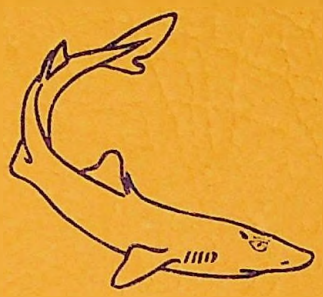
THE BULLETIN

Volume 10

MOUNT DESERT ISLAND
BIOLOGICAL LABORATORY
Salisbury Cove, Maine

50th Year
at
Salisbury Cove

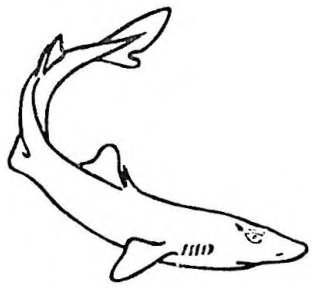


1970

THE BULLETIN OF THE MOUNT DESERT ISLAND BIOLOGICAL LABORATORY SALISBURY COVE, MAINE

1970

Volume 10 **Issued 1971**



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HOMER W. SMITH
1895-1962

This issue of the Bulletin is dedicated to the memory of Dr. Homer W. Smith who was a prominent member of the Mount Desert Island Biological Laboratory community during most of its 50-year existence in Salisbury Cove. Wide acclaim came to him during his lifetime for his work during both World Wars on the toxicity and pharmacological actions of the nitrogen and sulfur mustards, for his studies during the early twenties dealing with hydrogen ion permeation and its influence on the fertilization and growth of marine eggs and, most of all, for the classic investigations over a period of thirty years in which he established the detailed physiology and physiopathology of the kidney while relating the development of its complex structural and functional pattern to its evolutionary history.

All his work showed a brilliant combination of imagination and clear precise thought, and all was soundly based on broad biological concepts. Over the years he brought scores of his protégés to this marine research station for advanced training during the summer seasons, and although most of them came from purely clinical backgrounds he always insisted that while at Mount Desert they use some local organism for their studies. His faith in the value of the comparative experience was based on his conviction that new and unusual situations generate new ideas, that the experience of people from various disciplines living and working together has a cross-fertilizing effect in sparking new developments, that for every biological problem there is always some one animal or preparation that will serve best in finding the solution to that problem, and that structural differences in closely related animals can be effectively used as experimental variables that otherwise might be obtained only by introducing the disturbing effects of anesthesia or drastic operative procedures.

Homer W. Smith was a Trustee of the Laboratory for over forty years, and its President from 1951-60. He gave unstintingly of himself in the welfare of the Laboratory and in behalf of the many students and investigators he trained or influenced here. Despite his vigorous scientific effort his mind flourished also where philosophy, art, religion and music meet; and conversations with him in his beautiful home at the edge of a meadow looking out over Eastern Bay were as much an inspiration to generations of workers in our community as were the sharply honed lessons in basic science gleaned in his busy laboratory.

We are indebted to Homer W. Smith for his conviction that an institution such as this was destined to play an important role in the development of modern biology, and for the contributions he made by effort and example in setting the Laboratory on a course that made realization of this goal possible.

Roy P. Forster
December 16, 1970

Photograph by Fabian Bachrach

DESCRIPTION OF FACILITIES

The Mount Desert Island Biological Laboratory is an independent marine biological station on the coast of Maine near the mouth of the Bay of Fundy which provides a seasonal research facility for investigations on local flora and fauna. There is basic laboratory space for 32 research programs. Certain specialized equipment is available. During 1970 there were 73 scientific personnel in 31 research groups representing 29 institutions both here and abroad. There were 40 professional scientists and 24 students in the 1970 programs.

No formal courses are offered, but some advanced undergraduate, graduate, medical, and post doctoral students spend the summer as assistants to senior investigators, thereby gaining research training. Most of these students are selected by the investigators from their home institutions.

History and Organization

The Laboratory was founded in 1898 by J. S. Kingsley, of Tufts College, and its original location was at South Harpswell, Maine. The site at Salisbury Cove was donated to the Laboratory by the Wild Gardens of Acadia, a group instrumental in the establishment of Acadia National Park, and removal to this location was completed in 1921. The first laboratory buildings, the original salt water system and some of the residential cottages were constructed or obtained by the gifts of local summer residents.

