THE MOUNT DESERT ISLAND BIOLOGICAL LABORATORY

Annual Announcement and Report

The Weir Mitchell Station at Salisbury Cove, and the Dorr Station at Bar Harbor, on Mount Desert Island, Maine, from June 15th to September 15th

THIRTY-FOURTH SEASON

1932

THE CORPORATION OF THE MOUNT DESERT ISLAND BIOLOGICAL LABORATORY

Henry B. Bigelow, Harvard University
Louise DeKoven Bowen, Chicago, Illinois
Hermon Carey Bumpus, Waban, Massachusetts
Esther F. Byrnes, Girls' High School, Brooklyn
William H. Cole, Rutgers University
Edwin Grant Conklin, Princeton University
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Ulric Dahlgren, Princeton University
Carl L. Davis, University of Maryland
George B. Dorr, Bar Harbor, Maine
Charles J. Fish, Buffalo Museum of Science
Allan Grafflin, Harvard University
Robert W. Hegner, Johns Hopkins University
Margaret M. Hoskins, New York University Dental School
Duncan Starr Johnson, Johns Hopkins University
Percy L. Johnson, Missouri Valley College
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Warren H. Lewis, Johns Hopkins Medical School
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Clarence Cook Little, Jackson Memorial Laboratory
Frank E. Lutz, American Museum of Natural History
Edward F. Malone, University of Cincinnati Medical School
Eli K. Marshall, Jr., Johns Hopkins Medical School
Samuel O. Mast, Johns Hopkins University
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Stuart Mudd, Henry Phipps Institute
Frank J. Myers, Ventnor, New Jersey
Herbert V. Neal, Tufts College
Thurlow C. Nelson, Rutgers University
George Howard Parker, Harvard University
Harold D. Senior, New York University Medical School
Homer W. Smith, New York University Medical School
Benjamin Spector, Tufts College Medical School
G. Ledyard Stebbins, Harvard University
William Morton Wheeler, Harvard University
Charles Branch Wilson, Normal School, Westfield, Mass.
Donnell B. Young, University of Maine

David O. Rodick, Clerk, Bar Harbor, Maine

THE MOUNT DESERT ISLAND BIOLOGICAL LABORATORY

(FORMERLY THE HARPSWELL LABORATORY)

Founded by John Sterling Kingsley in 1898

OFFICERS

CLARENCE COOK LITTLE
Bar Harbor, Me.
President of the Corporation

DUNCAN STARR JOHNSON
Johns Hopkins University, Baltimore, Md.
Vice-President of the Corporation

DAVID O. RODICK
Bar Harbor, Me.
Treasurer of the Corporation

WILLIAM HARDER COLE
Rutgers University, New Brunswick, N. J.
Secretary of the Corporation and Director of the Weir Mitchell Station, Salisbury Cove, Me.

RAYMOND L. TAYLOR
College of William and Mary, Williamsburg, Va.
Director of the Dorr Station, Bar Harbor, Me.

HERBERT V. NEAL
Honorary Director, Tufts College, Mass.

TRUSTEES

To serve until 1932

LOUISE DE KOVEN BOWEN, Chicago, Ill.
HERMON C. BUMPUS, Waban, Mass.
ULRIC DAHLGREN, Princeton University.
GEORGE B. DORR, Bar Harbor, Me.
HERBERT V. NEAL, Tufts College.

To serve until 1933

DUNCAN S. JOHNSON, Johns Hopkins University.
FRANK R. LITTLE, University of Chicago.
*CLARENCE C. LITTLE, Roscoe B. Jackson Memorial Laboratory.
FRANK J. MYERS, American Museum of Natural History.
HAROLD D. SENIOR, New York University.

To serve until 1934

*WILLIAM H. COLE, Rutgers University.
ROBERT W. HEGNER, Johns Hopkins University.
WARREN H. LEWIS, Johns Hopkins University.
E. K. MARSHALL, JR., Johns Hopkins University.
SAMUEL O. MAST, Johns Hopkins University.
*DAVID O. RODICK, Bar Harbor.
*HOMER W. SMITH, New York University.

**Members of Executive Committee.*

Eagle Lake, Mt. Desert Island

HISTORICAL

1898 Laboratory established at South Harpswell, Me., by J. S. Kingsley.

1913 Reorganization of laboratory as a scientific corporation under the laws of the State of Maine with a board of ten trustees and J. S. Kingsley as director.

1921 Removal of laboratory to Salisbury Cove on Mount Desert Island, Maine, and designation as the Weir Mitchell Station of the Harpswell laboratory under the directorship of Ulric Dahlgren.

