

1937

DESCRIPTIVE PAMPHLET, 1937

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THE ROCKEFELLER INSTITUTE
FOR MEDICAL RESEARCH



History
Organization
Present Scope of the Scientific Work
Buildings and Equipment
Publications

NEW YORK CITY
NEW YORK
1937

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HISTORY

Endowment The Rockefeller Institute for Medical Research was founded in 1901 by Mr. John D. Rockefeller, as a philanthropic corporation under the laws of the State of New York. Since its beginning, as needs have arisen for buildings, equipment, and additional endowment, to permit more extensive investigations, gifts have very generously been made by Mr. John D. Rockefeller and Mr. John D. Rockefeller, Jr. A legacy from the late Henry Rutherford, for the promotion of cancer research, is also administered by the Institute.

Purposes The purposes of The Rockefeller Institute are set forth in its charter, which states that:

“The objects of said corporation shall be to conduct, assist and encourage investigations in the sciences and arts of hygiene, medicine and surgery, and allied subjects, in the nature and causes of disease and the methods of its prevention and treatment, and to make knowledge relating to these various subjects available for the protection of the health of the public and the improved treatment of disease and injury. It shall be within the purposes of said corporation to use any means to those ends which from time to time shall seem to it expedient, including research, publication, education, the establishment and maintenance of charitable or benevolent activities, agencies or institutions appropriate thereto, and the aid of any other such activities, agencies or institutions already established or which may hereafter be established.”

Development The Rockefeller Institute was conceived, not by physicians or scientists, but rather by laymen who studied the state of medical knowledge at the end of the nineteenth century and concluded that the time was favorable for the establishment in the United States of an institute devoted exclusively to medical research, just as institutions devoted to physical or chemical research might be founded.

In the United States before 1900 the growth of medical science had not kept pace with that of the physical sciences, despite the fact that research in medicine had been carried on in universities at a constantly increased rate. The conclusion reached by Mr. Frederick T. Gates, acting as adviser to Mr. Rockefeller, was, therefore, that “medicine could hardly hope to become a science until it should be endowed, and qualified men be enabled to give themselves to uninterrupted study and investigation, on ample salary, entirely independent of practice.” This

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view was accepted by Mr. Rockefeller, who made the initial contribution toward the eventual permanent establishment of The Rockefeller Institute for Medical Research.

The original gift, amounting to \$200,000, was in 1901 placed in the hands of a Board of Directors, composed of William H. Welch, President; T. Mitchell Prudden, Vice-President; L. Emmett Holt, Secretary; Theobald Smith, Christian A. Herter, Hermann M. Biggs, and Simon Flexner. This gift was not made for the immediate purpose of building an institution for medical research, but was to be used by a group of scientifically trained medical men to ascertain the resources in adequately trained younger men of the universities engaged in the pursuit of medical research. It was to be awarded in grants and fellowships and expended within a period of ten years. During this period, and in this way, it was hoped that more precise knowledge would be obtained concerning the advisability of establishing in the United States an independent institute for medical research. This information was secured more quickly than had been anticipated, so that early in 1902 the conception of a research laboratory to be located in New York City had taken form in the minds of the scientific directors, and met with Mr. Rockefeller's approval.

The principles of organization of the research laboratory which constituted the beginnings of the present Rockefeller Institute have continued essentially unchanged. They were, briefly, that there should be a Board of Scientific Directors responsible for the appointment of the Scientific Staff and for the general policies of scientific investigations carried on, while the general direction of the scientific work was to be entrusted to a Scientific Director, who was himself an investigator and in intimate contact with other investigators. Each investigator was to be accorded complete freedom, under the general supervision of the Director of the Institute, in the pursuit of problems within his particular field, but it was thought best to avoid, as far as practicable, the overlapping of problems into contiguous fields, except where problems were investigated jointly by two or more groups of workers.

It was apparent that Mr. Rockefeller's initial gift necessitated that the operation of the original laboratory in New York should be on a limited scale. Accordingly a small building was rented at 127 East 50th Street,

equipped for investigations in pathology, physiology, pharmacology, and biological chemistry, and opened on October 15, 1904. The original scientific staff consisted of Simon Flexner, pathologist and Director, with whom were associated Hideyo Noguchi, Eugene L. Opie, and J. E. Sweet, pathologists; Samuel J. Meltzer, physiologist and pharmacologist; and P. A. Levene, biological chemist.

The results achieved with grants given in aid of research, and in the first small laboratory, proved to be so encouraging that a tract of land was purchased by Mr. Rockefeller overlooking the East River at 66th Street, upon which was erected a modern laboratory. In order to provide both for the erection of the laboratory and for its cost of operation, Mr. Rockefeller made an additional gift to be expended and not reserved in part as endowment. This laboratory, known as the Central Laboratory, was opened in 1906, and provided suitable space for the study of the above subjects together with experimental surgery, and, later, experimental biology.

The need for a hospital attached to the Institute, in which disease in man could be investigated under as favorable conditions as possible, was felt early, inasmuch as investigations had been conducted only in the laboratories, and access to patients suffering from disease had to be secured in a small way at hospitals in the city. In 1908 and shortly thereafter Mr. Rockefeller made gifts for the purpose of erecting a main hospital of sixty beds, and an isolation pavilion, of nine beds, designed for the study of infectious diseases. The hospital was opened in 1910 with Rufus Cole as Director. At that time Mr. Rockefeller provided a suitable endowment for the needs of the Institute as then existing. In 1937 Dr. Cole retired as Director of the Hospital and was succeeded by Dr. Thomas M. Rivers.

The principles of organization of the hospital were, first, that the number of diseases studied at any one time would be limited and only patients suffering from one or another of the diseases under investigation would be accepted; second, that all the scientific staff was to devote its entire time to the duties of the hospital; third, that the work of the hospital staff should consist not merely in observational studies, but in experimental studies equally; and fourth, that no charge was to be exacted from the patients for services rendered. These principles have not been departed from in the twenty-seven years during which the hospital has now been in operation with a constantly enlarging staff of scientific workers.

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In 1910, with the added endowment and the opening of the hospital, the powers of the Corporation were increased and its membership was enlarged to include the members of a new Board of Trustees as well as the members of the original Board of Directors, the name of which was changed at that time to the Board of Scientific Directors. The new Board of Trustees was composed of two groups: one representing the business or fiscal interests of the Institute and the other the scientific interests. The former group consisted of Frederick T. Gates, as President, John D. Rockefeller, Jr., and Starr J. Murphy; and the latter group of William H. Welch and Simon Flexner. Owing to death and other circumstances, the personnel of the trustees has changed, and at the present time consists of eight members, with John D. Rockefeller, Jr., as President.

