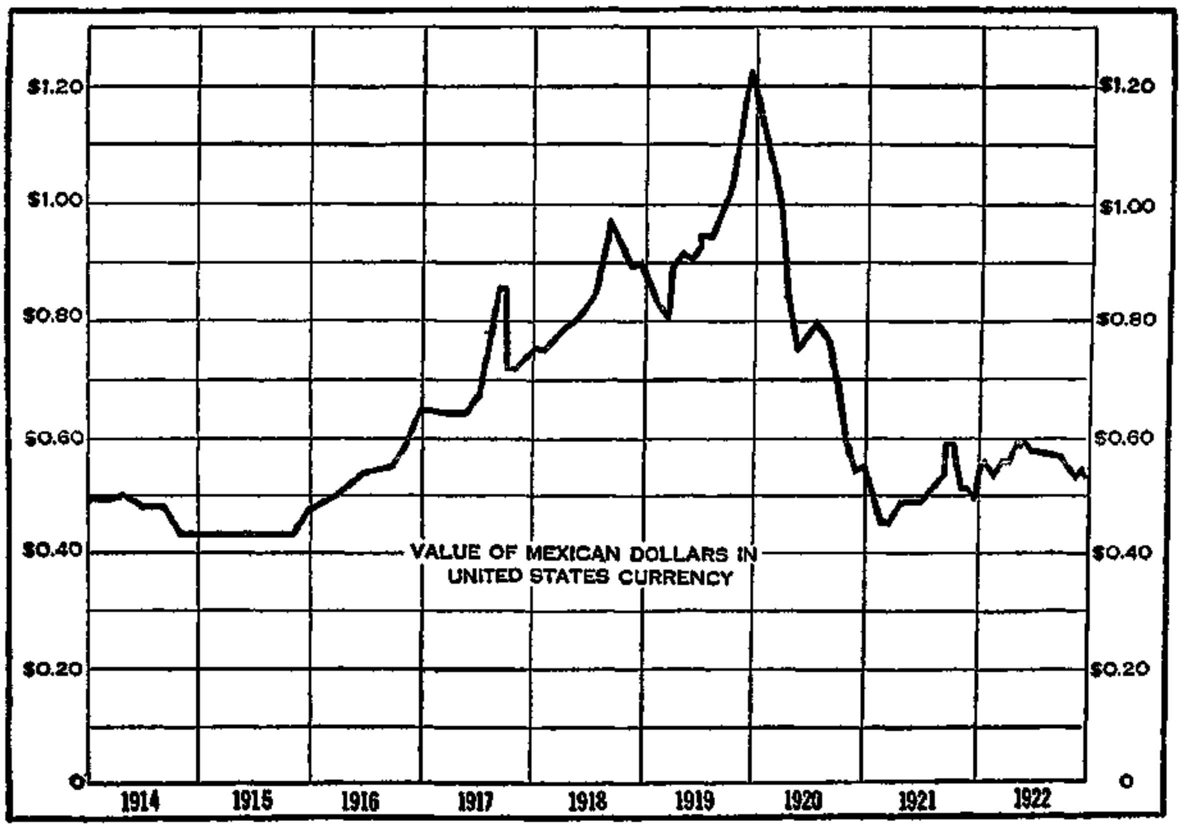

Fig. 82.—Curve showing monthly fluctuation in the value of Chinese silver currency in terms of United States money, 1914–1922

II

STATISTICS CONCERNING MEDICAL SCHOOLS IN CHINA

Name of School	Staff						Students								
	Faculty			Administrative and Technical Employees			Preparatory		Medical School					Graduate or Special Students
							Year		Year					
	Full Time	Part Time	Total	Full Time	Part Time	Total	1st	2nd	1st	2nd	3rd	4th	5th	
Foochow Union Medical College....	4	2	6	1	2	3	..	..	..	..	..	9	6	..
Hackett Medical College....	12	10	22	3	..	3	8	..	8	..	13	10	8	6
Hunan-Yale Medical College....	18	1	19	6	..	6	17	14	16	4	9	7	9	..
Mukden Medical College....	19	5	24	..	..	..	..	..	30	..	..	34	..	..

Name of School	Graduates	Character of Work				Hospital			
	1922	For Men or Women	Language Used in Teaching	Preparatory Course	Length of Medical Course	Number of Beds	Number of Out-patient Visits, 1921–1922		
							New Visits	Return Visits	Total
Foochow Union Medical College....	6	Men only	English	None	5 years	152	7,456	4,728	12,184
Hackett Medical College....	6	Women only	Chinese	1 year	5 years (Including internship)	72 (Some use of other hospitals)	7,651	9,446	17,097
Hunan-Yale Medical College....	8	Coeducational	English	2 years	5 years	120	7,302	10,281	17,583
Mukden Medical College....	27	Men only at present	Chinese	None	5 years (from 1923, 6 years)	120	15,535	28,314	44,169

SHANTUNG CHRISTIAN UNIVERSITY MEDICAL SCHOOL.....	23	2	25	3	..	3	28	11	10	25	11	17	12	..	21	Men only	Chinese	2 years	5 years	115	12,525	27,306	39,831
ST. JOHN'S UNIVERSITY MEDICAL SCHOOL.....	17	7	24	..	5	5	..	..	6	3	5	4	13	6	13	Men only	English	2 years	5 years	St. Luke's 155 St. Elizabeth's 110	22,993 15,000	43,143	81,136
WEST CHINA UNION UNIVERSITY MEDICAL SCHOOL.....	5	3 or 4	8	3*	..	3	32	8	7	..	..	1	5	..	5	Men only	Chinese	2 years	5 years	105	5,060	4,070	9,130
NORTH CHINA UNION MEDICAL COLLEGE FOR WOMEN.....	7	8	15	†		..	..	..	..	6	2	5	5	3	5	Women only	Chinese chiefly, some in English	2 years	5 years	65	5,045	15,012	20,057

*University Officers.

† Accounted for in figures given for faculty.

II (*Continued*)

STATISTICS CONCERNING MEDICAL SCHOOLS IN CHINA (*Continued*)

Name of School	Gross Expenditure and Income, 1921–1922								
	Gross Expenditure			Fees and Local Income			Subsidies		
	School	Hospital	Total	School	Hospital	Total	School	Hospital	Total
Foochow Union Medical College	....	....	....	....	....	....	....	....	....
Hackett Medical College........	....	....	$78,564.00	....	....	$47,800.00	....	....	$49,900.00*
Hunan-Yale Medical College....	$90,609.12	$87,667.31	$178,276.43	$1,889.85	$30,308.59	$32,198.44	$88,719.27	$57,358.82	$146,077.99
Mukden Medical College........	£4,920 (Excluding salaries of several professors not directly paid by College)	£3,509	£8,429	£865 (Including Chinese Government grant of £315)	£2,589	£3,454	....	....	....

Shantung Christian University Medical School	$38,479.68	$51,635.85	$90,115.53	$2,660.77	$22,896.27	$25,557.04	....	....	$56,809.45†
St. John's University Medical School.........	$55,000.00	$82,544.17	$162,544.17	$7,600.00	$77,784.17	$105,384.17	$47,400.00	$4,760.00	$57,160.00‡
	....	25,000.00	....	....	20,000.00	....	....	5,000.00	....
West China Union University Medical School.....	$9,000.00	$16,785.15	$25,785.15	....	$10,463.80	$10,463.80	....	$6,321.35	$6,321.35§
North China Union Medical College for Women.....	$23,835.28	$53,742.04 (Not including part time salaries and passage money)	$77,577.32	$2,768.00	$21,226.54	$23,994.54	$23,460.00 (Building operations carried by previous appropriations $22,789).	$13,821.00	$37,281.00

Note: These tables were prepared from information courteously supplied by the authorities of the schools concerned. The variation in methods of budgeting and accounting makes comparison of the figures difficult but it is hoped that in later reports an adequate summary will be feasible.

* The finances of Hospital, Medical School, and Nurses' Training School are not divided. Of the expenditures $37,000 was for lands and buildings. *Salaries of 11 of the staff were not included in subsidies.*

† These figures do not include salaries of teachers paid by missions, estimated at Mex. 60,000.

‡ For St. Elisabeth Hospital only estimates of total income, which is all local except about Mex. 5,000. This also does not include salaries of five foreign nurses at St. Luke's and one at St. Elisabeth.

§ This gross expenditure does not include salaries of teachers, etc., but is the amount spent yearly for the purchase of supplies and apparatus.

III

PUBLICATIONS OF STAFF MEMBERS PEKING UNION MEDICAL COLLEGE, 1922

The preparation and use of Dakin's Solution; by A. S. Taylor and T. Tuffier. *Addresses and Papers*, September, 1921.

Present-day aspects of parasitology in China; by E. C. Faust. *Addresses and Papers*, September, 1921.

Tuberculosis; by J. H. Korns. *Addresses and Papers*, September, 1921.

The new viewpoint in pharmacology; by B. E. Read. *China Medical Journal*, v. 35, pp. 567–574.

Taoist ideas of human anatomy; by E. V. Cowdry. *Annals of Medical History*, v. 3, pp. 301-309, 16 figs.

Phases in the life history of a Holostome, *Cyathocotyle orientalis* Nov. Spec., with Notes on the Excretory System of the Larva; by E. C. Faust. *Journal of Parasitology*, v. 8, pp. 78–85, 4 figs.

Hole in the macular region of both eyes due to simultaneous injury; by T. M. Li. *American Journal of Ophthalmology*, v. 5, pp. 1–4, 1 pl., 3 figs.

Experiments on the transplantation of limbs in Amphibia. Further observations on peripheral nerve connections; by S. R. Detwiler. *Journal of Experimental Zoology*, v. 35, pp. 115–161, 32 figs.

Occipital lobe embolism; by A. H. Woods. *Journal of Nervous and Mental Disease*, v. 55, pp. 81–90, 3 figs.

Separate analyses of the corpuscles and the plasma; by Hsien Wu. *Journal of Biological Chemistry*, v. 51, pp. 21–31.

A new colorimetric method for the determination of plasma proteins; by Hsien Wu. *Journal of Biological Chemistry*, v. 51, pp. 33–39.

Epithelioma; by F. L. Meleney. *China Medical Journal*, v. 36, pp. 93–102, 12 figs.

Trachoma in China; by T. M. Li. *National Medical Journal of China*, v. 8, pp. 1–10.

The drainage of mastoids as a means of preventing "scarlet fever ear"; by A. M. Dunlap. *Laryngoscope*, v. 32, pp. 272–274.

The motor nuclei of the cerebral nerves in phylogeny. A study of the phenomena of neurobiotaxis; by D. Black. *Journal of Comparative Neurology*, v. 34, pp. 233–275, 16 figs.

Types of cerebro-spinal syphilis in China; by A. H. Woods. *China Medical Journal*, v. 36, pp. 206–215.

On an anomalous digastric muscle in the thigh of a Chinese; by P. H. Stevenson. *Anatomical Record*, v. 23, pp. 281–290, 1 fig.

A survey of the helminth parasites of man in North China; by E. C. Faust. Extract, *Transactions 4th Congress Far Eastern Ass'n Trop. Med.*, 6 pp.

A slide rule for computing and converting chinese dates and ages; by P. H. Stevenson. *China Medical Journal*, v. 36, pp. 327–329, 2 figs.

Notes on the excretory system in *Aspidogaster conchicola;* by E. C. Faust. *Transactions of the American Microscopical Society*, v. 41, pp. 113–117, 2 pl.

Odor from healing mastoid wounds simulating that from necrosing bone associated with secondary invasion of diphtheroids; by A. M. Dunlap. *Laryngoscope*, v. 32, pp. 616–618.

Syncytioma (atypical chorioma) of the uterus terminated by acute peritonitis; by H. E. Meleney. *Surgery, Gynecology, and Obstetrics*, v. 35, pp. 137–141, 10 figs.

The tetanus bacillus as an intestinal saprophyte in man; by C. Ten Broeck and J. H. Bauer. *Journal of Experimental Medicine*, v. 36, pp. 261–271.

Bronchospirochetosis in China; by E. C. Faust. *Archives of Internal Medicine*, v. 30, pp. 343–354, 3 charts.

Notes on *Embadomonas Sinensis*, Faust and Wassell, 1921; by E. C. Faust. *Journal of Parasitology*, v. 9, pp. 33–34, 1 pl.

Streptococcus hemolyticus mastoiditis; by A. M. Dunlap. *Laryngoscope*, v. 32, pp. 733–762.

Thrombosis of the superior petrosal sinus and meningitis, following acute mastoiditis; by H. E. Meleney. *Laryngoscope*, v. 32, pp. 763–767.

Some observations on experimental tetany; by E. W. H. Cruickshank. *China Medical Journal*, v. 36, pp. 445–468, 3 figs.

A marker for identifying right and left eye images in stereoscopic chest films; by P. C. Hodges. *American Journal of Roentgenology*, v. 9, pp. 751–752, 2 figs.

A metastisizing malignant tumor of the thyroid gland; by F. L. Meleney. *Annals of Surgery*, v. 76, pp. 684–694, 9 figs.

Studies on hemoglobin. I. The advantage of alkaline solutions for colorimetric determination of hemoglobins; by Hsien Wu. *Journal of Biochemistry*, v. 2, pp. 173–180.

NOTE: This list does not include papers presented at the opening exercises by persons not on the staff, although published by the College in 1922. The contribution of a visiting professor, which was also published by the College in 1922, is not included.

DIVISION OF MEDICAL EDUCATION

Report of the General Director

To the President of the Rockefeller Foundation:

Sir:

I have the honor to submit herewith my report as General Director of the Division of Medical Education for the period January 1, 1922, to December 31, 1922.

Respectfully yours,
RICHARD M. PEARCE,
General Director

DIVISION OF MEDICAL EDUCATION

The work of the Division of Medical Education during the year 1922 may be described under two headings: (1) new undertakings, and (2) a progress report on programs inaugurated in previous years.

I. New Work

Study of Conditions in Medical Schools of Central Europe

In October, November, and December, the Director visited Germany, Austria, Hungary, Czechoslovakia, and Poland in order to obtain exact knowledge concerning medical institutions and personnel, the condition of laboratory equipment and supplies, and the facilities for training men. In general it was found that institutes and clinics liberally equipped before the War had used up their stocks, and that fixed apparatus, as a result of general wear and tear, was in need of replacement. The high cost of supplies and animals endangered research, and the difficulties of exchange and the heightened cost of living had led to a decrease in the number of men entering on scientific careers. The regular staffs on salary were as a rule, however, complete, and men were awaiting appointment provided they could receive compensation. In all the countries mentioned the conditions were practically the same, but there was some evidence of a slight, gradual improvement in Austria, largely due to the stabilization of currency and the hope of relief in the Government's attempt to balance its budget on the basis of the Geneva Convention Loan. In some countries, as Poland, Czechoslovakia, and Hungary, the situation has been complicated by the establishment of new medical schools, and the necessity of finding for these not only faculty, but also equipment and supplies.

In Austria, Czechoslovakia, and Hungary the Foundation has since 1920 been aiding institutions through supplies for laboratory equipment.