The Mount Desert Island Biological Laboratory was incorporated in 1914 under the laws of the State of Maine as a nonprofit scientific and educational institution, and it is owned and operated by the Trustees and members of the Corporation. At present there are 281 members of the Corporation. It functions without full time professional administrative personnel and in most ways it is a cooperative enterprise. Income is derived from membership dues, laboratory fees, cottage rentals, investments, private and corporate donations, and grants. The business and scientific management of the Laboratory is in the hands of the Director and the Board of Trustees.

The Directors have been: Ulrich Dahlgren, Princeton University (1920-26); H. V. Neal, Tufts College (1926-31); William H. Cole, Rutgers University (1931-40); Roy P. Forster, Dartmouth College (1940-47); J. Wendell Burger, Trinity College (1947-50); Warner F. Sheldon, University of Pennsylvania (1950-56); Raymond Rappaport, Jr., Union College (1956-59); Alvin F. Rieck, Marquette University (1959-64); William L. Doyle, University of Chicago (1964-67); Charles E. Wilde, Jr., University of Pennsylvania (1967-70); H. V. Murdaugh, Jr., University of Pittsburgh (1970-).

Location

Mount Desert Island lies in the Gulf of Maine about 150 miles northeast of Portland, Maine, and is connected to the mainland by a short bridge. Year round air service is available to Bangor, Maine with seasonal service to Bar Harbor Airport. The island has an area of more than 100 square miles and is traversed east to west by a range of glaciated mountains and north to south by a narrow fiord six miles long that partially divides the east and west halves. Among

the mountains lie several deep fresh water lakes and shallow ponds. Much of the mountainous area is a part of Acadia National Park. The Island is separated from the mainland and adjacent islands by narrow deep bays. Spring tides average 13.2 feet and neap tides 8.7 feet.

The many varied biological resources of the Acadian area are readily available. In summer, the cold waters of the Gulf of Maine are rich in marine life. The rocky shores, mud flats and strong tidal currents provide a variety of habitats. Fresh water lakes and ponds and the mixed terrain give further diversity to the forms available. Certain of these are abundant, others are scarce. The research abstracts in past Bulletins will give a good indication of the common forms. (See especially Vol. 5, No. 1.) The director will be glad to furnish an estimate of the availability of any special forms. Special arrangements may be made for collections in Acadia National Park.

Physical Plant

The Laboratory is situated on a tract of about 150 acres fronting on Frenchman Bay at Salisbury Cove in the Township of Bar Harbor. In addition to shore frontage, the Laboratory owns part of a fresh water pond and brook, and its land varies from meadow and forest to sphagnum bog. Investigation is carried on in single story buildings of frame construction located along the shore. These buildings are as follows:

(1) The Neal Laboratory. This, the oldest and largest of the laboratory buildings, was remodeled in 1955 and now contains eight laboratories: four large rooms that will each accommodate 3 to 4 persons, and four small rooms suitable for single investigators. All rooms are provided with gas, and fresh and salt water. Water troughs, aquaria, and larger tanks are located along the north wall outside.

(2) The Halsey Laboratory was remodeled in 1961 and consists of four rooms each capable of accommodating 3 to 4 persons. The rooms all have gas, fresh and salt water. Refrigerators, ovens and aquaria are located on a common terrace at the entrance to the building.

(3) The Lewis Laboratory consists of two adjacent rooms for 3 to 4 persons.

(4) The Kidney Shed is a single large laboratory. It accommodates two research groups.

(5) The Hegner Laboratory contains 10 laboratory rooms provided with salt and fresh water each accommodating 1 to 2 persons.

(6) The Karnofsky Laboratory, constructed in 1970, contains 4 large laboratories, one large enough to accommodate 2 research groups.

(7) The Darkroom-Laboratory erected in 1962 contains one laboratory suitable for 2 to 3 persons and is equipped with salt and fresh water, and a photographic darkroom for general use.

(8) The Instrument Room was renovated in 1955 for the purpose of housing equipment used in common by members of the Laboratory. In 1969 one-half of this space was equipped as a research laboratory.

(9) Biophysics Building. This air-conditioned building was erected in 1965. It houses isotope counting systems, ultracentrifuges, spectrophotometers, and a chemical hood.

