LONG ISLAND BIOLOGICAL ASSOCIATION

ANNUAL REPORT
OF
THE BIOLOGICAL LABORATORY

COLD SPRING HARBOR
LONG ISLAND, NEW YORK
1927

LONG ISLAND BIOLOGICAL ASSOCIATION

INCORPORATED 1924

ANNUAL REPORT

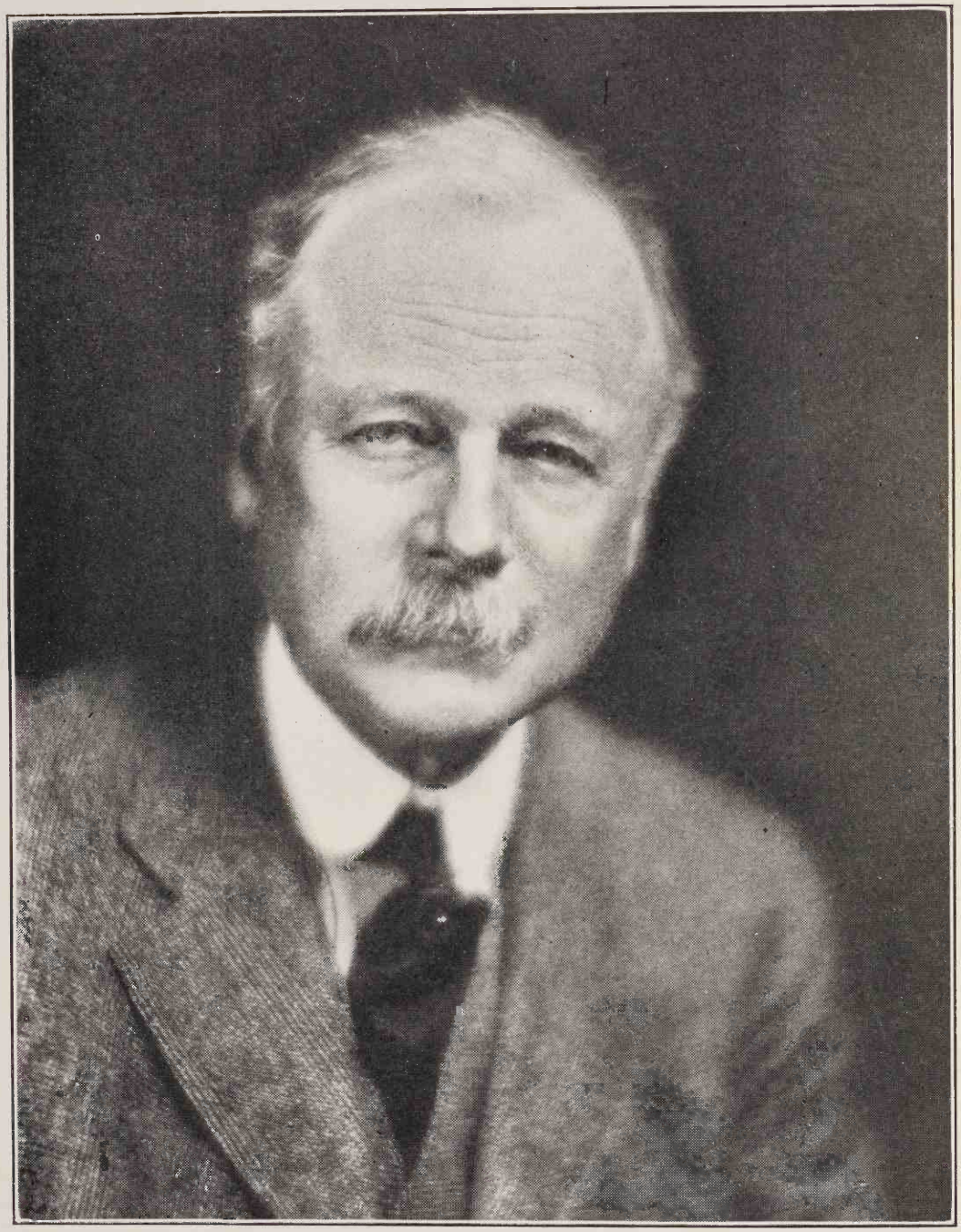
OF

THE BIOLOGICAL LABORATORY

FOUNDED 1890

THIRTY-EIGHTH YEAR

1927



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.

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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 present the following report for the year 1927.

It is impossible to review the procession of achievements of the year without experiencing profound enthusiasm and gratitude; enthusiasm for the accomplishments of the year and the prospects of the future, and gratitude toward those whose splendid help has made both possible.

Only four or five years ago the Biological Laboratory was a source of serious concern to its Director and other officers of that time. The question agitating these gentlemen was no less vital than whether or not the Laboratory could continue to exist. At present no question is farther from the minds of those interested in the welfare of the institution and the advancement of biological science. The question today has nothing to do with death. It is concerned with growth. How fast and in what direction can a healthy productive institution, The Biological Laboratory, best continue its development to accomplish its ends: the advancement of knowledge and of human welfare? The change in the nature of the problems confronting the Laboratory is the result of the increasing and far-sighted activity of its officers, the support of its friends, and the accomplishments of its scientific workers. These have been demonstrated in 1927 in a manner and to a degree far surpassing that of any previous year in the history of the Laboratory.

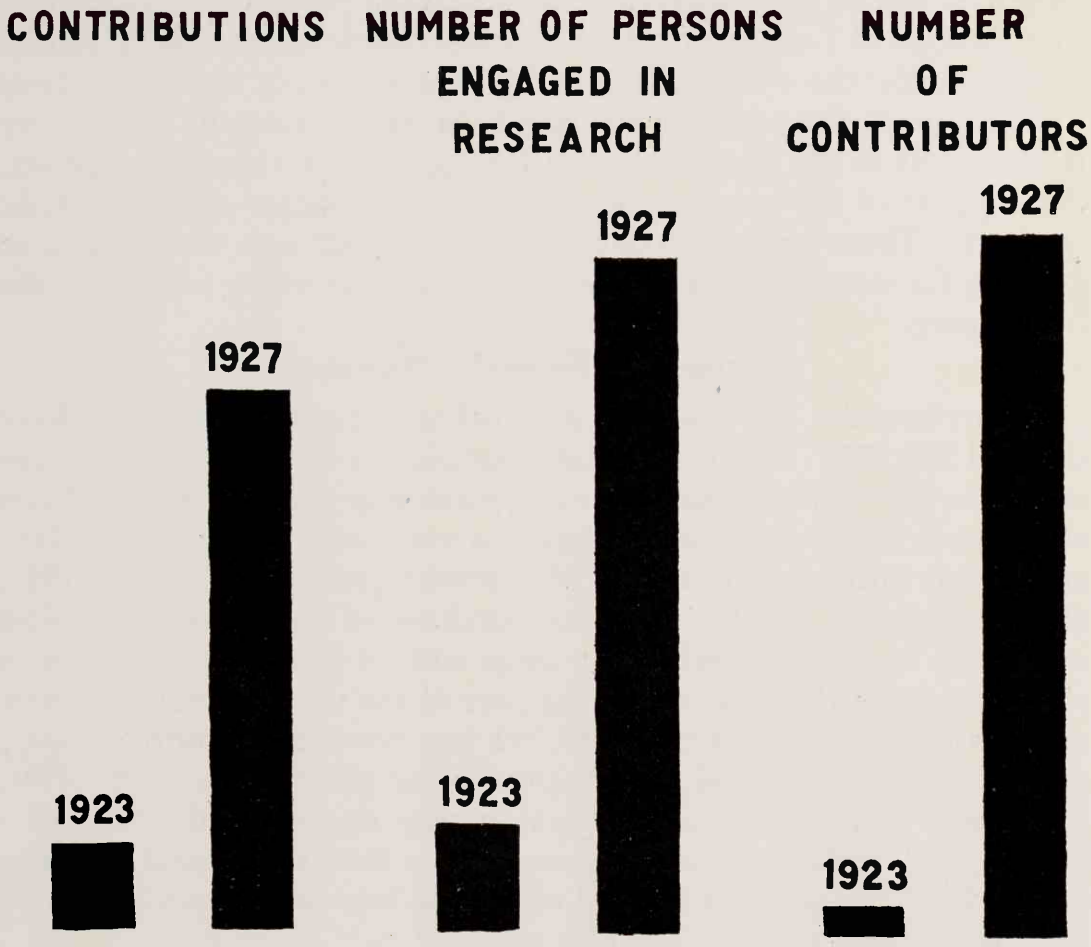
Increase in Financial Support

Contributions for research and other expenses this year have totalled $16,875. This is not a large amount in itself and by no means meets the demand made upon the Laboratory or the aims of the officers and friends of the Association, but it is very large, wholly significant and highly encouraging in comparison with previous years. In 1926, after completing the fund for the purchase of land, a special effort was made to obtain a relatively large sum in contributions to meet the expenses of the year, including part of the cost of erecting a new wooden building. As a result $9,092 was received in contributions, over and above the fund of $65,000 for the purchase of land. (Dr. Davenport and others took a leading part in raising the $65,000.) The $9,092, received in contributions was a marked increase over the $3,698.50 of the year before, and not a few wondered if we would be able to continue the progress this year.

