

ANNUAL ANNOUNCEMENT
of the
Biological Laboratory
of the
LONG ISLAND BIOLOGICAL ASSOCIATION



COLD SPRING HARBOR
LONG ISLAND, NEW YORK

Forty-Fifth Year

1 9 3 4

THE LONG ISLAND BIOLOGICAL ASSOCIATION

President

Arthur W. Page

Vice President and Treasurer

Marshall Field

Vice President

W. J. V. Osterhout

Secretary

Charles B. Davenport

BOARD OF DIRECTORS

To serve until 1937

| | | |
|--------------------|-------|--|
| C. B. Davenport | ..... | Carnegie Institute of Washington |
| Reginald G. Harris | ..... | The Biological Laboratory |
| Henry Hicks | ..... | Westbury, N. Y. |
| Stuart Mudd | ..... | University of Pennsylvania, Medical School |
| Acosta Nichols | ..... | Oyster Bay, N. Y. |
| John K. Roosevelt | ..... | Glen Cove, N. Y. |

To serve until 1936

| | | |
|--------------------------------|-------|---------------------------|
| W. H. Cole | ..... | Rutgers University |
| W. J. Crozier | ..... | Harvard University |
| Oliver B. James | ..... | Cold Spring Harbor, N. Y. |
| Mrs. Van Santvoord Merle-Smith | ..... | Oyster Bay, N. Y. |
| W. J. V. Osterhout | ..... | Rockefeller Institute |
| Charles R. Stockard | ..... | Cornell Medical College |

To serve until 1935

| | | |
|-----------------------|-------|---------------------------|
| Charles M. Bleecker | ..... | Cold Spring Harbor, N. Y. |
| Marshall Field | ..... | Huntington, N. Y. |
| Ross G. Harrison | ..... | Yale University |
| Wilton Lloyd-Smith | ..... | Huntington, N. Y. |
| Arthur W. Page | ..... | Cold Spring Harbor, N. Y. |
| William K. Vanderbilt | ..... | Centerport, N. Y. |
| H. E. Walter | ..... | Brown University |

To serve until 1934

| | | |
|-----------------|-------|---------------------------|
| Robert Chambers | ..... | New York University |
| S. R. Detwiler | ..... | Columbia University |
| John Schiff | ..... | Oyster Bay, N. Y. |
| W. W. Swingle | ..... | Princeton University |
| Henry C. Taylor | ..... | Cold Spring Harbor, N. Y. |
| Willis D. Wood | ..... | Huntington, N. Y. |

LONG ISLAND
BIOLOGICAL ASSOCIATION
Incorporated 1924

ANNUAL ANNOUNCEMENT
of the
BIOLOGICAL LABORATORY
Founded by JOHN D. JONES, 1890

COLD SPRING HARBOR
LONG ISLAND, NEW YORK

Forty-Fifth Year

1 9 3 4

SCIENTIFIC COMMITTEES

Scientific Advisory Committee

| | | |
|------------------------|--------------------|---------------------|
| J. H. Bodine, Chairman | S. R. Detwiler | H. M. Parshley |
| Harold A. Abramson | Hugo Fricke | Eric Ponder |
| Edgar Allen | Robert Gaunt | William Salant |
| Justin Andrews | Ross G. Harrison | Asa A. Schaeffer |
| Robert Chambers | A. J. Grout | Christianna Smith |
| Barnett Cohen | I. S. Kleiner | Herman T. Spieth |
| Kenneth S. Cole | S. I. Kornhauser | Charles R. Stockard |
| William H. Cole | Duncan A. MacInnes | W. W. Swingle |
| Henry S. Conard | Stuart Mudd | I. R. Taylor |
| W. J. Crozier | Hans Mueller | H. E. Walter |
| Alden B. Dawson | J. S. Nicholas | L. T. Webster |
| Charles B. Davenport | W. J. V. Osterhout | |

Advisory Committee in Physics and Physiology

W. J. V. Osterhout, Chairman J. H. Bodine W. J. Crozier

THE LABORATORY STAFF

(See also Cold Spring Harbor Symposia on Quantitative Biology, Page 8)

