# THE BULLETIN VOLUME 23/1983 MOUNT DESERT ISLAND BIOLOGICAL LABORATORY, SALSBURY COVE, MAINE 046



# THE BULLETIN OF

The Mount Desert Island

Biological Laboratory

Salsbury Cove, Maine

198**3** 

Volume 23 ,,,,,,,

Issued 1984

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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 Maine 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 1983 there were 124 scientific personnel representing 55 institutions in 20 states and 3 foreign countries. The personnel included 46 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 post-doctoral students spend the summer under supervision of senior investigators.

Weekly formal and informal seminars are scheduled, and formal courses are occasionally offered. 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>. 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 approximately 30% of the summer population. Acceptance notices are usually issued in late March or 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 relocation 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 430 members of the Corporation. It fuctions 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 Rappoport, 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 (1979–83); David H. Evans, University of Florida (1983–). 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

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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, 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. The research abstracts in past Bulletins will give a good indication of the commonly used species. The Assistant Director will be glad to furnish an estimate of the availability of any particular species.

#### 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. The Physical plant is as follows:

Biophysics Building	: This air-conditioned building was erected in 1965. It houses isotope counting systems, ultracentrifuges, spectrophotometers, and sectioning equipment for electron microscopy.
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.
Hegner Laboratory	contains 9 laboratory rooms provided with salt and fresh water, each accommodating 1 to 3 persons.
The Instrument Shea	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.
Karnofsky Laborator	y, constructed in 1970, contains 4 large laboratories, one large enough to accommodate 2 research groups. This is now a year- round facility.
The Kidney Shed	is a single large laboratory capable of accommodating two research groups.
Lewis Laboratory,	renovated in 1979, contains two laboratories.
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.
Neal Laboratory:	This, the oldest and largest of the laboratory buildings, was re- modeled 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.
Union Station,	erected in 1962, contains two laboratories, each suitable for 2 to 3 persons, and is equipped with <b>s</b> alt and fresh water.
Study Space:	Three studies and two offices are available for rental. The studies are small, individual structures, while the two offices are located in larger laboratory buildings.
Administration Buildi	ng: A centrally located building that houses the business office, a small reference library, and the physical plant office and shop.
Director's Office:	A separate building contains the Director's Office and a small conference room.

Dahlgren Hall:	The former village schoolhouse, this serves as the primary site for seminars, lectures and corporation meetings. The single large room can seat approximately 120 people.
Dining Hall (Co-op):	The dining hall was constructed in 1963. In addition to dining facilities, this building contains a meeting and recreation area for students and assistants at the Laboratory.
Collecting:	The Laboratory owns and operates a 32-foot gasoline-powered boat, a 22-foot inboard/outboard and a 16-foot outboard for collecting near shore. The MDIBL contracts with local fisher- men for the collection of commonly used fish species, and most native invertebrates are available from local supply operations.
Seawater System:	Flowing seawater is supplied to most laboratories from May through October. There are additional large fiberglass pools available on a rental basis for holding large numbers of organisms. The Laboratory is currently planning to improve this system for year-round operation.
Dock:	The dock consists of two floats with live wells and attached live cars for storage of specimens (Squalus). It is attached to the shore by an inclined ramp and a bridge and abutment.

#### Housing

The Laboratory owns and maintains sixteen cottages as rental units for summer investigators and their families. Four wooden dormitories are used to house single investigators and student assistants. Dormitory residents must take their meals in the Laboratory Dining Hall. Two one-bedroom apartments are available for year-round use. Island Activities

Mount Desert Island has long been known to have one of America's most desirable summer climates. The acean, 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. An automobile is essential for family mobility on the Island.

#### 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 variausly 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 BSR-8100823 is gratefully acknowledged.

#### Applications

Fees for research space vary according to the space assigned and the number of workers. Special arrange-

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ments 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 for investigators and student assistants are available from several memorial funds.

In an effort to make our specimen collecting facilities as self-supporting as possible, fees change almost annually. The fees in 1984 will range from \$8 for flounder and skates to \$11 for dogfish. Prices for other species will depend on availability and the supplier. Some of the commonly used organisms include:

INVERTEGRATES: Metridium senile, frilled anemone; Ilyanassa obsoletus, dog whelk; Mytilus edulis, blue mussel; Homarus americanus, lobster; Pragurus sp., hermit crabs; Cancer irroratus, rock crab; Carcinus maenas, green crab; Echinarachnius parma, sand dollar; Boltenia ovifera, sea potato.

PISCES: Myxine glutinosa, hagfish; Squalus acanthias, spiny dogfish; Raja erinacea, little skate; Anguilla rostrata, eel; Fundulus heteroclitus, killifish; Gadus sp., cod; Pseudopleuronectes americanus, winter flounder; Myoxocephalus sp., sculpins; Hemitripterus americanus, sea raven; Pholis gunnellus, rock eel; Macrozoacres americanus, eel pout; Lophius americanus, goosefish.

