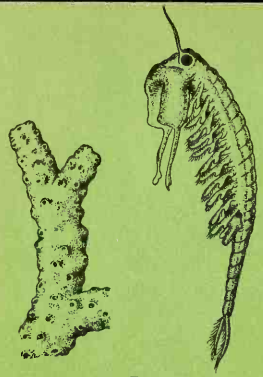


# 1959-60

ANNUAL REPORT

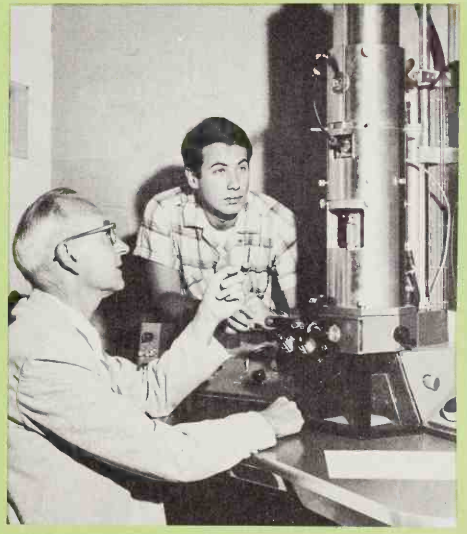
# BIOLOGICAL LABORATORY

## AT COLD SPRING HARBOR, NEW YORK

LONG ISLAND BIOLOGICAL ASSOCIATION

dedicated to the advancement of science

# through research and education



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## Table of Contents

## A Message to the Members

George Lane Nichols Memorial Building

In 1890, a group of scientists, in cooperation with residents of the Cold Spring Harbor area, founded the Biological Laboratory. Its original purpose the Laboratory was to provide summer research facilities for scientists, principally those connected with institutions in the New York City area, and to offer training to students and teachers. With this beginning, the past 70 years have seen the emergence, at Cold Spring Harbor, of a highly integrated program of year-round activities in research and education that has established the Laboratory as a leading scientific center. At this time, with the retirement of Dr. Milislav Demerec, it is pertinent for the Association to recognize his accomplishments. It has been the good fortune of the Association to have had, in its Laboratory Directors, the services of outstanding men of great foresight. Indeed, much of the credit for the past success of the Laboratory, and the current central position of its activities, belongs to these men.

Last summer, in anticipation of the retirement of our Laboratory Director, the Board of Directors called upon a group of leading scientists from other institutions to provide counsel in the task of determining a future policy that would assure a vigorous, outstanding and broadened program for the years ahead *(see "Creative Adaptability" on pages 6 and 7)*. We are most gratified at the enthusiasm and interest in the Laboratory shown by these distinguished gentlemen. We have sought and received their wise counsel on several occasions during the past year, and steps have been taken to have this group serve the Board of Directors as a permanent

scientific advisory council.

Over the past 20 years, we have shared the services of a joint Laboratory Director with our neighbor, the Carnegie Institution of Washington, Department of Genetics. With the growth of activities of the Biological Laboratory during this period, it has become apparent that the administrative duties of the dual directorship pose an unreasonably heavy burden. Consequently, both institutions have agreed to place the future administration of the two laboratories under separate directors. Continued close collaboration is assured, through a committee consisting of representatives of both institutions.

*The New Director*

Dr. Arthur Chovnick has been appointed as our Laboratory Director, taking office on July 1, 1960. He came to us as Assistant Director in January 1959 from the faculty of the University of Connecticut, where he had served some five years. Dr. Chovnick was born in New York City and educated in the public schools. After military service in the war, he secured his A.B. degree from Indiana University in 1949 and the M.A. degree in 1950. In 1953 he obtained the Ph.D. degree from Ohio State University. Married in 1949, Dr. and Mrs. Chovnick and their two children have established their home on the Laboratory grounds.

Your attention is directed to our development program outlined later in this report by Dr. Chovnick *(see "Development Program," pages 8 and 9)*. It is, of course, based upon the past accomplishments of the Laboratory and recommendations of our Scientific Advisory Council, as well as other scientists to whom we are most grateful.

During the past year our program of activities has continued undiminished, and has in fact broadened. During the summer of 1959 our research courses and nature study program for children were augmented by a conference for college teachers of genetics and a program that brings a group of outstanding young science students to the Laboratory to participate in research with members of our staff.

*"Biological Clocks"*

The XXV Annual Symposium, held in June 1960 on the topic "Biological Clocks" brought more than 150 scientists to Cold Spring Harbor from major research centers throughout the world. This year's symposium was particularly timely in view of the immediate and manifold practical significances of basic research efforts in this field. Thus, seemingly esoteric topics as "Temporal Coordination of Physiological Function" and "Experimental Manipulation of the Orientational Clock in Birds" bear directly on such problems as: Health and efficiency of workers subjected to frequent shifting of working hours; conditions for human space flight or lengthy submerged cruises by modern nuclear submarines.

With the continued aid of the National Science Foundation, our program of renovation of existing buildings is providing modern, comfortable facilities for our summer program. The provision of adequate research spaces for our year-round staff is progressing through the generosity of members of the Association and the National Institutes of Health. There remains much to be done, for which we seek the necessary funds.

*Membership Support Multiplied*

As shown in our financial report, membership contributions this year totaled $24,398, compared to $13,777 for the previous year. During the next fiscal year, the Laboratory budget exceeds $450,000, more than $400,000 of which will come from sources outside our regular membership. This means that your contribution will be multiplied more than 10 times in terms of its contribution to basic research and education, so important to the health and welfare of our nation.

We wish to emphasize again the importance to the Association of broad community support. This support and the nature of its source is the cornerstone of the Laboratory. An envelope is enclosed for your convenience in renewing your contributions.

Nevil Ford
*Chairman*

Walter H. Page
*President*

Nevil Ford

Walter H. Page

The grounds and buildings of the Long Island Biological Association and the Carnegie Institution of Washington at Cold Spring Harbor.

## To Milislav Demerec — a Tribute

*From the minutes of the 81st meeting of the Board of Directors of the Long Island Biological Association, May 31, 1960:*

The Board of Directors of the Long Island Biological Association in November 1940 elected Dr. Milislav Demerec as Director of the Biological Laboratory, following an arrangement whereby the Carnegie Institution of Washington was to provide the scientific leadership and administration for the Biological Laboratory, an arrangement which under his direction proved highly advantageous, enabling the Laboratory to attain recognition as a major factor in the current renascence of genetic research. At that time Dr. Demerec was a staff member of the Department of Genetics, Carnegie Institution of Washington, and shortly thereafter became its Director.

Under his administration, the Laboratory has shown remarkable growth. The budget for the year 1941 totalled about $9,000; that for 1959, nearly $100,000. During this period Dr. Demerec's efficient administration of the Laboratory's current funds resulted in an increase of those on hand of more than 50%. By gift and purchase the Sand Spit, de Forest Cottage, the residence, Airslie, and adjoining acreage were deeded to the Laboratory. The acquisition of land between these holdings and the Laboratory grounds insures against undesirable changes in the neighborhood. As a final contribution to the permanence and usefulness of the site, Dr. Demerec's recent campaign is largely responsible for the successful blocking of further dredging of the inner harbor.

The new lecture hall and the 18-unit motel have enhanced the effectiveness of the Symposia. These have set an example that has been extensively followed in many other places, but even so, the popularity and fame of the Cold Spring Harbor Symposia on Quantitative Biology have continued to expand. The number of sponsoring foundations has been increased and the ability to draw together top-ranking specialists from diverse fields and from whatever part of the world, has led to an extended series of publications, unique as records and bibliographic sources and providing inspiration for new approaches.