*Reginald G. Harris Director, The Biological Laboratory

*Hugo Fricke The Biological Laboratory
Biophysics

*A. J. Grout The Biological Laboratory

~~W. W. Swingle~~ ~~Professor of Zoology, Princeton University~~
G.W. Corner Bryology
School of Medicine, Univ of Rochester
Surgical Methods in Experimental Biology

H. S. Conard Professor of Botany, Grinnell College
Plant Sociology

S. I. Kornhauser Professor of Anatomy and Embryology
University of Louisville, Medical School
Field Zoology

I. R. Taylor Assistant Professor of Biology, Brown University
General Physiology

Asa A. Schaeffer Professor of Biology, Temple University
Research in Protozoology

Charles B. Davenport Director, Department of Genetics
Carnegie Institution of Washington
Lecturer

W. J. V. Osterhout Rockefeller Institute for Medical Research
Chairman Advisory Committee on Physiology and Biophysics

J. H. Bodine Professor of Zoology, University of Iowa
Chairman Scientific Advisory Committee

*Eugene R. Brownscombe The Biological Laboratory
Chemist

*Howard J. Curtis The Biological Laboratory
Physicist

Kenneth S. Cole Assistant Professor of Physiology
College of Physicians and Surgeons
Lecturer in General Physiology

Harold A. Abramson Department of Biochemistry
College of Physicians and Surgeons
Associate in General Physiology

* Member of All-Year Staff.

- Herman T. Spieth ..Dept. of Biology, College of the City of New York
Associate in Field Zoology
- Louisa M. Sargent Assistant Professor of Botany, Grinnell College
Associate in Plant Sociology
- Bert Cunningham Professor of Biology, Duke University
Research
- William M. Parkins Princeton University
Assistant in Surgical Methods in Experimental Biology
- Edward McC. Walzl The Johns Hopkins University
Assistant in Physiology
.....
Assistant in Surgical Methods in Experimental Biology
- *D. M. Gallagher Radio Engineer
- *Catherine R. Brown Secretary
- *Mrs. E. M. Chouteau Librarian
- James H. Birnie Brown University
Chemical Supplies
- *Ernest Victoreen The Biological Laboratory
Instrument Maker
- *Edward Deery Glassblower (Part-time)

* Member of All-Year Staff.

HISTORICAL SKETCH

The Biological Laboratory was established at Cold Spring Harbor in 1890 as a department of the Brooklyn Institute of Arts and Sciences. Prominent among the founders and early patrons of the Laboratory were Professor Franklin W. Hooper, Director of the Institute, who, through his acquaintance with Professor Agassiz's station at Penikese Island, immediately recognized the advantages of Cold Spring Harbor for the location of a permanent biological laboratory. Mr. Eugene G. Blackford, fish commissioner of New York and the first president of the Board of Managers of the Laboratory, gave much thought and effort, while Dr. Bashford Dean, the first director of the Laboratory, and his lifelong friend, William E. Jones, interested the latter's uncle, Mr. John D. Jones, in the newly founded station.

In 1894 Mr. Jones (in collaboration with his brother, Walter R. T. Jones) erected, on land provided by him for the use of the station, a building (now called John D. Jones Laboratory) to which the Laboratory was immediately transferred from the previous cramped quarters of the State Fish Hatchery. From this modest beginning the Biological Laboratory has steadily grown until its present equipment includes two laboratory buildings for use throughout the year, three laboratory buildings for summer use, Blackford Memorial Hall, seven other dormitory buildings and cottages, five of which are heated for use throughout the year, and four of which are provided with small apartments.

Prof. Herbert W. Conn was Director of the Laboratory from 1891-1897. From 1898 to 1923, Dr. Charles B. Davenport was the Director, being aided in the later years of this period by Prof. H. E. Walter of Brown University who was appointed assistant director. In addition to his splendid work in behalf of the Laboratory, Dr. Davenport played a leading part in influencing Carnegie Institution of Washington to establish a station for Experimental Evolution at Cold Spring Harbor in 1904, and was the chief factor in the foundation and location of the Eugenics Record Office nearby in 1910.

During the thirty-four years of its existence previous to 1924 the Biological Laboratory had been instrumental in training over eighteen hundred biologists, while many scientific investigations of note had been carried on by investigators in residence during the summer.