Up to 1914 The Rockefeller Institute was located wholly in New York City and consisted of laboratories and a hospital. In that year a Department of Animal Pathology was created, and Theobald Smith was chosen Director. A suitable country location, about three miles from Princeton University, was secured, on which laboratories and stables for animals were erected. To these buildings were added dwellings for the Director, scientific staff, and employees. This department was created in order to provide facilities for the study of the comparative aspects of the pathology of disease in various animal species, especially in the more valuable domestic animals, and in order to bring to light such processes as are especially clear in animals but obscure or difficult of access in human beings. In 1930 Dr. Carl TenBroeck succeeded Dr. Theobald Smith as Director.

In 1931 the department at Princeton was extended to include a Laboratory of Plant Pathology, and the combined laboratories are now known as the Department of Animal and Plant Pathology. Through the addition of plant pathology The Rockefeller Institute has provided in one organization for the study of disease as it occurs in all the main orders of living things.

In 1935 Dr. Simon Flexner retired from the directorship of the Institute and was succeeded by Dr. Herbert S. Gasser.

ORGANIZATION

Administration The Institute's charter provides for a Board of Trustees and a Board of Scientific Directors. The Board of Trustees, of which two members may be appointed by the Scientific Di-

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rectors from their own number, is charged with the maintenance and care of the endowment and property of the Institute. Income from endowment, after taxes and other charges on capital have been paid, is available for expenditure by the Board of Scientific Directors. The Board of Scientific Directors, acting through the Director of the Institute, has control of all the scientific work and of the administration of the several departments of the Institute. Its stated meetings are held quarterly. The expenditures are made under its direction in accordance with an annual budget framed by a Budget Committee consisting of three members of the Board of Scientific Directors and two members of the Board of Trustees. Of the three members of the Budget Committee chosen by the Board of Scientific Directors at least one shall also be a member of the Board of Trustees.

The Trustees of the Institute, who are the custodians of its property, and the Scientific Directors, who have unrestricted charge of all phases of its scientific work, together constitute the Corporation. The Corporation meets at least once a year to receive reports from the Trustees and Scientific Directors, who consider together, from a common standpoint, the affairs of the Institute as a whole. This organization of the Governing Boards has fostered the aims of the Institute in a most gratifying way, giving as it does to the Scientific Directors the advantage of wise and sympathetic counsel in the relationships of the institution to the community, and affording to the Trustees opportunity to share in the problems, outlooks, and successes which are the inspiration of the scientific staff.

The routine administration of the Institute is in charge of an Executive Committee of the Board of Scientific Directors which acts chiefly through a Business Manager. The fiscal year begins July 1.

**Departments
of the
Institute** There are three Departments of the Institute: the Department of the Laboratories, the Department of the Hospital, and the Department of Animal and Plant Pathology. At the head of each of these Departments is a Director, who is also a member of the Scientific Staff. The departmental Directors are appointed by the Board of Scientific Directors, and the Director of the Institute by the Corporation.

The present division of the Institute into the above three departments corresponds with a natural division of medical research into three

branches. The Department of the Laboratories deals with the problems of disease in their physiological, pathological, bacteriological, chemical, and physical aspects and admits of the fullest use of the experimental method. The Department of the Hospital studies disease as it actually appears in human beings, facilities being provided not only for scientific observation and treatment of patients, but also—through experiments on animals—for solution of the problems arising from these clinical observations. The Department of Animal and Plant Pathology, through observation and experiment, deals with all aspects of the diseases of animals and plants.

In the different Departments of the Institute separate laboratories have been organized under the guidance of Members or Associate Members.

The Department of the Laboratories

The Department of the Laboratories was directed by Dr. Simon Flexner from its organization in 1905 up to the time of his retirement in 1935. He was succeeded in that year by Dr. Herbert S. Gasser. In this Department investigations are carried on at the present time in the following scientific fields: Chemistry, Experimental Surgery, Pathology and Bacteriology, Physiology, and Biophysics. These are conducted by the following staff groups.

Chemistry

Laboratories of Chemistry are conducted by Dr. Levene, assisted by Drs. Meyer, Rothen, Tipson, Christman, and Schmidt; and by Dr. Bergmann, assisted by Drs. Behrens and Fruton.

A Laboratory of Chemical Pharmacology is conducted by Dr. Jacobs, assisted by Drs. Craig and Gould.

Laboratories of Physical Chemistry are conducted by Dr. Michaelis, assisted by Drs. Schubert and Smythe; and by Dr. MacInnes, assisted by Drs. Shedlovsky and Longsworth.

Experimental Surgery

A Laboratory of Experimental Surgery is conducted by Dr. Carrel, assisted by Drs. Baker, Ebeling, and Parker.

Pathology and Bacteriology

Laboratories of Pathology and Bacteriology are conducted by Dr. Rous, assisted by Drs. McMaster, Kidd, and Parsons; by Dr. Landsteiner, assisted by Mr. van der Scheer, Dr. Chase, and Mr. Di Somma; by Dr. Florence R. Sabin, assisted by Drs. Smithburn and Joyner; by Dr. Olitsky, assisted by Drs. A. B. Sabin and Harford; and by Dr. Webster, assisted by Dr. Hodes.

A Laboratory of Cancer Research is conducted by Dr. Murphy, assisted by Drs. Duran-Reynals and Claude, and Mr. Sturm. The Rutherford Fund, made available by a bequest of Mr. Henry Rutherford in 1916, is applied to special lines of investigation in the field of cancer research.

Physiology

A Laboratory of Physiology is conducted by Dr. Gasser, assisted by Drs. Lorente de N6, Toennies, and Grundfest.

Laboratories of General Physiology are conducted in New York by Dr. Osterhout, assisted by Drs. Hill, Jacques, and Murray; and in Princeton by Dr. Northrop, assisted by Drs. Anson, Herriott, and Kunitz.

Biophysics

A Laboratory of Biophysics is conducted by Dr. Wyckoff.

The Department of the Hospital

In 1910 the Hospital was established as a Department of the Institute in order that the laboratory and experimental investigations which are carried on in the Department of the Laboratories could be supplemented by the study of certain diseases as they actually occur in man. Dr. Rufus Cole was Director of the Hospital from its beginning up to the time of his retirement in 1937, in which year he was succeeded by Dr. Thomas M. Rivers.