In this connection Mr. Marshall Field suggested that the group supporting the Laboratory be still further enlarged and that the Laboratory Director spend even more time in promoting interest in the work of the Laboratory. The suggestion was accepted by other members of the Board of Directors. The suggestion was not in any way a shifting of responsibility. It was made with characteristic far-sightedness and with splendid faith in and appreciation of the Laboratory. As the highest possible indication of that faith and appreciation, Mr. Field, Mr. Arthur W. Page, Mr. Mortimer Schiff, and Col. T. S. Williams furnished the Director of the Laboratory with a number of letters of introduction to residents of the vicinity who, it was hoped, might become interested in the work of the Laboratory, and by their support aid in its upbuilding and in the advancement of its scientific work.

Explanation of Graphs

The first series of graphs shows the measureable growth of The Biological Laboratory as demonstrated by a comparison of the year 1923 with the year 1927. The year 1923 was the last year during which the Laboratory was under the control of the Brooklyn Institute of Arts and



Measurable Growth As Demonstrated By A Comparison Of The Year 1923 With The Year 1927

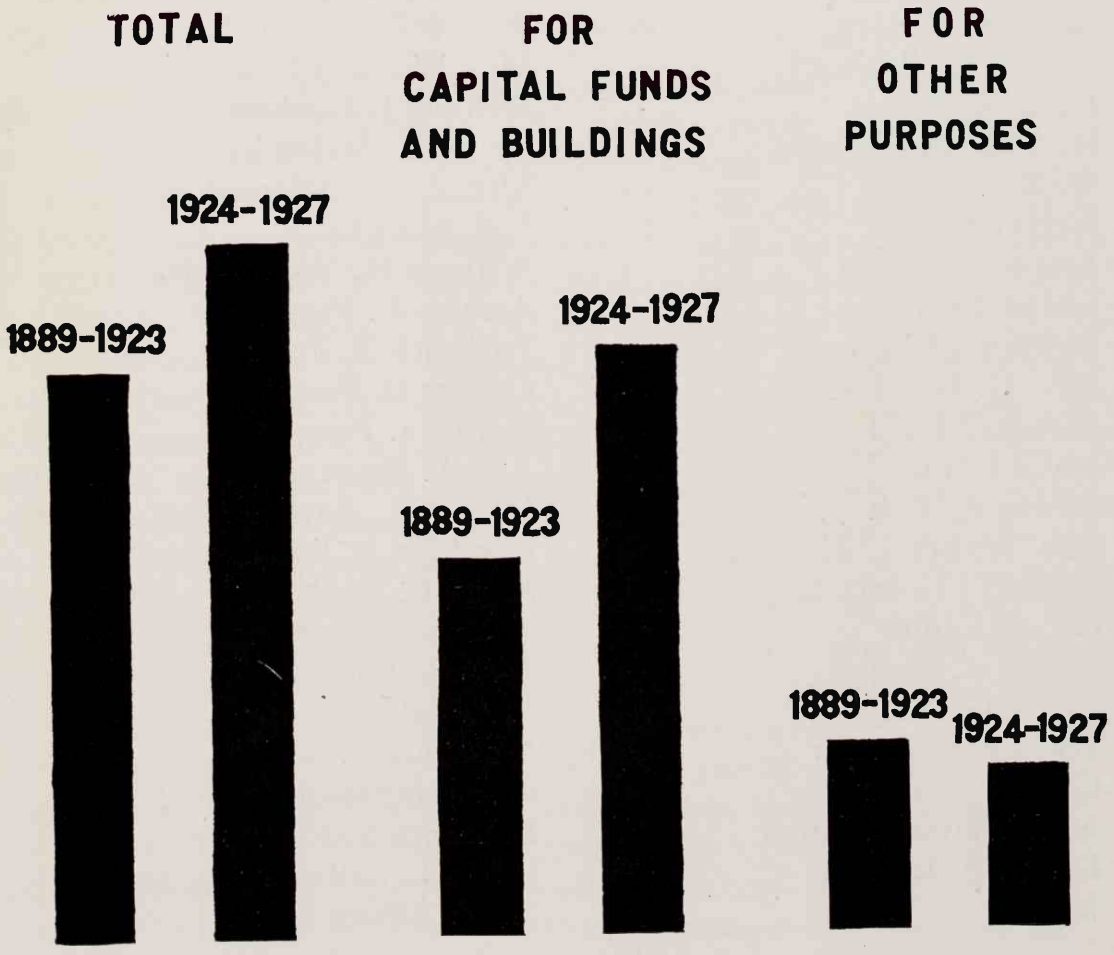
Sciences. From the data available, the conclusion is warranted that during that year the Laboratory was as active as at any year in its history up to that time.

It is immediately apparent that the Biological Laboratory is receiving far more support now than it did then; that this support is coming from a much greater number of persons; and that there have been many more biologists engaged in research at the Laboratory this year than there were in 1923.

While all the graphs are not drawn to the same numerical scale, both members of each pair are drawn to the same scale. The graphs are presented as they are to emphasize the very close correlation and relationship between the funds received from contributions and the number of persons engaged in biological research at the Laboratory. These two factors in the growth of the Laboratory, viz.: income and scientific achievement are markedly interdependent, as the graphs indicate.

The graphs further show that the increase in the number of contributions has a high positive correlation with the increase in the amount of contributions. This indicates that the support of the Laboratory is in the hands of a large number of persons interested in its welfare. We believe that this has a decided advantage over a situation in which an institution is supported by only a limited number of persons. It seems unquestionable that an institution which is supported financially in the manner in which the Biological Laboratory is supported, is assured, thereby, of strength and permanency.

The second series of graphs shows the remarkable increase in financial support which the Biological Laboratory has enjoyed since its transfer from the Brooklyn Institute of Arts and Sciences to the Long Island Biological Association Incorporated. All of the graphs in this series are drawn to the same scale. From them, it is evident that the Laboratory has received a greater total in contributions in the four years under the Association than in the preceding thirty-five years, during which it was a part of the Brooklyn Institute. It is also seen that a greater proportion of the contributions received in the last four years has been put into capital funds and other permanent assets than during the previous thirty-five years. This, we believe, is as it should be during a period of marked growth and reconstruction.



CONTRIBUTIONS

The response to the presentation of the letters was very gratifying. The Director was received courteously by the persons addressed, who frequently showed considerable interest in the work, and offered their support as Sustaining Members of the Association. Many of this group are among the following.

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There are still other letters which the Director has not yet had an opportunity to present, and it is hoped that the coming year will witness even more additions to our already exceptionally fine group of members.

Too much appreciation cannot be expressed to those of our officers, already mentioned, without whose aid the work accomplished would have been extremely difficult, if not impossible. Indeed it is, in large measure, due to the interest of such persons and their presence on our Board of Directors, that the past four years have been so gratifying, and that the future of the Laboratory is so bright and the achieving of a worthy destiny for it so probable.

Biological Research

Scientific research at the Biological Laboratory has increased concurrently with the funds available for its support. In the summer of 1923 there were three persons engaged in research at the Laboratory. This year nineteen persons were engaged in biological research. The increase in the number of research workers has not only increased the quantity of the scientific output of the Laboratory, but has enlarged the nature of the work, while better equipment has been a distinct help in putting on a very high plane the quality and accuracy of the results. During this year the work has embraced a wide range of subject material, work upon which has advanced biological knowledge in its most fundamental theoretical aspects as well as in that part of it which bears one of the most practical relationships to man's immediate welfare, experimental biology applicable to medicine. The practical application of some of the research which will be described will be immediately apparent to nearly everyone. The importance of other work will be less apparent, and in some cases possibly rather obscure to persons who are not biologists. We offer no apology for this. The time should have passed when it is necessary to make the significance of every scientific investigation understandable to persons who are not specialists in a particular branch of science. Biology has become so broad and its knowledge and accumulation of data have become so vast that biologists of one type are

often almost as much at loss to understand completely the activities of biologists of a markedly different type, as is the layman. This by no means signifies that the work is unimportant. On the contrary, it indicates the vast progress which has been made in biology in the last few years. This progress of biology has played an important role in many of the great advances in medicine, in agriculture, in animal and plant breeding and in many other activities of the greatest importance to man; indeed even in philosophy and religion. A vast body of biological knowledge still remains comparatively unused, but not useless if it has been accumulated accurately. Part of it, apparently dead, awaits only the trumpet of a new discovery to experience a glorious resurrection.

