



Naturhistoriska
riksmuseet

The Petrus Artedi Tricentennial Symposium on Systematic Ichthyology

Text: Anders Silfvergrip

Photos: Te-Yu Liao

The Artedi Tricentennial Symposium on Ichthyology commemorated the birth of Artedi by providing a forum of excellence for summarizing the present state of systematic ichthyology. The invited speakers represent today's frontline of research on the inventory and systematic arrangement of the global fish fauna, as well as phylogenetics and biological information systems. The symposium is part of the annual FishBase symposium series

The programme included one day of public lectures, held on the 13th of September in the Beijer Hall at the Royal Swedish Academy of Sciences, followed by a one-day open workshop on Collaborative Platforms for Ichthyology, held on the 14th of September at the Swedish Museum of Natural History.

The five Artedi Lecturers for 2005 are:

- * G. David Johnson
- * Maurice Kottelat
- * Richard L. Mayden
- * Lynne R. Parenti
- * Mutsumi Nishida

Professor Gunnar Öqvist, Permanent Secretary of The Royal Swedish Academy of Sciences opened the symposium. He noted how forgotten Petrus Artedi has been by his fellow Swedes and hoped that this symposium would lead to the well-deserved recognition of the name Artedi in a wider audience. As became evident during the day, it seems more clear than ever that Artedi ranks among the forgotten genius personalities.

Sven Kullander, Senior Curator of Fishes at the Swedish Museum of Natural History and project leader for FishBase Sweden welcomed all participants to the symposium and took the chance to allude to the museum's history emanating from the academy.

After lunch break, the symposium was honoured by a spiritual visit of Carl von Linné, alias the actor Hans Odöo. Professor Bertil Nordenstam also demonstrated a herbarium specimen from the Swedish Museum of Natural History of an *Artemia squamata* L., a plant named in honour of Artedi by Linnaeus.

Petrus Artedi

Petrus Artedi was born to the parish of Anundsjö in northern Sweden, and grew up in Anundsjö and the nearby town of Nordmaling. In 1724 he matriculated at Uppsala University where he made a lasting acquaintance with Carl Linnaeus. Artedi and Linnaeus both specialized in the study of natural history and pioneered biological systematics as now known. Artedi designed the system of naming organisms by a generic name and a specific epithet, and from that Linnaeus created the binominal nomenclature and hierarchical classification that is still in use for all organisms.

Artedi's life was short. In 1735 he drowned in a canal in Amsterdam, leaving in the aftermath only fragments of knowledge about his person - just a few manuscripts, a single letter, Linnaeus' brief summary of his life and career, no portrait, no diary, and not even any scientific correspondence. Linnaeus, however, published his major manuscript, in 1738 as *Ichthyologia sive Opera omnia de piscibus*. It became the starting point for modern descriptive systematics and created a standard for fish taxonomy that is still followed today. Artedi's interaction with Linnaeus was apparently also influential for the development of Linnaeus' achievements in organismal systematics.

Was Linnaeus responsible for Artedi's demise?

The innocent title of Professor Theodore Pietsch's introductory speech was *The Curious Death of Peter Artedi*. The content, however, was mind provoking as well as interesting.

Professor Theodore Pietsch, apart from being an excellent ichthyologist, is also a well-known historian of ichthyological research. He introduced his speech by indirectly excusing himself for blasphemy - putting forth criticism in Linnaeus' native country, Sweden. Professor Pietsch quoted Brian Gardiner (*The Linnean*, 21(2): 3, 2005): "as you are well aware, in Sweden one simply does not criticize Linnaeus."

Petrus Artedi did indeed die under curious circumstances in Amsterdam. Professor Pietsch has retraced the last steps of Artedi before he fell into a canal and drowned. How could he possibly have fallen into a canal during an eleven-minute walk from his patron Albertus Seba's home to his own? That was the recurrent question of Professor Pietsch. What was the reason? And who would have gained from it, was it not an accident?



Professor Pietsch then continued to point at Linnaeus' great self-esteem presenting a number of quotes that clearly show how fond Linnaeus was of his achievements. The picture painted by Professor Pietsch was not flattering. He also pointed at a number of indicative similarities between works published by Linnaeus right after he had acquired Artedi's manuscript in 1735, and Artedi's work *Ichthyologia* from 1738 (posthumously published by Linnaeus). The similarities are suggestive and probably only recovery of Artedi's original manuscripts may elucidate who was the original theorist. One should remember that Artedi's manuscript was almost finished and that the publication appears to have been only a few weeks away.