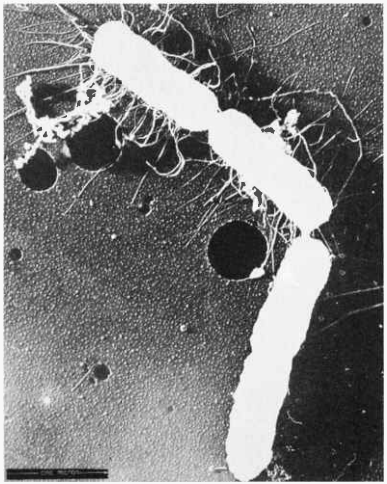
Of more immediate influence upon the modern development of genetic research was Dr. Demerec's establishment of graduate courses in microbiological techniques in 1945. These courses, covering in all, five specialized fields, have, perhaps, been of equal importance to the Symposia in establishing the reputation of the Laboratory.

With a more distant goal, but still of great import, was the establishment of Nature Study classes for children in 1941. These have continued uninterrupted and have expanded into a series of subjects for different age groups. A Nature Study Workshop for school teachers has recently been added.

Besides his administrative achievements, Dr. Demerec has conducted his own researches for which the Laboratory has provided an extended base and widened support. His brilliant results have placed him securely in the world's top rank of scientists and brought him honors and wide recognition, which in turn enhance the prestige of the Laboratory.

Therefore, be it resolved that on his retirement as Director of the Biological Laboratory the Board of Directors of the Long Island Biological Association place on record its deep appreciation of his twenty years of service, beginning at a time when the continued existence of the Laboratory was in doubt and virtually rebuilding it into its present form.

*E. Coli* bacteria



## "Creative Adaptability"

*Report of the August 12, 13, 1959 meeting of the* ad hoc *review committee of the Long Island Biological Association:*

During the past two decades Cold Spring Harbor has been a focus for practically every major development in genetics. This position in the biological world was not won easily. It grew out of the farsighted prescience of director and research staffs alike, that enabled them to sense important new trends before these became widely apparent to other biologists. It was also owing to the admirable flexibility of the program of research and summer activities, and to the excellent quality of the permanent staff. Both Cold Spring Harbor institutions have made essential, complementary contributions to this leadership in genetic biology, the Carnegie Department of Genetics especially through its research program and permanent staff, the Biological Laboratory through its flexibility of program and the stimulating quality of its world-famous symposia and summer courses. It has been the special function of the Biological Laboratory to serve as a catalyst of ideas, and incalculable benefit to science has flowed from the exchange here of facts, opinions, and frank speculations and from the opportunity for visitors to learn the skills needed for new and exciting fields of biological research. The program of the Biological Laboratory has furthermore kept in mind the need in the general community for education in the ways and spirit of scientific exploration, as well as the growing need for the training and retraining of teachers of biology.

Neither the Biological Laboratory, nor the Carnegie laboratories could have functioned so well alone as they have together, and it is greatly to be hoped that their harmonious relationship will long continue.

*Molecular Biology*

Biology is currently undergoing a rapid development and reorientation analogous to that undergone by chemistry after World War I and physics after World War II. This development centers around molecular biology — analysis of cellular structure and function in terms of molecular events and specificity.

By molecular biology is meant the quantitative study of the structural basis of biological processes. As examples, we may quote the study of gene structure and gene function; the study of subcellular elements in relation to cellular architecture and to adaptive and regulatory processes; the analysis of intercellular and intracellular mechanisms underlying cellular differentiation; and the molecular basis of evolution, such as the comparative study of hemoglobin and other functional molecules in different species and populations. In citing these areas we do not wish to advise restricting in any way the program to be developed by the new director and his staff; in fact, new developments will make available opportunities that a staff of the type now considered should be able to define constructively and develop imaginatively.

The committee also wants to emphasis the desirability of continuing the past wise policies of the Biological Laboratory of maintaining flexibility around this core of molecular biology and genetics. By flexibility of program we do not mean "jumping on every bandwagon," but a sort of creative adaptability depending on the foresight and leadership of the entire staff, especially the director. It is important that these principles guide the choice of

a new director. Until the new director is selected, it seems inadvisable to formulate too precise a program.

*Permanent Staff*

The committee feels strongly that the unique role of the Cold Spring Harbor Laboratories can be as significant in the future development of biological research, thought, and concepts as it has proven in the past. The committee enthusiastically endorses as essential for its function the unique programs of the Biological Laboratory — the symposia, the teaching programs, summer research, and the successful community projects.

The committee feels that the proposed enlargement of laboratory facilities and the provision for a core of permanent staff are soundly conceived and vital to the continued contributions of the Association to biology. With the increasing significance of biochemical concepts and techniques in molecular biology more adequate facilities in this area are needed. Additional space and facilities are also necessary to attract and hold the high quality of permanent staff hoped for. In turn, the presence of an enlarged permanent nucleus of scientific personnel and the availability of a variety of laboratory facilities will catalytically strengthen the effectiveness and attractiveness of the summer research and teaching programs. The existence of a permanent Long Island Biological Association staff will also facilitate obtaining the financial support needed for its expanded facilities.

*Carnegie Laboratories*

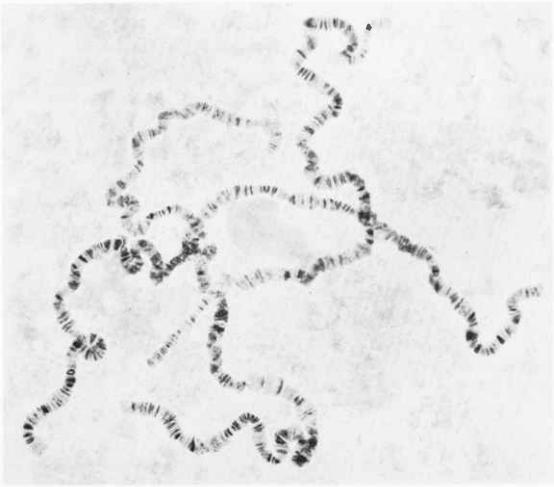
Although the Biological Laboratory by itself could fulfill a most important function, the committee feels that the optimal implementation of its future potentialities, as well as those of the Carnegie laboratories, can come about only with continued close cooperation, integration and mutual complementation of function and activities of the Biological Laboratory and Carnegie laboratories.

The committee urges, therefore, that the past record of joint accomplishments be taken into account in planning for the future of the Cold Spring Harbor laboratories, and feels it to be of vital importance that problems related to the immediate and future development of the laboratories be considered jointly by representatives of both organizations concerned.

E. L. Tatum, *Chairman*

*E. Caspari, H. B. Glass, S. E. Luria, J. D. Watson, E. Zwilling. Absent: W. D. McElroy.*

Giant chromosomes of fruit fly



## Development Program

When any organization changes its administrative leadership, one should expect that its future operation will undergo some modification. In addition to reflecting the motivations and judgement of its new leadership, such future course, if intelligently conceived will reflect past experiences, available resources, the changing demands of an advancing science as well as the changing needs of the society to which it owes its existence. Of course, the future direction of our organization will be restricted by a framework which represents our notion of its general role in the world of science.

In plotting a future course, it is indeed instructive to examine the history of our organization. Why are we here? What is our purpose?

An examination of our early records reveals that the very first concept of the Laboratory's role involved higher education and research training. More specifically, the initial program of the Laboratory, as conceived by its founders, was to provide training to students and teachers. Moreover, such training opportunities were unique insofar as they were concerned with important basic areas of knowledge that *could not* readily be treated within the programs of our colleges and universities.

### *Education and Research*

Beginning with the first summer program in 1890, the Laboratory has offered courses in relatively new areas. From our first courses in the general area of Evolutionary Biology to our current educational program described on subsequent pages, this general philosophy is apparent. Most certainly, the Laboratory will continue to serve as a forum for new ideas, and as a training ground for a vigorous corps of research workers and teachers. That it will be flexible also is most certain. Indeed, some growth and changes have been instituted at this time. All of us are well aware of the increasing need for well trained scientists. As a contribution towards improving science education, and the selection of future scientists, the Laboratory has added two new experimental programs which are described in this report (College Teachers Conference and Undergraduate Research Participation). To stimulate the development of an important basic research area, our course in tissue culture is being modified to emphasize the new methods for quantitative study of animal viruses. This new course, to be given for the first time in 1960, will provide training unavailable elsewhere.