No man's knowledge is sufficiently great to allow him to sit in judgment on the ultimate value of scientific contributions to knowledge. While we hold no mysterious brief for theoretical knowledge as opposed to knowledge whose immediate practical application to human welfare is apparent, we do not adhere to the other extreme, that of underestimating the value of such theoretical knowledge. Investigators engaged in research leading to the accumulation of both types of knowledge are welcomed at the Biological Laboratory, whenever facilities for their work are available, and when their past records and future promise justify us in extending those facilities to them.

Confident of a general acceptance of the principles expressed in the foregoing discussion, we present a résumé of the research carried on at the Biological Laboratory this year.

The Function of the Adrenal Cortex

Notable in the group of studies, ofwhich the practical applications are apparent, are those conducted by Dr. W. W. Swingle, head of the department of Zoology of the University of Iowa, and for several years a member of our staff. Dr. Swingle's studies were concerned with the function of the external portion of the adrenal glands: the adrenal cortex.

The adrenal glands are made up of two distinct portions, (1) the internal part, the medulla, from which adrenalin is secreted and is now obtained, as an extract, for medical purposes; and (2) the external part, the cortex. These two parts are not only clearly different in the higher animals, including man, but they are represented in certain lower animals by two distinct groups of glandular structures.

By a series of clever experiments, carried on in part at the Biological Laboratory, Dr. Swingle ascertained that the presence and proper

functioning of the external part of the adrenal gland is essential to life in the higher animals. This is also true of man. He further found that the adrenal cortex helps maintain life by effectively aiding in the maintenance of the proper proportion of acids and bases in the blood. When the adrenal cortex is removed, the kidneys fail to properly perform their acid-eliminating function with the result that fatal acid-intoxication develops. This summer Dr. Swingle continued his work in attempting, with the aid of chemists, to isolate the active substance from the adrenal cortex, in the form of an extract which can be administered with success to persons suffering from disorders of the adrenal cortex. Such an extract will have, in addition to its practical application, the highly interesting quality of increasing the amount of sugar in the blood, and of maintaining a normal acid-base equilibrium. This extract will produce a reaction, with reference to the amount of sugar in the blood, directly opposed to that of insulin, which is effective in decreasing the amount of sugar in solution in the blood. They have been successful in obtaining an extract which will greatly prolong the life of adrenalectomized animals, and expect, in the near future, to try out this extract in cases of Addison's disease in persons.

Other Endocrine Studies

Dr. Swingle and his students have accomplished other investigations of note, the work being done in whole or in part at the Biological Laboratory, concerning the physiology and function of the glands of internal secretion, notably the determination of the relationship of the parathyroid glands to infantile tetany, and the discovery of several effective treatments for that disorder. Other studies on the adrenal glands, in addition to those cited, have been made.

The following papers in which due credit is given the Biological Laboratory, make these results available to the biological and medical professions.

Wenner, W. F., The Prevention of Tetany by Oral Administration of Magnesium Lactate, Amer. Journ. Physiol. Vol. LXXXI, No. 2, July, 1927, 392–403.

Wenner, W. F., The Prevention of Tetany by the Oral Administration of Ammonium Chloride, Amer. Journ. Physiol. Vol. LXXXI, No. 3, Aug., 1927, 612–619.

Zwemer, R. L., An Experimental Study of the Adrenal Cortex. I. Survival Value of the Adrenal Cortex. II. Prolongation of Life after Complete Epinephrectomy. Amer. Journ. Physiol. Vol. LXXIX, No. 3, 641–665.

Swingle, W. W., Studies on the Functional Significance of the Suprarenal Cortex. I. Blood Changes following Bilateral Epinephrectomy. Amer. Journ. Physiol. Vol. LXXIX, No. 3, 666–678.

The Pharmacology of Ergotamine

During this year the Biological Laboratory made another step in extending its investigations in experimental medicine by appointing to its staff Dr. William Salant, Professor of Physiology and Pharmacology of the Medical School of the University of Georgia.

Appreciation is expressed to Mr. Mortimer Schiff for his contribution of $400 toward the equipping of the pharmacological laboratory, and to Messrs. Walter Jennings and William J. Matheson for their special donations of $750 each for increasing the equipment for mammalian research.

In addition to establishing his laboratory this year, Dr. Salant and his assistants carried on investigations of the pharmacology of ergotamine tartrate, an alkaloid which is used extensively in obstetrics for the purpose of producing uterine contractions to prevent hemorrhage after childbirth. The substance is obtained from ergot and is sold under the name of "Gynergen." Valuable data were obtained by experiments on different animals showing that the substance varies greatly in potency. Thus Ergotamine may produce a fall as well as a rise of blood pressure. Such findings concerning substances which are used in medicine, are of considerable importance. Of further practical clinical importance are the observations, made at the Biological Laboratory this summer, that in some experiments a second dose of Ergotamine of the same amount as the first, produced the same effect and that adrenalin, given soon after, produced a rise instead of a fall of blood pressure. Thus no reversal of effect was produced by adrenalin after the administration of Ergotamine.

Experiments were conducted also to ascertain whether the anæsthetics used modified the action of the Ergotamine. Dr. Salant and his assistants found that the effect was usually the same when they employed ether as when urethane was given. Variation in the acidity of the blood (the hydrogen ion concentration), produced by injections of acid and alkali, had no apparent effect in the animals employed.

The Effect of the Sex-Glands on Resistance to Drugs

Other work was undertaken by Doctor Salant and his assistants to ascertain the effect of the sex-glands on resistance to drugs. In this research morphine was given to castrated mice and, in similar quantities, to mice whose sex-glands were not removed. This work

has not yet been completed, but Doctor Salant reports that the prospect of interesting conclusions is already favorable.

The Physiology of Reproduction

Doctor Reginald G. Harris, Director of the Biological Laboratory, has completed a series of experiments upon the effects of complete removal of the ovaries during pregnancy. For certain technical reasons, mice were used in the experiments. Doctor Harris and his assistants found that removal of both ovaries in mice invariably terminates pregnancy; the termination being accomplished by death and resorption of the embryos in early and middle pregnancy, and by abortion in advanced pregnancy. Abundant evidence was collected showing that these results were not due to operative shock or directly to factors other than the absence of the ovaries. The experiments give conclusive demonstration that the structures regulating pregnancy are located in the ovary. The results are described in the Anatomical Record, Vol. 37, No. 1, Nov., 1927, under the title, "Effect of Bilatoral Ovariectomy upon the Duration of Pregnancy in Mice."

Experimental Embryology

Doctor J. S. Nicholas, of Yale University, made further use of his remarkable technique for operating on rat-embryos within the uterus of the mother, a technique whereby embryos may be operated upon in utero without the shock of the operation causing any deleterious effects upon the development or birth of the embryos or upon the mother. His studies on this material this summer at the Biological Laboratory were concerned with the effects of the removal of certain areas of the brain and with the reactions of this tissue.

Doctor Nicholas also continued his studies of the experimental development of the salamander, *Amblystoma*. This work, which is characteristic of the famous school of experimental embryology at Yale University under the leadership of Professor Ross G. Harrison, a member of our Board of Directors, has gone far in ascertaining the time of action of the factors determining development in different regions of the growing embryo.

Doctor Nicholas opened a new field for studies of this nature at the Biological Laboratory this summer, when he made use of the fertilized eggs of the small salt water fish, *Fundulus*. This fish is abundant in the waters of the inner harbor, upon which the property of the Laboratory fronts, and is reared successfully in the aquaria of the new building supplied with sea-water through our new lead,

hard lead, and hard rubber sea-water system. The studies are still in an early stage but Doctor Nicholas already reports in the Proceedings of the National Academy of Sciences of October 15th, 1927, that, "The results of these various types of experiment are extremely interesting from the standpoint of the regenerative capabilities of this form. The preliminary results indicate clearly that there is a very high degree of determination in the tissues of the *Fundulus* embryos at a very early period of their development. This is indicated by the fact that there is no regeneration in embryos after the definite organ systems are formed."