The particular diseases studied in the Hospital vary from time to time, the choice of problems being determined to some extent by the special fitness of the scientific staff for certain kinds of investigation. The staff of the Hospital is divided into several groups each of which is en-

gaged in studying a special class of diseases, the investigation of which demands especially the employment of the methods of a particular fundamental science. The interests of a member of a special group are not necessarily confined to the disease being studied by his group, however, since, for instance, a student of cardiovascular disease may carry on investigations concerning the circulatory disturbances occurring in an infectious disease, or a physician studying metabolic diseases may investigate the metabolic disturbances occurring in patients with heart disease.

The groups of diseases at present under investigation in the Hospital and the individuals on the staff engaged in the study of each of them are as follows:

1. *Infectious Diseases*

(a) *Acute Respiratory Disease*

Drs. Avery, Goebel, C. M. MacLeod, Dubos, Goodner, Stillman, Beeson, Hoagland, and Reeves.

(b) *Rheumatic Fever*

Drs. Swift, Lancefield, T. McP. Brown, and Hirst.

(c) *Diseases Due to Filtrable Viruses*

Drs. Rivers, Baird, and Smadel.

2. *Metabolic Diseases*

Drs. Van Slyke, Farr, Hiller, Bourdillon, Folch-Pi, MacFadyen, and Robinson.

3. *Cardiovascular Diseases*

Drs. Cohn, A. G. Macleod, Mirsky, Steele, and Schroeder.

4. *Blood Diseases*

Anemia

Drs. Rhoads and Erf.

Admission of Patients to the Hospital

The Hospital provides accommodation for a limited number of patients, and it has been so organized that the most approved methods of treatment can be adequately employed. Each physician has only a few patients under his care in order that a considerable portion of his time may be given to investigation. The Hospital employs none but graduate nurses.

The work of the Hospital at a particular time is limited to a small number of subjects; bulletins are issued from time to time stating the

forms of disease then the subject of study. Only patients suffering from one of these diseases are admitted for treatment. They are admitted only by the Resident Physician, to whom they are referred by physicians or hospitals, or to whom they may apply directly. While making the fullest use of its opportunities for observation and study, the Institute recognizes at all times the paramount right of the patient to receive the most effective treatment within the power of the attending physicians. A patient does not impair that right by the voluntary character of his application for admission.

Under the By-Laws of the Corporation, no charge for professional care or service rendered, or for board or lodging, is to be made to persons treated at the Hospital.

The Department of Animal and Plant Pathology

The Department was organized as the Department of Animal Pathology in 1916 and the work begun in newly erected buildings in 1917. It has been growing steadily by additions to its staff and to the material equipment. The Department was directed by Dr. Theobald Smith from its beginning up to the time of his retirement from executive responsibility in 1929, when he was succeeded by Dr. Carl TenBroeck as Acting Director. Dr. TenBroeck was appointed Director in 1930.

In this Department investigations are carried on in the fields of Animal and Plant Pathology, and are at present conducted by the following staff groups.

Animal Pathology

Laboratories of Animal Pathology are conducted by Dr. TenBroeck, with whom are associated Drs. Glaser, Shope, Little, Nelson, Traub, King, Seastone, Trager, and J. M. Pearce; by Drs. Wade H. Brown and Louise Pearce, assisted by Drs. Greene and Saxton; and by Dr. Stoll, assisted by Dr. Graham.

Plant Pathology

A Laboratory of Plant Pathology is conducted by Dr. Kunkel, with whom are associated Drs. Holmes, Stanley, Osborn, Black, Loring, McNew, Price, Spencer, White, Lauffer, and Ross.

**General
Statement**

The three departments of the Institute are organized for research only. Under normal conditions no provision is made for the enrollment of individuals or classes for formal instruction in the medical sciences or in laboratory or clinical methods. Thus the Institute absolves its staff from the necessity of devoting time and energy to formal teaching or to the consideration of subjects and problems chosen for reasons other than because of their value and promise for the advancement of science.

The scope of the Institute's work is wider than the study of problems whose solution has an immediate application to human pathology. It has, in fact, been the principle of the Institute's organization that it can best serve medical science by devoting a great deal of attention to the investigation of fundamental biological, physical, and chemical subjects. These aspects of science, as well as those of direct clinical importance, have been constantly under investigation, and together with problems of general biological interest, have largely occupied certain of the scientific staff and have used a considerable share of the Institute's annual budget.

It is not the aim of the Institute to perpetuate the lines of investigation in which it may engage, or even Departments or Laboratories, should the usefulness or promise of these at any time become doubtful, either from changes in the requirements and outlooks of science, or from lack of leaders of vision or achievement. On the other hand, the elucidation of fundamental problems may proceed under favorable conditions and with adequate support for an indefinite period, unhurried and unhindered by the urgency of obviously practical or immediate results. The organization of the Scientific Staff of the Institute is thus flexible and adaptable to the ever shifting requirements of research, so that at any time its Directors may alter the emphasis of its work, and focus its various resources upon different aspects of complex problems.

While the various phases of research which are being carried forward at the Institute are more or less independently conducted in the several Departments and Laboratories, it is aimed as far as is possible, through coordination and cooperation, to make them mutually helpful and stimulating. Thus through frequent symposia, the common services of publication, illustration, library, and other accessory services, and the lunch room shared by the scientific staff, a helpful community of interest is maintained.

**Appointments to
the Scientific
Staff**

Appointments to the scientific staff are made by the Board of Scientific Directors, upon recommendation of the Director of one of the Departments. The following grades are fixed by the rules of the Board: Member of the Institute, Associate Member of the Institute, Associate, Assistant, and Fellow. The clinical staff of the Hospital may have in addition to the appropriate Institute titles, as above, the following titles indicating their special functions: Physician to the Hospital, Assistant Physician to the Hospital, Resident Physician, Assistant Resident Physician. Appointments of the Members of the Institute are made without limit of time; of Associate Members and Associates for a term of years; while all other appointments are made for a term not exceeding one year. Fellowships may be renewed from year to year, for a limited period of time.

Applications for appointment may be made at any time. Blank forms of application are furnished on request. Appointments are ordinarily made only as vacancies occur. They may be sought for the purpose of permanent or indefinite association with the Institute, or for the purpose of temporary association with the Institute with one of the following objects: (1) experience in methods of investigation generally; (2) training in a special line of investigation; or (3) opportunity to work more or less independently on a particular problem which may be the subject of study at the time. The qualifications for appointments to the scientific staff include preliminary training such as would be represented by an M.D. or a Ph.D. degree and, in addition, a knowledge of research, or a training such as would ordinarily be appropriate to the higher degrees in the biological or physical sciences.

