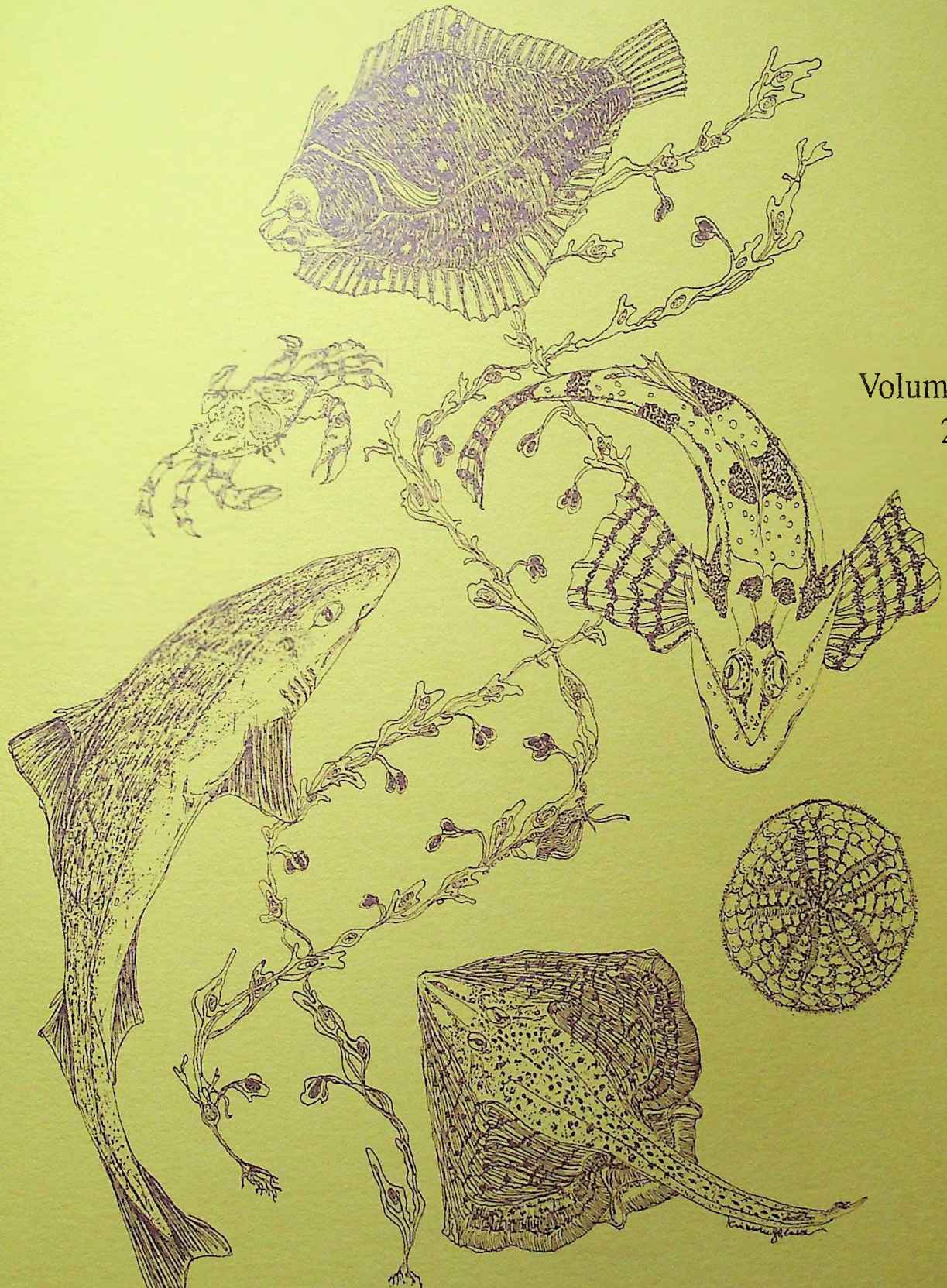
# THE BULLETIN

Mount Desert Island Biological Laboratory



Volume 42
2003

THE 2002 BULLETIN EDITORIAL COMMITTEE

| | |
|---|---|
| Editor | Dr. J.B. Claiborne |
| Co-Editor | Dr. John Mickle |
| Managing Editor | Michael P. McKernan |