Returning to an examination of the Association's records, a second feature should be noted. In 1924, the management of the Laboratory passed from the Brooklyn Institute of Arts and Sciences, to its current operation by the Long Island Biological Association. Shortly thereafter, under the leadership of its laboratory director, Dr. Reginald Harris, the Association's concept of the Laboratory's function broadened in two ways. First, during this period, the Laboratory's role as a research organization received added emphasis and secondly, our activities were expanded from a summer operation to a year-round program. From its original interest in biophysics and general physiology to its current program in genetics and molecular biology, the year-round research program of the Laboratory has paralleled and, in some ways, anticipated the major trends in basic research in biology.

By retaining a broad spectrum of interests, and ever seeking new directions for exploration, our year-round research program will continue to reflect the Association's concept of our role in year-round research. Indeed, the recent appointment of Dr. Edwin Umbarger to our research staff represents just this policy. Dr. Umbarger's research program, described later in this report, will complement our existing research efforts, but of greater significance is the new departure that this program represents.

### *Staff and Facilities*

During the past five years, the tremendous increase in emphasis upon basic research and science education throughout the United States has created a demand for first-rate scientists far in excess of supply. At the present time, our key staff is supported on annual income to the Association from its varied program of activities, overhead on grants, dividends on our small investments, and annual contributions from its membership. With our small reserve fund, the Laboratory is unable, at present, to provide security of position to our key scientific staff. Our endowment income, representing approximately 1% of our total income must be increased substantially in order to provide a competitive basis for the maintenance of an outstanding staff.

A second major problem facing the Laboratory is concerned with our physical plant. After seventy years of distinguished service, major rehabilitation of our physical facilities is required. With the help of the National Science Foundation, the National Institutes of Health, and contributions from Association members, some progress has been made toward providing modern facilities to house our program. Considerable effort will be needed during the next few years to complete the financing for our building needs outlined later in this report.

## Research in Genetics

Major emphasis in research at the Biological Laboratory is concerned with a series of closely related studies in the field of genetics. In order to introduce these studies, we might well begin with a consideration of the question — What is genetics?

A comparison of the diversity of life that surrounds us leads to the recognition of similarities and differences in the gross form and functional characteristics of all living things. That these similarities and differences are inherited is clearly self-evident. All of us would agree that, from generation to generation, dogs breed dogs and not fish, cats, or birds. We may conclude from this simple observation that what is transmitted from generation to generation is the potential for a particular pattern of development.

### *The Hereditary Process*

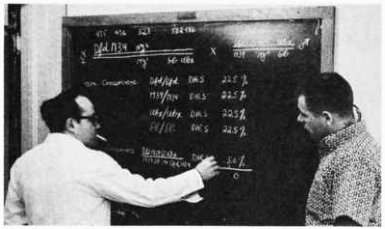
In one species then, there is transmitted a potential for a developmental pattern clearly recognizable as a dog, and separable from the developmental pattern of all other species of organisms. Moreover, within the theme of any one developmental pattern, considerable room for variation is evident. For example, each of us is recognizable as belonging to the species *Homo sapiens* by virtue of a series of fixed characteristics which are attributes of all men. Nevertheless, within this pattern we are able to distinguish variation. Thus, if we select any member of this species, we can find certain features about him which distinguish him from most members of the species. A more critical examination would reveal that he shares some of these distinguishing features with other members of his family. Indeed, if we were to make an extensive study, it would be possible to describe features of this individual that distinguish him from all other members of this species, including his close relatives.

The science of genetics is concerned with all aspects of the potential that is transmitted from generation to generation. We refer to this potential as "the hereditary or genetic material." Today, after some sixty years of intensive investigation by many research workers, many features about the mechanism of heredity are understood. Nevertheless, much important information is lacking, and considerable effort will be needed to solve some most important problems in biology.

Fortunately, it turns out that the behavior of the genetic material is essentially the same in all living things. Consequently, principles derived from an investigation of a limited selection of organisms can be used to draw universal generalizations. Thus for experimental purposes, we, at the Biological Laboratory, find it more convenient to conduct our investigations with bacteria, viruses, and fruit flies rather than other organisms.

### *The Genetic Material*

Let us now focus our attention upon the material basis of heredity, and examine some of the specific research in progress at the Laboratory. It was learned early in the history of genetic investigation that the hereditary material resides in all of the cells of a living organism, within a very specific structure— the chromosomes of the cell nucleus. It was found that the chromosomes behave in a very precise fashion during the processes of cell division and formation of reproductive cells. Indeed, the precise behavior of the chromosomes is matched by the precision with which hereditary characteristics are transmitted



Chalk-talk about genetics

Laboratory refrigerator

from generation to generation. Investigators found further that it is possible to localize specific genetic activity to specific places on the chromosomes. Thus, units of heredity, known as genes, can be identified and assigned specific locations on maps of the chromosomes. Thus, in the fruit fly, *Drosophila melanogaster*, some 5,000 genetic units or genes are known, and many of these units have been studied sufficiently to be assigned to specific locations on the chromosome map of this species. These genes are concerned with the control of the physiological processes which take place in cells. These processes control all of the activities which we ascribe to a living organism, and their interactions control the final form of each individual.

A detailed description of these genetic units may be found in "The Mutants of Drosophila Melanogaster." One of our collaborators, Dr. Katherine S. Brehme, is engaged in writing the second edition of this volume. This reference book for research workers was originally published in 1944, five years after the death of C. B. Bridges. Written from memoranda prepared by Bridges, and greatly amplified by Brehme, it appeared under their joint authorship.

*Fine-structure in Action*

In one of our laboratories, major attention is devoted to an understanding of the fine-structure of living cells. These studies are important in that a final understanding of the nature and precision of the action of genes will depend upon our knowledge of the organization of the chromosomes and the changes effected therein during cell division, growth, and differentation. Utilizing the electron microscope as a major tool, considerable progress has been made in understanding the fine-structure of living cells. One important finding has been the discovery of a mechanism whereby chromosomal materials are funneled through the nuclear membrane into the cytoplasm where they direct the synthesis of specific proteins (See Helen Gay's "Nuclear Control of the Cell" in the *Scientific American* for January, 1960.)

Studies of the chemistry of the genetic material have revealed that the essential activity of the gene resides in a large molecule known as deoxyribosenucleic acid (DNA). In some unknown fashion, this molecule transmits information which instructs the cell in the conduct of its activities. One approach that is being used to study the genetic material searches below the level of even microscopic visibility — down at the size range of molecules.

*Chemistry of Heredity*

In another of our laboratories, a small region of genetic material in the cells of the fruit fly, *Drosophila melangaster*, is under intensive investigation. This gene controls the production of a specific protein, one of the many "enzymes" which serve to catalyze the chemical reactions which characterize all life processes. From normal flies, it is possible to extract a highly purified preparation of this protein, which can be described in terms of its chemical and physical properties in test tube experiments. From a series of experiments in which normal flies were treated with x-rays, it was possible to recover, and preserve for study, a large number of independent mutations within the gene that controls the enzyme under study. These mutations, representing a variety of alterations within the chemical structure of the gene, lead to characteristic effects on the adult organism. All of the mutations share one feature in common. Extracts of flies carrying these mutations no longer exhibit the catalytic effects of the enzyme. Studies now are under way investigating the relationship between the genetic alterations and the resultant loss in enzymatic activitiy. One investigation is concerned with the alterations within the gene structure. We already know that several of the mutations involve different sites within the gene, presumably changes in different chemical groups within the gene.

Another study is directed at the nature of the alterations in the protein enzyme which lead to loss of its catalytic properties. From these studies, we hope eventually to relate the "architecture" of a gene to its biological activity—the control of a particular protein molecule.