Physiology

The eggs of the fish, *Fundulus*, served as valuable material for the physiological research of Doctor J. H. Bodine of the University of Pennsylvania, in charge of our course in General Physiology. These eggs have been used previously as a material for studying the action of various salts such as sodium, potassium and calcium chlorides on living matter. This fundamental work was repeated this summer, by Doctor Bodine, with one very important addition. Not only were observations made upon eggs and larvæ but also upon the very young embryos within the eggs, which embryos were dissected from the membrane surrounding the eggs. In this way the effect of the several chemicals acting directly upon the developing embryos, without the interference of a more or less protective membrane, could be observed. Furthermore, the relative action of the membrane itself would be made apparent. A technique, providing for the removal of the membrane surrounding the developing egg without harming the embryo and the yolk sac, was devised by Doctor Nicholas. Dr. Bodine reports in the Proceedings of the National Academy of Sciences that, "The results obtained have been of considerable importance inasmuch as they afford a quantitative means of measuring the relative resistance of the different stages of the embryo to the salts as well as a method for estimating the relative influence of the salt on the membrane and on the contained embryo." The results, thus far obtained, in some cases correct the classical work of the late Doctor Jacques Loeb of the Rockefeller Institute. In this connection, a point of considerable interest is that sodium plus calcium mixtures are not toxic for eggs but are markedly so for the embryo freed from the egg-membrane. "To the writer (Doctor Bodine) it means that by the methods outlined above definite quantitative information can be gained as to the fundamental site of action of various chemicals on the egg of *Fundulus*."

Doctor Bodine also carried on studies upon the effect of the hydrogen ion concentration (relative acidity of the sea-water) on the toxi-

city of hydrocyanic acid for embryos of *Fundulus*. As a result of this research Doctor Bodine established the fact that hydrocyanic acid enters, or exerts its toxic action on, the animal in the form of molecules and not as ions.

Miss Elizabeth Yagle, of the University of Pennsylvania, working with Doctor Bodine, also used the eggs of the fish, *Fundulus*, for investigations on the rate of water-exchange through egg-membrane. "To determine the rate of water exchange through a cell membrane, eggs of *Fundulus heteroclitus* were used with salt solutions of different concentrations; . . . ." "The eggs were used in different stages of development,—unfertilized, and, 1, 2, 3, 4 and 9 days after fertilization." It was found by means of a very simple and very clever technique that, "the rate of water exchange is independent of the specific gravity and the osmotic pressure of the solutions. The fact is also established that the permeability of the egg membrane varies at different stages of development. Eggs 1, 2, and 3 days after fertilization are more permeable than unfertilized eggs and than those 4 and 9 days after fertilization."

Mr. J. F. Yaeger, Jr., of New York University, was engaged in a quantitative study of the effects of various anæsthetics upon marine crustaceans. The work first led Mr. Yaeger into a determination of the accuracy of the "pyridine test" described by Cole in 1926. The test is essentially a colorimetric test for dilutions of chloroform between 0.5% and 0.0001%. It is used to determine the rate at which the concentration of chloroform in the sea-water, surrounding various marine animals changes during the process of anæsthesia.

Botany

We were fortunate in being able to obtain Professor H. S. Conard of Grinell College to take charge of the course in Botany. Under his direction, the course has undergone rather marked changes. The work now deals, in great measure, with the ecology of plants, i.e., the relation of plants to their environment, both in respect to individual plants and in respect to the regional distribution of plants. Inasmuch as the members of the class in Botany, in their studies, aided in the collecting of data of this nature, while carrying on their work, they should be mentioned here as a group. Doctor Conard's report follows:

"The work of the Botany Department was partly a review of former studies round about the Laboratory and partly a preliminary survey for a monographic treatment of the Vegetation of Cold Spring Harbor and Vicinity.

"An examination of the transect of the Sandspit (studied in 1909–11)[1], [2] showed no change of any significance. Certain ailanthus trees have continued to grow in size. Certain minor species have disappeared. *Quercus* (oak) and *Prunus* (beach plum) have failed to maintain a footing. The inner beach shows the usual fluctuations of drift, and scattered plants of *Salsola* (saltwort) and *Sueda* (sea blite).

"The Saltmarsh[3] has been modified by the filling of all tide pools with gravel in June, 1927. The fresh water vegetation (especially *Aspidium thelypteris*, the shield fern, and *Scirpus americanus* (bulrush or club rush), has extended northward about three feet beyond the very large extensions noted in 1922. This shows that stabilization of the marsh is still a long way off. That stability will come is shown by the relative absence of change on the outer (northern) border of the belt studied.

"The denuded area west of Cold Spring Harbor railway station[4], [5] has been reduced about one half by grading operations along the railroad. Studies were made of the remaining vegetation, showing important progress in the return of native species, the rapid growth of trees, the closing and stabilization of the vegetation and the addition of humus to the soil.

"The Vegetation of Cold Spring and Vicinity leads to a coordination of vegetation-types slightly different from that proposed by some American writers. We are obliged to recognize Littoral Regions, as did Schimper, among the major categories. Another major category is Cultural Areas, as used by European ecologists. Thus the region of Cold Spring Harbor shows:

1. The Forest Region
    1. Eastern North American Forest Province
        1. Oak Forest Formation
            1. Oak-Chestnut Association
            2. Oak-Pine Association
2. The Grassland Region
    1. Temperate Grassland Province
        1. Tallgrass Prairie Formation
3. The Littoral Regions
    1. North Atlantic Littoral Province

[1] Johnson, D. S., and H. H. York: Relations of Plants to Tide Levels. Carnegie Inst. Pub. 206 Wash. 1915.

[2] Conard, H. S.: Belt Transect of Cold Spring Harbor Sandspit, 1922. Ecol. 5:259-261. July, 1924.

[3] Conard, H. S.: Second Survey of a Long Island Saltmarsh. Ecol. 5:379-388. Oct., 1924.

[4] Conard, H. S.: Revegetation of a Denuded Area. Bot. Gaz. 55:80-84, Jan., 1913.

[5] .....: Revegetation of a Denuded Area II. Bot. Gaz. 75: 414-420. June, 1923.

4. Cultural Regions
    1. Agricultural Province
    2. Timber Province
    3. Roadside Province

"With the aid of students in Field Botany this classification was tested. Studies of each type of vegetation by the quantitative methods of Ruebel and Markgraf were begun, with very satisfactory results. Much remains to be done on this phase of the subject before a final classification and description can be attained. It was shown that an adequate treatment demands a recognition of successional stages as already begun by Transeau.[6] These should also be quantitatively studied. A tentative table of successions was prepared. Further work will consist of mapping, measuring and reclassifying the types of vegetation, measurement of habitat factors in pursuance of the beginnings made by Transeau and by Wherry[7],[8], and the study of the autecology of the various species found."

Mr. Frederick Sparrow, Jr., of Harvard University, began a collection and study of certain groups of fungi (among the Phycomycetes). Mr. Sparrow's report includes the following:

"During the past summer fifteen genera, all previously unreported from Cold Spring Harbor, were found and drawings and slides were made from these specimens. At least one new species is included in this list and possibly several more. The finding of *Pythium undulatum* Pet. makes its first reported occurrence in this country, as far as I have been able to determine."

Protozoology

Doctor Robert W. Hegner, Professor of Protozoology in the Johns Hopkins School of Hygiene and Public Health, was in residence at the Biological Laboratory during part of the summer. He reports on "investigations on protozoa of the genus *Arcella* and on the effects of intestinal environment of tadpoles on free-living protozoa. *Arcella* is a particularly favorable organism for study since the nuclei with their large spherical karyosomes can be seen easily and measured accurately in the living animal. Studies were continued on specific characteristics in the genus *Arcella* by means of pure line cultures. It is expected that the accumulated data will eventually be published in monographic form.

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[6] Transeau, E. N.: The Vegetation of Cold Spring Harbor, L. I., The Littoral Successions. Plant World, 16:189-209. July, 1913.

[7] Transeau, E. N.: Relation of Plant Societies to Evaporation. Bot. Gaz. **45**: 217-232. 1908.

[8] Wherry, E. T.: A Soil Acidity Map of a Long Island Wild Garden. Ecol. 4·395-401. 1923.

"Investigations of the viability of free-living protozoa in the intestine of tadpoles were also carried out as a continuation of previous studies. The object of this work is to obtain evidence regarding the origin of the entozoic habit of intestinal protozoa. It was found that *Paramecium* when fed to tadpoles are very quickly killed in the stomach (within 2 hours), whereas these ciliates may live for 5 hours or more when injected into the rectum. This indicates that the rectum of the tadpole, which is the normal habitat of such ciliates as *Opalina* and *Nyctotherus*, cannot be reached by *Paramecium* in a viable condition by way of the mouth, but that these protozoa must gain access through the anal aperture."

Mr. Herbert L. Ratcliffe, of the Johns Hopkins School of Hygiene and Public Health, was in charge of the chemical supply room of the Biological Laboratory during the summer. In his experimental work he verified some earlier feeding experiments, done by Doctor Hegner at Johns Hopkins, and found that rats kept on a high protein diet lost their intestinal protozoa within fifteen days.