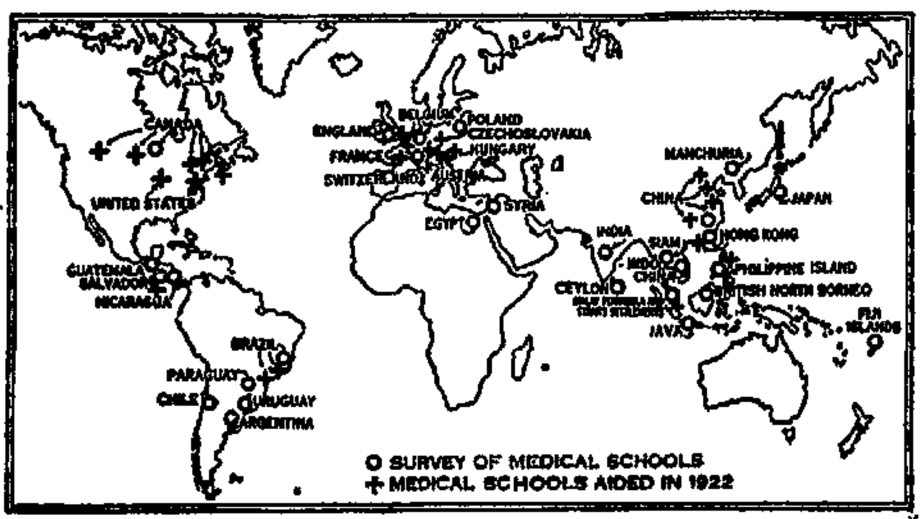

Fig. 83.—Activities of the Division of Medical Education. On this map are shown (1) the countries in which surveys of medical education have been made by representatives of the Foundation up to the end of 1922, and (2) the location of medical schools aided during 1922

As a result of the present survey this aid has been increased in the countries mentioned and is to be extended to Germany and Poland. In addition, the system of traveling fellowships for foreign study has been extended to all surveyed countries in the hope of allowing properly equipped men to continue their studies under more favorable conditions in other countries of Europe or in America. A new form of emergency aid has also been established in all these countries—that of resident fellowships, the essential principle of which is the granting of relatively small sums to cover the expense of living and research so that younger men desiring to enter upon a scientific career, or older men already in service but who need assistance, may be given adequate opportunity for good training. This plan will be in operation in 1923. In Germany resident fellowships will be assigned by a local committee composed of Professor M. Matthes, University of Königsberg, Professor Max von Frey, University of Würzburg, Professor Versé, University of Marburg, and Professor Heinrich Poll, University of Berlin (secretary). With this committee serves a representative of the Notgemeinschaft der Deutschen Wissenschaft, the emergency committee appointed by the Government to aid in the support of scientific work, and also (as chairman) the Director of the European

Office of the Division of Medical Education of the Rockefeller Foundation. In the other countries named local committees are being appointed to co-operate with the European Director in handling all problems concerning laboratory supplies and fellowships.

The chief object of this emergency support is to insure a succession of well-trained men in the medical sciences in each of these countries.

Teaching Methods in England

As a result of the mutual interest in teaching methods in America and England it seemed advisable for the Foundation to support a study of the methods of instruction in the clinics and dispensaries in the English medical schools. The adoption in England of what is there called the "unit" system and in the United States the "full-time" system of instruction in clinical medicine lent further interest to such a study. A survey was made in October and November by Drs. David L. Edsall, of the Harvard Medical School, and Evarts A. Graham, of Washington University.

University of Hongkong

In 1921 the Director studied the medical school of the University of Hongkong, with particular reference to the development of strong medical teaching centers in the Far East. As a result the Foundation agreed to endow chairs in medicine, surgery, and obstetrics, with the understanding that such assistance would aid the local authorities in bringing about certain improvements in the general situation. These changes included (1) appointment of incumbents of these chairs on a university basis, (2) separation of the chairs of surgery and anatomy, (3) development of the department of pathology to the same level and importance as the departments of anatomy and physiology, and (4) full-time assistants for anatomy, physiology, and pathology; (5) development of a library for the medical school; (6) provision of salary and quarters for an assistant and a resident house man in the Civil Hospital for each of the three clinics of surgery, medicine, and obstetrics; and (7) other improvements in the outpatient and clinical laboratory facilities.

The changes in regard to obstetrics were not considered immediately feasible by the university authorities, but the chair of surgery has been filled by the appointment of Dr. Kenelm H. Digby, formerly professor of surgery and anatomy in the same institution, and the chair of medicine by the appointment of Dr. John Anderson, from the London School of Tropical Medicine. The sum of 500,000 Hongkong dollars has been paid to the University for the endowment of these two chairs. It is hoped that the department of obstetrics also may be developed in the near future.

Royal Medical College of Bangkok, Siam

In line with the development of important centers in the Far East, and following the survey made by the Director in 1921, the Foundation on December 6, 1922, agreed to assist the government of Siam during a period of five years in reorganizing the Royal Medical College of Bangkok. As a result of this assistance the Government will (1) provide an extension of facilities for secondary education; (2) reorganize the school of arts and sciences in Chulalongkorn University so as to provide a satisfactory two-year premedical course; (3) establish a medical course of four years with full-time professors to head six major departments (anatomy, physiology, pathology, medicine, surgery, obstetrics); (4) increase substantially salaries of graduates of the reorganized medical school who enter government service; (5) erect a pathological laboratory, new wards, and an administration building. The Foundation agrees (1) to select foreign professors for temporary appointment in charge of the six major departments and to provide remuneration as may be necessary in addition to the maximum salary paid by the Siamese

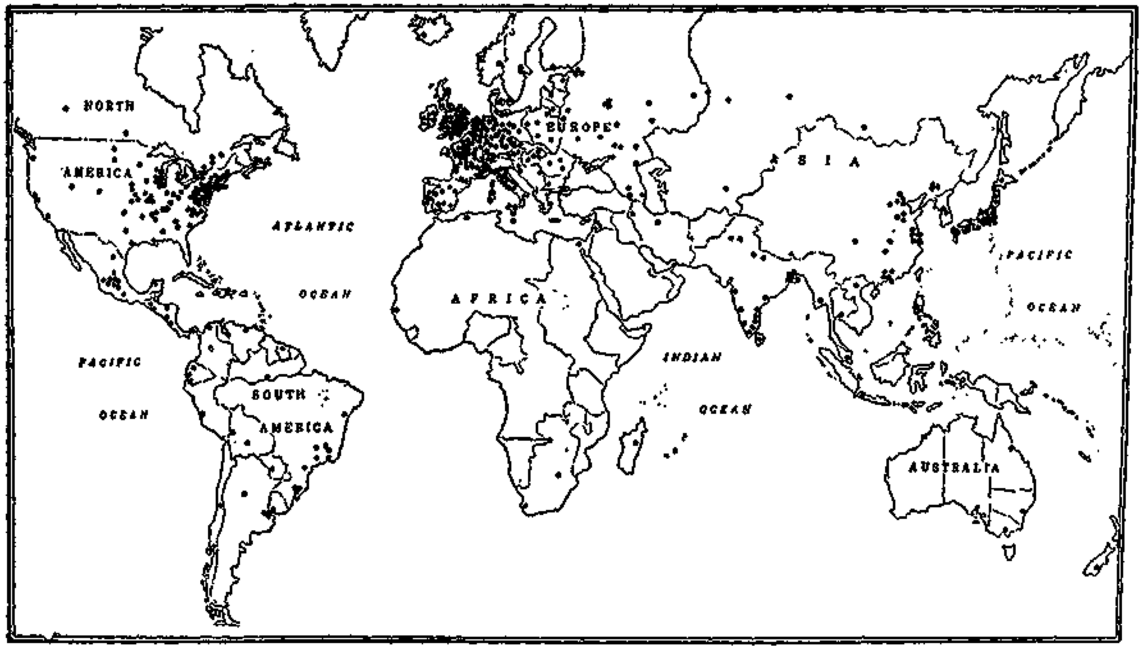

Fig. 84.—Geographical distribution of the medical schools of the world. Note the concentration of facilities for medical training in Western Europe, Japan, and the eastern part of the United States. Many populous countries are practically without modern medical schools

government; (2) to assist, through fellowship grants, in the training of Siamese who are to succeed the temporary foreign professors; and (3) to furnish $125,000 to be used in building laboratories of physiology and anatomy and a surgical building containing operating rooms, offices, and laboratories.

Medical School of the University of the Philippines

At the request of the government of the Philippines, the Division of Medical Education secured Dr. William S. Carter, formerly dean and professor of physiology of the medical school of the University of Texas, to act as associate dean of the College of Medicine and Surgery of the University of the Philippines, and to advise the faculty on the development of this school. Dr. Carter went to Manila in March, 1922, and has since been acting professor in the department of physiology and has advised with the dean of the school, Dr. Calderon, on matters of educational policy.

Very important changes have taken place during the year in the medical school of the University of the Philippines. The curriculum has been modified to emphasize laboratory courses and to increase the amount of obligatory clinical training, the budget system has been rearranged, a survey has been made of the cause of students' failures in premedical and medical courses, and reorganization of the resident staff of the Philippine General Hospital has been brought about.

Faculdade de Medicina e Cirurgia, São Paulo, Brazil

As the result of a survey made in February and March at the invitation of the Faculdade de Medicina e Cirurgia de São Paulo by the Director of the Division of Medical Education and the Director of Public Health Laboratory Service of the International Health Board, the Foundation on May 24, 1922, decided to assist in the reorganization of this school on general lines, as follows: Concentration of all activities of the medical school at one site, including a hospital of at least three hundred beds under the professional control of the faculty of the school; new laboratory buildings for (1) anatomy, histology, and medical biology, (2) physiology, pharmacology, and physics, (3) chemistry, including inorganic, organic, and biological chemistry, (4) pathology and bacteriology, and (5) hygiene; limitation of students to correspond to the amount of equipment for individual class work in the medical sciences; development of the departments of anatomy, physiology, biochemistry, pathology, bacteriology, and hygiene, with a full-time professor in charge and at least one other full-time person in each department, with increased budgets for salaries and maintenance, the curriculum to be changed to increase the time given to laboratory instruction; increased power for the faculty in determining appointments to its membership; recognition of the school by the Government. If the reorganization outlined were put into effect, the Foundation agreed (1) to provide 4,000 contos (approximately $480,000 at the rate of exchange on December 31, 1922) for the erection of the five laboratory buildings mentioned, with the understanding that the Government would increase the annual budget of the medical school by 200 contos for maintenance of the laboratories; (2) to invite a commission composed of members of the faculty of the São Paulo school, with the possible addition of an architect, to visit the United States and other countries as guests of the Foundation to study hospital and laboratory construction and administration and methods of laboratory and clinical teaching; (3) to provide fellowships for men appointed by the Faculdade; and (4) if requested by the Faculdade, to stand ready to send one or more professors from the United States or Europe to assist in organizing the work temporarily.

Medical School of University of Salvador

On the invitation of the University of Salvador Dr. Robert A. Lambert, of Yale, was sent to that institution, where, in co-operation with the local faculty, he delivered a series of lectures on pathology and conducted practical demonstrations. In addition he studied the general problem of medical education in Central American countries.

National Research Council Fellowships in Medicine

There is commonly a critical period in the career of a young man who is fitting himself to become a teacher or investigator in the medical sciences. This period falls at the time of or shortly after his graduation from the medical school when he is obliged to choose between the practice of medicine or the continuance of studies in the field of his choice. The graduate is usually between twenty-six and thirty years of age, and in many cases has assumed financial obligations which have a considerable influence in discouraging him from continuing his studies unless he can secure an adequate income. Large numbers of men who are really more interested in some one of the medical sciences than they are in the practice of medicine are obliged, from economic causes, to desert the ranks of teaching and regovernment; (2) to assist, through fellowship grants, in the training of Siamese who are to succeed the temporary foreign professors; and (3) to furnish $125,000 to be used in building laboratories of physiology and anatomy and a surgical building containing operating rooms, offices, and laboratories.

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In order to encourage competent workers who would otherwise be obliged to forsake careers of teaching and investigation, the Rockefeller Foundation, in co-operation with the General Education Board, offered to the National Research Council the sum of $100,000 yearly for a period of five years. The administration of the fund is under a committee composed of the Chairman of the Division of Medical Sciences of the National Research Council as chairman *ex officio*, and the following members appointed by the National Research Council: Drs. David L. Edsall, Joseph Erlanger, G. Carl Huber, Edwin O. Jordan, Dean Lewis, W. G. MacCallum, Lafayette Mendel, and W. W. Palmer. In this initial year grants amounting to $56,200 were made to twenty-six fellows—five in the fields of pathology and bacteriology, five in medicine, six in surgery, four in physiology, two in biochemistry, and one each in anatomy, medical specialties, pharmacology, and physical chemistry.

State University of Iowa College of Medicine

The General Education Board and the Rockefeller Foundation have authorized a contribution of one half of a total of $4,500,000 required by

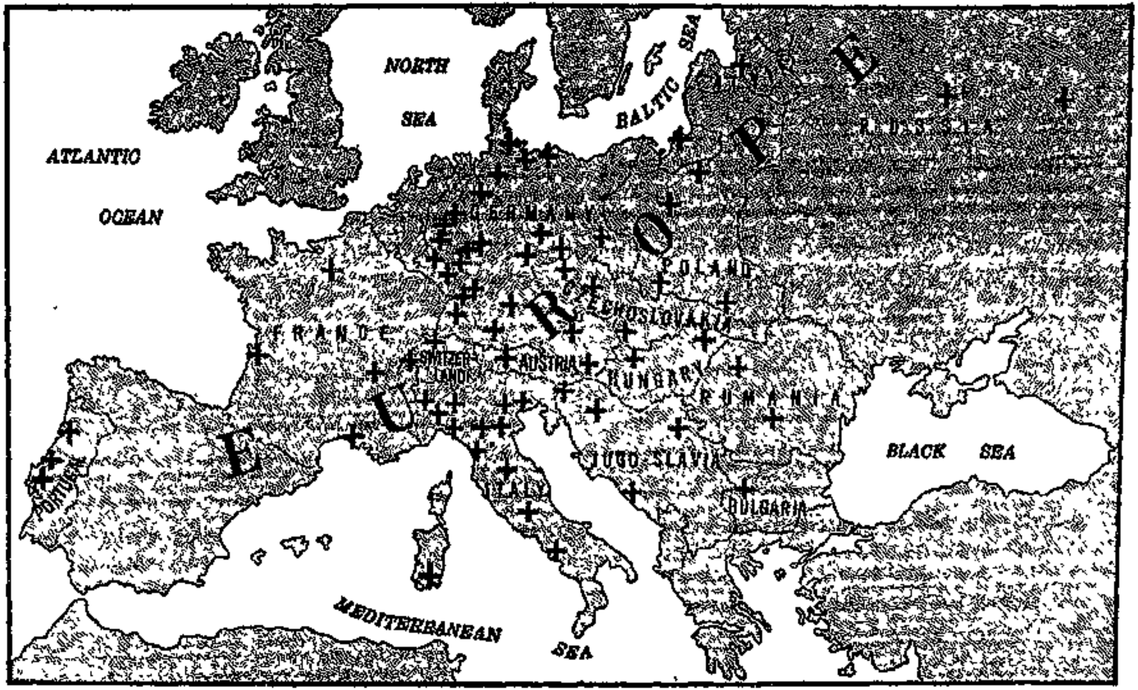

Fig. 85.—Map showing location of European cities to which English and American scientific journals were sent in 1922 for the use of 216 medical libraries

the State University of Iowa College of Medicine for building and equipment. The gift of $1,125,000 from the General Education Board and of a like amount from the Rockefeller Foundation is contingent on the appropriation[1] by the state of Iowa of the remaining $2,250,000 necessary to make up the total of $4,500,000.

Medical Information Service

Increased demands from many parts of the world have come to the Division of Medical Education for information in regard to hospital plans, methods of instruction, curricula, and general theory of medical education. To meet these requests, school and hospital plans, catalogs, reports on medical education, etc., are being formed into collections of documents on educational theory, experiment, and practice throughout the world from which will be prepared later bulletins of value to medical teachers.

II. Progress of Earlier Undertakings

Medical Literature and Laboratory Supplies

The policy of furnishing medical literature to important centers in low-exchange countries of Europe has been continued. During the year books and about 1,500 subscriptions to British and American medical journals were sent to

[1] The bill to accept the provisions of this gift passed both houses of the General Assembly of Iowa in March, 1923.