*Tissue Culture*

A third project is attempting to develop methods and procedures for the test tube culture of fruit fly tissues. Success in the development of these procedures will open a new realm for investigation, relating the genetic control of cell chemistry to the processes of growth and development.

One of the most important properties inherent in the genetic material is its ability to undergo sudden permanent alterations known as mutations. Its importance refers simply to the fact that mutation is the primary source of all inheritable variation. Although spontaneous mutation of any given gene in an individual has a very low likelihood of occurrence, the significance of the mutational process as the source of hereditary variation becomes apparent when one considers the total number of genes in all organisms that are now subject to mutation; and in addition, all those

genes that were subject to mutation throughout the history of life.

*The Mechanism of Mutation*

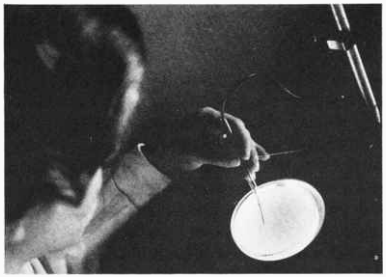
One group of investigators at the Laboratory is engaged in studies designed to provide an understanding of the mechanism by which the mutational event takes place. Despite the fact that such events occur rarely, it is possible to explore this rare phenomenon in the laboratory, utilizing the bacterium, *Salmonella Typhimurium.*

Focusing attention upon one small region of genetic material in this organism, it is possible to study mutations which occur with frequencies on the order of one in a million opportunities (or even less) with procedures which permit examination of as many as one thousand million bacteria grown on a single dish within a twenty four hour period. In our Laboratory, scientists are concerned with the region of genetic material which determines the ability of the bacterial cell to manufacture the amino acid, leucine, an essential component of the proteins of all organisms. Utilizing a variety of chemical agents, with known modes of activity, it is possible to produce mutations at different sites in the region controlling leucine production. The mutations, thus produced, are then subjected to further studies designed to see how they are related to each other. In many ways, this approach to the study of the gene is similar to someone taking apart and reassembling an automobile motor in order to learn how it is constructed, and how it functions.

*Genetic Recombination*

Still another area under investigation is concerned with one of the most elusive problems in the field of genetics. The most important feature associated with biparental inheritance (where the genetic constitution of an individual is composed of contributions from two parents, as in man) is a phenomenon called genetic recombination. Its significance derives from the fact that in the formation of reproductive cells in each individual, there takes place a reshuffling of paternal and maternal genetic contributions, in a fashion such that each germ cell thus formed is unique in its particular genetic composition. Union of paternal and maternal germ cells then give rise to the next generation of individuals, each with a specific combination of genetic factors. Thus, in man and all other forms of life which reproduce in a biparental fashion, each individual is endowed with a combination of genetic factors which distinguish him from all other individuals.

From extensive investigations conducted in many laboratories, major principles governing the transmission and recombination of genetic material have been established. Nevertheless, many basic questions concerning this most important process still elude us. Thus, while we may be able to measure recombination frequencies between genetic units with great precision, and control their occurrence in a variety of ways, we still do not know why and how these events take place. One aspect of our research is designed to contribute towards an understanding of these problems.



Counting bacterial colonies


## Acknowledgments

The Association is indeed pleased to recognize the generous support of various agencies which make our research possible. During the past year, research in genetics at the Laboratory was supported by the following research grants and contracts:

Division of General Medical Sciences, National Institutes of Health, United States Public Health Service, RG-5336

Division of General Medical Sciences, National Institutes of Health, United States Public Health Service, RG-7178

National Cancer Institute, National Institutes of Health, United States Public Health Service, CY-3773

National Cancer Institute, National Institutes of Health, United States Public Health Service, C-4440

National Science Foundation, G5739

National Science Foundation, G6431

United States Atomic Energy Commission, Contract #AT (30-1)-1944

## Staff Investigators

### Research In Genetics

Evelyn Balbinder, *Research Assistant*
David Brooks, *Technician*
Arthur Chovnick, *Director Designate*
Milislav Demerec, *Director*
Gloria Gillies, *Research Assistant*
R. Peter Kernaghan, *Research Assistant*
Marion Krauss, *Research Assistant*
Paul Margolin, *Investigator*
Horace Mazzone, *Research Associate*
Hermann Moser, *Investigator*
Carol Pascarella, *Research Assistant*
Barbara Prokop, *Research Assistant*
Abraham Schalet, *Investigator*
Doris Schoonmaker, *Technician*
Elizabeth J. Simrell, *Research Assistant*
David Weisbrot, *Research Assistant*

### Collaborating Investigators

Elof Carlson, Queens University, Ontario, Canada
Helen Gay, Carnegie Institute of Washington
Berwind P. Kaufmann, Carnegie Institute of Washington
Ilse Schwinck, Max-Planck Institute für Tierzucht, Mariensee, Germany
Katherine S. Brehme, Adelphi College

H. Edwin Umbarger

## H. Edwin Umbarger

Effective July 1, 1960, Dr. Edwin Umbarger, Assistant Professor of Bacteriology and Immunology at the Harvard Medical School has been appointed to a senior staff position at the Laboratory. Dr. Umbarger and his colleagues will bring to Cold Spring Harbor a pioneering research program in the area of cellular biochemistry. Their investigations, designed to provide an understanding of the mechanisms which serve to regulate the chemical activities that take place in living cells, will complement and augment our existing research activities.

Originating from the middle west, Dr. Umbarger took his Bachelor's and Master's degrees at Ohio University. Following military service during World War II, he studied at Harvard University. He received the Ph.D. degree from Harvard University in 1950, and has been teaching and conducting research at that institution since that time. He held the Lederle Medical Faculty Award (1957-1960), and is a member of the following scientific societies: American Chemical Society ( Division of Biological Chemists), American Society of Biological Chemists, Society of American Bacteriologists, Society of Sigma XI.

Dr. and Mrs. Umbarger and their three children will make their residence on the Laboratory grounds.

## Research in Psychobiology

Dr. H. A. Abramson and his collaborators (B. Sklarofsky, G. Dean, H. Gettner, M. Hewitt, and G. Neviackas) have been studying the psychobiological effects of LSD-25 (lysergic acid diethylamide). It is a compound which, when administered in extremely minute quantities (one five thousandth of an aspirin tab-

let) can produce in normal individuals mental states that resemble schizophrenia. LSD-25 and its derivatives have been studied on a group of normal volunteer subjects. A bioassay method has been developed using *Betta splendens* (Siamese Fighting Fish) as the test animal. Work is also being carried out to find a substance that will block the reaction to LSD-25.

The studies on the psychobiological effects of LSD-25 and its derivatives have been extended to a simpler molecule, Psilocybin and its derivatives. Psilocybin is about half the size of LSD-25 and produces a psychotic state in man indistinguishable, as far as the nature of the reaction goes, from LSD-25.

It is of great importance to determine mechanisms concerned with the production of psychoses. To this end the protective effect of giving LSD-25 ahead of time against the Psilocybin reaction has been studied, as well as the counterpart of this experiment: giving Psilocybin ahead of time to determine if it will protect against LSD-25. Psilocybin taken for a week ahead of time in increasing doses protected very effectively against psychosis-producing doses of LSD-25.

An even simpler molecule naturally occurring in Mexican mushrooms called Psilocin also produces a psychotic state. Two milligrams of Psilocin is sufficient to produce a threshold psychosis in non-psychotic subjects. Although this is about 100 times what is required when LSD-25 is used, the fact that it occurs in nature and that it has a much simpler molecular configuration makes the study of these compounds of importance in any investigation designed to study the nature of psychoses in man.

Our studies on the fish continue. It has been found that Psilocybin acts on the Siamese fighting fish just the way LSD does, but that a much larger dose is required. This fits in with our studies on man. In addition, experiments are continuing, designed to narrow down the nature of the LSD blocking substances in brain extract. It is not as yet certain whether the blocking is due to salts preventing diffusion across the gill membrane or to the presence of an organic substance.

