BULLETIN
OF
THE MOUNT DESERT ISLAND BIOLOGICAL LABORATORY
1941

FORTY-THIRD SEASON

JUNE 15TH TO SEPTEMBER 15TH

1941

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OF
THE MOUNT DESERT ISLAND BIOLOGICAL LABORATORY

JANUARY 30, 1941

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THE MOUNT DESERT ISLAND BIOLOGICAL LABORATORY

(FORMERLY THE HARPSWELL LABORATORY)

Founded by John Sterling Kingsley in 1898

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HISTORICAL SKETCH

1898 Laboratory established at South Harpswell, Maine, 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 Salsbury 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 Mount Desert Island Biological Laboratory.

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

1928 Amalgamation of the Mount 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, Jr.

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.

1935 Additional land opposite Weir Mitchell Station, containing fresh water pond, deeded to laboratory by John D. Rockefeller, Jr.

1938 Student course of instruction in Invertebrate Zoology introduced under direction of Ulric Dahlgren.

1940 Roy P. Forster elected director of laboratories.

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 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 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. Nemerteans: *Cerebratulatus lacteus*—available in small numbers with ripe eggs from July to August 20th; and several other genera.
4. A great variety of annelids, including *Echiurus*—sometimes with ripe eggs and sperms—moderate numbers; *Amphitrite, Clymenella Myxicola* and *Pisciola*—abundant.
5. The brachiopod *Terebratulina*—abundant.
6. The molluscs *Mya, Mytilus, Polinyces, Natica, Chiton, Yoldia, Saxicava, Acmaea, Dentalium, Astarte, Pecten maximum, 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, Huro, Lepomis gibbosus,* 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, *Squalus;* skate, *Raja;* cod, *Gadus;* haddock, *Melanogrammus;* sculpin, *Myxocephalus;* flounder, *Pseudopleuronectes;* hake, *Urophycis*—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. The scenic features of the unusual combination of wooded mountains rising from the sea have been preserved for all time by the establishment of the Acadia National Park, the only national park in the country in direct contact with the ocean.

Situated in a region of great beauty, unspoiled by commercial exploitation or nearness to large cities, the laboratory has the advantage of being near the wild life sanctuary of the park which secures a permanent and singularly rich area for biological study. The usual summer climate of the island is pleasant and invigorating, with cool nights and daytime temperatures rarely exceeding 80°F.

CONTRIBUTORS AND SUBSCRIBING INSTITUTIONS

The financial support of the Mount Desert Island Biological Laboratory comes partly from contributions of summer residents of Mount 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. During 1940 rooms were supported by the following:

New York University Medical School
    Department of Physiology
    Department of Anatomy
Princeton University
    Department of Biology
Rutgers University
    Department of Physiology
    Department of Biophotography
University of Minnesota
    Department of Zoology
The Wistar Institute of
    Anatomy and Biology
Dartmouth College
    Department of Zoology
Connecticut College for Women
    Department of Biology
State of Maine
    Bureau of Sea & Shore Fisheries
The Rockefeller Foundation

SCIENTIFIC FACILITIES

WEIR MITCHELL STATION

Research

At the Weir Mitchell Station in Salsbury Cove a group of buildings provides facilities for research in biology. 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, gas and compressed air are also available. The main building contains 10 research rooms accommodating 2 persons each. Along the central hallway are 2 salt water shelves providing running salt water. A new research laboratory of 4 rooms for 2 workers each, built in 1938, has a concrete floor.

each room has running fresh and salt water and 120 square feet of floor space. A stock room in the main building 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. Another building accommodating 4 workers is supplied with running salt water and a laboratory especially equipped for chemical studies. A fourth building is arranged as a dark room for experimental and photographic work. Two other buildings provide space for a shop, an office and a library. The latter contains 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.

The sea water for the laboratories is pumped from well below the lowest tide by a lead pump into a 2100 gallon wooden reservoir, and is delivered through lead pipes and hard rubber spigots. Insulation of the reservoir prevents heating of the water, so that the temperature of water delivered to the aquaria is only from 1 to 2 degrees above that of the sea, which varies from 8 to 16°C. during the summer. Besides being cold the water is uncontaminated with wastes and oil, thus allowing prolonged observations on sensitive organisms in the laboratory.

For collecting and dredging in deeper water a thirty-foot cabin power boat, with 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.

Instruction

A course in Invertebrate Zoology will be offered to college undergraduate and graduate students from July 7 to August 16 inclusive. The new laboratory, named in memory of Isabelle Hegner, offers special facilities for instruction in marine zoology. Emphasis will be placed on the study of living animals and the students will be urged to make as many of their observations as possible in the field.