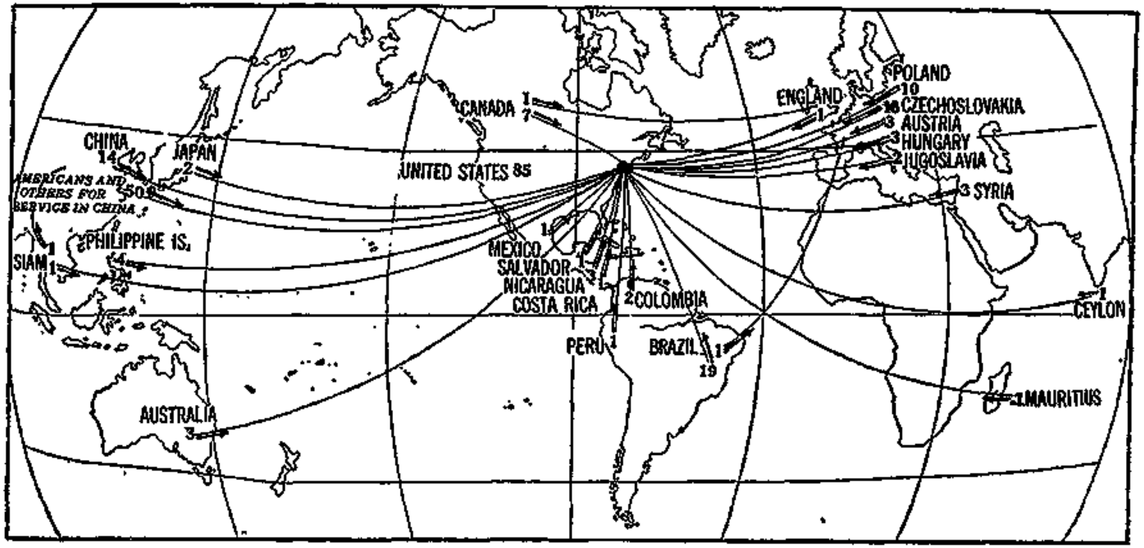

Fig. 86.—Fellowships for twenty-three countries. Through its fellowship plan the Foundation provides for both men and women an opportunity for study in the United States and other countries to fit them for leadership and technical efficiency. These fellowships promise to be one of the most important means of promoting international co-operation in preventive medicine and medical education

over two hundred medical libraries in Europe. In Germany the distribution of this literature has been placed in the hands of the Notgemeinschaft der Deutschen Wissenschaft, but in other countries it is handled by local committees. The wide use and great appreciation of this material, in many instances the only medical literature available in English, has justified the continuation and extension of this service.

In the same way the assistance in procuring laboratory equipment, which was begun in 1920 in Austria, Czechoslovakia, and Hungary, is to be extended to other low-exchange countries and the principle broadened to include cost of animals and their maintenance, and important services in connection with teaching facilities.

Pasteur Institute

Continuing the policy of assisting the Pasteur Institute of Paris, which exerts a fundamental influence on French medical education through training advanced investigators in the medical sciences, the Rockefeller Foundation appropriated the sum of $25,000 to this Institute for work during 1922.

Free University of Brussels

The Brussels authorities have cleared of buildings the site proposed for the new medical school, and have had plans drawn for both medical school and hospital. It is anticipated that the construction of both these buildings will begin during the year 1923.

University College and University College Hospital Medical School, London

The building of the new Institute of Anatomy, University College, is approaching completion, and will be dedicated in the late spring of 1923,[1] while construction has begun in connection with the new buildings of the medical school. Final payments on the Foundation's pledge for endowment of this important medical center were made in 1922.

Visiting Commissions

A group of professors from the Faculty of Medicine of the University of Strasbourg, France, visited medical schools and institutions of the United States and Canada from October 1 to 21, 1922. The Commission was composed of the following:

Dr. Georges Weiss, Dean, and Professor of Biophysics.
Dr. Léon Blum, Professor of Clinical Medicine.
Dr. Paul Bouin, Professor of Histology.
Dr. Camille Duverger, Professor of Ophthalmology.
Dr. P. Masson, Professor of Pathological Anatomy.
Dr. Maurice Nicloux, Professor of Physiological Chemistry.
Dr. Lucien Pautrier, Professor of Dermatology.

[1] Dedicated May 31, 1923.

Special attention was paid by the Commission to the organization of medical teaching in the United States. On its return to Europe the Commission spent two weeks in England. Both in England and in the United States the visit resulted in a mutual exchange of ideas and information, stimulating and valuable to medical men of all three countries.

On May 30, 1922, the Rockefeller Foundation, through the Japanese Ambassador at Washington, extended an invitation to the Japanese Government to send a Commission to visit the United States as guests of the Foundation to study medical institutions and public health administration. This invitation was accepted and the visit planned for the spring of 1923.

Fellowships

Fellowships under the Division of Medical Education are limited to candidates who are assured of teaching positions upon the conclusion of their studies, and preference has been given to men in institutions with which the Foundation has definite programs of co-operation. The sixteen fellows under direct charge of the Division of Medical Education during 1922, not including the medical fellows under the National Research Council, came from the following countries: Brazil, 5; Canada, 3; England, 1;

Japan, 2; Jugoslavia, 2; Syria, 3. The distribution of these fellowships according to field of work was as follows:

Anatomy	3
Bacteriology and Immunology	1
Gynecology	1
Internal medicine	1
Oral surgery	1
Pathology	3
Physiological chemistry	4
Physiology	1
Surgery	1
	16

Canadian Schools

During the year 1922, the program of assistance for the schools in Canada, adopted in 1920, was continued. To the Faculty of Medicine of Dalhousie University $50,000 appropriated in 1921 was paid for the improvement of clinical facilities, principally in obstetrics, at the new Salvation Army Hospital. The Université de Montréal received a grant of $25,000 for the development of laboratory teaching in the premedical and medical departments. The University of Toronto received $50,000 interest on the pledge of $1,000,000 endowment. The University of Manitoba on May 8 received payment of the entire pledge of $500,000, with interest from January 1, for general endowment. At Alberta the development of the clinical branches was aided by a grant of $25,000 for the year.

THE ROCKEFELLER FOUNDATION

Report of the Treasurer

NEW YORK, DECEMBER 31, 1922

To the President of the Rockefeller Foundation:

Sir:

I have the honor to submit herewith my report of the financial operations of The Rockefeller Foundation and its subsidiary organizations for the period January 1, 1922, to December 31, 1922.

Respectfully yours,
L. G. MYERS,
Treasurer.

TREASURER'S REPORT

The following table summarizes the situation with respect to income, disbursements, and appropriations:

Undisbursed income on hand January 1, 1922, amounted to	$7,359,000.90
Refunds on account of payments in 1921 and prior years amounted to	6,960.41
Income from January 1, 1922, to December 31, 1922, amounted to	8,836,309.55
The total amount available for disbursement was, therefore	$16,202,270.86
Disbursements on account of appropriations (not including a payment of $6,000,000 to Johns Hopkins University made from principal funds) amount to	9,911,408.78
Leaving a balance of undisbursed income on December 31, 1922, amounting to	$6,290,862.08
Unpaid appropriations and commitments effective in 1922 and prior years amount to	4,377,426.74
Leaving a balance in income account available for appropriation amounting to	$1,913,435.34

Appropriations and pledges effective in 1923 and following years, amounting to $15,609,869.22, as shown in the annexed balance sheet, are not provided for in the foregoing figures but are considered as charges against the income of the years in which they fall due.

In addition to the payments mentioned in the foregoing summary, the sum of $6,000,000 was appropriated and paid from principal.

The Foundation has heretofore carried its investments at their purchase price, or, in the case of those received from Mr. Rockefeller, at an appraised valuation based upon their market value when the several gifts were received.

As securities have been redeemed or sold from time to time, any difference between the price received and the ledger value has been credited or debited, as the case happened to be, to a reserve fund. The net result of this has been a credit balance. As this plan has affected only securities actually disposed of, no change has heretofore been made in the valuation of other securities that have depreciated in market, and, in the judgment of the Finance Committee, in asset values.

The Finance Committee came to believe that in the case of a number of issues the recovery of this depreciation was more or less uncertain, and decided to recommend to the Trustees the adoption of the long-established commercial and fiduciary practice of readjusting, from time to time, the valuations of depreciated securities.

This recommendation was adopted by the Trustees, who authorized the modification of the original plan and directed that the net sum received from the sale and redemption of securities in excess of their ledger valuation, together with the balance to the credit of the reserve fund on December 31, 1921, be used to reduce the ledger valuations of securities on which substantial depreciation had taken place. These instructions have been carried out.

Since the close of the year the accounts of the Comptroller, the accounts of the Treasurer and the securities owned by the Corporation have been examined by Messrs. Townsend, Dix and Pogson, Accountants, who have rendered a report to the Chairman.

The financial condition and operations are set forth in the appended exhibits listed below:

Balance Sheet......................	Exhibit A
Statements of Receipts and Disbursements of Income..................	Exhibit B

EXHIBIT A

BALANCE SHEET, DECEMBER 31, 1922

ASSETS

I. INVESTMENTS			
General Fund			
General Schedule (Exhibit P)		$161,573,215.10	
Secured demand loans		3,631,409.40	
			$165,204,624.50
Special Funds (Exhibit Q)			116,800.00
			$165,321,424.50
II. LAND, BUILDINGS, AND EQUIPMENT (Exhibit O)			
In China		$8,850,106.00	
In New York		39,326.26	
			$8,889,432.26
III. INCOME ACCOUNTS			
Special Funds			
Cash on deposit in New York			$6,771.65
General Fund			
Cash on deposit in New York		$2,326,847.12	
Cash in London		222,290.93	
Cash in Brussels		233,542.58	
Cash in Czechoslovakia		361,533.38	
Secured demand loans		1,368,590.60	
Funds in hands of agents, to be accounted for, and sundry accounts receivable	$1,784,548.03		
Less accounts payable	6,490.56		
		1,778,057.47	
TOTAL		$6,290,862.08	
Excess of appropriations and pledges over income available		13,696,433.88	
			19,987,295.96
			$19,994,067.61
GRAND TOTAL			$194,204,924.37

EXHIBIT A

BALANCE SHEET, DECEMBER 31, 1922

FUNDS AND OBLIGATIONS

I. Funds			
General Fund (Exhibit N)			$165,204,624.50
Special Funds			
Gift of Laura S. Rockefeller		$49,300.00	
Gift of John D. Rockefeller		37,000.00	
Henry Sturgis Grew Memorial Fund		25,000.00	
Arthur Theodore Lyman Endowment		5,500.00	
			116,800.00
			$165,321,424.50
II. Land, Buildings, and Equipment Fund			
Appropriations from income (Exhibit O)			$8,889,432.26
III. Income Accounts			
Special Funds			
Estate Laura S. Rockefeller Fund (Exhibit B)		$64.77	
Henry Sturgis Grew Memorial Fund Income (Exhibit B)		5,665.54	
Arthur Theodore Lyman Endowment Fund Income (Exhibit B)		1,041.34	
			$6,771.65
General Fund			
Balance due on appropriations payable in 1922 and prior years (Exhibit L)		$4,377,426.74	
Appropriations and pledges effective in 1923 and following years:			
1923	$9,717,520.72		
1924	2,683,932.50		
1925	1,131,846.50		
1926	1,941,309.50		
1927	135,260.00		
		15,609,869.22	
			*19,987,295.96
			$19,994,067.61
Grand Total			$194,204,924.37

* The total of all unpaid appropriations and pledges is $13,696,433.88 in excess of the balance of general fund income amounting to $6,290,862.08, as shown on opposite page, but it will be noted that these obligations become effective over a term of years, thus permitting their satisfaction gradually as the income of the respective years is received.

EXHIBIT B

STATEMENT OF RECEIPTS AND DISBURSEMENTS OF INCOME

GENERAL FUND

Receipts

Balance, December 31, 1921			$7,359,000.90	
Refunds of payments made in prior years				
The Rockefeller Foundation		$5,544.10		
International Health Board		127.49		
China Medical Board		1,288.82		
			6,960.41	
				$7,365,961.31
Income for the year				8,836,309.55
				$16,202,270.86

Disbursements

International Health Board (Exhibit J)				
Hookworm, county health work, malaria, and yellow fever		$717,607.41		
Tuberculosis in France		230,197.72		
Public health education and fellowships		154,249.61		
Miscellaneous		569,410.26		
Administration		170,911.80		
			$1,842,376.80	
China Medical Board (Exhibit K)				
Medical education				
Peking Union Medical College				
Buildings and equipment	$219,741.09			
Operation	623,943.83			
Unaffiliated medical schools	15,483.76			
		$859,168.68		
Premedical education		45,605.00		
Hospitals and premedical education		29,258.34		

Hospitals—Mission and Chinese	121,088.20		
Translation of medical and nursing textbooks	4,413.79		
Fellowships and scholarships	30,510.42		
Miscellaneous	1,567.54		
Administration	115,302.49		
		1,206,914.46	
Medical Education (Exhibit C)		4,896,216.70	
Schools of Hygiene and Public Health (Exhibit D)		1,374,151.85	
Biology, Physics, and Chemistry (Exhibit E)		110,174.27	
Hospital, Dispensary, and Nursing Studies and Demonstrations (Exhibit F)		141,657.05	
Public Health Education and Demonstrations—miscellaneous (Exhibit G)		40,695.62	
Mental Hygiene (Exhibit H)		64,083.55	
Miscellaneous (Exhibit I)		66,096.31	
Administration (Exhibit I)		169,042.17	
			9,911,408.78
Income on hand December 31, 1922			$6,290,862.08
Income on hand December 31, 1922, is accounted for as follows			
Cash in New York		$2,326,847.12	
Cash in London		222,290.93	
Cash in Brussels		233,542.58	
Cash in Czechoslovakia		361,533.38	
Secured demand loans		1,368,590.60	
Funds in hands of agents, to be accounted for, and sundry accounts receivable	$1,784,548.03		
Less accounts payable	6,490.56		
		1,778,057.47	
			$6,290,862.08

EXHIBIT B—*Continued*

SPECIAL FUNDS

LAURA S. ROCKEFELLER FUNDS

Income collected during the year ending December 31, 1922	$3,000.00
Amounts paid to the several societies designated by Mrs. Rockefeller	3,000.00

JOHN D. ROCKEFELLER FUND

Income collected during the year ending December 31, 1922	$1,850.00
Amounts paid to the several societies designated by Mr. Rockefeller	1,850.00

ESTATE LAURA S. ROCKEFELLER FUND

Balance of income December 31, 1922, accounted for in cash on deposit	$64.77

HENRY STURGIS GREW MEMORIAL FUND

Balance December 31, 1921	$4,082.95
Income collected during the year ending December 31, 1922	1,582.59
Accounted for in cash on deposit	$5,665.54

ARTHUR THEODORE LYMAN ENDOWMENT

Balance December 31, 1921	$714.48
Income collected during the year ending December 31, 1922	326.86
Accounted for in cash on deposit	$1,041.34

1922 FOUNDATION APPROPRIATIONS

BALANCES OF APPROPRIATIONS MADE IN PRIOR YEARS AND PAYMENTS THEREON MADE IN 1922

EXHIBIT C

MEDICAL EDUCATION

	PRIOR APPROPRIATIONS	1922 APPROPRIATIONS	1922 PAYMENTS
Austria, Hungary, Poland, Czechoslovakia, and Jugoslavia			
To co-operate with the medical schools of the Universities of Vienna, Prague, Innsbruck, Budapest, and Gratz, in the rehabilitation of their scientific equipment for teaching and research (R.F. 2495, 2581)*.....	$121,375.96	$........	$53,986.12
Belgium			
University of Brussels. Toward building and equipment of the new University Institutes, Francs 6,700,000 (R.F. 2668).................	....	500,000.00	....
Expenses of visit to England and the United States of representatives of the University of Brussels (R.F. 2577)..........................	1,203.20	....	279.46
Brazil			
Oswaldo Cruz Institute, Rio de Janeiro. For extending its work in pathology (R.F. 2485, 2641, 2642).............................	868.87	3,500.00	1,935.10
Faculdade de Medicina e Cirurgia, São Paulo. For scientific equipment and assistants for Department of Pathology (R.F. 2569, 2650)......	3,090.79	5,000.00	5,106.99
Faculdade de Medicina e Cirurgia, São Paulo. To supplement salary of professor of pathology, 1921 and 1922 (R.F. 2589).................	7,471.81	....	6,785.76
Study of Medical Education in Brazil, 1922 (R.F. 2630)..............	....	3,000.00	998.15

* The figures in parentheses, following the text describing the purpose of each appropriation, are the serial numbers of the resolution of the Board or Executive Committee, authorizing the payment.