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

Applications and inquiries should be addressed to:

Dr, David L. Wynes Assistant Director Mount Desert Island Biological Laboratory Salsbury Cove, Maine 04672

Tel. (207)288-3605

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Associate: A. Evans

#### 1983 TUESDAY EVENING SEMINARS

July 5 "The renal handling of sugars", Dr. Arnost Kleinzeller, University of Pennsylvania School of Medicine. July 12 "Role of the egg cortex in early development", Dr. David Begg, Harvard Medical School. July 19 "Intracellular pH regulation", Dr. Walter F. Boron, Yale University Medical School. July 26 "Design of the mammalian lung: a structure-function paradox", Dr. Richard C. Taylor, Harvard University. August 3 "Membrane dynamics in cultured mammalian cells", Dr. John Cook, National Science Foundation. August 9 "Environmental acidification – consequences for the acid-base and ionoregulatory physiology of aquatic organisms", Dr. Chris Wood, McMaster University. August 17 "Sex determination in mice", Dr. Eva Eicher, The Jackson Laboratory. August 23 "Membrane assembly and circulation in vertebrate photoreceptor cells", Dr. Eric Holtzman, Columbia University. 1983 THURSDAY NOON (BROWN BAG) SEMINARS July 7 "Ouabain binding by the corneal endothelium", Dr. Henry F. Edelhauser, Professor, Departments of Physiology and Ophthalmology, Medical College of Wisconsin. July 11 "Cortical actin reorganization associated with microvillar growth in the sea urchin egg", Dr. David (Tues.) Begg, Assistant Professor, Department of Anatomy, Laboratory of Human Reproduction and Reproductive Biology, Harvard Medical School, July 14 "Shark rectal gland and mammalian crypts of Lieberkuhn: a phylogenetic basis for functional similarity?", Dr. Christopher Loretz, Assistant Professor, Department of Biological Sciences, State University of New York at Buffalo. 'Na-K-Cl transport in flounder intestine", Dr. Mark Musch, Department of Pharmacology/ Physiology, University of Chicago. July 19 "Corneal nerve development", Dr. Gary Conrad, Professor, Division of Biology, Kansas State (Tues.) University. July 21 "In vivo control of rectal gland function", Dr. Richard Solomon, Chief, Renal Section, Roger Williams General Hospital and Veterans Administration Medical Center; Assistant Professor of Medicine, Brown University College of Medicine. "Site of action of cyclic AMP in rectal gland", Dr. Patricio Silva, Associate Professor of Medicine, Associate Director, Renal Unit, Beth Israel Hospital. "Volume regulation - intertidal nemertina and oligochaeta. Neuroendocrine effects under August 4 fluctuating salinity conditions", Dr. Joan D. Ferraris, Research Scientist, MDI Biological Laboratory. "Lessons learned from elasmobranch gastric mucosa", Dr. George Kidder, Professor, Department of Physiology, University of Maryland School of Dentistry. "Sodium-transporting vesicles from crab gill", Dr. David W. Towle, Professor of Biology, August 11 University of Richmond. "Do albumin receptors facilitate the transport of organic anions?", Dr. James L. Boyer, Professor of Medicine, Director, Liver Study Unit, Yale University School of Medicine. "Forskolin: a new tool for the study of cellular events mediated by adenylate cyclase and August 18 cyclic AMP", Dr. John Forrest, Jr., Associate Professor of Medicine, Yale University School of Medicine. "Some evolutionary aspects of neural and non neural membrane-bound carbonic anhydrase", Dr. Victor Sapirstein, Associate Biochemist and Director of Experimental Cell Research, E.K. Shriver Center. "How to eat all you want and not gain weight", Dr. Eric Newsholme, Lecturer in Bio-August 25 chemistry, Oxford University, England.

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#### 1983 MONDAY MORNING TRANSPORT SEMINARS

- July 11 "Co-transport of Na-K-Cl in perfused tubules", Dr. Rainer Greger, Associate Professor of Physiology, Max Planck Institut für Biophysik, West Germany.
- July 18 "Intracellular potentials of cultured corneal endothelial cells", Dr. Michael Wiederholt, Professor, Klinikum Steglitz, Freie Universität Berlin, Institut für Klinische Physiologie, West Germany.
- July 25 "Rapid photo conversion of calcium antagonists: implications for calcium transport", Dr. Martin Morad, Professor of Physiology and Medicine, University of Pennsylvania School of Medicine.
- August 1 "Biochemistry of Na-K-ATPase", Dr. Lewis Cantley, Department of Biochemistry and Cell Biology, Harvard University.
- August 8 "Paracellular pathways", Dr. Raymond Frizzell, Professor, Department of Physiology and Biophysics, University of Alabama at Birmingham.
- August 12"Transport by retinal pigment epithelium", Dr. Sheldon Miller, Associate Professor of Physio-<br/>logical Optics, University of California at Berkeley.
- August 15 "Bicarbonate transport in the proximal nephron", Dr. Eberhard Frömter, Professor of Medicine, Max Planck Institut für Biophysik, West Germany.
- August 22 "Angina of the renal medulla work, oxygen and cell death in the thick limb of Henle", Dr. Franklin H. Epstein, Professor of Medicine, Harvard Medical School and Beth Israel Hospital.