The Institute requires all who serve on its scientific staff to give full time to the work, permitting them to pursue no gainful occupations outside of its organization and paying them a stipend fixed with reference to their complete devotion to whatever may be their special assignments. No part time workers are accepted.

All staff appointees are paid investigators with the exception of a small number of so called volunteer workers and special appointees, usually persons receiving fellowships awarded by various institutions in the United States and abroad. Those who come to the Institute under fellowships awarded by it, or by other institutions, are ordinarily privi-

leged to enter the United States as "students" under the Immigration Laws. The volunteer workers and those receiving fellowships also give their entire time to the scientific work on which they are engaged, under the direction of one of the heads of laboratories of the Institute. Volunteer investigators wishing to pursue individual subjects of research foreign to the investigations being carried on in the laboratories of the Institute are not, as a rule, acceptable. Language plays no part in the eligibility of volunteer workers. They are expected to be self-supporting, but there are no laboratory charges imposed either for space or materials.

Technical Employees

The Institute employs a group of men and women who act as technical assistants to the scientific staff. This group is largely made up of technicians, skilled helpers, and helpers. The technicians have had training equivalent to a B.S. degree, or considerable experience in special laboratory technique. The skilled helper and helper groups are composed mainly of young men who are high school graduates and who have a special interest in scientific work. Applications for employment may be filed with the Assistant Business Manager.

Services Auxiliary to Research

The organization of the Institute provides for the maintenance of a series of Auxiliary Services for the scientific staff, thus relieving the latter of such personal routine as can be wisely delegated to specially trained persons. The following are now in operation in New York: Publication, Illustration, Library, Purchase and Supply, Culture Media and Glassware Preparation, X-Ray, Section Cutting, Animal House, Instrument-Making, and Glass-Blowing. Also of service to the scientific staff, as well as in maintenance work, are the Power House, Machine Shop, Carpenter Shop, and Paint Shop.

At the Department of Animal and Plant Pathology at Princeton a number of these services are also maintained.

Discoveries and Inventions

All discoveries and inventions made by any person while receiving compensation from the Institute, or while using the facilities of the Institute, become the property of the Institute, to be placed by it at the service of humanity in accordance with the beneficent purposes of the founder.

PRESENT SCOPE OF THE SCIENTIFIC WORK

As previously stated, in the organization of the scientific work of the Institute the principle has been recognized that the ultimate purposes of medical science may be greatly served by the study of fundamental biological, chemical, and physical problems. It will thus be seen that the scope of the Institute's work is broader than the study of problems whose solution would have an immediate application in the treatment and prevention of diseases of man, animals, and plants.

The Department of the Laboratories Dr. Herbert S. Gasser, Director of the Institute, is also Director of the Department of the Laboratories, in which investigations are being carried on at the present time in the following scientific fields: Chemistry, Experimental Surgery, Pathology and Bacteriology, Physiology, and Biophysics.

Chemistry

There are two Laboratories of Chemistry, one in charge of Dr. Levene, and the other in charge of Dr. Bergmann.

Dr. Levene and his associates have devoted themselves to problems in the structural chemistry of biologically important substances and in stereochemistry. The former investigations deal with nucleic acids, mucoids, simple sugars, and nitrogenous sugars; the latter are concerned with the relationship of chemical structure and optical activity, and with the phenomenon of the Walden inversion.

Dr. Bergmann and his associates are studying the structure of proteins. The investigations are being carried out by means of methods devised for the purpose of securing a better understanding, from a chemical point of view, of the differences in behavior of various proteins and protein split-products in digestion, in cell metabolism, and in serological reactions. Associated with this problem is the study of proteolytic enzymes from the standpoint of their specificity. Work on the chemical structure of protein-like enzymes has also been begun and is to be extended to the protein-like hormones.

In the Laboratory of Chemical Pharmacology, Dr. Jacobs and his associates in earlier years were engaged in chemotherapeutic studies. More recently they have turned to the investigation of the chemistry of pharmacologically important substances. Special attention has been

given to digitalis and related glucosides, to polyterpenes, and to alkaloids, such as those of ergot, veratrine, and others.

There are two Laboratories of Physical Chemistry, one in charge of Dr. Michaelis, and the other in charge of Dr. MacInnes.

Dr. Michaelis and his associates are investigating the physical chemistry of respiration and fermentation. The studies include the measurement of oxidation-reduction potentials of dyestuffs, both synthetical and those occurring in living organisms in the form of respiratory ferments or vitamins. At the present time emphasis is laid upon the investigation of the intermediate forms of oxidation-reduction represented by semiquinoid radicals. The equilibrium of these radicals with their parent substances and their rôle as catalysts for the oxidation of organic compounds are being studied.

Dr. MacInnes and associates are making studies, chiefly of an electrochemical nature, on solutions of electrolytes, in aqueous and non-aqueous solvents.

Experimental Surgery

In the Laboratory of Experimental Surgery, Dr. Carrel and his associates are developing methods for the cultivation of whole organs outside of the body.

Pathology and Bacteriology

This laboratory was the first to be established and has been in operation since 1904. Until his retirement from the directorship of the Institute in 1935, the laboratory was in general charge of Dr. Flexner. Under his immediate direction, studies were made chiefly of problems relating to the infectious and epidemic diseases which were particularly prevalent during that period. At the present time the investigations are being carried on in laboratories in charge of the persons indicated below.

Dr. Rous and one of his associates are studying mammalian tumors caused by viruses, with reference to what these mean for the tumor problem in general. The other workers in the laboratory are concerned with the state of the lymph vessels and the intercellular tissues under normal and pathological conditions.

Dr. Florence R. Sabin and her associates are conducting investigations on tuberculosis. These include studies of the reactions of the tissues to products separated in the chemical analysis of tubercle bacilli, together with investigations of the capacity of these products to induce

hypersensitiveness and immunity; experiments concerned with the dissociation of tubercle bacilli into forms which are virulent and others which are attenuated, and studies of the differences in lesions corresponding to the differences in virulence, together with analyses of the immunological properties of virulent and attenuated organisms. The experiments dealing with the virulence of dissociated variants have included studies of the blood cells of animals inoculated with cultures varying in virulence.

Dr. Landsteiner and his associates are conducting investigations on the chemistry of antigens and the nature of immunological specificity. Other parts of the work deal with drug idiosyncrasy, with human blood groups and individual serological distinctions, and with the nature of antibodies.

