even worse mayhem in the 1980’s on the Grand Banks of Newfoundland, and the unthinkable near-extinction of cod, Canadian fishery managers had access to, and very well understood, the results of several decades of research on the biology and ecology of the cod population, while for the fishery they had excellent catch and effort statistics, but—for reasons not far to seek—were induced to take a sorry series of management options. Look to pressure from politicians and banks for the reasons for their unhappy performance. All this illustrates the most unfortunate truth that politicians and administrators (even those who are ex-scientists) are today much better at shelving a problem by funding a research programme, than at using the results of research to solve a problem.

Funding for major oceanographic programmes has always been justified by reference to a series of issues that have evolved from defence and the needs of navies, through the natural basis of fisheries resources, to our concerns about the role of the oceans in global climate change. There has usually been a rather clear distinction between fundamental research justified in this way, and the applied research required for year-to-year management, yet most of us in this room certainly believe that the latter must be nourished by the former. However, Science (17 January 1997) correctly tells us that we can’t assume that society will continue to support high-cost fundamental science indefinitely: I don’t find it surprising that, by my count, there are only five nations left in global-scale deep-water oceanography. The voices raised to justify fundamental science seem to me curiously muted today, almost as if we thought we knew enough for immediate purposes. Our ASLO Bulletin seems to worry about everything else, but not that.

Which brings me full circle. Looking back, I think my research was driven much more by simple curiosity than by a desire to do good to anybody, though that crept in now and then. Maybe it is politically incorrect these days, but I can’t help thinking that I was most extraordinarily lucky to live through a period when sufficient resources for fundamental research at sea were a component of numerous national science budgets that was never compromised by more immediate issues. I happen to think the funds were well spent in producing a remarkable level of understanding of physical and biological processes in the ocean. It is self-evident that our politicians and financial institutions are in a much better position to organise the management of the planet - anytime they really have a mind to do so - than if our ships had not gone to sea. And if that’s living in an ivory tower, then jolly good luck to it, and may it last your time, too!

**NOMINATION DEADLINE**

for 1998 Awards:

**NOVEMBER 15, 1997**


or contact Susan Weiler

weiler@whitman.edu

**ROBERT H. PETERS HONORED WITH ASLO’S CITATION FOR SCIENTIFIC EXCELLENCE**

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Robert H. Peters was honored posthumously at the ASLO 1997 Aquatic Science Meeting with ASLO’s Citation for Scientific Excellence, for his outstanding contributions to limnology in general and to phosphorus cycling in lakes in particular, and for his leadership in epistemological and philosophical thinking in the ecological sciences. This periodic award was initiated in 1987 to recognize members who could not fulfill their career potential because of early death or disability. Peters’ wife, Antonella Cattaneo (photo below), was present to receive the award.

Peters was born in Toronto, Ontario, Canada, on August 2, 1946. He received his Ph.D. in 1972. His doctoral thesis on regeneration of phosphorus by zooplankton—an issue which is still of great topical importance—was supervised by the late Frank Rigler.

Hakanson and Peters 1995), co-edited one (Peters and de Bernardi 1988), and published over 130 scientific papers, comments and book chapters. There were two main themes in his creative scientific work. First, he endeavored to build empirical relationships that describe general patterns in limnology and ecology. He saw such relationships as exemplary of a new ecology which is oriented towards prediction. His initial focus was on phosphorus dynamics in lakes (Peters and Rigler 1973; Peters and Lean 1973; Peters 1975), and later expanded his interests to a much broader array of topics, including zooplankton behavior (Peters and Downing 1984), material flow in aquatic systems (del Giorgio and Hakanson and Peters 1995), plant ecology (Shippley and Peters 1990 a-b; Hakanson and Peters 1988; Duarte et al. 1986), invertebrate ecology (Morin and Peters 1988), fish ecology (MacKenzie et al. 1990; Godbout and Peters 1988), community ecology (Duarte et al. 1987), ecotoxicology (Pawlisz 1993a-b; Mailhot et al. 1989; Mailhot and Peters 1998), and allometric relationships in autecology (Ahrens and Peters 1991). His most influential work was his first book, Ecological Implications of Body Size (1983, Cambridge University Press), which presents a powerful overview of the utility of allomet-
Building ecological theory. In all of these areas, he worked with the same principle, that we must make science more effective in order to address current environmental and social problems.