Plating out bacterial colonies

## 1960 Symposium

Every year since 1933, excepting only the war years, the Long Island Biological Association has convened an international symposium on some central topic of research in quantitative biology. These meetings, conducted each year in early June, bring together scientists from throughout the world for a week to 10 days of formal discussion and informal living. Over the years, these gatherings have contributed substantially to the integration of biological research on an international basis.

In 1960 the "XXV Cold Spring Harbor Symposium — 'Biological Clocks' " was convened on June 5 and continued to June 14.

### *"Biological Clocks"*

While biological time-measuring systems have been studied systematically for 75 years, there has been a most remarkable outburst of interest in the subject in the last 10 years. This interest is due almost entirely to the spectacular work of the German animal-behavior people who showed that *birds* and *bees* and now many other animals can orient or, perhaps one can say navigate, using the position of the sun as a guidepost and compensating for their movements throughout the day with the use of an internal chronometer of some kind. This demonstration, in 1950, that birds had good internal chronometers, was perhaps more responsible than any other factor for the tremendous outburst of work on biological clocks in the last decade.

The first three days of the Symposium were devoted to a general survey of the properties of daily rhythms in all kinds of organisms—from single cells to the most complex mammals. One day was devoted to a consideration of mathematical models and electrical analogues for daily rhythms. This was followed by a series of papers reporting physiological studies of rhythms exhibited by plants. The latter part of the Symposium was devoted largely to the role of biological clocks in celestial orientation or navigation. There was a large contingent present from Germany, where most of the work on the use of innate clocks for navigation or orientation is being done; in fact, every leading worker in this field participated in the Symposium.

### *Committee and Sponsors*

The Association gratefully acknowledges the efforts of the organizing committee for the 1960 Symposium. They were instrumental in bringing together outstanding workers from all over the world, and planned a most comprehensive program.

Chairman of the Committee was Dr. Colin S. Pittendrigh, Princeton University, and its members were Dr. J. Aschoff, Max-Planck-Institut für Verhaltensphysiologie, Germany; Dr. V. G. Bruce, Princeton University; Dr. E. Bünning, Botanisches Institut, Tübingen, Germany; Dr. D. R. Griffin, Harvard University and Dr. J. W. Hastings, University of Illinois.

The XXV Cold Spring Harbor Symposium was supported by the following foundations and agencies: Carnegie Corporation of New York, The Rockefeller Foundation, Institute of Oceanography and Marine Biology, National Science Foundation, United States Public Health Service, U.S. Office of Naval Research (under the auspices of the American Institute of Biological Sciences), and U.S. Air Force (monitored by the Office of Scientific Research of the Air Research and Development Command).

## Guest Investigators

Because of its location on the seashore, the Biological Laboratory is an attractive place for distinguished scientists from universities and research institutions throughout the world to spend all or part of the summer. The attraction is considerably increased by the fact that good facilities for research are available, and an active group of research scientists is in residence here.

A large proportion of the summer guests work on problems that are close to the interests of the year-round staff, and in occasional collaborative efforts.

During the summer of 1959, the following investigators were guests of the Laboratory: Dr. Alan W. Bernheimer, New York Universitysity College of Medicine; Dr. Ernst W. Caspari, Wesleyan University; Dr. Maurice Fox, The Rockefeller Institute for Medical Research; Dr. Sol Goodgal, Johns Hopkins University; Dr. Leonard D. Hamilton, Sloan-Kettering Institute for Cancer Research; Dr. Philip E. Hartman, Johns Hopkins University; Dr. Rollin D. Hotchkiss, The Rockefeller Institute for Medical Research; Dr. Carl Kirchner, Johns Hopkins University; Dr. S. E. Luria, Massachusetts Institute of Technology; Dr. Karl Marmarosch, The Rockefeller Institute for Medical Research; Dr. Norman Melechen, St. Louis University School of Medicine; Dr. Franklin W. Stahl, University of Oregon; Dr. S. R. Suskind, Johns Hopkins University; Dr. A. O. Tantawy, Columbia University; Dr. Felix Wasserman, The Public Health Research Institute.

## Summer Courses for Scientists

During the summer of 1959, the Laboratory once again conducted a series of three intensive courses for research workers. Designed to present advanced techniques and to review significant research developments in microbial genetics, our courses provide a training opportunity unavailable elsewhere. The continued usefulness of this program is attested by the keen competition by research workers throughout the world for places in these limited enrollment courses.

During the summer of 1959, the following courses were offered:

1. BACTERIAL GENETICS, June 15 to July 4.
   Staff: M. Demerec, Biological Laboratory and Carnegie Institution
   Evelyn Witkin, University of the State of New York, College of Medicine, Downstate Medical Center
   Vernon Bryson, Rutgers University
   Philip Hartman, Johns Hopkins University
2. BACTERIAL VIRUSES, July 6 to August 1.
   Staff: George Streisinger, Carnegie Institution
   F. W. Stahl, University of Oregon
   S. E. Luria, Massachusetts Institute of Technology
3. QUANTITATIVE STUDY OF HUMAN CELLS IN TISSUE CULTURE, August 3 to 22.
   Staff: Hermann Moser, Biological Laboratory
   E. H. Y. Chu, Oak Ridge National Laboratory

In addition to laboratory exercises supervised by the indicated staff members, a seminar program was conducted, consisting of talks by leading investigators in each field. Thus, during the course of the summer, 40 lectures were held in conjunction with this program.

This program of research training in microbial genetics is supported by a grant, CRT-5032(C2), from the National Cancer Institute, National Institutes of Health.

ERICH HARTMANN – MAGNUM

L. D. Hamilton, guest investigator

## Education Program—College Teachers

During the summer of 1959, the Laboratory initiated an experimental program directed towards strengthening college teachers' mastery of new developments in the field of genetics. Twenty college faculty members from as many institutions throughout the United States were selected to participate in this program of lectures, discussions and demonstrations on the topic "Recent Developments in Genetics." The program of this conference, organized by Dr. Arthur Chovnick, consisted of three 1-week sessions devoted to the following topics:

Structural Organization of the Genetic Material — August 3-8

Function of the Genetic Material — August 10-15

Population Genetics and Evolution — August 17-22

This program was supported by a grant, NSF-G7232, from the National Science Foundation.

## Undergraduate Researchers

The selection and training of brilliant young people assures continuity of basic research. Clearly, the most effective way to impress bright young students with the prospects of a scientific career is to offer them a research experience under enthusiastic tutelage and pleasant circumstances.

During the summer of 1959, a group of 10 outstanding undergraduate science majors were brought to the Laboratory to work on research problems under the direction of members of our research staff. The students were in residence at the Laboratory, participated in the many seminars conducted for the various courses and met weekly for a special seminar of their own.

It was quite clear from the enthusiasm of the staff and students, and from the remarkable intellectual growth exhibited by the students during the short duration of the program, that it would be well to continue this activity in the future.

This program was supported by a grant, NSF-G7854, from the National Science Foundation.

## Elementary School Teachers

During the summer of 1956, the Laboratory instituted a nature-study workshop, designed primarily for teachers in the elementary grades. Those who complete the two-week course receive two credits from the New York State Education Department.

Designed to familiarize teachers with the natural environment of the Long Island area, this course aims at helping teachers learn how to stimulate scientific curiosity in youngsters, encouraging the most able to pick science as their own careers

During the summer of 1959, 24 teachers were enrolled in the workshop. To provide background information and experience to improve classroom presentations, various techniques were employed. The principal means of instruction consisted of field trips to the many types of natural habitats on Long Island. The participants collected specimens of the flora and fauna for subsequent identification and

study. There were lectures, demonstrations, bird walks, examination of specimens, etc.

