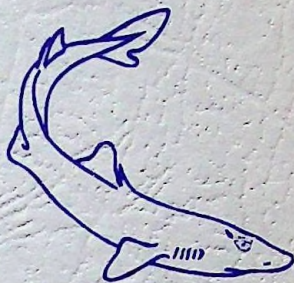


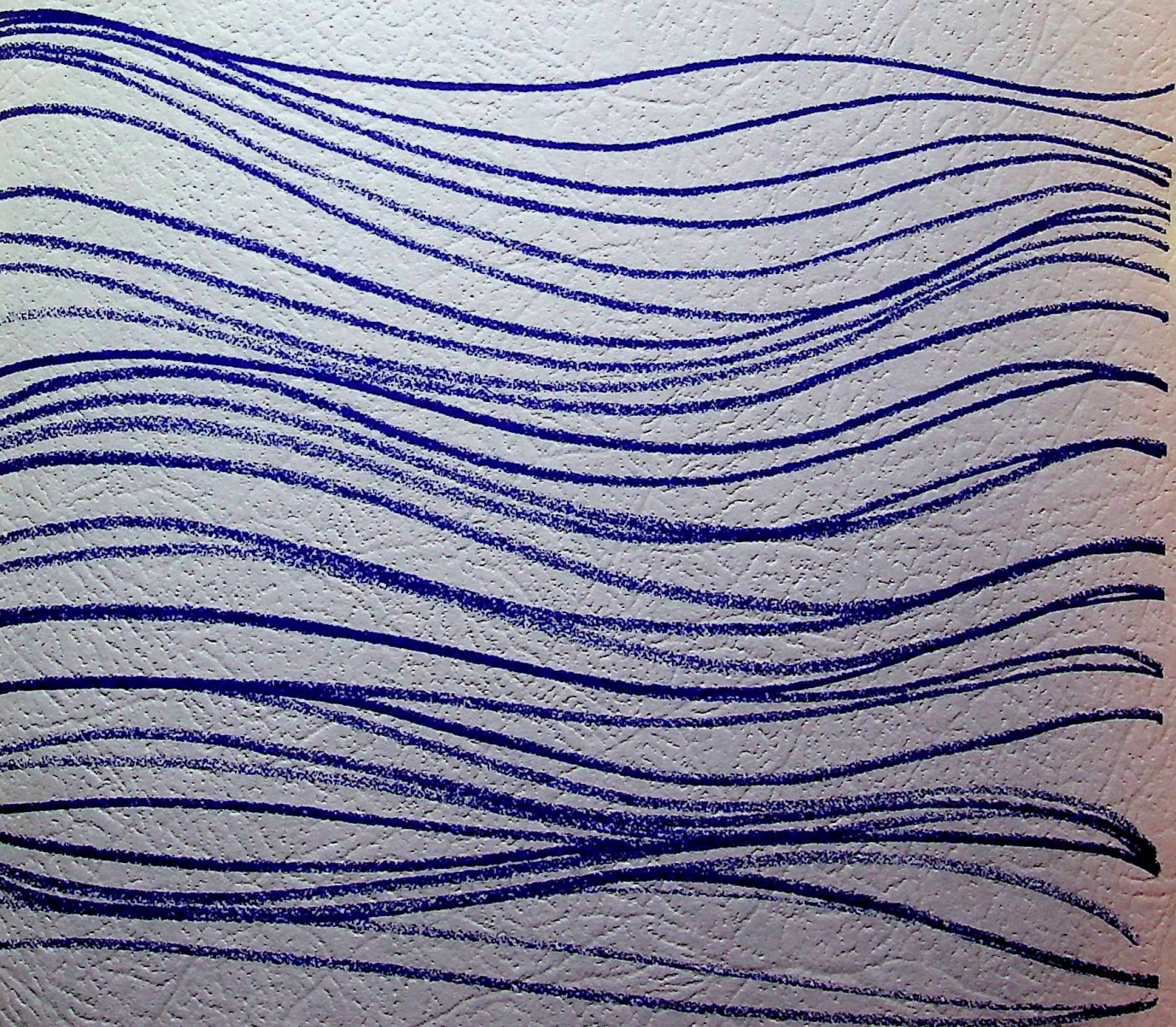
# THE BULLETIN

*Volume 9*

MOUNT DESERT ISLAND  
BIOLOGICAL LABORATORY  
Salisbury Cove, Maine

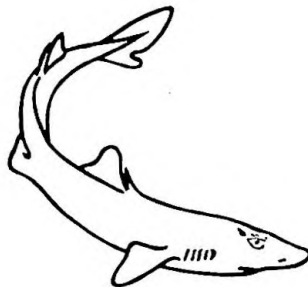


1969



THE BULLETIN OF  
THE MOUNT DESERT ISLAND  
BIOLOGICAL LABORATORY  
SALISBURY COVE, MAINE  
*1969*

**Volume 9**



**Issued 1970**

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## 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 27 research programs. Certain specialized equipment is available. During 1969 there were 59 scientific personnel in 28 research groups representing 32 institutions both here and abroad. There were 33 professional scientists with 10 students in the 1969 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- ).