1922 Eighty acres of land near the Weir Mitchell Station purchased from Louis B. McCagg, since then partly developed as home sites for biologists working in the laboratory.

1923 Land for Weir Mitchell Station deeded by the Wild Gardens Corporation to the laboratory, the name of which was changed to the Mt. Desert Island Biological Laboratory.

1926 H. V. Neal elected Director of the Weir Mitchell Station.

1928 Amalgamation of the Mt. Desert Island Biological Laboratory with the laboratory founded by Clarence Cook Little at Bar Harbor. The latter was designated the Dorr Station with C. C. Little as director.

1929 Land opposite the Weir Mitchell Station deeded to the laboratory by John D. Rockefeller.

1931 William H. Cole elected Director of Weir Mitchell Station, and R. L. Taylor Director of Dorr Station.

LOCATION

Mount Desert Island is situated on the coast of Maine, one hundred miles east of Portland. Its cold waters are extraordinarily rich in marine life, including forms found on rocky, surf-beaten shores, in muddy coves, on the sea bottom at a multitude of depths and conditions,

and floating on the surface of bays, inlets, and open sea. Depths of over a hundred fathoms are found within twenty miles, where hundreds of pelagic forms are found on the surface in their season. The deep bottoms furnish brachiopods, huge actinians, basket stars, tunicates and other rare forms. Mud flats furnish a great abundance of invertebrates and plants. The tide rises and falls from twelve to fourteen feet, giving ample opportunity to secure many forms on the bottom or in rock pools, while the strong currents from the outer sea bring in many jelly-fishes and floating species not ordinarily easy to secure in still waters.

In the following list are mentioned some of the common aquatic animals which may be secured at Mount Desert Island for investigation during the summer season.

1. Many different types of bryozoa and rotifers—very abundant.
2. The actinian, *Metridium*—abundant; breeds irregularly in summer.
3. Several balanoid barnacles at their best—extremely abundant.
4. The nemertean, *Cerebratulatus lacteus*—can be secured in small quantities with ripe eggs from July to August 20th.
5. The sipunculid worm, *Echiurus Pallasi*—regularly available in moderate numbers; sometimes ripe with eggs or sperms.
6. The brachiopod, *Terebratulina*—very abundant.
7. The mud starfish, *Ctenodiscus*—very abundant; breeds in winter.
8. The many armed starfish, *Crossaster* and *Solaster*—available in moderate numbers; breed in winter.
9. The sand dollar, *Echinarachnius parma*—abundant. Eggs and sperm ripe from June to October. Very fine clear eggs with total cleavage.
10. The holothurian, *Cucumaria frondosa*—very abundant; breeds in winter.
11. The tunicate, *Boltenia*—very abundant.
12. The fresh water fishes, *Holopedium* and *Leptodora*—very abundant in the lakes.
13. The marine fishes: the cyclostome, *Myxine,* or slime eel, very abundant; *Fundulus heteroclitus,* abundant, with eggs ripe from July 1st to August 20th; *Lophius,* or goose fish, easily obtainable; cod; haddock; sculpins; flounder *(Pseudopleuronectes)*; and hake, all very abundant. Eggs of hake available in summer.

Upon a survey of the fauna it becomes evident that a research laboratory, situated at some point on the gulf

of Maine, is highly desirable for the biologists of the country. Cape Cod, as has been pointed out in past years by Gould, Dana, Verrill, Packard and many others, is the dividing boundary between the more northern Acadian, and the southerly Virginian fauna and flora of our coast, and no other boundary is so sharp in its delimiting of many species and genera. The Marine Biological Laboratory at Woods Hole serves as a point of access to the Virginian fauna and the Mount Desert Island Laboratory brings the worker in contact with the rich Acadian groups.

In addition to its marine fauna, the island, which comprises about one hundred square miles, has a range of bold, deeply divided, ice-eroded mountains that form a belt across its southern half. Their lower sides are clothed by forests, and between their peaks, rising at the highest to over 1500 feet, are lakes, streams, and marshes with a rich fresh-water fauna and flora. Several of the lakes are large and deep; one of lesser size is 1100 feet above the sea. Brooks of cold water are abundant, containing trout and a great variety of northern fresh-water invertebrates. Besides being the home of numerous plant and animal communities, the island is on the migration route of many birds.

Situated in a region of great beauty, unspoiled by commercial exploitation or nearness to cities, the laboratory has the advantage of being placed near the wild life sanctuary of the Acadia National Park. This is the only national park in the eastern portion of the continent and the only one in the country in direct contact with the sea. This secures for all time a permanent and singularly rich area for biological study.

