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# THE MOUNT DESERT ISLAND BIOLOGICAL LABORATORY DESCRIPTION OF FACILITIES

The Mount Desert Island Biological Laboratory is an independent marine biological station on the coast of Main near the mouth of the Bay of Fundy which provides a research facility for investigations on local flora and fauna. There is laboratory space for 34 research programs. Certain specialized equipment is available. During 1982 there were 133 scientific personnel representing 53 institutions in 19 states and 5 foreign countries. The personnel included 44 investigators and co-investigators of faculty rank. The work of the laboratory covers a broad area of biology, comparative physiology and biochemistry. Advanced undergraduate, graduate, medical and postdoctoral students spend the summer under supervision of senior investigators.

No formal courses are given, but weekly formal and informal seminars are scheduled. Effective in 1971, some year-round programs have been established.

The laboratory administration solicits and welcomes applications from all qualified scientists whose programs can be best fostered in its environment. With rare exceptions, investigators are required to utilize local flora and fauna. The opportunity to work at MDIBL is advertised annually in the journal <u>Science</u>. Recently the number of applications has exceeded the capacity of the laboratory. Applications are screened for scientific merit by a Scientific Advisory Committee, made up of investigators who have worked at the laboratory for some time, and then by the Executive Committee, for feasibility and setting or priorities of acceptance. New investigators routinely constitute 30% to 40% of the summer population. Acceptance notices are usually issued in late March of early April for tenancy in June.

## 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 Salsbury 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 non-profit scientific and educational institution, and it is owned and operated by the Trustees and members of the Corporation. At present there are over 400 members of the Corporation. It functions with minimal full-time professional administrative personnel and in many 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 (1970–75); Richard M. Hays, Albert Einstein College of Medicine (1976–79); Leon Goldstein, Brown University (1979–).

#### Location

Mount Desert Island lies in the Gulf of Maine about 120 miles northeast of Portland, and is connected to the mainland by a short bridge. Year-round air service is available to Bangor, Maine with connecting flights on Bar Harbor Airlines, as well as direct flights from Boston to Bar Harbor. 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 fjord 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.

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, and flats, and strong tital 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 soarce. The research abstracts in past Bulletins will give a good indication of the common forms. The Director will be glad to furnish an estimate of the availability of any special forms.

## Physical Plant

The Laboratory is situated on a tract of about 250 acres fronting on Frenchman Bay at Salsbury 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:

<u>Neal Laboratory</u>: 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.

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, and aquaria are located on a common terrace at the entrance to the building.

Marshall Laboratory, a year-round facility built in 1972, contains five laboratories and a full basement which includes a tank room, common instrument space, and office space.

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

<u>Hegner Laboratory</u> contains 9 laboratory rooms provided with salt and fresh water, each accommodating 1 to 3 persons. It is next on the list of buildings to be remodeled.

Karnofsky Laboratory, constructed in 1970, contains 4 large laboratories, one large enough to accommodate 2 research groups. This is now a year-round facility.

Union Station, erected in 1962, contains two laboratories, each suitable for 2 to 3 persons, and is equipped with salt and fresh water.

The Instrument Shed was renovated in 1979 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.

Lewis Laboratory, renovated in 1979, contains two laboratories.

Biophysics Building: This air-conditioned building was erected in 1965. It houses isotope counting systems, ultracentrifuges, spectrophotometers, and sectioning equipment for electron microscopy.

Director's Office: A separate building contains the Director's Office and a small conference room.

Shop: A centrally located frame building that houses supplies, equipment, and machinery and serves as the headquarters for the Plant Manager.

Business Office and Library:

ry: In the same building as the shop, it also houses an additional common instrument room.

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	Dahlgren Hall:	The former village schoolhouse, was purchased and converted to use as a meeting hall; it also houses a reprint collection. The single large room can seat about 120 persons and is equipped with projectors.
	Dining Hall (Co-c	p): This dining hall and living room for about 20 junior investigators and students was built in 1963. It is operated by a oook-manager. A small general library of books and records and a record player have been furnished by private donation.
	Bowen Hall:	Is one of the oldest remaining examples of early 19th century Island architecture. It now serves as one of four dormitories and has a common room for young women.
Support	Facilities	Studies: Three small sheds for individual study space.
	Dock:	The dock consists of two floats with live wells and attached live cars for storage of specimens. It is attached to the shore by an inclined ramp and a bridge and abutment.
	Collecting Boats:	A 32' gasoline powered collecting boat, the <u>Squalus</u> , was built in 1958. It is provided with a circulating water tank for the transportation of specimens. Arrangements can be made with local fishermen for offshore specimens. A fiberglass skiff with an outboard motor is also used for collecting and skiffs are available to investigators. A motor launch is used for access to bird breeding colonies.