The second element in his research was the criticism of traditional scientific approaches. The essence of the message conveyed by Peters is this: Ecologists have collected impressive amounts of observations and facts, but they have failed to sufficiently identify and formulate theories that go beyond the facts, theories that can be tested and that can predict. Rob reflected his views in several influential papers dealing with conceptual problems in the ecological science (Peters, 1971, 1976, 1977, 1978, 1986, 1988, 1989, 1990). The culmination of these series was his book “A Critique for Ecology” (Peters, 1991), where he synthesized his views on the problems, and also on the solutions. This book was received with quite contrasting reactions among the scientific community, but nevertheless succeeded in generating a lively debate on the effectiveness of current approaches in ecological and environmental sciences. This was, in all likelihood, Rob’s main objective.

As a recognition to his scientific contribution to aquatic ecology, Rob Peters was given the Rigler Award by the Society of Canadian Limnologists in 1992. He was also awarded the Prize in Limnetic Ecology offered by the International Ecology Institute in 1991. This award gave him the opportunity to fulfill a long standing aspiration: to complete a book based on his interpretation of the writings and ideas of the late Frank Rigler, who greatly influenced Rob’s approach to science. The result was the book Science and Limnology (1995), co-authored by Rigler and Peters, explaining the epistemological views of both outstanding intellectuals and demonstrating the relevance of such views to the day-to-day tasks that confront limnologists and other scientists: teaching, grant applications, peer reviews, identification of appropriate research topics, pursuits of research, and the defense of social and scientific relevance.

Rob also displayed an impressive public activity. Until last year, he was President of the Society of Canadian Limnologists, and was upon his death on the Board of the American Society of Limnology and Oceanography, Director (Central Canada) of the North American Lake Management Society and Associate Editor of the journal Lake and Reservoir Management. He was on the editorial board of Limnology and Oceanography, ISIS Reviews, and Lake and Reservoir Management, and regularly sat on provincial (FCAR) and federal (NSERC) grant committees.

The published and public work of Robert Peters, summarized above, in generally well known in the scientific community, but we must emphasize some of his achievements that are less public. Rob supervised in the last 16 years nine postdoctoral researchers, ten Ph.D. theses, and twelve Master’s theses at McGill University, and many of his former students and associates now hold positions in science and academia where they continue to be influenced by Rob’s ideas. But as professor, advisor, and most importantly, as a friend, Rob has had a major intellectual influence on the career and scientific development of countless more individuals, at levels ranging from undergraduate students to senior scientists. He was a model for intellectual integrity and profundity, and was a constant source of inspiration and strength to students and colleagues alike. His apparent unbending views on science were in contrast with his own personal modesty. Outside speakers invited to McGill University, familiar with Rob’s writing, often expected a tough, unyielding opponent, and what they actually found was a kind and humble man, aware above all of his own limitations. Rob taught with his own example, that we should not fall into scientific self-indulgence, and that criticism starts with oneself.

Robert Henry Peters passed away on June 26, 1996, at the prime of his rich scientific career and personal life. With his death, the scientific community has lost one of its major exponents, and all of us who had the privilege of sharing his friendship are deeply saddened by his departure.

**References**


There are few scientists who have a clear vision of what science can do, what it must do, and how ecologists can accomplish these goals. Rob Peters had this vision and adopted, as a life quest, the teaching of this vision to other ecologists. That is why when he died recently we lost more than a charming friend, an incisive mind and a skilled advocate or adversary. Many of his friends fear we risk losing direction in ecology and despair at a field without his remarkable, reasonable and critical voice. He was the best friend aquatic ecology had, and, like a good friend, loved the field knowing its faults.

