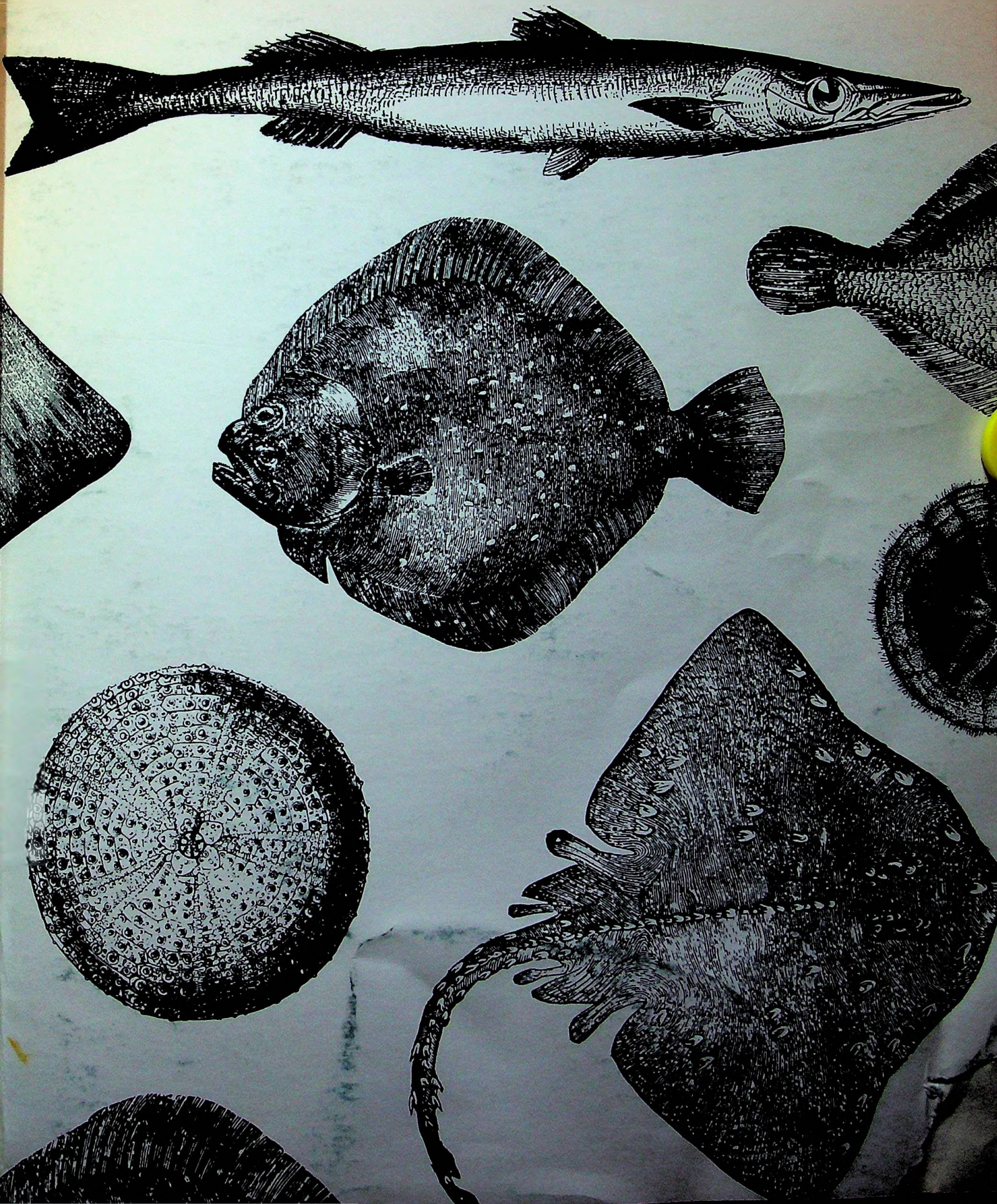


# THE BULLETIN

VOLUME 21/1981

MOUNT DESERT ISLAND BIOLOGICAL LABORATORY, SALSBURY COVE, MAINE 04672





# *Volume 21 • 1982*

## **THE BULLETIN OF**

*The Mount Desert Island*

*Biological Laboratory*

*Salsbury Cove, Maine*

1981

**Volume 21**

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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 1981 there were 150 scientific personnel representing 65 institutions in 22 states and abroad. The personnel included 54 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 Science. 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 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 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 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. 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:

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.

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 new year-round facility, 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.

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

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-op): 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.