Histology

Doctor Alden B. Dawson, Associate Professor of Biology in New York University, carried on a histological study of the persisting cartilage plates in "lapsed" epiphyseal union in the albino rat. Doctor Dawson made a study of the condition in very old rats (1,000 days and older) to determine the histological picture, the variations and the possible relation to sex.

Doctor Dawson also collaborated with Doctor Swingle by making histological examinations of the liver following removal of the adrenal cortex. From this work it became apparent that the maintenance by the adrenal cortex of the normal acid-base equilibrium in the blood is accomplished indirectly through the liver.

A cytological study of the calcification, fibrous transformation and architecture of the costal cartilages in the albino rat was also made by Doctor Dawson.

Genetics

Mr. T. Y. Chen, John D. Jones Fellow from Columbia University, made studies concerning development in the fruit-fly, Drosophila, upon which so much information concerning the biological laws of heredity has been ascertained in the famous school at Columbia, under the leadership of Professor T. H. Morgan, a member of our Board of Directors. Mr. Chen was particularly concerned with the development of the "imaginal discs." From these structures which occur in the larvæ, the legs and wings of the adult flies develop.

Mr. Chen studied the origin and development of the imaginal discs in common "wild" forms, which occur in nature, in comparison with ten variant forms (*mutants*), which have arisen under experimental conditions in the laboratory.

Miss Kathryn Ordway, of the University of Minnesota, and her assistant, working in collaboration with Doctor A. M. Banta of the Carnegie Institution, carried on an investigation of the inheritance of the number of young per mother in the fresh water crustaceans, *Cladocera*.

Other Problems

In keeping with the program of the course in surgical technique as applied to experimental biology and medicine, group problems and individual problems were begun under the direction of Doctor J. S. Nicholas of Yale University.

The group problems involved the relations of various phases of nutrition to the oestrous cycle of the rat. The relationship of the amount of hæmoglobin present at various stages during the period of pregnancy and the normal and varied content of red blood cells during this period were also under observation.

Personal research started during the course includes the following: Mr. Charles S. Apgar, of the University of Pittsburgh, began studies upon the collateral circulation established after ligation of the abdominal aorta.

Mr. William A. Ellison, of Duke University, commenced studies upon the rate of development of the peroneal nerve after section.

The effects of thyroid feeding upon the oestrous cycle of the rat were studied by Mrs. Queene H. Faust, of New York State College.

Preparation of Books

Several members of the staff of instruction of the Biological Laboratory were preparing important text books and manuscripts when not actually engaged in teaching.

Professor H. E. Walter, of Brown University, was reading the proof of his important new eight hundred page book on the "Biology of Vertebrates," being published by Macmillan.

Professor H. P. K. Agersborg was engaged in a translation of Professor J. E. V. Boas' "Laerebog i Zoologien." This book has been, and is, used successfully in all the Scandinavian Universities. It is now in the fifth edition. Professor Agersborg has the rights for translating it into English.

Doctor Herbert Friedmann worked on the preparation of manuscripts dealing with his previous studies, made in the field, of East African ornithology.

Instruction

The most important change in instruction at the Biological Laboratory this year was the addition of a course in General Physiology under the able leadership of Doctor J. H. Bodine of the University of Pennsylvania. The course, which is housed in the new building, deals primarily with fundamental vital phenomena and particularly with these phenomena as shown in marine organisms found in abundance at Cold Spring Harbor. Among the topics discussed are: diffusion and osmotic pressure and their physiological significance, surface tension and related phenomena, hydrogen-ion effects, physiological effects of temperature, cell permeability, role of electrolytes, colloids and their general physiological significance, etc. All topics are discussed from the broadest biological viewpoint.

The course is planned for advanced students with preliminary training in biological and related sciences who are interested in securing training in the methods of fundamental physiological research as well as those wishing an introduction into the subject of General Physiology.

Adequate equipment, including running sea-water, and a complete supply of the necessary chemicals and apparatus, was provided for the course.

The course in Botany was markedly altered as described earlier. Under the excellent leadership of Professor H. S. Conard, it now deals primarily with ecology.

The Laboratory was fortunate in obtaining the services of Professor H. E. Walter, of Brown University, to take charge of the course in Field Zoology. In this course the following new appointments were made for the year: Professor A. L. Melander of the College of the City of New York, Doctor Herbert Friedmann of Brown University, and Professor H. P. K. Agersborg of the James Millikin University.

Doctor J. S. Nicholas of Yale University ably led the work of the course on Surgical Methods in Experimental Biology.

Repairs and Equipment

The interior of the men's dormitory was completely refinished during the year. The Wawepex Society helped in this work by a special gift of $500.00.

The new laboratory-building was completed, and a new sea-water system installed. The system is made up of a hard-lead-lined pump, paraffined tank, and lead and hard rubber pipes, thereby doing away with corrosion, the chemical by-products of which are very toxic to marine animals.

A new fresh water line, with two-inch supply, serving Blackford Hall, and the John D. Jones Laboratory building, connecting with a one and one-fourth-inch line serving the new laboratory-building, has been installed. The total length of the new line is about one thousand feet.

The roof of Blackford Hall has been refinished, and other repairs have been made in the interior.

The fine old house located on the property purchased last year is being repaired, including reshingling of the roof.

Notable additions have been made to the scientific equipment of the Laboratory in apparatus and chemicals. The acquisition of the former was made possible, in large measure, by Mr. Jennings' and Mr. Matheson's special gifts of $750.00 each, and by Mr. Schiff's special donation of $400.00 for this purpose.

The total amount spent for repairs exclusive of our own workmen's salaries, and for equipment was about $8,000.00.

The Wawepex Society, Inc.

The Wawepex Society of Cold Spring Harbor has drawn up and signed a lease of the three acres of land, occupied by the Laboratory, the John D. Jones Laboratory, and three other buildings for the fifty years following the expiration of the lease in 1929. In addition to providing the Association with the lands and buildings mentioned, the Society contributes $1,500.00 annually to its support. The officers of the Wawepex Society are: Charles M. Bleecker, Governor; Jesse Knight, Scribe; Walter J. Whipple, custodian.

Nature Study for Children

Twenty-six children were enrolled in classes of Nature Study under the leadership on Miss Grace M. Lowe. The work was very successful and was carried on with enthusiasm by the children. Indeed we had several requests to prolong the course. Grateful acknowledgment is made to Mrs. Rodman Gilder for her splendid work in organizing the children for the several classes.

The Women's Auxiliary

The second annual meeting of the Women's Auxiliary was held at Blackford Hall, July 14th. At this time the members decided to expend money available this year, from the Blackford Memorial Fund and from other sources, toward repairing the furniture in the living room in Blackford Hall and toward refinishing the roof of the same building. The latter has already been done, and the furniture is now in the repairer's shop undergoing extensive renovation.

Officers were elected as follows: Mrs. Walter Jennings, President; Mrs. Arthur W. Page, Vice-President; Mrs. George Nichols, Treasurer; Mrs. Archibald Roosevelt, Secretary, and Mrs. John H. J. Stewart, Chairman of the House Committee.

Following the meeting the members visited the various buildings where the scientific work being carried on was described.

Members of the Women's Auxiliary have contributed $630.00 this year toward the work of the Association.

Evening Lectures

The following public evening lectures were given this year:

Doctor A. F. Blakeslee—"A Trip to the Pacific Coast."

Doctor J. H. Bodine—"Some Physiological Actions of Cyanides."

Doctor H. S. Conard—"Ecological Aspects of Cold Spring Harbor."

Doctor C. B. Davenport—"Race Crossing in Man."

Doctor George Draper—"The Constitutional Clinic."

Doctor F. E. Denny—"Do Plants Have Hormones?"

Doctor Herbert Friedmann—"Field Zoology in Africa."

Doctor Robert C. Murphy—"Mountain and Seacoasts in Ecuador"

Doctor J. S. Nicholas—"Recent Advances in Experimental Embryology."

Doctor William Salant—"Factors Modifying Protoplasmic Reactions to Chemical Irritants."

Doctor W. W. Swingle—"The Adrenal Gland."

Supporting Institutions

Forty-two colleges, universities, and medical schools were represented at the Laboratory this year.

The following institutions supported the work of the Laboratory by establishing 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
Columbia University
Duke University
Hunter College
Newcomb College
New York University
Rockefeller Foundation
Rutgers University
Smith College
Sweet Briar College
University of Georgia Medical School
University of Iowa
University of Pennsylvania
University of Pittsburgh
Yale University

Gifts Received During the Year

We have been informed of a bequest of $5,000.00 made by Doctor Walter B. James. The income from this fund will be available for the Biological Laboratory.