Rob was born into an intense interest in nature. His grandfather came from a lumbering background in rural Ontario, and grew up surrounded by the fascinating diversity of the boreal forest. As a city youth, Rob delved deeply into nature wanting to know all there was to know about the animals that inhabited it. Summers spent at his lake cottage on the Canadian shield bolstered his fascination with aquatic systems. Rob was a member of the Young Naturalist’s Club in Toronto, which brought him to study with notable observ-

ers of nature, including Robert Bateman, whose art Rob came to treasure throughout his life. Rob’s mother was an ardent supporter of the University of Toronto, thus Rob was almost predestined to study there when he finished secondary school.

At the University of Toronto, Rob met his future friend, Ph.D. supervisor and colleague, Frank Rigler. It must have been a spectacular match, for Rob held him in such high esteem that Rigler, Rigler’s lab and Rigler’s ideas were always the epitome of excellence, in Rob’s view. It is easy for many of us to understand this. Those of us who were fortunate enough to spend some time with Frank before his early death in 1982 sensed the richness of working with him. Those of us fortunate enough to study with Rob hold him in similar esteem. One of the beautiful things about working with a scientist like Rob is that one is taught so well that it is difficult to figure out which favorite tenets are mine, which are Rob’s and which are Frank’s. Rob would suggest, however, that does not really matter where we get our ideas, it’s what we do with them that counts.

When Rob became a graduate student, Frank Rigler was consumed with the analysis of phosphorus cycling in lakes. Some of his students were analyzing uptake of particles by zooplankton, others the fractionation of P in large and small molecular weights, and others, like Rob, were measuring minute rates of excretion by tiny zooplankton. The idea was that if all the components of the lake could be understood, then the lake would be understood. During the same period, Frank was teaching a course in the history and philosophy of science which was one of the favorite courses of students in Biology. He and his graduate students held regular lunch lab meetings, discussing the history and structure of scientific discovery, among other things. As Rob told me the story, one day, during one of these meetings in the late 1960s or very early 1970s, a man who had a cottage on a lake near Toronto knocked on the door looking for the “lake expert”. The cottager was ushered into the lab and faced the group with a question. The cottager had noticed that lakes with many cottages on them had green water, and were not as attractive as they had been before. As several new cottages were planned for his little lake, he wondered how many could be built before his lake would turn green. The group had no answer. They could tell him how much P Daphnia excreted, how many particles they would clear from the water, how much P got stuck to epiphytes in a lake, but they could not answer this most basic question.

This event convinced Rob that ecologists need to face the most important environmental questions directly, and that there is something wrong with a science that spends years of work collecting the pieces to a puzzle that may never be solved. The lessons of history and philosophy Rigler had been teaching convinced him that we could be more effective scientists by looking for strong patterns in nature, not by trying to rebuild all of nature from its components. Pete Dillon’s landmark work on the phosphorus-chlorophyll relationship was a direct result of this revolution in the Rigler lab. Pete told me years afterward that Rigler
graduate students were thought of as "before" or "after" students. Rob was present at the revolution which left an indelible mark. Rob took strongly to the positivist approach, and in 1971 wrote Ecology and the World View (Limnol. Oceanogr. 16:143-147), followed by Tautology in Evolution and Ecology in 1975 (Am. Nat. 110:1-12). These articles set the tone for many of his works that sought to improve the scientific quality of ecological research.

Since Rob had done undergraduate and graduate degrees at the University of Toronto, he viewed his postdoc as a chance to try something completely different. He secured a postdoctoral post at the Istituto Italiano di Idrobiologia, as well as briefer postdoctoral visits in Munich and Vienna. Italy became his second home, both because of the fruitful interactions he found with the many young scientists at the Istituto, and because he admired one of them in particular, Antonella Cattaneo, both as a scientist and later as his wife and life-long partner. Nella has told me that she first dated Rob at the urging of her brother-in-law who wanted the Canadian to teach him how to catch trout! Nella and Rob were married in Italy, traveled to Africa to study African lakes, and moved to Montréal in 1974, where Rob had been offered a post at McGill University. In spite of his career in Canada, Rob felt tightly bound to Italy. When I first spoke to him on the telephone in 1975, he proudly explained to me that he was soon off to visit his family in Italy. I believe that toward the end of his life he was more comfortable in Italy than Montréal. He seemed more relaxed, at ease and at peace around the beautiful mountain lakes near Corconio and Pallanza.