*Dr. J.B. Claiborne, Chair*

*Dr. David Barnes*

*Dr. Raymond Frizzell*

*Dr. John Henson*

*Dr. Harmut Hentschel*

*Dr. Karl Karnaky*

*Dr. Eva Kinne-Saffran*

*Dr. David Miller*

*Dr. Robert L. Preston*

*Dr. Alice Villalobos*

Published by the Mount Desert Island Biological Laboratory
May 2003
$10.00

# THE BULLETIN

VOLUME 42, 2003

Mount Desert Island Biological Laboratory
Salisbury Cove, Maine 04672

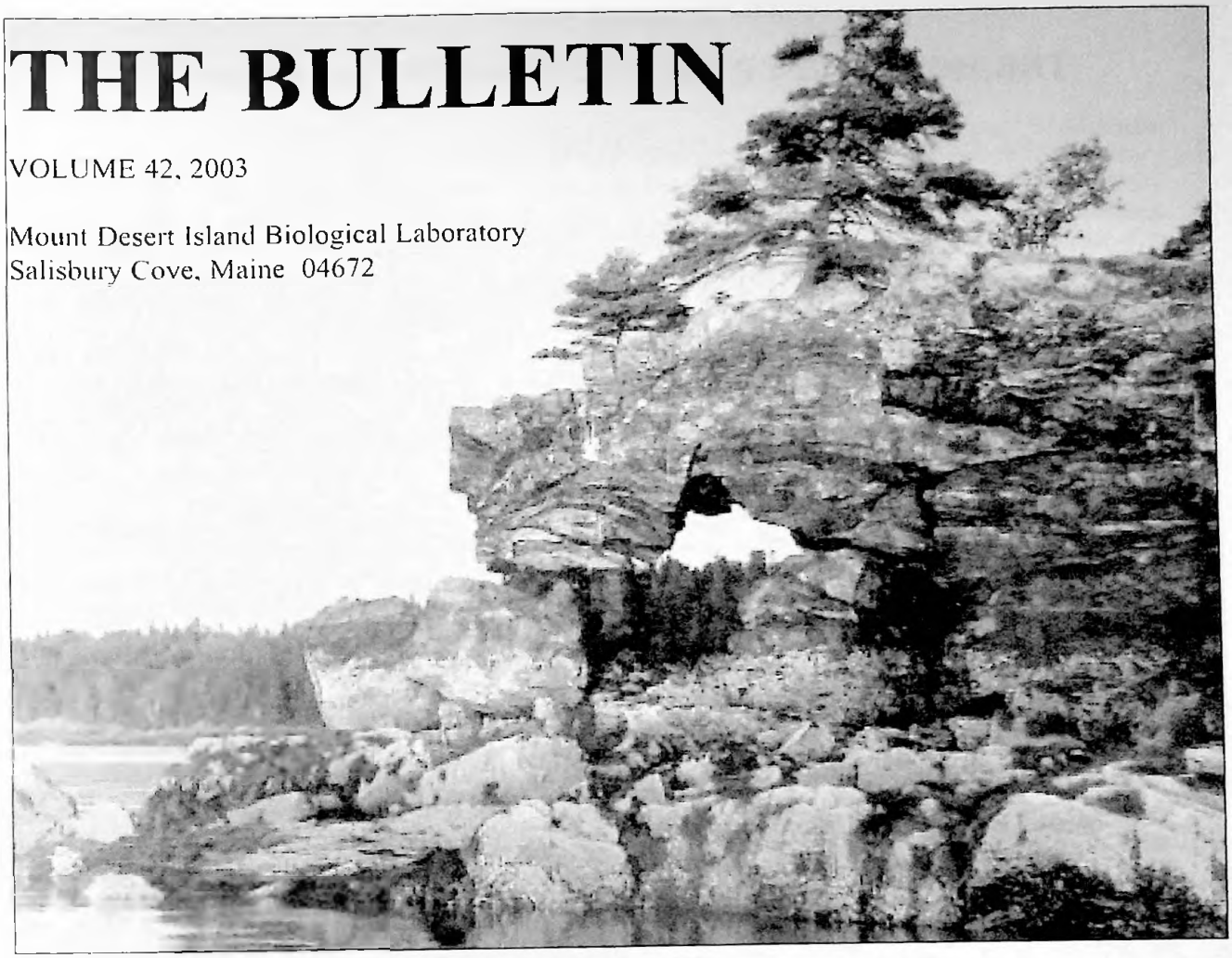


TABLE OF CONTENTS

# 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 marine and biomedical research facility and international center for comparative physiology, toxicology and marine functional genomic studies. The Laboratory is 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 among the oldest cold water research facilities 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 2002, the scientific personnel included 86 doctoral level scientists (including 59 Investigators), plus 101 students, and technical staff, representing 88 institutions in 25 states, Australia, Europe, and South America.

## 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 CENTER FOR MEMBRANE TOXICITY STUDIES

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 two highly integrated research cores or themes consisting of:

- Signal Transduction and Ion Transport
- Xenobiotic Transport and Excretion

Investigators in the Signal Transduction and Ion Transport 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. These signaling pathways often involve mechanisms of homeostasis of ion transport, pH and cell volume regulation. Investigators in the Core are interested in determining the fundamental mechanisms by which cells regulate their cell volume, maintain internal pH and secretory functions and how these processes are disturbed by environmental influences. 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 signal Transduction and Ion Transport Core.

**Facilities Cores:** The Center provides for five facility cores for Center investigators. These include:

- an Animal Core that is responsible for the acquisition, and maintenance of the many marine species available to investigators at this Center;