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

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 Squalus, 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 \$1010 to \$1960 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 \$640 to \$3540, 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 1982 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; Raja erinacea, little skate; Anguilla rostrata, eel; Fundulus heteroclitus, killifish; Lophius americanus, goosefish; Myoxocephalus sp., sculpins; Pholis gunnellus, rock eel; Pseudopleuronectes americanus, winter flounder; Macrozoarces americanus, eelpout.

INVERTEBRATES: Echinarachnius parma, sand 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 31

Mount Desert Island Biological Laboratory  
Salsbury Cove, ME 04672  
(207) 288-3605

Division of Biomedical Sciences  
Brown University - Box G  
Providence, RI 02912 (401) 863-3341

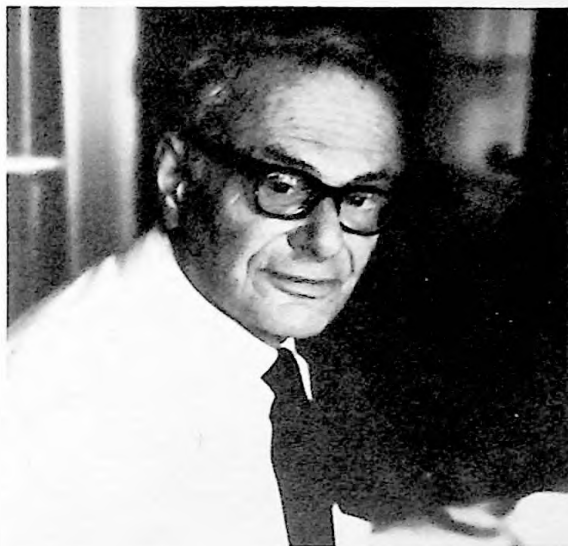
Inquiries regarding specific matters such as laboratory charges and facilities can also be directed to:

Tel. (207) 288-3605

Mr. Jonathan S. Gormley  
Executive Secretary  
Mount Desert Island Biological Laboratory  
Salsbury Cove, ME 04672

## IN MEMORIAM

SIR HANS ADOLF KREBS, F.R.S.



August 25, 1900 – November 22, 1981; Nobel Laureate, 1953

We pay homage to Sir Hans Krebs, an honorary member of the Laboratory. In the summer of 1968, the Laboratory had the great privilege of being host to Sir Hans and Lady Krebs, the first Visiting Scientist at MDIBL. This was not only as an expression of appreciation of Sir Hans as one of the greatest living biochemists (cell physiologists) but also because of a convergence of interests, particularly renal function and urea metabolism. It is less known that there were additional strands of mutual interest: The first three papers of Hans Krebs (1926) dealt with the permeability of the choroid plexus, and in the early fifties he made a fundamental contribution to the understanding of the driving forces involved in cation transport in animal tissues. With Hans Krebs the world loses a great scientist, and an era comes to a close when his most fundamental contribution, i.e., the concept of metabolic cycles and their regulation, is now firmly established in the intellectual inventory of students. There are other admirable traits difficult to emulate: His unerring sense of identifying at the right time fundamental questions and choosing (and developing) appropriate experimental tools for his scientific strategy; his breadth of scholarship (two years ago, he mentioned, with a twinkle in his eye, that he was reading Cicero's *De Senectute*, in Latin); his self-discipline which allowed him to stretch days, weeks and years of hard work to yield maximal results; his conception of standards in science, transmitted by his mentors O. Warburg, S. Thannhauser and F.G. Hopkins, which permitted him to present only definitive new results – hence his advice: "Never repeat yourself"; his scientific integrity,

including a meticulous recognition of the merit of others. A finally, his art of communicating the results of his work to others. Forty odd years ago, when this student handed him a draft of a report, he returned the same the next day with the admonition: Any scientific paper has to be written in such a way that a) there will not be a superfluous word; b) it will be understood by "the man in the street" (provided he understands the employed scientific terms); and c) it must also be true fifty years hence. Sir Hans certainly managed to be true to his counsel.

MDIBL has lost a friend.

A. Kleinzeller

The Laboratory gratefully acknowledges recent benefactors.