The course will be in charge of Professor Ulric Dahlgren, of Princeton University, assisted by Dr. J. Wendell Burger of Trinity College and another instructor. It will consist of lectures, laboratory exercises, collecting trips, discussions and a thesis by

each student on some aspect of zoology. Occasional lectures on special topics may also be given by other members of the laboratory colony, among whom are Professors Warren H. Lewis, William H. Cole, Robert W. Hegner, Homer W. Smith, E. K. Marshall, Jr., and Dwight E. Minnich. The anatomy, taxonomy, development, physiology, ecology and distribution of animals representing the invertebrate phyla will be studied, with varying emphasis on each topic according to the species being considered. A final examination will be arranged for those who wish it, especially for those who plan to offer the course to colleges for credit. Students showing proficiency in the course may continue work at the laboratory after August 16, either independently or with some member of the staff, until September 15.

Tuition fee for the course will be $60 payable on or before July 7, 1941. If the fee is to be paid by a college or other institution for the student, notice to that effect must be received prior to July 7th. Applications for admission to the course must be received before May 10, 1941, by Dr. Roy P. Forster, Dartmouth College, Hanover, New Hampshire, from whom application blanks may be secured upon request. Each application must be accompanied by an enrollment fee of $5. If the applicant is not accepted his fee of $5 will be refunded; otherwise it will be applied towards the tuition fee.

THE DORR STATION

The Dorr Station is located one and one-half miles south of Bar Harbor, and about seven miles from Salsbury 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 offers facilities for the study of plants and animals (exclusive of marine forms) in their natural environment. No instruction is offered.

The physical equipment consists of a wooden laboratory 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 in advance or brought by the investigators.

GENERAL INFORMATION

During 1941 the laboratory will be open from June 15 to September 15.

Applications for use of the research facilities by investigators at the Weir Mitchell and Dorr Stations will be considered on May 1, 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 Dr. Roy P. Forster, Dartmouth College, Hanover, New Hampshire, before May 1, 1941.

The fees for use of research rooms during the summer season including ordinary glassware, chemicals and supplies is $100 at the Weir Mitchell Station, and $50 at the Dorr Station, payable July 1, 1941. In special cases the Executive Committee may remit part or all of such fees. Applications for remission should be made as early as possible.

Board for those connected with the laboratory and their immediate families will be provided in the laboratory dining hall in Salsbury Cove at $8 per week. For others the charge will be $10.

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

Salsbury 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 Salsbury Cove is a quiet market-gardening and farming community with its own post office and general store. Bar Harbor has good stores of every sort, an excellent hospital, express, telegraph, cable facilities and bus 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 Main Railroad, which will bring them directly to Ellsworth whence a bus runs through Salsbury Cove to Bar Harbor. Upon notice to the driver, the bus will stop at the laboratory. Convenient rail connections from intermediate stations are served by the Boston and Maine, the Maine Central, the Boston and Albany, and the New York, New Haven and Hartford. An air line from Boston to Bar Har-

bor provides rapid service 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. Personal baggage and cartage of workers at the laboratory will be carried by the laboratory car from Ellsworth or Bar Harbor for a nominal charge. Correspondents are advised against addressing mail to Mount Desert, which is the official name of Somesville, a village on Mount Desert Island. The correct address is:

The Mount Desert Island Biological Laboratory
Salsbury Cove, Maine

DIRECTOR'S REPORT FOR 1940

The 1940 season has been a very successful one for the laboratory. Twenty-eight investigators and their assistants representing 16 different institutions were engaged in research, and 14 students from 12 different colleges and universities were enrolled in the invertebrate zoology course. Instruction was again under the direction of Prof. Ulric Dahlgren who was assisted by Drs. J. W. Burger, F. A. Brown, Jr., and C. Dobbin.

There are now 56 active members in the corporation and 30 associate members. At the annual meeting of the corporation all the trustees whose terms expired in 1940 were elected for the 1943 class: William H. Cole, Robert W. Hegner, Warren H. Lewis, E. K. Marshall, Jr., David O. Rodick and Stanley J. G. Nowak. Dr. J. Wendell Burger was elected to fill the unexpired term of Dr. H. V. Neal in the 1941 class of trustees, and David O. Rodick was reelected clerk of the corporation for 1941.

At the annual meeting of the trustees the following officers were chosen for the ensuing year: President, Ulric Dahlgren; Vice President, Dwight E. Minnich; Treasurer, John Whitcomb; Secretary, J. Wendell Burger; and Director, Roy P. Forster. Dr. William H. Cole and Dr. Homer W. Smith were elected to serve with the President and the Director on the Executive Committee.