- 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 part of this core, as well as equipment for basic electrophysiologic measurements and an oocyte injection facility);
- a Cell Isolation, Culture and Organ Perfusion Core that provides isolated cells and tissues from marine species to Center investigators;
- an Imaging Core that maintains and operates a confocal fluorescent microscope as well as providing other imaging technology including epifluorescence and video-enhanced microscopy;
- A Bioinformatics Core that is the site of development of a national Comparative Toxicogenomics Database and webpage design. This core incorporates molecular data on marine sequences with a highly annotated database and provides comparative information with human genes of toxicologic interest.

All Center members and pilot recipients have free access to these core facilities. Non-Center members who utilize these facilities are charged appropriate fees.

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 project 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:*

Dr. Patricia H. Hand
Administrative Director
Mount Desert Island Biological Laboratory
P.O. Box 35
Salisbury Cove, Maine 04672
Tel. (207) 288-3605
Fax. (207) 288-2130
phand@mdibl.org

Students should contact:

Michael McKernan
Director of Education and Conferences
mmckernan@mdibl.org

## ACKNOWLEDGEMENTS

The Mount Desert Island Biological Laboratory is indebted to the National Institutes of Health and National Science Foundation and 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 National Science Foundation Research Experience for Undergraduates, Maine Biomedical Research Infrastructure Network (NCRR/NIH), Cserr/Grass Foundation, Milbury Fellowship Fund, Northeast Affiliate of the American Heart Association, Cystic Fibrosis Foundation, Blum/Halsey Fellowship, Stanley Bradley Fund, Stan and Judy Fund, Bodil Schmidt-Nielsen Fellowship Fund, Maine Community Foundation, the Hearst Foundation and many local businesses and individuals.

