LONG ISLAND BIOLOGICAL ASSOCIATION

ANNUAL REPORT
OF
THE BIOLOGICAL LABORATORY

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LONG ISLAND, NEW YORK
1929

LONG ISLAND BIOLOGICAL ASSOCIATION

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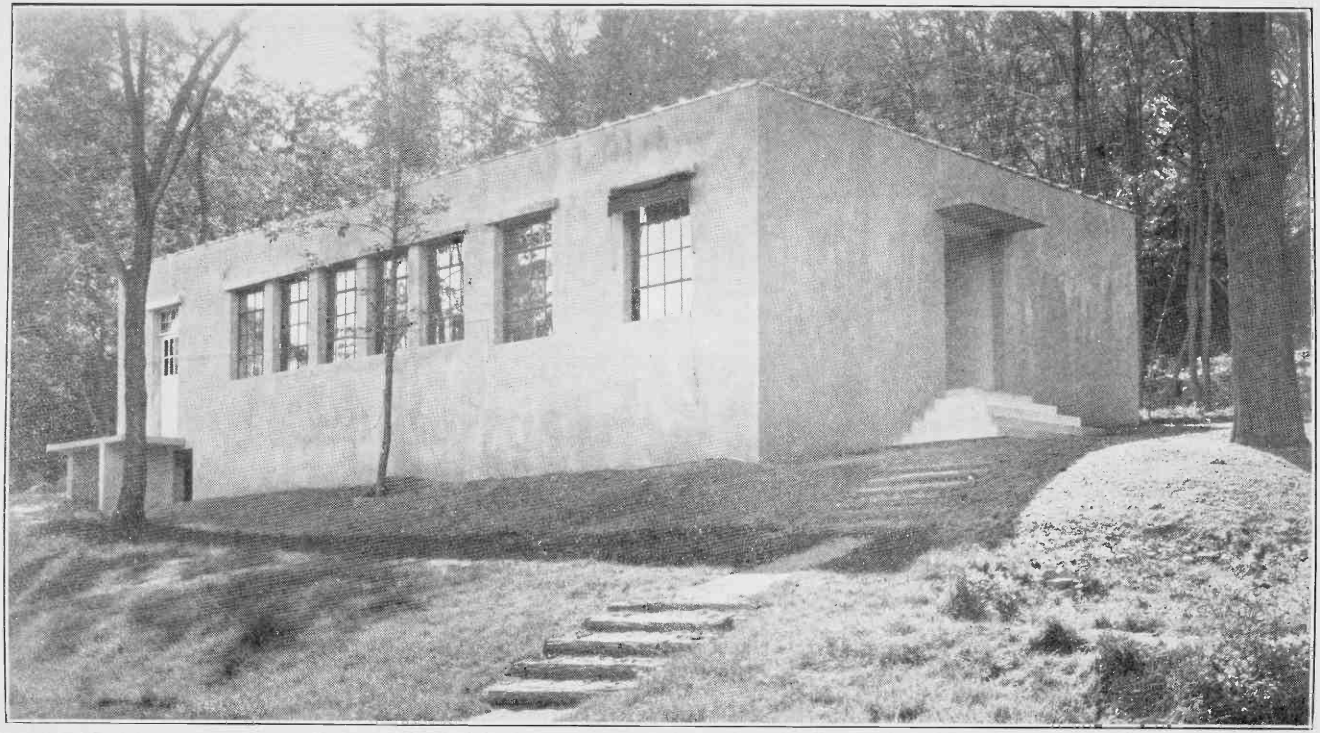

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REPORT OF THE DIRECTOR

To the officers and members of the Long Island Biological Association

Gentlemen:

I have the honor to submit the following report for the year 1929. As an institution maintained primarily for research in biology throughout the year the Biological Laboratory has made marked progress this year through

(1) Erecting a new laboratory for biophysics and placing the work in that department upon a broader basis.

(2) Extending in time and scope the research in experimental pharmacology, under the leadership of Dr. William Salant, whose appointment continues throughout the year.

(3) Engaging in research upon the physiology of reproduction, under the direct supervision of Dr. Reginald G. Harris.

(4) Creating a special scientific advisory committee for the work upon the physiology of reproduction; this committee composed of Dr. John Gowen, Rockefeller Institute, Chairman; Dr. John Hammond, University of Cambridge; Dr. George W. Corner, University of Rochester Medical School; Dr. A. S. Parkes, University of London, and Dr. Harris.

(5) Actively cooperating with Dr. W. W. Swingle's research in isolating a potent extract of the adrenal cortex.

(6) Appointing Dr. J. J. Pfiffner to our all-year staff of research to collaborate with Dr. Swingle and Dr. Harris.

(7) Granting fellowships to four European scientists for cooperative research in our institution.

(8) Printing a bulletin for members, "The Biological Laboratory."

Permanent Research

The Biological Laboratory is now engaged throughout the year in four major departments of biological research. They are (1) biophysics, (2) experimental pharmacology, (3) studies of the physiology of reproduction and (4) endocrinology. The first three are carried on at Cold Spring Harbor by resident members of our staff while the fourth is carried on in cooperation with Dr. W. W. Swingle, of Princeton University, and a member of our summer staff.

The Doctor Walter B. James Memorial Laboratory and The George Lane Nichols Memorial Laboratory have been of the greatest use in the carrying on of research throughout the year.

Biophysics

The work in biophysics, inaugurated a little over a year ago, with the appointment to our staff of Dr. Hugo Fricke, formerly director of the

department of biophysics of the Cleveland Clinic Foundation, has progressed, this year, farther than we had expected.

This is due, in large measure, to the erection of a laboratory for biophysics, the Dr. Walter B. James Memorial Laboratory, the gift of Mrs. James. In this building, designed and constructed specifically for biophysical research, Dr. Fricke and his staff have established their work under very favorable conditions. As Dr. Fricke pointed out in a recent address before the Women's Auxiliary, "The Laboratory here at Cold Spring Harbor as it now stands is perhaps already the best equipped [biophysical laboratory] in this country".

The Dr. Walter B. James Memorial Laboratory is established for the application of physics to biological research. The work is of the deepest fundamental and, at the same time, practical importance to progress in biology and medicine. Physics is, to quote Dr. Fricke again, "the science which attempts to formulate the fundamental laws for the behavior of matter. It forms the foundation for every other science. One side of biophysics is therefore a very fundamental one. It is the science which attempts to decide whether life can be explained by the laws for the non-living. However, physics does not only deal with the ultimate principles, it also deals with their practical applications. Thus, biophysics is also a practical science, which teaches us how to use the various physical instruments and methods to solve practical problems in biology".

There are a large number of machines, instruments and methods used in biology and medicine today which obviously have their origin directly in physics. Perhaps the most outstanding of these is the X-ray machine.

X-rays have been extensively used for therapeutic purposes for a number of years, yet so pressing has been the demand for their clinical use and so few have been the men who were trained suitably to make studies of their fundamental action upon chemicals and tissues that the scientific world in general appears in the strange predicament of using a tool which is not understood.

To bridge the serious gap between subjecting a patient to X-rays and expecting that the treatment will be beneficial, rather than the opposite, we have undertaken, as one of the major problems of the biophysical laboratory, a series of studies of the chemical action of X-rays upon substances and tissues. It is expected that this work will not only increase the theoretical knowledge of the effects produced by X-ray irradiation, but will serve as a secure basis for the extension of X-ray therapy.

A second major problem of the biophysical department deals with the electrical capacity and conductivity of biological cells and systems.

It is widely known that living matter of all kinds has electrical properties. It is, perhaps, not so well known that various cells and systems have characteristic responses to electrical currents of high frequency. Thus Dr. Fricke has found that malignant and benign tumors may be distinguished not only by examination under the microscope, but also (and probably eventually more accurately) by means of their responses to the passing of electric currents through the cells which go to make up the growth.

This seems to be part of a general rule that fast growing cells have a greater electrical capacity than slower growing cells. As malignant tumor is produced by cells which multiply more rapidly than benign tumor cells the capacity of malignant cells is measurably greater than that of benign cells under similar conditions.

In the biophysical laboratory we are engaged in studies of electrical capacity of living cells, with a view to increasing knowledge in this relatively unknown region, which holds promise of findings of outstanding theoretical and practical significance.

In addition to these definite researches which are being conducted at the biophysical laboratory there is a third important aim. We hope to serve as a center of distribution for biologists of the knowledge and methods of physics which are applicable to biology and medicine.

As the Biological Laboratory, in its beginning and early years, set forth and disseminated the then new conception that living material should be used for experimental purposes whenever possible, so now we wish to spread abroad, among the profession, the value of the wholly modern application of physics to biology. Our ability to accomplish such a task is marked, especially during the summer when biologists from all over the country are in residence at the Laboratory.

The Biological Laboratory is very fortunate in being able to undertake these several problems in biophysics. We are thus taking a leading part in that most modern and most promising of movements in biology and medicine, which has as its goal making, in so far as possible, exact sciences of these sciences which have thus far been relatively inexact. Herein lies ultimate progress.

The success of this task depends upon the equipment available, upon the new machines and methods produced, and finally upon the men who are engaged in these problems.

We have made creditable progress in the matter of equipment. Our staff in biophysics this year is composed of Dr. Hugo Fricke, in charge; Dr. Erwin Saxl, guest investigator from Vienna, collaborating in the work on electrical capacity and conductivity of biological cells and systems; Messrs. Asmussen and Hempel-Hansen, chemists from the University of Copenhagen, collaborating in the studies of the chemical action of X-rays; and a glass blower, an instrument maker, and a radio engineer, all assisting in the construction of machines and apparatus.

Experimental Pharmacology

The primary consideration in promoting the work in experimental pharmacology to an all year basis this year was a belief, which we have expressed before, that there should be a closer liason between biology and medicine. It seems apparent that considerable time can ultimately be saved in the solution of problems common to both sciences if the rapprochement between the two is strengthened. At the present time, seemingly all too often, medical investigators are unaware of useful biological progress, while, on the other hand, biologists may at times be on

the verge of an important medical discovery only to move off in another direction because they may be unaware of the clinical importance which might be attached to it. The general tendency of biological research seems to be toward fundamental conceptions while medicine is primarily concerned with specific applications and often loses sight of general significance.

Pharmacology stands as a link between "pure" physiology and medicine. It has had its basis in the first and its end in the second. It is concerned with the response of an individual to drugs and other chemicals often used for medical purposes.

It happens, however, that an accurate solution of the problem of the use of drugs frequently depends upon much more than the administration of a drug and the observation of its effect upon the patient. To disregard the physiological condition of the recipient of drugs is to be ignorant of the fundamental action of those substances and to have an inaccurate and unsatisfactory basis for their use.

The Biological Laboratory believes that modern pharmacology should be finally based upon the methods of modern general physiology, an increasingly accurate biological science.

There is no subject of greater interest and fascination than the action of physical and chemical forces upon living matter. Here we are engaged with chemical forces. But in order to interpret the responses which occur we must have as accurate information as possible about the chemical status of the living matter. Herein lies the basis of the research in pharmacology which is being carried on at the Laboratory.

Specifically, the problems being undertaken are (1) the effect of diet upon the action of drugs, and (2) the effect of calcium upon the action of drugs.

These studies are being carried forward with the greatest possible accuracy in respect to the physiology and chemistry of the whole subject as well as with a view to its ultimate application, and should produce results both of general biological importance and clinical significance.

The work is under the direction of Dr. William Salant, formerly Professor of Physiology and Pharmacology of the University of Georgia Medical School, and a member of our summer staff. He was earlier a fellow at the Rockefeller Institute (1901-1907) and chief pharmacologist of the Bureau of Chemistry of the United States Department of Agriculture (1908-1918). He received his doctorate in medicine from Columbia.

Dr. Salant is assisted by Dr. Martha Washburn chemist, who was formerly at the Jewish Hospital, Brooklyn, and by Mr. Harold Nagler.

During the summer the workers in pharmacology included Mr. Keeve Brodman, Mr. Leon Ehrlich, Mr. Bryant and Mr. Miyamoto.

Work already completed in the pharmacological laboratory was reported by Dr. Salant under the title of, "Pharmacological and Physiological Studies on the Autonomic Nervous System", at the International Physiological Congress held in Boston this year, while the following publications have appeared from that laboratory during the year: "The

Effect of Mercury on Cardiac Inhibition", "The Effect of Mercury on Intestinal Mobility" and "Functional Changes in the Autonomic Nervous System and the Action of Mercury". All were by William Salant and Keeve Brodman, and were published in various numbers of the Journal of Pharmacology and Experimental Therapeutics.

Physiology of Reproduction

Among the problems in mammalian physiology one of the most interesting is concerned with the physiology of reproduction. Much work has been accomplished in this field but such basic factors as those controlling pregnancy have remained relatively obscure and debatable.