#### 1983 SPECIAL SEMINARS

January 17 THE 4th WILLIAM B. KINTER MEMORIAL SEMINAR "Collecting Duct Hydraulics – Role of the Renal Pelvis", Dr. Peter Koch Jensen, Panum Institute in Copenhagen, presently doing research at the Laboratory of Kidney and Electrolyte Metabolism, National Institutes of Health. Sponsored jointly with and held at the Jackson Laboratory.

#### 4th ANNUAL POSTER AND DEMONSTRATION SESSION July 27, 1983

#### Demonstrations:

- 1. Mesencephalic Electrosensory Area in Squalus acanthias. R.G. Northcutt, D. Bodznick.
- 2. The Isolated, Perfused Shark Pup Head: Sensitivity to Low Levels of Epinephrine. D.H. Evans, C. Hooks.
- Studies of the Regulation of the Apical Membrane K. Conductance Using Microelectrode Techniques.
  D.R. Halm, R.A. Frizzell.
- Modification of Tight Junction Ion Selectivity in Flounder Intestine by Cyclic AMP. E.J. Krasny, Jr., R.A. Frizzell.

5. Effects of the Kidney Pelvis upon the Renal Papilla. B. Schmidt-Nielsen, B. Graves, H. Church.

#### Posters:

- 1. Attempts to Measure Intracellular Calcium Activity During Polar Lobe Formation and Cytokinesis in Ilyanassa Eggs. D.L. Sommerfeld, A. Schantz, G.W. Conrad.
- Intracellular pH and Chloride Activity During Polar Lobe Formation and Cytokinesis in <u>Ilyanassa</u> Eggs. G.W. Conrad.
- 3. Genetic Variation in a Sea Anemone: Patterns and Processes. R.J. Hoffmann.
- 4. Swelling Properties of Dogfish & Sculpin Cornea. D. Wheaton, S. Edelhauser, H. Edelhauser.
- 5. Sodium Transport at the Blood-Brain Barrier & Its Role in Brain Volume Regulation. K. Mackie, H. Cserr.
- Hydrostatic Pressures & Rectal Gland Secretion. Bioactive Cardiac Substances in Dogfish Myocardium?
  B. Kent, T. Bonilla, M. Levy.
- 7. Bile Pigment Excretion in the Skate. M. Grossbard, E. Gordon, J.L. Boyer.
- Effect of Forskolin on Bile Secretion in the Isolated, Perfused Skate Liver. M. Brainard, E. Gordon, A. Boyer, J.L. Boyer.
- 9. Hydrochlorothiazide Effects of NaCl Transport by Flounder Urinary Bladder. J.B. Stokes, I.B. Lee.

- 10. The Effects of Hydrochlorothiazide on Intracellular Potassium and Chloride Activities in Flounder Bladder. M.E. Duffey, J.B. Stokes.
- 11. Chloride's View of Its Transporter. J. Hannafin, E. Kinne–Saffran, R. Kinne, with technical assistance from H. Schuetz & B. Vickermann.
- Some Aspects of the Cellular Mechanism of Salt Secretion in the Rectal Gland of <u>Squalus acanthias</u>.
  R. Greger, E. Schlatter, F. Wang, J. Forrest.
- 13. Stimulation of the Rectal Gland by an Endogenous Peptide. T.J. Shuttleworth, J.L. Thompson.
- The Specificity (or lack thereof) of the Inhibitory Effect of Somatostatin. A. Landsberg, R. Brown, P. Silva, F.H. Epstein.
- 15. Ex Vivo Studies in Shark Rectal Gland. R. Solomon, P. Silva, F.H. Epstein.
- Rapid Kinetic Studies with Optically-Sensitive Compounds in Heart Muscle. T. Allen, J. Choo, L. Cleeman, M. Morad.
- 17. Biological Antifreeze Agents in Coastal Atlantic Fishes. A.L. DeVries, R. Williams.
- 18. Current-Voltage Plot of Skate Gastric Mucosa. G.W. Kidder, III.
- 19. Effect of Sea and Fresh Water Adaptation on Intestinal Electrolyte Transport in the American Eel (Anguilla). U. Hopfer, D. Gorman.
- 20. The Significance of Rocks in the Study of Body Fluids. R. Cserr.

Editorial Committee

Dr. William L. Doyle Dr. Roy Forster Dr. Raymond A. Frizzell Dr. Thomas H. Maren Dr. Martin Morad

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It appears that the chloride in has two different actions: one to increase the number of binding sites of NECA and another to reverse the GTP effect possibly by stimulating a GTPase. Further experiments are necessary to identify the membrane protein(s) that are regulated by chloride. This work was supported by grants from the Deutsche Forschungsgemeinschaft (Os 42/6-7) and the American Heart Association.

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