In addition to the contributions for current expenditures the following donations were received for the purposes noted.

Colonel T. S. Williams contributed $1,000.00 toward the new building, Colonel Henry L. Stimson contributed $250.00 and Doctor C. B. Davenport and Mr. Russell Leffingwell $200.00 each, for the same purpose, in addition to their regular annual contributions.

Mr. William J. Matheson and Mr. Walter Jennings gave $750.00 each, in addition to their annual contributions, for the purchase of special apparatus.

Mr. Mortimer L. Schiff contributed $400.00, in addition to his annual contribution, for equipping the pharmacological laboratory.

The Wawepex Society contributed $500.00, in addition to its annual grant, toward the renovation of the men's dormitory.

Mr. Arthur W. Page donated subscriptions in scientific magazines to the Laboratory.

The executors of the estate of Mary E. Jones kindly gave the Laboratory the use of a house for the summer.

As a result of an attempt to obtain photographs, to be hung at the Laboratory, of former Directors of the Laboratory, Presidents of the Board of Directors, and others who have taken a leading part in the development of the Laboratory, photographs of the following persons have been graciously presented to the Laboratory: Doctor C. B. Davenport, Doctor Bashford Dean, the late Doctor Walter B. James, the late Mr. John D. Jones, Mr. William J. Matheson, the late Mr. John H. J. Stewart, and Colonel T. S. Williams.

Doctor Dean was the first Director of the Laboratory. Doctor Davenport was Director from 1898 to 1923, and is now Secretary of the Association and of the Board of Directors. Doctor James was a member of the Board of Directors for twenty-six years and was President of the Board at the time of his death in April, 1927. Mr. John D. Jones was an early patron of the Laboratory, founder of the Wawepex Society, and donor of the John D. Jones Laboratory. His photograph is the gift of Mrs. J. H. J. Stewart. Mr. Matheson was President of the Board of Managers from 1905 to 1923, when the Laboratory was a part of the Brooklyn Institute of Arts and Sciences. Mr. John H. J. Stewart was a member of the Board of Directors from 1893 until his death and Governor of the Wawepex Society for a number of years. Colonel Williams has been a member of the Board

of Directors since 1910. He was the first President of the Board of Directors after the transfer of the Laboratory from the Brooklyn Institute of Arts and Sciences to the Long Island Biological Association in 1924, and remained in that office until 1926, when he was forced to resign on account of ill health. He is now a member of the Board of Directors and of the Executive Committee.

Gardens Opened to the Biological Laboratory

The visiting of gardens in the vicinity of the Laboratory has become an important part of the work in Botany and a source of pleasure to other workers at the Laboratory. Last summer the following persons very kindly opened their gardens to the members of the Laboratory: Mrs. Henry W. De Forest, Mrs. Robert De Forest, Mr. Anton G. Hodenpyl, Mr. Otto H. Kahn, Mrs. Walter B. James, Mr. and Mrs. Walter Jennings, Mr. William J. Matheson, Mrs. Theodore Roosevelt, Sr., and Mr. Louis C. Tiffany.

The Scientific Advisory Committee

A Scientific Advisory Committee has been appointed to be active in advising the Director of the Laboratory and the Board of Directors of the Association. The Committee is appointed from year to year from the biologists who are in charge of courses and from investigators who have been at the Laboratory during the year. It is expected that, in this way, we will have the benefit of the formal advice of persons not only acquainted with biological problems but with these problems in relation to the Biological Laboratory: its needs, policy, and administration.

The membership of that Committee for the current year is as follows: Dr. J. H. Bodine, of the University of Pennsylvania, chairman, Prof. H. S. Conard, of Grinell College, Dr. A. B. Dawson, of New York University, Dr. J. S. Nicholas of Yale University, Dr. William Salant of the Medical School of the University of Georgia, Dr. Asa A. Schæffer, of the University of Kansas, Mr. F. K. Sparrow, of Harvard University, Dr. W. W. Swingle, of the University of Iowa, and Prof. H. E. Walter of Brown University.

In its report, which follows, the Committee presents the most urgent need of the Biological Laboratory, and other important suggestions. The Director of the Laboratory takes this occasion to express his appreciation of the activity of that Committee and his approval of the proposals which the Committee makes.

Reginald G. Harris

First Annual Report of the Scientific Advisory Committee of The Biological Laboratory, Cold Spring Harbor

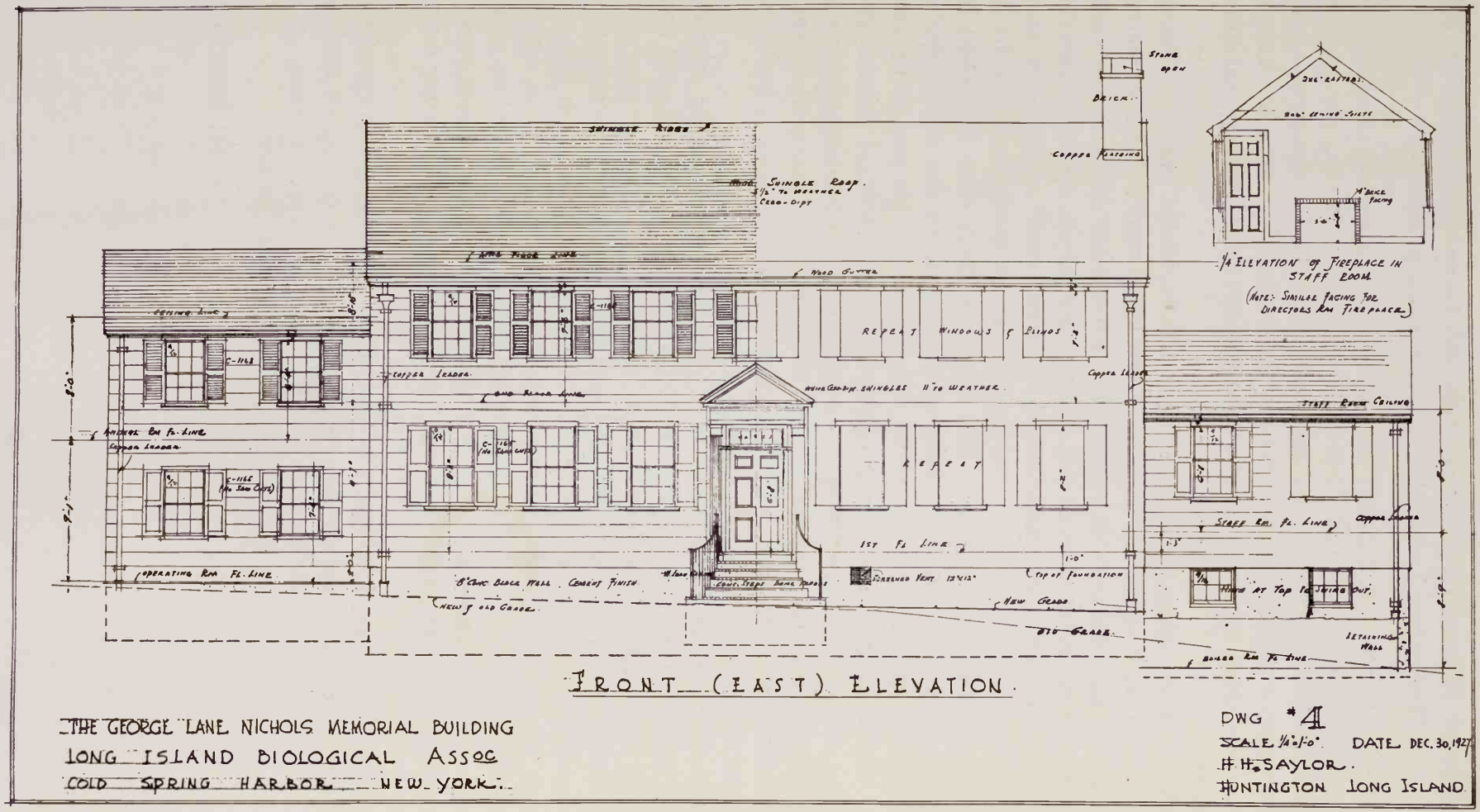
This Committee, composed of those in charge of courses and experienced scientific investigators, has carefully studied the general situation at Cold Spring Harbor and feels that the Laboratory is now entering upon a period of great possibilities and that certain changes are now necessary in order that the situation may be most satisfactorily met.

First—The growing demand for research facilities makes it essential that adequate space be provided for this work. The practical value of this Laboratory as a scientific institution depends not only upon the courses offered but to a much greater degree upon its research activities. The one and only building now used exclusively as a research laboratory offers very inadequate accommodations due to its size and type of construction. The Director feels that it would be possible to finance the construction of a building of the same type as that built last year. This building, two stories high and with two wings, would house the main office, have an animal house and operating rooms for small animals in one wing,—a heating system in another wing and the remainder to be made into research rooms. This Committee, therefore, highly recommends that such a building be erected to meet this urgent situation.