Considerable evidence has been amassed by biologists, among others by the director of the laboratory, apparently supporting the view that the corpora lutea of the ovaries play an important part in maintaining pregnancy.

As this question is of considerable interest to animal breeders, to biologists and to physicians, experimental work has been undertaken at the Laboratory on an all year basis, in the hope of obtaining results which will help settle many perplexing theoretical questions and which will be of considerable practical importance.

During the past year Dr. George W. Corner (of the University of Rochester Medical School, and a member of our summer staff), with the aid of a student chemist, Mr. Allen, succeeded in obtaining an extract of the corpora lutea which was active in preparing the uterus for the reception of the very young embryo. The extract also seemed to be active in some cases in maintaining pregnancy in rabbits from which the ovaries had been removed.

About the same time Dr. J. J. Pfiffner, then of Parke, Davis and Company, and working wholly independently from Dr. Corner, obtained a differently prepared extract, of the corpora lutea, which increased the interval between heat in normal rats.

Dr. Pfiffner was appointed to the all year staff of the Laboratory, and the problem of maintaining pregnancy after the ovaries, with the corpora lutea intact, have been removed, was undertaken as one of the major activities of the Laboratory.

Since that time Dr. Pfiffner has developed a new extract of corpora lutea, which seems to be the most potent thus far obtained. With this extract, rats, from which the ovaries have been removed shortly after the middle of normal term, have continued pregnant and have produced normal young.

A large amount of work remains to be done before the results will be suitable for therapeutic use, but unquestionably an important factor in the normal maintenance of pregnancy has been located, and the ultimate possibility of its extraction in a potent form made apparent.

These studies of the physiology of reproduction are being carried on by Dr. Reginald G. Harris with the collaboration of Dr. Pfiffner, chemist, and with the aid of Miss Dorothy Newman. Messrs. Dykshorn, and L'Ecluse, assisted in the work during the summer.

A preliminary report of the work was given before the autumn meeting of the National Academy of Sciences at Princeton, N. J., by Dr. Pfiffner under the title, "Studies on an Active Extract of the Corpus Luteum", while a fuller report of the work in this laboratory to date was made by Dr. Harris at the annual meeting of the American Association for the Advancement of Science held in December at Des Moines, Iowa, under the title, "Corpora Lutea in Relation to Pregnancy".

Endocrinology

It will be remembered that six years ago experimental work upon the glands of internal secretion was first introduced in the program of the Laboratory with the appointment to our summer staff of Dr. W. W. Swingle, then of Yale University. With the exception of one summer, Dr. Swingle has continued with us during the summer since that time, carrying on his interesting and productive researches.

For the last few years the work has centered about the function of the adrenal (or suprarenal) cortex, and more recently on attempts to obtain an active extract of the hormone secreted by that glandular tissue.

With Dr. Swingle's appointment as Professor of Biology at Princeton University, it was highly desirable that the work which was then in a very promising stage should not be discontinued during the period of the transfer from Iowa to Princeton and the arranging of his laboratory quarters and of his work at the latter institution.

The Biological Laboratory was happy to be able to cooperate with him to the extent of permitting Dr. Pfiffner, a chemist of our staff, who is preparing the extract, to go to Princeton with Dr. Swingle to aid in the work.

The work is based upon the facts that experimental animals deprived of the cortex of the adrenal glands die, on the average, 6 or 7 days later. Among people, insufficiency of function of the adrenal cortex is believed to be the cause of Addison's disease.

The extract which Dr. Swingle and Dr. Pfiffner are preparing and using at the present time keeps experimental animals alive and in good health, as long as the limitations of the present technique will allow, namely, up to forty or fifty days.

These workers have already succeeded in eliminating from their extract, adrenalin (a comparatively recently discovered, but now widely used substance which is produced by the internal part of the adrenal gland and the function of which is quite different from that of the hormone of the cortex of the gland).

The work which Drs. Swingle and Pfiffner are thus engaged in should throw additional light upon an important internal secretion and eventually be of value to medicine.

Dr. Swingle reported the results of this work, obtained previous to November before the National Academy of Sciences at a meeting held that month. The title of his paper was "The Preparation of an Active Extract of the Suprarenal Cortex".

Seasonal Research

The value of seasonal research, to those who engage in it and to the institution which welcomes them, is clear. It exists outstandingly in a mutual exchange of methods, experience and results, under pleasant and stimulating circumstances. Such exchange is highly desirable in present conditions of individual specialization and in the dispersing of leaders in sciences in departments of universities and of institutions all over the country.

Since we believe that modern research institutions maintained primarily for seasonal activity are perforce very costly in respect to the measurable results obtained, we have placed the major branches of biological research upon an all-year basis as rapidly as possible. At the same time we have not, and shall not, lose sight of the non-measurable advantages to biology of fulfilling our original function of providing a meeting and working place for biologists.

The fact that such opportunities are essential, as indicated in the increasing demands made upon such laboratories as the Marine Biological Laboratory at Woods Hole, the Laboratory at Mount Desert and our laboratory here, makes clear a fundamental weakness in the present system of research conducted by a scientific body scattered in many universities. Until such weakness is remedied the Biological Laboratory will continue to accomplish its pleasant duty in this respect to the best of its ability.

This year we were able to be of greater use to a larger number of biologists, carrying on research, than ever before.

Fifty-seven biologists were engaged in research at the Laboratory this year. They came from thirty-one institutions and universities, including eight public health and medical schools. Obviously, the Laboratory is accomplishing the function of serving as a clearing house for biologists.

The type of work carried on by these investigators covered, of course, a wide range of experimental biology and medicine. As the reports of individual workers are appended to this report their work will not be considered in detail here, but merely listed under the several headings to which the work belongs.

Medical Biology

The encouragement which we have given to experimental medical biology is shown in the fact that research in mammalian physiology has taken the attention of twenty-two workers at the Laboratory this year.

In addition to the work already described, research included that of Doctor I. S. Kleiner, Professor of Physiological Chemistry at the New York Homeopathic Medical College and Flower Hospital, who, with the assistance of Messrs. Harold Birnkrant and Theodore Rothman, conducted studies upon the blood-sugar in diabetes. Dr. Kleiner reported his results at the International Physiological Congress at Boston under the title, "Further Experiments on the Rate of Dialysis of Blood-Sugar in Diabetes".

Dr. Franklin Hollander, Assistant Professor of Physiology, assisted by Mr. Samuel Galburt, both of New York Homeopathic Medical College, studied the mechanism of gastric secretion in the stomach.

Dr. Christianna Smith, Associate Professor of Physiology at Mount Holyoke College, assisted by Miss Priscilla Rasquin of the same institution, carried on quantitative studies of the red blood corpuscles in women.

Dr. Roy A. Waggener, Professor of Biology of Carleton College, studied the oxidase content of animal tissue.

Dr. George W. Corner, Head of the Department of Anatomy of the University of Rochester School of Medicine and Dentistry, continued his research upon the physiology of reproduction. Miss Elizabeth Lewis, of Sophie Newcomb College, assisted in the work.

Dr. S. I. Kornhauser, Professor of Anatomy and Embryology at the University of Louisville Medical School, collected further data for his studies upon hermaphroditism in the higher mammals.

Mr. E. S. Tauber, of Yale University, investigated parathyroid tetany in rats.

Mr. George E. Daniel, of the School of Hygiene and Public Health of Johns Hopkins University, studied the disease, coccidiosis, in rabbits.

General Physiology

It will be seen that some of the foregoing work in mammalian physiology goes over into that modern branch of biology in which chemical methods and knowledge are used in the solution of biological problems. This promising field finds even more exponents in general physiology, a fundamental science without the aid of which the oftentimes more immediately practical science of mammalian physiology could not make the progress it is enjoying.

The work in general physiology at The Biological Laboratory has, for the most part, been conducted upon fishes and other cold-blooded forms, though some of the work carried on upon fishes, which will be mentioned at this time, would perhaps strictly come under a further sub-division of biology.

Dr. Bodine, formerly of the University of Pennsylvania, and now Head of the Department of Zoology of the University of Iowa, studied the permeability of the egg and melanophore of the marine fish, Fundulus.

Mr. D. E. S. Brown, Assistant Professor of General Physiology, Washington Square College, New York University, studied muscle contraction, using turtles as experimental material.

Mr. Gifford C. Ewing, of Yale University, studied sex differentiation in Guppies, Lebistes reticulatus.

Mr. Charles Hodge, Jr., of the University of Pennsylvania, carried on research upon the metabolism of invertebrates using fireflies as experimental material.

Mr. W. J. Leach, Instructor in Biology at Temple University, studied the function of the larval thyroid gland in the lamprey eel, Petromyzon,

Dr. Eric Ponder, Professor of General Physiology at Washington Square College, New York University, assisted by Mr. John McCleod of the same institution, continued his research upon the blood of fishes, using several species.

Miss Edith Rogers of the University of Pennsylvania, studied the action of cyanides on the egg of the fish, Fundulus.

Embryology

Research in embryology covered several types of embryonic development.

Dr. S. I. Kornhauser, Professor of Anatomy and Embryology, University of Louisville Medical School, studied the growth of eggs (oocytes) in the maritime earwig, Anisolabis.

Dr. Pauline Kimball, Head of Biology of the Women's College, University of Delaware, was concerned with the embryology of the vascular system.

Dr. George B. Jenkins, Professor of Anatomy at the Medical School of George Washington University was interested in comparative embryology.

Professor George F. Sykes, Assistant Professor of Anatomy at Tufts Medical School made embryological studies.

Mr. John R. Huggins Instructor at the University of Pennsylvania continued his studies of the embryology of the fruit fly, Drosophila.

Fish Culture

The Biological Laboratory collaborated with the United States Bureau of Fisheries this year by placing its facilities at the disposal of one of the special investigators of the Bureau. Miss A. L. Palmer of the University of Pennsylvania, working for the Bureau of Fisheries, tested various methods for the control of the propagation of starfish.

Botany

The work in botany continued to stress the ecological aspects of the science, while specialists in mosses and in water molds gave particular attention to these forms.

Dr. Henry S. Conard, Head of the Department of Botany of Grinnell College, continued his studies of the vegetation of Cold Spring Harbor and vicinity.

Dr. A. W. Blizzard, of Coker College, was engaged in a completion of his study of the vegetation and succession on High Hill.

Dr. A. J. Grout, specialist in mosses, assisted by Miss A. E. Blagg, Instructor at Iowa State College, and Miss Frances Bober, of Adelphi College, studied the mosses of the region for "Vegetation of Cold Spring Harbor" in collaboration with Dr. Conard.

Miss Elva Lawton, Instructor at Hunter College, carried on her research upon the gametophytes of ferns. She continues to maintain her cultures and to make her observations at The Biological Laboratory.

Dr. F. K. Sparrow, Assistant Professor of Botany at Dartmouth College, continued his studies of the water-molds, (Phycomycetes) of Cold Spring Harbor.

Other Research

Dr. Felix Bernstein, Director of the Institut fur Mathematische Statistic of the University of Goettingen, Germany, was a guest investigator at the Laboratory during the winter of 1928-29 and the following spring. He conducted statistical studies of the musical capacity of negro children.

Miss B. B. Montgomery, Assistant in Zoology at Ohio Wesleyan University, made an experimental study of the mullerian ducts in the frog, Rana pipiens.

Mr. H. P. Sturdivant, of Columbia University, studied the central apparatus in somatic cells.

Mr. Richard P. Dow, of Bussey Institution, Harvard University, studied the taxonomy of wasps.

Resume of Seasonal Research

The foregoing lists should serve to indicate the wide range of experimental work in which The Biological Laboratory is privileged to aid. They also indicate the variety of institutions which the Laboratory serves, in addition to promoting its own research; and they set forth with what success the Laboratory is meeting its responsibility of serving as one of the major clearing houses for biologists.

Instruction

The fact that no courses have been added to, or eliminated from, the curriculum for the last three years has produced a situation favorable for progressively carrying into effect our policy of advanced instruction as a basis for serious, professional use of biology. The process of careful selection of students has been accompanied by a continued reduction of the number accepted, a reduction to 40 in 1928, and a further reduction to 25 in 1929. This number (25) seems to be the optimum, at any given moment for the present, both from the viewpoint of the students and of the Laboratory. The students have the advantage of unusually individual attention from the instructors. The Laboratory is assured of a serious group of students, large enough to form a very appreciable nucleus for the future body of biologists in this country, and small enough to be easily assimilated into the life of a research institution.

All courses were of advanced type, in which research was an integral part. The Staff of instruction was most helpful in maintaining the courses upon the highest level.

The course in Field Zoology was under the competent leadership of Dr. S. I. Kornhauser, supported throughout by Professor Sykes, both former members of our Staff. Dr. C. T. Brues, of Bussey Institution, Harvard University, took charge of the work, of two weeks duration, on insects.

The work of the course in General Physiology, which remained under the excellent leadership of Dr. Bodine, is given in his report.