Pick-up Trucks are used for laboratory operations and specimen transport.

#### 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 and linen, as well as pay the Laboratory for the use of the cottage (which includes utilities and garbage disposal) Rent is \$1130 to \$2200 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. The Laboratory business office maintains a list of available rentals. An automobile is essential for family mobility in the area.

In addition, seven cottages are presently privately owned but located on Laboratory property under a special leasehold arrangement.

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

Four dormitories (two for men and two for women) are available for summer laboratory assistants. They are relatively old wooden buildings.

## **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. Salsbury 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 and Post Office. The Laboratory colony comprises about 180 adults and 80 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 and the National Institutes of Health for substantial support in the past. 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 NSF and NIH grants to the Laboratory. Current support from NSF under Grant DEB-8100823 is gratefully acknowledged. Additional support has been provided by NIH Biomedical Research Support Grant SO7 RR 05764.

#### Applications

Fees for research space vary according to the demand made on the facilities. They range from approximately \$720 to \$4000, depending on the space assigned and the number of workers. Special arrangements may be made for facilities beyond the summer season (June 1 - September 30). 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. 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) and other memorial funds.

In an effort to make our specimen collecting facilities as self-supporting as possible, fees change almost annually. The fees in 1983 will range from \$6 for flounder and \$10 for dogfish and skates, to \$100 per trip for unusual specimens. Some of the commonly used organisms include:

PISCES: Myxine glutinosa, Hagfish; Squalus acanthias, spiny dogfish; <u>Raja erinacea</u>, little skate; <u>Anguilla rostrata</u>, eel; <u>Fundulus heteroclitus</u>, killifish; <u>Lophius americanus</u>, goosefish; <u>Myxocephalus</u> sp., <u>sculpins</u>; <u>Pholis gunnellus</u>, rock eel; <u>Pseudopleuronectes</u> americanus, winter flounder; Macrozoarces americanus, eelpout.

INVERTEBRATES: Echinarachnius parma, sond dollar; Pagurus sp., hermit crabs; Homarus americanus, lobster; Boltenia ovifera, sea potato.

Other native fauna under investigation include: echinoderms, oligochaetes, gastropods, frogs and salamanders, and marine birds.

Applications and inquiries should be addressed to the Laboratory Director, Dr. Leon Goldstein.

June 15 – August 31Mount Desert Island Biological LaboratoryDivision of Biomedical SciencesSalsbury Cove, ME 04672Brown University – Box G(207) 288–3605Providence, RI 02912 (401) 863–3341

Inquiries regarding specific matters such as laboratory charges and facilities can also be directed to:

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Associates: Dr. J. Brown, A. Evans, Dr. J. Lowenstein

# 1982 TUESDAY EVENING SEMINARS

July 6 "Neuropeptides and their evolutionary history", Dr. Berta Scharrer, Albert Einstein College of Medicine.

- July 13 "Teratocarcinogenesis and parthenogenesis in mice", Dr. Leroy C. Stevens, The Jackson Laboratory.
- July 20 "How calcium helps turtles survive months of anoxia", Dr. Donald C. Jackson, Brown University.
- July 27 "Ionic channels and their gates in nerve fibers", Dr. Clay M. Armstrong, University of Pennsylvania Medical School.
- August 4 "Drinking and eating electrolytes at the bottom of the sea: how does the flounder do it?", Dr. Michael Field, University of Chicago
- August 10 "Ionic variations and their implications in the brain microenvironment. Studies with ionselective microelectrodes", Dr. Charles Nicholson, New York University Medical Center.
- August 17 "Recording currents through single ion channels", Dr. Charles F. Stevens, Yale University Medical School.
- August 24 "Regulation of neuronal ion transport proteins", Dr. Stanley Goldin, Harvard Medical School.

#### 1982 THURSDAY NOON (BROWN BAG) SEMINARS

- July 8 "Proton transport systems in isolated rat renal brushborder membrane vesicles", Dr. Eva Kinne–Saffran, Associate Professor, Department of Physiology, Albert Einstein College of Medicine.
- July 15 "Apical membrane potassium conductance in the flounder enterocyte: relation to Na<sup>+</sup>, and Cl<sup>-</sup> absorption", Dr. Edward Krasny Jr., Departments of Physiology and Biophysics, University of Alabama in Birmingham.