Second—Dr. Walter has long been desirous of releasing himself from the leadership of the course in Field Zoology. He resigned two years ago and came back last year, conditionally, for one year as a 'pinch hitter.' Dr. Walter's resignation necessitates a reorganization of the teaching staff in this course. Since such a situation offers a favorable opportunity for reorganization of the course, it is recommended that the services of a recognized scientist be secured to carry out same. Any changes made in the general type of the course would be passed upon by the Director and by the Scientific Advisory Committee.

Third—The Committee and the Director have also given considerable thought to the desirability of establishing a course in embryology. While this may not be feasible for the current year, it is hoped that this plan can be carried out in the near future.

J. H. Bodine



FRONT ELEVATION OF THE GEORGE LANE NICHOLS MEMORIAL DESCRIBED IN THE TEXT ON PAGE 33

The George Lane Nichols Memorial

The Director announces a gift of $12,000 from Mr. and Mrs. Acosta Nichols in memory of their son, George Lane Nichols, a former member of the Nature Study Class for children given under the direction of the Biological Laboratory. George Lane Nichols was very much interested in nature study and biology. During his visits to the Laboratory he showed a degree of appreciation far beyond that generally found in a boy of his age.

In making the gift Mr. and Mrs. Nichols stated their desire to have as much of it as seemed necessary applied toward the building of the proposed research laboratory, though they generously refrained from attaching any formal restrictions to the use of the gift.

Although the pledge was not made until after the end of our fiscal year, December first, it was announced at the annual meeting of the Board of Directors on December fourteenth, and for that reason is included in this report.

Upon the vote of the Board of Directors the building will be known as the George Lane Nichols Memorial.

At the time this report goes to press the architect's plans have been accepted and work has already been commenced on the foundation. The Memorial will be of the Long Island Colonial type of architecture. It will be of frame construction, two stories high, and 84 feet in length overall, made up of a main portion 50 feet by 25 feet and two ells 17 feet by 14 feet each. Its use will be limited to research and administration. There will be seven private research laboratories, an animal room, an operating room, a staff room, the Director's office and two secretaries' offices. There will be an aquarium in the main hall, and running sea-water and fresh water, gas and electricity in each work room. Tables, capping concrete columns, will be located in the laboratories on the first floor for use in research requiring that vibration be reduced to a minimum. Equipment for steam heating will be installed, and the building will be open throughout the year. It is hoped that it will be available for use late in the spring.

The architect's drawing of the front elevation is reproduced herewith.

REGINALD G. HARRIS

REPORT OF THE SECRETARY

During the year one annual meeting of the corporation was held (on July 26), four meetings of the Board of Directors and four of the Executive Committee, as follows:

(a) *The ninth meeting of the Executive Committee* was held in New York City, January 11, 1927. It was voted to appoint various instructors; that the Laboratory Director be assistant treasurer; that he arrange for the improvement of the water supply of the Laboratory and for repairs on the caretaker's house. The purchase of a one-ton truck was authorized and the clearing of the woods ordered. The Wawepex Society was thanked for contributing $500 toward the repair of Hooper Hall.

The President of the Association, Dr. Walter B. James, died in New York City, April 6, 1927, and the following resolution was adopted by the Executive Committee on April 7th:

"The Executive Committee of the Long Island Biological Association hereby expresses its feeling of great loss in the death of the President of the Association, Dr. Walter B. James. He was connected with the Biological Laboratory at Cold Spring Harbor for a generation, he was a leading factor in its reorganization and in bringing it through a critical period. To the carrying out of the broad plans that he had for its development we pledge our best efforts. To Mrs. James and her family we extend our sympathy."

Dr. James left, by will, a trust fund of $5,000, the income of which will be paid to the Association.

(b) *The tenth meeting of the Executive Committee* was held in New York City, May 5, 1927. Mr. R. C. Leffingwell was elected a member of the committee and the distribution of a letter soliciting funds was authorized.

(c) *The eleventh meeting of the Executive Committee* was held June 2, 1927, to consider a successor to Dr. James. The thanks of the Association were extended to Col. H. L. Stimson for legal services rendered.

(d) *The eleventh meeting of the Board of Directors* was held at Cold Spring Harbor, June 28, 1927. Mr. Arthur W. Page was elected President and Mr. Henry C. Taylor elected to fill the vacancy caused by the death of Dr. James. The President was requested to appoint a committee on grounds, with authority to lay out the grounds. Col. Stimson was requested to draw up an amended certificate of incorporation, increasing the number of the Board of Directors from 20 to 28.

(e) *The fourth annual meeting* of the Corporation was held at

Blackford Hall, July 26, Mr. Walter Jennings in the chair. The actions taken by the Board of Directors and the Executive Committee, as reported, were approved; 35 sustaining members and the following patrons were elected: Henry L. Stimson and Walter J. Salmon. The following were elected to the Board of Directors in the class of 1931: Marshall Field, Ross G. Harrison, Arthur W. Page, William K. Vanderbilt and H. E. Walter. It was voted to increase the number of directors of the corporation from 20 to 28 and that the amendment to the certificate of incorporation, prepared by Col. Stimson, be duly executed and filed, as directed. The Laboratory Director reported special gifts as follows: bequest of Walter B. James, $5,000; for special equipment, Wm. J. Matheson, $750, Walter Jennings, $750, Mortimer Schiff, $400; for the renovation of Hooper Hall, Wawepex Society, $500; for the new building, T. S. Williams, $1,000, H. L. Stimson, $250, R. C. Leffingwell, $200, C. B. Davenport, $200. The Women's Auxiliary made arrangements to redecorate the Assembly Room of Blackford Hall.

(f) *The twelfth meeting of the Board of Directors* was held at Blackford Hall, July 26, 1927. The following officers were elected for the current year: President, Arthur W. Page; Vice-President and Treasurer, Marshall Field; Secretary, C. B. Davenport; Assistant Treasurers, R. G. Harris and William Dean. The Executive Committee were re-elected. The resignation of Prof. H. S. Jennings was accepted with regret and Dr. Herman C. Bumpus was elected to the vacancy. C. M. Bleecker, Willis D. Wood, John K. Roosevelt and Oliver B. James were elected directors. The committee on buildings and grounds (Messrs Page, Taylor and Harris) was instructed to draw up conditions of sale of lots to members of the Association.

(g) *The twelfth meeting of the Executive Committee* was held November 2, 1927, at New York City. The purchase of the cottage on the turnpike from Mrs. Alethea A. Stewart, on liberal terms, was authorized. Mr. Nicholas F. Brady was elected patron. Pledges were reported as follows: from A. G. Hodenpyl, $250, R. W. DeForest, $100. N. F. Brady, $1,000. The Laboratory Director submitted plans for a research laboratory and the President and Laboratory Director were given power to act in the matter.

(h) *The thirteenth meeting of the Board of Directors* was held December 13, 1927, at New York City. New directors were elected as follows: Acosta Nichols and W. J. V. Osterhout. The financial statement of the treasurer, as presented in this report, was accepted. An advisory committee of the laboratory presented, through Dr. J. H. Bodine, recommendations. The Laboratory Director read his report, as presented herewith.

Mr. and Mrs. Acosta Nichols have offered to contribute $12,000 for a research laboratory, in memory of their son, George Lane Nichols. *Voted*, to express in suitable terms the gratitude of the Board to the donors. *Voted*, that the building be known as the George Lane Nichols Memorial.

A form of contract for sale of land, as prepared by Col. Stimson, was read, and the Executive Committee was empowered to conduct sales on the plan as presented by the committee on lands.

The budget for 1928 was presented by the Laboratory Director, calling for an expenditure of $44,870. It was accepted as presented. The tuition fee was fixed at $75. The President appointed as committee on library building, Messrs. Bleecker, Page and Harris. Col. Williams was appointed a committee to confer with the officers of the Brooklyn Institute on the matter of funds of the Laboratory in their hands.

