BULLETIN

OF

THE MOUNT DESERT ISLAND BIOLOGICAL LABORATORY 1934

Announcement for 1934 By-Laws of the Corporation Reports for 1933 Research Abstracts for 1933

THIRTY-SIXTH SEASON

JUNE 20TH TO SEPTEMBER 10TH

1934

THE CORPORATION OF THE MOUNT DESERT ISLAND BIOLOGICAL LABORATORY

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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

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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.

To serve until 1935

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To serve until 1936

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*Members of Executive Committee.



Eagle Lake

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 director.
- 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 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 hun-

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dreds ot 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 eleven 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.
- 11. The marine fishes, *Myxine*, the slime eel, and *Petromyzon* abundant; *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 the Atlantic 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 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.

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 1933 rooms were supported by the following:

> Carnegie Institution Department of Embryology

Harvard University Department of Anatomy

Johns Hopkins University Department of Botany Department of Pharmacology

New York University Department of Anatomy Department of Physiology

Princeton University Department of Biology

Rockefeller Foundation

Rutgers University Department of Physiology

Tufts College Department of Biology

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 work. A fourth building provides space for a shop and for storage. The fifth building serves as an office and 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 thirty foot 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 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 persons who desire to study plants and animals in their natural environment. Beginning in 1933 all class work and instruction was discontinued at the Dorr Station. Facilities will be provided for research on land and fresh-water forms, and in mammalian genetics in co-operation 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 and electricity. 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. Requests received after that date may have to be denied due to lack of space. Application blanks will be sent to anyone interested. They should be returned to Prof. William H. Cole, Rutgers University, New Brunswick, N.J., before May 1st, 1934.

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, 1934.

Board for those connected with the laboratory and their immediate families will be provided in the laboratory dining hall in Salisbury Cove at \$8.00 per week. For others the charge wil be \$10.00.

Rooms may be found in the neighboring village at reasonable prices.

At the Dorr Station a small laboratory fee will be charged according to the requirements of the investigator.

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

* It is possible that the fee of \$100 may be materially reduced before June 1, 1934.

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, time of departure and arrivals and similar information 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. 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 correct address is:

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



DIRECTOR'S REPORT FOR 1933

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DIRECTOR'S REPORT FOR 1933

During the summer of 1933 the personnel at the Weir Mitchell Station in Salisbury Cove was as follows:

INVESTIGATORS

Allison, James B., Rutgers University Bevelander, Gerrit, New York University Chang, Chun, Rockefeller Foundation Clarke, Robert W., New York University Cole, William H., Rutgers University Grafflin, Allan L., Harvard University Hatch, Winslow R., Johns Hopkins University Hubbard, Helen, Phoenix Junior College Johnson, Duncan Starr, Johns Hopkins University Lewis, Margaret R., Carnegie Institution Lewis, Warren H., Johns Hopkins University Marshall, Eli K., Jr., Johns Hopkins University Menke, John F., University of California Shannon, James A., New York University Sizer, Irwin W., Rutgers University Smith, Homer W., New York University

TECHNICAL ASSISTANTS

Brown, Angus, Union College Clarke, M. F., Yale University Golden, Edna, Carnegie Institution Innes, David, Harvard University Spence, Gordon, Choate School

LABORATORY STAFF

Cole, William H., Director Whitcomb, Helen, Secretary and Librarian Bevelander, Gerrit, Collector Brown, Angus, Assistant to Collector Russell, Walter, Caretaker Crabtree, William, Chauffeur and boatman Lindsay, Mrs. Sarah, Cook Lindsay, Margaret, Waitress

At the Dorr Station, the following were in attendance: Merrill, Priscilla, Beasley School Silence, Caroline, Howard University Smith, Helen, Howard University Warner, S. G., Harvard University

THE SEMINARS-1933

The lectures and seminars were held in the Grange Hall at Salisbury Cove, and were well attended. The dates and speakers were as follows:

- July 24, Clarence C. Little, "The relation of biology to cancer research."
- July 27, Norman McClintock, motion pictures entitled, "The romance of the commonplace."
- July 31, Dorothy Richardson, "Heteroplastic transplantation of the ear in Amblystoma."
 - Ira B. Hansen, "Rat seminal vesicle and prostate glands as quantitative indicators of testicular hormone."
- Aug. 7, W. Mansfield Clark, "Anaerobiosis," illustrated by experiments.
- Aug. 14, George L. Stebbins, "Reminiscences of Mount Desert Island."
- Aug. 21, Warren H. Lewis, motion pictures of "Normal and malignant cells."

GENERAL REMARKS

Due to the splendid co-operation of all the investigators the laboratory succeeded in carrying on its program with the greatly reduced budget. This was partly due to the high room fee of \$100 charged to each one. During the summer several much needed repairs and improvements were omitted. It is planned, however, to use about half of the funds on hand October 1st, to carry out those projects so that the property and equipment will not deteriorate too seriously.

It is becoming increasingly clear that some sort of assured income must be provided if the laboratory is to maintain and to enlarge its present usefulness.

RESEARCH ABSTRACTS

Continuing the custom begun in 1930 of publishing summaries of the research accomplished during the preceding season, the following are presented for 1933. The reports have been edited to insure uniformity of arrangement, but are otherwise in the form contributed by the authors. (For bibliographic references it is suggested that the following form be used: "Bull. Mt. Desert Is. Biol. Lab., 1934, p ")

THE GROWTH OF CANCEROUS CELLS IN EGG ALBUMIN

MARGARET REED LEWIS and LEONELL C. STRONG

Carnegie Institution of Washington and Yale University

The malignant cells of the spontaneous mammary gland cancers of the mouse grow in hanging drops of white of egg ($\triangle -0.43^{\circ}$ C.; pH 9.2) in such a way as to form an extensive thin membrane surrounding the explant, and spreading out onto the coverglass.

The white of egg medium inhibits the growth of the macrophages and of the stroma of the tumor so that most of the tissue cultures contain growths of only malignant epithelial cells.

The egg albumin medium can be removed from the growth by bathing it with Locke's or Tyrode's solution. This procedure leaves the malignant cells free from other substances.

Egg albumin proved to be a favorable medium for the growth of carcinoma cells but not of sarcoma cells.

Yolk of egg and mixtures of yolk and white of egg inhibited the growth of malignant cells, of stroma cells and also of normal cells.

THE GROWTH OF CARCINOMA CELLS IN DILUTED MEDIA

MARGARET REED LEWIS and LEONELL C. STRONG

Carnegie Institution of Washington and Yale University

The malignant cells of the spontaneous mammary gland carcinoma of the mouse exhibited growth in media having a wide range of osmotic pressure (Δ -0.63°C to Δ -0.3°C).

The spontaneous tumors appearing in mice of four different strains were studied. All of them grew when explanted into chicken plasma and into diluted forms of plasma. The ratio of dilutions of plasma with distilled water were 1 to 4, 2 to 4, 3 to 4, and 4 to 4.

The growths which took place in a medium of chicken plasma to which had been added equal parts of distilled water were frequently as extensive as those in undiluted chicken plasma; in some instances, however, the growths in the diluted media had fewer cells undergoing mitotic division than those in the undiluted medium.

It has been found that chicken blood has a freezing point of -0.63° C (Bialazewiez) to -0.59° C (Howard) which would be equivalent to about 1.07 to 1 per cent sodium chloride solution. Chicken plasma diluted with equal parts of water is equivalent to 0.53 to 0.5 per cent salt solution which would have a freezing point of approximately -0.3° C.

LIVING MALIGNANT SARCOMA CELLS

WARREN H. LEWIS, Carnegie Institution of Washington

The living malignant cells of five different rat sarcomas, Nos. 10146, 1548, 4337, and 4338, kindly supplied by the Institute for