## Evamaria Kinne-Saffran, M.D.

## (1941-2002)

*Dedicated to my dear wife, companion in life and love, and partner in spirit and science; and to all people who similarly as Partners in Science by their joint endeavors promote knowledge for the sake of mankind.*

Much too soon and entirely unexpected, Evamaria Kinne-Saffran died on December 6, 2002 while at work in her laboratory in Germany. Since 1975 she had come to the MDIBL every summer as part of the Kinne-duo, that became a Kinne-trio with son Daniel, and sometimes a Kinne-quartet when her mother joined the family at the Laboratory at the Sea. Her role as daughter, wife, mother and spousal partner in science was greatly admired, and she served as role model for a great number of students and colleagues. Her friendship was unpretentious in its warmth and honesty, and those who considered themselves a friend of Eva's felt fortunate to have met her. It is common that absence intensifies the awareness of loss. Departing so suddenly, Evamaria leaves us with a heightened recognition of her inner beauty and of how much she has meant to me, son Daniel, our family, to the Max Planck Institute in Dortmund, to the MDIBL in Maine, and to her students and colleagues around the world.

Evamaria was born in 1941 in Berlin during the height of World War II. Her mother, Paula Helene Vogelsang, was a secretary who had come to Berlin from Gevelsberg, a hilly region in North-Rhine Westphalia. Her father, Anton Saffran, had his family roots in Schwanheim, a rural part of Frankfurt am Main, where the family name is synonymous with a small restaurant that serves " apple wine ". He cultivated his family roots during all his later life as director of an engineering firm. Evamaria was very close to him and she inherited from her father the love of family and her interest in history.

After attending the Luise-Henriette Gymnasium in Berlin she began her medical studies at the Free University with the aim to become a practicing medical doctor and thereby serve the community. We were classmates and were married in 1966. In the same year Evamaria graduated from Medical School, but by then her interests had shifted to

science. Her move with me to the Max Planck Institute for Biophysics in Frankfurt in 1967 marked the beginning of our fruitful and enduring partnership in professional activities. Together we built the Laboratory for Membrane Transport that soon attracted visitors from around the world. Evamaria was always the one who welcomed our scientific colleagues as part of the family, and many deep friendships developed.

In 1979, after having given birth to our son Daniel and having nurtured him for three years at home, she moved to New York and became Assistant Professor at the Albert Einstein College of Medicine, where I had been appointed as Chairman of Physiology. She flourished in this environment that welcomed us without any reservation and where she could combine ideally her role as scientist, teacher, mother and spouse.

In New York she also was much closer to Maine and the MDIBL, whose spirit of collaboration, sharing, and friendship in an international family she had been enjoying since 1975, when the late Bill Kinter and his wife Ann first introduced us to the beautiful Mount Desert Island. During the years to come her commitment to the Lab broadened and deepened. Tending to personal needs, tutoring students, and advising junior and senior investigators in Membrane Biology gave her pride and satisfaction. In 1992 she was elected to the Board of Trustees where she served until 1995. At that point she joined the Editorial Committee contributing in an additional manner to the scientific excellence of the Laboratory. When Evamaria died she was also a member of the Development Committee and of the Research Resources Committee- representing the breadth of her interest, caring and abilities. Unforgotten is her pivotal role in organizing in 1995 the scientifically exciting and for all participants personally rewarding symposium on the occasion of the 100$^{th}$ birthday of Homer Smith, the eminent nephrologist and long time "spiritus rector" of the MDIBL. Again she added warmth and heartfelt hospitality to the program and was a superb and admired host. In 1998 the MDIBL celebrated its Centennial. The overwhelming success of this event can to a significant part be traced back to Evamaria's creative involvement in planning and organizing, and compassion in helping and assisting. On this, as on many other occasions she generously gave back to the Lab what over the years the Lab had given to her. The MDIBL was a haven of joy Eva cherished during all her life.

In 1984 the family moved to Dortmund, Germany where I had been called upon to head the Max Planck Institute of Physiology of Complex Systems. Here Evamaria established her own Laboratory of Membrane Biochemistry and maintained her ties to teaching by joining the Department of Physiology of the Ruhr-University in Bochum. In 2000 she was appointed an Adjunct Professor of Physiology at the University of Witten-Herdecke. She was a devoted and passionate teacher who was committed to provide the students with an easy to understand and yet in depth-knowledge in Physiology.