The course in Field Botany and Plant Ecology continued its fine work under the direction of Prof. Henry S. Conard, supported by Drs. Frederick K. Sparrow and A. W. Blizzard. The work this year made further progress

through the aid of Dr. A. J. Grout, moss specialist, whom Dr. Conard obtained for special cooperation during two weeks. Details of the work in botany are given in the appended reports of these several gentlemen.

In the course in Surgical Methods, Dr. Justin Andrews, of Johns Hopkins University, asked to be relieved to carry on research in tropical America. We were fortunate in being able to persuade Dr. George W. Corner, of the University of Rochester School of Medicine and Dentistry, to take charge of this important course.

Students

The following lists, in addition to naming the students at the Laboratory this year, give indication of their sources, trainings and experiences.

In Field Zoology: Harriet M. Boyd, Ph. B. Brown Univ., M. Sc. and assistant in bacteriology, Middlebury College; Bettina Bryant, scholarship from Smith College; Rev. E. J. Calhoun, S. J. St. Louis Univ., head dept. of Biology, John Carroll Univ.; Donald F. Chichester, assistant at and scholarship from Rutgers Univ.; Rebecca Conard, Grinnell College; John Stanislaus Dziob, assistant at and scholarship from Brown Univ.; Gifford Cochran Ewing, A. B. Yale, assistant at Yale; James H. Gaul, Univ. of Pittsburg; Harriet M. Gay, B. A. Mount Holyoke, assistant in biology Spelman College; Gordon M. Kutchka, scholarship from Univ. of Pittsburg; Willie Agnes Morgan, assistant Coker College; Magdalen D. Tuttle, Penn. State Teachers College; Reginald Voorhes, A. B. and Fellowship Maryville College.

In General Physiology: Nila G. Kirkpatrick, B. A. and scholarship from Ohio Wesleyan Uni., physiotherapist Mt. Sinai Hospital, Cleveland; Floyd Russ Nevin, A. B. Temple Univ., M. Sc. Univ. of Pennsylvania; Edmund Overstreet, Yale Univ.; Sarah Walden, B. A. Wellesley, graduate student Yale Univ.

In Field Botany and Plant Ecology; Leonore A. Cisney, Dickinson College; Dorothy L. Dreikorn, Smith College; Ruth M. Patrick, assistant and B. A. Coker College; Dorothy Rasch, Barnard College, Ruth C. Raynor, Adelphi College; Eva Saper, Barnard College; Marian G. Smith, scholarship from Adelphi College.

In Surgical Methods in Experimental Biology: William J. Leach, B. S. Indiana State Normal, Instructor in Biology, Temple Univ.; Elizabeth Lewis, scholarship from Newcomb College; Blanche B. Montgomery, B. A., B. S., and assistant at Ohio State Univ. scholarship; Edward Sanford Tauber, Honor Student Yale Univ.

Fifteen students were also enrolled in the course of lectures only, in Endocrinology.

Evening Lectures

The public evening lectures delivered at the Laboratory this year maintained the high standard which has been set. They are listed herewith:

Dr. J. H. Bodine, Head of Department of Zoology, University of Iowa —"Factors Influencing the Respiratory Metabolism of a Developing Egg."

Dr. C. T. Brues, Professor Economic Entomology, Harvard University —"Do the Insects Menace the Future of Our Civilization?

Dr. G. W. Corner, Chairman Department of Anatomy, University of Rochester School of Medicine and Dentistry—"The Hormones of the Mammalian Ovary."

Dr. Chas. B. Davenport, Director, Department of Genetics, Carnegie Institution of Washington—"Light Thrown by Genetics on Development and Evolution."

Dr. Hugo Fricke, Biophysics, The Biological Laboratory—"Using X-rays in Biology."

Dr. A. J. Grout, Bryology, The Biological Laboratory—"Human Interest in Mosses."

Dr. S. I. Kornhauser, Professor of Anatomy and Embryology, University of Louisville Medical School—"Anomalous Development of Sexual Organs in Humans."

Dr. Robert Cushman Murphy, Curator Oceanic Birds, American Museum of Natural History—"The General Significance of Certain Taxonomic Variations Among Insular and Oceanic Birds: Illustrated by Specimens."

Dr. William Salant, Pharmacology, The Biological Laboratory—"Physiological and Chemical Control of Toxicity."

Dr. F. K. Sparrow, Department of Botany, Dartmouth College—"Interesting Water-Moulds from Cold Spring Harbor."

Dr. W. W. Swingle, Professor of Biology, Princeton University—"An Experimental Study of the Function of the Adrenal Gland."

Mr. Norman Taylor, Brooklyn Botanic Garden—"Long Island Flora and Vegetation."

Dr. Frank Thone, Staff Member, Science Service—"Anti-Evolution Activity."

Dr. Eduard Uhlenhuth, Associate Professor of Anatomy, University of Maryland Medical School—"The Mechanism of the Function of the Thyroid Gland."

The Doctor Walter B. James Memorial Laboratory

At a meeting of the Board of Directors of The Long Island Biological Association, held at Blackford Hall on July 30, announcement was made of the gift of Mrs. Walter B. James of the biophysics laboratory. In accepting the gift and in expressing its appreciation the Board unanimously voted that the building should be known as the Doctor Walter B. James Memorial Laboratory.

The laboratory is one story in height and of simple utilitarian architecture (Henry Saylor, architect). It includes an X-ray room, a chemical laboratory, a general research laboratory, a dark room, a cold room, a machine shop, a glass blower's room, a filing room and a study. Provision has been made for the addition of a second story if later developments warrant it.

In planning and building the laboratory, attention was given to safety, and to the control of temperature, vibration and noise.

Doctor James became a member of the Board of Directors of the Biological Laboratory in 1901 and was president of the Board and of the

Association at the time of his death in 1927. A man of enthusiasm, energy and kindliness, he showed, in his relationships with the Biological Laboratory, not only these characteristics, but a rare and valuable understanding both of the scientific work and of the administrative problems. That he took an active interest in both was continually demonstrated in his actions.

A consistent counsellor and supporter for over twenty years he accepted the opportunity to give the value of his leadership to the Laboratory after its transfer to the Long Island Biological Association. He took an invaluable part in bringing to a successful conclusion the effort to purchase land which would help make secure the future of the Laboratory and which was urgently needed for immediate expansion. This accomplished, he took steps to plan for its future use and development. It is a happy coincidence that the building which bears his name is situated on the land, the need of the Laboratory's control of which was so apparent to him.

As with the land, so with the work and equipment of the Laboratory, no detail or need escaped him. He saw the desirability of providing better facilities for marine collecting, and donated his own motor launch, the Goblin. Upon his frequent visits to various workers in their laboratories here, his trained eyes would notice a desirable piece of apparatus was lacking and his generous nature immediately led him to provide it.

His sustained and reasoned optimism was one of his greatest charms. Speaking of the Laboratory and its future in the days immediately following its transfer to the Long Island Biological Association, he remarked that, "Few people are greatly impressed with the appearance or accomplishments of a new born infant, and left to itself it would certainly die, but with suitable nourishment and guidance the babe will develop into a robust man or a charming woman, and, under suitable conditions, the Laboratory may be expected to attain an equally satisfactory maturity." He fully appreciated the value of proper nourishment and guidance, and gave generously of both.

In the Annual Report for 1927 facing a photograph of Dr. James we find these words: "This Report is dedicated to the memory of Dr. Walter B. James, for twenty-six years a member of the Board of Directors of the Laboratory, and at the time of his death president of the Long Island Biological Association. His generous support helped maintain the Laboratory in its beginnings and his wide knowledge and abundant faith in its future expressed in direction, counsel, and leadership, in large measure resulted in its present period of greater dignity, scientific achievement and public usefulness."

It is very appropriate that Mrs. James, knowing and appreciating his aims, should aid in this further growth with its opportunity for fostering research so closely allied to Doctor James' life work.

Women's Auxiliary Board

The Women's Auxiliary Board has continued its excellent support of the work of The Biological Laboratory, notably by continuing its subscription of the Special Research Fund. In addition to this contribution of $5,000, many members of the Women's Auxiliary have made other contributions directly to the Association, and totaling this year over $20,000.

This measurable aid was born of, and is accompanied by, the very important immeasurable help which has resulted from the increasing interest of the members of this Board. This increasing interest comes directly from the fact that officers and members, through their own initiative, have become increasingly familar with the research which is being carried on here. The fine leadership of the retiring officers, Mrs. Rodman Gilder, President; Mrs. Russell Leffingwell, Vice-President; Mrs. George Nichols, Treasurer; Mrs. Acosta Nichols, Secretary; Mrs. Walter Jennings, Chairman of the Finance Committee, and Mrs. John H. J. Stewart, Chairman of the House Committee, has been very gratifying. With the exception of the President, Mrs. Rodman Gilder, all of the officers were reelected. Mrs. Gilder wished to be relieved of her duties as President in order to spend more time upon her work in psychology. The vacancy, thus occurring, was most fittingly filled by the election of Mrs. Walter B. James to the Presidency. Mrs. James' interest in, and action on behalf of, the Laboratory have already been so marked that the Board is assured of continued growth under her stimulating leadership.

At the September meeting Dr. Hugo Fricke delivered an address on Biophysics, which was published in "The Biological Laboratory".

The following new members have been received this year: Mrs. F. L. Babbott, Jr., Mrs. Daniel Bacon, Mrs. George W. Bacon, Mrs. T. Bache Bleecker, Jr., Mrs. Herbert L. Bodman, Mrs. F. Trubee Davison, Mrs. Robert W. de Forest, Mrs. Douglas C. Despard, Mrs. Haliburton Fales, Jr., Mrs. George S. Franklin, Mrs. Paul L. Hammond, Mrs. Forbes Hawkes, Mrs. S. C. W. Hoppin, Mrs. F. Coit Johnson, Mrs. David Keppel, Mrs. Junius Morgan, Jr., Mrs. Ray Morris, Mrs. William H. Nichols, Jr., Mrs. Winchester Noyes, Mrs. Edward C. Parish, Miss Alice Peters, Miss Isabel Peters, Mrs. Stanley M. Rumbough, Miss Elsie M. Schefer, Mrs. J. Barstow Smull, Mrs. Edward W. Sparrow, Mrs. Charles J. Symington, Mrs. James B. Taylor, Mrs. William J. Tingue, Mrs. Edward M. Townsend, and Mrs. Henry W. Warner.

The Wawepex Society

The Wawepex Society, under the leadership of Charles M. Bleecker, Governor, Jesse Knight, Scribe, and Walter J. Whipple, Custodian, continues to lease certain buildings and grounds, and to give financial support to the Laboratory in the generous manner of its founder, Mr. John D. Jones.

Gardens Opened to The Biological Laboratory

The visiting of gardens in this vicinity continues to be a source of interest and pleasure to members of the Laboratory. Under the direction of Doctor Conard these visits are of unquestionable scientific value. In 1929 the following persons very kindly opened their gardens to the members of the Laboratory: Mr. W. R. Coe, Mrs. Henry W. de Forest, Mrs. Robert de Forest, Mr. Anton G. Hodenpyl, Mrs. Walter B. James, Mr. and Mrs. Walter Jennings, Mr. Otto Kahn, Mr. William J. Matheson, Mrs. Theodore Roosevelt, Sr., Mr. Louis C. Tiffany, (Art Foundation, house and gardens), and Colonel and Mrs. Timothy S. Williams.

New Members

The following new members have been received in the several classes as given herewith.

Founders: Mrs. Ethel Clyde, Mrs. Leonard Elmhirst, Mrs. Walter B. James, Russell C. Leffingwell, Arthur W. Page, and T. S. Williams.

Patrons: Miss Rosina Boardman, Mrs. Ethel Clyde, Paul D. Cravath, Hugo Fricke, Alfred Kornfeld, Mrs. Russell C. Leffingwell, Van Santvoord Merle-Smith, Mrs. Van Santvoord Merle-Smith, W. Emlen Roosevelt, Mrs. W. Emlen Roosevelt, Ogden L. Mills, Victor Rakowsky, Willis D. Wood, and Mrs. Willis D. Wood.

Sustaining Members: Harold Birnkrant, A. W. Blizzard, George W. Corner, John W. Davis, Ferdinand Eberstadt, H. E. Hawkes, Franklin Hollander, Prescott Lecky, Graham Lusk, and Louis C. Robb.

Cooperating Institutions

Thirty-nine colleges, universities, and medical schools were represented at the Laboratory this year.

The following institutions cooperated in the work of the Laboratory by granting scholarships in their institutions applicable to The Biological Laboratory, or by a loan of equipment, or by giving financial aid to members of their institutions in residence at the Laboratory.