### 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 forms 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 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.

(7) 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.

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

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

(10) 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.

(11) 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.

(12) 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.

(13) 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.

(14) 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.

(15) 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 \$400 to \$650 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 consider-

able 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 1969 were compiled by Dr. H. V. Murdaugh.

### Applications

Fees for research space vary according to the demand made on the facilities. They range from \$300 to \$650 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. Charles E. Wilde, Jr.

June 1 - September 1

Mount Desert Island Biological Laboratory  
Salisbury Cove, Maine, 04672

September 1 - June 1

Department of Histology and Embryology  
School of Dental Medicine  
University of Pennsylvania  
Philadelphia, Pennsylvania, 19104

The Mount Desert Island Biological Laboratory  
Salisbury Cove, Maine

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Vice President	Raymond Rappaport
Secretary	William C. Grant, Jr.
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Assistants	William L. Kinter	Syracuse, N.Y.
	Peter Rappaport	Schenectady, N.Y.
	Steven W. Dolliver	Bar Harbor
Collecting Crew	Lewis B. Kinter	Union College
	Jon R. Carter	Bar Harbor
Secretary	Sara H. Murdaugh	Washington University
Dining Hall Manager	Elaine K. Hersey	University of Maine
Isotope Laboratory	Frank W. Sheldon	McGill University

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 Kenyon College  
 University of Iowa  
 Iowa City  
 University of Louisville  
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 Emory University  
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 Radcliffe College  
 Case-Western Reserve  
 S.U.N.Y. at Syracuse  
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 Heidelberg College  
 Case-Western Reserve  
 Emory University  
 N.I.H.  
 Union College  
 University of Pennsylvania  
 University of Pennsylvania  
 Dartmouth College  
 N. Y. Medical College  
 Marquette University  
 University of Pittsburgh  
 University of Pennsylvania  
 Case-Western Reserve  
 Brown University  
 N. Y. Medical College  
 University of Florida  
 University of Pittsburgh  
 University of Munich

Peter Weller  
Robert Welliver  
Charles E. Wilde, Jr.  
Robert Woodworth

Harvard Medical School  
University of Florida  
University of Pennsylvania  
Bar Harbor

## Research Programs - 1969

Adamson, Richard H.

Effect of Foreign Compounds on Marine Animals and Effect of Marine Animals on Foreign Compounds

Boylan, John W.; Thureau, Klaus

Kidney Micropuncture Studies in the Spiny Dogfish

Burg, Maurice B.

Electrical Properties of Flounder Renal Tubule Cells

Crawford, Richard B.

Regulation of Protein Synthesis During Embryogenesis of Fundulus heteroclitus

Cserr, Helen F.

1. The Function of Cerebrospinal Fluid
2. The Ontogeny of the Blood-Brain Barrier in Squalus acanthias

Doyle, William L.

1. Morphological Aspects of Salt and Water Transport in the Intestine of Squalus acanthias
2. Relation of ATP-ase Level to Fine Structure of the Gill in Anguilla

Epstein, Franklin H.

Sodium-Potassium-Activated Adenosine Triphosphatase and Osmoregulation in Fish

Fenstermacher, Joseph D.

1. Ventricular Perfusion Studies of Cerebrospinal Fluid-Blood-Brain Transport in Squalus
2. Transport of Various Organic Molecules by the Dogfish Choroid Plexus

Forster, Roy P.

1. Cellular and Comparative Aspects of Renal Involvement in Osmoregulation
2. Mechanism of Urine Formation in the Absence of Glomerular Filtration

Goldstein, Leon

Urea Metabolism in Elasmobranchs

Grant, William C., Jr.

1. Immunologic Determination of Prolactin-like Principles in Elasmobranchs
2. Tissue Respiration in Elasmobranchs as Affected by Catecholamines

Hogben, C. Adrian M.

1. Studies on Epithelial Transport
  - a. Permeability of Dogfish Intestine
  - b. Acidification by Gas Gland Epithelium of the Pollack
  - c. Electrophysiology of the Dogfish Cornea (in collaboration with Dr. J. Goldman of George Washington University)
2. Survey of Available Nudibranchs for a Possible Acid Source

Huang, K. C.

1. Effect of Hexose on Ion Transport in Flounder Intestine
2. Intestinal Secretion of P-aminohippuric Acid

Janicki, Ralph

1. Mitochondrial Respiration in Teleosts and Elasmobranchs
2. Amino Acid Metabolism in Vertebrates and Invertebrates

Kinter, William B.