Salisbury Cove is an old fishing and farming hamlet on the north shore of Mount Desert Island, about five miles from the town of Bar Harbor and on the main road from it to the town of Ellsworth on the mainland, where there is a railroad station and an important railroad junction. The village of Salisbury Cove is a market-gardening and farming community of a quiet and simple kind, but Bar Harbor has good stores of every sort, an excellent hospital, express, telegraph, cable facilities, bus and boat service.

SUBSCRIBING AND COOPERATING INSTITUTIONS

The financial support of the Mt. Desert Island Biological Laboratory has come chiefly through contributions of summer residents of Mt. Desert Island who are interested in biological research. To such gifts are added fees for laboratory tables and annual dues paid by members of the Corporation. For several years, however, a few colleges and universities have supported research rooms occupied by members of their respective faculties. These institutions are:

Johns Hopkins University
New York University
Princeton University
Rutgers University
Tufts College

WEIR MITCHELL STATION

SCIENTIFIC FACILITIES

The Weir Mitchell Station offers no instruction, but provides facilities for research in marine biology. The largest building contains ten research rooms, in each of which one or two persons can work. This building is served with running fresh water and running sea-water from a non-toxic system, in which the salt water touches only a lead pump, lead pipe, a wooden tank and glass. Each research room is supplied with electricity for light, heat, and power of 110 volts 60 cycles single phase current. The building is furnished with the equipment and reagents required for ordinary experimental work.

Of the remaining three buildings on the Weir Mitchell tract one for workers is supplied with aquaria and with running fresh and salt water; another is equipped as a dark-room and supplied with fresh and salt water; and the third is used as a library and office. The library contains many of the American Biological Journals, several thousand reprints, and about a thous-

and bound volumes. It is hoped that biologists will place the Laboratory on their exchange lists. Books not found in the library may be borrowed by arrangement with the Boston Society of Natural History and the Boston Medical Library.

For collecting and dredging in deep water, a thirty-foot boat, the Dahlgren, has been equipped with a four-cylinder Scripps gasoline engine, and the necessary hauling, towing and dredging apparatus. For work nearer shore, a strong sea-worthy gasoline boat, the Porter, and several row boats with proper equipment are available.

On the McCagg tract a small dwelling house has been equipped for such research as does not require the presence of running sea-water. Six or eight research workers can be accommodated in this building.

Applications for use of the laboratory facilities by investigators will be considered on April 15th, and assignments of rooms made according to order of receipt and special needs. Applications received after that date may have to be denied due to limited space. The fee for the use of a research room including ordinary glassware, chemicals and supplies is $100, for the season, payable July 1st. Microscopes are not available at the laboratory.

Board for those connected with the Laboratory and their immediate families will be provided in the Laboratory dining hall in Salisbury Cove at $10.00 per week. For others the charge will be $15.00.

Rooms may be found in the neighboring village at reasonable prices, and for those who wish, lodging will be provided on the Laboratory grounds in army tents on wooden bases at $2.00 per week per person, two persons in a tent. All bills will be presented at the end of each week.

Applications for research rooms in the Weir Mitchell Station for the season of 1932 should be addressed to Dr. William H. Cole, Rutgers University, New Brunswick, New Jersey, on the blank form accompanying this bulletin. (From June 1 to September 15,1932, Mt. Desert Island Biological Laboratory, Salisbury Cove, Maine.)

THE DORR STATION

The Dorr Station is located one and one-half miles south of Bar Harbor. It abuts directly on the Acadia National Park, which is available for exploration and research. The land and buildings, which are now the property of the Jackson Memorial Laboratory and which are available through the courtesy and cooperation of that institution, were originally provided by the generous gift of George B. Dorr, Superintendent of the Acadia National Park.

The station was founded for the primary purpose of accommodating those persons who desire to study plants and animals in their natural surroundings. Besides the informal courses for those who have little or no preparation in biology, facilities are offered for more advanced work in botany, entomology, zoology and mammalian genetics. In this way the Dorr Station widens the scope of the Mount Desert Island Biological Laboratory.

FACILITIES

The station consists of a wooden laboratory building, a small recreation building, a dining hall and tents with wooden floors accommodating up to thirty students. All of the buildings are equipped with running water, electricity and modern plumbing. The laboratory is supplied with the usual materials for elementary work in biology. Microscopes and other pieces of special apparatus must be furnished by the students. The facilities of the adjacent Jackson Laboratory, including its library, and collection of plants and animals, are available to students of the station.