Dr. Olitsky and his associates are studying the viruses of equine encephalomyelitis, pseudorabies, vesicular stomatitis, vaccinia, Sabin's B virus, and poliomyelitis. Attention is being given to methods of active and passive immunization; to specific and non-specific means of developing local and general resistance; and to types of resistance unrelated to specific immunity.

Dr. Webster and his associate are making experimental studies on the epidemiology and control of encephalitis and rabies. They are also analyzing the mechanism of resistance to infectious disease from the standpoint of both inherited and environmental factors.

In the Laboratories of Cancer Research, Dr. Murphy and his associates are conducting studies on induced, transplanted, and spontaneously occurring tumors in mice, chickens, and rabbits. A systematic investigation of families of mice having a high, organ-specific, spontaneous tumor rate is being made to determine the degree of susceptibility to induced tumor (carcinogenic agents). The chemical nature of the filtrable transmitting agents of fowl tumors, which have been isolated in relatively pure form, is being investigated. The main topic of research concerns the isolation and identification of the substance or substances, extractable from certain tumors and normal tissues, which inhibit the growth of transplanted and natural cancers in animals. The antigenic properties of tumor cells and tumor protein are being compared with the same properties of normal cells and their proteins.

Physiology

In the Laboratory of Physiology, Dr. Gasser and his associates are investigating, principally with electrophysiological methods, the properties of mammalian nerves and the nature of conduction across synapses in the central nervous system.

There are two Laboratories of General Physiology, one in New York in charge of Dr. Osterhout, and the other in Princeton in charge of Dr. Northrop.

Dr. Osterhout and his associates are investigating the fundamental properties of protoplasm, using certain very large cells, some up to six inches in length, which offer especial advantages for chemical analyses and bioelectric studies.

Dr. Northrop and his associates are engaged in the study of the proteolytic enzymes and the bacteriophage. Methods for the isolation and crystallization of these compounds are being developed, and their properties, chemical structure, and mode of formation determined.

Biophysics

In the Laboratory of Biophysics, Dr. Wyckoff has been developing certain physical methods for the isolation and study of some of the less stable crystallizable substances from living matter. Recent work has been devoted to the design of ultracentrifuges and their use in the preparation of high molecular weight proteins present in some virus-diseased plants and animals.

A Spectroscopic Laboratory, in charge of Dr. Lavin, is providing a central service for spectroanalysis to various laboratory groups throughout the Institute.

The Department of the Hospital The Hospital was established as a Department of the Institute in 1910 in order to "extend the field of its [the Institute's] research so as to include the study of disease in the clinical aspects, under conditions as near as possible to standards of laboratory exactness and efficiency." From its beginning up to the time of his retirement in 1937, its Director was Dr. Rufus Cole. In that year Dr. Cole was succeeded by Dr. Thomas M. Rivers.

Although the ultimate purpose of the work carried on in the Depart-

ment of the Laboratories is the prevention of disease and the relief of suffering, it has been found that in order to accomplish these ends it is frequently necessary that the studies undertaken shall concern fundamental biological processes and not necessarily have a direct relationship to any special diseases. On the other hand, the studies carried on in the hospital, and in the laboratories directly connected with it, have in general a fairly direct relationship to the diseases being investigated at any given time and are undertaken with the more immediate objectives of prevention and cure. Even in the hospital, however, it has been deemed important that the work shall consist not merely in observation of the more superficial manifestations of disease in the patient, but that an effort shall be made to determine the causes of disease and the nature and the course of the abnormal symptoms. For carrying out these investigations laboratories in the hospital have been equipped for the employment of the methods developed in the contributing sciences of physics, chemistry, physiology, and bacteriology. Moreover, it is believed to be important that the physicians caring for the patients shall themselves engage in these studies, since not infrequently careful observation of patients may yield suggestions for lines of research which might otherwise be overlooked. The present scope of the investigations being carried on in the hospital is outlined below.

1. *Infectious Diseases*

(a) *Acute Respiratory Disease.* Various forms of acute pulmonary infections are being investigated, especially acute lobar pneumonia due to pneumococci of the various types. In suitable cases specific serum is administered and the results are believed to be very beneficial. Considerable attention is being given to the chemical composition of the various components of the pneumococcus cells, and to their antigenic properties. Especially has study been devoted to the capsules of these cells. It has been found that the substances forming the capsules are polysaccharides and that these substances not only determine the type specificity, but are responsible for the virulence of the organisms. Bacterial enzymes have been discovered which act specifically on certain of these polysaccharides, and they do this not only *in vitro*, but also in the animal body. Studies of the chemical nature of the active substances in specific immune serum are also being made, and constant efforts are being exerted to improve the activity of the serum. Various other therapeutic measures are being investigated.

In connection with the study of acute pulmonary infections not asso-

ciated with the presence of pneumococci, other bacteria which apparently play a rôle have been investigated.

The alterations observed in physiological functions of the body during the course of pneumonia are being studied.

Studies of the relation of viruses to respiratory diseases have resulted in the demonstration of the presence of a filtrable virus in patients suffering from influenza. Laboratory animals have been infected with this virus, and its cultivation in tissue culture has been accomplished. The development of immunity in infected animals and in recovered patients is now being investigated.

(b) *Rheumatic Fever*. Clinical studies continued over many years have emphasized the chronic and recurring nature of this disease. The protean manifestations and the frequent paucity of clinical symptoms often make it difficult to separate rheumatic fever definitely from other diseases. Efforts have been made, therefore, to find additional signs that would indicate activity of the infection, for it is highly probable that continuing and recurring infection are important factors in the development of cardiac failure. Many different techniques have been employed in attempts to transmit the disease to laboratory animals or to induce typical rheumatic histopathologic lesions in them. Various phases of different allergic states in their possible relationship to rheumatic fever have been studied, and recently the tissues and sera of animals infected with streptococci or tubercle bacilli have been investigated with tissue culture techniques in order to analyze their "allergic reactivity." It appears that rheumatic individuals are especially sensitive to various foreign substances, some bacterial and some non-bacterial. Because of the possible relationship between streptococcal infections and rheumatic fever, extensive studies of hemolytic streptococci have been made; and a system of immunological classification of hemolytic streptococci has been elaborated, whereby these microorganisms can be differentiated into groups and further divided into types. This system of classification opens up a new method of studying streptococcal infections having relation to the variety of *Streptococcus* concerned.