EXHIBIT C—*Continued*

	PRIOR APPROPRIATIONS	1922 APPROPRIATIONS	1922 PAYMENTS
Canada			
University of Alberta. Development of work in clinical branches (R.F. 2582, 2655)	$12,500.00	$25,000.00	$25,000.00
Dalhousie University. Improvement of clinical facilities (R.F. 2571)	50,000.00	....	50,000.00
University of Manitoba			
Interest on pledge of $500,000 for general endowment (R.F. 2602)	....	25,000.00	8,784.24
General endowment of its Faculty of Medicine (R.F. 2640)	....	500,000.00	500,000.00
Université de Montréal, Faculty of Medicine. Development of laboratories (R.F. 2580, 2656)	12,500.00	25,000.00	25,000.00
University of Toronto. Current expenses of its Department of Medicine (R.F. 2567, 2657)	25,000.00	50,000.00	50,000.00
England			
University College			
Toward building and equipment program £100,000 (R.F. 2624, 2637, 2659)	212,500.00	246,000.00	439,343.75
Interest on pledge of £180,000 for general endowment (R.F. 2599)	....	36,000.00	19,774.11
General endowment £180,000 (R.F. 2653)	....	810,000.00	803,559.38
University College Hospital			
Toward building and equipment program £100,000 (R.F. 2670)	....	440,000.00	440,000.00
Interest on pledge of £435,000 for general endowment (R.F. 2600)	....	87,000.00	66,812.88
General endowment £435,000 (R.F. 2654, 2661, 2662)	....	1,965,400.00	1,919,803.13
Study of English methods of clinical instruction (R.F. 2631)	....	7,000.00	2,725.74
France			
Pasteur Institute. Toward its work during 1922 (R.F. 2636)	....	25,000.00	25,000.00
Expenses of visit to England and the United States of representatives of the University of Strasbourg (R.F. 2644)	....	10,000.00	8,676.84

Hongkong			
University of Hongkong. Endowment of chairs in medicine and surgery, Hongkong dollars 500,000 (R.F. 2647)	....	320,000.00	293,750.00
Jugoslavia			
Expenses of visit to the United States of representatives of the Belgrade Medical School (R.F. 2576)	2,982.07	....	2,978.09
Philippine Islands			
University of the Philippines			
Salary of associate dean of its medical school during 1922, and traveling expenses of himself and family from his home to the Philippines (R.F. 2633)	....	8,500.00	8,081.47
Expenses of associate dean of its medical school in connection with his visit to the Peking Union Medical College (R.F. 2665)	....	500.00	....
Salvador			
Expenses of visiting pathologist to the Medical School of Salvador University (R.F. 2658)	....	1,500.00	936.03
United States			
University of Chicago Medical School. Interest on pledge of $1,000,000 (R. F. 2515, 2603)	10,085.61	50,000.00	47,705.49
Miscellaneous			
Survey of medical schools in Europe (R.F. 2651)	....	17,500.00	3,495.07
Supplying the chief medical centers of Europe with important medical journals of America and England (R.F. 2584, 2626, 2649)	27,891.36	20,000.00	24,322.04
Expenses of visit to the Peking Union Medical College of scientists from Japan (R.F. 2660)	....	500.00	201.92
American Medical Association			
Toward loss in publishing a Spanish edition of the Journal of the American Medical Association (R.F. 2634)	....	7,782.37	7,782.37

EXHIBIT C—*Continued*

		PRIOR APPROPRIATIONS	1922 APPROPRIATIONS	1922 PAYMENTS
Fellowships				
Grants to doctors for medical study (R.F. 2605, 2606, 2607)...........		$........	$56,000.00	$21,688.54
National Research Council				
Research fellowships in medicine supported jointly by the Foundation and the General Education Board (R.F. 2632)..................		....	25,000.00	8,477.98
Division of Medical Education				
Administration (R. F. 2516, 2604)................................		4,007.46	25,608.00	23,226.05
TOTALS..		$491,477.13	$5,295,790.37	$4,896,216.70
Unexpended balances of appropriations allowed to lapse—				
Travel—University of Brussels (R.F. 2577)...............	$923.74			
Oswaldo Cruz Institute (R.F. 2641).....................	1,000.00			
Brazil—Study of Medical Education (R.F. 2630).........	1,951.85			
University of Manitoba (R.F. 2602).....................	16,215.76			
University College (R.F. 2637, 2659)...................	19,156.25			
University College (R.F. 2653).........................	6,440.62			
University College Hospital (R.F. 2600)...............	20,187.12			
University College Hospital (R.F. 2662)................	45,596.87			
University of Hongkong (R.F. 2647).....................	26,250.00			
Salvador—Visiting Pathologist (R.F. 2658)..............	563.97			
University of Chicago (R.F. 2515, 2603).................	12,380.12			
Travel—Belgrade Medical School (R.F. 2576)............	3.98			
Fellowships (R.F. 2605, 2606, 2607).....................	34,311.46			
Division of Medical Education (R.F. 2516, 2604)..........	6,389.41			
		9,024.67	182,346.48	....
NET TOTALS..		$482,452.46	$5,113,443.89	$4,896,216.70

EXHIBIT D

SCHOOLS OF HYGIENE AND PUBLIC HEALTH

		PRIOR APPROPRIATIONS	1922 APPROPRIATIONS	1922 PAYMENTS
Harvard University—School of Public Health				
For buildings and equipment (R.F. 2578)		$500,000.00	$........	$........
Toward cost of operation 1922 (R.F. 2639)		....	25,000.00	25,000.00
Interest on pledge of $1,160,000 for endowment (R.F. 2638)		....	58,000.00	24,034.25
General endowment (R.F. 2648)		....	1,160,000.00	1,160,000.00
Johns Hopkins University—School of Hygiene and Public Health				
For the establishment of a school of hygiene and public health (R.F. 2170)		162,354.82	....	2,660.52
Operating expenses (R.F. 2506, 2590)		79,661.18	250,000.00	162,457.08
Land, building, equipment, and endowment (R.F. 2635)		....	6,000,000.00*	6,000,000.00
TOTALS		$742,016.00	$7,493,000.00	$7,374,151.85
Unexpended balances of appropriations allowed to lapse—				
Harvard University (R.F. 2638)	$33,965.75			
Johns Hopkins University (R.F. 2170)	159,694.30			
Johns Hopkins University (R. F. 2506, 2590)	167,204.10			
		177,944.07	182,920.08	....
NET TOTALS		$564,071.93	$7,310,079.92	$7,374,151.85

* Payment of this appropriation was made from the principal fund of the Foundation.

EXHIBIT E

BIOLOGY, PHYSICS, AND CHEMISTRY

		PRIOR APPROPRIATIONS	1922 APPROPRIATIONS	1922 PAYMENTS
National Research Council				
Research fellowships in physics and chemistry (R.F. 2517, 2608)		$7,293.47	$100,000.00	$80,770.23
Expenses of Division of Physical Sciences (R.F. 2518)		4,232.65	....	1,490.00
Concilium Bibliographicum				
Current expenses (R.F. 2463, 2519)		11,856.23	....	7,914.04
Current expenses 1922 paid through the National Research Council (R.F. 2610)		....	20,000.00	20,000.00
TOTALS		$23,382.35	$120,000.00	$110,174.27
Unexpended balances of appropriations allowed to lapse—				
R.F. 2517	$1,025.50			
R.F. 2518	2,742.65			
R.F. 2519	3,942.19			
		7,710.34	....	....
NET TOTALS		$15,672.01	$120,000.00	$110,174.27

EXHIBIT F

HOSPITAL, DISPENSARY, AND NURSING STUDIES AND DEMONSTRATIONS

	PRIOR APPROPRIATIONS	1922 APPROPRIATIONS	1922 PAYMENTS
American Conference on Hospital Service—Equipment and maintenance of library service bureau (R.F. 2595)	$7,000.00	$........	$7,000.00
Committee for the Study of Public Health Nursing			
Study in the proper training of public health nurses (R.F. 2475)	2,150.93	....	2,150.93
Publication of report (R.F. 2667)	....	5,000.00	1,903.00
Committee on Dispensary Development			
Maintenance of service bureau (R.F. 2514)	4,146.89	....	2,807.44
Study and experiment in the district dispensary field (R.F. 2575)	5,442.05	....	1,427.62
Development of a demonstration dispensary in connection with the Presbyterian Hospital 1921 (R.F. 2558)	9,169.28	....	1,392.12
Development of a demonstration dispensary in connection with Cornell Medical College Dispensary 1921 (R.F. 2573)	6,111.25	....	6,111.25
For the work of the Committee during 1922 (R.F. 2573, 2597)	....	140,000.00	103,640.05
Committee on Training of Hospital Administrators—Study of hospital service (R.F. 2574)	13,073.17	....	9,662.54
Hospital and Dispensary Studies—Expenses of studies (R.F. 2513, 2596)	2,091.61	4,000.00	173.64
Study of Nurse Training in Europe—Expenses of study (R.F. 2555, 2627)	10,000.00	10,000.00	4,243.57
L'Ecole de la Salpêtrière—Equipping of demonstration room (R.F. 2663)	....	1,000.00	....
Advanced Training of French Nurses—Training in English or American hospitals of French nurses who may return to France to carry on the supervision of training centers (R.F. 2628)	....	7,000.00	1,144.89
TOTALS	$59,185.18	$167,000.00	$141,657.05

EXHIBIT F—*Continued*

		PRIOR APPROPRIATIONS	1922 APPROPRIATIONS	1922 PAYMENTS
Unexpended balances of appropriations allowed to lapse—				
Committee on Dispensary Development (R.F. 2575)......	$4,014.43			
Committee on Dispensary Development (R.F. 2558)......	7,777.16			
Committee on Dispensary Development (R.F. 2514)......	1,339.45			
Committee on Training of Hospital Administrators (R.F. 2574)..	3,410.63			
Hospital and Dispensary Studies (R.F. 2513)............	2,091.61			
Hospital and Dispensary Studies (R.F. 2596)............	3,826.36			
Study of Nurse Training in Europe (R.F. 2555)..........	10,000.00			
		$28,633.28	$3,826.36	$........
NET TOTALS..		$30,551.90	$163,173.64	$141,657.05

EXHIBIT G

PUBLIC HEALTH EDUCATION AND DEMONSTRATIONS—MISCELLANEOUS

	PRIOR APPROPRIATIONS	1922 APPROPRIATIONS	1922 PAYMENTS
Common Service Committee—Demonstration in centralized offices for health agencies (R.F. 2583)	$5,695.62	$........	$5,695.62
National Health Council—Toward budget for 1922 (R.F. 2611)	....	10,000.00	10,000.00
New York University—To provide facilities for teaching preventive medicine, hygiene, and sanitation (R.F. 2572)	25,000.00	....	25,000.00
TOTALS	$30,695.62	$10,000.00	$40,695.62

EXHIBIT H

MENTAL HYGIENE

		Prior Appropriations	1922 Appropriations	1922 Payments
National Committee for Mental Hygiene				
For the work of the Committee in aiding state commissions on provision for the mentally defective (R.F. 2508)		$4,621.53	$........	$3,367.36
Surveys of the care and treatment of mental deficiency (R.F. 2591)		....	35,000.00	29,321.36
Surveys of the care and treatment of mental diseases (R.F. 2507, 2592)		13,814.85	15,000.00	17,195.97
Establishing uniform statistics on mental diseases (R.F. 2510, 2593)		839.59	4,500.00	4,198.36
Administration expenses (R.F. 2594)		....	10,000.00	10,000.00
Studies in the psychopathology of crime (R.F. 2509)		1,228.61	....	....
Totals		$20,504.58	$64,500.00	$64,083.55
Unexpended balances of appropriations allowed to lapse—				
R.F. 2507	$11,052.56			
R.F. 2508	1,253.67			
R.F. 2509	1,228.61			
R.F. 2510	25.27			
		13,560.11	....	....
Net Totals		$6,944.47	$64,500.00	$64,083.55

EXHIBIT I

MISCELLANEOUS

	PRIOR APPROPRIATIONS	1922 APPROPRIATIONS	1922 PAYMENTS
American Academy in Rome—General purposes, $10,000 a year for ten years beginning 1914 (R.F. 215). Instalment due 1922	$........	$10,000.00	$10,000.00
Committee of Reference and Counsel of the Annual Foreign Missions Conference of North America			
For carrying out its program of co-operation and co-ordination in foreign missionary work of the principal American Mission Boards. Total pledge of $425,000 extending over a period of ten years beginning 1914 (R.F. 228). Instalment due 1922	....	30,000.00	30,000.00
Johns Hopkins University—Study of fluke disease (R.F. 2568)	750.00	....	750.00
National Information Bureau—Sustaining membership 1922 (R.F. 2629)	....	1,000.00	1,000.00
New York Association for Improving the Condition of the Poor—Providing pensions for dependent widows with families, $20,000 a year for ten years beginning 1914 (R.F. 239)			
Balance of instalment due 1921	10,000.00	....	10,000.00
Instalment due 1922	....	20,000.00	10,000.00
Grand Chenier Wild Life Refuge—Taxes and expenses (R.F. 2548)	3,232.12	....	....
War Relief Commission—Administration—1917 (R.F. 2216)	644.75	....	....
	$14,626.87	$61,000.00	$61,750.00
Asset Accounts			
Furniture and fixtures (R.F. 2616)	....	4,000.00	3,692.22
Books for the library (R.F. 2617, 2666)	....	900.00	654.09
TOTALS	$14,626.87	$65,900.00	$66,096.31

EXHIBIT I—*Continued*

Unexpended balances of appropriations allowed to lapse—				
Furniture and fixtures (R.F. 2616)	$307.78			
Books for the library (R.F. 2666)	245.91	....	$553.69	....
NET TOTALS		$14,626.87	$65,346.31	$66,096.31
Administration				
Executive Offices (R.F. 2560, 2612, 2615, 2643)		$1,528.13	$159,144.75	$154,084.01
Treasurer's Office (R.F. 2522, 2547, 2613, 2614)		4,209.37	16,543.65	14,958.16
TOTALS		$5,737.50	$175,688.40	$169,042.17
Unexpended balances of appropriations allowed to lapse—				
R.F. 2560	$1,223.36			
R.F. 2522	1,120.47			
R.F. 2612	3,221.70			
R.F. 2613	154.68			
R.F. 2615	2,143.81	2,343.83	5,520.19	....
NET TOTALS		$3,393.67	$170,168.21	$169,042.17
Refunds of amounts disbursed in prior years—Rockefeller Institute for Medical Research				
War Research and Relief 1918 (R.F. 2327)		$534.84		
Preparation of Serum (R.F. 2394)		176.28		
War Demonstration Hospital (R.F. 2386)		4,832.98		
		$5,544.10		

EXHIBIT J

1922 INTERNATIONAL HEALTH BOARD APPROPRIATIONS*
BALANCES OF APPROPRIATIONS MADE IN PRIOR YEARS AND PAYMENTS THEREON MADE IN 1922

	PRIOR APPROPRIATIONS	1922 APPROPRIATIONS	1922 PAYMENTS
COUNTY HEALTH WORK			
United States			
Alabama			
1921 (I.H. 21059, 21062–63, 21065–67, 21162–63, 21228–30, 21421–22)	$8,868.91	$625.00	$4,301.80
1922 (I.H. 21276–85, 21636–37)	....	20,725.00	9,077.52
California			
1922 (I.H. 21650)	....	208.33	......
Florida			
1921 (I.H. 21387)	262.50	....	237.75
1922 (I.H. 21427)	....	3,100.00	772.08
Georgia			
1921 (I.H. 21028)	5,000.00	....	4,338.17
1922 (I.H. 21286)	....	5,000.00	2,444.64
Illinois			
1922 (I.H. 21495)	....	1,562.50	666.66
Indiana			
1922 (I.H. 21416–18, 21482–84)	....	9,000.00	891.66
Kansas			
1921 (I.H. 21183–89)	5,126.90	....	1,941.40
1922 (I.H. 21287–93)	....	11,900.00	6,018.95

* The Foundation provides for the cost of work carried on by the International Health Board by making to the Board one or more appropriations to cover its work during the year. From these large grants the Board then makes its own appropriations for specific objects.