COURSES

1. For persons with little or no preparation in biology, including children, informal courses supervised by members of the station staff will be conducted from July 15th to August 29th. The courses will vary not only in content but in extent depending upon the requirements of the students. Instruction will be given in non-technical language as far as possible. No examinations, no

"grades" and no compulsion will be features of the work. The necessary equipment and supplies will be furnished at cost for $2.50 per student. The tuition will vary from $15.00 to $30.00 per person for the eight weeks of instruction. If there are fewer than four students in any class the tuition will be correspondingly increased per student. For complete details concerning these courses inquiries should be addressed to Dr. R. L. Taylor, College of William and Mary, Williamsburg, Va.

2. For persons with some previous training in biology opportunities to make independent studies are presented. Problems in taxonomy of plants or insects, ecology, orinthology, vertebrate zoology and genetics are suggested but the list is not exclusive. Opportunity also for a few students to take up special problems in mouse cancer research will be offered in collaboration with the staff of the Jackson Laboratory. The tuition for the season, from June 26th to August 31st, will depend upon the extent to which the facilities of the laboratory and the time of the staff are used, with a minimum of $10.00. Full information on the courses in genetics and mouse cancer may be obtained from Dr. C. C. Little, Jackson Memorial Laboratory, Bar Harbor, Me. For all the other courses inquiries for further details should be addressed to Dr. R. L. Taylor, College of William and Mary, Williamsburg, Va.

Students taking courses under paragraph No. 2 above, will be expected to live in tents and eat in the dining hall operated by the station. A limited number of scholarships covering board, lodging and tuition are available. Board will be provided for $9.00 per week per person. Tents, including bed, mattress and pillow, will be rented for $2.00 per week per person. Bed linen and blankets will be furnished by the students. All bills for board and lodging will be rendered weekly.

GENERAL INFORMATION

Those wishing to come to the Laboratory by rail may arrive from Boston, New York, Philadelphia, or Washington on the Bar Harbor Express over the Boston and Maine Railroad, which will bring them directly to

Ellsworth whence a bus runs to Bar Harbor. The connections by water from Boston are excellent and less expensive, the Boston and Bangor Steamship Line leaving Boston every evening and connecting at Rockland in the early morning with a Bar Harbor boat which arrives at Bar Harbor about noon. An airplane line from Boston to Bangor provides rapid service between the two cities at no greater expense than by rail. Prices of fares, staterooms, etc., time of departure and arrivals may be obtained from travel bureaus. Through automobile roads from all sections of New England to Bar Harbor are excellent, with ample facilities for overnight stops. The Laboratory car will meet all arrivals in Bar Harbor, provided notice is received by the Director in advance. Correspondents are advised against addressing mail to Mount Desert, which is the official name of Somesville, a town on Mount Desert Island.

The Mount Desert Island Biological Laboratory,
Salisbury Cove,
Mount Desert Island,
Maine.

DIRECTOR'S REPORT FOR 1931

REPORT FOR 1931

All of the research rooms at the Weir Mitchell Station were occupied throughout the season of 1931. The personnel was as follows:

INVESTIGATORS

Bevelander, G., Union College
Clarke, R. W., Bellevue Medical College
Cole, W. H., Rutgers University
Dahlgren, U., Princeton University
Defrise, A., University of Milano
Doyle, W. L., Johns Hopkins University
Gey, G. O., Johns Hopkins Medical School
Grafflin, A. L., Harvard University
Greenwald, I., New York University Medical School
Hoskins, Mrs. M. M., New York University
Johnson, P. L., Missouri Valley College
Lewis, W. H., Johns Hopkins Medical School
Lewis, Mrs. W. H., Carnegie Institution of Washington
Lutz, B. R., Boston University
Marshall, E. K., Jr., Johns Hopkins Medical School
Mast, S. O., Johns Hopkins University
Pace, D. M., Johns Hopkins University
Pitts, R. F., Johns Hopkins University
Senior, H. D., New York University Medical School
Smith, H. W., University and Bellevue Hospital Medical College
Wyman, L. C., Boston University School of Medicine

TECHNICAL ASSISTANTS

Edwards, A. E., Goucher College
Feng, R., Ohio State University
Fitz-Williams, W., Johns Hopkins Medical School
Golden, E., Baltimore, Maryland
Mathews, R. S., Princeton University
Riesman, J. P., Harvard University
Suden, C., Boston University

