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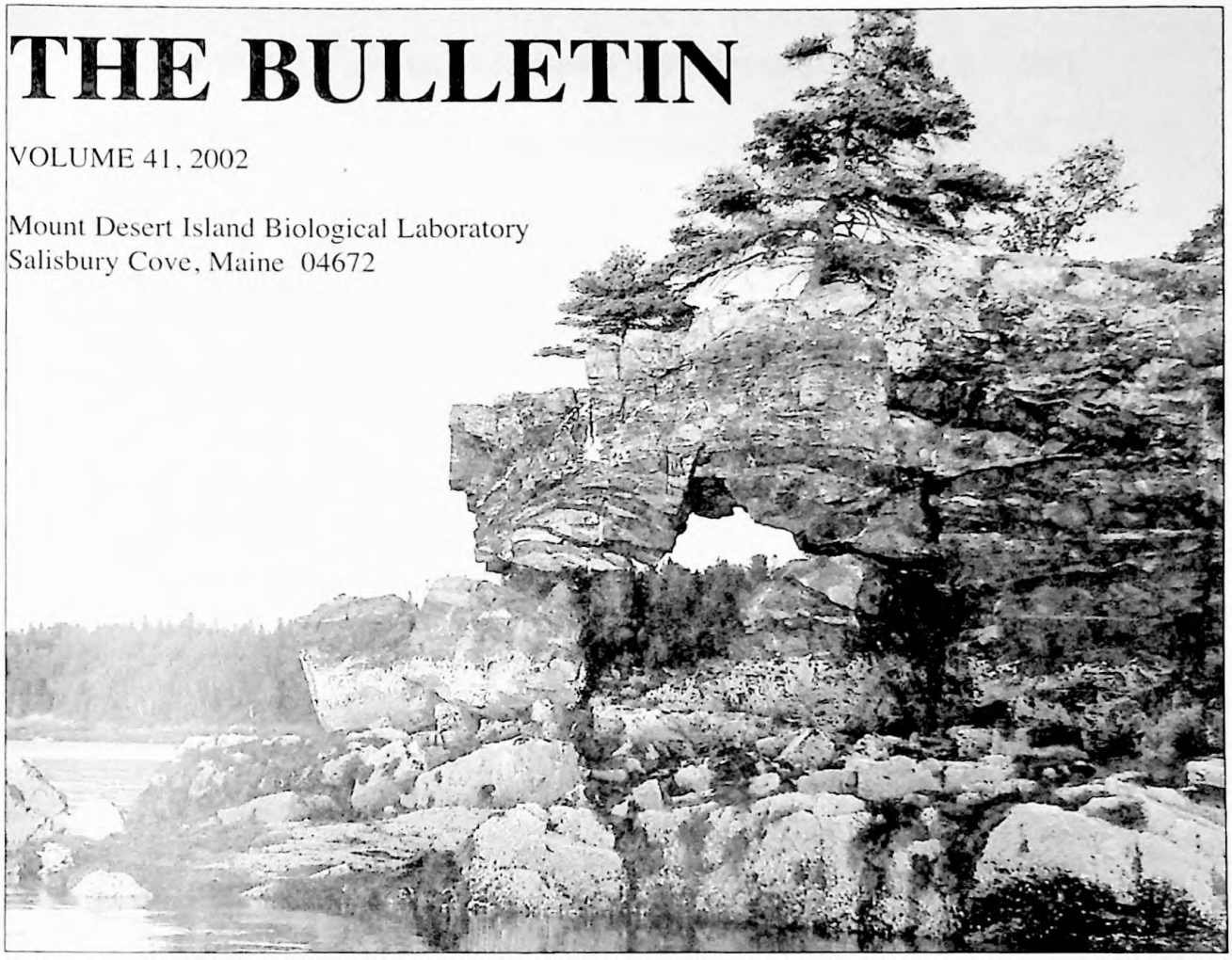
Mount Desert Island Biological Laboratory
Salisbury Cove, Maine 04672