Back in Canada, Rob went quickly to work building a strong limnological research group with Jaap Kalff and Bill Leggett. The group worked hard to seek strong empirical patterns in nature, centering specific studies on Lake Memphremagog, but students and professors ranged far afield in the literature, nearly single-handedly building the field of comparative limnology. This work was frequently based on the philosophical approaches advocated by Rob, strengthened by the technical expertise, inquisitive and supportive nature of Kalff, and the down-to-earth practicality of Leggett. They built an incredibly exciting research group where students pushed each other to examine the underpinnings of their science while doing technically elegant research.

Rob told me that in the late 1970s Rigler began to feel too complacent, "too worried about the colour of his curtains," so joined Rob with the McGill group. For a short but brilliant time, both Peters and Rigler were working independently and together in this research group. Our seminar series was a terror. Students would study philosophy by night to try to catch up with Peters, Rigler, Kalff and Leggett, who would often sit serenely through seminars while students ripped into invited speakers. "What is science?" "What is theory?" "What is cause?" "What have you shown us that wasn't known before?" "You've said what you think, but what do you know?" Rob taught us all to relentlessly seek pattern in nature, that theory is the prime objective of science, that prediction is the prime objective of theory, that empirical theories need to precede explanatory ones, and that if we do our job well enough, someone will go to the trouble of showing that we were wrong! The challenge was not to prove that we were right, but to see how much we could learn. Doing science with Rob was so much fun; the rules of the game were set and clear and everyone was encouraged to play.

Rob felt that we should start, like physics, to seek broad-scale theories, and that this should be done by identifying characteristics of organisms that allow us to make predictions about them. Inspired by early physiological ecologists, he settled on body-mass. He began to compile data on body-mass and how it relates to virtually every characteristic of an organism's life. Although he had many philosophical arguments to convince others that this was the best way to theory, he decided that it would be better to demonstrate the primacy of empirical theory by his own example. In 1983, he published his most successful book, The Ecological Implications of Body Size, which is responsible for around half of his lifetime citations. This work, along with the empirical theories of many new ecologists, forms the core of the emerging field that Rob saw as our future: Predictive Ecology.

(No article about Rob Peters should be published without at least one graph, so Fig. 1 shows the evolution (sorry Rob) of his publication record, considering only articles for which he was first author.)

By latest count, Rob has authored nearly 120 refereed publications and citations surpassed 200/year in 1995. These appeared at a rate of 2-3 per year between 1971 and 1981, accelerating to >6 per year after the appearance of Ecological Implications. This count does not include the >100 articles published by members of his lab with his support, that generously do not carry his name. His refereed publications are very diverse, concentrating on many aspects of phospho-

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Fig. 1. Relationship between the cumulative number of refereed publications listing Robert H. Peters as an author (x), and the annual number of citations of publications listing him as first author (y). Numbers by data points refer to years. Citation data are taken from the Science Citation Index. The dashed line is the least squares regression (of course): $y = 2.68 + 1.85x$, $r^2=0.97$. 

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Ecologists do science, especially for his book, Critique for Ecological Science. The fact that this book touched a raw nerve is increasingly cited for his criticisms of the way in which we think about ecology. In recent years, he is ecology, phytoplankton ecology, and science policy.

Robert Peters has had a great impact on the way we do and the way we think about ecology. In recent years, he is increasingly cited for his criticisms of the way in which ecologists do science, especially for his book, Critique for Ecology. The fact that this book touched a raw nerve is amply illustrated by the sometimes personal vehemence of a few of the published reviews of it. If Rob had been wrong, his error could have been demonstrated coldly and empirically. Rob must have found this vehemence peculiar as he warmly welcomed all points of view in hopes that he could learn something new from them. Rob’s intention has been to help ecologists see clearer paths to powerful theory. The utility of his close critique of the field he loved is clear from the number of graduate seminars around the world that have used this book to fuel their own examination of the science of ecology.