OTHER BIOLOGISTS NOT REQUIRING LABORATORY FACILITIES

Byrnes, E. F., Brooklyn Girls High School
Hunt, B., Bangor, Maine
Johnson, D. S., Johns Hopkins University
Kerr, A. T., Cornell University Medical School
Myers, F. J., Ventnor, New Jersey
Park, E. A., Johns Hopkins Medical School
Plitt, C. C., University of Maryland
Rubin, M. I., Johns Hopkins Medical School
Wherry, W., University of Cincinnati Medical School

LABORATORY STAFF

Neal, H. V., Director
Snow, Frances R., Secretary and Librarian
Mast, Louise, Stockroom Clerk
Specht, Heinz, Collector
Holt, William L. Jr., Chauffeur
Russell, Walter, Carpenter
Lindsay, Mrs. Sarah, Cook
Lindsay, Margaret, Waitress
Youngerman, Marie, Waitress

At the Dorr Station the personnel was as follows:

TEACHING AND RESEARCH STAFF

Little,C. C., Roscoe B. Jackson Memorial Laboratory
Taylor, R. L., College of William and Mary
Spofford, W. R., Yale University
Green, A., Massachusetts Agricultural College

STUDENT INVESTIGATORS

Brower, E., Maine Forest Service
Dane, C., New York City
Gillespie, A. M., Maine Forest Service
Hodson, E. C., Maine Forest Service
Silence, C., Howard University
Smith H., Howard University
Warner, S. G., Harvard University

Informal classes in nature study were conducted in Bar Harbor, Southwest Harbor and Northeast Harbor, attended respectively by 15, 11 and 6 students.

THE LECTURE COURSE—1931

The fifth popular lecture course given under the auspices of the Laboratory attracted large interested audiences from among the summer residents of the Island. After each lecture tea was served in the Grange Hall. The lectures were as follows:

July 16—"Electric Fishes," by Professor Ulric Dahlgren, Princeton University.

July 23—"Inflammation," by Dr. Joseph McFarland, University of Pennsylvania.

July 30—"Some Aspects of Physiology," by Dr. E. K. Marshall, Jr., Johns Hopkins University.

August 6—"Cancer Problems," illustrated by motion pictures, by Dr. Warren H. Lewis, Johns Hopkins University.

August 20—"What is Evolution?" by Dr. H. V. Neal, Tufts College.

August 25—"Recent Discoveries Concerning the Antiquity of Man," by Dr. Kirtley F. Mather, Harvard University.

September 3—"Inheritance of Susceptibility to Cancer in Mice," by Dr. Clarence C. Little, Jackson Memorial Laboratory.

THE SEMINARS—1931

The Monday night Seminar program was as follows:

July 13—"Experiences in Siam and Malaysia," by Dr. Homer W. Smith, New York University.

July 20—"Chemical Stimulation in Animals," by Dr. William H. Cole, Rutgers University.

July 27—"The Aim of Science," by Dr. S. O. Mast, Johns Hopkins University.

August 3—(1) "The Radical Differences Between the Arterial Anomalies of the Human Upper and Lower Extremities," by Dr. H. D. Senior, New York University.

(2) "Cyto-physiology of the Kidney," by Dr. Aldo Defrise, University of Milano.

August 10—(1) "Disease Among the Invertebrates," by Professor Ulric Dahlgren, Princeton University.
(2) "Biological Control of Bubonic Plague," by William B. Wherry, University of Cincinnati.

August 17—(1) "The Behavior of the Cercariae of Bucepulus elegans," by Mr. Gerrit Bevelander, Union College.
(2) "Urine Flow and Diuresis in Marine Teleosts," by Dr. Allan L. Grafflin, Harvard University.

August 24—(1) "Biological Aspects of Fox Farming," by Dr. Donnell B. Young, University of Maine.
(2) "Some Observations on the Biochemistry of Creatine," by Dr. Isidor Greenwald, New York University.

August 31—(1) "Suprarenal Insufficiency," by Dr. L. C. Wyman, Boston University.
(2) "Some Phases of Human Tissue Culture," by Mr. George O. Gey, Johns Hopkins University.

SUMMARIES OF RESEARCH ACCOMPLISHED DURING 1931

Continuing the custom begun last year of publishing brief summaries of the research work accomplished by individuals, the following series is presented for 1931. The reports are printed in the form contributed by their authors.

REPORT ON THE SUMMER WORK AT THE MOUNT DESERT ISLAND BIOLOGICAL LABORATORY, 1931

By ULRIC DAHLGREN, *Princeton University*

The ecology of several marine invertebrates was studied with successful results in some cases, and delayed results in others. The conditions of marine plankton in Frenchman's Bay were exceptional, due, it is believed, to heavy spring and summer rains which brought solutions of land soil into the Bay and favored the growth of floating