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THE MOUNT DESERT ISLAND BIOLOGICAL LABORATORY

RESEARCH AND EDUCATION IN THE BIOLOGY OF MARINE ANIMALS

INTRODUCTION

The Mount Desert Island Biological Laboratory (MDIBL) is an independent non-profit biological station located on the north shore of Mount Desert Island, overlooking the gulf of Maine about 120 miles northeast of the Portland near the mouth of the Bay of Fundy. The island, well known for Acadia National Park, provides a variety of habitats including shallow and deep saltwater, a broad intertidal zone, saltwater and freshwater marshes, freshwater lakes and streams, forests and meadows.

The Laboratory is the largest cold water research facility in the Eastern United States, and its unique site provides an outstanding environment for studying the physiology of marine and freshwater flora and fauna. During 2001, the scientific personnel included 55 principal investigators and 95 associates, representing 68 institutions in 23 states and four European countries.

HISTORY AND ORGANIZATION

MDIBL was founded in 1898 at South Harpswell, Maine by J.S. Kingsley of Tufts University. Its present site at Salisbury Cove was donated by the Wild Gardens of Acadia, and relocation was completed in 1921. The Wild Gardens of Acadia, a land-holding group headed by George B. Dorr and John D. Rockefeller, Jr., who was instrumental in the founding of Acadia National Park.

In 1914, the Laboratory was incorporated under the laws of the State of Maine as a non-profit scientific and educational institution. Founded as a teaching laboratory, MDIBL is now a center for marine research and education that attracts investigators and students from across the U.S. and around the world. Since the pioneering work of H.W. Smith, E.K. Marshall and Roy P. Forster on various aspects of renal and osmoregulatory physiology of local fauna, the Laboratory has become known worldwide as a center for investigations in electrolyte and transport physiology, developmental biology, electrophysiology and marine molecular biology.

The Mount Desert Island Biological Laboratory is owned and operated by the Board of Trustees and Members of the Corporation; at present, there are 430 members. Officers of the Corporation - Chair, Vice-Chair, Director, Secretary, Treasurer, Clerk - and an Executive Committee are elected from among the Trustees. The Chair and Executive Committee oversee and promote long range goals of the Laboratory. The Director, with the aid of a full-time Administrative Director, staff and a Scientific Advisory Committee is responsible for implementing the scientific, educational and public service activities of the Laboratory.

NIEHS TOXICOLOGY CENTER

Introduction: The Center for Membrane Toxicity Studies (CMTS), an NIEHS Marine and Freshwater Biomedical Sciences Center was established at the Mount Desert Island Biological Laboratory (MDIBL) in 1985. The purpose of this Center has been to involve a group of internationally recognized investigators, who are primarily experts in mechanisms of epithelial transport, to study the biological effects of environmental pollutants on cell and membrane transport functions. The primary emphasis of this research effort has been to elucidate the mechanisms of toxicity of environmental pollutants at the cellular and molecular level, using novel aquatic models developed at this laboratory.

The focus of the research programs of the Center has broadened in the last several years from the more narrow objective of identifying the molecular targets for the effects of heavy metals (or metal compounds) on cell functions, to include the effects of a broader range of environmental toxicants (including marine toxins) and the mechanisms by which the organism takes up and eliminates a wide range of xenobiotics and environmental pollutants. However, the concept that a "membrane lesion" accounts for the cellular toxicity of many environmental toxins still remains as a paradigm.