In 1924 the Laboratory was transferred from the Brooklyn Institute of Arts and Sciences to the Long Island Biological Association. With this transfer the activities of the Laboratory were placed in the hands of biologists and neighbors of the station. This action has resulted in an increase in financial support which has permitted important improvements in facilities and equipment for scientific work, and a marked emphasis upon research not only during the summer but throughout the year. The growth of the Laboratory in this respect was indicated by the formation of an all-year laboratory for biophysics in 1928.

The Laboratory's interest in a closer liason between biology and the so-called basic sciences was given further expression in 1933 with the inauguration of a new method in biological research, namely conference-symposia, now known as Cold Spring Harbor Symposia on Quantitative Biology.

Meanwhile notable additions have been made to the Laboratory's assets since its transfer to the Association. These include the purchase of over thirty-two acres of land with a large dwelling house and with frontage on Cold Spring Harbor; the erection of a small new laboratory building used as a general laboratory; the purchase of the Stewart cottage; the gift of the George Lane Nichols Memorial Laboratory; the gift of the Doctor Walter B. James Memorial Laboratory; the purchase and remodelling for dormitory use of the old Cold Spring Harbor fire house; the erection of two small cottages, and the purchase of equipment now valued at over fifty thousand dollars.

THE BIOLOGICAL LABORATORY IN 1934

The Biological Laboratory exists for the advancement of biology in the most fundamental sense. To this end it promotes biological research at all times (a) through a permanent staff and through guest investigators resident throughout the year, (b) through welcoming investigators who wish to make use of the facilities of the Laboratory during any period, especially during the summer, (c) through holding each summer conference-symposia on quantitative biology, and (d) through giving advanced instruction during the summer to students of biology.

The active promotion of research throughout the year gives an atmosphere to the whole Laboratory which the investigator and the student find agreeable and stimulating. The permanent work has been arranged with a view to its value to the summer work as well as its intrinsic value.

The staff of the Laboratory is so composed that various members are eminently fitted to give advice in a wide range of research including ecology, physiology, embryology, endocrinology, biophysics, biochemistry, anatomy, protozoology, entomology, histology, and genetics, in plants and in various groups of animals from protozoa to mammals. Advanced students of approved standing are allowed to choose the investigator with whom they will work. They may continue to work upon problems which they have already started or, after appropriate conferences, begin work upon new problems. While such work will be carried on under the guidance of individual members of the staff, the student will find the tradition of the Laboratory such that it is always possible and agreeable to approach all members of the staff in seeking advice concerning his problem.

A number of evening lectures will be given, open to the members of the Laboratory, of the L. I. Biological Association, and of the Carnegie Institution. These lectures are given by the members of the Staff and by visitors from various other institutions. The lectures are intended to be of general biological interest and will be fully illustrated.

Special attention is called to the fact that the Laboratory is eager to cooperate with persons having sabbatical leave, to the end that such leave may be of the greatest possible advantage to themselves and to biology. The Laboratory is ready not only to place its facilities at the disposal of such biologists who wish to carry on research, but to give supplementary financial support during the period of residence, whenever it is desirable and necessary.

COLD SPRING HARBOR SYMPOSIA ON QUANTITATIVE BIOLOGY

As a part of its policy of fostering a closer relationship between biology and the basic sciences, the Laboratory invites each summer a group of mathematicians, physicists, chemists and biologists, actively interested in a specific aspect of quantitative biology, or in methods and theories applicable to it, to carry on their work, to give lectures and to take part in symposia at the Laboratory.

A given group in residence is necessarily relatively small, since large attendance would interfere with certain unique advantages such as the present informality and freedom of discussion, but the members of the group are chosen with the aim that every important aspect of a particular subject be adequately represented from the physical and chemical, as well as the biological point of view; and that the whole span of a subject, from theories of physics to application to medicine, be covered. In addition, workers, other than those forming the group in residence during the summer, are invited to take part in the symposia in connection with the group meeting.

The conference-symposia of 1934 will center about **Certain Aspects of Growth and Development**; and while plans are still incomplete, as this announcement goes to press, we already can definitely list some of the men who will take part. Some of these (indicated by asterisk) will be in residence at Cold Spring Harbor during July and others for a short time only.

Dr. Felix Bernstein, formerly Director of the Institute for Mathematical Statistics of the University of Goettingen, now at Columbia University.

