BULLETIN
OF
THE MOUNT DESERT ISLAND BIOLOGICAL LABORATORY
1940

FORTY-SECOND SEASON

JUNE 15TH TO SEPTEMBER 15TH

1940

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JANUARY 30, 1940

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Salsbury Cove, Maine
1940

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.

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 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, Euphomotis, 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. 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 1939 rooms were supported by the following:

Carnegie Institution of Washington,
Department of Anatomy
New York University Medical School
Department of Physiology
Princeton University
Department of Biology
Rutgers University
Department of Physiology
University of Minnesota
Department of Zoology
Vassar College
Department of Zoology

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 un-

usual 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 oils, 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.

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 there.

Instruction

A course in Invertebrate Zoology will be offered to college undergraduate and graduate students from July 8 to August 17 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, Herbert V. Neal, 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 17, 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 8, 1940. 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 8th. Applications for admission to the course must be received before May 10th, 1940, by Prof. William H. Cole, Rutgers University, New Brunswick, N.J., 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 1940 the laboratory will be open from June 15th to September 15th.

Applications for use of the research 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, 1940.

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 1st, 1940. 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 $8.00 per week. For others the charge will be $10.00.

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 Maine 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 Harbor 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 1939

It is a pleasure to report again that the laboratory enjoyed a successful season of work last summer. Although the number of investigators was somewhat smaller than in recent years interest and accomplishment did not decrease. Eighteen colleges and institutions were represented by the twenty-five investigators and students. Improvements in the Isabelle Hegner Memorial Laboratory and completion of the new research laboratory increased markedly the facilities of the station.

At the annual meeting of the Corporation all the officers and trustees were re-elected and one new trustee was added: Dr. Esther F. Byrnes of Philadelphia. Three new active members and six associate members were elected making a total membership of eighty-one. Five members were lost during the past year through death or resignation.

At request of the State of Maine a study of the herring disease was begun late in August. In years past this disease has caused the loss of several hundred thousand dollars to the canners and fishermen. It is hoped that a continued investigation for several years will yield much more information on the cause, course and spreading of the disease than is now available. Dr. Roy P. Forster of Dartmouth College is in active charge of the study under the general supervision of a committee of officers and members of the Corporation.

The seminars were unusually well attended last summer, the attendance varying from forty to over seventy. As in the past, workers at the Jackson and the University of Maine Laboratories were regularly welcomed. The program was as follows:

July 18, "The mind of the insect" by Dr. Dwight E. Minnich.
July 25, "The use of sulfopyridine in pneumococcic infections" by Dr. E. K. Marshall, Jr.
August 1, "Cell division of normal and abnormal cells," by Dr. W. H. Lewis (illustrated by motion pictures).
August 3, "Recent advances in biochemistry and experimental embryology" by Dr. Joseph Needham.
August 8, "Analysis of renal tubular secretory activity" by Dr. R. P. Forster.

August 15, "The effect of beta-indole acetic acid on plant tissues" by Dr. Mary S. Gardiner.
August 22, "The invertebrate heart and perfusion solutions" by Dr. W. H. Cole.
August 29, "Some persistent problems of morphology" by Dr. H. V. Neal.

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

Senior Investigators

Dr. Ulric Dahlgren	Princeton University
Dr. William H. Cole	Rutgers University
Dr. E. K. Marshall, Jr.	Johns Hopkins University
Dr. Dwight E. Minnich	University of Minnesota
Dr. Rudolf T. Kempton	Vassar College
Dr. Gairdner B. Moment	Goucher College
Dr. J. Wendell Burger	Trinity College
Dr. Mary S. Gardiner	Bryn Mawr College
Dr. Roy P. Forster	Dartmouth College
Dr. Joseph Needham	Cambridge University, England
Dr. Margaret M. Lewis	Carnegie Institution
Dr. Warren H. Lewis	Carnegie Institution

Scientific Assistants

Mrs. Roy P. Forster	Dartmouth College
Mr. Andrew Niles	Taft School
Miss Barbara Parker	New York University

Students in Course

Mr. Robert B. Brown	Kenyon College
Mr. George O. Halsted	Princeton University
Miss Joan Halsted	Sarah Lawrence College
Mr. Bruce Johnson	DePauw University
Dr. J. B. Knight	Princeton University
Mr. George N. Lenci, Jr.	Hamilton College
Mr. T. P. Needham	Princeton University
Miss Mary R. Streeter	Vassar College
Mr. Charles Tanzer	New York University
Miss Martha B. Young	Connecticut College
Miss Nina Zworykin	Vassar College

Staff

Dr. William H. Cole	Director
Dr. Ulric Dahlgren	In charge of course
Dr. G. B. Moment	Assistant in course
Dr. J. W. Burger	Assistant in course
Mr. Walter G. Russell	Caretaker
Mr. Joseph Seronde Jr.	Collector
Mr. Harold Sampson	Assistant collector
Mr. James Knight Jr.	Assistant collector

RESEARCH ABSTRACTS FOR 1939

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. ——.")

REVISION OF THE WORK OF PEARSE AND WALKER ON LITTORAL POLYCLADS OF NEW ENGLAND AND ADJACENT PARTS OF CANADA

LIBBIE H. HYMAN
American Museum of Natural History, New York City

In the 1939 number of this Bulletin there appeared an account by Pearse and Walker of the littoral polyclads of New England and adjacent parts of Canada. This account contains many errors and requires extensive correction. Of the fifteen species listed and figured by them, all but 4, 9, 11, 13, 14 and possibly 5 are in the wrong genera, 10 is wholly misnamed, and 3, 8, 12, and 16, are synonyms of 2, 9, 6, and 13 respectively. Figure 15 does not represent any animal known to me and several of the other figures are either inaccurate reproductions of Verrill's figures or are pieced together from several sources, combining in some cases figures of different species.

Actually 9 species of polyclads are known from the region in question and 5 of these have never been recorded north of Massachusetts.

Concerning Verrill's 2 species *Stylochus frontalis* and *"Leptoplana" angusta* it must be recalled that Verrill obtained these species at Provincetown, Massachusetts, on the bottom of a whaling vessel that had recently come from the Carolina coast, and that they were associated with southern forms. It is, therefore, certain that these 2 species do not belong to the region under consideration and it is probable that they are not even native to the coast of North America. They have never been collected again since Verrill's day. *Stylochus frontalis* was described by Verrill from a single specimen; he figured only the eyes (so that Pearse and Walker's figure 5 is obviously incorrect) and these indicate a stylochid but there is no way of knowing that the animal belongs to the genus *Stylochus*, since the genera of the Stylochidae cannot be determined without serial sections of the reproductive system. I was able to clear up the taxonomic position of *"Leptoplana" angusta* through finding several of the specimens collected by Verrill among unidentified material in the Peabody Museum and the United States National Museum. I found that the animal is not a *Leptoplana* at all but is close to the genus *Stylochoplana* and I