The fish pathology studies conducted by the laboratory for the State of Maine Department of Sea and Shore Fisheries during the 1939 and 1940 seasons were completed, and the final report was submitted for publication. The laboratory realized in this

study a unique opportunity to cooperate with the State of Maine in the solution of problems of vital importance to the sea fisheries of the Gulf of Maine.

The seminars during the summer season were again very well attended. Scientists from our neighboring institutions, the Jackson Laboratories and the University of Maine Laboratories, were regularly welcomed. The program was as follows:

July 16—Dr. H. W. Smith, New York University. "Selected topics related to homeostasis." (Illustrated)
July 23—Dr. H. J. Sawin, Harvard University. "The Chondrocranuim of Mus musculus." (Illustrated)
July 30—Dr. W. B. Unger, Dartmouth College. "Animals of the Antipodes." (Illustrated)
Aug. 6—Dr. J. W. V. Butler, University of Edinburgh. "Some aspects of enzyme action."
Aug. 13—Dr. E. B. Perkins, Rutgers University. "Color films of marine invertebrates."
Aug. 20—Dr. F. A. Brown, Jr., Northwestern University. "Crustacean endocrinology."
Aug. 27—Dr. J. W. Burger, Trinity College. "Factors influencing seasonal reproduction."

During the summer, the following workers were at the laboratory:

Senior Investigators

Dr. Ulric Dahlgren	Princeton University
Dr. William H. Cole	Rutgers University
Dr. Earl B. Perkins	Rutgers University
Dr. Dwight E. Minnich	University of Minnesota
Dr. F. A. Brown, Jr.	Northwestern University
Dr. W. Byers Unger	Dartmouth College
Dr. Norman K. Arnold	Dartmouth College
Dr. J. W. V. Butler	University of Edinburgh
Dr. Roy P. Forster	Dartmouth College
Dr. G. Castelnuovo	University of Rome
Dr. E. P. Hiatt	New York University
Dr. H. J. Sawin	Harvard University
Dr. Warren H. Lewis	Wistar Institute of Anatomy and Biology
Dr. Edwin Shearer	New York University
Dr. Homer W. Smith	New York University
Dr. J. Wendell Burger	Trinity College
Dr. Catherine Dobbin	Smith College
Dr. Willie W. Smith	Smith College

Scientific Assistants

Dr. S. E. Bradley	New York University
Mr. J. T. Daggy	Northwestern University
Mr. V. J. Wulff	Northwestern University
Mr. William D. Blake	Harvard University

Mr. A. L. Friedlich	Harvard University
Mr. Thomas V. Morton	Northwestern University
Mr. R. B. Hiatt	University of Cincinnati
Miss Ruth Crozier	Radcliffe College
Mrs. Andrew Niles	Taft School
Mr. Joel Rothschild	Croton on the Hudson

Students in Course

Mr. Charles C. Abbott	Haverford College
Mr. William H. Amos	Rutgers University
Mr. Randolph Biddle	University of New Mexico
Mr. Edward W. Hauch	DePauw University
Mr. William G. Herrman, Jr.	Rutgers University
Mr. David Kraus	Long Island City H. S. (instructor)
Mr. William S. Metz	Johns Hopkins University
Miss Mary W. Rines	Smith College
Mr. Elvio H. Sadum	Harvard University
Miss Jeanne M. Slate	Smith College
Miss Penelope D. Smith	Horticultural School for Women
Miss Rachel E. Stickney	Tufts College Extension (instructor)
Mr. Hewson H. Swift	Swarthmore College
Mr. Joseph Tannenhaus	Drew University

Staff

Dr. William H. Cole	Director
Dr. Roy P. Forster	Director (after Aug. 17)
Dr. Ulric Dahlgren	In charge of course
Dr. W. J. Burger	Assistant in course
Dr. F. A. Brown, Jr.	Assistant in course
Dr. Catherine Dobbin	Assistant in course
Mr. Walter G. Russell	Caretaker
Mr. Joseph Seronde	Collector
Mr. Richard Sturley	Assistant collector

RESEARCH ABSTRACTS FOR 1940

Abstracts of the results of investigations carried on at the laboratory are printed below. The reports have been edited to insure uniformity of style and arrangement, but are otherwise in the form contributed by the authors. (For bibliographic reference to the abstracts it is recommended that the following form be used: "Bull. Mt. Desert Is. Biol. Lab., (year), p. ——.")