THE MOUNT DESERT ISLAND BIOLOGICAL LABORATORY

Annual Announcement for 1933 and Report for 1932

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-FIFTH SEASON

1933

THE CORPORATION OF THE MOUNT DESERT ISLAND BIOLOGICAL LABORATORY

James B. Allison, Rutgers University Gerrit Bevelander, Union College Louise DeKoven Bowen, Chicago, Illinois Hermon Carey Bumpus, Waban, Massachusetts Esther F. Byrnes, Philadelphia, Pennsylvania Robert W. Clarke, New York University William H. Cole, Rutgers University Edwin Grant Conklin, Princeton University Ulric Dahlgren, Princeton University George B. Dorr, Bar Harbor, Maine Allan Grafflin, Harvard University Robert W. Hegner, Johns Hopkins University Margaret M. Hoskins, New York University Duncan Starr Johnson, Johns Hopkins University Percy L. Johnson, Missouri Valley College Abram T. Kerr, Cornell University Warren H. Lewis, Johns Hopkins University Frank Rattray Lillie, University of Chicago Clarence Cook Little, Jackson Memorial Laboratory Frank E. Lutz, American Museum of Natural History Edward F. Malone, University of Cincinnati Eli K. Marshall, Jr., Johns Hopkins University Samuel O. Mast, Johns Hopkins University Roy Waldo Miner, American Museum of Natural History 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 Robert F. Pitts, New York University George B. Roth, George Washington University Harold D. Senior, New York University James A. Shannon, New York University Homer W. Smith, New York University Benjamin Spector, Tufts College G. Ledyard Stebbins, Harvard University R. L. Taylor, William and Mary College William Morton Wheeler, Harvard University Edmund B. Wilson, Columbia University 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 Laboratories

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

TRUSTEES

To serve until 1933

DUNCAN S. JOHNSON, Johns Hopkins University. FRANK R. LILLIE, 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 scrve 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.

To serve until 1935

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.

*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 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 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 direcor.
- 1929 Land opposite the Weir Mitchell Station deeded to the laboratory by John D. Rockefeller.
- 1931 William H. Cole elected Director of the Weir Mitchell Station, and R. L. Taylor, Director of Dorr Station.
- 1933 All instruction at the Dorr Station discontinued; facilities to be devoted to research in terrestrial and fresh water biology, under the same direction as the Weir Mitchell 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

LOCATION

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. Several genera of colonial hydrozoa—very abundant; the scyphozoa Aurelia, Cyanea and Melicerta frequently abundant; the actinozoa Metridium and Sagartia—abundant.
- 3. The nemertean *Cerebratulatus lacteus*—available in small numbers with ripe eggs from July to August 20th.
- 4. A great variety of annelids, including *Echiurus*—sometimes with ripe eggs and sperms; *Amphitrite, Clymenella, Myxicola* and *Piscicola*—abundant.
- 5. The brachiopod Terebratulina-very abundant.
- 6. The molluscs Mya, Mytilus, Chrysodomus, Natica, Chiton, Yoldia, Saxicava, Acmaea, Dentalium, Astarte, Pecten maximus, Venericardium and many others—abundant.
- 7. Many genera of echinodermata, including Asterias, Ctenodiscus, Strongylocentrotus, Echinarachnius (sexually mature June to October), Ophiopholis, Cucumaria—very abundant; Crossaster, Solaster and Henricia—available in moderate numbers.
- 8. Crustacea in great abundance and diversity.
- 9. The tunicates, Cynthia, Molgula and Boltenia-abundant.
- 10. The fresh-water fishes, Perca, Micropterus, Eupomotis, Leptodoras, etc.-abundant in the lakes.

LOCATION

11. The marine fishes, Myxine, the slime eel, and Petromyzonabundant; Fundulus heteroclitus, with ripe eggs from July 1st to August 20th, very abundant; Lophius, or goosefish,—easily obtainable; dogfish, skates, cod, haddock, sculpins, flounders, and hake—very abundant, the hake being sexually mature 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 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 in 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.