Various techniques for incorporating nature study into the school curriculum were presented. Organization of field trips for class groups was discussed. Each student kept a nature log for the duration of the course and prepared a term project. Reports and demonstrations were given on the last day of the workshop.

The staff consisted of Marvin J. Rosenberg, University of the State of New York, College on Long Island, Oyster Bay, New York, and Otto Heck, Island Trees High School, Levittown, New York.

## Nature Study for Children

For the past twenty years, the Biological Laboratory has offered a summer course in nature study for the children of the neighborhood from the ages of 6 to 14. The aims of the courses are to encourage an interest in the natural sciences — to stimulate in children a curiosity about the natural history of the region — to develop scientific ways of thinking through logical and thoughtful methods of observation and exploration.

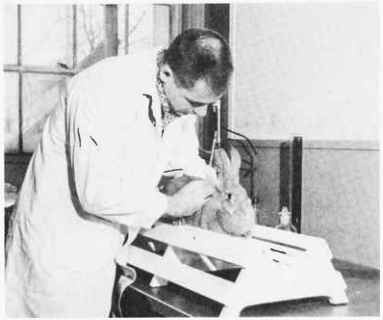
The Cold Spring Harbor region, with its fresh-water streams, ponds, seashore, tidal pools, sea walls, woodland and cleared meadow areas, is rich in a diversity of plant and animal life. Trips are made to beaches, tidal pools, mud flats, woods and fields to study the many varied forms of life in their native habitats.

Older children work on projects of their own choosing, and many collections are gathered. Ornithology and geology are topics covered by the advanced groups. Outside reading and research are encouraged.

So much enthusiasm has been shown by the children that for the past two years an extra session has been held after the completion of the regular course. The enrollment for the summer of 1959 was 195. Course offerings were: General Nature Study, General Ecology, Seashore Life, Entomology and Conservation, Advanced Ecology, Botany-Plant Life, Vertebrate Zoology, Advanced Nature Study.

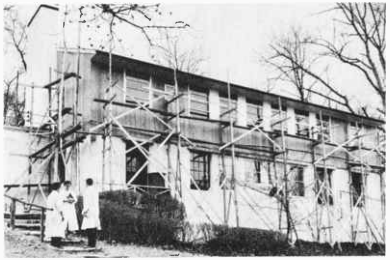
The staff was composed of Marvin J. Rosenberg, University of the State of New York, College on Long Island; Otto Heck, Island Trees High School, Levittown, New York; Irwin Brodo, Cornell University, Ithaca, New York, and Barbara A. Sheehan.

The Association gratefully acknowledges the contribution of the Huntington Federal Savings and Loan Association. Their contribution provided scholarships for 12 students from the Town of Huntington during the summer of 1959.



James Laboratory — new second floor

James Laboratory — interior



James Laboratory — exterior

## Buildings and Grounds

The Long Island Biological Laboratory is located on about 65 acres of land at the head of Cold Spring Harbor in Nassau County, township of Oyster Bay. This property includes, in addition to buildings, lawn and experimental fields, a wooded area, marshlands, shoreline and a fine beach. The physical plant consists of 19 buildings: two laboratory buildings usable the year round, three laboratory buildings suitable only for summer use, six year-round residences and eight summer residence units.

Recent inspections by the Nassau County Fire Commission and Building Inspectors have pointed up a degree of deterioration, inadequacy of structure and potential fire hazard that had never before been fully appreciated.

*Renovation of Summer Facilities*

Most of our summer activities are housed in structures acquired early in the history of the Laboratory. Recognizing the importance of our summer programs and our need for aid, the National Science Foundation, last year, provided $135,000 to provide part of the funds needed to make major repairs, modernize and reconstruct existing facilities. The allotments for the first and part of the second year have been utilized as follows:

1. Installation of equipment for cafeteria service in the dining room at Blackford Hall.
2. Addition to the Page Residence Building, providing eight additional rooms and six baths for summer guests.
3. Renovation of dormitories and year-round apartments in Hooper House.
4. Renovation of dormitories in Blackford Hall.

*NSF Statement*

The grant award of the National Science Foundation was accompanied by the following statement:

"The Long Island Biological Laboratory has played a leading role in the development of biological sciences in this country, and particularly in the field of genetics. Notable contributions have been made both by resident staff and by scientists participating in the summer research, instruction and symposium program held each year. The Laboratory's physical plant consists of 19 buildings, all but two of which are of frame construction. A third of the structures predate 1900 and require major rehabilitation. The Foundation grant will provide part of the funds needed during the next five years for a program of major repairs and modernization."

*Nature Study Building*

The Wawepex Laboratory, headquarters for nature study activities for the past 20 years, can no longer be used until it is reconstructed to meet building code requirements for structures used in teaching. Since the cost of reconstruction would be prohibitive, the findings of the Fire Commission and Building Inspectors were, in effect, a condemnation of this building.

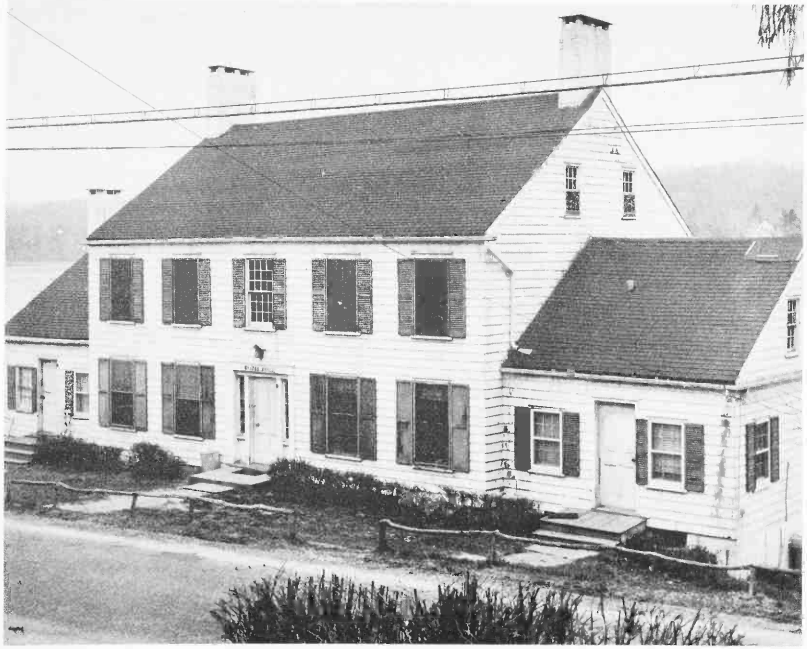
Plans will be drawn for a new structure to conform to the State Education Department's building code. Following this, we will have an estimate of construction cost and will be in a position to seek support for a nature study center.

*W. B. James Laboratory*

The provision of modern, well-equipped research spaces for an expanded year-round staff is one of the major features of the development program adopted by the Board of Directors. The first step in this direction involves the renovation and expansion of the existing Dr. Walter B. James Laboratory. A recent grant of $70,000 from the Health Research Facilities division of the National Institutes of Health will permit the addition of a second floor and the renovation of the first floor of the James building or Laboratory. However, this sum must be matched by private funds to cover the total cost of building, renovating and equipping the laboratories with modern research facilities. We are currently seeking these matching funds. Upon completion, this building will provide space for a research staff of 20 investigators in the fields of genetics and biochemistry. A second year-round research building, of similar size, is contemplated for our staff expansion.

The renovation and construction program is under the direction of architect E. Everett Post, of George B. Post & Sons, Huntington and New York. General Contractor is Roy Skogan and Co. of Huntington.

Williams House



Hooper House

Air view of Cold Spring Harbor shows outer harbor beyond sand spit, inner harbor on near side of sand spit and fresh water ponds in foreground. Laboratory grounds are at left.

## The Laboratory Environment

In the ultimate sense, it is the environment of Cold Spring Harbor, rather than a cluster of buildings, that constitutes the Laboratory of the Long Island Biological Association. The particular relationship of fresh and salt water, the landlocked tidal flat and the shielding sandy barrier are the reasons why the Laboratory was founded at the site in 1890, only one year after the establishment of the Marine Biological Institute at Woods Hole.