Rob’s warmth and caring extended through all aspects of his life. When I think of Rob, I think of a man who blended a highly productive career with a warm family life, and an ever extending circle of friends. Reading manuscripts while playing with Julian and Elisa. Never preoccupied or too busy to have a child climb up on his lap and talk about nonsense. Talking about science while cooking in a kitchen in Canada or Italy. Propped against the wall locked in intense conversation and equally intense enjoyment of his beloved Italian wines. Rob enjoyed the richness and diversity of all of life. He relentlessly sought the outliers that make both life and science interesting.

Rob Peters was the scientist that we all should strive to be. His mind was always open to new ideas and new ways of solving problems. He toiled unselfishly toward the advancement of limnology and ecology, the fields his professional life was completely dedicated to. As critical as he was of non-predictive science, he was equally warm and inquisitive toward people of all scientific backgrounds. I believe that he felt that all scientists pursue the course that they sincerely believe in, for I never heard him say an unkind word about anyone. In addition to being a productive and incisive scientist, he was a loving and kind husband, father and friend. Whether they knew Robert Peters or not, all limnologists and ecologists have lost a close ally.

Polly A. Penhale Receives ASLO’s Distinguished Service Award

Polly A. Penhale was a honored with ASLO’s Distinguished Service Award for her valuable ideas, insights and advice concerning society operations and programs, for fostering collaborations with other societies, and especially for developing annual and other meetings to bring together the full range of aquatic sciences. This award was initiated in 1993, to recognize members who have displayed exceptional efforts that support the professional goals and enhance the stature of ASLO.

Dr. Penhale was born in St. Louis, Missouri, and received a B.S. in Biology from Earlham College. She received her M.S. (1972, feeding ecology of arctic sticklebacks) and Ph.D. (1976, primary productivity and nutrient transport in seagrass-epiphyte system) degrees from North Carolina State University, followed by postdoctoral research at the University of Miami’s Rosenstiel School of Marine Science (1976-1977) and the Kellogg Biological Station (1977-1979). She joined the faculty of the College of William and Mary’s Virginia Institute of Marine Science in 1979, and spent 21 1/2 years as a Visiting Scientist at the National Science Foundation (1982-1985). In 1986, she returned to the National Science Foundation as Program Manager for the Polar Biology and Medicine Program (Office of Polar Programs).

Penhale was elected to the position of ASLO Secretary in 1985, and will complete her fourth and final term this July. With her dedication to building strong aquatic science programs, Penhale has distinguished herself through work with ASLO, as a member of the U.S. Delegation to the Committee on Conservation of Antarctic Marine Living Resources, and her service on various academic, governmental, and non-governmental working groups.

Perspectives on ASLO: Acceptance Speech by Polly Penhale

Polly A. Penhale, Office of Polar Programs, National Science Foundation, 4201 Wilson Blvd., Arlington, VA 22230 (ppenhale@nsf.gov)

I am greatly honored to be recognized by my colleagues in ASLO for service to the society as secretary and board member over the past twelve years. I grew up in a family where volunteer work was part of life and where the rewards were very internal and private. I’m overwhelmed to stand before so many friends and colleagues to accept this award and I thank you. When first approached by the Nominations Committee to be a candidate for the secretary’s position, I was reluctant to run for office. I had not served on the board, I wasn’t an ASLO insider, and I wasn’t sure what I could contribute to the society. Over the years, I’ve found a group...
of dedicated colleagues on the board and an organization which encourages and listens to volunteers who step forward to advise and serve the society.

When Diane McKnight called to say that I’d receive this award, she asked if I could comment on changes in the society that I’ve observed over the past twelve years [1985-1997]. I’m happy to note that some things have stayed the same. ASLO continues to be known for its excellent journal, *Limnology and Oceanography*, and continues to hold excellent meetings. Since 1986 the society has grown from about 3300 members to 3800 members. Meeting attendance has grown from about 400 to 600 attendees in the early 1980’s to ca. 1500 attendees in 1997. The number of pages of *Limnology and Oceanography* published annually have increased from 1,400 in 1985 to 2,200 in 1997. ASLO has often held two meetings a year and has more frequently joined with other societies to co-sponsor meetings. Member services have increased.