(10) Shop and Stockroom. The shop contains power and hand tools for wookworking; the stockroom has chemicals, glassware, analytical balances, a fume hood and an area for glassworking, and an isotope vault.

(11) Office and Library. A separate building was constructed in 1955 to contain the Director's Office and to house the business records and library. The library is small, comprising

reference texts for biology and medicine, a few complete journals (Biological Abstracts, Biological Bulletin and the Journal of the Marine Biological Association), as well as monographs.

(12) Dahlgren Hall, the former village schoolhouse, was purchased and converted to use as a meeting hall; it houses a reprint collection. The single large room can seat about 120 persons. It is equipped with projectors for regular lantern slides, 35 mm slides, and 16 mm silent motion pictures.

(13) The Dining Hall. This dining hall and living room for about 20 junior investigators and students was built in 1963. It is operated by a cook-manager. A small general library of books and records, and a record player have been furnished by private donation.

(14) Bowen Hall is one of the finest remaining examples of early 19th century Island architecture. It now serves as one of two dormitories and has a common room for young women.

(15) Dock. The dock consists of two floats with livewells and attached live cars for storage of specimens. It is attached to the shore by an inclined ramp and a bridge and abutment.

(16) Collecting Boats. A 32' gasoline powered collecting boat, the Squalus, was purchased in 1958. It is provided with a circulating water tank for the transportation of specimens. Some simple dredging gear is available for collecting purposes and arrangements can be made with local fishermen for offshore specimens. A Nova Scotia skiff with an outboard motor is also used for collecting and skiffs are available to investigators.

Housing

Sixteen cottages suitable for families with children stand on land owned by the Laboratory and are within easy walking distance of it. The cottages are rented by the season, or occasionally for shorter periods. Occupants must supply their own blankets, linen, and silver, pay for utilities (electricity and gas), and pay the Laboratory for the use of the cottage (including water rent and garbage disposal). Rent is $520 to $890 per season, depending upon the size of the cottage. A few privately owned cottages are also available for rental near the Laboratory, and in other communities on the island. An automobile is essential for family mobility in the area.

Single investigators, student assistants, and couples without children rent rooms in the village and take their meals in the Laboratory Dining Hall. The weekly charge for meals is based on self-sustaining nonprofit operation.

In order to encourage private construction and ownership of cottages by workers, the Laboratory has a policy of issuing leases on certain plots of laboratory land. Provision is made for sale or rental of the cottages to other workers in case the owner finds it impossible to continue to work at the Laboratory. In this way, the Laboratory is able to encourage capital investment by individuals and at the same time ensure that the land will remain under its own jurisdiction. At present seven cottages are privately owned in this way.

Recreational Activities

Mount Desert Island has long been known to have one of America's most desirable summer climates. The ocean, rocky shores, and mountains provide scenery of unexcelled beauty. The distance from large metropolitan areas has so far helped to keep it relatively unspoiled. Swimming, hiking, mountain climbing, picnicking, boating and sailing, tennis, golf, and other sports are readily available. Acadia National Park with its excellent naturalists' program contributes to the general interest. There are small museums of Indian and local lore, public gardens, a

good public library and cultural exhibits. Proximity to the Jackson Laboratory adds scientific interest and resources. Salisbury Cove is an old fishing and farming community on the northern shore of the Island near the main road from Bar Harbor to Ellsworth. It has one general store. The Laboratory colony comprises about 100 adults and 60 children of assorted ages, and forms a considerable portion of the summer population of the village. Bar Harbor, the largest town on Mount Desert Island, is about six miles from the Laboratory and provides many of the services of a city including excellent shopping facilities and a good hospital.

Acknowledgments

The Mount Desert Island Biological Laboratory is indebted to the National Science Foundation for substantial support during the past decade. Funds for renovations of buildings and new construction have permitted the laboratory to expand and upgrade its facilities. Contributions to operating costs and for specialized research equipment have greatly improved the efficiency of research activities. The individual research projects which have been served by this laboratory are variously funded by private and government agencies and by individuals and all of these projects have benefited from the National Science Foundation grants to the laboratory. Current support under grant GB 8662 is gratefully acknowledged. The research reports and index for 1970 were compiled by Dr. John W. Boylan and Dr. H. V. Murdaugh.