Adelphi College
Brown University
Carleton College
Coker College
Columbia University
John Carroll University
Johns Hopkins University
Maryville College
Mount Holyoke College
New York Homeopathic Medical College and Flower Hospital
New York University
Ohio Wesleyan University
University of Pennsylvania
University of Pittsburgh
Rutgers University
Smith College
Sophie Newcomb College
University of Rochester School of Medicine and Dentistry
Yale University

Contributions

Contributions from members of the Long Island Biological Association continue to form the backbone of the financial support of The Biological Laboratory. This year over sixty-five thousand dollars were received from members of the Association and of the Women's Auxiliary. Contributions were received as follows: from $1,000 to $12,000; Mrs. Ethel Clyde, Henry W. de Forest, Mrs. Leonard Elmhirst, Marshall Field, Hugo Fricke, Mrs. Walter B. James, Walter Jennings, William J. Matheson, Mr. and Mrs. Van Santvoord Merle-Smith, J. P. Morgan, Arthur W. Page, Mortimer L. Schiff, William K. Vanderbilt, Wawpex Society, and T. S. Williams; from $500 to $1,000: Robert W. de Forest, Anton G. Hodenpyl, Mrs. Otto H. Kahn, Alfred Kornfeld, Mr. and Mrs. Wilton Lloyd-Smith, Acosta Nichols, and Victor Rakowsky; from $100 to $500: J. E. Aldred, Frank L. Babbott,

Miss Rosina Boardman, John Chase, W. R. Coe, Paul D. Cravath, John W. Davis, Mrs. H. P. Davison, Mrs. Henry W. de Forest, F. N. Doubleday, Ferdinand Eberstadt, Mrs. Marshall Field, Mrs. Childs Frick, Mrs. Walter Jennings, Mrs. Russell C. Leffingwell, Gerald M. Livingston, Albert G. Milbank, Ogden L. Mills, Mrs. Acosta Nichols, Mrs. George Nichols, Isaac R. Oeland, Frederick B. Pratt, George D. Pratt, Harold I. Pratt, Herbert L. Pratt, Geraldyn L. Redmond, Mrs. Emlen Roosevelt, John Roosevelt, Thomas H. Roulston, S. A. Salvage, Carl J. Schmidlapp, Henry L. Stimson, George Whitney, Mrs. Timothy S. Williams, Mrs. Willis D. Wood, and Willis D. Wood.

Many have made smaller contributions without which the work of the Laboratory would not have progressed as it has. The names of all contributors appear in the list of members of the Association, and the Laboratory is grateful to each person who has aided in the work.

Grounds and Buildings

The general appearance of the grounds and buildings has probably been improved more this year than ever before. At the suggestion, and through the generosity, of Mrs. Ethel Clyde, extensive outside repairs were undertaken on many of the buildings. These included repainting of five buildings, the restoration of Hooper House to its early lines, and substantial external restoration of the charming old house which was purchased a few years ago with the Townsend Jones property.

This same house has been completely taken over for use by the Laboratory. With extensive renovation within, and the installation of a central heating system (the latter the gift of Colonel T. S. Williams) it now admirably serves as the winter dining house of the Laboratory, at the some time providing several living apartments.

The general improvement in living conditions, including the arranging of a number of small apartments has been greatly appreciated by both summer and winter residents at the Laboratory. At the same time the expenditures made to bring about these changes have been justified from the financial standpoint as evidenced by the fact that our return from rentals in 1928 was $2,980.44 (the largest up to that time), while in 1929 the amount was $5,409.77. The need for additional living accommodations, for both summer and winter, is pronounced. Advances made in this respect will not only provide additional and better accommodations for biologists working here, but will provide further permanent income for the Laboratory.

At the suggestion of Mr. Henry C. Taylor, Chairman of the Committee on Grounds and Buildings, considerable improvement was made in the appearance of the grounds through additional grading. A tennis court (the gift of Mrs. Ethel Clyde) was constructed in time for frequent use during the summer.

Estimates have been obtained for the grading and planting of the sandbank opposite Blackford Hall, and definite provision for this work should be forthcoming in the near future.

Our location lends itself admirably to the possession and maintenance

of attractive grounds of simply beauty, and full advantage should be taken of this fact.

Recommendations and Acknowledgements

The progress of the Biological Laboratory since its transfer to the Long Island Biological Association in 1924 has been most gratifying. During this period the Laboratory has definitely become a permanent research institution of outstanding usefulness. The quantity of research which is sponsored by the Laboratory has increased enormously, while its quality has maintained an exceptionally high standard. The type of student who benefits by summer instruction at the Laboratory has reached a level from which much may be expected.

The holdings of the Laboratory have been increased by the purchase of over thirty acres of land, two houses and by the erection of three new laboratory buildings.

Much remains to be done. The undertaking of permanent research calls for the establishment of an adequate endowment. We need further laboratory and living accommodations.

The Laboratory is not embarking upon a period of expansion in order to obtain the advantages which may be intrinsic therein. We believe a "bigger and better" laboratory, while being a pleasant picture, is not sufficient justification for expending the effort which may be available. We, rather, see the Laboratory as a part of that great organism called biology, whose members are endeavoring to aid man in the increase of his knowledge and the useful conquest of his environment. Whenever it seems apparent that The Biological Laboratory can be of unusual aid in promoting this conquest we hope to be ready to accept the opportunity. Such a policy will, no doubt, bring growth in the future, as it has in the past, but it will be a growth governed by the problems of mankind, and the ability of the Laboratory to aid in their solution, rather than by a definite program of institutional development.

The progress which has been made here in the advancement of biology, and that which may be looked forward to with reasonable assurance, reflects largely the far-seeing support of those who provide for its physical needs, and the intelligent application of those who advance the scientific work. Especial thanks are due to the Staff, the officers and members of the Association, and of the Women's Auxiliary, the scientific advisory committees, biologists at large, and finally to our President, Mr. Arthur W. Page, whose calm energy and broad viewpoint make his leadership of immeasurable value to this work.

Reginald G. Harris

Report of the Scientific Advisory Committee for the Year 1929

The Committee feels that during the past year much progress has been made in advancing the quality and amount of scientific work carried out at the laboratory. The general atmosphere of the laboratory has been changed to one where research work plays no small part. An especially well selected group of investigators has been present at the laboratory during the Summer Session and these, along with the graduate students, have aided greatly in carrying out policies outlined in last year's report.

It is the opinion of this committee that policies adopted last year are sound and need but continued financial support to make Cold Spring Harbor Biological Laboratory an outstanding research institution. As previously pointed out, the necessity of an adequate endowment seems almost imperative if the laboratory is to extend and develop its present activities along these lines. The Committee further feels that the director has been doing highly commendable work in his rigid selection of candidates for research facilities during the Summer Session, and highly recommends the support of the Board of Trustees in aiding him to continue such policies.

J. H. Bodine
Chairman

Report of the Special Scientific Advisory Committee on General Physiology and Biophysics

The Advisory Scientific Committee has much pleasure in reporting the installation of a Biophysical Laboratory under the direction of Dr. Hugo Fricke, who is assisted by Dr. Saxl, and Messrs. Hempel-Hansen, Force, Henderson and Gallagher.

The Biophysical Laboratory contains shops for metal, wood and glass work; an X-ray laboratory; a chemical laboratory; a laboratory for work with electrical currents of high frequency; a library; and a purchasing office. All these units have been equipped and put in working order. A considerable part of the equipment has for economical reasons or because it was commercially unavailable been built in the shops here. Larger pieces of equipment of this kind include: a high potential generating unit for operating X-ray tubes, consisting of a 10 K. W. 140 K. V. transformer with kenotron rectification, with an induction regulator and equipped with various special devices; apparatus for measuring X-ray dosage in absolute units; two high vacuum systems for evacuating X-ray tubes; apparatus for gas analysis and apparatus for electric titration, specially designed for use in work on the chemical action of X-rays; and a high frequency bridge for measuring electric conductivity and capacity of biological materials. Much of the work it is planned to do will require X-ray tubes of special design and considerable effort has been made to perfect the various points in the technique required for making such tubes.

As an introduction to a study of the biological effect of X-rays, it is proposed to make a systematic investigation of their chemical effect, and particularly of their effect on substances dissolved in water. From earlier work it was concluded that a number of reactions of this last type are due to the production of activated water molecules and it is proposed now to determine the properties of these activated molecules. For this purpose a series of substances have been selected for study, which exist in an oxidated and reduced state, the endeavor being to determine the relation of the action of the X-rays to the oxidation-reduction potential. For practical and theoretical reasons it is important to be able to use the highest possible dilutions and considerable work has been done to develop methods for analyzing very diluted solutions. The following systems have been used: (Fe^{++}, Fe^{+++}), (I, I^-), (Br, Br^-), (Tl^+, Tl^{+++}), (hemoglobin, methemoglobin). Dilutions down to N|100,000 have been used. Except for hemoglobin, the analysis is made by an electric titration. For hemoglobin the oxygen capacity method is used, although a special technique had to be developed because of the high dilution. It is important in this work to be able to determine the gas exchange, gaseous oxygen being of special importance, and considerable work has been done for devolping methods for gas analysis. Continuing earlier work, investigations have been made of reactions involving a color change, such reactions having a practical value in clinical X-ray dosimetry. A bridge for measuring the electric conductivity and capacity of biological material has been built and work with this bridge has been started.

In addition work in General Physiology has been carried on during the

summer by Dr. J. H. Bodine, whose investigations dealt especially with the action of an extract of the pituitary gland upon the melanophores of the fish, Fundulus. Doctor Bodine's work, together with that of his young associates is described in some detail in his reports and in the report of Miss Palmer. Professor Ponder's and Professor Brown's reports may likewise be found among the statements of research workers.

The Committee feels that the coming of Dr. Fricke as a full-time investigator marks an epoch in the development of the Laboratory since it inaugurates work of the most modern description, and of the highest quality, which is certain to prove highly stimulating in many directions. It is very seldom that a physicist of the standing of Dr. Fricke becomes interested in biological investigation and it seems almost providential that he should have been brought to Cold Spring Harbor at this time. His work is of the highest interest, both from a theoretical and a practical standpoint, and therefore contains the greatest promise for the future.

W. J. V. Osterhout

Report of the Secretary of the Association

During the calendar year of 1929 the sixth annual meeting of the corporation was held on July 30th, 4 meetings of the Board of Directors and 2 of the Executive Committee.

a. The 13th meeting of the Executive Committee was held at 195 Broadway on Jan. 15, 1929. It was voted that the committee recommends to the Board of Directors of the Association that Article 9 of the By-laws be amended so as to decrease the severity of the restrictions involved in that article and to provide for the selling of land to approved scientists, who will agree to erect homes of an approved character, retaining only such restrictions as are appropriate to a high class community. The building of a laboratory for bio-physics was authorized. The offer of Mr. Marshall Field to contribute toward investigations on the physiology of reproduction was accepted with thanks.

b. The 17th meeting of the Board of Directors was held at 195 Broadway on March 8th, 1929. The proposed revision of Article 9 was adopted unanimously. The lot and sub-division plan of Mr. H. A. Caparn was adopted with provision for making necessary changes. Also cooperation with the committee on town planning of the Town of Oyster Bay was agreed to and a gift from an unknown donor of 65 shares of stock was announced and accepted with gratitude.

c. The 18th meeting of the Board of Directors was held at the George Lane Nichols Memorial, Cold Spring Harbor, June 21, 1929. Due notice having been given, in Article 3, section 2, of the By-laws the month of July was substituted for June as the month for the stated meeting of the Board. The laboratory director read the treasurer's report showing cash on hand of $9,330. An appropriation was made toward the researches on the suprarenal cortex under Dr. Swingle and a sum was advanced to anticipate Dr. Fricke's expenses in equipping a new bio-physical laboratory. It was voted to provide for Dr. Salant and his work for a period of one year from September 1st. The following persons were constituted an advisory board on the physiology of reproduction: Dr. John W. Gowen of the Rockefeller Institute for Medical Research, Prof. John Hammond of Cambridge University, Dr. A. W. Parkes of the University of London, and Professor George W. Corner of the University of Rochester. The laboratory director was authorized to issue a four page periodical eight times a year devoted to the work of the laboratory. The generous gift of Mrs. E. Clyde of $5400 to provide for improvement of buildings on the grounds and for a tennis court was gratefully accepted. The gift of Mr. R. C. Leffingwell of $2500 toward the maintenance of the work of the laboratory was gratefully accepted. The receipt of the sum of $7500 from Mr. Marshall Field toward work on the physiology of reproduction in cows was gratefully accepted. The sum of $2000 from Mr. Henry W. de Forest toward the research work of the laboratory was gratefully accepted.

d. The 19th meeting of the Board of Directors was held at Blackford Hall, Cold Spring Harbor, July 30, 1929. Mr. Leffingwell having been elected temporary chairman the following officers were reelected for the coming year: Arthur W. Page, president; Marshall Field, vice president and

treasurer; Chas. B. Davenport, secretary; R. G. Harris and William Dean, assistant treasurers. The following members were reelected to the Executive Committee: Marshall Field, Walter Jennings, R. C. Leffingwell, W. J. V. Osterhout, Arthur W. Page, T. S. Williams and C. B. Davenport. To fill a vacancy in the Board of Directors, class of 1933, Mr. Harold I. Pratt was elected. The Board expressed its deep appreciation to Mrs. Helen James for her generous gift of the bio-physical laboratory to the Association and designated the laboratory as the Dr. Walter B. James Memorial Laboratory. A committee was appointed by President Page to consider the relation of the work done at the bio-physics laboratory to university degrees.

e. The 14th meeting of the executive committee was held at the Broad Street Club, New York City, December 3d, 1929. President Page was authorized to seek special support for the Association's work.

f. The 20th meeting of the Board of Directors was held at the Broad Street Club, New York City, December 3d, 1929, 13 members being present. The resignation of Col. Stimson, necessarily absent in Washington as Secretary of State, was accepted with regret. The treasurer of the Association was authorized to borrow sufficient funds to anticipate the payments due early in 1930. The treasurer's report showed a cash balance of $963.63. Dr. A. J. Grout was appointed delegate of the Association to the International Botanic Congress, to be held in England in 1930 and Dr. G. W. Corner, delegate from the Association to the Congress of Anatomists. A report of the scientific advisory committee was presented by Dr. Bodine and is printed elsewhere in this report. The annual report was read by the director and the budget for 1930 amounting to $78,180 was authorized.