While Professor Pietsch never claimed that Linnaeus killed Artedi, it is possible that Linnaeus' career may have benefited significantly from his death through the acquisition of Artedi's manuscripts.

G. David Johnson - Artedi Lecturer 2005

The first Artedi Lecturer of the symposium was Dr. G. David Johnson from the Smithsonian Institution. The title of his talk was *Morphology and Phylogeny of Fishes - Progress and Prospects*. One may characterize Dr. Johnson's lecture as an ode to ichthyology.

Dr. Johnson gave the audience a first rate guided tour through the diverse seascape of fish morphology with backdrops from the scientific advances and his colleagues and friends over the years. Dr. Johnson also noted the importance of recent technology advances within morphological studies in producing more accurate results. Notably the clearing and counterstaining techniques have opened up new areas of studies that essentially were not available as late as the mid sixties.

He emphatically stressed that the results from other new techniques for elucidating relationships, and molecular technique in particular, must have a morphological setting. There is no intuitive countercheck of molecular results as you have with morphological results. In light of that it is discomfoting that there is a slow rate of recruitment of good morphologists within the ichthyological community.

Dr. G David Johnson is Curator of Fishes and Research Scientist with the Division of Fishes, National Museum of Natural History, Smithsonian Institution, Washington, D.C. His



ichthyological research is concerned with the systematics and early life history of teleost fishes, particularly acanthomorphs, with a central focus on comparative anatomy, ontogeny, phylogenetic reconstruction and classification. His work on the phylogeny of acanthomorph fishes has positioned him as one of the world's leading fish systematists.

He received his PhD in Marine Biology in 1977 from the Scripps Institution of Oceanography, University of California at San Diego. He held research and postdoctoral positions with the Chesapeake Biological Laboratory, University of Maryland, the South Carolina Marine Resources Research Institute, Charleston, and the Smithsonian Institution.

Dr. Johnson has published 75 peer reviewed articles including several milestone papers on the systematics of higher teleosts. He received several awards, e.g. the Robert H. Gibbs Jr., Memorial Award for an Outstanding Body of Published Work in Systematic Ichthyology and the Smithsonian NMNH Science Achievement Award for an Outstanding Publication.

Maurice Kottelat - Artedi Lecturer 2005

Dr. Maurice Kottelat's work spans European and Asian freshwaters, and articulates very well the Artedian tradition of carefully recording the available literature while moving forwards with personal observations and extensive fieldwork. Few other living ichthyologists have named so many new fish species or published as many papers.

The title of his lecture was 2349 years, alluding to the number of years since the first comprehensive scientific fish work was published by Aristotelis. After that work very little happened and the next works of the same influence were not published until mid 16th Century. After that he presented some recent estimates on the total number of fishes, known and unknown, and the basis for these estimates. He noted that we may expect a higher increase in newly discovered species from fresh waters rather than from marine environments. His conclusion is that many newly discovered taxa remain undescribed due to a shortage of trained taxonomists and that the publication pace needs to increase if we shall have a chance to provide data for management, conservation and research.



Dr. Kottelat is an independent consultant working from his home in Cornol, Switzerland, and Honorary Research Associate of the Raffles Museum of Biodiversity Research, National University of Singapore.

Dr. Kottelat is the world leading authority on the taxonomy of Eurasian fresh water fishes, with a focus on species diversity and classification.

Dr. Kottelat graduated from the University of Amsterdam in 1989. He is one of the most experienced field workers in ichthyology with numerous expeditions particularly in Asia, and ranks as the most influential fish systematist in Europe. He is repeatedly consulted for his expertise on aquatic life in environmental assessments by international funding bodies, including the World Bank. He is also both the founder and the editor of the quarterly scientific periodical Ichthyological Explorations of Freshwaters. He is also the current president of the European Ichthyological Society.

Dr. Kottelat has produced over 220 scientific publications, including eight books some of which cover entire national freshwater fish faunas. His field research resulted in the discovery and/or description of about 440 fish species new to science.

Richard Mayden - Artdi Lecturer 2005

Petrus Artdi did not discuss species or their ontology, his contribution was on higher ranks. Professor Mayden, however, has tenaciously confronted one of the most difficult yet fundamental issues in biology, the species concept. Many authors have taken it for granted but Professor Mayden has systematically illuminated the topic from new perspectives and has improved our understanding of what is a species.

Professor Mayden's lecture, entitled *The Search for Biological Species as Fundamental Entities in Natural Science: Theory, Operations, Biases, and Resolutions*, summarized much of his own work on the topic. His talk posed an open end, what will be the overall unifying theory of species? Professor Mayden envisions a unifying theory, which can harness the amazing diversity of species concepts currently in use.