"Heart function during acidosis in vertebrates: comparative aspects", Dr. Hans Gesser, Assistant Professor, Department of Zoophysiology, University of Aarhus, Aarhus, Denmark

July 21	"Estrogen synthesis in the teleast brain and pituitary role in hormone action", Dr. Gloria Callard, Department of Biology, Boston University.
	"Bile pigments and UDP-glucuronyl transferase in fish and mammals: comparative aspects", Dr. Jayanta Roy-Chowdhury, Liver Research Center, Albert Einstein College of Medicine.
July 29	"Taurine transport by isolated flounder renal tubules", Dr. Patricia King, Department of Physiology and Biophysics, Brown University.
	"The nature of the relationship between the mitotic apparatus and the surface which initiates cell division", Dr. Raymond Rappaport, Department of Biological Sciences, Union College.
August 5	5 "Elasmobranch gill function", Dr. David Evans, Department of Zoology, University of Florida.
	"The fish gill is permeable to ammonium ions", Dr. Leon Goldstein, Department of Physiology and Biophysics, Brown University.
August 1	12 "Metabolic control of organ function: Does it apply to the kidney?", Dr. Hartmut Osswald, Department of Pharmacology, Medical Faculty RWTH, Aachen, West Germany
	"Adenosine receptors and epithelial transport: lessons from the perfused gland and isolated perfused tubule of the shark rectal gland:, Dr. John Forrest, Department of Medicine, Yale University School of Medicine.
August	19 Third Annual Scientific Poster Session.
August 2	26 "Pharmacological evidence for nervous control of rectal gland secretion", Dr. David Erlij, Department of Physiology, Downstate Medical Center, New York.
	"Hormonal regulation of active chloride transport in the rectal gland", Dr. Jeffrey Stoff, Department of Medicine, Beth Israel Hospital.
	1982 MONDAY MORNING TRANSPORT SEMINARS
June 28	"Control of cell Volume – and the role of Ca <sup>++</sup> ", Professor Peter Cala, Department of Human Physiology, University of California.
July 5	"Acid-base regulation in fish", Dr. David Evans, Department of Zoology, University of Florida.
July 12	"Pathways and mechanisms of $K^+$ recycling", Dr. John Stokes, Department of Internal Medicine, University of Iowa.
July 19	"Intracellular Ca <sup>++</sup> – techniques of measurement", Dr. Gary Conrad, Division of Biology, Kansas State University.
July 26	"Role of K <sup>+</sup> in NaCl co-transport", Dr. Rolf Kinne, Department of Physiology, Albert Einstein College of Medicine.
August 2	"Electrolyte transport in human cornea and lens", Dr. Michael Wiederholt, Klinikum Steglitz, Freie Universitat Berlin, West Germany.
August 9	"Co- and counter-transport in membrane vesicles", Dr. Ulrich Hopfer, Department of Anatomy, Case Western Reserve University.
August 10	6 "Beta-adrenergic receptors and ion transport", Dr. Jose Zadunaisky, Department of Physiology, New York University Medical Center.
August 23	Probing the mechanism of fluid secretion in flounder proximal tubule", Dr. Klaus Beyenbach, Section Physiology, Cornell University.
	1982 SPECIAL SEMINARS
July 29	"The need for an Environmental Resource Inventory as a basis for accepting development for humar activities while protecting the quality of life on Mount Desert Island", Arthur E. Palmer, Esq., author of <u>Toward Eden</u> and resident of Pretty Marsh, Maine and New York City.
August 3	"Electrophysiological study of active chloride transport by the early segment of amphibian distal tubule", Dr. Takeshi Hoshi, Chairman of Department of Physiology, University of Tokyo, Japan.
	3rd ANNUAL POSTER SESSION - AUGUST 19, 1982
1. Dv	mamics of Distribution and Uptake of Glycoprotein Antifreeze by Northern Fishes. A.L. DeVries,

E.J. Moody, J.D. Turner.