In her scientific work Evamaria combined a sharp intellect and broad biomedical interests with an extraordinary talent for organization, excellent technical skills, unerring concentration on the essential goal, and untiring perseverance. She gave her scientific life to the study of epithelial transport phenomena in plasma membranes using biochemical approaches [1-3]. She was among the first to isolate the luminal and contraluminal membranes of epithelial cells of renal proximal tubules that still expressed transport activity [4]. Producing such membrane fractions made it possible to investigate transport systems in apical and basolateral membrane domains independently from each other as well as from the cellular metabolism. She discovered a $Ca^{2+}$-ATPase in the contraluminal membrane [5] and an ATP-driven proton pump ($H^+$-ATPase) in the luminal brush border membrane [6;7]. She detected the hormone-sensitive adenylyl cyclase in basolateral membranes and cAMP-dependent kinases in apical membranes of the proximal tubule and the papillary collecting duct [8-10]. The study of transporters in isolated membranes was successfully applied to many epithelial tissues. The molecular basis of glucose transport was elucidated in rat proximal tubule and rat intestine [11;12], transport-related elements of the acid/base balance were localized and characterized in the turtle bladder [13] and the first channel-like transport system for magnesium was identified in the trout kidney [14]. All these investigations provided biochemical evidence that plasma membranes in epithelial cells have a functional asymmetry, a prerequisite for vectorial transepithelial transport.

At the MDIBL, the $Na^+$-$K^+$-$2Cl^-$-cotransport system and its sensitivity to loop diuretics was discovered in basolateral membrane vesicles isolated from the shark rectal gland [15]. These studies formed the basis for detecting and characterizing this transporter in apical membranes of rabbit kidney thick ascending limb of Henle's loop [16-18]. Studies of other sodium-cotransport systems in tissues of the hagfish, the shark, the skate and the flounder were aimed at delineating the origin and evolution of transporters [19-21]. The biochemical approach to transport systems in so many tissues and animals enriched Comparative Physiology by illuminating as well commonality as diversity.

Next to well-defined characterization of transporters, the availability of isolated membranes also provided a fruitful approach to investigate the membrane-molecular basis of the toxic action of pollutants on epithelia. Under the umbrella of the NIEHS Centre for Membrane Toxicity Studies at the MDIBL cadmium was found to inhibit amino acid transport systems in flounder and rabbit kidney, and flounder intestine [22;23]. According to Evamaria's studies it also affected the $Na^+$-$K^+$-ATPase by different mechanisms in shark rectal gland and rabbit outer medulla [24]. She also observed that mercuric chlorid, another heavy metal, inhibited the $Na^+$-$K^+$-$2Cl^-$-cotransport system in the rectal gland [25]. Investigating the toxicology of heavy metals Evamaria returned to her roots as physician, trying to define the molecular basis of disease. Shortly before her death she had started yet another clinically oriented research project that focused on the molecular mechanisms of calcium and phosphate transport in human salivary glands and their role in the development of dental diseases.

Not only students and colleagues, but also editors and publishers sought Evamaria's scientific acumen. She reviewed extensively for the American Journal of Physiology, the Journal of Membrane Biology, and the Proceedings of the National Academy of Sciences, and she co-published a book series on Comparative Physiology.

Lately she also applied her interest in history to Nephrology where she chronicled the role Jacob Henle had played in developing the concept of the epithelium and the mechanism of renal function [26]. She wrote about the science of Friedrich Woehler who proved the chemical basis of biological reactions by synthesizing urea [27]. And she reflected on the contribution of "wise women" in the early days of Medicine and on the role of William Withering in discovering the potency of cardiac glycosides in the treatment of dropsy [28].

The development of the experimental tools for the preparation of isolated plasma membrane vesicles and for investigations of individual transport systems therein occurred when it became clear that the thermodynamic models of epithelial transport and the biophysical study of whole cells with microelectrodes were reaching the limits in their important contributions. This new approach paved the way for obtaining direct information on the molecular details of transport phenomena. At the same time, the first observation of a single membrane channel by the methods of patch clamp was reported [29]. Thus, in retrospect, the study of membrane vesicles constitutes an essential transition from the black box analysis of epithelial cells to the molecular study of individual transporters.