*Dr. George L. Clark, Professor of Chemistry, University of Illinois.

Dr. W. J. Crozier, Professor of Physiology, Harvard.

*Dr. Charles B. Davenport, Director, Department of Genetics, Carnegie Institution of Washington.

*Dr. M. Demerec, Investigator, Department of Genetics, Carnegie Institution of Washington.

Dr. S. R. Detwiler, Professor of Anatomy, Columbia University College of Physicians and Surgeons.

*Dr. Hugo Fricke, Biological Laboratory.

Dr. John Gowen, Rockefeller Institute, Princeton.

Dr. Frederick S. Hammett, Director Marine Experimental Station of the Lankenau Hospital Research Institute, North Truro, Cape Cod, Massachusetts.

*Dr. Otto Rahn, Professor of Bacteriology, Cornell.

Dr. Nicolas Rashevsky, Research Physicist, Westinghouse Electric and Manufacturing Company, Pittsburgh.

Dr. C. R. Stockard, Professor of Anatomy, Cornell Medical School.

*Dr. Victor C. Twitty, Assistant Professor of Zoology, Stanford University.

Dr. Sewall Wright, Professor of Zoology, University of Chicago.

Dr. Ralph W. G. Wyckoff, Associate Member, Biophysics, Rockefeller Institute.

In order to make available to all workers the methods and ideas which are set forth in the group meetings from year to year, the lectures, symposia and essential parts of the discussions are being published as monographs, under the title: Cold Spring Harbor Symposia on Quantitative Biology, of which Volume I appeared as a result of the conference-symposia of 1933. (Copies of Volume I may be purchased from the Laboratory.)

The conference-symposia are an experiment in scientific procedure. Participants have already found them to be of such value, however, as to indicate that this new method can contribute to advance in biology.

Investigators interested in any given symposium, or group of symposia, may attend and take part in the discussion of papers without further invitation. A program of the symposia for 1934 will be sent to such persons upon request. Those planning to stay over night at the Laboratory should make arrangements for rooms in advance.

GENERAL

Situation. The Biological Laboratory stands on the shore of a harbor five miles long and hardly a mile wide—a deep fiord, stretching back into the land and limited on each side by a plateau. The harbor is not exposed to the surf of the ocean, with the result that marine animals and plants grow here in great numbers, in a way which is impossible upon an unsheltered beach. The inhabitants of rocks, of gravelly and shelly and muddy bottoms, all live here in profusion. Combined with these marine conditions there is an abundance of fresh water—a chain of small lakes, numerous small ponds and springs. Woods and uplands complete the unusual series of habitats.

The Laboratory is situated in a center of biological activity that is maintained throughout the year. The State of New York maintains here its largest fish hatchery, where many millions of brook trout and tom cod are hatched annually. The Department of Genetics, Carnegie Institution of Washington, with its library of 14,000 volumes, and a permanent staff of research associates and assistants, is located on the grounds adjoining those of The Biological Laboratory. The Eugenics Record Office, also of the Carnegie Institution of Washington, devoted to the collection and study of data on human heredity, is located nearby.

Buildings. There are five laboratory buildings, two of which, the Doctor Walter B. James Memorial Laboratory for biophysics and the George Lane Nichols Memorial Laboratory, are heated and in use throughout the year. Three of the five laboratories are equipped with running sea water, the source and piping of which insure freedom from toxic substances. The collecting of experimental material from the floor of the Sound has been considerably improved through arrangements with local oyster boats, whereby their dredging and collecting facilities supplement those of the Laboratory. Of the eight dormitories and dwelling houses, five are centrally heated.

Instruction. The Laboratory offers courses of instruction during the summer, designed for the training of investigators and others who intend to make primary use of pure or applied biology in the professions which they plan to enter. The taking of examinations and the assignment of grades is optional with the student. The Laboratory will certify to the satisfactory completion of the work of any course upon the recommendation of the instructor of the course.

Admission. Application for admission to the Laboratory should be made on a form which may be obtained from the Laboratory upon request. New applicants must present supporting statements from their former or present instructors in biology. Applications should be made before May 15th, on which day notices of the action taken on all applications will be sent to the applicants. Applications for admission received subsequently will be acted upon immediately.