(c) *Diseases Due to Filtrable Viruses*. Measles is a disease typical of this group, and therefore from time to time it has been a subject of investigation in the wards and laboratories of the hospital. A culture vaccine virus has been developed for the intradermal vaccination of human beings against smallpox, and investigations are now being made to determine the duration of immunity induced by it. The nature and antigenic components of the elementary bodies of vaccinia are being

investigated. A new virus has been recovered from the spinal fluid of two patients suffering from a non-bacterial meningitis; attempts are being made to ascertain its natural host and its importance as an incitant of disease in man. The cause of "postinfection encephalitis" has not been determined. Indeed, there is doubt whether the disease has been produced experimentally. In view of the fact that such an encephalitis sometimes occurs during or after antirabic vaccination in which considerable amounts of rabbit brain are injected into subjects, a number of macaque monkeys were given repeated intramuscular injections of fresh normal rabbit brain. In three sets of experiments some of the animals showed clinical evidences of involvement of the central nervous system and sections of their brains and cords revealed perivascular demyelination. Further work regarding the manner in which such lesions are produced is in progress.

2. Metabolic Diseases

At present metabolic studies in this hospital are being concentrated on problems developed in the study of nephritis. It has been found in this study that until more than 90 per cent of the functioning renal tissue has been destroyed no serious inconvenience may be felt, as long as complications are absent. Such complications are circulatory disorders, disturbances of mineral metabolism, anemia, malnutrition, and particularly edema, which is often the result of malnutrition. Success in controlling these complications frequently means prevention of years of invalidism, even when the progress of renal destruction cannot be stopped. After nephritis has become chronic, the best therapeutic aim apparently attainable at present is maintenance of activity and well-being as near as possible to the onset of terminal uremia, which does not occur until the glomeruli approach 95 per cent destruction. Achievement of this aim appears attainable in proportion to our understanding of the metabolic conditions. Studies are being carried out to clarify the problems of metabolism, nutrition, and renal physiology involved, and to provide methods for prosecution of these problems. In connection with these studies, investigations are being conducted on cases of "lipoid nephrosis."

Investigations are being made concerning the underlying factors in high blood pressure, not only when this occurs as a feature of nephritis, but also in other conditions, and especially in the forms known as essential and malignant hypertension. In the latter disease a form of therapy

which consists in altering the nervous control of the abdominal blood supply by section of certain nerves is being studied.

3. *Cardiovascular Diseases*

In the study of cardiovascular disease, the changes in the behavior and structure of the heart and blood vessels due to advancing age are being investigated. Studies have also been undertaken on the anatomy and on certain functions of the heart, such as its volume output of blood, and the mechanism of the distribution of heat in heart failure. More recently investigation of the function of the larger arteries, principally of their elastic properties throughout the aging process and in cardiovascular disease has been begun. Beside anatomical and physiological researches, pharmacological ones with drugs having an action on the heart and the blood vessels have from time to time received attention. The drug digitalis, which has so powerful an action on the heart, has been almost continuously under investigation. Recently a number of glucosides related to strophanthin have been isolated in pure form. The action of these is receiving systematic study. In this connection it has been found advantageous to conduct new investigations concerning the electrocardiogram, especially in relation to the structure and behavior of the T wave. Whenever suitable opportunity is afforded, experiments on animals are made, to further knowledge in ways which are not possible by clinical methods. When occasion presents itself, problems having to do with the functions of the lungs, especially in heart disease, are included in these researches. At the same time, the course of events in the heart in infectious diseases, such as rheumatic fever, is being analyzed.

4. *Blood Diseases*

Anemia. Certain clinical and experimental studies have indicated that in many chronic and intractable cases of anemia the underlying etiologic mechanism is complicated and may involve the lack of certain essential substances in the diet, or the inability of the body to absorb and utilize these substances. These dietary and gastrointestinal factors apparently play a rôle in the etiology, not only of the anemia of pellagra and sprue, but also of pernicious anemia and of idiopathic achlorhydric microcytic anemia. Experimental studies on animals are being made in order to learn more concerning the importance of these factors, and at the same time patients suffering from various forms of anemia are being investigated with special reference to determining the importance of

dietary control, and to analyzing the nature of the gastrointestinal dysfunction when it exists. Studies so far made indicate that therapeutic measures based on the new knowledge obtained are of much practical significance.

**The Department
of Animal and
Plant Pathology**

The Department was organized as the Department of Animal Pathology in 1916, and the laboratories were opened in 1917. From its beginning in 1917 up to the time of his retirement from administrative work in 1929, its Director was Dr. Theobald Smith. Dr. Smith was succeeded by Dr. Carl TenBroeck, who became Acting Director in 1929 and Director in 1930. In 1931 Plant Pathology, under the direction of Dr. Louis O. Kunkel, was added.

Animal Pathology

The purpose of the establishment of the Laboratory of Animal Pathology was the investigation of animal diseases in the broadest way, unaffected by immediately practical considerations. The original objective was the development of the comparative aspects of pathology by a study of disease in various animal species. A comparative pathology of this kind must be preceded by a continuously expanding, accurate knowledge of specific animal diseases. To bring this about, the Laboratory has been preoccupied from the start with such a study devoted thus far more or less exclusively to diseases affecting the more valuable food-producing domesticated animals, such as cattle, swine, sheep, and poultry.

In animal life, agents such as bacteria, protozoa, the filter-passing viruses, and higher animal parasites dominate the disease processes. Bacteriology and parasitology have, therefore, up to the present formed the major lines of research. Intimately associated with these are pathological conditions due to hereditary characters, to inadequate food rations, and to toxic substances in the food. To disentangle these conditions and to assign to each one its proper place in the production of disease will be the most important work of the near future.

At the present time the following subjects are under investigation.

Dr. TenBroeck and associates have been studying equine encephalomyelitis, a filtrable virus disease of mice, coryza of chickens and other animals, mastitis in cattle, and a streptococcus infection in guinea pigs.

Dr. Shope has under investigation infectious fibroma and papillomatosis of rabbits, pseudorabies, and swine influenza.

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Dr. Glaser and his associate have been studying parasitological and physiological processes in the lower animals, using for material protozoa, nematodes, and insects.

Dr. Stoll and his associate have continued their work on the inter-relations of parasitic worms and their hosts.

Drs. Wade H. Brown and Louise Pearce and their associates have continued the investigation of the relation of constitution to disease. Particular attention is now being given to factors influencing the reaction to natural infections and to hereditary peculiarities, especially those associated with functional disorders. In order to provide better facilities for the maintenance of the large animal population on which these studies are based, the work has been transferred from the Department of the Laboratories to the Department of Animal and Plant Pathology at Princeton.