C. B. DAVENPORT, *Secretary*

BALANCE SHEET NOV. 30, 1927

EXHIBIT A

Assets

Current Assets:		
Cash—Bankers Trust Co	$615.26	
Cash—Bank of Huntington	34.55	
		$649.81
Endowment Fund Assets:		
Securities in hands of trustees	$22,500.00	
Mrs. Eugene Blackford Bequest	5,000.00	
Temple Prime Scholarship Fund	2,500.00	
Dorothy Frances Rice Scholarship Fund	2,000.00	
		32,000.00
Land Assets:		
Land Purchased	$71,380.52	
Land (On 52 Years' Lease)	13,500.00	
		84,880.52
Building Assets:		
Blackford Hall	$75,000.00	
Jones Laboratory	25,000.00	
New Building (Physiology)	20,000.00	
Wheeler House	10,500.00	
		130,500.00
Building Assets (On 52 Years' Lease):		
Hooper Hall	$20,000.00	
Research Laboratory	7,500.00	
Cottage	5,500.00	
		33,000.00
Fixed Assets:		
Equipment	$14,600.00	14,600.00
		$295,630.33

Liabilities

Current Liabilities:		
Accounts Payable	$113.98	
Wages Payable	5.00	
		$118.98
Capital:		
Long Island Biological Association	$210,178.98	
Wawepex Society	46,500.00	
Brooklyn Institute of Arts and Sciences	30,000.00	
		286,678.98
Land Fund	91.14	91.14
Surplus made in 1927	8,741.23	8,741.23
		$295,630.33

EXHIBIT B

Income Account

Income:		
Dues and Contributions	$16,875.58	
Endowment Interest	1,856.72	
Bank Interest	11.69	
Tuition	4,103.22	
Rentals	2,471.47	
Storeroom	149.99	
Dining Hall	378.78	
Miscellaneous	1,947.18	
		$27,794.63
Expense:		
Salaries	$14,855.88	
Repairs, Supplies and Expenses	2,964.57	
Biological Supplies	868.91	
Interest on Note	62.66	
Miscellaneous	301.38	
		19,053.40
Gain for 1927		*8,741.23
		$27,794.63

*This includes complete payment of the loan of $4,000.

EXHIBIT C

Temple Prime Fund

Balance, 1926	$56.73	
Interest received in 1927	137.48	
	194.21	
Disbursements:		
Scholarship to Sylvia Kotrba	100.00	
Balance on hand		$94.21

Dorothy Frances Rice Fund

Balance, 1926	$60.00	
Interest received in 1927	120.00	
Balance on hand		$180.00

Blackford Memorial Fund

Interest received in 1927	$275.00	
Disbursements:		
Roof Repairs	102.00	
Tinsmith	53.75	
Painting	60.00	
	215.75	
Balance on hand		$59.25

Marshall Field, *Treasurer*
Reginald G. Harris, *Assistant Treasurer*
William F. Dean, *Assistant Treasurer and Accountant*

THE LABORATORY STAFF

REGINALD G. HARRIS.....Director, The Biological Laboratory
Experimental Zoology

H. E. WALTER.....Professor of Biology, Brown University
Field Zoology

A. L. MELANDER, Professor of Biology, City College of New York
Field Zoology

W. W. SWINGLE.....Professor of Zoology, University of Iowa
Endocrine Biology

H. S. CONARD.....Professor of Botany, Grinell College
Botany

J. S. NICHOLAS.....Assistant Professor of Zoology, Yale University
Experimental Surgery

J. H. BODINE, Asst. Prof. of Zoology, University of Pennsylvania
General Physiology

WILLIAM SALANT, Prof. of Pharmacology, Univ. Georgia Med. School
Experimental Pharmacology

GEORGE F. SYKES, Asst. Professor of Anatomy, Tufts Medical School
Associate in Field Zoology

HERBERT FRIEDMANN.....Instructor in Biology, Brown University
Assistant in Field Zoology

H. P. K. AGERSBORG, Professor of Biology, James Millikin University
Associate in Field Zoology

FREDERIC K. SPARROW...Department of Botany, Harvard University
Assistant in Botany

HERBERT L. RATCLIFFE, Dept. of Protozoology, Johns Hopkins Univ.
Chemical Supplies

C. B. DAVENPORT, Dir., Dept. of Genetics, Carnegie Inst'n of Wash.
Lecturer

CATHERINE R. BROWN.....Librarian

M. CATHERINE HINCHEY.....Technical Assistant

THOMAS WHEELER.....Collector and Caretaker

ALBERT W. STRICKLAND.....Mechanic

The Staff of the Department of Genetics of the Carnegie Institution of Washington contributes to the scientific life of the Biological Laboratory by occasional lectures and demonstrations and by voluntary cooperation with investigators in residence at the Laboratory.

Persons in Residence at the Laboratory in 1927

In Addition to Members of the Staff

Name	Registration	Institution	Graduate or Undergraduate
Chas. S. Apgar, Jr.,	E., E. S. & R.	University of Pittsburgh	Graduate
Ralph J. Bailey	F. Z.	University of Pittsburgh	Undergraduate
Edward T. Boardman	F. B.	University of Florida	Undergraduate
K. M. Brightbill	E. & F. Z.	Sweet Briar	Undergraduate
Keeve Brodman	E. & R.	City College of New York	Graduate
Sumner O. Burhoe	F. Z.	Massachusetts Agricultural	
		Kansas State Agricultural	Graduate
Helen E. Butts	F. Z.	Brown	Undergraduate
Myrtle C. Carroll	F. B.	Adelphi	Undergraduate
Herbert M. Chaimas	E. & F. B.	City College of New York	Graduate
T. Y. Chen	R.	Columbia	Graduate
Jocelyn Crane	F. Z.	Smith	Undergraduate
Alden B. Dawson	R.	New York University	Assoc. Prof.
Bessie Dickerson	G. P.	University of Pittsburgh	Graduate
Charlotte Dill	R.	Adelphi	Graduate
Joseph H. Doll	E. & F. Z.	Brown	Undergraduate
Isabelle Ellis	E. & F. Z.	Alfred	Graduate
W. A. Ellison, Jr.,	E., E. S. & R.	Duke	Graduate
Edith Eskrigge	E. & F. Z.	Newcomb	Undergraduate
Queene H. Faust,	E., E. S. & R.	New York State College	Graduate
Gladys C. Galligar	F. Z.	James Millikin	Undergraduate
Harry C. Goldberg	E. & G. P.	Rutgers	Undergraduate
Oscar Goldin	E. & R.	City College of New York	Graduate
Robert W. Hegner	R.	Johns Hopkins	Professor
Gwladys F. Hughes	F. Z.	Goucher	Graduate
Helen C. Hunt	F. Z.	Wellesley	Undergraduate
Carrie B. Huntley	F. Z.	Rhode Island College of Education	Graduate
Charles H. Iglauer	E. & F. Z.	University of Cincinnati	Undergraduate
Leah Kaplan	E. & F. Z.	Hunter	Undergraduate
Gisella Kauf	E., E. S. & R.	Hunter and Columbia	Graduate
Vera Kenney	F. B.	Wellesley	Graduate
Pauline Kirschenbaum	F. Z.	Adelphi	Undergraduate
Christopher G. Knorr	F. Z.	Johns Hopkins	Undergraduate
Ruth G. Koester	R.	University of Minnesota	Graduate
Joseph L. Kostecki	F. Z.	Brown	Undergraduate
Sylvia V. Kotbra	F. Z.	Elmira	Undergraduate
Gemma M. Lichtenstein	E. & G. P.	Smith	Graduate

Name	Registration	Institution	Graduate or Undergraduate
Grace M. Lowe	E. & F. Z.	Rhode Island College of Education	Graduate
Ethel L. Martus	F. Z.	Brown	Undergraduate
Victor E. Nelson	E. & F. Z.	Michigan State	Undergraduate
Polly Norwood	E. & F. Z.	Newcomb	Undergraduate
Kathryn Ordway	R.	University of Minnesota	Graduate
Elizabeth M. Payne	F. Z.	Brown	Graduate
Sara T. Rau	F. Z.	Hood	Undergraduate
Madeline B. Sawyer	F. Z.	Brown	Undergraduate
Ida M. Schwab	E. & F. Z.	Hunter	Graduate
Ruth Silverman	F. Z.	Hunter	Undergraduate
Elizabeth Snodgrass	F. Z.	Mount Holyoke, Brown	Graduate
Julian L. Solinger	E. & F. Z.	Brown	Undergraduate
L. C. Stegeman	F. Z.	Michigan State	Undergraduate
Elinor A. Strickland	E. & F. Z.	Simmons	Undergraduate
F. D. Stubbs	E., E. S. & R.	Dartmouth	Graduate
Jessie Titus	E. & F. Z.	Adelphi	Graduate
Subhajaya Vanijvadhana	F. B.	Princeton	Undergraduate
Grace Wasson	E	Columbia	Graduate
Elizabeth M. Yagle	E. & R.	University of Pennsylvania	Graduate
J. F. Yeager	R.	New York University	Instructor

E.: Endocrinology.
E. S.: Experimental Surgery.
F. B.: Field Botany.
F. Z.: Field Zoology.
G. P.: General Physiology.
R. Research.