Applications

Fees for research space vary according to the demand made on the facilities. They range from $300 to $800 depending on the space assigned and the number of workers. All investigators have the use of the general facilities, but special arrangements are necessary if unusual demands are anticipated. Investigators are urged to bring their own specialized equipment and chemicals. On occasion, the Laboratory may be able to provide apparatus which would have long term usefulness for other workers. Since the Laboratory is closed for nine months of each year, the general policy has been to maintain as little delicate or especially valuable equipment as possible. Isotope counting systems and ultracentrifuges are available on a fee basis. Persons planning to use isotopes must make prior arrangements in conformity with our Radiation Safety Committee requirements.

Limited fellowships are supported by funds from the Ulrich Dahlgren Memorial Fund (a gift from the American Philosophical Society).

Application and inquiries should be addressed to the Laboratory Director, Dr. H. V. Murdaugh, Jr.

July 1 - September 1	Mount Desert Island Biological Laboratory Salisbury Cove, Maine 04672
September 1 - July 1	Department of Medicine University of Pittsburgh School of Medicine Pittsburgh, Pennsylvania 15213

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Research Programs - 1970

Adamson, Richard H.

1. Effect of Foreign Compounds on Marine Animals and Effect of Marine Animals on Foreign Compounds
2. The Disposition of DDT by the Spiny Dogfish

Arias, Irwin M.

Hepatic Organic Anion Binding Proteins in Elasmobranchs and Teleosts and Their Relationship to Selective Hepatic Uptake of Bilirubin, Sulfobromphthalein (BSP), and Other Organic Anions

Boylan, John W.; Peter Deetjen; Patricia Acquisto; Dorothy Antkowiak; Molly Boylan

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Crawford, Richard B.; Charles E. Wilde, Jr.; Murk-Hein Heinemann

Temporal Relationships of Protein Synthesis to Morphogenesis in the Fundulus Embryo

Deetjen, Peter; Helena Dlouha; Patricia Acquisto

Dynamics of Renal Circulation in Squalus acanthias

Doyle, William L.

Fine Structure in Relation to Transport Conditions in Gills and Intestine of Anguilla and Squalus

Dvorchik, Barry and Robert M. Woodworth

Pharmacology of DDT in S. acanthias

Epstein, Franklin H.; John Forrest; Don Schon; Allan Cohen

Hormonal Control of Na-K-ATPase and Sodium Transport in Teleost Gills

Fenstermacher, Joseph D.; David Rall; Frank W. Sheldon; Megan N. Dethier

Distribution Kinetics of a Series of Polar Materials in Squalus acanthias

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1. Renal Hemodynamic Factors Influencing Tubular Transport in Squalus acanthias
2. Nitrogen Metabolism and Excretion in Marine and Freshwater Elasmobranchs

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1. Comparison of Urea Metabolism in Freshwater and Marine Elasmobranchs
2. Peritubular Control of Urea Reabsorption in the Elasmobranch Kidney

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Physiological Aspects of the Ecology in Selected Invertebrates from the Littoral Zone

Grant, William C., Jr.; Bruce G. Lindsey
Interspecific Behavior and Ecology in Two Species of Hermit Crabs, Pagurus acadianus and Pagurus pubescens

Guarino, Anthony M.; David P. Rall; Jacqueline B. Call; Nancy Davidson
Fate and Distribution of DDT After Intravascular Administration to Lobster, Flounder, and Dogfish

Harvey, William R.; Jerome J. Jordon
Potassium Ion Activity Distribution in Marine Cells Measured with Intracellular Glass Microelectrodes

Hayslett, John P.
Effect of Intrarenal Hydrostatic Pressure on Sodium Reabsorption in the Proximal Tubule of Necturus maculosus

Hendler, Freddy J.
Magnesium Dependent Adenosine Triphosphatase Activity in the Echinarachinius parma Embryos

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1. Electrophysiology of Dogfish Gastric Mucosa: Effects of Extracellular Cation Substitution
2. Secretion of Acid by Fish Swimbladder Gas Gland Epithelium