WEIR MITCHELL STATION

CONTRIBUTORS AND SUBSCRIBING 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 a few colleges, universities, and foundations have supported research rooms occupied by members of their respective staffs. For 1932 rooms were supported by the following:

> Carnegie Institution Department of Embryology

Johns Hopkins University Department of Anatomy Department of Botany Department of Pharmacology Department of Protozoology

New York University Department of Anatomy Department of Physiology

Princeton University Department of Biology

Rockefeller Foundation

Rutgers University Department of Physiology Department of Zoology

Tufts College Department of Biology

United States Public Health Service

SCIENTIFIC FACILITIES

WEIR MITCHELL STATION

At the Weir Mitchell Station in Salisbury Cove a group of buildings provides facilities for research in biology. No instruction is offered. All of the buildings are supplied with fresh water and electricity for light, heat, and power of 110 volts, 60 cycles, single phase, alternating current. Distilled water and compressed air are also available. The main building contains 10 research rooms accommodating 2 persons each. Along the central hallway are two salt water shelves providing running salt water from a non-toxic system. in which the water comes in contact only with a lead pump, lead pipe, a wooden tank and rubber spigots. A stock room supplies the equipment and reagents commonly required for ordinary experimental work in biology. All special and unusual pieces of apparatus and equipment must be requested well in advance or brought by the investigator. A second building with two research rooms is supplied with salt water shelves and a laboratory especially equipped for chemical studies. A third building, also supplied with salt water, is arranged as a dark room for experimental and photographic The fourth building serves as an office and work. library, containing many of the American biological journals, several thousand reprints and about 1000 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 thirtyfoot, cabin, power boat, the Dahlgren, with cable and equipment for hauling, towing, and dredging at moderate depths is available. For work near shore a small motor boat and several row boats are supplied.

On the McCagg tract, about one-quarter mile distant, a small dwelling house has been equipped for such research as does not require sea water. Six or eight investigators can be accommodated in that building.

THE DORR STATION

The Dorr Station is located one and one-half miles south of Bar Harbor, and about seven miles from Salisbury Cove. It abuts on the Acadia National Park which is available for exploration and study. 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 primarily for accommodating those persons who desire to study plants and animals in their natural environment. Beginning in 1933 all class work and instruction will be discontinued at the Dorr Station. Facilities will be provided for research on land and fresh-water forms and in mammalian genetics in cooperation with the Jackson Memorial Laboratory under the direction of Dr. C. C. Little.

The physical equipment consists of a wooden laboratory building, a small recreation building, a dining hall, and tents with wooden floors. All of the buildings are supplied with running fresh water, electricity and modern plumbing. The laboratory is equipped for elementary work in biology. All optical apparatus and all special and unusual supplies must be requested well in advance or brought by the investigator.

GENERAL INFORMATION

Applications for use of the laboratory facilities by investigators at the Weir Mitchell and Dorr Stations will be considered on May 1st, and assignments made according to order of receipt and special needs. Applications received after that date may have to be denied due to lack of space. An application blank accompanies this announcement. All applications should be sent to Prof. William H. Cole, Rutgers University, New Brunswick, N. J., before May 1st, 1933.

At the Weir Mitchell Station the fee for a research room including ordinary glassware, chemicals and supplies is \$100 for the season, payable July 1st, 1933.

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 in army tents with floor on the laboratory grounds at \$2.50 per week per person, two persons in a tent. All bills will presented at the end of each week.

At the Dorr Station a small laboratory fee will be charged according to the requirements of the investigator. In 1933 it is expected that the dining hall will be operated at cost as in the past, provided a sufficient number of persons desire it.

Salisbury Cove is an old fishing and farming hamlet on the north shore of Mount Desert Island, about five miles from Bar Harbor and on the main road between Bar Harbor and Ellsworth on the mainland, the terminus of the Boston and Maine Railroad. The village of Salisbury Cove is a quiet market-gardening and farming community with its own post office. Bar Harbor has good stores of every sort, an excellent hospital, express, telegraph, cable facilities, bus and boat service.