Research Cores: The Center consists of 3 highly integrated research cores or themes consisting of: 1) Signal Transduction, 2) Ion and Cell Volume Regulation, and 3) Xenobiotic Transport and Excretion. Investigators in the Signal Transduction Core are examining the basic mechanisms concerning the cell's signaling response to changes in its external environment, particularly as related to environmental stress, heavy metal exposure, marine toxins and environmental estrogens. Investigators in the Ion and Cell Volume Regulation Core are interested in determining the fundamental mechanisms by which cells regulate their cell volume, internal pH and secretory functions and how these processes are disturbed by environmental influences. Work in this Core has considerable overlap with the Signal Transduction Core. Investigators in the Xenobiotic Transport and Excretion Core are examining the processes that are used by various epithelial tissues such as the liver and kidney to take up and excrete drugs and xenobiotics and other toxic compounds that enter from the environment and to study the effects of toxicants on this process. Investigators in this Core also interact with investigators working in the other two Cores.

Facilities Cores: The Center provides for 5 facility cores for Center investigators. These include: 1) an Animal Core that is responsible for the acquisition, and maintenance of the many marine species available to investigators at this Center; 2) an Instrumentation Core that maintains the basic laboratory equipment that investigators would not otherwise be able to easily bring to the laboratory (a fully equipped cell culture and molecular biology facility is also part of this core); 3) a Cell Isolation, Culture and Organ Perfusion Core that provides isolated cells and tissues from marine species to Center investigators; 4) an Electrophysiology Core that maintains equipment for basic electrophysiologic measurements as well as an oocyte injection facility; and 5) an Imaging Core that maintains and operates a confocal fluorescent microscope as well as providing other imaging technology including epifluorescence and video-enhanced microscopy.

Community Outreach and Education Program: The Center's outreach program involves community education on water monitoring programs. This is directed primarily at high school and college students in the immediate area of the laboratory. However, an extensive summer research educational program includes high school students from both regional and national sites, the latter emphasizing minority student education as well as college and postdoctoral fellowship training.

Pilot Projects: The Pilot project program provides support for investigators who are interested in pursuing a new projected related to environmental toxicology in one or more of the Center's Research Cores. The purpose of these Pilot grants is to obtain preliminary data to facilitate new grant submissions. Grants are awarded competitively and successful applicants receive up to $10,000/season.

APPLICATIONS AND FELLOWSHIPS

Research space is available for the entire summer season (June 1 - September 30) or a half-season (June 1 - July 31 or August 1 - September 30). Applications for the coming summer must be submitted by February 1st each year. Investigators are invited to use the year-round facilities at other times of the year, but such plans should include prior consultation with the *MDIBL* office concerning available facilities and specimen supply.

A number of fellowships and scholarships are available to research scientists, undergraduate faculty and students, and high school students. These funds may be used to cover the cost of laboratory rent, housing and supplies. Stipends are granted with many of the student awards. Applicants for fellowships for the coming summer research period are generally due in January.

For further information on research fellowships, please contact:

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Students should contact:

Michael McKernan
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Adrian Hogben (1921 - 2001)

Adrian Hogben was a highly valued colleague, mentor and friend to many at MDIBL. Born on Nov. 12, 1921 in Buckinghamshire, England; he received the majority of his education and scientific training in the U.S. Adrian earned a BS from the University of Wisconsin in 1941 and the MD from the same institution in 1943. In 1950 he completed the Ph.D. at the University of Minnesota. After an internship at Philadelphia General Hospital in 1944 he served for two years in the U.S. Army medical Corps and then as a fellow in medicine at the Mayo Clinic.

Adrian's scientific career, that established him as an international leader in the field of membrane transport, was launched during a two-year stay in the lab of Professor Hans Ussing in Copenhagen. There he made the pivotal discovery that the gastric mucosa of the frog actively secreted chloride, perhaps the first definitive demonstration of active chloride transport by any cell membrane (PNAS 37:393-395, 1951). The behavior of the gastric mucosa and the relation of chloride movement to acid secretion was to occupy him for the remainder of his scientific career.