Huang, K. C.; Walter M. Williams; Theresa S. T. Chen
1. Active Chloride Transport Across the Flounder Intestinal Mucosa
2. Effect of Vasopressin on Permeability of Flounder Urinary Bladder

Janicki, Ralph A.; Jo B. Lingis
1. The Effect of DDT on Osmotic Regulation in Teleosts and Elasmobranchs
2. The Cellular Aspects of Salinity Adaptation in the Intestinal Mucosa of the Euryhaline Eel (Anguilla rostrata)

Kinter, William B.; John Pritchard
1. Fate and Distribution of ^{14}C-DDT in the Winter Flounder, Pseudopleuronectes americanus
2. DDA: An Inhibitor of Chlorphenol Red Transport by Flounder Kidney Tubules in vitro

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Transport of Sugars Into Flounder Kidney Tubules

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2. In vivo and in vitro Studies of Renin Synthesis and Release by the Flounder (Pseudopleuronectes americanus)

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2. Transport of Na and Cl from Plasma into CSF in S. acanthias
3. Effect of Hypercapnia on CSG HCO^-_3 in S. acanthias

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1. Cation Excretion by the Dogfish Kidney
2. Trace Metal Excretion by the Goosefish
3. Acid-Base Studies in the Dogfish

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Morphological Studies of the Teleost Preoptic-Hypophyseal System. Effects of Hypophysectomy and Alterations in Salinity

Opdyke, David F.; James R. McGreehan; Nancy E. Opdyke

Effect of Spinal Cord Stimulation and Sympathomietic Drugs on Dorsal Aortic Pressure in Squalus acanthias

Peirce, E. Converse II; Barbara B. Kent; Marjorie G. Peirce; Carey G. Mumford

1. Reflex Control of the Cardiovascular System of Squalus acanthias
2. Effect of Vaso-Active Drugs on Squalus acanthias Using Total Body Perfusion

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Phylogenetic and Development Studies of Blood, Brain and Cerebrospinal Fluid

Rappaport, Raymond

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2. Potentiability for Repair Following Injury to the Cornea of Fundulus heteroclitus

Schmidt-Nielsen, Bodil; William Mackay

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Motais, Rene

The Effect of Hormones on the Separate Mechanism for Na^+ and Cl^- Uptake by Bull Frogs

Mackay, William

Salt and Water Transport in the Eel Intestine During Adaptation to Sea Water

EVENING SEMINARS 1970

Held each Tuesday at 8:00 P.M. in Dahlgren Hall, Salisbury Cove

July 7	Dr. Charles E. Wilde, Jr.; University of Pennsylvania "Introduction to the Laboratory"
July 14	Dr. Saul Winegrad; University of Pennsylvania "Studies of Frog Ventricle with Chemically Disrupted Membrane"
July 21	Dr. Peter Deetjen; Physiologisches Institut (Munich) "Renal Tubular Handling of Uric Acid in the Rat: Microperfusion Studies"
July 28	Dr. Robin M. Bannerman; S.U.N.Y. at Buffalo "Iron Transport in Gut: Lessons from a Genetic Variant"
August 11	Dr. William Sawyer; Columbia University "Homologies, Structures Among the Neurohypophyseal Hormones"
August 18	Dr. Hans Ussing; University of Copenhagen "Transport by Epithelial Membranes, 1970"

LUNCHEON SEMINARS

Held each Thursday at 12:00 noon in Dahlgren Hall, Salisbury Cove

July 9	Project reports, Investigators A - H
July 16	Project reports, Investigators I - Z
July 23	Dr. Arnost Kleinzeller; University of Pennsylvania "Volume Control in Kidney Cortex Cells"
July 30	Dr. David F. Opdyke; New Jersey College of Medicine "Sympathetic Control of Peripheral Circulation in Squalus acanthias"
August 6	Dr. Joseph Fenstermacher; National Institutes of Health "Capillary Permeability in Various Organs of Squalus acanthias"
August 13	Franklin H. Epstein; Yale University School of Medicine "The Migration of the Eel: Hormonal Control of NaK ATP-ase"
	Alvin F. Rieck; Marquette University School of Medicine "Events of the Cell Cycle as Related to Ultra-Violet Damage"
August 20	Dr. Thomas M. Maack; Cornell University Medical College "Protein Transport by Renal Tubules"