The membership and the Board have worked together to bring improvements for the Society and its members. As a member of ASLO, Ben Cuker came to the Board with an idea which led to the establishment of the Committee on Under-Represented Minorities in Limnology and Oceanography. As President, Trevor Platt encouraged a focus on international membership. As a Board member, Diane McKnight’s concern with ethical matters led to the establishment of the Ethics Committee, which produced an ethics statement for the society. A main focus of Nancy Marcus’s Presidency was the development of education workshops.

Some of the increases in member services have come from creating an infrastructure which reduces the burden to volunteers. The executive director, Susan Weiler, has written proposals for the external funds which have supported several education workshops, the DIALOG program, and student poster awards. The *ASLO Bulletin*, which is produced by Sue, has developed into a good means for communicating information and commentary to members. The Business Office, now led by Helen Schneider, has taken more of a role in meeting organization, data management, and in budget activities over the past years twelve years.

As secretary, I devoted much of my time in the area of meetings development. One goal was to work with other societies, such as the American Geophysical Union, to co-sponsor interdisciplinary meetings such as the Ocean Sciences Meeting. Another goal was to find ways to reduce the administrative burden to a meeting’s program committee volunteers so that they could devote their talents and energies to the intellectual content of the meeting. Some of the changes in meeting organization are perhaps not apparent to members. In the past, universities and institutions were able to donate significant support for meetings, including staffing and services such as meeting rooms and audio-visual equipment without charge. Today we face a very different world of cost-accounting where institutions have much less ability to contribute to the financial support of meetings. Meeting budgets have evolved to a finely tuned financial venture where small errors could have serious effects on the society’s treasury. Professional meeting organizers are often required to assist the volunteer efforts. The secretary, treasurer, executive director and business manager have all worked together to effect changes in meeting management with minimal impact to the membership.

My final comment is that I see ASLO’s strength in its membership having diverse interests in all areas of aquatic sciences. As I step down as secretary, I hope our meetings, such as this Aquatic Sciences Meeting and meetings co-sponsored with other societies, will continue to foster productive interactions across the fields of limnology and oceanography.

### 1997 OUTSTANDING STUDENT POSTER AWARD RECIPIENTS

Six awards were made for outstanding student posters presented at the ASLO 1997 Aquatic Sciences meeting in Santa Fe, New Mexico. The 111 posters under consideration were judged on the basis of innovation/scientific insight, quality of experimental design/methods, and clarity/effectiveness of presentation. We thank the U.S. Office of Naval Research for contributing $500 cash prizes for each award recipient. Each awardee also received a pot made by the local pueblo indians. We thank Steven Widder, concierge at the La Fonda Hotel, for offering a beautiful selection of pots from his own collection. The committee of judges included Thomas A. Malone (ASLO President Elect and judging committee co-chair), Thomas Sibley (judging committee co-chair), David Burdige, Arthur S. Brooks, James E. Cloern, Paula G. Coble, Gregory A. Cutter, Erica J.H. Head, Joel Kostka, Steven E. Lohrenz, George Matsumoto, Douglas C. Miller, Heidi M. Nepf, Jonathan R. Pennock, Lawrence P. Sanford, Oscar M.E. Schofield, Linda P. Shapiro, Peter G. Verity, Cathleen Wigand, and Peter J. Leb Williams.

The tradition of ASLO’s student poster awards was begun at the 1988 meeting in Boulder, Colorado when meeting organizers Diane M. McKnight and James Lebaugh decided to make the first poster awards. It was such a good idea that every meeting since has followed their example. The “tradition” became formalized in 1992, when ONR was approached and agreed to support the awards with the $500 prizes. The process seemed to come full circle this year, as now-president Diane McKnight made the award presentations to the 6 recipients. Diane noted that it is not necessary to be an officer or even Board member to make a difference in ASLO!

**Awards were presented to:**

Irena F. Creed for Creed, I.F. and L.E. Band, “Role of spatial organization of water and nitrogen contributing source areas on nitrogen export from catchments”. Irena received her B.S. in 1985 and M.S. in 1989, both in biology, from the University of Toronto. During this time, her primary interests were in aquatic ecology and toxicology. During her M.Sc. program, she investigated the role of primary producers on the in vitro transformation of arsenic and elucidated the unstable nature of arsenic in freshwaters. Prior to the start of her doctoral program, she was an envi-