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Professor of Physiology, Biophysics & Ophthalmology  
New York University  
Associates: T. Bradbury, Dr. N. Primor, B. Sherman

# WINTER SEMINAR SERIES, 1980-81

- November 13. "The opercular epithelium, an experimental model for the teleost gill", Dr. Kevin Degnan, Department of Physiology & Biophysics at New York University Medical Center.
- December 4. "The reduced reproductive success in crude oil-dosed Leach's petrels", Dr. Wayne Trivelpiece, Research Associate, Mount Desert Island Biological Laboratory.
- December 17. "Oxygen uptake with temperature-salinity variation in two coral reef polychaetes; a pilot laboratory study in the field", Dr. Joan Ferraris, Research Associate at Mount Desert Island Biological Laboratory.
- January 8. "The role of sialic acid in cell surface properties", Dr. Anne Sherbrooke, Department of Biochemistry, University of Maine at Orono.
- January 15. "Animals in man's way - or vice versa", Dr. Hubert Frings, Professor Emeritus, Department of Zoology, University of Oklahoma.
- January 22. "Temperature acclimation of striped bass: partition of metabolic fuels between liver and muscle tissue", Dr. Bruce Sidell, Department of Zoology, University of Maine at Orono.
- January 29. "The calcium requirement of fast axoplasmic transport in mammalian nerve and the effect of other ions", Dr. Shew-Yin Chan, Department of Pharmacology, Harvard Medical School.
- February 12. "Microcirculation in shark gill and rectal gland", Dr. Barbara Kent, Department of Surgery, Mt. Sinai School of Medicine.
- February 26. "Birds in man's way, or vice-versa", Dr. Hubert Frings, Professor Emeritus of the University of Oklahoma.
- March 5. "Characterization of metabolic carbon flow in hepatocytes of temperature acclimated Fundulus heteroclitus", Timothy Moerland, Department of Zoology, University of Maine at Orono.
- March 12. "Sea birds and oil pollution: recent developments", Dr. David Miller, Research Scientist, Mount Desert Island Biological Laboratory.
- March 19. "Renal transport mechanisms -- cells, membranes, molecules", Dr. Rolf Kinne, Chairman, Department of Physiology, Albert Einstein College of Medicine. WILLIAM B. KINTER MEMORIAL SEMINAR.
- March 26. "Functional and anatomical changes in the mammalian kidney papilla during normal peristaltic action of the renal pelvis", Dr. Bodil Schmidt-Nielsen, Research Scientist, Mount Desert Island Biological Laboratory.
- April 2. "Flow of cerebral interstitial fluid and its drainage into deep cervical lymph", Dr. Helen Cserr, Division of Biology and Medicine, Brown University.

## TUESDAY EVENING SEMINARS

- July 7. "The hormonal control of kidney functions: a biochemical approach using isolated tubules", Dr. Francois Morel, Professor, College de France, Laboratoire de Physiologie Cellulaire.
- July 14. "Photoperiodic control of antler growth cycles in deer", Dr. Richard J. Goss, Dean of Biological Sciences, Brown University.
- July 21. "Lithium, membranes and manic depressive illness", Dr. Barbara Ehrlich, Department of Physiology, Albert Einstein College of Medicine.
- July 28. "Role of basolateral co-transport of NaCl in the volume regulation of frog skin epithelium", Professor Hans H. Ussing, Institute of Biological Chemistry, University of Copenhagen.
- August 5. "Homocellular regulatory mechanisms in sodium-transporting epithelia", Dr. Stanley G. Schultz, Professor/Chairman, Department of Physiology, University of Texas Health Science Center at Houston.
- August 11. "The reticulum, the bilayer, and the contour of the human red blood cell membrane", Dr. Theodore Steck, Professor/Chairman, Department of Biochemistry, University of Chicago.
- August 18. "Placentas - tight or leaky?", Professor Michael Bradbury, Department of Physiology, University of London, King's College.
- August 25. "Isolation and reconstitution of the glucose transporter from red cells and other animal cells", Dr. Peter Hinkle, Associate Professor of Biochemistry, Cornell University.