Rooms. Single and double rooms in the dormitories cost \$3.00 to \$4.00 per person per week, payable in advance either by the season or by the week. Rooms are reserved in the order of application, accompanied by a fee of \$5.00 applicable to the student's account. In all cases in which applications are not accepted by the Laboratory the deposit will be refunded. In other cases the deposit will not be refunded after May 10.

A number of small apartments have been arranged which are available summer or winter. At all times it is wholly optional whether workers eat at the general dining room or keep house. In addition to the living accommodations available at the Laboratory, a number of building lots are procurable, while frequent bus service to Huntington makes it practicable for investigators and their families, who so desire, to live in this pleasant town while working at the Laboratory. Huntington is the business center of this region and provides very adequate shops of many kinds. Arrangements for apartments and cottages may be made by correspondence.

Board is furnished to investigators and their immediate families and to students only, for \$7.75 per week (at any time throughout the year) payable in advance either for the season or by the week. Board may be furnished to relatives or friends visiting students, if due notice is given, at \$1.50 per day. A limited number of students may defray the cost of board by waiting on tables.

Tuition and Fees. Tuition including one course of instruction, the general lectures, and the use of the privileges, is \$75. Students who make use of the Laboratory microscopes will be charged \$6.00 extra. Research table \$50. Private laboratories \$75 to \$200 per season. Institutions may secure research facilities to be available at any time of the year by the subscription of \$100 per person per year. Tuition and fees are payable in advance at registration.

Scholarships. Besides the various scholarships offered by colleges and universities to students in their biological departments and applicable to this Laboratory, the following scholarships have been established:

The John D. Jones scholarship, donated by the Wawepex Society in memory of the founder of the Society and of the Laboratory. Given annually to one or more advanced students of biology. Stipend \$250 or a part thereof.

The Temple Prime scholarship established by Miss Cornelia Prime, of Huntington, in memory of Temple Prime, a distinguished student of the mollusca. Amount \$100.

The Dorothy Frances Rice scholarship, established by Mr. Oran W. Rice, in memory of Dorothy Frances Rice, a former student at the Biological Laboratory. Applicable to a woman student at the Laboratory, "preference being given to students working in the botanical sciences". Amount \$100.

Application for any of these scholarships, supported by letters and other data, is to be made to the Director of the Laboratory before April 15th, on or about which day award is made.

How to Reach the Laboratory. The Laboratory lies on the north shore of Long Island about thirty miles from Manhattan, (Route 25A), and about fifteen miles beyond the nearest part of the boundary of Greater New York. It is two miles from the village of Huntington and about three miles from Oyster Bay. Persons coming from the West and South will find the P. R. R. the most convenient, since direct connection is made at the 33rd St. terminal in Manhattan with trains to Cold Spring Harbor on the Long Island Railroad, in some cases changing cars at Jamaica. Those arriving at the Grand Central Terminal may go by subway to the Pennsylvania-Long Island station at West 33rd Street and Seventh Avenue. From the station at Cold Spring Harbor a short bus ride (25c) brings one to the Laboratory. During the summer months there are ten or more trains a day from the city. Ferries across the Sound from Bridgeport to Port Jefferson, and from Stamford, Conn., to Oyster Bay, Long Island, are usually operated daily during the summer time. Two trains a day from New England enter the Pennsylvania Station, Manhattan.

BIOPHYSICS

All Year Staff

Hugo Fricke, Biophysicist in charge.
Eugene R. Brownscombe, Chemist.
Howard J. Curtis, Physicist.
D. M. Gallagher, Radio Engineer.
Ernest Victoreen, Instrument Maker.
Edward Deery, Glassblower (part time).

Cooperating Investigators

M. Demerec, Investigator, Department of Genetics, Carnegie Institution of Washington.

Eric Ponder, Professor of Physiology, New York University.

The all year research in biophysics is concerned with a systematic study of the chemical action of X-rays, dosage measurements, soft X-ray photography, and, with the cooperation of Dr. M. Demerec of Carnegie Institution of Washington, the genetic effects of very soft X-rays; the power factor, and the dielectric constant of the membrane of the red corpuscles and of different proteins in aqueous solution, the impedance of artificial membranes, and, with the cooperation of Prof. Eric Ponder of New York University, hemolysis.