EXHIBIT J—*Continued*

	PRIOR APPROPRIATIONS	1922 APPROPRIATIONS	1922 PAYMENTS
COUNTY HEALTH WORK—*Continued*			
United States—*Continued*			
Kentucky			
1921 (I.H. 21084–90)	$6,314.01	$........	$4,545.61
1922 (I.H. 21377–83)	....	17,900.00	8,073.07
Louisiana			
1921 (I.H. 21179–81, 21223–25)	5,467.31	....	3,352.70
1922 (I.H. 21294–99)	....	15,500.00	10,292.97
Maryland			
1921 (I.H. 21164)	4,351.67	....	1,815.36
1922 (I.H. 21481, 21516)	....	7,540.00	3,532.62
Mississippi			
1921 (I.H. 21019–24, 21026, 21108)	12,631.23	....	8,250.62
1922 (I.H. 21300–306, 21522)	....	17,250.00	4,686.62
Missouri			
1921 (I.H. 21194)	600.00	....	600.00
1922 (I.H. 21307, 21394–96, 21419, 21428–29)	....	9,500.00	3,635.57
New Mexico			
1921 (I.H. 21068–70)	3,286.59	....	3,286.59
1922 (I.H. 21308–15, 21384–86, 21485, 21665)	....	13,165.00	3,814.47
North Carolina			
1921 (I.H. 21113–27, 21467–68)	8,091.82	1,000.00	7,588.53
1922 (I.H. 21420)	....	10,000.00	....
Oregon			
1922 (I.H. 21535)	....	620.00	....
South Carolina			
1921 (I.H. 21136–43)	4,779.08	....	4,431.05
1922 (I.H. 21316–22)	....	13,500.00	6,755.72

Tennessee			
1921 (I.H. 21041–45, 21205)	4,464.89	....	3,538.81
1922 (I.H. 21323–28, 21536–40)	....	22,250.00	7,081.89
Texas			
1921 (I.H. 21093–98, 21219–22)	4,619.20	....	2,375.00
1922 (I.H. 21397–400)	....	10,000.00	1,578.59
Virginia			
1921 (I.H. 21079–83, 21128)	8,134.78	....	7,624.19
1922 (I.H. 21368–72, 21496–500, 21543)	....	18,687.51	8,210.01
West Virginia			
1921 (I.H. 21107, 21176–78, 21226)	5,617.06	....	1,875.64
1922 (I.H. 21443–47)	....	9,658.33	2,806.54
Foreign Countries			
Brazil			
1922 (I.H. 21257, 21263, 21518–20, 21542)	....	20,764.59	3,892.79
HOOKWORM WORK			
Central America			
Costa Rica			
1921 (I.H. 2969)	3,223.59	....	699.73
1922 (I.H. 21247)	....	5,500.00	20.57
Guatemala			
1921 (I.H. 2970)	9,266.44	....	1,747.53
1922 (I.H. 21248)	....	19,740.00	7,450.05
Honduras			
1922 (I.H. 21423, 21487)	....	11,816.67	1,683.40
Nicaragua			
1921 (I.H. 2971, 21462)	3,717.03	230.00	3,946.23
1922 (I.H. 21249)	....	7,280.00	5,060.57
Panama			
1921 (I.H. 2972)	4,107.59	....	142.18
1922 (I.H. 21250)	....	21,600.00	14,744.48
Salvador			
1921 (I.H. 2973)	1,342.36	....	7.53

EXHIBIT J—*Continued*

	PRIOR APPROPRIATIONS	1922 APPROPRIATIONS	1922 PAYMENTS
HOOKWORM WORK—*Continued*			
South America			
Brazil			
1921 (I.H. 2975–76, 2979–84, 21014, 21071, 21077–78, 21148–50, 21246)	$120,902.84	$........	$78,256.62
1922 (I.H. 21251–56, 21258–62, 21264–65, 21479–80, 21486, 21521, 21634)	....	192,920.83	89,304.72
British Guiana			
1921 (I.H. 2989)	5,250.00	....	487.21
1922 (I.H. 21267–68)	....	10,587.50	210.28
Colombia			
1921 (I.H. 2985–87)	24,402.56	....	7,265.95
1922 (I.H. 21366)	....	19,100.00	9,269.73
Dutch Guiana			
1921 (I.H. 2990, 21217)	8,269.33	....	5,949.71
1922 (I.H. 21269)	....	12,955.00	6,065.04
West Indies			
Antigua			
1922 (I.H. 21266)	....	1,085.00	872.27
Jamaica			
1921 (I.H. 2992)	8,607.94	....	2,618.66
1922 (I.H. 21270)	....	15,300.00	8,524.94
Porto Rico			
1921 (I.H. 2993)	12,876.46	....	1,071.21
1922 (I.H. 21271)	....	24,580.00	10,012.19
St. Lucia			
1921 (I.H. 2995)	2,710.22	....	2,096.84
1922 (I.H. 21272)	....	9,282.80	4,142.56

Trinidad			
1921 (I.H. 2996)	6,672.38	....	3,961.69
1922 (I.H. 21273)	....	11,640.00	4,110.74
Europe			
Spain—Survey (I.H. 21474)	....	5,000.00	....
The East			
Australia			
1921 (I.H. 21012, 21523)	13,195.69	1,372.09	14,567.78
1922 (I.H. 21274)	....	28,750.00	5,594.36
British North Borneo			
1921 (I.H. 21156)	5,084.82	....	802.91
1922 (I.H. 21367)	....	2,560.00	472.75
British Solomon Islands			
1921 (I.H. 21133)	795.50	....	616.05
1922 (I. H. 21473)	....	234.22	225.60
Ceylon			
1921 (I.H. 2775, 2910, 2997–21000)	19,625.00	....	....
Egypt			
1915 (I.H. 237)	4,641.88	....	....
Fiji			
1921 (I.H. 21355)	1,508.79	....	7.43
1922 (I.H. 21405, 21452)	....	6,400.00	3,445.54
Java			
1922 (I.H. 21477)	....	5,000.00	....
Mauritius			
1922 (I.H. 21442, 21531)	....	8,000.00	651.96
Siam			
1921 (I.H. 21001)	1,273.96	....	302.14
1922 (I.H. 21275, 21504)	....	16,300.00	6,756.87

EXHIBIT J—*Continued*

	PRIOR APPROPRIATIONS	1922 APPROPRIATIONS	1922 PAYMENTS
HOOKWORM WORK—*Continued*			
The East—*Continued*			
Miscellaneous			
Study of various methods of diagnosis used in connection with hookworm disease (I.H. 21165)	$1,000.00	$........	$758.57
Portable house and office at Salvador (I.H. 2839)	75.00	....	....
Research in life history of hookworm eggs and larvae (I.H. 2964, 21464)	74.50	6,000.00	5,419.44
Study of ankylostome larvae in Ceylon (I.H. 21508)	....	450.00	....
Resurveys in selected counties in the Southern States (I.H. 21154, 21216, 21409)	3,638.69	10,000.00	7,672.05
Motion picture film on hookworm disease (I.H. 2947)	397.53	....	....
MALARIA WORK			
Southern States			
Alabama			
1921 (I.H. 21145, 21158–59, 21196–97)	1,000.99	....	608.05
1922 (I.H. 21430, 21433–34, 21465, 21744)	....	8,458.63	3,003.00
Arkansas			
1921 (I.H. 21241)	1,477.85	....	1,245.93
1922 (I.H. 21411)	....	5,000.00	2,294.43
Georgia			
1922 (I.H. 21432)	....	2,017.08	1,492.00
Illinois			
1922 (I.H. 21494)	....	1,000.00	422.80
Louisiana			
1921 (I.H. 21051, 21106, 21135, 21160)	7,483.44	....	3,535.08
1922 (I.H. 21412, 21461, 21466, 21510)	....	14,978.33	6,309.94

Mississippi			
1921 (I.H. 2546, 21027, 21111–12, 21134, 21192–93, 21198, 21209, 21240)	19,399.89	....	6,476.38
1922 (I.H. 21413, 21453–56, 21470, 21517, 21532, 21674)	....	9,320.83	4,095.64
Missouri			
1921 (I.H. 21211)	833.33	....	813.58
1922 (I.H. 21435–38, 21509, 21675)	....	6,450.00	200.00
North Carolina			
1921 (I.H. 21110, 21152, 21239)	7,197.39	....	1,881.17
1922 (I.H. 21393)	....	10,000.00	1,028.43
South Carolina			
1921 (I.H. 21072–76, 21200–03, 21242–45)	18,022.50	....	12,208.72
1922 (I.H. 21414, 21431, 21490–93, 21641, 21677)	....	14,690.00	309.76
Tennessee			
1921 (I.H. 2892–93, 21161, 21175, 21410)	4,167.00	275.00	2,469.97
1922 (I.H. 21533–34)	....	314.00	....
Texas			
1922 (I.H. 21460, 21472)	....	2,415.00	....
Virginia			
1921 (I.H. 21199)	1,218.75	....	831.65
1922 (I.H. 21415, 21441, 21457–59, 21471, 21489)	....	6,062.50	3,116.14
Conference of malaria workers (I.H. 21238, 21639)	219.05	250.00	385.08
Study to determine source of blood meals of Anopheles mosquitoes (I.H. 21213)	134.37	....	....
Central America			
Nicaragua			
1921 (I.H. 21174)	744.36	....	637.41
1922 (I.H. 21358)	....	1,689.00	1,079.58
South America			
Brazil—Field Studies (I.H. 21488)	....	23,681.25	7,637.65

EXHIBIT J—(*Continued*)

	PRIOR APPROPRIATIONS	1922 APPROPRIATIONS	1922 PAYMENTS
MALARIA WORK—*Continued*			
Southern States—*Continued*			
West Indies			
Porto Rico			
1921 (I.H. 21018, 21109, 21191)	$7,737.78	$........	$5,464.39
1922 (I.H. 21364–65, 21440)	....	27,075.00	8,366.37
Europe			
Italy (I.H. 21476)	....	5,000.00	....
The East			
Palestine—Field Studies (I.H. 21640)	....	559.50	....
Philippine Islands (I.H. 21389)	....	10,000.00	584.86
YELLOW FEVER			
Brazil			
1921 (I.H. 21214)	1,000.00	....	461.30
1922 (I.H. 21406)	....	1,000.00	....
Ecuador			
1921 (I.H. 21204)	938.35	....	938.35
1922 (I.H. 21407)	....	4,000.00	2,641.34
Mexico and Central America			
1921 (I.H. 21058)	61,650.04	....	38,743.62
1922 (I.H. 21402, 21450, 21530)	....	120,000.00	65,694.48
Peru			
1921 (I.H. 21354)	72,318.88	....	62,631.71
1922 (I.H. 21401, 21449)	....	50,000.00	36,034.58
West Africa (I.H. 21392)	....	5,000.00	2,923.73
Vaccine and Serum (I.H. 21408, 21541)	....	6,000.00	5,037.99
History of Yellow Fever (I.H. 21478)	....	600.00	232.19
Epidemic Work (I.H. 21048)	394.95	....	394.95

TUBERCULOSIS IN FRANCE			
Central Administration			
1921 (I.H. 21004)	22,882.97	....	16,301.01
1922 (I.H. 21329)	....	100,030.00	53,100.70
Departmental Organization			
1921 (I.H. 21003)	41,012.15	....	20,553.43
1922 (I.H. 21332)	....	32,000.00	11,431.43
Educational Division			
1921 (I.H. 21007)	29,659.64	....	13,015.34
1922 (I.H. 21331)	....	108,765.00	30,874.56
Medical Division			
1921 (I.H. 21005)	27,759.82	....	7,168.83
Public Health Visiting			
1921 (I.H. 21006)	48,445.83	....	20,946.51
1922 (I.H. 21330)	....	152,280.00	51,199.20
Contingent Fund			
1921 (I.H. 2963)	9,250.00	....	....
1922 (I.H. 21334)	....	10,000.00	2,490.04
Postgraduate Tuberculosis Courses			
1922 (I.H. 21333)	....	10,000.00	3,115.77
PUBLIC HEALTH EDUCATION			
Schools of Hygiene and Public Health			
Brazil, São Paulo—Department of Hygiene			
Operation (I.H. 21132, 21336)	4,293.49	20,000.00	13,122.61
Equipment and Supplies (I.H. 21647)	....	2,500.00	751.05
Czechoslovakia—Institute of Public Health, Prague (I.H. 21207, 21391, 21680)	250,000.00	150,000.00	2,212.95
England—School of Hygiene, London (I.H. 21448, 21469)	....	234,000.00	22,774.78
Poland—Institute of Hygiene, Warsaw (I.H. 21524)	....	100,000.00	....