It is noteworthy that methods to separate plasma membranes and techniques to investigate transport systems using vesicles have not been supplanted by molecular biology. Functional genomics, cell biology, and integrative physiology will continue to call for such experimental approaches in the awareness that life is a complex network of components and reactions at a variety of levels of organization. The contributions of Evamaria Kinne-Saffran to science are thus perpetuated by the current and certainly future generations of scientists.

**Acknowledgements:**

The generous, inspiring, and comforting help of Klaus and Christa Beyenbach in composing this obituary is acknowledged in deep gratitude and friendship. They formulated this concluding sentence:

"Future readers of Eva's work will take knowledge and inspiration from her pages, blind to Eva the human being – like the sand that trickles through small fingers forming miniature mountains, castles, and kingdoms is blind to the child and all the human activities around her on a sunny July day on the beach at Salisbury Cove, at the Laboratory by the Sea."

Written in Dortmund on March 17, 2003
By Rolf K.H.Kinne, M.D.,Ph.D.
Director at the Max Planck Institute of Molecular Physiology, Dortmund, Germany and
Vice-Chairman of the Board of Trustees,
Mount Desert Island Biological Laboratory, Maine, U.S.A.

**References**


[1] Kinne-Saffran,E. & Kinne,R.K. (1989) Membrane isolation: strategy, techniques, markers. *Methods Enzymol.*, **172,** 3-17.

[2] Kinne-Saffran,E. & Kinne,R.K. (1990) Isolation of lumenal and contralumenal plasma membrane vesicles from kidney. *Methods Enzymol.*, **191,** 450-469.

[3] Kinne-Saffran,E. (1985) Transport Function of Renal Cell Membranes: ATP-Driven Transport Systems. *Renal Biochemistry*, 143-174.

[4] Heidrich,H.G., Kinne,R., Kinne-Saffran,E., & Hannig,K. (1972) The polarity of the proximal tubule cell in rat kidney. Different surface charges for the brush-border microvilli and plasma membranes from the basal infoldings. *J. Cell Biol.*, **54,** 232-245.

[5] Kinne-Saffran,E. & Kinne,R. (1974) Localization of a calcium-stimulated ATPase in the basal-lateral plasma membranes of the proximal tubule of rat kidney cortex. *J. Membr. Biol.*, **17,** 263-274.

[6] Kinne-Saffran,E. & Kinne,R. (1974) Presence of bicarbonate stimulated ATPase in the brush border microvillus membranes of the proximal tubule. *Proc. Soc. Exp. Biol. Med.*, **146,** 751-753.

[7] Kinne-Saffran,E., Beauwens,R., & Kinne,R. (1982) An ATP-driven proton pump in brush-border membranes from rat renal cortex. *J. Membr. Biol.*, **64,** 67-76.

[8] Shlatz,L.J., Schwartz,I.L., Kinne-Saffran,E., & Kinne,R. (1975) Distribution of parathyroid hormone-stimulated adenylate cyclase in plasma membranes of cells of the kidney cortex. *J. Membr. Biol.*, **24,** 131-144.

[9] Kinne,R., Shlatz,L.J., Kinne-Saffran,E., & Schwartz,I.L. (1975) Distribution of membrane-bound cyclic AMP-dependent protein kinase in plasma membranes of cells of the kidney cortex. *J. Membr. Biol.*, **24,** 145-159.

[10] Schwartz,I.L., Shlatz,L.J., Kinne-Saffran,E., & Kinne,R. (1974) Target cell polarity and membrane phosphorylation in relation to the mechanism of action of antidiuretic hormone. *Proc. Natl. Acad. Sci. U. S. A*, **71,** 2595-2599.

[11] Murer,H., Hopfer,U., Kinne-Saffran,E., & Kinne,R. (1974) Glucose transport in isolated brush-border and lateral-basal plasma-membrane vesicles from intestinal epithelial cells. *Biochim. Biophys. Acta*, **345,** 170-179.

