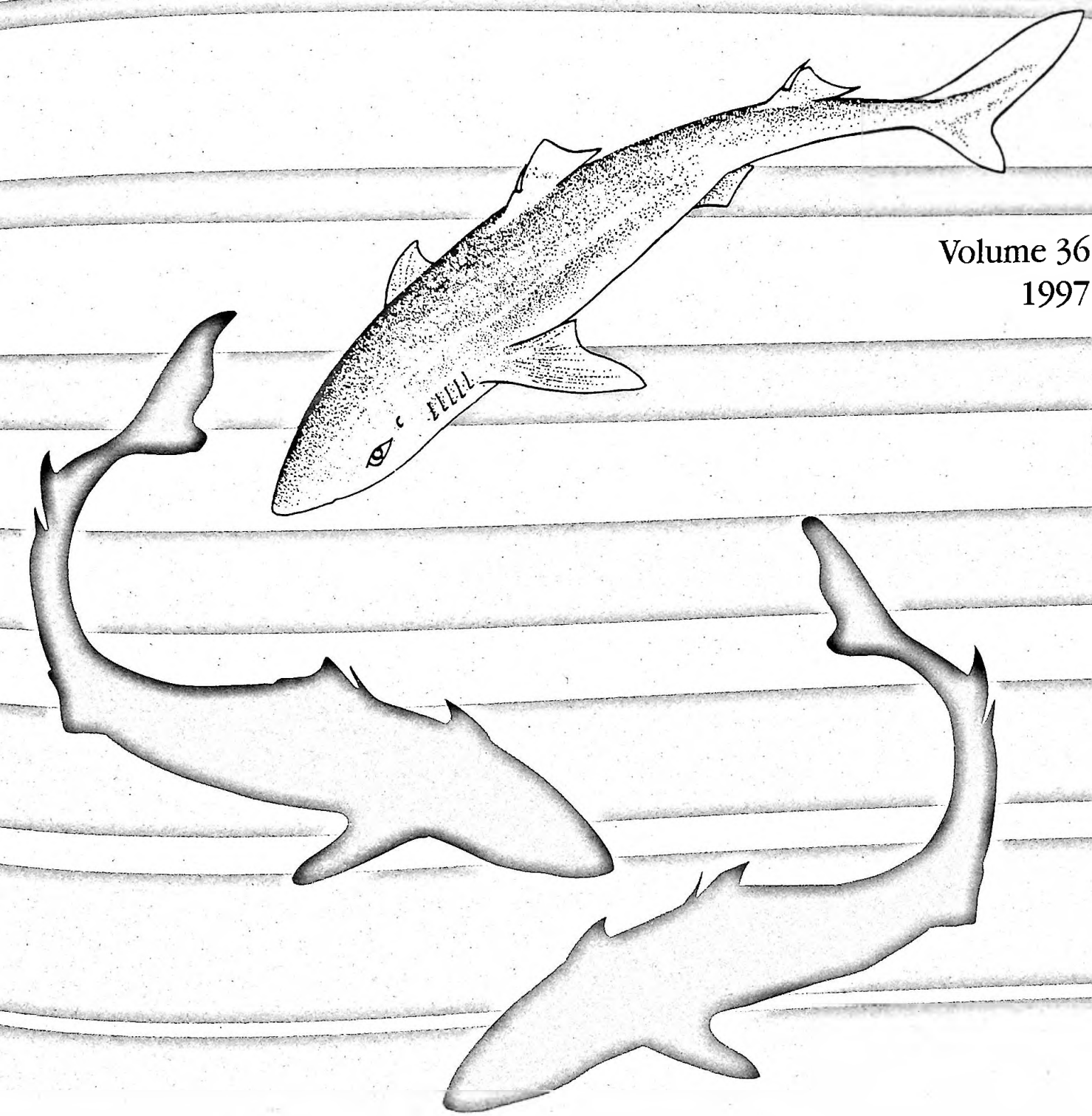
THE BULLETIN

Mount Desert Island Biological Laboratory



Volume 36
1997

Printed on Recycled Paper

Published by the MDI Biological Laboratory
May 1997
$10.00

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VOLUME 36 1997

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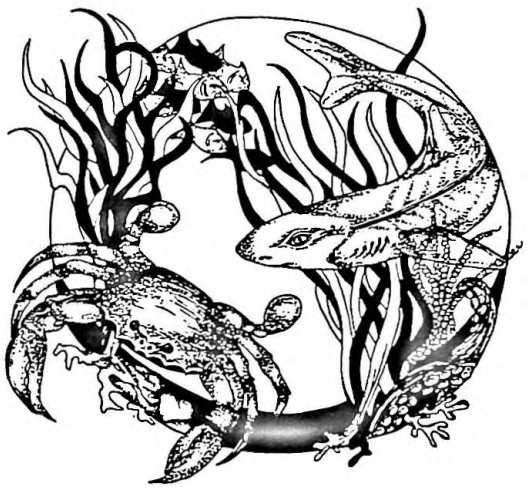
Biological Laboratory
Salsbury Cove, Maine 04672



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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 1996, the scientific personnel included 54 principal investigators and 93 associates, representing 48 institutions in 23 states and 5 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 Salsbury 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.