EXHIBIT J—*Continued*

	PRIOR APPROPRIATIONS	1922 APPROPRIATIONS	1922 PAYMENTS
PUBLIC HEALTH EDUCATION—*Continued*			
Study and Training Courses for Health Officers			
Alabama—Birmingham (I.H. 21374, 21527)	$175.00	$200.00	$332.07
New York—Albany (I.H. 21363)	368.00	....	311.92
Michigan—Lansing (I.H. 21638)	....	600.00	....
Mississippi—Jackson (I.H. 21544)	....	500.00	467.73
Ohio—Columbus (I.H. 21512)	....	300.00	266.49
Correspondence Course for Health Officers (I.H. 21375, 21376)	125.00	1,800.00	1,383.54
Correspondence Course for Health Nurses (I.H. 21645)	....	337.50	....
Fellowships			
Grants to doctors for study of public health (I.H. 21348–50, 21505–06, 21679)	....	167,500.00	112,626.47
PUBLIC HEALTH ADMINISTRATION			
United States			
Aid in developing State Health Services			
Missouri—Division of Sanitary Engineering (I.H. 21501)	....	1,050.00	....
Utah—Division of Sanitary Engineering (I.H. 21502)	....	805.00	....
Czechoslovakia (I.H. 2961, 21335, 21503)	9,138.71	8,880.00	7,306.97
Philippine Islands—Secretary for Consultant to Governor-General (I.H. 21390)	....	3,000.00	1,345.81
Canada—New Brunswick—Rural health program (I.H. 21526)	....	9,000.00	9,000.00
League of Nations—Maintenance of an International Interchange of Public Health Personnel (I.H. 21525, 21633)	....	15,020.00	....
Brazil—Toward development of a Public Health Nursing Service (I.H. 21425, 21463)	....	10,900.00	4,750.91

Public Health Laboratory Service			
United States			
Alabama (I.H. 21515)	....	3,600.00	....
Kansas (I.H. 21099, 21182, 21337)	3,157.78	5,500.00	5,350.64
Missouri (I.H. 21426)	....	1,041.67	333.34
Tennessee (I.H. 21678)	....	250.00	....
Central America			
Guatemala (I.H. 21235, 21507)	1,489.92	600.00	420.18
Honduras (I.H. 21513)	....	3,000.00	....
Nicaragua (I.H. 21236, 21338, 21529)	1,050.00	5,600.00	2,226.64
Salvador (I.H. 21234, 21514)	1,500.00	600.00	1,513.06
Demonstrations (I.H. 21144)	291.00	....	....
Administrative Field Staff			
Salaries (I.H. 2949, 21340)	26,858 39	412,000.00	353,985.71
Traveling Expenses (I.H. 2951, 21342)	15,655.15	112,000.00	106,072.06
Commutation (I.H. 2950, 21341)	29,801.10	60,000.00	42,954.26
Medical Examinations (I.H. 21346)	....	700.00	632.00
Drugs for Conserving Health (I.H. 21345)	....	1,000.00	7.98
Bonding (I.H. 21344)	....	5,000.00	2,662.52
Traveling Expenses of Families (I.H. 2952, 21343)	6,011.55	15,000.00	13,709.06
Automobiles for Directors in Training (I.H. 21347)	....	3,000.00	772.77
Miscellaneous			
Express, Freight, and Exchange (I.H. 21353)	....	5,000.00	....
Field Equipment and Supplies (I.H. 21351, 21528)	....	6,000.00	5,189.62
Expenses in connection with the compilation of a mining sanitary code (I.H. 21373, 21451)	14.02	85.00	77.20
Pamphlets and Charts (I.H. 21352, 21359)	7,846.56	10,000.00	8,869.43
Expenses in connection with the visit to the United States of Brazilian Scientists (I.H. 21104, 21206)	301.61	....	161.73
Expenses in connection with the visit to England and the United States of French Scientist (I.H. 21475)	....	3,000.00	2,068.37

EXHIBIT J—*Continued*

		PRIOR APPROPRIATIONS	1922 APPROPRIATIONS	1922 PAYMENTS
MISCELLANEOUS—*Continued*				
Expenses in connection with the visit to England, Germany, and the United States of Polish Scientist (I.H. 21642)......................		$........	$3,000.00	$........
ADMINISTRATION (I.H. 21339, 21388)................................		....	178,845.50	170,911.80
			$3,003,166.16	
Unappropriated balance of Rockefeller Foundation appropriation to the International Health Board for London School of Hygiene and Warsaw Institute of Hygiene (R.F. 2646, 2664)............................		....	138,500.00	....
TOTALS..		$1,093,302.66	$3,141,666.16	$1,878,253.31
Appropriations for expenditures made in certain foreign countries are based on fixed rates of exchange. This amount represents the difference between the cost at the fixed rate and the actual cost of such exchange items		....	....	35,876.51
Unexpended balances of appropriations allowed to lapse—				
Prior Year..		397,349.74	....	....
1922..	$255,668.35	....	....	....
Difference in exchange as above..........................	35,876.51			
		....	291,544.86	....
NET TOTALS *..		$695,952.92	$2,850,121.30	$1,842,376.80
Refund on prior year appropriation Argentina Malaria Survey (I.H. 21046)..	$127.49			

* The Foundation appropriated to the International Health Board for its work during the year 1922 the sum of $2,972,500.00.

EXHIBIT K

1922 CHINA MEDICAL BOARD APPROPRIATIONS* AND BALANCES OF APPROPRIATIONS MADE IN PRIOR YEARS, AND PAYMENTS THEREON MADE IN 1922

	PRIOR APPROPRIATIONS	1922 APPROPRIATIONS	1922 PAYMENTS
HOSPITALS OF MISSIONARY SOCIETIES			
American Baptist Foreign Mission Society			
Ningpo—Salaries of doctor and nurse, $2,250 a year for five years beginning 1920 (C.M. 276)			
Balance due on previous instalments...........................	$4,500.00	$........	$........
Instalment for 1922..................................	....	2,250.00	....
Shaohsing			
Support of foreign nurse, Chinese manager, and foreign doctor, $2,475 a year for five years beginning 1920 (C.M. 277)			
Balance due on previous instalments.........................	4,200.00	....	....
Instalment due 1922..................................	....	2,475.00	....
Equipment and residences for physician, nurse, and Chinese staff (C.M. 278, 2319)....................................	5,625.00	....	....
American Board of Commissioners for Foreign Missions			
Fenchow			
Buildings, and equipment, Mex. 6,250.00 (C.M. 2518)..............	4,000.00	....	3,578.13
Salaries of additional staff, $3,700 a year for five years beginning 1921 (C.M. 2519)			
Instalment due 1921..................................	3,700.00	....	....
Instalment due 1922..................................	....	3,700.00	....

* The Foundation provides for the cost of work carried on by the China Medical Board by making to the Board one or more appropriations to cover its work for the year. From these large grants the Board then makes its own appropriations for specific objects.

EXHIBIT K—*Continued*

	PRIOR APPROPRIATIONS	1922 APPROPRIATIONS	1922 PAYMENTS
HOSPITALS OF MISSIONARY SOCIETIES—*Continued*			
American Board of Commissioners for Foreign Missions—*Continued*			
Fenchow—*Continued*			
Current expenses, Mex. 2,500 a year for five years beginning 1921 (C.M. 2520)			
Instalment due 1921	$1,500.00	$........	$1,421.88
Instalment due 1922	....	1,500.00	....
Tehchow			
Salary of two doctors, $3,236 a year for five years beginning 1915 (C.M. 211, 294) Balance due on instalments	11,796.60	....	....
Employees' salaries, $4,152 a year for five years beginning 1916 (C.M. 297, 2229) Balance due on instalments	4,040.75	....	277.11
Salary of business manager, $3,525.88 extending over a period of four years beginning 1918 (C.M. 2360)			
Balance due on previous instalments	712.70	....	712.70
Instalment due 1922	....	475.13	237.58
Support of successor to Dr. Lee M. Miles, $1,091 a year for five years beginning 1921. To cover one half of loss on exchange $2,545 (C.M. 2498)			
Instalment due 1921	3,636.00	....	....
Instalment due 1922	....	1,091.00	....
Maintenance $2,310.50 a year for five years beginning 1922 (C.M. 2571) Instalment due 1922	....	2,310.50	....
Buildings and equipment (C.M. 2570)	....	900.00	900.00

Board of Foreign Missions of the Methodist Episcopal Church			
Peking			
Salary of doctor, $2,400 a year for five years beginning 1916 (C.M. 223, 2102) Balance due on instalments	8,800.00	....	....
Support of dentist, medical practitioner, and nurse, $22,500 extending over a period of five years beginning 1920 (C.M. 2266) Instalment due 1922	....	4,500.00	....
Support of two dentists, $2,400 a year for five years beginning 1921 (C.M. 2522)			
Instalment due 1921	2,400.00	....	....
Instalment due 1922	....	2,400.00	600.00
Residences for two dentists (C.M. 2523)	8,000.00	....	....
Initial equipment for dental department (C.M. 2540)	10,000.00	....	....
Wuhu			
Building of hospital and residences (C.M. 2384, 2499)	70,000.00	....	....
Salaries of additional staff and maintenance expenses, $7,250 a year for five years beginning 1920 (C.M. 2385)			
Balance due on previous instalments	10,375.00	....	7,325.67
Instalment due 1922	....	7,250.00	....
Board of Missions of the Methodist Episcopal Church, South			
Soochow			
Salary of nurse, $600 a year for five years beginning 1916 (C.M. 236, 2105) Balance due on instalments	1,800.00	....	....
Building and equipment, Mex. 45,000 (C.M. 2577)	....	27,000.00	26,212.50
Maintenance of additional foreign staff, Mex. 8,000 a year for five years beginning 1920 (C.M. 2418)			
Balance due on previous instalments	19,000.00	....	....
Instalment due 1922	....	9,500.00	....
Board of Missions of the Methodist Episcopal Church, South—American Baptist Foreign Mission Society, Jointly			
Huchow			
Building and equipment (C.M. 2151)	10,000.00	....	10,000.00

EXHIBIT K—*Continued*

	PRIOR APPROPRIATIONS	1922 APPROPRIATIONS	1922 PAYMENTS
HOSPITALS OF MISSIONARY SOCIETIES—*Continued*			
Board of Missions of the Methodist Episcopal Church, South, American Baptist Foreign Mission Society, Jointly—*Continued*			
Huchow—*Continued*			
Support of foreign physician, $5,025 extending over a period of five years beginning 1920 (C.M. 2152)			
Balance due on previous instalments	$2,475.00	$........	$2,475.00
Instalment due 1922	....	825.00	....
Support of foreign nurse, $3,000 extending over a period of five years beginning 1920 (C.M. 2153)			
Balance due on previous instalments	1,275.00	....	1,275.00
Instalment due 1922	....	450.00	....
Support of Chinese physician, $2,250 extending over a period of five years beginning 1920 (C.M. 2154)			
Balance due on previous instalments	900.00	....	900.00
Instalment due 1922	....	450.00	....
Board of Foreign Missions of the Presbyterian Church in the U. S. A.			
Changteh			
Current expenses, $2,625 a year for five years beginning 1916 (C.M. 2144) Balance due on instalments	3,768.75	....	3,318.75
Current expenses, $2,250 a year for five years beginning 1918 (C.M. 2318) Instalment due 1922	....	2,250.00	2,250.00
Chefoo			
Salary and allowance of doctor and nurse, $2,625 a year for five years beginning 1917 (C.M. 284) Balance due on instalments	9,811.30	....	3,450.00
Operating expenses, $2,250 a year for five years beginning 1918 (C.M. 2243) Instalment due 1922	....	2,250.00	2,250.00

Hwaiyuen			
Salary and allowance of physician and nurse and operating expenses, $3,375 a year for five years beginning 1919 (C.M. 285)			
Balance due on previous instalments........................	7,725.00	....	7,162.50
Instalment due 1922....................................	....	3,375.00	....
Residence of doctor and equipment (C.M. 286, 2553)............	2,250.00	750.00	3,000.00
Paotingfu			
Support of business manager, $900 a year for four years beginning 1918 (C.M. 2306) Instalment due 1921......................	900.00	....	675.00
Maintenance, $4,500 a year for five years beginning 1922 (C.M. 2572) Instalment due 1922....................................	....	4,500.00	2,250.00
Paotingfu, Shuntehfu			
Support of additional staff, $9,200 a year for five years beginning 1916 (C.M. 214, 295) Balance due on instalments..............	14,025.00	....	1,650.00
Shuntehfu			
Maintenance, $750 a year for five years beginning 1916 (C.M. 2142) Balance due on instalments..............................	437.50	....	437.50
Maintenance, $6,000 extending over a period of three years beginning 1922 (C.M. 2573) Instalment due 1922.....................	....	2,250.00	1,125.00
Board of Foreign Missions of the Reformed Church in America			
Hope and Wilhelmina Hospital			
Purchase of equipment (C.M. 2282)............................	2,025.00	....	....
Support of physician, $1,881 a year for five years beginning 1920 (C.M. 2283)			
Balance due on previous instalments........................	3,762.00	....	....
Instalment due 1922....................................	....	1,881.00	....
Canton Christian College, Canton			
Current expenses 1921-1922, Mex. 9,000 (C.M. 2541)............	5,500.00	....	....
Church of Scotland Foreign Mission Committee, Ichang			
Support of third foreign doctor and nurse, $2,250 a year for five years beginning 1920 (C.M. 289)			
Balance due on previous instalments........................	3,750.00	....	750.00
Instalment due 1922....................................	....	2,250.00	....

EXHIBIT K—*Continued*

	PRIOR APPROPRIATIONS	1922 APPROPRIATIONS	1922 PAYMENTS
HOSPITALS OF MISSIONARY SOCIETIES—*Continued*			
Domestic and Foreign Mission Society of the Protestant Episcopal Church in the U. S. A.			
Anking			
Operating expenses, $4,200 a year for five years beginning 1919 (C.M. 2308)			
Balance due on previous instalments	$3,600.00	$........	$2,025.00
Instalment due 1922	....	4,200.00	1,500.00
Executive Committee of Foreign Missions of the Presbyterian Church in the U. S., South			
Soochow, Kashing			
Support of additional staff. Salaries, $3,600 a year for five years beginning 1915 (C.M. 221, 2101) Balance due on instalments	13,625.00	....	....
Foreign Mission Board of the Southern Baptist Convention			
Chengchow			
Salary of doctor, $1,200 a year for five years beginning 1916 (C.M. 228, 2106) Balance due on instalments	3,250.00	....	....
Hwanghien			
Salary of physician, $900 a year for five years beginning 1920 (C.M. 281)			
Balance due on previous instalments	1,800.00	....	....
Instalment due 1922	....	900.00	....
Outfit and travel of physician (C.M. 282)	750.00	....	....
Salary of nurse, $600 a year for five years beginning 1916 (C.M. 225, 2103) Balance due on instalments	1,500.00	....	....

Laichowfu			
Equipment and outgoing expenses of physician and wife (C.M. 280)	750.00	....	....
Salary of physician and wife and nurse, $1,650 a year for five years beginning 1920 (C.M. 279)			
Balance due on previous instalments	3,300.00	....	....
Instalment due 1922	....	1,650.00	....
Yanchow			
Salary of nurse, $600 a year for five years beginning 1916 (C.M. 232, 2104) Balance due on instalments	1,625.00	....	....
Maintenance Mex. 2,000 a year for five years beginning 1921 (C.M. 2525)			
Instalment due 1921	1,000.00	....	1,000.00
Instalment due 1922	....	1,000.00	1,000.00
London Missionary Society			
Siaochang			
Support of nurse, $600 a year for five years beginning 1920 (C.M. 2167)			
Balance due on previous instalments	1,200.00	....	....
Instalment due 1922	....	600.00	....
Tsangchow			
Support of nurse, $750 a year for five years beginning 1918 (C.M. 2326)			
Balance due on previous instalments	2,250.00	....	....
Instalment due 1922	....	750.00	....
Medical Mission Auxiliary of London			
Tai Yuan Fu			
Improvements and supplies (C.M. 2201)	1,702.22	....	1,702.22
Nanking Union Hospital			
Buildings and equipment—Mex. 45,000 (C.M. 2574)	....	27,000.00	....
Maintenance, $9,250 a year for five years beginning 1917 (C.M. 2137)			
Balance due on previous instalments	18,500.00	....	18,500.00

EXHIBIT K—*Continued*

	PRIOR APPROPRIATIONS	1922 APPROPRIATIONS	1922 PAYMENTS
HOSPITALS OF MISSIONARY SOCIETIES—*Continued*			
Nanking Union Hospital—*Continued*			
Maintenance, $9,250 a year for five years beginning 1922 (C.M. 2575)			
Instalment due 1922	$........	$9,250.00	$........
United Christian Missionary Society (formerly the Foreign Christian Missionary Society)			
Luchowfu			
Buildings and fixed equipment (C.M. 2327)	500.00	....	....
Movable equipment (C.M. 2328)	4,800.00	....	....
Maintenance $4,100 a year for five years beginning 1920 (C.M. 2329)			
Balance due on previous instalments	8,200.00	....	....
Instalment due 1922	....	4,100.00	....
Salary of second foreign nurse, $1,400 a year for five years beginning 1920 (C.M. 2330)			
Balance due on previous instalments	2,800.00	....	....
Instalment due 1922	....	1,400.00	....
Salary of business manager, $1,400 a year for five years beginning 1920 (C.M. 2331)			
Balance due on previous instalments	2,800.00	....	870.00
Instalment due 1922	....	1,400.00	....
Luchowfu, Nantungchow			
Support of additional staff, $4,200 a year for five years beginning 1918 (C.M. 215, 2100)			
Balance due on previous instalments	13,605.00	....	2,512.50
Instalment due 1922	....	4,200.00	....