#### THURSDAY NOON SEMINARS

- July 2. "Stocks of Atlantic Herring - discreteness, abundance, variability and relationship to physical oceanography and productivity", Dr. Michael Sinclair, Bedford Institute of Oceanography. Sponsored jointly by MDIBL and College of the Atlantic.
- July 9. "Ion transport in flounder intestine", Dr. Raymond A. Frizzell, Associate Professor, Department of Physiology, University of Texas Medical School.  
"Transport studies with isolated tubules from flounder kidney", Dr. Klaus Beyenbach, Assistant Professor of Physiology, Cornell University.
- July 16. "Energy metabolism in red and white fish hearts", Dr. William L. Driedzic, Assistant Professor, Biology Department, Mount Allison University.  
"The microvasculature of the salt-excreting gland of the shark (dogfish)", Dr. Barbara Kent, Associate Professor of Physiology, Mt. Sinai School of Medicine.
- July 22. "Toxicity of O<sub>2</sub> to the retina", Dr. John L. Ubels, Department of Physiology, Medical College of Wisconsin.  
"Epithelial chloride transport and the beta-adrenergic receptor", Dr. Jose Zadunaisky, Department of Physiology, New York University Medical Center.
- July 30. "Selected aspects of renal function in crab", Dr. Charles Holliday, Research Associate, Mount Desert Island Biological Laboratory.  
"Organic anion and cation transport in crab urinary bladder", Dr. David Miller, Research Scientist, Mount Desert Island Biological Laboratory.
- August 6. "The mammalian renal pelvis: its effect upon papillary morphology and fluid removal from the collecting ducts", Dr. Bodil Schmidt-Nielsen, Research Scientist, Mount Desert Island Biological Laboratory.  
"Organic anion transport in elasmobranch liver", Dr. James L. Boyer, Professor of Medicine, Director of Yale Liver Study Unit, Yale University.
- August 13. "Sugar absorption and secretion in flounder intestine", Dr. Richard Naftalin, Reader in Physiology, King's College, London and Dr. Arnost Kleinzeller, Professor of Physiology, University of Pennsylvania.  
"Hemodynamics and secretion in the dogfish rectal gland", Dr. Trevor Shuttleworth, Lecturer, Department of Biological Sciences, University of Exeter, England.
- August 20. Second Annual Poster Seminar (see separate listing below).
- August 27. "Sand dollar ecology", Joe Ghiold, Research Fellow, Universität Tübingen, Institut und Museum für Geologie und Paläontologie.  
"Exploratory studies of agonistic behavior in the Rock Crab", Dr. J.P. Scott, Regents Professor of Psychology, Emeritus, Population and Society Research Center, Bowling Green State University.

#### FRIDAY MORNING TRANSPORT SEMINARS

- July 10. "'Single-file' ion flows through epithelial potassium channels: how to distinguish 'knock' from 'block'", Dr. David Dawson, Associate Professor, Department of Physiology, University of Michigan Medical School.
- July 24. "The use of phlorizin to characterize and to purify the sodium glucose co-transport system", Dr. Rolf Kinne, Professor and Chairman, Department of Physiology, Albert Einstein College of Medicine.
- July 31. "Impedance and cell-coupling in syncytial epithelium: the lens", Professor James Rae, Professor of Physiology, Rush Medical College.
- August 7. "Regulation of Na permeability", Dr. Stanley Schultz, Professor and Chairman, Department of Physiology, University of Texas Health Science Center at Houston.
- August 14. "Cell volume regulation", Dr. Arnost Kleinzeller, Professor of Physiology, University of Pennsylvania.

- August 21. "Vesicle studies", Dr. James Boyer, Professor of Medicine, Director of Yale Liver Study Unit, Yale University School of Medicine and Dr. Raymond Frizzell, Associate Professor, Department of Physiology, University of Texas Medical School.
- August 28. "Visualization of intracellular proton pumps", Dr. Qais Al-Awqati, Associate Professor, Department of Medicine, Columbia University, College of Physicians & Surgeons.

#### SPECIAL SEMINARS

- June 22. "Molecular architecture of the mature and developing synapse", Dr. Paul Kelly, Division of Biology, Kansas State University.
- July 13. "Synthesis and function of extracellular matrix in muscle development", Dr. Klaus von der Mark, Max-Planck-Institute für Biochemie, West Germany.
- July 15. "Metabolic aspects of running", Dr. Leon Goldstein, Professor, Brown University.
- July 29. "The evolution of Na uptake", Dr. Leonard B. Kirschner, Department of Zoology, Washington State University.
- August 3. Minisymposium: "Adenosine and the regulation of Epithelial Transport"
- "Adenosine and glomerular-tubular feedback", Dr. Hartmut Osswald, Department of Pharmacology, Medical Faculty RWTH, Aachen, West Germany.
- "Adenosine, catecholamines and chloride secretion in the cornea", Dr. Jose Zadunaisky, Professor of Physiology & Biophysics, Professor of Experimental Ophthalmology, New York University Medical Center.
- "Ribose-specific adenosine receptors and chloride secretion in the rectal gland", Dr. John Forrest, Associate Professor of Medicine, Yale University School of Medicine.
- "Tissue levels of adenine nucleotides in the rectal gland", Dr. David Erlij, Professor, Department of Physiology, Downstate Medical Center, State University of New York.
- "Overview: regulation of adenosine production", Dr. Rafael Rubio, Department of Physiology, University of Virginia.
- August 7. "The nature and regulation of carbohydrate transport in *E. coli*", Sir Hans Kornberg, Sir William Dunn Professor of Biochemistry, University of Cambridge, England. Sponsored jointly by MDIBL and The Jackson Laboratory.
- August 17. "The elephant seal's heart" a biophysical approach to understanding how it pumps during prolonged anoxia", Dr. Martin Morad, Professor of Physiology, University of Pennsylvania.
- August 26. "Recent studies on bacteriorhodopsin", Dr. H.G. Khorana, Sloan Professor of Biology & Chemistry, Massachusetts Institute of Technology.