Dr. Richard L Mayden is the chairman of the Department of Biological Sciences with a William S. Barnickel Endowed Chair of Natural Sciences at the Saint Louis University since 2001. His research is focused on the fresh water fish diversity. He has conducted large-scale phylogenetic and biogeographic analyses of fishes from the North American fish fauna using a wide variety of techniques including both morphological and molecular data. He is also known for his interest in species concepts and speciation and has published several articles on the topic.



Dr. Mayden received his PhD at the University of Kansas in 1987, and was Curator of Fishes at the Ichthyological Collection, University of Alabama between 1987 and 2001. He has received several large-scale research grants, including for the ongoing collaborative research project "Systematics of Cypriniformes, Earth's Most Diverse Clade of Freshwater Fishes" which involves about 40 scientists from 13 nations. Dr. Mayden has published 123 articles in peer reviewed journals and 17 reports.

Lynne R. Parenti - Ardedi Lecturer 2005

Dr. Lynne R. Parenti is a pioneer in many respects. For example, she made phylogenetic analyses of a large group of fishes occurring in freshwaters on three, even four continents, down to genus level, and did a complete biogeographic analysis at a time when historical biogeography was not more than just invented. Even today, looking beyond one continent is a rare phenomenon in systematic analysis.

Dr. Parenti's lecture, named *The Relationship Between Biogeography and Phylogeny of Fishes*, demonstrated the need to include the biogeographic perspective. She started her lecture by describing the history of biogeographic research from about the time of Wegener. One of her conclusive points was that there is no separate biogeographic history for marine and freshwater fishes.

Dr. Lynne R. Parenti is Curator of Fishes and Research Scientist with the Division of Fishes, National Museum of Natural History, Smithsonian Institution, Washington, D.C., and also Adjunct Professor at the San Francisco State University, and The George Washington University. Dr. Parenti's ichthyological research focuses on the systematics and biogeography of tropical freshwater and coastal fishes, the phylogeny of teleost fishes, and comparative teleost anatomy and development, including application of underutilized character sets to understand the phylogeny and evolution of fishes. Dr. Parenti is widely recognized for contributions to the theory and methods of Historical Biogeography.

She graduated in Biology at the City University of New York in 1980, and has since conducted research at the Smithsonian Institution, The Natural History Museum (London) and the California Academy of Sciences (San Francisco).

Dr. Parenti is the author of 80 scientific publications, including co-editor of *Interrelationships of Fishes* (1996, Academic Press), and *Ecology of the Marine Fishes of*



Cuba (2002, Smithsonian Institution Press), and co-author of *Cladistic biogeography* (1986, 1999, Oxford University Press). She received the Annual Award (2002) from the Academia de Ciencias, Cuba, for an outstanding scientific publication for *Ecology of the Marine Fishes of Cuba*. Dr. Parenti is President of the American Society of Ichthyologists and Herpetologists, and member of the National Academy of Sciences US National Committee and DIVERSITAS. She was elected Honorary Fellow of the California Academy of Sciences in 1989, and Fellow of the American Association for the Advancement of Science in 2001.

Mutsumi Nishida - Artedi Lecturer 2005

Professor Mutsumi Nishida commenced his lecture with an overview of the molecular techniques he uses and the benefits of examining the entire mitochondrial genome. Several of the side-effects inherently present in nuclear DNA may be avoided by using the much less complex mitochondrial genome. It has about 17,000 base pairs in humans whereas the nuclear genome contains some 300,000,000 base pairs. He noted that due to the high number of fish species, close to 30,000, they choose their analyzed taxa carefully, to have a broad phylogenetic sample. Recent results have shown that many traditional groupings of fish species have little support from molecular data. The search continues and more species are added. However, Professor Nishida remarked, with the current pace of analyzing taxa it still would take more than one hundred and fifty years before his work is finished.



Professor Nishida works at the Department of Marine Life Science, Ocean Research Institute, The University of Tokyo. He conducts internationally renowned research on population genetics, phylogenetics, and evolution of aquatic animals, such as fishes and crustaceans. Using molecular techniques, he tries to provide reliable phylogenetic frameworks aiming to understand the evolution of biologically interesting characters, such as morphology, behaviour, or life history, from genetic and genomic viewpoints.