Renal Tubular Transport of  $^3\text{H}$ -Chlorphenol Red and  $^3\text{H}$ -PAH in Winter Flounder (Pseudopleuronectes americanus): Clearance Studies in vivo and Autoradiographic Studies in vivo and in vitro

Kleinzeller, Arnost

Sugar Transport in Flounder Kidney

Maren, Thomas H.; Welliver, Robert; Woodworth, Robert

1. Transfer Rates of Chloride and Bicarbonate from Plasma to Cerebrospinal Fluid in Squalus acanthias: Effect of Carbonic Anhydrase Inhibition
2. Pharmacology and Anesthetic Properties of Isobutyl m-Aminobenzoate in Squalus acanthias

Murdaugh, H. Victor, Jr.; Robin, Eugene D.

1. Cation Transport in Dogfish Red Cells
2. Energetics of Muscle Metabolism in the Seal During Diving
3. Trace Metal Excretion in the Dogfish
4. Oxygen Debt During Diving in the Seal
5. Cation Transport in the Seal Red Cell

Opdyke, David P.

1. Mechanism of Sequestration of Normal Erythrocytes in Vertebrates
2. Time Relations of Transmission of Pressure Pulse from Ventral Aorta to Dorsal Aorta in Squalus acanthias

Peirce, E. Converse II

Effects of  $\text{CO}_2$  Administration on Cardiovascular Reflexes and Gill  $\text{H}^+$  Excretion in Squalus acanthias

Rall, David P.

1. Toxicity of Anti-Cancer Drugs in Elasmobranchs
2. Kinetics of Blood to Brain Transport in Elasmobranchs

Rappaport, Raymond

Factors Affecting Aster-Equatorial Surface Relation in Cleaving Sand Dollar Eggs.

Rhodin, Johannes A. G.

Structure and Ultrastructure of Fish Microvasculature

Rieck, Alvin F.

Photobiological Studies on Early Development in E. parma

Schmidt-Nielsen, Bodil

1. Micropuncture Study of the Function of Nephridia in the Leech. The Primary Secretion, the Dilution Mechanism, and the Nitrogen Excretion
2. Salt and Water Transport by Isolated Eel Intestine. The Effect of Transfer from Fresh Water to Sea Water, and the Effect of Steroid Hormones
3. Osmotic and Diffusional Water Permeability in Metamorphosing Tadpoles and Young Frogs

Settles, Harry E.

Light and Electron Microscopy of Regenerating Tubularia

Smith, Richard T.

- The Origin and Differentiation of the "Spindle Cell" of the Peripheral Blood of the Hagfish  
- Myxine glutinosa

Wilde, Charles E., Jr.

An Analysis of the Genomic Control of Axial and Bilateral Symmetry in Fundulus heteroclitus

## EVENING SEMINARS 1969

Tuesday, 8:00 P.M., Dahlgren Hall

- |           |   |
|-----------|---|
| July 8    | Introduction to the Laboratory<br>Dr. Charles E. Wilde, Jr., University of Pennsylvania                 |
| July 15   | The Mechanism of Division in Animal Cells<br>Dr. Raymond Rappaport, Union College                       |
| July 22   | Salt Handling in the Kidney<br>Dr. Klaus Thurnau, University of Munich                                  |
| July 29   | The Pleural-Pressure Controversy<br>Dr. Jere Mead, Harvard School of Public Health                      |
| August 12 | What the Mammalian Kidney Does with Sugars<br>Dr. Arnost Kleinzeller, University of Pennsylvania        |
| August 19 | Mechanism of Salt and Water Transport by Renal Tubules<br>Dr. Maurice B. Burg, National Heart Institute |
| August 26 | The Lingering Lungfish<br>Dr. Alfred P. Fishman, University of Pennsylvania                             |

## LUNCHEON SEMINARS

- |           |   |
|-----------|---|
| July 3    | Introductory talks<br>Investigators A - M   |
| July 10   | Introductory talks<br>Investigators N - W   |
| July 17   | Adaptation of Elasmobranchs to Dilute Environment<br>Dr. Leon Goldstein, Brown University               |
| July 24   | Na-K-ATPase and Osmoregulation<br>Dr. Franklin H. Epstein, Yale University School of Medicine           |
| July 31   | Histamine and Gastric Secretion<br>Dr. C. Adrian M. Hogben, University of Iowa                          |
| August 7  | Development of a New Sulfone for the Treatment of Malaria<br>Dr. Thomas H. Maren, University of Florida |
| August 21 | The Splenic Microcirculation - Open or Closed?<br>Dr. Johannes A. G. Rhodin, New York Medical College   |