Those wishing to come to the Laboratory by rail may arrive from Portland, 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. Convenient rail connections from intermediate stations are served by the Boston and Maine, the Boston and Albany, and the New York, New Haven and Hartford. Connections by water from Boston are excellent and less expensive. A Boston and Bangor Steamship Line boat leaves Boston for Bangor every evening except Sunday. Passengers for Mt. Desert may change at Rockland in the early morning for a boat to Bar Harbor arriving about noon, or may continue to Bucksport on the Penobscot River, whence a bus runs through Salisbury Cove arriving at Bar Harbor about eleven in the morning. An airplane line from Boston to Bangor provides rapid service between the two cities at only slightly 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 arrivals in Bar Harbor, provided notice is received by the Director well in advance.

GENERAL INFORMATION

Personal baggage and cartage of workers at the laboratory will be carried by the laboratory car for a nominal charge. 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,

Maine.

DIRECTOR'S REPORT FOR 1932

REPORT FOR 1932

All but one of the research rooms at the Weir Mitchell Station were occupied throughout the season of 1932. The personnel was as follows:

INVESTIGATORS

Allison, J. B., Rutgers University Andervont, H. B., U. S. Public Health Service Bevelander, G., Union College Clarke, R. W., New York University Cole, W. H., Rutgers University Dahlgren, U., Princeton University Grafflin, A., Harvard University Hegner, R. W., Johns Hopkins University Howell, A. B., Johns Hopkins University Johnson, P. L., Missouri Valley College Kaylor, C. T., Rutgers University Kropp, B., Harvard University Lewis, Mrs. W. H., Carnegie Institution of Washington Lewis, W. H., Johns Hopkins University Marshall, E. K., Jr., Johns Hopkins University Perkins, E. B., Rutgers University Pitts, R. F., New York University Roth, G. B., George Washington University Senior, H. D., New York University Schopper, W., University of Giessen Shannon, J. A., New York University Sizer, I. W., Rutgers University Smith, H. W., New York University Wintrobe, M. M., Johns Hopkins University

TECHNICAL ASSISTANTS

Andervont, Mrs. H. B., U. S. Public Health Service Golden, Miss Edna, Carnegie Institution Grafflin, Mrs. A., Radcliffe College Meneely, G., Princeton University Smith, Miss Helen, Rutgers University Spence, G., Choate School Wintrobe Mrs. M. M., Johns Hopkins University

12

DIRECTOR'S REPORT FOR 1932

OTHER BIOLOGISTS NOT REQUIRING LABORATORY FACILITIES

Byrnes, Miss E. F., Philadelphia Kerr, A. T., Cornell University Neal, H. V., Tufts College Plitt, C. C., University of Maryland

LABORATORY STAFF

Cole, W. H., Director Snow, Miss F. R., Secretary and Librarian Kaylor, C. T., Chauffeur and Collector Sizer, I. W., Collector Russell, W., Utility Man Roth, Miss D., Assistant in Library Lindsay, Mrs. S., Cook Lindsay, Miss M., Waitress Apakian, Miss V., Waitress

At the Dorr Station the personnel was as follows:

TEACHING AND RESEARCH STAFF

Taylor, R. L., College of William and Mary Spofford, W. R., Yale University Green, A. A., Massachusetts State College

INVESTIGATORS AND STUDENTS

Brower, A. E., Maine Forest Service (Cooperating)
Gillespie, A. M., Maine Forest Service (Cooperating)
Jenks, R., University of Arizona
Lester, A., H. C. Frick Training School for Teachers (Pittsburgh)
Lester, Mrs. A., New Brighton, Pa.
McPheters, B. W., Jackson Memorial Laboratory
Mitchell, A., Allegheny College
Mueller, J. F., New York State College of Forestry
Percival, K. W., University of Maine
Rich, A. M., College of William and Mary
Riesman, J. P., Harvard University
Silence, C., Howard University
Smith, H., Howard University
Warner, S. G., Harvard University

DINING HALL STAFF

Candage, Mrs. M. L., Cook, Bar Harbor, Maine Little, R. A., Assistant, Bar Harbor, Maine

Informal classes in nature study were conducted in Bar Harbor, Southwest Harbor and Northeast Harbor, attended respectively by 3, 5 and 7 students.