[12] Kinne,R., Murer,H., Kinne-Saffran,E., Thees,M., & Sachs,G. (1975) Sugar transport by renal plasma membrane vesicles. Characterization of the systems in the brush-border microvilli and basal-lateral plasma membranes. *J. Membr. Biol.*, **21,** 375-395.

[13] Brodsky,W.A., Cabantchik,Z.I., Davidson,N., Ehrenspeck,G., Kinne-Saffran,E.M., & Kinne,R. (1979) Localization and characterization of transport-related elements in the plasma membrane of turtle bladder epithelial cells. *Biochim. Biophys. Acta*, **556,** 490-508.

[14] Freire,C.A., Kinne,R.K., Kinne-Saffran,E., & Beyenbach,K.W. (1996) Electrodiffusive transport of Mg across renal membrane vesicles of the rainbow trout Oncorhynchus mykiss. *Am. J. Physiol*, **270,** F739-F748.

[15] Hannafin,J., Kinne-Saffran,E., Friedman,D., & Kinne,R. (1983) Presence of a sodium-potassium chloride cotransport system in the rectal gland of Squalus acanthias. *J. Membr. Biol.*, **75,** 73-83.

[16] Kinne,R., Koenig,B., Hannafin,J., Kinne-Saffran,E., Scott,D.M., & Zierold,K. (1985) The use of membrane vesicles to study the NaCl/KCl cotransporter involved in active transepithelial chloride transport. *Pflugers Arch.*, **405** Suppl 1, S101-S105.

[17] Kinne,R., Kinne-Saffran,E., Schölermann,B., & Schütz,H. (1986) The anion specificity of the sodium-potassium-chloride cotransporter in rabbit kidney outer medulla: studies on medullary plasma membranes. *Pflugers Arch.*, **407** Suppl 2, S168-S173.

[18] Kinne,R., Kinne-Saffran,E., Schütz,H., & Schölermann,B. (1986) Ammonium transport in medullary thick ascending limb of rabbit kidney: involvement of the Na+,K+,Cl(-)-cotransporter. *J. Membr. Biol.*, **94,** 279-284.

[19] Zadunaisky,J.A., Kinne-Saffran,E., & Kinne,R. (1989) A Na/H exchange mechanism in apical membrane vesicles of the retinal pigment epithelium. *Invest Ophthalmol. Vis. Sci.*, **30,** 2332-2340.

[20] Bevan,C., Kinne,R.K.H., Shetlar,R.E., & Kinne-saffran,E. (1989) Presence of a Na+/H+ Exchanger in Brush-Border Membranes Isolated from the Kidney of the Spiny Dogfish, Squalus acanthias. *Journal of Comparative Physiology B-Biochemical Systemic and Environmental Physiology*, **159,** 339-347.

[21] Kipp,H., Kinne-Saffran,E., Bevan,C., & Kinne,R.K. (1997) Characteristics of renal Na(+)-D-glucose cotransport in the skate (Raja erinacea) and shark (Squalus acanthias). *Am. J. Physiol*, **273,** R134-R142.

[22] Bevan,C., Kinne-Saffran,E., Foulkes,E.C., & Kinne,R.K. (1989) Cadmium inhibition of L-alanine transport into renal brush border membrane vesicles isolated from the winter flounder (Pseudopleuronectes americanus). *Toxicol. Appl. Pharmacol.*, **101,** 461-469.

[23] Kinne,R.K., Schütz,H., & Kinne-Saffran,E. (1995) The effect of cadmium chloride in vitro on sodium-glutamate cotransport in brush border membrane vesicles isolated from rabbit kidney. *Toxicol. Appl. Pharmacol.*, **135,** 216-221.

[24] Kinne-Saffran,E., Hülseweh,M., Pfaff,C., & Kinne,R.K. (1993) Inhibition of Na,K-ATPase by cadmium: different mechanisms in different species. *Toxicol. Appl. Pharmacol.*, **121,** 22-29.

[25] Kinne-Saffran,E. & Kinne,R.K.H. (2001) Inhibition by mercuric chloride of Na-K-2Cl cotransport activity in rectal gland plasma membrane vesicles isolated from Squalus acanthias. *Biochimica et Biophysica Acta-Biomembranes*, **1510,** 442-451.