The excellently equipped biophysical laboratory provides an unusual opportunity for the many biologists, both students and investigators, who are interested in the possibilities of applying physical methods to biological problems, to become acquainted with such methods, and with machines, their construction and uses.

The laboratory contains shops for mechanical, electrical and glass work as well as a laboratory for X-ray investigations, a chemical laboratory, a laboratory for work with electrical currents of high frequency, a library, and a purchasing office. The equipment includes apparatus both for the technical shops and for the scientific laboratories. Larger pieces of apparatus within this category are: equipment for high vacuum research; a 140 k. v. generating outfit for X-ray work; apparatus for soft X-ray photography; apparatus for measuring X-ray dosage in the international r-unit; apparatus for the measurement of electrical resistance and capacitance of biological cells at different frequencies; equipment for ultra-violet work.

A very limited number of advanced students are accepted annually to carry on research under Dr. Fricke's direction during the summer.

FIELD ZOOLOGY

June 18 — July 28

This course is intended for college students who have already pursued elementary courses in biology, and for recent graduates interested in biological problems. The course has two objects in view: first, to acquaint students with the materials for the study of biological problems in their natural habitats; and second, to introduce the students to problems of investigation at a place where the material can be obtained fresh, and worked upon under optimum conditions.

For carrying out the first of these objects, a number of field trips will be taken to a wide variety of habitats such as Cold Spring Harbor offers so splendidly. The time will be divided so as to give opportunity for the study of marine, fresh water and land life. The principal objects of these trips will be a consideration of the organisms in relation to their environment, although some time must necessarily be spent upon collection and identification of specimens to make each student familiar with the fauna.

The second object of the course will be accomplished by each student's carrying on a problem selected by him from a wide range of suggested subjects and the material available. Approximately one-half the time should be spent on this investigation, the student becoming familiar with methods of biological research and the use of the library in looking up literature on his particular problem. The course is limited to 15 students. If possible, each student should bring a compound microscope, a binocular microscope, or both, and a set of dissecting instruments. Drs. Kornhauser and Spieth.

GENERAL PHYSIOLOGY

June 20 — July 31

This course includes lectures and laboratory work bearing on the fundamental phenomena in general physiology with considerable emphasis placed on the physico-chemical and quantitative aspects. It is offered to advanced undergraduate and graduate students and is planned to meet the needs of those with or without previous training in physiology.

Lectures are given daily on week days at 9:00 A. M. by the members of the staff. Special lectures are frequently given by visiting physiologists. The laboratory work continues from 10:00 A. M. to 12:30 P. M. and from 2:00 P. M. to 4:30 P. M., except on Saturdays and Sundays. On Saturdays the work continues until noon.

The main phases of general physiology and their applications to medical problems to be dealt with by lecture and laboratory work this summer are:

1. Under the direction of Dr. H. A. Abramson—
 - Electrophoresis
 - Electrosmosis
 - Streaming potentials
 - Surface conductance
 - Injury potentials
 - Membrane potentials
 - Surface tension and surface chemistry
 - Viscosity
 - Osmosis and osmotic pressure
2. Under the direction of Dr. Hugo Fricke—
 - X-ray apparatus
 - X-ray dosimetry
 - X-ray photography
 - Ultra violet dosimetry
3. Under the direction of Dr. Kenneth S. Cole—
 - Nerve excitation
4. Under the direction of Dr. I. R. Taylor—
 - Hydrogen Ion Activity
 - Bicolorimeter measurements
 - Hydrogen electrode measurements
 - Quinhydrone electrode measurements
 - Glass electrode measurements
 - Buffer solutions
 - Physiological effects of ions
 - Electrical conductivity
 - Cell permeability
 - Gaseous exchange; microrespirometers

Physiological effects of high frequency fields and currents
Temperature effects and measurements
Colloidal phenomena
Oxidation-reduction potentials

Ordinarily students are advised to undertake the regular laboratory work offered during their first season in the course without commencing research problems. However, certain phases of general physiology which are open to investigation are called to the attention of the group and students are encouraged to return a second summer to carry on research. The facilities of The Biological Laboratory and the advice of the staff are at the disposal of those who wish to undertake investigations.

A considerable amount of fine equipment is available for the use of the group engaged in the work of the course.

It is recommended that each student bring a compound microscope. The number of students is limited to 15.