#### 2ND ANNUAL SCIENTIFIC POSTER SESSION - AUGUST 20, 1981

1. Effects of Used Offshore Drilling Fluids on Teleost and Echinoderm Development. R.B. Crawford, L. Wright, B. Bergquist, N. Crawford.
2. The Pressor Response to KCl in Dogfish is Not Autonomically Mediated. D.F. Opdyke, K. Holmes, N. Keller.
3. The effect of Exercise on Dogfish Blood Pressure and Heart Rate. D.F. Opdyke, K. Holmes, N. Keller.
4. The Heart of the Shark has no CPK! F.H. Epstein.
5. Salt Secretion by the Explanted Rectal Gland. R. Solomon, M. Taylor, P. Silva, J. Stoff, F. Epstein.
6. Tissue Cyclic AMP Content and Chloride Secretion in the Rectal Gland: Stimulation by Adenosine and Ribose-Specific Analogs and Inhibition by Theophylline. J.N. Forrest, E. Poeschla, D. Rieck.
7. Hemodynamics and Secretion in the Rectal Gland. T. Shuttleworth and J. Thompson.
8. The Effects of Carbonic Anhydrase Inhibition and Acid-Base Alterations on Rectal Gland Secretion. E. Swenson and A. Kirby.
9. Vertebrates Lacking Red Cell Carbonic Anhydrase: Studies of Certain Urodeles. T. Maren and C. Azar.
10. The Alkaline Gland of the Skate Rediscovered. P.L. Smith, R.A. Frizzell, Q. Al-Awqati and J. Field.
11. A New Model for Reabsorption of Fluid from Mammalian Papillary Collecting Ducts During Peristaltic Flow. B. Schmidt-Nielsen, B. Graves and H. Church.

12. Taurine Transport in Isolated Flounder Renal Tubules. P.A. King, S.R. Goldstein and L. Goldstein.
13. Organic Cation Transport in Flounder Renal Tissue. D.S. Miller, D. Brier-Russell, P. Holohan.
14. Transport of Glucose Analogues in Flounder Intestine. K. Thompson and A. Kleinzeller.
15. Role of  $K^+$  in Ion Transport Across Flounder Intestine: Active Absorption and Secretion of  $K^+$  and  $K^+$ -dependence of Cl Transport. M. Musch, L. Kimberg, S. Orellana, R.A. Frizzell and M. Field.
16. Regulation of Apical Membrane K Channels in Flounder Intestine. D. Halm, E. Krasny, Jr., P.L. Smith and R.A. Frizzell.
17. Sodium/Proton Antiport in Brush Border Vesicles from Flounder Intestine. M. Rao, E. Vosburgh, W. Dubinsky, S. Gluck, R. Frizzell, Q. Al-Awqati and M. Field.
18. Calcium is a Regulator of Intestinal Cl Transport in the Winter Flounder. M. Donowitz, L. Battisti, J. Madara, J. Trier, S. Cusolito and S. Carlson.
19. The Structure of Cell Junctions in Flounder Intestine. J. Madara, R. Curtis and J. Trier.
20. Fine Structure of Secretory Tissues in the Elasmobranch. J.L. Boyer, J.N. Forrest, N. Primor.
21. Hepatic Uptake of Organic Anions: Lessons from the Elasmobranch. C.M. Zacks, J.S. Reed, R. Weisiger, N.D. Smith and J.L. Boyer.
22. Regulation of  $\beta$ -Alanine Metabolism in Skate Liver in Response to Environmental Dilution. T. Leech and P. McLaughlin.
23. Characterization of the Hepatic Monooxygenase System in Winter Flounder, Pseudopleuronectes americanus. G. Foureman and J.R. Bend.
24. Volume Regulation of Brain Extracellular Fluid in the Skate. H. Cserr, K. Mackie, E. Moody and M. Bradbury.
25. Compliance and Outflow Resistance of Extradural Fluid in the Skate. E. Moody, H. Cserr and M. Bradbury.

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