The Laboratory was incorporated in 1914 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 and electrophysiology.

The Mount Desert Island Biological Laboratory is owned and operated by the Board of Trustees and Members of the Corporation; at present, there are 429 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

In 1985, with the support of the National Institute of Environmental Health Sciences (NIEHS), MDIBL established a center dedicated to the study of the toxic effects of heavy metals and other environmental pollutants that pose an increasing health risk to humans and a threat to the marine environment. The focus of The Center for Membrane Toxicity Studies (CMTS), it is the use of the marine animals like the shark, the founder and the skate to define sites of action for metals such as mercury and cadmium that enter the environment due to improper disposal of industrial waste and as a component of some pesticides. The effects of these pollutants are wide-spread in the human body, with affected organs including the brain, the kidney, the liver, the gastrointestinal tract and the reproductive system. The goal of the CMTS is to identify the molecular targets for toxic substances and to provide the scientific basis for the development of treatments for heavy-metal intoxication. Inquiries concerning the center are welcome.

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 applications and fellowships/scholarships, please contact:

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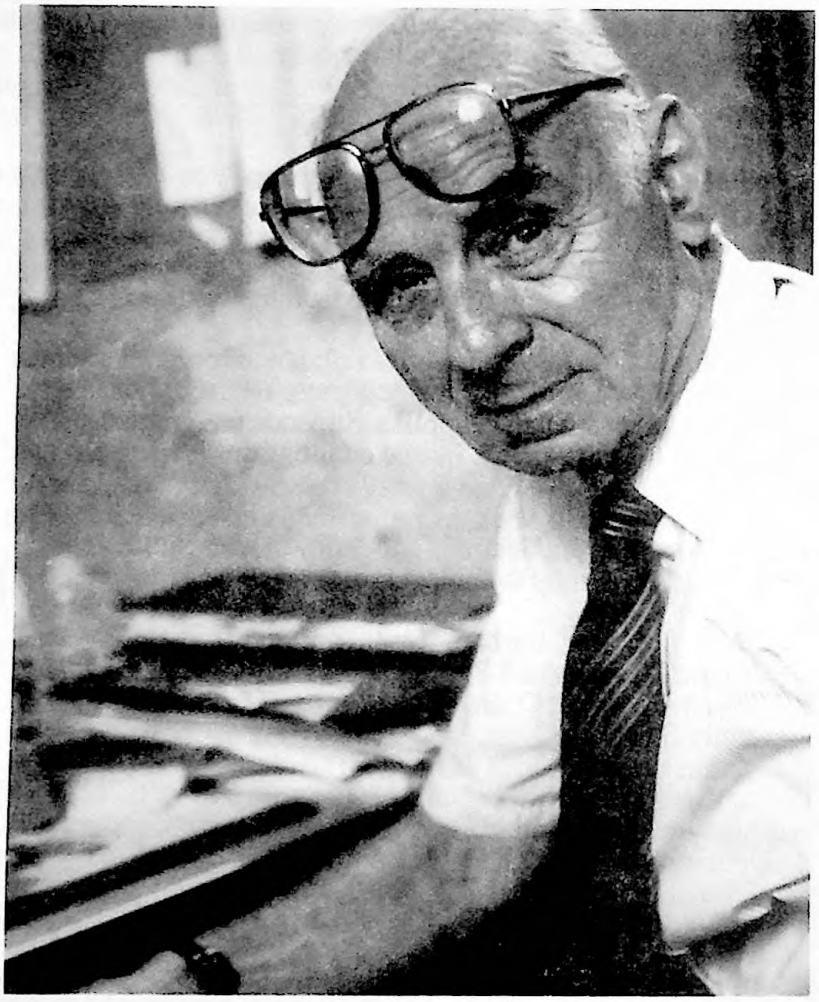
ACKNOWLEDGEMENTS

The Mount Desert Island Biological Laboratory is indebted to the National Science Foundation and National Institutes of Health for substantial support. Funds for building renovations and new construction continue to permit the Laboratory to expand and upgrade its research and teaching facilities. Individual research projects served by the Laboratory are funded by private and government agencies, and all of these projects have benefited from the NSF and NIH grants to the Laboratory. For supporting our educational initiative, MDIBL acknowledges the Cserr/Grass Foundation, Milbury Fellowship Fund, American Heart Association - Maine Affiliate, Mr. Robert E. Blum, Bodil Schmidt-Nielsen Fellowship Fund, Maine Community Foundation, NSF - Research Experience for Undergraduates and NSF Young Scholar Program for High School students and many local businesses and individuals.