Plant Pathology

Dr. Kunkel and associates are working on the relation of heat inactivation of aster yellows virus in the leafhopper vector, *Cicadula sexnotata*, to the epidemiology of aster yellows and on the movement of peach yellows virus in peach tissues. Chemical studies are being made on the tobacco-mosaic virus protein, the tobacco ring-spot virus protein, and the potato X-virus protein. Further work is in progress on the effects of genetic factors on hosts of tobacco-mosaic virus, on the classification and properties of strains of cucumber-mosaic virus, and on the antigenic reactions of various plant virus proteins. Further work is also being done on the physiology of root tissue cultures of tomato, tobacco, clover, radish, and sunflower and on the frenching disease of tobacco. The origin and stability of strains of the bacterium causing Stewart's disease of corn are being investigated. The effect of nutrition of the host on the pathogenicity of these strains is also under investigation.

BUILDINGS AND EQUIPMENT

New York City The Departments of the Laboratories and the Hospital are housed in a group of buildings situated in New York City, on the cliff overlooking the East River and lying between 64th and 68th Streets (see frontispiece). This location ensures excellent light and air, and greater quiet than could be secured in the more ac-

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cessible parts of the city. The group consists of three laboratory buildings, a main hospital building, an isolation pavilion, a library building, an animal house, a building combining laboratory and animal house facilities, and a central power house. All these buildings are connected by service tunnels.

Of the laboratory buildings, the *Central Laboratory* was first erected. It was occupied in 1906, and contains laboratories and administration offices. It covers an area of 136 feet by 60 feet and has five main floors, a light basement, and a suite of surgical rooms and kennels on the roof. The second, or *Middle Laboratory* was opened in 1916. It contains six floors and two basements and covers an area of 150 feet by 62 feet. The third laboratory building, known as the *North Laboratory*, occupies a ground area of 197 feet by 60 feet, and has seven floors and two basements. At the present time four floors are occupied for general and laboratory purposes; unoccupied laboratory space has been left free of partitions pending future development.

All the above buildings are fireproof and so constructed that all interior partitions may be altered or removed as occasion requires. Provision is made for supplying hot and cold water, steam, gas, compressed air, suction, and electricity to all laboratories. Numerous cold rooms refrigerated by means of a brine circulation system, and also incubator rooms, are located in central positions in the buildings and form part of their permanent equipment. Pipes, drains, vents, and conduits are either exposed or carried in accessible ducts wherever possible, to facilitate inspection or alteration. In these buildings, largely devoted to laboratories, are also an assembly room and quarters for various auxiliary services.

The *Hospital*, opened in 1910, consists of a main structure 165 feet long by 54 feet wide, and an *Isolation Pavilion* 78 feet long by 44 feet wide. The main building has eight main floors, with two additional basement floors in the wall of the East River cliff. It is connected by a covered bridge at the third floor level with the Isolation Pavilion, which is a four story and basement building containing an isolation ward, laboratories, an operating room, and living quarters for the Hospital personnel. The first floor of the hospital provides for administration and reception rooms, and for quarters of the resident staff. The second floor is entirely occupied by nurses' quarters. The third floor contains a number of small rooms for the accommodation of one or two patients each, with a solarium at its easterly end. The fourth and fifth floors are arranged for ward

patients. On the fourth floor is situated the diet kitchen which is arranged for special dietary studies. On the same floor there has been built a chamber in which the oxygen content of the air can be accurately regulated. This chamber will accommodate two patients and is being used for the study of the therapeutic effects of oxygen in patients suffering from pneumonia or heart disease. The hospital is so planned that the staff and nurses may give an unusual amount of attention to each of a small number of patients. The general wards contain six to eight beds each and the open air balconies at each end of the building are large enough to accommodate all of them. The sixth, seventh, and eighth floors are devoted to laboratories, including an electrocardiograph station.

The *Library Building*, covering an area 89 feet by 70 feet, is located to the east of the Central Laboratory. It has two high stories above ground and three levels of basement floors below. The library is located on the top floor, and with a mezzanine has a capacity of 38,500 volumes. There is also on the lower levels additional storage space to provide for future expansion. On the ground level is located a room with a floor space of 72 feet by 35 feet, which serves as a staff dining room and assembly hall. There are also on this floor a small formal dining room, and a dining room for women employees. In the basement levels are located a kitchen, stack space for the storage of publications of the Institute, and other rooms reserved for general purposes.

The *Animal House*, which occupies a building by itself adjoining the Middle Laboratory at the east, has a recently completed extension to the north which is only partially occupied. The older part of the animal house is six stories in height and occupies an area of 77 feet by 62 feet. The new section occupies an area of 96 feet by 83 feet and contains four floors. In these buildings are kept small animals such as rabbits, guinea pigs, monkeys, etc., as well as sheep, goats, and horses. Their special equipment includes cold rooms for serum and aquaria, rooms for the storage and preparation of foods, the sterilization of cages, the incineration of refuse, and a garage. All walls are finished so that they can be washed down, and cages are suspended from the ceiling on metal racks rather than being placed on the floor.

The *Low Laboratory Building*, constructed as a partly detached wing at the east of the North Laboratory, is 94 feet by 60 feet in area. It is a four story building, with the foundation planned to carry additional floors to the height of the main laboratory.

A *Power House* built and operated by the Institute provides the buildings with heat, light, electric power, compressed air, refrigeration, suction, and filtered water.

A *Greenhouse* has been erected on the grounds of the Institute in which various plants can be grown under controlled conditions.

Children's Gardens and Playgrounds. The founder of the Institute has made generous provision for its future physical growth by the gift of land lying between York Avenue and the East River water-front, which, including a recent addition, now extends from 63rd to 68th Streets. Unoccupied portions of this property adjoining York Avenue, have for some years been placed at the disposal of the New York Plant and Flower Guild, for maintenance of Children's Gardens. In 1920 the entire York Avenue frontage from 64th to 67th Streets was devoted to this purpose. Pending the development of the work of the Institute the Trustees have arranged for temporarily assigning the unused portion of the northerly plot, between 67th and 68th Streets, to such form of park and playground activities as the site and neighborhood conditions may invite. Control, administration, and support of this playground and its equipment were assumed in June, 1921, by the Lenox Hill Neighborhood Association of New York.

**Near Princeton,
New Jersey** In the autumn of 1914 the Institute acquired for the Department of Animal Pathology a tract of land, which, with subsequent additions, now comprises approximately 780 acres, situated on the easterly side of Carnegie Lake, opposite Princeton, in the township of Plainsboro.