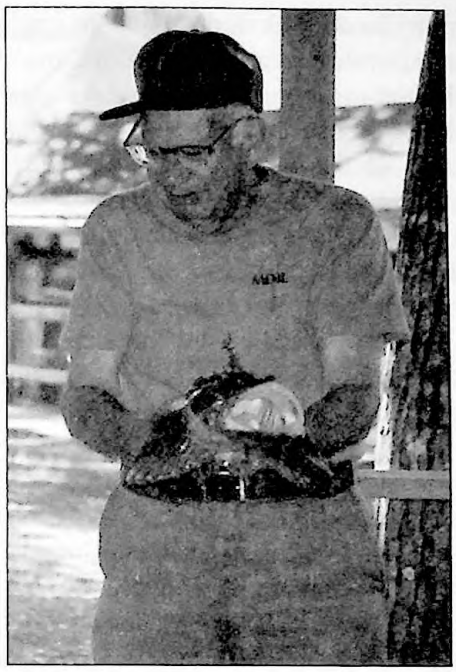
When Adrian first became an investigator at MDIBL in 1957 he had already served on the NIH staff in the Section on Kidney and Electrolyte Metabolism (1951 - 57) and had been selected as Chair of the Department of Physiology at the George Washington University Medical School (1957 -- 61). Adrian's work at MDIBL followed in the great tradition of Smith and Marshall as he searched for marine models to use in the solution of problems in medical physiology. Within a few years he had published in both Nature and Science describing unique properties of the teleost swim badder and the elasmobranch stomach.

During his 44 years of association with MDIBL Adrian worked to recruit scientists and to contribute to the scientific development of junior investigators. During a major portion of this time he also served as Professor and Chair of the Department of Physiology and Biophysics at University of Iowa College of Medicine.

Throughout his career Adrian was engaged in Science, both as an individual activity and a collective enterprise. He served on major peer review panels for NIH and NSF as well as numerous editorial boards. He served MDIBL as a member of the Executive Committee and the Scientific Advisory Committee. While at George Washington he even taught a course in physiology on television (WTOP-TV)!

Adrian's wry sense of humor was always at the ready during casual conversation or vigorous is scientific exchange. The MDIBL community will miss him and always remember his unflagging support and love for the lab; the sort that has sustained this island institution for over 100 years.

David C. Dawson, Ph.D.
Oregon Health Sciences University



David F. Opdyke (1915 - 2001)

David Opdyke, a long time research scientist at the Mount Desert Island Biological Laboratory(MDIBL) and friend of the laboratory in many capacities, died April 2, 2001 at the age of 85. Born in 1915 in Montpelier, Ohio, Dave graduated from Heidelberg College and received his Ph.D. from Indiana University where he held faculty appointments there and at Case Western Reserve School of Medicine where he worked with the famous Carl Wiggers pursuing his life long interest in cardiovascular physiology. Dr. Opdyke left academia for a five year period beginning in 1951 to work for the Merck Institute for Therapeutic Research. He enjoyed the science and international travelling involved, but missed the contact with students which he so enjoyed.

This vacuum in his life was soon filled when he became the first faculty member hired by the Seton Hall Medical School in New Jersey. Dave was instrumental in the formation and success of this school which evolved into the University of Medicine and Dentistry of New Jersey (UMDNJ). As the first Department Chair of Physiology at UMDNJ, Dave formed a cohesive group of leading cardiovascular researchers who in turn graduated many fine scientists and physicians. During his years at UMDNJ Dave personally mentored scores of graduate students and over his lifetime authored over 100 scientific publications. After retiring from his New Jersey post, Dr. Opdyke continued part time teaching at East Carolina State University Medical School in North Carolina until he was 77 years old.