THE SEMINARS-1932

- June 27—"A Second Type of Contraction Mechanism in Selachians," Prof. Ulric Dahlgren, Princeton University.
 - July 5—"Chemical Stimulation in Animals," Dr. J. B. Allison, Rutgers University.
 - July 11—"Water Regulation in Fishes and its Evolution," Dr. H. W. Smith, New York University.
 - July 18—"The Invertebrate Eye Hormone in Relation to the Pigmentary Effector System," Dr. E. B. Perkins, Rutgers University.
 - July 25—"Glomerular Function in the Dog," Dr. J. A. Shannon, New York University.
- August 1—"Sexual and Asexual Reproduction in Ameba diploidea," Dr. B. Kropp, Harvard University.
- August 8—"The Present Status of the Anterior Pituitary Gonadal Mechanism," Dr. E. T. Engle, Columbia University and the University of Maine Biological Station at Lemoine, Maine.
- August 15—"The Site of the Antidiuretic Action of Post-pituitary Extract," Dr. E. K. Marshall, Jr., John Hopkins University.
- August 22—"The 'Resultantgesetz' in Relation to Photic Stimulation," Dr. P. L. Johnson, Missouri Valley College.

DIRECTOR'S REPORT FOR 1932

SUMMARIES OF RESEARCH ACCOMPLISHED DURING 1932

Continuing the custom begun in 1930 of publishing brief summaries of the research work accomplished by individuals, the following series is presented for 1932. The reports have been edited to insure uniformity of arrangement, but are otherwise printed in the form contributed by their authors.

INVESTIGATIONS ON CARCINOMA

WERNER SCHOPPER, University of Giessen*

Studies on the Walker rat carcinoma No. 72 which were begun in Baltimore with Dr. Warren H. Lewis of the Carnegie Institution of Washington were continued utilizing fixed preparations of tissue cultures of this tumor.

The results showed that the cancer cells of this tumor grow in the cultures as groups or as single cells more independently than (1), the cancer cells of many other types of tumors, and (2), the epithelial cells of normal tissue. On the other hand, this tumor exhibited greatly stimulated and fast growing stroma cells in the cultures. The stroma cells did not show any abnormalities of the resting cells or of the dividing cells while the carcinoma cells differed from the normal cells and frequently exhibited abnormal mitotic figures. The results of this investigation will be published in the Journal of Cancer Research.

In addition to the investigations made on the rat carcinoma No. 72 a study of the spontaneous mammary gland tumor of the mouse was made in cooperation with Mrs. Lewis. Many cultures were prepared of a number of different tumors that arose spontaneously in mice of different strains at the Roscoe B. Jackson Memorial Laboratory. The cancerous tissue was explanted into various media consisting of mouse plasma, both auto and normal, of chicken plasma, of mixtures of mouse and chicken plasma and of fish plasma.

In these cultures it was found that the cancer cells grow out as thin membranes of epithelial cells resembling the growth of epithelial cells from normal tissue. The growth in mouse plasma was not very satisfactory as sooner or later liquefaction took place. The growth in chicken plasma 'containing a small amount of mouse plasma was perhaps the most extensive but in this medium some liquefaction occurred. No liquefaction took place in chicken plasma. The mouse tumor did not grow in fish (sculpin) plasma but it exhibited a slight growth in salt solution.

The growth of the mouse cancer cells in tissue cultures furnished favorable material for the study of the division of these cells and for following the phenomenon of phagocytosis.

^{*}Fellow of the Rockefeller Foundation, New York.