C. B. Davenport,
Secretary

Papers Presented Before Scientific Societies in 1929 by Members of the Staff of The Biological Laboratory

1. **American Association for the Advancement of Science**

Dr. J. H. Bodine—The Action of Pituitary Extracts on the Melanophores of the Fish, Fundulus.

Dr. C. T. Brues—The Food of Insects Viewed from the Biological and Human Standpoint.

Dr. Reginald G. Harris and Dr. J. J. Pfiffner—Extracts of Corpora Lutea in Relation to Pregnancy.

Dr. S. I. Kornhauser—Anomalous Development of the Sexual Apparatus in Human Embryo.

(Mr. W. O. Nelson), Dr. J. J. Pfiffner, (Dr. H. O. Haterius)—The Prolongation of Pregnancy by Extracts of Corpus Luteum.

Dr. J. J. Pfiffner, and Dr. W. W. Swingle—The Preparation of an Active Extract of the Suprarenal Cortex

Dr. A. A. Schaeffer—The Effect of Light on the Mechanism of Spiral Movement.

Dr. Christianna Smith—Further Observations on the Normal Variations in Red Blood Cell Counts.

Dr. Frederick K. Sparrow, Jr.—The Non-sexual Stage of Aphanomyces phycophilus de Bary.

Dr. W. W. Swingle and Dr. J. J. Pfiffner—Experiments with an Extract of the Suprarenal Cortex.

2. **XIIIth International Physiological Congress**

Dr. William Salant—Pharmacological and Physiological Studies on the Autonomic Nervous System.

Dr. I. S. Kleiner—Further Experiment on the Rate of Dialysis of Blood-Sugar in Diabetes.

3. **National Academy of Science**

Dr. W. J. V. Osterhout—Electrical Phenomena in Plant Cells.

Dr. J. J. Pfiffner—Studies on an Active Extract of the Corpus Luteum.

Dr. W. W. Swingle—The Preparation of an Active Extract of the Suprarenal Cortex.

REPORTS OF RESEARCH WORKERS

Dr. Bernstein's Report

Formal research work carried on through my institute, the Insitut fur mathematische Statistik der Universitaet Goettingen, on more than 5,000 school children in Europe, from Sicily to Denmark, has shown differences in voices, the hereditary behavior and racial meaning of which were brought out. Additional study of Indian voices has already shown us that other types of voices than the European ones would exist in non-European races. The study of negro voices has now given definitive evidence of this.

I carried out a study of voices of negro girls in the James Russell Lowell School in Harlem. The main object of this first study had to be to make sure of the qualitative side of the object, i. e. to find the main categories of voices which occur, and are to be distinguished by ear, and to standardize them for later statistical research.

For such a qualitative study the material is unusually suitable because all kinds of crosses between white and negro, Indian and negro, and between all three races are present. Territorial origin of 181 of 200 children could be traced back for at least two generations. More than a fourth of the children are of West Indian parentage, having partly Spanish ancestry. Thus a great variety of kinds of voices occurs, and a selected number can be compared with each other and grouped systematically.

I shall now give some details of the study. The first peculiaity that attracted attention as a possible racial character was a peculiar hoarseness of the voices of colored children. This hoarseness is confined often to the chest register, sometimes, but more seldom, to the head register, but in the majority of cases it is a general character of the voices, perhaps slightly more expressed in the chest register than in the head register.

A second peculiarity of the negro voice which I observed frequently was the occurrence of a typical yell in the head register, especially of contralto voices. This yell is never observed in voices of northern and middle Europe. It occurs in southern Italian voices, and is called "stridulo" in Italy, and was considered in our former study as an indication of Arab or negro influence.

Both characters of the negro voices can be defined exactly as the addition of (a) non-harmonic sounds to the sound spectra (hoarseness), (b) very high but rather harmonic partials to the sound spectra (yell).

The hoarseness and the yell occur independently of each other. We had as well cases of combination of hoarseness with very soft voice characters, from high sopranos to deep contraltos, and also combinations of hoarseness with a typical hard yell in the head register of contralto voices. In this qualitative study confined to careful examination of each of about 200 voices the percentages, of course, have no definitive meaning, but to illustrate the above facts I like to mention that very strong hoarseness was observed in twenty-three cases which were controlled several times so as to exclude any possibility that catarrhal infection not observed by the children themselves, who were questioned concerning this, played a role. In not more than fifteen cases of colored children my ear was not able to

distinguish any degree of hoarseness, but in comparison with every negro voice the voices of three Italian children seemed essentially clearer. In all other cases a harmonic analysis of sound curves would reveal a measurable amount of energy not belonging to the harmonic partials of the tune. The character of hoarseness has undoubtedly a strong hereditary behavior. This came out clearly in the case of two girls with mostly white ancestry, who showed practically no negro traits of color or features except that peculiar hoarseness but combined otherwise with typical European soprano and mezzo-soprano voices.

If one abstracts from those additions one can classify the voices according to timbre, i. e. to the musical partials of the tunes. It is then possible to group them in one series also with the voices of white and Chinese children.

In one classroom I grouped more than sixteen children in one graded series, from highest soprano timbre of voice to deepest contralto voice. I compared the timbre of voices in the chest register in singing the vowel "o". I used for this purpose the hymn,

"Holy, Holy, Holy,
Lord God Almighty",

which was generally known. In comparison with my gramophone records of European children I could make the statement that two of the negro girls had contralto voices of such deep timbre as was never heard in European research work. On the other hand it has become clear that the timbre of voices must depend upon a peculiarity of the larynx that varies in an analogous manner in all races involved in the research, a fact that limits the possible explanation of this character to a great degree.

A gramophone record of ten voices graded according to timbre from soprano to contralto was made. All children started with the same tone except one girl who had such a deep contralto that a lower pitch for starting had to be given to her. To reach a standard for the chest register, the hymn, "Holy, holy, holy, etc.", proved to be the best choice. For the head register the second line of the spiritual, "Go down, Moses," was chosen. There is a gap between the exceptional contralto and the nine other voices. Otherwise the standardizing of timbre of voices seems fairly well reached and a mass examination on that basis seems now possible.

Incidentally we observed that the tongue color of the negro is more white than that of the white due probably to the thicker epidermis of the negro. As the thickness of skin influences greatly the skin color, whose hereditary behavior was studied in fundamental lines by Doctor Davenport, an independent study of this character seemed important. For that reason the color of the tongue was observed in a certain number of children by the use of the Klincksieck "Codes des Couleurs", and brought out the fact that only shades of red and occasionally of blueish red occur due alone to the color of the blood shining through more or less, according to the thickness of the epidermis. It is planned to carry on further the study of the hereditary behavior of this undoubtedly racial character, which study may also throw further light on the very complicated question of hereditary behavior of skin color.

Grassland of Andropogon scoparius invaded by Deciduous Forest.

On High Hill, Suffolk County, with an elevation of 420 ft. there is a grassland of Andropogon scoparius. West Hills, of which High Hill is a part, were formed by deposition of immense quantities of quartz gravel, etc., during the glacial period. These hills were covered until recently by an oak-chestnut forest, the fungus Endothia parasitica having killed the chestnut trees. Records show that the grassland on the top of High Hill existed as such for at least more than a century. The forest is slowly but surely invading this vegational unit. By means of permanent quadrats located on the permanent triangle station of the U. S. Geodetic and Costal Survey on High Hill; also by maps and charts, a record of this invasion of the grassland by the forest was made in 1928-1929.

The dominant species of this grassland is Andropogon scoparius, and associated with it, growing in the gravel between the tussocks are the following species: Polytrichum piliferum, Cladonia rangiferina, and Cladonia sp.?; more sparsely scattered; Hypericum gentianoides, Hieraceum scabrum, Hypericum perforatum, Heliantheum canadense, Chrysanthemum leucanthemum, Linaria vulgaris, Baptisia tinctoria, Polygala polygama, Rumex acetosella, and Juniperus virginiana.

On High Hill the line of tension or ecotone between the grassland and forest is definite and sharply marked except where Myrica carolinensis occurs. The bayberry invades the grassland and by sending out root-sprouts in its immediate vicinity ecesis follows. These clumps (bushes) of Myrica can be considered as the pioneer of a group of invaders.

An examination of well-developed clumps reveals the fact that secondary invaders are making their appearance, viz: Prunus pennsylvanica, P. serotina, Rubus villosus, Vitis labrusca, Psedera quinquifolia, Rhus toxicodendron and Smilax rotundifolia. The species of Prunus growing tall, produce shade which aids greatly in killing the Myrica in the center of the bush. Simultaneously the Myrica extends farther into the grassland by peripheral migrations.

Following the Prunus-vitis-psedera society growing in humus produced by the decaying of the Myrica, etc., (in the center of the Myrica clumps) may be found seedlings of Acer rubrum, species of Quercus, Betula lenta, and Robina pseudo-acacia. These seedlings soon out-distance their neighbors in growth, and by towering above them, cause the Prunus species to die out. In the shade and protection of the species of Quercus or Acer, the following succession make their appearance: Rubus hispidus, Carya alba, Vaccinium vacillans, V. pennsylvanicum, Chimaphila umbellata, Polytrichium Ohioensis, etc.

The climax stage of vegetation, characteristic of this section of Long Island, follows next; which is a mixed oak association with its typical forest floor.

Preceding the climax stage, however, is a shrub belt area formed by the "fusing" of the ever expanding Myrica clumps.

The shrub-belt was studied by means of the Braun-Blanquet four meter belt transect, noting distribution and frequency of a hundred or more species.

Doctor Bodine's Report

A.

Interest in the field of general physiology at the Laboratory has centered largely about research activities which have grown markedly during the past few years. Instruction at the present time is on a strictly graduate basis, the student body being composed of advanced students in biology and related subjects. Extensive use is made of the marine forms such as Fundulus (killifish), starfish, etc., found in abundance at the Laboratory as research material. The plan of instruction followed has been adapted to the needs of beginning investigators, especial reference being placed on the idea of giving the student opportunity for first hand acquaintance with the types of living marine and other forms available as biological research material.

Research activities have included subjects of both practical and scientific importance. Among them the following are of interest.

The question of the rates of diffusion of different ions and molescules into and out of cells has been especially dealt with in connection with such important problems as those dealing with the question of potassium heart block. The manner in which heart cessation and recovery from potassium ions is brought about is of much practical importance since so little of the fundamental nature of such reaction is known at the present day.

Water balance of protoplasm and the factors underlying its regulation have been investigated, making use of the eggs of the marine fish, Fundulus. Interesting effects of common salts on these phenomena have been carefully studied and should add much toward a solution of such a fundamentally important problem.

The effect of such factors as osmotic pressure, temperature, etc., on the rate of heart beat have also been carefully studied and results obtained seem of value in learning further concerning the workings of the heart under the influence of such factors.

Studies have also been made on the action of certain poisons such as cyanide on protoplasm and heart action. At the present day little of a quantitative nature is known concerning the fundamental biological action of such chemicals.

Extracts of the pituitary gland, so extensively used in surgical practice have been studied in their relations to the contraction of the melanophores or pigment cells of certain marine fishes. These pigment cells are thought to act like smooth muscle cells of higher organisms and therefore information concerning their reactions to this important drug should add to a better understanding of its fundamental modes of action.

Research investigations of more immediate practical application are also under way, chief of which is a quantitative study of the action of chlorine on the starfish. No greater enemy to the oyster industry exists than the starfish. Some selective chemical method whereby the starfish could be

killed without injury to the oyster would greatly aid in a more economical cultivation of the oyster.