Nantungchow			
Support of second physician, $8,400 extending over a period of five years beginning 1920 (C.M. 2218)			
Balance due on previous instalments	3,450.00	....	....
Instalment due 1922	....	1,650.00	....
United Free Church of Scotland			
Mukden			
Support of nurse, $750 a year for five years beginning 1918 (C.M. 2232)			
Balance due on previous instalments	1,500.00	....	750.00
Instalment due 1922	....	750.00	....
Buildings and equipment £1,500 (C.M.2576)	....	7,000.00	6,673.13
Women's Foreign Missionary Society of the Methodist Episcopal Church			
Kiukiang			
Salary of nurse, $500 a year for five years beginning 1919 (C.M. 2359)			
Balance due on previous instalments	1,000.00	....	....
Instalment due 1922	....	500.00	....
Loss in Exchange			
To cover loss in exchange on payments to missionary societies for their hospitals (C.M. 2503)	129,923.41	....	321.03
Missionary Societies—Hospitals and Premedical Education			
Yale Foreign Missionary Society			
Hunan-Yale Medical School, Changsha			
Salaries and expenses of staff of hospital, premedical school and nurses' training school, Mex. 41,605 per year for five years beginning July 1, 1920 (C.M. 2454)			
Balance due on previous instalments	52,221.76	....	22,613.34
Instalment due 1922	....	50,000.00	....

EXHIBIT K—*Continued*

	PRIOR APPROPRIATIONS	1922 APPROPRIATIONS	1922 PAYMENTS
MISSIONARY SOCIETIES—HOSPITALS AND PREMEDICAL EDUCATION—*Continued*			
Yale Foreign Missionary Society—*Continued*			
Salaries and expenses of staff of hospital, premedical school, and nurses' training school, $6,645 a year for five years beginning July 1, 1920 (C.M. 2455)			
Instalment due 1921	$6,645.00	$........	$6,645.00
Instalment due 1922	....	6,645.00	....
HOSPITALS UNDER CHINESE MANAGEMENT			
Central Hospital, Peking			
Salaries of Chinese doctor and nurse, $5,000 a year for three years beginning 1920 (C.M. 2464)			
Balance due on previous instalments	7,500.00	....	....
Instalment due 1922	....	5,000.00	....
Red Cross General Hospital—Shanghai			
X-ray equipment Mex. 3,000 (C.M. 2595)	....	2,000.00	....
PREMEDICAL EDUCATION			
Canton Christian College			
Equipment (C.M. 2443)	10,000.00	....	....
Salaries of two professors and one instructor, Mex. 10,200 a year for five years beginning 1920 (C.M. 2445) Instalment due 1922	....	12,000.00	....
Fukien Christian University			
Salaries of six instructors, $10,000 a year for five years beginning 1919 (C.M. 2274) Instalment due 1922	....	10,000.00	10,000.00
Salaries of Chinese instructors, $2,700 a year for five years beginning 1919 (C.M. 2275) Instalment due 1922	....	2,700.00	2,700.00
Maintenance of science department $10,000 a year for five years beginning 1919 (C.M. 2276) Instalment due 1922	....	10,000.00	10,000.00

Ginling College			
Salary of teacher of physics, $2,400 a year for five years beginning 1920 (C.M. 2402)			
Balance due on previous instalments...........................	1,164.00	....	....
Instalment due 1922.......................................	....	2,400.00	....
Nankai College			
Science building, Mex. 100,000 (C.M. 2591)......................	....	60,000.00	....
Scientific equipment Mex. 25,000 (C.M. 2592).....................	....	15,000.00	....
Salaries of additional science teachers, Mex. 6,750 a year for three years beginning 1923 (C.M. 2593).................................	....	....	....
Salary and expenses of visiting professor—1923 (C.M. 2594)	....	....	....
Peking (Yenching) University			
Maintenance of its premedical department, $7,500 a year for two years beginning 1922 (C.M. 2509) Instalment due 1922.................	....	7,500.00	5,625.00
St. John's University, Shanghai			
Maintenance expenses, $18,800 extending over a period of four years beginning 1920 (C.M. 2415) Instalment due 1922................	....	5,500.00	5,500.00
Southeastern University			
Science building, Mex. 100,000 (C.M. 2587)......................	....	60,000.00	....
Scientific equipment, Mex. 25,000(C.M. 2588).....................	....	15,000.00	....
Salaries of additional science teachers, Mex. 6,750 a year for three years beginning 1922 (C.M. 2589) Instalment due 1922............	....	4,050.00	....
Salaries and expenses of visiting professor (C.M. 2590)...............	....	8,000.00	2,736.72
Yale Foreign Missionary Society			
Hunan-Yale Medical School, Changsha—Heating plant for laboratory building (C.M. 2527)..	3,400.00	....	3,400.00

EXHIBIT K—*Continued*

	PRIOR APPROPRIATIONS	1922 APPROPRIATIONS	1922 PAYMENTS
PREMEDICAL EDUCATION—*Continued*			
Miscellaneous			
Committee of Reference and Counsel of the Foreign Missions Conference of North America—Toward expenses of survey of education under missionary auspices in China (C.M. 2533)	$8,000.00	$........	$........
Studies of premedical education in China 1922 (C.M. 2511, 2568)	500.00	8,000.00	5,157.18
Salary of specialist in science teaching for work under the direction of the National Educational Reform Association of China, 1922–23 (C.M. 2565)	....	5,000.00	486.10
MEDICAL EDUCATION			
Medical Schools—Affiliated			
Peking Union Medical College Asset Accounts			
Purchase of additional property (C.M. 2381)	29,808.58	....	....
Buildings and fixed equipment (C.M. 2495)	58,320.05	....	31,053.56
Alterations to original buildings (C.M. 2537, 2582)	124,900.25	28,800.00	99,605.11
Alterations to new buildings (C.M. 2566)	....	5,000.00	179.19
Alterations to Chinese houses (C.M. 2579)	....	6,000.00	2,192.01
Street improvements (C.M. 2408)	3,979.48	....	3,979.48
Movable Equipment (C.M. 2409, 2583)	44,097.21	30,600.00	43,874.52
Accessories (C.M. 2410, 2496, 2516, 2529)	31,933.04	....	13,275.26
Supplies (C.M. 2544)	40,000.00	....	20,200.09
Heavy furniture for staff residences (C.M. 2378)	8,141.62	....	399.66
Library (C.M. 244)	8,614.74	....	4,982.21
Operation			
Budget 1920–21 (C.M. 2441)	26,490.57	....	Cr. 1,588.91
Budget 1921–22 (C.M. 2535)	288,847.20	300,000.00	519,836.25
Budget 1922–23 (C.M. 2567)	....	350,000.00	....
Peking American School, Mex. 40,000 (C.M. 2501)	50,000.00	....	21,830.47
Diet investigation work (C.M. 2539)	7,500.00	7,500.00	7,387.35
Expenses of visiting professors (C.M. 2538, 2549)	10,000.00	20,000.00	20,780.26
Travel and expenses of trustees in attending dedication of College (C. M. 2494)	38,889.97	....	26,798.45

Insurance (C.M. 2514, 2545)	6,306.08	8,000.00	10,019.04
Contingent Fund (C.M. 2536, 2584)	20,000.00	35,000.00	15,236.22
Expenses in America			
Year 1921–22 (C.M. 2475, 2534)	6,726.30	5,000.00	3,013.99
Year 1922–23 (C.M. 2597)	....	1,000.00	635.71
Training Service for Chinese doctors (C.M. 2581)	....	20,000.00	....
Shanghai Medical School			
Asset Accounts			
Purchase of land (C.M. 2269, 2429)	63,503.46	....	....
Buildings and fixed equipment (C.M. 2413)	28,153.76	....	....
Accessories (C.M. 2272)	4,960.24	....	....
Library (C.M. 2215)	3,000.00	....	....
Operation			
Budget 1918–19 (C.M. 2277)	4,230.48	....	....
Medical Schools—Unaffiliated			
St. Johns University, Shanghai			
Support of instructor 1922–23 (C.M. 2596)	....	1,500.00	1,500.00
Shantung Christian University Medical School			
To cover loss in exchange (C.M. 2353)	10,327.95	....	....
Maintenance, Mex. 33,000 a year for four years commencing 1922 (C.M. 2578) Instalment due 1922	....	20,000.00	13,983.76
FELLOWSHIPS AND SCHOLARSHIPS			
Stipend, tuition, and travel (C.M. 2546, 2547, 2548, 2599)	....	53,000.00	23,771.44
Students from the Canton Christian College for study in the medical department of the University of Hongkong. Hongkong dollars 5,600 extending over a period of five years beginning 1922 (C.M. 2554 to 2558) Instalment due 1922—Hongkong dollars 400	....	300.00	235.00
Peking Union Medical College			
Chinese students (C.M. 2510, 2560, 2580)	1,841.40	10,000.00	2,092.14
Missionary doctors (C.M. 2564)	....	7,243.98	4,411.84

EXHIBIT K—*Continued*

	PRIOR APPROPRIATIONS	1922 APPROPRIATIONS	1922 PAYMENTS
TRANSLATION			
China Medical Missionary Association			
Publication Committee			
For use in translation work, Mex. 10,000 a year for two years beginning 1919 (C.M. 2423) Balance due on instalments.............	$5,882.18	$........	$........
For use in translation work Mex. 8,000 a year for two years beginning 1921 (C.M. 2532)			
Instalment due 1921..	5,000.00	....	4,413.79
Instalment due 1922..	....	5,000.00	....
National Medical Association of China—For expenses connected with their participation in the terminology committee, Mex. 500 a year for five years beginning 1920 (C.M. 2453) Instalment due 1922.............	....	600.00	....
MISCELLANEOUS			
China Medical Missionary Association—Expenses of Association, Mex. 15,000 a year for two years beginning 1922 (C.M. 2585) Instalment due 1922..	....	9,000.00	....
Commission of Three Chinese Scientists—Expenses of visit to America (C.M. 2562)..	....	8,500.00	....
Emergency Fund—For aid of medical work in China, at the discretion of the resident director (C.M. 2512, 2559)...........................	878.67	1,500.00	1,567.54
Famine Relief—Sanitary work in connection with the Chinese famine relief (C.M. 2508)..	10,000.00	....	....
North China American School, Tungchow—Maintenance, Mex. 5,000 (C.M. 2598)..	....	3,000.00	....
North China Union Language School—Toward cost of recitation building and library, Mex. 40,000 (C.M. 2513)...........................	45,000.00	....	....

ADMINISTRATION			
Home Office (C.M. 2552)	....	95,031.75	89,077.71
Peking Office (C.M. 2507, 2550)	19,179.42	21,500.00	26,224.78
TOTALS	$1,552,069.82	$1,494,803.36	$1,206,914.46
Unexpended balances of appropriations allowed to lapse	408,015.60	61,217.18	....
NET TOTALS*	$1,144,054.22	$1,433,586.18	$1,206,914.46
Refund of amount disbursed in prior year—Purchase of land in China (C.M. 2269)	$1,288.82		

* The Foundation appropriated to the China Medical Board for its work during the year 1922 the sum of $1,510,000.

EXHIBIT L

SUMMARY OF APPROPRIATIONS AND PAYMENTS

	PRIOR APPROPRIATIONS	1922 APPROPRIATIONS	1922 PAYMENTS
INTERNATIONAL HEALTH BOARD	$695,952.92	$2,850,121.30	$1,842,376.80
CHINA MEDICAL BOARD	1,144,054.22	1,433,586.18	1,206,914.46
MEDICAL EDUCATION	482,452.46	5,113,443.89	4,896,216.70
SCHOOLS OF HYGIENE AND PUBLIC HEALTH	564,071.93	7,310,079.92	7,374,151.85
BIOLOGY, PHYSICS, AND CHEMISTRY	15,672.01	120,000.00	110,174.27
HOSPITAL, DISPENSARY, AND NURSING STUDIES AND DEMONSTRATIONS	30,551.90	163,173.64	141,657.05
PUBLIC HEALTH EDUCATION AND DEMONSTRATIONS—MISCELLANEOUS	30,695.62	10,000.00	40,695.62
MENTAL HYGIENE	6,944.47	64,500.00	64,083.55
MISCELLANEOUS	14,626 87	65,346.31	66,096.31
ADMINISTRATION	3,393.67	170,168.21	169,042.17
TOTALS	$2,988,416.07	$17,300,419.45	$15,911,408.78
Prior Appropriations	$2,988,416.07		
1922 Appropriations	17,300,419.45		
TOTAL APPROPRIATIONS		$20,288,835.52	
1922 Payments		15,911,408.78	
Balance Payable on Appropriations			$4,377,426.74

In addition to the foregoing, the Foundation has made pledges and appropriations which become effective in future years, and which will require for payment the following amounts:

YEAR 1923		
INTERNATIONAL HEALTH BOARD	$2,500,000.00	
CHINA MEDICAL BOARD	1,400,000.00	
MEDICAL EDUCATION	2,806,389.50	
SCHOOLS OF HYGIENE AND PUBLIC HEALTH	2,276,440.00	
MISCELLANEOUS	734,691 22	
		$9,717,520.72
YEAR 1924		2,683,932.50
YEAR 1925		1,131,846.50
YEAR 1926		1,941,309.50
YEAR 1927		135,260.00
TOTAL		$15,609,869.22

EXHIBIT M

STATEMENT OF APPROPRIATIONS AND PAYMENTS ON ACCOUNT OF SPECIAL FUNDS DURING THE YEAR 1922

	APPROPRIATIONS	PAYMENTS
Laura S. Rockefeller Funds		
Baptist Home for the Aged of New York City (R. F. 2621)	$500.00	$500.00
Baptist Home of Northern Ohio (R. F. 2619)	500.00	500.00
Euclid Avenue Baptist Church of Cleveland, Ohio (R. F. 2620)	1,500.00	1,500.00
Ministers and Missionaries Benefit Board of the Northern Baptist Convention (R. F. 2618)	500.00	500.00
	$3,000.00	$3,000.00
John D. Rockefeller Fund		
Baptist Home for the Aged of New York City (R.F. 2622, 2623)	$1,850.00	$1,850.00

EXHIBIT N

STATEMENTS OF PRINCIPAL FUNDS

General Fund

Balance of Mr. Rockefeller's gifts December 31, 1921	$171,204,624.50
Less payment of appropriation to Johns Hopkins University for the School of Hygiene and Public Health	6,000,000.00
Total	$165,204,624.50

This fund is accounted for in securities and secured demand loans.

Reserve

Balance, December 31, 1921	$3,190,533.00
Amount used to reduce the ledger valuation of a number of securities which had depreciated in value	$3,190,533.00
	0,000,000.00

Laura S. Rockefeller Funds

Gifts comprising four separate funds	$49,300.00

These funds are invested in securities.

John D. Rockefeller Fund

Gifts	$37,000.00

This fund is invested in securities.

Henry Sturgis Grew Memorial Fund

Gift to Harvard Medical School of China transferred to the Foundation in trust	$25,000.00

This fund is invested in securities.