[26] Kinne-Saffran,E. & Kinne,R.K. (1994) Jacob Henle: the kidney and beyond. *Am. J. Nephrol.*, **14,** 355-360.

[27] Kinne-Saffran,E. & Kinne,R.K. (1999) Vitalism and synthesis of urea. From Friedrich Wöhler to Hans A. Krebs. *Am. J. Nephrol.*, **19,** 290-294.

[28] Kinne-Saffran,E. & Kinne,R.K.H. (2002) Herbal diuretics revisited: From 'wise women' to William Withering. *American Journal of Nephrology*, **22,** 112-118.

[29] Neher,E. & Sakmann,B. (1976) Single-channel currents recorded from membrane of denervated frog muscle fibres. *Nature*, **260,** 799-802.

Eva and Rolf Kinne were an inseparable pair of scientific researchers who led the world in the investigation of transport by isolated cell membranes and enriched the lives of their colleagues.

Their friends at MDIBL treasure their memories of Eva, that elegant, gracious, gentle and beautiful woman; modest, forthright and unselfconscious. Meticulous in her science, she was completely generous with her time and knowledge. She shared with Rolf an unobtrusive but deep and genuine concern for people that everyone instinctively and immediately perceived.

She had one extravagance – a flaming red Triumph roadster that she kept in Maine to drive the short distance from Spruce Point to MDIBL each day in style. We will miss, but always remember, the red Triumph and the warm and gentle smile.

*Franklin H. Epstein*

---

A summer season at MDIBL arouses mixed emotions in the full-time staff. It is a very busy time, but also a time to renew dear acquaintances. And it was always particularly uplifting to find on my desk those boxes of sweets distributed by Lufthansa Airlines that Eva had saved and brought to me. But there was also the gift of her lovely presence and beautiful smile. We had a special relationship that I had hoped to cultivate further as I reached retirement. We exchanged favorite books and family anecdotes. We shared amusing tales. She was fun, and she was happy to pitch in, never hesitating to help clear tables following a banquet. She didn't worry that this might diminish her elegant style and prominence. And, of course, it didn't. I hold dear these tokens of her friendship. For me Eva was the balance needed during the hectic summers at MDIBL. I will surely miss her.

*Mary Rush*

---

Amidst a very special environment for laboratory training at MDIBL, Eva Kinne had an unusual impact on me and left an indelible impression. Her radiant warmth was mixed with patience and a demand for exquisitely careful laboratory observation. She was the admired teacher whom I hoped never to disappoint.

Dr. Kinne offered to teach me basic aspects of laboratory biochemistry and subcellular purification techniques. I was a young college student spending the summer in an adjacent laboratory and Dr. Kinne went out of her way to ask about my project and my interests. I was inexperienced but eager and I recall her firm corrections of my misunderstandings coupled with that infectious smile. She conveyed her lessons with firmness and confidence but with a tenderness that made learning painless. She taught as she worked, describing each step, allowing me to repeat it and then requiring an explanation to ensure that I understood. During these lessons, she acted as if she had nothing more critical to do, making me feel that imparting her wisdom to me was important to her.

It is only in the years since these special summers at Mount Desert Island that I have learned to appreciate the uniqueness and importance of Dr. Kinne's special attributes. As I listen to the misinterpretations of data by my own students and I consider my own responses, I frequently envision Dr. Kinne's warm smile, reassuring, reminding me of her example. She teaches me still, forcefully conveying her combined message of competence, unselfishness and tenderness – rare traits that are even more precious when combined in one remarkable role model. We will miss that welcoming smile and cheerful laugh when we return to Mount Desert, for they belong there, epitomizing the goals and values of that precious laboratory retreat. As my own role as scientist and teacher evolves, I know I will continue to be assisted by the friend we so adored and by the teacher I hope not to disappoint.

*Jonathan Epstein*

---

## 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*

MOLECULAR TOXICOLOGY AND XENOBIOTIC TRANSPORT