ARNOST KLEINZELLER - 1914-1997

Arnost Kleinzeller passed away on Saturday, February 1, 1997 in his home in Philadelphia. He was 83 years old and died of cancer. A long-time Principal Investigator at the Mount Desert Island Biological Laboratory, he was also Editor of this bulletin for many years. His home institution was the University of Pennsylvania in the Department of Physiology at the Medical School where he was a full Professor. He will be remembered at MDIBL as one of the most distinguished scientists in the field of kidney function and epithelial physiology, and one who was so friendly to newcomers to the laboratory. Arnost was a champion in the defense of the rights of investigators everywhere.

Arnost was born in 1914 in the city of Ostrava, then part of Austria, into a middle class family with high interest in learning and the sciences. His father was an engineer who introduced him to his technical library and his mother, a school teacher who oriented him in his education. At 15 he started some experimentation on the role of cations on the viscosity of soap solutions, under supervision. After secondary education, he traveled through European countries. He was fluent in several languages and on entering medical school, became a cell physiologist and learned the then new technique of tissue culture. He was graduated from Masaryk University Medical School in 1938, first in his class. In that time of turmoil with World War II declared in the spring of 1939, the invasion of Austria, discrimination toward the Jews, and subsequent Holocaust, Arnost emigrated to Poland, crossing the frontier on foot together with his brother. His mother was supposed to follow them and reunite with his father, already in Belgium, but she was caught by a patrol, and held in concentration camps until the end of the war. His father along with many other relatives perished in the Holocaust. In Poland, the British committee helping refugees selected Arnost and his brother to go to Great Britain. In spite of losing country and family, the good luck of Arnost in London and later in many other places was of great help. He met J.B. Haldane, the most influential of British scientists and discussed the work of Hans Krebs. He was offered a fellowship to study with Krebs, who was working on the urea cycle and later on the oxidative pathway that we now call the Krebs cycle. After two years and with a Ph.D. from the University of Sheffield, he proceeded to Cambridge and found there an excellent place in the Biochemistry Department. He shared in the life of war-time England and helped refugees. Near the end of the war he was in charge of efforts to help Czechoslovakia. At that time he met Lotte Reuter, a sweet and determined lady whom he married and with whom he shared a life until his recent death. At the end of World War II they decided to return to the continent, to Prague to join the reconstruction effort and contribute knowledge obtained during the war years to the reorganization of science, teaching and research. After some years it was clear that the Communist regime and its mistrust of western ideas -of which Arnost was full of- did not permit his development. After some time he organized a productive laboratory where he published some of his best research on kidney slices, tissue cultures and yeast and trained his best collaborators and friends, A. Kotyk and R. Rybova. In 1960, he organized in Prague the first meeting on cellular transport and edited a book that is still used today. The who's who - or who was who- of membrane biology was there, attracted by the novelty of the subject and by a visit to a country behind the iron curtain. Arnost and Lotte could not tolerate the regime as it was and through contacts in the west, particularly Aser Rothstein, they defected to the USA via the Congress of Biophysics of 1966 in Vienna. With small suitcases, taking one child and leaving

another in Prague, Arnost at 50 again left friends and country to emigrate to a democracy. There is something sad in the fact that he had to escape both the Nazis and the Communists. But there is a lesson in survival and timing, because in the last emigration, two years later, the Soviets invaded Czechoslovakia and imposed strict tyrannic measures on the Czech population. After a year in Rochester, Kleinzeller was appointed Professor of Physiology at the University of Pennsylvania, in the area of cell physiology. He became a popular, respected and loved figure until his death. At MDIBL he will be remembered not only for his contribution to science, but also for his helpful attitude toward newcomers, his willingness to discuss data with colleagues and students, and for an excellent job editing the bulletin of the laboratory. He will also be remembered for his and Lotte's old world style in the social interactions during the "season", the summers of work and discussions near Bar Harbor that he loved so much. Lotte Kleinzeller, a pillar of the MDIBL community, accompanied him in his fight for survival and his endurance including years of battle against cancer, the disease that finally took him away. During the summer of 1996 a symposium in his honor was organized, celebrating his emeritus status, and his reaching the third age with grace. The scientific level of the contributions was excellent and the speakers acknowledged the contributions of Arnost Kleinzeller in their presentations. The social program was a success as well, with a reception at the Ferns, in Bayview Drive, a banquet at the Blue Nose Hotel and the Open House gathering offered by Arnost and Lotte Kleinzeller at their cottage on Route 3. It was a celebration that he enjoyed very much. He will be missed.