The happiest times in Dave Opdyke's life were spent at MDIBL where he arrived every spring with his wife Betty, children David and Nancy and always a graduate or

undergraduate student to study endocrine controls of the cardiovascular system in dogfish shark. His first year at the laboratory was1969. In his introductory seminar in Dahlgren Hall, Dave paced across the then trampoline floor and in his characteristic gravely voice humbly told a room full of nephrologists and renal experts that he was "just a cardiovascular physiologist". In the same unassuming way in the '80's and early '90's Dave managed the Laboratory endowment fund and with wise investing, single-handedly helped it grow almost forty-fold. Dave served as Trustee of the Laboratory and Chair of the Finance Committee during his working years, but perhaps his most famous role, which he assumed after retirement, was that of "Dr. Shark". Every Wednesday afternoon, dressed in his Mount Desert Island "map" short sleeved shirt, Dave would enthrall and enchant the many children and adults who came on tour to see the marine animals at the MDIBL touch tank. He loved to pick up the sharks and other specimens and tell about their unique features and how they were useful to science.

Frenchman Bay itself held a fascination for Dave Opdyke. Many a sunny summer afternoon would find him standing straight up through the mid hatch in his motor boat, "Summer Thing", speeding across miles of splashing waves to explore all the hidden nooks and crannies in the Bay. In later years he had a small Cape Islander made which was large enough to accommodate an overnight for himself and Betty on their more elaborate exploration adventures.

Dave represented the true essence of the Laboratory – rigorous research and teaching, dedicated service, and an unfaltering love for the surrounding beauty of the place. His Laboratory family misses him.

Barbara Kent, Ph.D.
Mount Desert Island Biological Laboratory

David B. Peakall (1931 - 2001)

David B. Peakall died suddenly and unexpectedly following surgery on August 18, 2001. David was trained as a chemist obtaining a Ph.D. in Physical Chemistry in 1956 from the University of London and a D.Sc. from the same institution in 1979 for his thesis on The Ecological Effects of Pollutants.. His long and distinguished research career demonstrates the successful melding of his interest and training in chemistry with a life-long interest in ornithology. His work was conducted at Department of Anatomy of the Upstate Medical Center in Syracuse, NY, Laboratory of Ornithology and the Section of Ecology and Systematics, Division of Biological Sciences at Cornell University, the Canadian Wildlife Service, where he was Chief of Wildlife Toxicology and at MDIBL from 1972-1985.

David's work focused specifically on understanding how environmental pollutants affect bird populations and more generally on identifying ways to use wildlife species to monitor the health of the environment (biomarkers) and environmental health. David's team worked collaboratively with Canadian Wildlife Service biologists across Canada on such issues as reproductive declines in falcons, effects of mercury on common loon reproduction, impacts of forest spraying on songbird populations, effects of acid precipitation, impacts of dioxin in pulp mill effluent on great blue heron reproduction, and the effects of contaminants on fish eating birds particularly in the Great Lakes. David conceived the idea of swapping eggs between "clean" and "dirty" colonies to isolate the impact on parental behavior from that of embryo toxicity. In the late 1960s and 1970s, David's work was instrumental in determining how persistent DDT pollution caused egg shell thinning that decimated populations of some species of birds. A good portion of this work was done at MDIBL in collaboration with Bill Kinter and David Miller, the result being several publications in Science and Nature. This highly successful collaborative effort was one of the first substantial programs in environmental toxicology at the lab. David and MDIBL collaborators then turned their attention to the sub-lethal effects of ingested crude oil on sea birds. In combined field and laboratory studies, they found small oral doses caused disruption of osmoregulation, nutrient utilization, growth and nesting behavior. They also identified the components of the oil that were most toxic, these being ones that were concentrated as spilled oil weathered.

David authored over 140 scientific papers and book chapters as well as four books. However, he will be remembered best by those who knew him for his hospitality, his love of a good cup of tea, fine wines and good food. He cared passionately about our world and its inhabitants. He was a fine scientist, a loving and devoted husband and father, and a great friend.

David M. Miller, Ph.D.
National Institute of Environmental Health Sciences

REPORT TITLES

Reports preceded by an asterisk were prepared by investigators funded by the NIEHS Center for Membrane Toxicity Studies at the Mount Desert Island Biological Laboratory

COMPARATIVE PHYSIOLOGY