Those general features of the building plan which have been carried out (see frontispiece) are as follows:

1. A *Laboratory Building* which is equipped for work in pathology, bacteriology, parasitology, biochemistry, and allied subjects. This contains the library, general offices, and assembly room. It is of hollow tile, 140 feet long by 37 feet wide with a wing 62 feet by 37 feet, and is placed on the highest part of the land, facing Princeton and overlooking Carnegie Lake. It is three and a half stories high, the floor of the first being below ground level. The equipment is such as to be easily changed as new problems are taken up. The furniture is largely movable, except in the chemical laboratory. It is furnished with the modern requirements of biological laboratories, such as hot and cold water, steam, gas, electricity, refrigeration, pressure, and suction.

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2. *Animal Buildings* which are designed for the maintenance of large and small animals. Two of the buildings are divided into units in which animals may be kept isolated for the study of infectious diseases. Each unit contains hot and cold water, steam, gas, and electricity, and the floor is drained. The stall partitions are removable. Provisions are made for the changing of the outer garments and footwear of attendants.

A third building, erected in 1917 for the production of curative sera to meet the urgent requirements of the war, has been remodeled to provide isolation units for the housing and observation of large animals. A fourth unit 235 feet long and 39 feet wide was completed in 1928. This structure conforms in general architecture with the existing animal houses but differs in that space is provided for the development of laboratory suites.

3. *Combination Laboratory and Animal Unit*, in three connected sections, two of which are 131 feet long by 36 feet wide, and the other approximately 42 feet long by 36 feet wide, for the housing of a breeding and experimental animal colony, and for laboratories, required for studies on constitution. The buildings are one story high and are of a sectional type constructed almost entirely of metal. They are fireproof, well insulated and ventilated, and are built in such a way that they can be taken down and reassembled. Laboratory services, heat, and light are supplied from the general heating and power plant.

4. A *Greenhouse* 34 feet long by 20 feet wide is provided adjacent to and at the rear of the laboratory building for study of diseases of insects and other problems requiring greenhouse facilities. It is equipped with thermostatic control, gas, electricity, and compressed air.

5. *Outdoor Enclosures* for large and small animals under experimentation.

6. A *Power House* which supplies the necessary heat, electricity, refrigeration, and water from two deep driven wells.

7. An intermittent filtration *Sewage Plant* to provide for the safe disposal of fluid wastes from laboratory and animal buildings.

8. *Farm*. As a necessary adjunct to the scientific work conducted by the laboratories a considerable part of the land is under cultivation, requiring an organization and equipment of farm buildings sufficient for its needs.

9. *Staff and Employees' Houses*. The location of the Department being remote from thickly settled sections of the town, it has been necessary

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to develop the community by the erection on the Institute property of a number of homes which are rented at moderate cost to the staff and employees.

10. *Theobald Smith House.* The Director's house occupied by Dr. Theobald Smith up to the time of his retirement has been remodeled inside and furnished for use as a Staff House, thus providing dining space and facilities for recreation for the general use of the scientific staff, and living rooms for a small number of the staff and guests.

11. *Laboratory Buildings for Plant Pathology.* New buildings for plant pathology were constructed and occupied in the fall of 1932. The main building measuring 143 by 39 feet is of the same type as the laboratory building for animal pathology. It is equipped with lean-to greenhouses opening directly from the laboratories at each end of the basement, and with an underground constant temperature cellar. To the rear of the building, and connected with it by a glass-enclosed corridor are four greenhouses, each 66 feet long by 25 feet wide, four greenhouses each 66 feet long by 18 feet wide, and a potting shed with sterilizing facilities. There are in addition twelve garden frames, each 30 feet long by 7 feet wide, located on either side of the connecting corridor. All of these buildings are served by the present central heating and power plant.

PUBLICATIONS

In order to assist in the dissemination of the reports of scientific investigations conducted at The Rockefeller Institute, and elsewhere, the following publications are maintained by the Institute.

The Journal of Experimental Medicine. This journal, edited by Simon Flexner, Peyton Rous, and Herbert S. Gasser, is designed to cover the field of experimental medicine. It is a medium for the publication of investigations conducted at the Institute, or elsewhere under its auspices, and it also accepts contributions of a suitable character from other sources. It is issued monthly, two volumes appearing in a year. During the last few years, each volume has averaged more than 900 pages, with many plates and text-figures. INDEXES for Volumes 1 to 20 and Volumes 21 to 40 have been published.

Contributions should be sent to the editors of THE JOURNAL OF EXPERIMENTAL MEDICINE. They should be limited preferably to twenty printed pages, not counting the space occupied by illustrations.

Articles which exceed in length twenty-five printed pages will be returned to the authors in order that their contents may be reduced to this maximum. Authors receive 100 reprints of their papers free of charge; additional copies may be obtained at cost.

The Journal of General Physiology. This journal, the first number of which appeared in 1918, was founded by Jacques Loeb, and is edited by W. J. Crozier (Harvard University), John H. Northrop (The Rockefeller Institute), and W. J. V. Osterhout (The Rockefeller Institute). It is issued bimonthly, one volume of about 600 pages appearing in a year, and is devoted to the interpretation of vital phenomena on the basis of the physical and chemical constitution of living matter.

The editors invite contributions relating to the physicochemical explanation of life phenomena, in whatever field of science they may originate. These should be sent to the editors of THE JOURNAL OF GENERAL PHYSIOLOGY, York Avenue and 66th Street, New York, N. Y. The papers should be limited preferably to twenty printed pages, not counting the space occupied by illustrations. Authors receive 100 reprints of their papers free of charge; additional copies may be obtained at cost.

Studies from The Rockefeller Institute for Medical Research. Results of investigations made under the auspices of, or with the cooperation or support of The Rockefeller Institute are first reported in a variety of publications. These papers are ultimately assembled in volumes designated STUDIES FROM THE ROCKEFELLER INSTITUTE FOR MEDICAL RESEARCH, which appear serially, but at irregular intervals. The first volume was published in 1904, and in December, 1937, the one hundred and fifth volume appeared. Each volume contains about 600 pages, and is indexed. The number of volumes of STUDIES appearing annually averages four. INDEXES for Volumes 1 to 25 and Volumes 26 to 50 have been published.

Monographs. The MONOGRAPHS consist of scientific papers which are so extensive, or which require such elaborate illustration, that they are unsuitable for current periodical issues of journals. They are published at irregular intervals, determined by the available material on hand. In a small number of instances the results of investigations carried out by other laboratories have been included in this series. Twenty-three MONOGRAPHS have appeared during the years 1910 to 1937. The publication of new MONOGRAPHS is advertised on the covers

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