B.

The Action of Pituitary Extracts on the Melanophores of the Fish, Fundulus.

Recent results of Kamm and his coworkers on the isolation and physiological reactions of the oxytocic and vasopressor substances of pituitary extract have made it desirable to apply these substances to the reactions of the melanophores of isolated scales of Fundulus heteroclitus. Spoeth has shown that dilute commercial pituitary extract causes rather marked contraction of the melanophores of Fundulus. By use of technic similar to that of Spoeth's, the action of the following extracts on the melanophores of isolated scales has been tested;—acetone desiccated anterior lobe; acetone desiccated whole gland; acetone desiccated posterior lobe; unpurified pituitary extract; alpha hormone of Kamm and beta hormone of Kamm. Results thus far obtained have been quite striking. Chloretone containing extracts as pointed out by Spoeth, cannot be satisfactorily employed due to the action of the chloretone on the melanophores. Tenth normal NaCl solutions, without chloretone and in various dilutions have been used. Whole gland extracts give immediate and marked contractions of the melanophores; extracts of anterior lobe, posterior lobe, alpha and beta hormones of Kamm all gave negative reactions (no contraction of melanophores). Spoeth's striking positive results with pituitary extracts were probably due to the fact that his experiments were carried out with extracts of whole glands. Adrenalin in all dilutions produces rapid contraction of the melanophores.

Prof. Brown's Report

The investigations carried on during the summer of 1929 dealt with certain aspects of the general problem of the nature of the responsive mechanism of heart and skeletal muscle cells. When cells of this type are stimulated the most obvious response is the contraction of the muscle cell. If, however, suitable analytical methods are employed, the response of the cell is shown to consist of a whole group of closely associated processes following each other at definite intervals. Three distinct phases may be recognized in this system, (1) a group of processes localized at the point of stimulation, (2) a rapid series of changes progressing throughout the cell and similar to the nerve impulse. This is referred to as the propagated disturbance and is indicated by the bioelectric variation, and (3) the contraction of the cell beginning subsequent to the arrival of the propagated disturbance at any point in the cell.

Associated with each of these phases are various processes which, although they may be analyzed separately, appear to be integral parts of the whole response. Thus with the first and second phases are associated chronaxia, the bioelectric variation, the conduction of the propagated disturbance, the absolute refractory period, and other phenomena. With the third phase comprising the contraction of the muscle are associated the

latent period of contraction, the duration of the contractile phase, the duration of the relaxation phase, the tension developed and the heat production.

Considerable evidence exists that these processes are not independent processes but rather that they are interdependent processes varying as a function of the state of some intracellular component. Lillie ('23), Fulton ('26). It is evident that the exact nature of this interdependence between the processes is essential to any elucidation of the muscle mechanism. For the determination of this relation however it is essential to have some sort of systematic treatment of the kinetics of various individual processes. The investigation of the kinetics of these processes has been in progress for some time in other laboratories. At this laboratory the kinetics of the contraction of the sartorius muscle of the frog was chosen for investigation, since the vibrationless construction of the laboratory facilitated the use of apparatus whose stability is very difficult to control.

The immediate investigation has as its object the kinetics of the contractile process in muscle as revealed by the record of the isometric response. Since the success of such an analysis depends entirely on the accuracy with which the recorded response follows the response of the muscle cell itself, the present work has dealt entirely with the recording system. An analysis has been made of the part played by the mechanical properties of the recording apparatus on the shape of the record of a single muscle twitch.

The results show that the mechanical properties of the recording system play a considerable part in determining the shape of the recorded response. An accurate description of the effects will not be described at present since they are of significance only with reference to the results of other experiments now in progress on the effects of changes in the speed of contraction in muscle on the shape of the recorded response.

Doctor Conard's Report

During the summer of 1929 considerable progress has been made on the Description of the Vegetation of Cold Spring Harbor and Vicinity. Additional data have been collected and the plant societies and successions have been mostly outlined. The major work centered on the correlation of the moss flora with the societies of higher plants. This was made possible by the addition to the staff of Dr. A. J. Grout, distinguished specialist and author of books on mosses. Dr. Grout was at the Laboratory from June 29 to July 13. During this time intensive work on mosses was carried on, Misses Blagg, Bober and Lawton, and Dr. A. W. Blizzard also devoting their whole time to the work. Over 100 species of true mosses (Bryales) were collected and identified. Miss A. E. Blagg continued this work and enabled us to list the mosses of all the plant societies studied. Some of the more difficult material, and that collected toward the end of the session will be identified during the winter. Miss Frances Bober assisted in preparing a key to the mosses found here, and a systematic list with keys to species. Miss Elva Lawton, M. A., prepared a key to Hepatic mosses of Cold Spring Harbor, a group to which she gave special attention throughout the summer. She also carried forward her researches on the gametophytes of ferns.

Miss Blagg and Doctor Conard have noted wherever available the mosses that accompany the germination of seeds of Rhododendron (including Azalea). Further studies in this line should help to an understanding of the conditions required by these difficult seedlings.

Miss Ruth Patrick carried out a series of soil tests for hydrogen-ion in plant communities that had been carefully studied floristically. Her suggestive findings may furnish material for immediate publication, or may be held for additional data.

Dr. Frank Thone of Science Service, Washington, D. C., lectured before the class on the measurement of the water of soil and air, and conducted a field trip for the discussion of research problems and methods in this field.

Dr. A. W. Blizzard has assisted the class in all of the longer field trips, and on the making of transects. He has worked on the mosses with Dr. Grout. Especially he has continued the successional studies on High Hill, collecting much additional data in the field, in the Historical Library at Huntington, and from persons who have long known the area. By securing certain maps and making additional transects and diagrams, he has practically completed the studies begun last summer and reported orally to the Ecological Society of America at the New York meeting last Christmas.

"A Third Survey of a Long Island Salt Marsh" by Henry S. Conard and Gladys C. Galligar appeared in Ecology for July, 1929, pages 326-336. The data for this were taken and the paper written almost wholly by Miss Galligar, a member of last year's class in Field Botany, and of the Zoology Class of 1927. Two hundred copies of the paper were purchased by the Laboratory.

Papers are in preparation for early publication on Funaria flavicans, on Bruchia and Pleuridium and a puzzling form related to them, as well as a list of all the mosses collected this summer at the Laboratory. This will serve as a check-list for future workers. Dr. Blizzard's general paper on High Hill will be completed before another summer.

One of the most important results of the summer's work has been the clarification of our thought on the nature of vegetation, the classification of plant communities, and the evaluation of the methods of study of European and American ecologists.

Doctor Corner's Report

My work at the Laboratory during the summer of 1929 consisted first of teaching the course in Surgical Methods in Experimental Biology.

In addition I carried on experiments on the cause of lactation in rabbits and experiments on the transportation of ova in rabbits. Thus far the results of these experiments are incomplete.

Mr. Daniel's Report

An attempt was made to free the sporozoites from developed oocysts of Eimera perforans. The method used:—Free oocysts from caeca material

by flotation in saturated solution of sodium chloride. Wash several times with tap water and allow to develop in 1% chromic acid at 35-37 degrees C. The developed oocysts were treated with pepsin solution at 37 degrees C, for varying periods of time, washed with distilled water and treated with trypsin solution at 37 degrees C. for equal and longer periods. This treatment had no effect on the oocyst wall except a slight crenation which can be produced by the addition of a dilute acid (HCl.).

Mr. Dow's Report

I was primarily engaged in field work on wasps. Most of my time was spent collecting about the Laboratory, but I also made some observations on the habits of Polistes and collected nests for a study of the color variation in the common species.

Dr. Fricke's Report

The Biophysical 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. All these units have been equipped and put in working order during the year. Part of the equipment has been purchased, but a variety of special apparatus not commercially available had to be designed and built in the shops. This includes apparatus both for apparatus within this category are: a generating outfit for the production the technical shops and for the scientific laboratories. Larger pieces of of the high potentials needed for operating the X-ray tubes; apparatus for the building and evacuation of X-ray tubes; apparatus for measuring X-ray dosage in the international r-unit; apparatus for the measurement of the electrical resistance and capacity of biological cells at different frequencies.

One of the main lines of work of the laboratory is an investigation of the physical principles underlying the action which X-rays have on the living cell. This action may be considered as due to minute chemical changes produced by the rays in the cell. Very little is known about the laws for the chemical action of X-rays and it is planned consequently to start investigating this field systemically. Various special chemical methods to be used in this investigation have been worked out, including the construction of special apparatus for gas analysis and apparatus for electric titration of highly diluted solutions.

The apparatus needed for studying the electrical resistance and capacity of biological cells have been finished and investigations of various kinds of biological materials have been started.

Doctor Grout's Report

At the suggestion of Dr. Henry S. Conard of Grinnell College, in charge of the courses in botany at the Laboratory, I was requested by the management to spend the two first weeks of July at the Laboratory as leader of a group making an intensive study of the moss flora of the region, with special reference to the ecological associations.

Ninety-five species were collected and identified and their associations noted. All of the group were agreed that the moss flora of an area is one of the best indications of ecological conditions.

The Lakes, especially the upper, were found to furnish an interesting and typical group of aquatic and subaquatic forms such as Drepanocladus, Sciaromium and Eurhynchium rusciforme (Neck.) Milde. Fissidens minutulus Sull., Dicranum pallidum B. & S., D. montanum Hedw. D. fulvum Hook, Drepanocladus Kneifii (B. & S.) Warnst, var polycarpos were added to the list of mosses recorded from this immediate locality.

The course closed with a popular illustrated lecture on mosses at Blackford Hall.

Doctor Harris' and Doctor Pfiffner's Report

The purposes of the experiments reported are, (1) to demonstrate the importance of the corpora lutea in maintaining pregnancy and, (2) the maintenance of pregnancy by means of luteal extracts in animals from which the corpora lutea have been removed at various stages during pregnancy.

As rats are being used as experimental animals, the entire ovaries are extirpated with the corpora lutea intact.

Extirpation of both ovaries from pregnant rats results in discontinuance of pregnancy with external evidence thereof (abortion or hemorrhage) appearing, on the average, 2.22 days after the removal of the second ovary (six animals). Nineteen animals treated with extract prepared according to Corner and Allen averaged 3.95 days to external evidence of the discontinuance of pregnacy after double ovariectomy.

With an extract prepared by one of us (J. J. P.) pregnancy has continued to term, thus far, in eleven of twelve experimental animals. Hot methyl-alcoholic extraction of fresh corpora lutea (sow) serves as the basis for the preparation of the most active extracts thus far tested.

Doctor Hollander's Report

The immediate problem with which I am at present concerned is the cellular mechanism of gastric secretion, as evidenced by the properties of the pure gastric juice obtained from dogs' auxiliary stomach pouches, of the Pavlov type. My previous work in this field has been concerned with developing certain modifications in surgical procedure and method of collection of the juice, directed towards the elimination of mucous from admixture with the hydrochloric acid elaborated by the parietal cells. Such mucous-free gastric juice shows a surprising degree of uniformity in certain of its chemical characteristics. In fact, the degree of constancy and reproducibility demonstrated has already suggested, as a working hypothesis, a relatively simple physico-chemical mechanism for the formation of gastric hydrochloric acid.

The work of the past summer is a continuation of the above. Several Pavlov pouch dogs were prepared for the purpose of collecting gastric juice by the modified technique. When a sufficient quantity of this secretion has been obtained, its chemical composition and physico-chemical properties

will be investigated in greater detail. As a result of these studies it is hoped to arrive at a clearer understanding of the secretory process in general as a normal cellular activity of certain types of tissue.

Simultaneous with the above problem, a condition of gastric hypersecretion in dogs has been under investigation, particularly in relation to its etiology and control. This question is of more immediate clinical interest, than the other more basic problem, and it is planned to carry the investigation into the hospital as soon as results with experimental animals justify such a procedure.

Mr. Huggins' Report

Investigation of the morphological changes in the pupal stage of Drosophila melanogaster. In the diptera many of the structures of the larva disintegrate and the imaginal structures are formed anew from imaginal discs during the pupal stage. Work has been done on the development of external characters, specially by Mr. Tsi-Yin Chen, who worked at The Biological Laboratory a few years ago. This study, however, is confined to the internal changes, especially in the alimentary canal and reproductive system. Some of the work was done during the past two summers at The Biological Laboratory. During the summer of 1929, the morphological changes in the alimentary canal and reproductive system were traced by means of series of longitudinal and cross sections for the first two days of the pupal period.

Doctor Jenkins' Report

The most pressing problem that confronts us today in the study of embryology is that of evaluating and interpreting the phenomena involved in the development of a highly complex organism from a relatively undifferentiated fertilized ovum and, especially, to understand the principles which underlie these phenomena.