Arthur Theodore Lyman Endowment

Amount received from Harvard Medical School of China and held as a principal fund for Shanghai Medical school	$5,500.00

This fund is invested in securities.

EXHIBIT O

LAND, BUILDINGS, AND EQUIPMENT FUNDS

	Expenditures		
	To December 31, 1921	1922	To December 31, 1922
The Rockefeller Foundation:			
Library	$3,242.95	$654.09	$3,897.04
Equipment	31,737.00	3,692.22	35,429.22
Totals, The Rockefeller Foundation	$34,979 95	$4,346.31	$39,326.26
China Medical Board:			
Peking Union Medical College:			
Original purchase	$171,013.29	$........	$171,013.29
Additional land	202,145.46	....	202,145.46
New buildings	6,925,914.91	31,053.56	6,956,968.47
Alterations—original buildings	122,299.75	99,605.11	221,904.86
Alterations—Chinese houses	......	2,192.01	2,192.01
Movable equipment	379,902 79	43,874.52	423,777.31
Accessories	399,066.96	13,275.26	412,342.22
Supplies	....	20,200.09	20,200.09
Heavy furniture for staff residences	6,858.38	399.66	7,258.04
Library	71,385.26	4,982.21	76,367.47
Street improvements	5,020.52	3,979.48	9,000.00
Shanghai Medical School:			
Land	291,491.54	Cr. 1,288.82	290,202.72
New buildings	56,654 54	....	56,654.54
Movable equipment	39.76	....	39.76
Accessories	39.76	....	39.76
Totals, China Medical Board	$8,631,832 92	$218,273.08	$8,850,106.00
Grand Totals	$8,666,812.87	$222,619.39	$8,889,432.26

EXHIBIT P

SCHEDULE OF SECURITIES IN GENERAL FUNDS ON DECEMBER 31, 1922, REPRESENTING BOTH PRINCIPAL AND INCOME TEMPORARILY INVESTED

BONDS

Name	Rate Per Cent	Date of Maturity	Amount	Price Per Cent	Foundation's Ledger Value
American Agricultural Chemical Co. First Mortgage Convertible	5	Oct. 1928	$310,000	101.	$313,100.00
American Telephone & Telegraph Co. Thirty-year Collateral Trust	5	Dec. 1946	100,000	97.75	97,750.00
Armour & Co. Real Estate First Mortgage	4½	June 1939	1,000,000	93.25	932,500.00
Atlantic & Birmingham Ry. First Mortgage	5	Jan. 1934	677,000	90.	609,300.00
Baltimore & Ohio R. R. Refunding and General Mortgage	5	Dec. 1995	650,000	99.75	648,375.00
Belgian Government Securities			Fcs 32,415,000		2,386,821.88
Chicago & Alton R. R. Refunding Mortgage	3	Oct. 1949	$551,000	65.	358,150.00
Chicago & Alton Ry. First Lien	3½	July 1950	854,000	53.	452,620.00
Chicago City & Connecting Railways Collateral Trust	5	Jan. 1927	1,305,000	85.	1,109,250.00
Chicago, Milwaukee & St. Paul Ry. General Mortgage Series "A"	4	May 1989	30,000	97.	29,100.00
Chicago, Milwaukee & St. Paul Ry. General Mortgage Series "C"	4½	May 1989	500,000	103.	515,000.00
Chicago, Milwaukee & St. Paul Ry. Debenture	4	July 1934	450,000	88.2838	397,277.50
Chicago, Milwaukee & St. Paul Ry. General and Refunding Mortgage Series "A"	4½	Jan. 2014	500,000	91.0625	455,312.50

EXHIBIT P—*Continued*

Name	Rate Per Cent	Date of Maturity	Amount	Price Per Cent	Foundation's Ledger Value
Chicago & North Western Ry. Extension	4	Aug. 15 '26	$50,000	95.	$47,500.00
Chicago & North Western Ry. Sinking Fund Debenture	5	May 1933	80,000	102.	81,600.00
Chicago Railways Co. First Mortgage	5	Feb. 1927	500,000	97.	485,000.00
Cleveland, Cincinnati, Chicago & St. Louis Ry., St. Louis Division Collateral Trust	4	Nov. 1990	73,000	90.	65,700.00
Cleveland, Cincinnati, Chicago & St. Louis Ry. General	4	June 1993	700,000	83.893	587,250.00
Cleveland Short Line First Mortgage	4½	Apr. 1961	500,000	95.	475,000.00
Colorado Industrial Co. First Mortgage	5	Aug. 1934	2,000,000	80.	1,600,000.00
Dominion of Canada, Government of, Fifteen-year	5	Apr. 1931	500,000	94.565	472,825.00
Erie R. R. General Mortgage Convertible Fifty-year Series "B"	4	Apr. 1953	1,065,000	74.7175	795,742.30
Illinois Central R. R. Refunding Mortgage	4	Nov. 1955	300,000	87.	261,000.00
Interborough Rapid Transit Co. First Mortgage (Stamped)	5	Jan. 1966	1,750,000	96.8571	1,695,000.00
International Mercantile Marine Co. First and Collateral Trust Sinking Fund	6	Oct. 1941	2,848,290	97.5	2,777,082.75
Lake Erie & Western R. R. Second Mortgage	5	July 1941	100,000	100.	100,000.00
Lake Shore & Michigan Southern Ry. First Mortgage	3½	June 1997	926,000	87.	805,620.00
Lake Shore & Michigan Southern Ry. Debenture	4	May 1931	1,673,000	92.	1,539,160.00
Magnolia Petroleum Co. First Mortgage	6	Jan. 1937	1,809,000	100.	1,809,000.00
Missouri, Kansas & Texas Ry. General Mortgage Sinking Fund (Certificates of Deposit)	4½	Jan. 1936	1,325,000	84.	1,113,000.00
Morris & Essex R. R. First and Refunding Mortgage	3½	Dec. 2000	175,000	82.75	144,812.50
Mutual Fuel Gas Co. First Mortgage	5	Nov. 1947	250,000	100.	250,000.00

National Railways of Mexico, Prior Lien Fifty-year Sinking Fund, with January 1915 and subsequent coupons attached	4½	July 1957	$50,000	59.	$29,500.00
Secured 6% Notes for coupon due January 1, 1914		Jan. 1917	1,125	59.	663.75
Guaranty Trust Co. Receipt for July 1, 1914 coupon			1,125	59.	663.75
New York Central Lines Equipment Trust of 1913	4½	Jan. '23–'28	216,000	99.0393	213,924.91
New York Central & Hudson River R. R. Thirty-year Debenture	4	May 1934	330,000	88.45	291,885.00
New York, Chicago & St. Louis R. R. First Mortgage	4	Oct. 1937	35,000	95.	33,250.00
New York, Chicago & St. Louis R. R. Debenture	4	May 1931	1,303,000	87.	1,133,610.00
New York Connecting R. R. First Mortgage	4½	Aug. 1953	500,000	95.69073	478,453.65
Northern Pacific Ry. Refunding and Improvement Mortgage	4½	July 2047	390,000	91.577	357,150.00
Pennsylvania R. R. Consolidated Mortgage Sterling	4	May 1948	£2,400	99.	11,880.00
Pennsylvania R. R. General Mortgage	4½	June 1965	$1,500,000	98.25	1,473,750.00
Pittsburg, Cincinnati, Chicago & St. Louis Ry. Consolidated Mortgage Series "I"	4½	Aug. 1963	500,000	103.	515,000.00
Reading Co.—Philadelphia & Reading Coal & Iron Co. General Mortgage	4	Jan. 1997	500,000	94.25	471,250.00
Rutland R. R. First Consolidated Mortgage	4½	July 1941	25,000	90.	22,500.00
St. Louis—San Francisco Ry. Prior Lien Series "A"	4	July 1950	1,500,000	72.75	1,091,250.00
Seaboard Air Line Ry. Adjustment Mortgage	5	Oct. 1949	455,000	77.	350,350.00
Southern Pacific R. R. First and Refunding Mortgage	4	Jan. 1955	100,000	86.	86,000.00
United States Fourth Liberty	4¼	Oct. 15 '38	1,075,000	93.21347	1,002,044.80

EXHIBIT P—*Continued*

Name	Rate Per Cent	Date of Maturity	Amount	Price Per Cent	Foundation's Ledger Value
United States Second Liberty Converted	4¼	Nov. 15 '42	$2,100,000	93.00921	$1,953,193.40
United States Government Treasury Certificates	3¾	June 15 '23	1,000,000	100.	1,000,000.00
United States Government Treasury Notes Series "C"	4¾	June 15 '25	3,000,000	100.	3,000,000.00
United States Government Treasury Notes	4¼	Sept 15 '26	1,000,000	100.	1,000,000.00
Wabash R. R. Second Mortgage	5	Feb. 1939	120,000	97.8	117,360.00
Washington Ry. & Electric Co. Consolidated Mortgage	4	Dec. 1951	450,000	83.5	375,750.00
Western Maryland R. R. First Mortgage	4	Oct. 1952	1,032,000	78.8913	814,158.76
Wheeling & Lake Erie R. R. Lake Erie Division First Mortgage	5	Oct. 1926	140,000	100.	140,000.00
Wheeling & Lake Erie R. R. Equipment Trust Series "B"	5	Apr. '23–'27	250,000	99.75	249,375.00
Wilson Realty Co. First Mortgage	6	July 1929	7,500	95.	7,125.00
Total Bonds					$39,629,937.45

EXHIBIT P—*Continued*

STOCKS

Name	Number of Shares	Price per Share	Foundation's Ledger Value
American Ship Building Co. Common	24,260	54.173537	$1,314,250.00
Anglo-American Oil Co. Ltd. (Par £1)	366,517	30.5	11,178,768.50
Atchison, Topeka & Santa Fe Ry. Preferred	5,000	98.25	491,250.00
Atchison, Topeka & Santa Fe Ry. Common	21,100	95.2563	2,009,908.33
Borne-Scrymser Co.	720	59.	42,480.00
The Buckeye Pipe Line Co. (Par $50)	49,693	100.	4,969,300.00
Central National Bank, Savings & Trust Co. Capital	950	177.8538	168,961.10
Chehalis & Pacific Land Co. Capital	220	34.9095	7,240.10
Chesebrough Manufacturing Co. Consolidated	2,070	220.4522	456,336.14
Chicago City & Connecting Rys. Participation Certificates Preferred	17,530	15.	262,950.00
Chicago City & Connecting Rys. Participation Certificates Common	10,518	2.	21,036.00
Chicago & Eastern Illinois Ry. Preferred	3,000	34.	102,000.00
Cleveland Arcade Co. Capital	2,500	98.6222	246,555.56
Cleveland Trust Co. Capital	457	195.7541	89,459.62
Colorado & Southern Ry. First Preferred	4,800	54.	259,200.00
Consolidated Gas Co. of N. Y. Capital (No par value)	40,000	61.8868125	2,475,472.50
The Continental Oil Co.	20,550	62.2473	1,279,182.61
The Crescent Pipe Line Co. (Par $50)	14,120	60.	847,200.00
Cumberland Pipe Line Co.	6,000	40.6666	244,000.00
Erie R. R. First Preferred	21,400	45.8306	980,773.76
Eureka Pipe Line Co.	12,357	175.	2,162,475.00

EXHIBIT P—*Continued*

Name	Number of Shares	Price per Share	Foundation's Ledger Value
Galena Signal Oil Co. Preferred	4,193	$139.7	$585,779.50
Galena Signal Oil Co. Common	20,000	170.94	3,418,790.04
Great Lakes Towing Co. Preferred	1,527	88.7361	135,500.05
Great Lakes Towing Co. Common	1,200	12.	14,400.00
Indiana Pipe Line Co. (Par $50)	24,845	105.1111	2,611,485.28
Kanawha & Hocking Coal & Coke Co. Preferred	202½	100.	20,250.00
Kanawha & Hocking Coal & Coke Co. Common	668¼	90.953	60,779.97
Manhattan Ry. Capital (Certificates of Deposit)	10,000	100.	1,000,000.00
Missouri Pacific R. R. Convertible Preferred	17,880	55.50	992,340.00
National Transit Co. (Par $12.50)	126,481	28.5	3,604,708.50
New York Transit Co.	12,392	150.	1,858,800.00
Northern Pacific Ry. Common	700	91.7625	64,233.75
Northern Pipe Line Co.	9,000	110.	990,000.00
Pere Marquette Ry. Preferred	5,740.8	54.56	313,248.00
Provident Loan Certificates (Par $5,000)	40	100.	200,000.00
Seaboard Air Line Ry. Preferred	4,300	10.	43,000.00
Seaboard Air Line Ry. Common	3,400	5.	17,000.00
The Solar Refining Co.	9,076	92.5035	839,561.76
Southern Pipe Line Co.	24,845	125.	3,105,625.00
South West Pennsylvania Pipe Lines	8,000	125.	1,000,000.00
Standard Oil Co. (Indiana) (Par $25)	478,760	43.35	20,754,246.00
The Standard Oil Co. (Kansas) (Par $25)	78,624	17.1885	1,351,433.05
Standard Oil Co. (Nebraska)	7,446	90.	670,140.00
Standard Oil Co. (New Jersey) Non-voting Cumulative Preferred	55,000	102.8729	5,658,008.48

Standard Oil Co. (New Jersey) Common (Par $25)	919,500	36.475	33,538,762.50
The Standard Oil Co. (Ohio) Common	33,912	102.	3,459,024.00
The Standard Oil Co. (Ohio) Non-voting Cumulative Preferred	17,088	106.	1,811,328.00
Tilden Iron Mining Co. Capital	1,780	27.35	48,683.46
Union Tank Car Co. Common	36,000	44.6135	1,606,087.97
Virginia-Carolina Chemical Co., Voting, no par, Class "A" Common	35,000	27.	945,000.00
Virginia-Carolina Chemical Co., Non-voting, no par, Class "B" Common	8,750	18.	157,500.00
Washington Oil Co. (Par $10)	1,774	30.	53,220.00
Western Pacific R. R. Corporation Preferred	20,195	43.50	878,482.50
Western Pacific R. R. Corporation Common	30,292½	15.25	461,960.62
Wilson Realty Co. Capital	591	100.	59,100.00
Woman's Hotel Co. (In liquidation) Capital	300	20.	6,000.00
TOTAL STOCKS	....	....	$121,943,277.65

SUMMARY

Bonds	$39,629,937.45
Stocks	121,943,277.65
Total ledger value of investments belonging to General Fund	$161,573,215.10

EXHIBIT Q

SCHEDULE OF SECURITIES IN SPECIAL FUNDS ON DECEMBER 31, 1922

John D. Rockefeller Fund

BONDS

Name	Rate Per Cent	Date of Maturity	Amount	Price Per Cent	Foundation's Ledger Value
Canada Southern Ry. Consolidated Mortgage Series "A"	5	Oct. 1962	$37,000	100.	$37,000.00
Total Bonds					$37,000.00

Laura S. Rockefeller Fund

BONDS

Name	Rate Per Cent	Date of Maturity	Amount	Price Per Cent	Foundation's Ledger Value
Colorado Industrial Co. First Mortgage	5	Aug. 1934	$50,000	80.	$40,000.00
Virginia-Carolina Chemical Co. First Mortgage	5	Dec. 1923	10,000	93.	9,300.00
Total Bonds					$49,300.00

Henry Sturgis Grew Memorial Fund

BONDS

United States Second Liberty Loan Converted...........	4¼	Nov. 15 '42	$25,850	96.71167	$25,000.00
Total Bonds................................	....	....	....	....	$25,000.00

Arthur Theodore Lyman Endowment

BONDS

United States Fourth Liberty Loan....................	4¼	Oct. 15 '38	$5,850	94.01709	$5,500.00
Total Bonds................................	....	....	....	....	$5,500.00

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