Jose A. Zadunaisky M.D.

Cellular and Molecular Membrane Transport:
A Symposium in Honor of Arnost Kleinzeller

On August 1-3, 1996 the Mount Desert Island Biological Laboratory and the Rosenstiel School of Marine and Atmospheric Sciences of the University of Miami sponsored a symposium at MDIBL to celebrate the life and work of Dr. Arnost Kleinzeller. The symposium was organized by Dr. Jose A. Zadunaisky, and was attended by numerous experts, colleagues and friends of Arnost, in the fields of membrane physiology, transport and cell biology. Presentations from the conference will be published in a forthcoming symposium volume by *Journal of Experimental Zoology*. Conference presentations are listed below.

Welcome by the Director of MDIBL. David Dawson, Univ. of Michigan, Ann Arbor.

Arnost Kleinzeller: A man for all seasons. Jose Zadunaisky, RSMAS, Univ. of Miami.

Molecular Biology of Ion Transport and Osmolytes

CFTR exocytosis. Raymond Frizzell, Univ. of Pittsburg.

CFTR: Searching for the pore. David Dawson, Univ. of Michigan.

The cation-chloride cotransporter family. Biff Forbush, Yale Univ.

Cloning and expression of transmembrane protein regulating chloride secretion in the shark rectal gland. John Forrest, Jr., Yale Univ.

Osmotic regulation of gene expression: the aldose reductase gene under hyperosmotic stress. Arlyn Garcia Perez, J.D. Ferraris, C.K. Williams and M. Burg. National Institutes of Health.

Molecular biology of crustacean Na^+/H^+ transporters. David Towle, Lake Forest College.

Cellular Mechanisms of Osmoregulation

On the volume sensor and the swelling-initiated signal transduction pathway in the mammalian cell. Else K. Hoffman, Univ. of Copenhagen.

Cytoskeletal reorganizations following hypotonic and high K treatment of cultured shark rectal gland cells. John H. Henson and Arnost Kleinzeller, Dickinson College and Univ. of Pennsylvania.

Cytoskeletal dynamics in cell volume and ion channel regulation. Horacio Cantiello, Harvard Univ.

Regulation of tight junction permeability in MDCK cells. Kenneth R. Spring, National Institutes of Health.

Patch clamping ion channels in native endoplasmic reticulum. J. Kevin Foskett, Univ. of Pennsylvania.

Regulation of volume activated taurine channels and mercury inhibition in skate hepatocytes. James L. Boyer, Yale Univ.

Transport of Osmolytes

Role of urea in osmotic control in vertebrates. Bodil Schmidt-Nielson, Univ. of Florida.

Sugar, the magic potion of the collucting ducts. Eva M. Kinne and Rolf Kinne, Max Planck Institute, Dortmund.

Functional characterization of H-K ATPase in cortical collecting duct. Randi Silver, Cornell Univ.

Taurine and chloride efflux occur via different pathways in fish erythrocytes. Leon Goldstein, Brown Univ.

The Mechanisms of mercury inhibition of taurine transport by polychaete red cells. Robert Preston, Illinois State Univ.

Transport of Xenobiotics and Organic Anions

Transport of xenobiotics in the rat kidney. Karl Ullrich, Max Planck Institute, Frankfurt.

Transport of organic anions. David Miller, National Institutes of Health.

Transport of electrolytes in epithelia

The pump leak parallelism and ATP-regulated K channels in epithelia. Stanley G. Schultz, Univ. of Texas, Houston.

The role of protein kinase C in epithelial tight junction permeability and its implications for epithelial neoplasia. James M. Mullin, The Lankenau Medical Research Center.

Transport and pressure control in the eye

Topical carbonic anhydrase inhibitors for the treatment of glaucoma. Tom Maren, Univ. of Florida.

Patch clamping chloride channels in the ciliary epithelium. Mortimer Civan, Univ. of Pennsylvania.

Contraction of trabecular meshwork cells of human eyes in tissue culture. Jose A. Zadunaisky, RSMAS, Univ. of Miami.

Fish and gill osmoregulation

Regulation of chloride transport in the shark rectal gland. Patricio Silva, Richard Solomon and Frank Epstein, Harvard Univ.

Urea excretion by the toadfish gill. Patrick Walsh, RSMAS, Univ. of Miami.

Acid-base regulation in the gills of marine fish. J.B. Claiborne, Georgia Southern Univ.

Nitric oxide is not the EDRF in shark ventral aorta. David Evans, Univ. of Florida.

Gill Chloride secretion and osmolarity. Jose A. Zadunaisky, RSMAS, Univ. of Miami.

Closing remarks. Rolf Kinne, Max Planck Institute, Dortmund.

REPORT TITLES