In the attempt to understand the very early stages in the organization and differentiation of cells and tissues in embryogenesis one must turn from the complex higher animals to the relatively simple forms from which the gametes can be secured, fertilization induced at will and the developing zygote kept in its normal environment, yet under conditions that will permit one to observe the changes which the units undergo from fertilization to completed development, all under the absolute control of the investigator, who can time his material, stop or modify development at any stage with the assurance of unlimited material with which to work.

The necessary conditions outlined above can only be secured at marine laboratories, such as we have here at Cold Spring, where to the natural advantages of environment are added the artificial ones of adequate facilities and equipment for carrying on such investigations.

It is planned to study the more fundamental, beginning stages of body building in these simple animals. Stages where such tremendous results follow such apparently simple things as the maturation, organization and division of relatively undifferentiated units, in the hope that we may secure an insight into the structural and functional history of development in its

chronologic sequence in these simpler forms in order that we may use this record as a measuring stick in the study and interpretation of the changed and vastly more complex conditions found in the higher animals, especially the human, where it is possible to secure only a few specimens and those in more advanced stages of development.

Thus far the work has been confined to the morphologic study of fish embryos, principally Fundulus, and starfish, supplementing avian and mammalian material. Later it is planned to employ experimental methods, operative procedures and such to check up the various normal and abnormal conditions that have been observed.

Evidence gained from the study of a series of accurately timed Fundulus embryos that have been sectioned and stained points to two interesting features, the one the precocious development and the tremendous size, relative, of the early neural tube. The other what appears to be a decided modification of the germ-ring theory of development of the blastula. A further study is being made, using added material and wax reconstructions, of the differentiation of nerve tissue as well as to determine positively the behavior of the blastula.

Doctor Kimball's Report

The preliminary work necessary to determine stages in the development of the venous system in Cryptobranchus alleghaniensis was undertaken and accomplished this summer. The embryos used in making this investigation were supplied by Prof. B. G. Smith, New York University and Bellevue Medical College.

Development of the vena abdominalis is to be the first problem for investigation. The abdominal vein or veins of amphibia and reptilia have long been considered to be the lateral abdominal veins of elasmobranchs and the umbilical veins of the higher vertebrates. Hochstetter ('94) has given a brief description of the development of the abdominal vein in Salamandra maculata. Stromsten ('05) has shown that the abdominal veins of turtles are derived from three anlages.

By the study of a more carefully graded series of embryos, a more complete description than that of Hochstetter's of the development of the abdominal vein can be obtained. Five embryos and larvae were cut, sectioned and stained. These embryos measured 16.5mm (14 days before hatching), 24mm (10 days before hatching), 29.5mm (2 weeks after hatching), 30mm (6 weeks after hatching), and 36mm (9 weeks after hatching). The abdominal vein was not present in the first two stages mentioned but was well developed in the last three stages. Stages collected about the time of hatching will be necessary to finish this study.

Doctor Kleiner's Report

This summer I have continued the work which I reported to you a year ago and which I have been doing during the past winter. This year I have been so fortunate as to have two of my students act as assistants, Messrs. Harold Birnkrant and Theodore Rothman. With their help and

the improved facilities placed so generously at my command, I have obtained more results than last year.

Starting with the observations made a number of years ago that diabetic blood-sugar dialyzes more slowly and irregularly than glucose added to normal blood, we have first attempted to ascertain whether insulin would modify the diabetic curve. The answer is in the negative. In fact, a concentrated potent preparation of dry insulin, added to diabetic blood has either no effect or accentuates the abnormal curve. This result is in harmony with that of all other experimenters, thus far, upon the action of insulin upon blood in vitro. Undoubtedly this hormone acts upon some organ, directly or indirectly, rather than upon the sugar of the blood.

We have also done some experiments in continuation of work which Dr. Marion Bell and I started. In this investigation we find that a brief dialysis of diabetic blood causes the blood sugar, thereafter, to fluctuate in a very curious manner and to a marked degree. We are not in a position to interpret these results as yet, and intend to continue this line of work intensively.

Both of the above mentioned investigations were reported by Dr. Marion Bell and myself at the XIIIth International Physiological Congress.

In addition to the major subjects of our experimentation, we had one or two minor topics under consideration. These were begun late in the season and will be continued.

It is my hope to publish our dialysis work as two or three papers in the near future. There is some experimental work still to be done before publication, but I hope to accomplish this soon.

May I take this opportunity of again thanking you and the Board of Trustees for the opportunity to continue these investigations in such pleasant and stimulating surroundings.

Doctor Kornhauser's Report

My work was a continuance of the study of the ovarioles of the seaside earwig Anisolabis Maritima Bonn. Previously by using fixed material and by smear methods the chromosome cycle, although somewhat complex and unusual, was satisfactorily worked out. By special fixation and staining the phenomena accompanying the differential mitosis of the final oogonial generation into sister cells of different potentialities, that is oocyte and nurse cell, were demonstrated. The changes in these sister cells in the growth of the oocyte have been the subject of investigation for the past year. The formation and growth of yolk spheres, the formation of fat and the accumulation of glycogen have been studied by a large variety of methods and special attention has been paid to the nuclear changes which accompanied the increase of cytoplasmic inclusions. The probable role of Golgi apparatus in the formation of yolk is being studied in osmium, silver and cobalt impregnated material Most recently vital stains were used to check up results obtained on fixed material and to add new facts. These dyes included neutral red, janus green, methylene blue, trypan blue and Nile blue sulphate. These, dissolved in a specially modified Ringers solution, were injected into the body cavities of the living insects. After twelve

hours and up until two days from the time of injection, the ovaries were removed and placed in life slides, sealed and studied under the microscope. The rythmic contractions of the ovariole sheaths continued for as much as two days in these preparations. The entrance and accumulation of the dyes in the amoebocytes, the follicular cells of the oocyte, the oocyte itself and the nurse could be clearly observed. By this study it is hoped to arrive at a better understanding of the factors involved of the oocyte.

Miss Lawton's Report

Regeneration In Ferns

Spores of eight different species of Filicales were collected in the region of Cold Spring Harbor. These were planted either on sterile Shive's solution or on agar containing Shive's solution. Sex organs and sporophytes have been produced on five species and the leaves of the young sporophytes cut off and put on the nutrient solution to bring about regeneration. Regeneration or the production of gametophyte tissue from sporophyte tissue without the formation of spores, has taken place in twelve different leaves. Some experiments on the separation of sexes in the gametophyte of Osmunda regalis were continued.

Miss Montgomery's Report

My research consisted of a study of the female mammalian reproductive cycle with special reference to the glandular secretions modifying it. This work was carried on under the guidance of Dr. G. W. Corner. By means of the vaginal smear method observations were made of the normal estrous cycle in female albino rats. The effects of pregnancy and of bilateral oophorectomy on the cycle were noted. Spayed female rats were injected with the Parke-Davis preparation "Estrogen" and reappearance of estrous was noted. In connection with this work a general bibliography of the subject was prepared.

Miss Palmer's Report

Investigation for the Control and Elimination of Starfish on Oyster Beds

This investigation was carried on under the direction of the United States Bureau of Fisheries, with the purpose in view of determining a practical and efficient means of destroying the starfish on oyster beds by studying its life history, habits and reactions to chemicals.

At the present time a few of the oyster growers go to the expense of operating a star mopping boat at a cost approximately fifty dollars per day in order to keep their own grounds clean and free from this pest. The usual procedure is to drag over the bottom a large mop of heavy cord in which the starfish become entangled, and can be hauled on deck and killed by submerging the mops in vats of boiling water.

This practice has been carried on for years but it has not done much to reduce the starfish menace as there are extensive rocky and shallow inshore areas that are ideal for starfish growth and propagation where the use of mops is an ineffective and expensive operation.

The Biological Laboratory at Cold Spring Harbor was chosen for these investigations because the conditions are ideal for a study of the starfish throughout its life history as well as being accessible to all the oyster beds of Long Island Sound. The laboratory facilities enabled the chemical experiments to be carried on with accuracy.

It has been found during this investigation that the starfish of Cold Spring Harbor spawn during the first and second weeks of July and the minute stars set on the grass and shells during the first two weeks of August. The knowledge of these dates and the fact that mature stars seem to migrate to warm inshore waters to spawn give a clue as to the best time for eradication. In the course of the experiments records were kept of rates of growth for both adults and larval starfish, so that the conditions of the gonad development, feeding habits and time of maturity would be known. Starfish lay mature eggs capable of cleaving during the third growing season therefore it is extremely important that some method be developed to destroy the young starfish.

As a result of extensive work on the effect of various chemicals on small starfish of one and two growing seasons, it was found that the use of free chlorine gas is not a practical method of killing. The effect of various salts were tried and the starfish showed itself resistant to all but copper sulphate. This salt may be used in as high concentrations as 200 parts per million without seriously injuring anything but algae. Starfish are sensitive to 10 parts per million, individuals dying, and all small ones die in 50 parts per million.

It is planned to continue these experiments next summer and to test the practical value of these results in the control and elimination of starfish on oyster beds.

Doctor Ponder's Report

An investigation on certain characteristics of the blood of fishes was commenced, the material being principally supplied by the trout hatcheries at Cold Spring Harbor. Figures were obtained for the red cell dimensions, red cell count, haemoglobin content, and white cell count of about one hundred specimens of various types of fish, and these figures will be used as a basis for a more complete study to be undertaken at a later date.

Doctor Salant's Report

The investigations which were carried on during the summers of 1927 and 1928 on the action of mercury, with the assistance of Mr. Keeve Brodman, have been published under the following titles:

The effect of mercury on cardiac inhibition, by William Salant and Keeve Brodman. J. Pharm. and Exp. Ther. 1929. XXXVI, 195.

The effect of mercury on intestinal motility. William Salant and Keeve Brodman. J. Pharm. and Exp. Ther. 1929, XXXVII, 55.

Functional changes in the autonomic system and the action of mercury. William Salant and Keeve Brodman. J. Pharm. and Exp. Ther. 1929, XXXVII, 129.

I also presented a paper before the XIIIth International Congress of Physiology, held in Boston in August, 1929, on Pharmacological and Physiological Studies on the Autonomic Nervous System.

Although considerable time and energy were consumed in moving the laboratory to the new quarters and in equipping it for carrying on investigations throughout the year instead of the summer only, I am nevertheless able to report that much progress has been made on the problems investigated in the laboratory. One research dealing with the action of ergotamine on intestinal motility is practically finished and will be ready for publication before the end of the present year.

Considerable data have been accumulated on factors modifying the action of mercury. It is hoped that within another few months the results will be ready for publication.

Investigation on the effect of diet and studies on blood calcium in relation to drug action are in progress.

Doctor Smith's Report

The research on blood which was carried on in the Biological Laboratory was a part of a program which had for its purpose the study of the blood-cell picture in normal women. The particular phase which was studied during the summer pertained to the red corpuscles.

Total red blood-cell counts and haemoglobin determinations were made during eight hour periods from 8 A. M. through 3 P. M., 4 P. M. through 11 P. M., 12 M through 7 A. M. Within these periods there were no fluctuations outside of the error inherent in the method employed. The more precise the technique, the smaller were the coefficients of variation for the eight hour periods. The coefficients were less than one per cent when the technique was most accurate. This accuracy of technique was tested by the application of simple statistical methods using the means, the standard deviations and their probable errors. There seemed to be no significant differences in the peripheral blood picture due to the time of day, rest, moderate activity or food as far as the red cell content was concerned. Counts were made on persons at rest and at laboratory work, on days when food was omitted and on days when all meals were eaten. During days of ordinary activity and through the night, the red count remained remarkably constant. Changes which were noticeable when counts were taken for successive days over a long period of time did occur, however, in the red counts. These variations may be of fundamental importance in the study of the life history of the red corpuscle. As a part of the work on white cells, counts were made at the same time in order to gather more data in regard to the basic pattern or rhythm of the white cells during the twenty-four hour day and the variations which could occur in that pattern.

Doctor Sparrow's Report

During the past summer session the investigation of the Phycomycete flora of the Cold Spring Harbor region was continued. Several forms hitherto not observed in the region were found. The most noteworthy find was that of the non-sexual stage of Aphanomyces phycophilous

DeBary. This fungus was first seen by DeBary and described on the sexual stage alone. As the method of non-sexual reproduction determines the genus in this group of fungi, until now, the position and exact identity of DeBary's fungus has been in doubt. Of added interest was the fact that the fungus was found parasitic on Nitella sp. (?), a host hitherto unreported as being attacked by it.

Upon the suggestion of Mr. Henry Hicks, notes were taken on the drought-resisting ability of plants growing in various habitats near the Laboratory. The extraordinary lack of rain on Long Island during the past summer afforded an unusual opportunity for such a study and it is hoped that for purposes of comparison, an examination of these same localities will be made next summer under what may be expected to be more normal conditions.