Professor Nishida is both a pioneer and an active researcher in molecular studies on the higher level relationships between fishes. He has also demonstrated great interest in population structures, adaptive radiation of fishes, and the speciation of pelagic marine fish species and has published several papers on those topics.

Professor Mutsumi Nishida received his PhD at Kyoto University, and was Assistant Professor and Professor at University of the Ryukyus and Fukui Prefectural University,

respectively. He spent a year and half at the University of California, Berkeley as a visiting scientist. He is also the current President of the Japanese Society of Ichthyologists, and serves as Vice-Director for the Ocean Research Institute, The University of Tokyo. His laboratory employs more than twenty students, graduate students, post-doctoral fellows and collaborators. Professor Nishida has published 151 articles in peer reviewed journals.

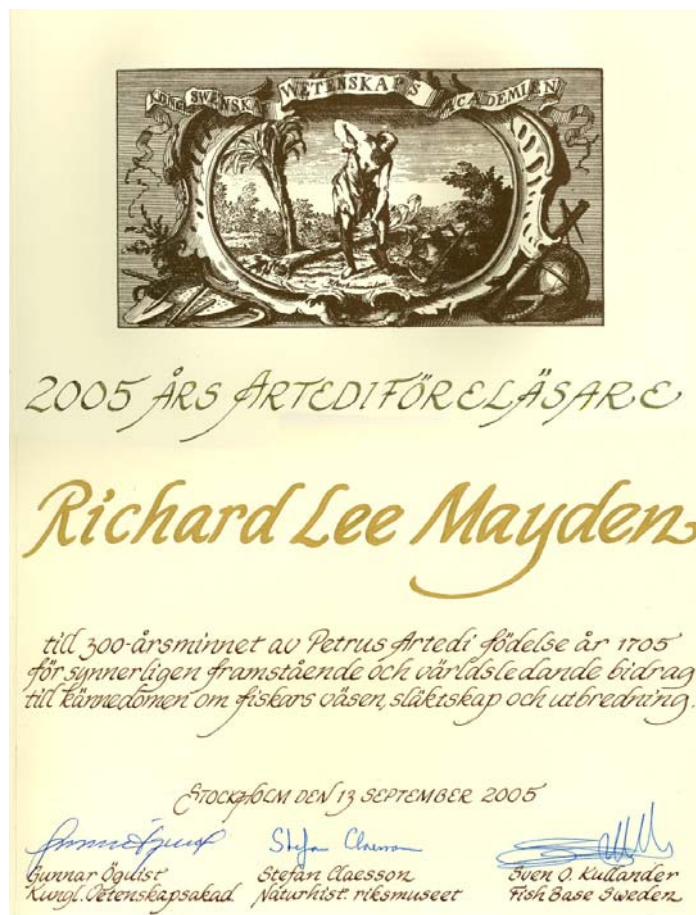
Artedi Lecturer Award

Professor Gunnar Öquist, Permanent Secretary of The Royal Swedish Academy of Sciences honoured each distinguished Artedi Lecturer with an award, established by the Royal Swedish Academy of Sciences, the Swedish Museum of Natural History, and FishBase Sweden to commemorate the birth of Petrus Artedi.

The motivation, in Swedish, reads:

...till 300-årsminnet av Petrus Artedi födelse år 1705 för synnerligen framstående och världsledande bidrag till kännedomen om fiskars väsen, släktskap och utbredning.

[...to the 300 year commemorial of Petrus Artedi's birth the year 1705, for particularly extraordinary and world leading contributions to the knowledge of the being, relationship, and distribution of fishes.]





Dr. G. David Johnson receives the Artedi Lecturer Award.



Dr. Maurice Kottelat receives the Artedi Lecturer Award.



Professor Richard L. Mayden receives the Artedi Lecturer Award.



Dr. Lynne R. Parenti receives the Artedi Lecturer Award.



Professor Mutsumi Nishida receives the Artedi Lecturer Award.

Plenary

The Petrus Artedi Tricentennial Symposium on Ichthyology was concluded with a plenary discussion, moderated by Dr. Ralf Britz from the Natural History Museum in London. Dr. Britz asked each Artedi Lecturer several questions as well some the audience. The first question was slightly more elaborate, relating to the Artedi Lecturers' own research and expertise. The second asked them to look into the future relating to their own research. The answers were varied but there was a common concern over the recruitment of both taxonomists and morphologists. Other topics discussed included species concepts, biogeography and how to interpret different results obtained from morphological data and molecular data.



The symposium was followed by a one-day open workshop on Collaborative Platforms for Ichthyology, held on the 14th of September at the Swedish Museum of Natural History.