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- 2. Na, K, and Cl Secretion in yet Another MDIBL Animal: The Mosquito. J.C. Williams Jr., K.W. Beyenbach.
- 3. Hepatic Estrogen Receptors in the Winter Flounder. G.W. Lucier, B. Sherman, T. Sloop.
- Taurine Transport by Flounder Kidney Brush Border Membrane Vesicles. P.A. King, P. Newsholme, R. Kinne, L. Goldstein.
- 5. Sugar Absorption and Secretion in Flounder Intestine. K.A. Thompson, A. Kleinzeller.
- 6. Inhibition of Na, K, Cl Co-transport across Flounder Intestine Apical Membranes Increases Their K Conductance. D. Halm, E.J. Krasny Jr., R. Frizzell.
- 7. Regulation of Paracellular Permselectivity in Flounder Intestine. E.J. Krasny Jr., M.C. Rao, R. Frizzell.
- Cyclic GMP: The Authentic Inhibitor of Na, K, Cl Co-transport in Flounder Intestine. M.C. Rao, N.T. Nash, M. Field, R.A. Frizzell.
- 9. Kinetics of Na, K, Cl Co-transport in Flounder Intestine. M. Musch, D. Halm, M. Field.
- 10. Sodium Effects on Taurocholate Uptake from Albumin Solutions in the Perfused Skate Liver. C. Zacks, S. Goos, S. Bradley, J.L. Boyer.
- 11. Electrophysiology of the Skate Gastric Mucosa. G.W. Kidder III, E.L. Kidder.
- 12. β-Alanine Transport in Isolated Skate Hepatocytes. T.J. Shuttleworth, J.L. Thompson, L. Goldstein.
- Demonstration of D-glucose Induced Sodium Flux in the Atlantic Hagfish (Myxine Glutinosa). J. Floege, H. Stolte, R. Kinne.
- 14. The Fate of HCO\_/CO\_ in Marine Fish: Branchial and Renal Handling in S. acanthias. E.R. Swenson, T.H. Maren, C.G. Azar, M.A. Hildesley.
- 15. The Dissociation of Renal H<sup>+</sup> Secretion from CO<sub>2</sub> Hydration in <u>S</u>. <u>acanthias</u>. E.R. Swenson, T.H. Maren, C.G. Azar, M.A. Hildesley.
- Interstitial Cells in the Inner Medulla of the Mammalian Kidney: Are They Beginning Lymphatics? B. Schmidt–Nilesen, B. Graves, H. Graves.
- 17. Influence of Myoglobin on O<sub>2</sub> Consumption of the Fish Heart. W.R. Driedzic, D.L. Scott.
- Exogenous Fuel Availability and Performance of Perfused Isolated Teleost and Elasmobranch Hearts. T. Hart, W.R. Driedzic.
- 19. Angiotensin 11 Stimulated Drinking in Fish. R.L. Malvin, D.R. Shier, D.S. Beasley, S. Eiger, D. Schiff.
- Intracellular Chloride Activity in the Isolated Retinal Pigment Epithelium. M. Wiederholt, J.A. Zadunaisky, A. Evans.
- Papaverine Blocking Effect on Chloride Channels and/or Na-Cl Coupling. J.A. Zadunaisky, M. Wiederholt, A. Evans.
- How Does Your Rectal Gland Turn On? R. Solomon, P. Silva, J. Staff, M. Taylor, J. Epstein, A. Stevens, M. Myers, D. Leone, A. Landsberg, F. Epstein.
- 23. Hormonal Regulation of Rectal Gland Secretion: Interaction of Vasoactive Intestinal Peptide (VIP) and Somatostatin. D.R. Leone, J.S. Stoff.
- 24. The Cellular Swelling of Rectal Gland Slices in Hypotonic Salines. A. Kleinzeller, J. Goldstein.
- 25. The Role of Calcium in the Vasomotor and Secretory Effects of cAMP in the Rectal Gland. T.J. Shuttleworth, J.L. Thompson.
- 26. Feasibility of Perfusing Single Isolated Tubules of the Rectal Gland: Response to Secretogogues and Inhibitors of Chloride Transport. F. Wang, K. Beyenbach, J.N. Forrest.
- 27. Forskolin: A Unique Diterpene Activator of Adenylate Cyclase Stimulates Chloride Secretion and Augments Receptor-mediated Responses in the Perfused Rectal Gland. G. Kelley, E. Poeschla, J.N. Forrest.
- 28. Adenosine Release from the Rectal Gland of <u>Squalus</u> acanthias following Stimulation with VIP. H. Osswald, J.N. Forrest.
- 29. Stereospecific Inhibition of Active Chloride Transport in the Salt Gland of <u>Squalus</u> <u>acanthias</u> by the Diuretic Ozolinone. H. Osswald, F. Wang, J.N. Forrest.

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