Mr. Sturdivant's Report

Kinetic Elements of Somatic Cells

The relationship between the basal granules of ciliated cells and the centrioles of dividing cells has long since been a subject of discussion. There are several schools of thought as to the origin and behavior of the granules. Possibly the most accepted one at present is that the basal granule is partitioned off from the centriole after the division of the cell is completed. This view is held by many authors but in no case do they present definite proof. Text books give a number of definite statements about these structures but they seem to be handed down from old ideas formed in the early history of cytology.

It is with this in mind that this problem is attacked. Considerable material was experimented with to obtain the one to give the best results, that is a cell in which there are not many other granules to get confused. The ependymal cells were found to lend themselves most perfectly to this, especially those of the mouse.

The material was placed in killing fluid immediately after being dissected out in Ringer's solution. The killing and fixing fluids used were Corrosive Sublimate with and without Acetic acid. Zenkers, Bouins and Allen's modification of Bouins, and Osmic Acid. All yielded similar results but all in all Corrosive Sublimate was the best. The stain used was Iron Haematoxylin for this yielded constant results after all fixations.

In the ependymal cells of the mouse these granules are very large, the number very small—thus their history can be followed closely. They are mostly doubled or dumb-bell shaped and are more or less arranged irregularly along the canal surface of the cell. From each of these granules is extended a long cilium into the spinal canal. The origin of these granules was then sought and it was found necessary to go far back into the early development of the mouse. Between the twelfth and fourteenth day embryo they were found to make their first appearance. The cells in which these granules are found are those lining the neural canal. They are never found in the cells distal to these or those undergoing division. After the cells have once migrated in and are lining the canal they show little or no evidence of dividing again. At first only one or two of these granules can

be found in a cell; in successively later stages they are more numerous. In a number of cases what was interpreted as division was observed. At this stage the granules are located at random in the cytoplasm usually between the nucleus and the canal surface of the cell. Here can be seen rhizoplast growing out from them in the direction of the canal. These granules then begin to migrate toward the surface of the cell and about the seventy-two hour old adult the cilia have grown out into the canal.

In order to trace the relationship of these granules to the centrioles it was necessary to get a complete history of both; so the division of cells was followed through the successive stages observing the centrioles. They were present and conspicious up to and through the telophase stage, after then no trace of them could be found. Neither could the basal granule be found until the cell had taken its place as one lining the canal. During the time between the disappearance of the centriole and the appearanc of the basal granule no trace of any granule could be found that would in any respect answer for the centriole, a part of it or a basal granule.

This work was repeated on ependymal cells of Amblystoma larva and the epididymis of the mouse and the same results obtained. The work is to be continued on other types of ciliated cells before any conclusions are drawn.

Doctor Swingle's and Doctor Pfiffner's Report

The extraction work on the suprarenal cortex carried on at Cold Spring Harbor during the summer of 1929 was highly successful. The following points were determined. The extract is highly potent and when injected into double adrenalectomized cats in small doses will keep them alive and in excellent condition forty or fifty days. The extract is stable in 95% ethyl alcohol for over a month, and when refined further and made water soluble will be ready for testing on human beings with Addison's disease.

The extract is now refined to the extent that it is soluble in water but has not yet been tested on double adrenalectomized animals. This will require several months of careful work and by spring we should be in a position to try it on human beings.

Extraction and testing of hormones is tedious work and requires much time and effort. Nothing can be accomplished within a few months time considering the fact that to date nothing is known of the function of the suprarenal cortex.

Prof. Sykes' Report

I present the following brief statements of my work at the Laboratory in addition to teaching this summer.

A considerable amount of time was given to systematic work in connection with the identification of species, new or uncommon at Cold Spring Harbor.

Ecological studies consisted, on the one hand, of classifying the fauna and plotting the habitat zonation of two new collecting stations, Duck Harbor, and Nissequoque Creek. On the other hand a study of the repro-

ductive succession of the inner harbor was begun. Samples of the plankton collected at successive periods I am taking with me to work on during the remainder of the summer.

As to reasearch, I have continued work on the problem of abnormalities of the heart of certain mammalian embryos. In addition, I began the investigation of the suitability of Eurycea bislineata (a lungless salamander) for brain surgery and other problems of experimental nature.

Doctor Waggener's Report

A Comparative Study of the Oxidase Content of Animal Tissues

It appears quite certain that the metabolic rate of an animal represents the sum total of the metabolic potentialities of the various tissues which go to make up the organism. It is well known that the underlying chemical reaction involved is one of oxidation. An intracellular organic catalyst speeds up this reaction so that it progresses rapidly at body temperature, or slightly less than body temperature. (Dye and Waggener '27) This enzyme has the power of hastening the chemical reaction of certain dyes in vitro where the rate can be measured quantitatively and the value so obtained may be used as an index to the oxidizing power of the tissue in question. Different tissues from the same mammal show a pronounced difference in oxidase content. (Dye and Waggener '27).

The preliminary results from a camporative study of the oxidase content in such diverse groups as the mammals on the one hand and certain marine forms (fish, crabs, and mollusca) on the other, show a very pronounced difference in the power of this catalyst. These findings are in accord with the fact that mammals in general are capable of maintaining a body temperature above that of the environmental medium in which they live and might, therefore, be expected to possess among other things a more efficient oxidation mechanism. There is some ground for expecting that, inasmuch as oxidation processes are of prime importance in growth and health, the power and quality of the oxidation system employed in any instance is closely linked with such important considerations as growth, health, sex, and differentiation; and that it may also deserve careful consideration as an intrinsic factor in organic evolution.—This is not a final report.

Persons in Residence at the Laboratory in 1929

In Addition to Members of the Staff

Name	Registration	Institution	
Harold Birnkrant	R.	New York Homeopathic Medical College and Flower Hospital	Undergraduate
Amy Elizabeth Blagg	R.	Iowa State College	Instructor
Frances Bober	R.	Adelphi College	Graduate
Harriet M. Boyd	F. Z.	Middlebury College	Instructor
Keeve Brodman	R.	Cornell Medical College	Undergraduate
D. E. S. Brown	R.	New York University, Washington Square	Assist. Prof.
Bettina Bryant	F. Z.	Smith College	Undergraduate
J. E. Bryant	R.	University of Georgia Medical School	Undergraduate
Rev. E. J. Calhoun	F. Z.	John Carroll University	Professor
Donald F. Chichester	F. Z.	Rutgers University	Und'rgd. Ass't
Lenore Cisney	F. B.	Dickinson College	Undergraduate
Rebecca Conard	F. Z.	Grinnell College	Undergraduate
Richard P. Dow	R.	Bussey Institution	Graduate
Dorothy L. Dreikhorn	F. B.	Smith College	Undergraduate
John S. Dziob	F. Z.	Brown University	Grad. Assist.
S. I. Dykshorn	R.	University of Iowa	Undergraduate
Leon Ehrlich	R.	Cornell Medical College	Undergraduate
Gifford C. Ewing	F. Z., E., R.	Yale University	Grad. Assist.
Samuel Galburt	R.	New York Homeopathic Medical College and Flower Hospital	Undergraduate
James H. Gaul	F. Z.	University of Pittsburgh	Undergraduate
Harriet M. Gay	F. Z., E.	Spelman College	Instructor
Charles Hodge, Jr.	R., E.	University of Pennsylvania	Graduate
Franklin Hollander	R.	New York Homeopathic Medical College and Flower Hospital	Assist. Prof.
John R. Huggins	R.	University of Pennsylvania	Instructor
George B. Jenkins	R.	George Washington University	Professor
Pauline Kimball	R.	University of Delaware	Professor
Nila G. Kirkpatrick	G. P.	Ohio Wesleyan University	Graduate
Gordon M. Kutchka	F. Z.	University of Pittsburgh	Undergraduate
Elva Lawton	R.	Hunter College	Instructor
W. J. Leach	S. M., R., E.	Temple University	Instructor
Elizabeth Lewis	S. M., R., E.	Sophie Newcomb College	Undergraduate

E.:Indocrinology.
F. B.:Field Botany and Plant Ecology.
F. Z.:Field Zoology.
G. P.:General Physiology.
S. M.:Surgical Methods in Experimental Biology.
R.:Research.

Name	Registration	Institution	
John McCleod	R.	New York University	Und'rgd. Ass't
Blanche B. Montgomery	S. M., R., E.	Ohio Wesleyan University	Und'rgd. Ass't
Willie Agnes Morgan	F. Z., E.	Coker College	Under. Assist.
Floyd R. Nevin	G. P.	Temple University	Instructor
Edmund Overstreet	G. P.	Yale University	Undergraduate
A. Louise Palmer	R.	University of Pennsylvania and United States Bureau of Fisheries	Graduate
Ruth M. Patrick	F. B., E.	Coker College	Und'rgd. Ass't
Eric Ponder	R.	New York University, Washington Square	Professor
Dorothy Rasch	F. B., E.	Barnard College	Undergraduate
Priscilla Rasquin	R.	Mount Holyoke College	Und'rgd. Ass't
Ruth C. Raynor	F. B.	Adelphi College	Undergraduate
Edith Rogers	R.	University of Pennsylvania	Grad. Assist.
Theodore Rothman	R.	New York Homeopathic Medical College and Flower Hospital	Undergraduate
Eva Saper	F. B., E.	Barnard College	Undergraduate
Marian G. Smith	F. B.	Adelphi College	Undergraduate
H. P. Sturdivant	R.	Columbia University	Grad. Assist.
E. S. Tauber	S. M., R., E.	Yale University	Undergraduate
Magdalen D. Tuttle	F. Z.	Pennsylvania State Teachers College	Graduate
Reginald Voorhees	F. Z.	Maryville College	Undergraduate
Roy A. Waggener	R.	Carleton College	Professor
Sarah S. Walden	F. Z., E.	Yale University	Graduate

E.:Endocrinology. G. P.:General Physiology.
F. B.:Field Botany and Plant Ecology S. M.:Surgical Methods in Experimental Biology.
F. Z.:Field Zoology. R.:Research.

THE LABORATORY STAFF

*Reginald G. Harris ..... Director, The Biological Laboratory
Physiology of Reproduction

*Hugo Fricke ..... The Biological Laboratory
Biophysics

*William Salant ..... The Biological Laboratory
Pharmacology

J. J. Pfiffner ..... The Biological Laboratory
Research Associate, Chemist

W. W. Swingle ..... Professor of Zoology, Princeton University
Endocrine Biology

H. S. Conard ..... Professor of Botany, Grinnell College
Field Botany and Plant Ecology

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

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

George W. Corner, Professor of Anatomy, University of Rochester School of Medicine and Dentistry
Surgical Methods in Experimental Biology

C. T. Brues ..... Bussey Institution, Harvard University
Field Zoology

Justin Andrews, Associate in Protozoology, School of Hygiene and Public Health, Johns Hopkins University
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J. S. Nicholas ..... Assistant Professor of Zoology, Yale University
Research in Embryology

W. J. V. Osterhout ..... Rockefeller Institute for Medical Research
Research in Physiological Botany

Asa A. Schaeffer ..... Professor of Zoology, University of Kansas
Research in Protozoology

W. J. Crozier ..... Professor of General Physiology, Harvard University
Research in Physiology

Christianna Smith, Associate Professor of Zoology, Mount Holyoke College
Research in Physiology

I. S. Kleiner, Professor of Physiological Chemistry, New York Homeopathic Medical College and Flower Hospital
Research in Physiological Chemistry

*In residence throughout the year.

Felix Bernstein, Director des Institut fur Mathematische Statistic der Universitate Goettingen
Guest Investigator

Erwin Saxl ..... Vienna, Austria
Guest Investigator

George F. Sykes ...Assistant Professor of Anatomy, Tufts Medical School
Associate in Field Zoology

A. J. Grout ..... The Biological Laboratory
Research in Botany

A. W. Blizzard ..... Professor of Biology, Coker College
Research in Plant Ecology

Frederick K. Sparrow, Jr. .... Department of Botany, Dartmouth College
Assistant in Botany

*Martha Washburn ..... The Biological Laboratory
Chemist

*Dorothy Newman ..... The Biological Laboratory
Technician

*Axel Hempel-Hansen ..... The Biological Laboratory
Chemist

*Harold Nagler ..... The Biological Laboratory
Technician

*R. W. Asmussen ..... The Biological Laboratory
Chemist

*K. Miyamoto ..... The Biological Laboratory
Chemist

George E. Daniel, School of Hygiene and Public Health, Johns Hopkins University
Chemical Supplies

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

*Catherine H. Robertson ..... Executive Secretary
*Catherine Brown ..... Secretary
*Frank Allen ..... Carpenter and Boatman
*Thomas Wheeler ..... Collector and Caretaker
*J. J. Force ..... Glass-Blower
*Christopher Henderson ..... Instrument-Maker
*D. M. Gallagher ..... Radio Engineer
*Henry Jordan ..... Animal Caretaker

*In residence throughout the year.

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