Dr. Taylor, Dr. Abramson, Dr. Cole, Dr. Fricke, Mr. Walzl.

SURGICAL METHODS IN EXPERIMENTAL BIOLOGY

June 20 — July 31

This is primarily a course for advanced students who wish to obtain knowledge of mammalian surgical technique as an aid in research in experimental biology and physiology. The first two-thirds of the course is concerned solely with operative procedure; the last third of the work is devoted to the study of special physiological methods. The number of students is limited to 12. The hours are from nine A. M. to one P. M. and from two to four P. M. daily, except Saturday afternoon and Sunday. Opportunities and encouragement are given for students to engage in research. The scope of the work is indicated in the following outlines:

1. Use of anaesthetics
2. Preparation of animals for operation
3. Methods for obtaining blood and for injecting materials, use of catheters, stomach tubes, vermifuges, etc.
4. Post-operative care and therapeutic treatment of animals
5. Operations
 - A. Devocalization
 - B. Nephrectomy
 - C. Ovariectomy
 - D. Castration
 - E. Splenectomy
 - F. Thyro-parathyroidectomy
 - G. Adrenalectomy
 - H. Technique of tissue transplantation
 - I. Pancreatectomy
 - J. Parathyroid transplantation
 - K. Gastro-intestinal work
 - a. Gastroduodostomy
 - b. Gastro-enterostomy
 - c. End to end anastomosis of intestine
 - d. Lateral anastomosis of intestine
 - e. Gastrectomy
 - f. Gastric fistula
 - L. Study of intestinal obstruction
 - a. The closed loop
 - b. Strangulation of intestine
 - c. High and low intestinal obstruction
 - M. Special physiological methods and apparatus
 - a. Arterial pressure methods
 - b. Venous pressure methods
 - c. Effect of various drugs, hormones, nerve section and stimulation on blood pressure
 - d. Use of uterine strip methods
 - e. Use of intestinal strip methods
 - f. Study of intestinal motility in vivo
 - g. Study of gastric motility in vivo
 - N. Experimental study of the capillaries
 - O. Heart perfusion methods

Dr. Swingle, Mr. Parkins, Mr. —

PLANT SOCIOLOGY

July 30 — September 8

Practice in the recognition and description of Plant Associations. Studies will be made of the relatively simple associations of sea and shore, progressing to those more complex of saltmarsh, forest and cultivated land. The procedure will be that of assisting the instructor in the investigation of the floristic composition of Associations, with selection of independent problems as soon as the student is able for them.

Students should know the general outlines of the plant kingdom, and should know at sight a hundred or more species of plants. Bring such manuals as are available for all classes of plants, and compound and dissecting microscopes, hand lens and the usual laboratory instruments. Text: Plant Sociology by Braun-Blanquet: McGraw-Hill, N. Y., 1932.

The vicinity of Cold Spring Harbor is peculiarly rich in material for studies in Plant Sociology. The littoral associations of green, brown and red seaweed, beach grass and saltmarsh, the various associations of the "Oak-chestnut forest" and "Oak-pine forest" of Shantz & Zon, "fragmentary associations" of the "beech-birch-maple-hemlock forest," including upland, lowland, marsh and pond communities of each forest type, natural grassland of the Hempstead Plains, and many characteristic cultural communities are within walking distance, or within an hour's drive. Preliminary lists of the species of the region are available. Various studies of habitat factors have been already published.

Dr. Conard and Miss Sargent.

BRYOLOGY

Prof. A. J. Grout, a member of the all year staff of the Laboratory, and who for the last few years has been writing and publishing a series of monographs on *The Moss Flora of North America, North of Mexico*, will accept a limited number of students and investigators at his private laboratory at Newfane, Vermont.

Newfane and adjacent regions in the hills of southern Vermont offer a moss and hepatic flora which is unusually abundant. In addition Dr. Grout's complete library and his collections are at his laboratory in Newfane.

Students wishing to gain proficiency in the study of mosses will have opportunity to work along lines most appropriate to their needs. Problems in morphology, taxonomy, ecology or physiology may be taken up by those who are qualified.

Tuition and research table fees are the same as those at Cold Spring Harbor. Students and investigators interested in working with Dr. Grout should communicate directly with him.