The geographic situation is described as follows in a semi-annual report of the Biological Laboratory published in 1940:

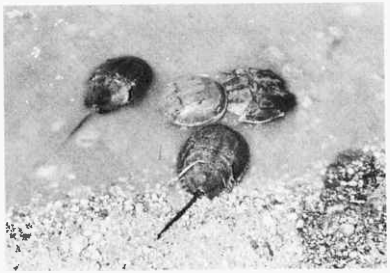
"Where the streams flow into the harbor, silt has been deposited forming extensive mud flats and these constitute the homes of a large number of mollusks, worms and crustacea. At Cold Spring Harbor a sandy bar has been thrown up at the outer end of this mud flat, and this bar affords a population which in numbers is probably equal to the human population of North America. A strictly marine fauna is found in the outer harbor. On account of the secluded conditions in the inner harbor the eggs and young of the species that inhabit it are not washed out to sea, but form a veritable soup during the latter part of the summer. Thus the mass and variety of the surface fauna (called plankton) are extraordinarily great."

Scientists, both American and from abroad, have found the Cold Spring Harbor area most productive for studies of marine life; indeed, so many such studies have been made that the region covering the Sand Spit and the inner harbor is considered the best-investigated region biologically in this country. It is well known to biologists as the birthplace in the U.S. of the science of ecology; that is, the study of the relationship between organisms and their environment.

Plants and animals belonging to the tension zone between fresh and salt water represent a distinctive association. Ever since the founding of the Biological Laboratory these organisms have been studied by a host of research workers from many parts of the world. The series of impressive scientific memoirs published by the Carnegie Institution of Washington and other organizations is to be found in all of the world's important scientific libraries, and the titles of these papers have been listed in innumerable bibliographies.

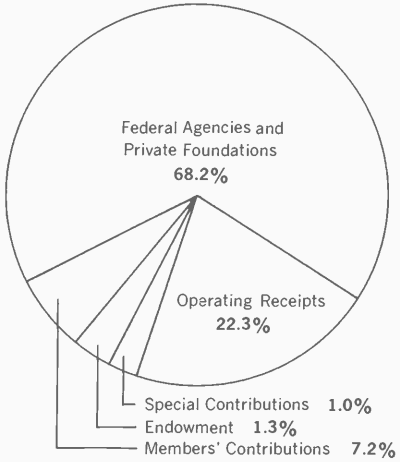
Evolution is a slow process. It cannot be observed without records covering extensive periods. In this respect Cold Spring Harbor stands by itself in the Western Hemisphere, because only here do we have exact records of waters and tidelands, correlated with studies of flora and fauna, going back well over half a century. As one example, the discoveries to be made from the hundreds of spring-breeding horseshoe crabs that have been tagged during the past few years depend upon records that have been kept for years past and require that this program continue without interruption for many years to come.

The continuation of a vigorous program of research at the laboratory of the Long Island Biological Association requires the perpetuation of its irreplaceable envronment. In supporting both objectives the Long Island community is making an important contribution to the progress of the life sciences.



Horseshoe crabs

Sources of Funds




## Financial Report

For the period May 1, 1959 — April 30, 1960

*As of April 30, 1959 our unrestricted assets were as follows:*

| | | |
|---|---|---|
| Cash | $ 43,694.75 | |
| Accounts receivable | 12,828.15 | |
| Inventory of books | 13,953.38 | |
| Deferred expenses | 1,334.20 | |
| Investments (market value $117,688.37) | | |
| Bonds $79,941.09 | | |
| Stocks $31,007.14 | 110,948.23 | |
| Land, buildings and equipment | 353,222.53 | |
| Total | | $535,981.24 |

*Our liabilities were as follows:*

| | | |
|---|---|---|
| Accounts payable | $ 29,159.19 | |
| Taxes | 142.20 | |
| Grants and contracts unexpended | 116,722.72 | 146,024.11 |
| leaving unrestricted funds amounting to | | 389,957.13 |
| represented by: | | |
| Deferred income | 205.00 | |
| Reserve for research | 20,000.00 | |
| Endowment Fund (Wm. J. Matheson Bequest) | 20,000.00 | |
| Net worth | 349,752.13 | |
| Total | | $535,981.24 |

*In addition we hold cash and investments in the amount of $19,530.66, representing restricted funds as follows:*

| | |
|---|---|
| Mark H. Adams Memorial Fund | $ 1,582.99 |
| Blackford Memorial Fund | 5,000.00 |
| Charles Benedict Davenport Memorial Fund | 6,543.45 |
| Charles Benedict Davenport, Junior, Fund | 1,364.16 |
| Temple Prime Scholarship Fund | 2,608.60 |
| Dorothy Frances Rice Fund | 2,431.46 |
| Total | $ 19,530.66 |

*For the year 1959-1960, our receipts were as follows:*

| | |
|---|---|
| Grants, contracts, research fees | $229,767.42 |
| Members contributions | 24,398.22 |
| Special contributions | 3,320.00 |
| Interest and dividends | 3,577.75 |
| Profit on sale of securities | 756.26 |
| Operating receipts (rentals, dining hall, booksales, etc.) | 75,290.47 |
| Total | $337,110.12 |

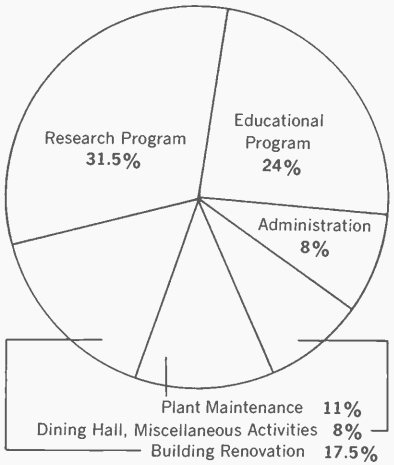
*Our expenditures were as follows:*

| | |
|---|---|
| Research | $100,031.46 |
| Educational program | 76,474.81 |
| Administration | 25,285.55 |
| Plant maintenance | 35,095.33 |
| Dining hall, summer activities | 25,024.28 |
| Building renovation | 55,750.00 |
| Total | $317,661.43 |

*Leaving an unexpended total of* $ 19,448.69

*Against this amount we had committed expenses for completion of the James Laboratory estimated at $70,000.*

**Distribution of Funds**



## The Membership

Dr. and Mrs. Harold A. Abramson
Mr. W. H. Alston
Mr. Amyas Ames
Mr. and Mrs. Charles E. Ames
Mrs. Charles O. Ames
Mr. and Mrs. Hoyt Ammidon
Mrs. Henry H. Anderson
Dr. Richard M. Arkwright
Mr. and Mrs. Donald Arthur, Jr.
Mr. and Mrs. Paul Atkins
Mr. and Mrs. Roy B. Attride
Mrs. Carl S. Auerbach
Mr. and Mrs. Robert W. Ayer
Mr. Richard F. Babcock
Mrs. Daniel Bacon
Dr. James C. Barnett
Mr. and Mrs. R. Barringer
Mr. and Mrs. Edmund Bartlett
Mr. and Mrs. E. Farrar Bateson
Mrs. E. F. Bateson, Jr.
Mr. and Mrs. A. H. Beaufrere
Mr. August Belmont
Mr. A. Benziger
Dr. Lloyd V. Berkner
Dr. Frederick Bernheim
Dr. Alan Bernheimer
Mrs. Loren C. Berry
Mr. Sydney Bevin
Mr. and Mrs. Nicholas Biddle
Dr. Saul M. Bien
Mr. and Mrs. Russell W. Billman
Mrs. Lillian M. Birch
Mrs. Richard F. Bishop
Mr. Henry Blackstone
Mr. and Mrs. B. DeWitt Bleecker
Mr. Bache Bleecker
Rev. and Mrs. Lyman C. Bleecker
Mrs. T. Bache Bleecker
Mrs. Anthony A. Bliss
Mr. and Mrs. Kenneth Boardman
Miss R. C. Boardman
Dr. Dietrich Bodenstein
Mrs. Herbert Bodman
Mr. and Mrs. Frederick E. Bolk
Mr. L. H. Bonn
Mrs. B. P. Bouverie
Dr. George T. Bowdoin
Mr. Leonard Braun
Dr. Katherine S. Brehme
Mrs. George E. Brower
Mr. and Mrs. Alastair Brown
Mr. Clark H. Brown
Mrs. David W. Brown
Mr. Walter F. Brunauer
Mrs. E. R. Bryan
Dr. Vernon Bryson
Mr. and Mrs. Louis H. Buck
Mr. F. Matthew Buermann
Mrs. I. T. Burden, Jr.
Dr. Dean Burk
Mr. Frank Bursi
Mrs. Trowbridge Callaway
Mrs. H. Schuyler Cammann
Mr. Ward C. Campbell
Mr. John L. Carey
Dr. E. W. Caspari
Mrs. J. R. Castellana
Mrs. Thomas H. Choate
Dr. Frank C. Ciafone
Mr. and Mrs. Frank L. Clough
Mrs. Henry E. Coe
Mr. John T. Cole
Mr. Emilio G. Collado
Mr. Thomas L. Collins
Mr. Melvin Conant
Dr. Crispin Cooke
Dr. George W. Corner
Mr. and Mrs. Howard Corning
Mr. and Mrs. Duncan Cox
Mr. and Mrs. John L. Cox, 2nd
Mr. and Mrs. Charles L. Craig
Mr. and Mrs. Miner D. Crary, Jr.
Mr. Arthur M. Crocker
Mr. George A. Crocker
Mr. S. Burford Crossman
Mrs. Robert L. Cummings, Jr.
Mr. Richard T. Cunniff
Dr. Howard J. Curtis
Mr. and Mrs. Curtis Cushman
Mr. and Mrs. Paul Cushman
Mr. and Mrs. F. Trubee Davison
Mr. Henry P. Davison, Jr.
Mrs. Henry P. Davison
Mr. and Mrs. Raymond de Clairville
Mr. Robert F. de Graff
Dr. Max Delbruck
Dr. and Mrs. M. Demerec
Mrs. William Denby
Mr. William de Neergaard
Dr. Richard Derby
Mr. A. C. Derrick
Mrs. Alvin Devereaux
Mrs. Norman G. DeWeir
Mrs. I. R. Dickson
Mr. and Mrs. J. C. Dinkelacker
Mr. William R. Dotson
Dr. Cyril E. Drysdale
Mrs. Henry G. Duvernoy
Mr. Russell E. Duvernoy
Mr. John N. Dyer
Mr. and Mrs. Jackson A. Dykman
Mr. and Mrs. Walter K. Earle
Mr. and Mrs. Ferdinand Eberstadt
Mrs. Maitland A. Edey
Mrs. Joseph R. Eggert, Jr.
Mr. and Mrs. Richard M. Emberson
Mr. and Mrs. R. S. Emmet
Dr. David J. Evancie
Mr. and Mrs. William Everdell, III
Dr. George L. Fair
Mr. and Mrs. J. Douglas Fairchild
Dr. Ugo Fano
Mr. M. H. Farnham
Mr. H. L. Fates
Mr. and Mrs. Richard H. Fay
Mr. and Mrs. Gordon M. Ferguson
Mr. Roy K. Ferguson
Dr. Anthony Firenze
Dr. Ernst Fischer
Mr. and Mrs. W. Allston Flagg
Dr. George H. Fonde
Dr. Alexander Forbes
Mr. and Mrs. Nevil Ford

Mr. and Mrs. Peter L. Francis
Mrs. George S. Franklin
Mr. George S. Franklin, Jr.
Mrs. Julian J. Frey
Mr. Childs Frick
Mrs. H. Clay Frick
Mr. Jack B. Friedman
Mr. Stephen D. Fuller
Mr. and Mrs. James E. Gardner, Jr.
Mr. Craig M. Garretson
Mr. Chauncey B. Garver
Mrs. John W. Gates, Jr.
Mrs. William C. Gay
Mr. W. R. Gherardi
Mrs. Harvey D. Gibson
Mr. and Mrs. Herbert Glasier
Dr. and Mrs. H. Bentley Glass
Dr. and Mrs. Martin Z. Glynn
Dr. Gustave Goldstein
Dr. E. R. Goodrich
Mr. and Mrs. C. Fitzhugh Gordon
Dr. Joseph Gots
Mr. H. A. Gottfried
Dr. Edwin J. Grace
Mr. Charles V. Graham
Dr. and Mrs. Earl L. Green
Mrs. Hamilton Hadden
Mrs. Joanna J. Hadden
Mr. and Mrs. Morris Hadley
Mr. Winston H. Hagen
Mr. Bruce Wood Hall
Mrs. Joseph Hambuechen
Mrs. Frederick J. Hamilton
Dr. L. D. Hamilton
Mrs. Paul L. Hammond
Mr. Michael M. Hare
Mr. F. Ward Harman
Mr. Henry U. Harris
Mr. and Mrs. Augustin S. Hart, Jr.
Dr. and Mrs. Chester Hartenstein
Dr. and Mrs. Philip E. Hartman
Mr. and Mrs. Herman Hartmann
Hartmann's Department Store
Dr. and Mrs. Caryl P. Haskins
Mr. and Mrs. Benjamin R. Hatch
Mr. Charles F. Havemeyer
Mr. Horace Havemeyer, Jr.
Mr. Ashton W. Hawkins
Mr. R. W. Hawkins
Mrs. Stephen B. Haynes
Mrs. Frederick Heberer
Mr. R. Graham Heiner
Mr. J. E. Hellier
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Mr. Herbert H. Zeese

## Special Events

Each year, Association members and their friends are invited to an open house demonstration and tea at Blackford Hall. On Sunday, September 20th, 1959, the speaker at the open house was Mr. Gerald Piel, Publisher of *Scientific America*. His talk was entitled "Science: Ends and Means."

The scientific exhibits displayed and demonstrated in Blackford Hall illustrated current projects at the Laboratory as well as summer activities of the Nature Study groups. Staff members demonstrated the exhibits and discussed their research with the visitors.

Tea was then served in the dining room, under the supervision of Mrs. Franz Schneider and other members of the Women's Committee.

*Lectures*

Throughout the year, lectures of general interest to the community are organized. The Laboratory cooperates with neighboring colleges such as Adelphi and the State University on Long Island for seminars, tours, demonstrations and use of facilities.

*Professional Meetings*

The annual meeting of investigators in the field of bacterial virus research, attended by 70 scientists, was held on the Laboratory grounds from August 24 to 27, 1959.

A workshop on antibodies, attended by 25 specialists in the field, was held on the Laboratory grounds from June 2-4, 1960.

*Symposium Dinner Parties*

During the XXV Symposium in June, 1960, Mrs. David Ingraham and Mrs. Franz Schneider organized a series of dinner parties for participating scientists from abroad. The Association gratefully acknowledges the hospitality of the following members of the community who served as hostesses:

Mrs. Howard Corning, Jr.
Mrs. Paul Cushman
Mrs. James A. deTomasi
Mrs. Ferdinand Eberstadt
Mrs. Joseph E. Eggert, Jr.
Mrs. James Eisenman
Mrs. Nevil Ford
Mrs. Burton J. Lee
Mrs. Robert V. Lindsay
Mrs. V. S. Littauer
Mrs. Richard B. McAdoo
Mrs. George Nichols
Mrs. William B. Nichols
Mrs. Walter Page
Mrs. Franz Schneider
Mrs. William Smoot
Mrs. Eugene S. Taliaferro
Mrs. David E. Warden

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