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Obituary: Michael C. Thorndyke (1946–2022)

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Obituary

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Photograph of Mike Thorndyke in 2008, taken by Sam Dupont. This recreates a photograph of Salvador Dali (with a starfish) taken in 1958 by Xavier Miserachs.

Michael (Mike) Charles Thorndyke was born on October 22nd 1946 in Walthamstow, east London, the eldest of the two sons of Alfred and Doris Thorndyke. Mike's interest in zoology began in childhood and his brother Chris recalls how on family holidays by the sea in Dovercourt, Essex, he was always rummaging around in rock pools collecting various marine creatures. When on holiday in Colwyn Bay in North Wales he would go on long hikes to collect bugs, which he would then keep in jars of ethanol. So it came as no surprise that this childhood enthusiasm led him to a BSc degree in Zoology at Queen Mary College (University of London), where he graduated in 1968 with 1st class special honours. Mike then proceeded onto doctoral research at Queen Mary, working under the supervision of Alan Thorpe and in collaboration with E.J.W. Barrington, Alan Thorpe's doctoral supervisor. Barrington was a pioneer in the field of comparative endocrinology, perhaps most notably for his research investigating the endostyle in invertebrate chordates as the evolutionary 'precursor' of the thyroid gland in vertebrates. Mike's doctoral research continued this tradition (Thorpe *et al.*, 1972) and he was awarded a PhD in 1971, having defended a thesis titled 'Ultrastructural studies on protochordate endostyles'.

Following lectureship appointments at the University of Dundee and the Institute of Urology (University of London), in 1974 Mike was appointed as a lecturer in the Department of Zoology at Bedford College (University of London) located in Regent's Park. Here Mike established a research programme that built upon his doctoral research, with a notable output being a paper in *Nature* reporting the presence of thyroglobulin-like immunoreactivity in the endostyle of the urochordate *Styela clava* (Thorndyke, 1978). He then shifted the focus of his research to the comparative physiology of peptide hormones, including a series of papers co-authored with Peter Bevis (Mike's first PhD student) and Graham Dockray that reported the biochemical and functional characterization of gastrin/cholecystokinin-type peptides in urochordates (Bevis & Thorndyke, 1981; Thorndyke & Bevis, 1984; Thorndyke & Dockray, 1986). A collaboration with Trevor Shuttleworth, also one of the 1968 class of Queen Mary Zoology graduates, and Rod Dimaline, enabled functional characterization of gut regulatory peptides in elasmobranchs (Shuttleworth & Thorndyke, 1984; Dimaline *et al.*, 1986). Accordingly, Mike's teaching activities at this time reflected these research interests, including a first-year Physiology module and an advanced module in Comparative Endocrinology.

Anticipating the merger of Bedford College with Royal Holloway College in 1985, Mike and other Bedford College biologists moved to the Royal Holloway campus at Egham. It was here where Maurice Elphick, first as an undergraduate and then as a PhD student, established with Mike a research project on neuropeptides in echinoderms. Then working in collaboration with David Price and Michael Greenberg at the University of Florida, the first echinoderm neuropeptides were identified (SALMFamides; Elphick *et al.*, 1991, 1995). In 1991 Mike was promoted to Professor of Comparative Endocrinology, heralding the beginning of a decade during which his research group and collaborators also began to investigate other aspects of echinoderm and urochordate biology, including molecular-based investigations of their remarkable capacity for tissue regeneration (Bollner *et al.*, 1995; Candia Carnevali *et al.*, 1998; Moss *et al.*, 1998; Thorndyke *et al.*, 2001). During this period at Royal Holloway, Mike took on many management and leadership roles – acting as Director of Research in the Biology Department and serving externally on the councils/committees of the University Marine Biological Station Millport, Bayliss & Starling Society, Company of Biologists, European Society for Comparative Endocrinology, Marine Biological Association, Society of Experimental Biology (SEB) and International Union of Biological Sciences (President of Comparative Physiology and Biochemistry Section). Mike also gave service to the editorial boards of several journals at this time, including *Comparative Biochemistry and Physiology* and *General and Comparative Endocrinology*, and was Editor of the SEB's *Experimental Biology Series*.

Over the years Mike often visited the Kristineberg Marine Research Station (KMRS) in Sweden for research on marine animals, developing a strong connection and affection for this special place. KMRS was created in 1877 on the initiative of Sven Lovén and is one of the oldest marine stations in the world. It has hosted many iconic scientists and was always a hot spot for marine research. In 2002, Mike was appointed as the Station's last Director for the Royal Swedish Academy of Sciences (KVA) and was instrumental in raising its reputation internationally. Here, together with Sam Dupont, he also established the brittle star *Amphiura filiformis* as an experimental system for investigation of the molecular and cellular mechanisms of development and adult regeneration (Dupont & Thorndyke, 2006; Dupont *et al.*, 2009). While acting as Director (2002–2008) and then later as Distinguished Chair of Experimental Marine Biology for the Swedish Royal Academy of Sciences and Head of International Development for the University of Gothenburg (2008–2014), he advocated application of new genome sequencing technologies in marine science (Sea Urchin Genome Sequencing Consortium, 2006) and helped the transition of KMRS to management by the University of Gothenburg in 2008.

Mike's move to Sweden coincided with growing international recognition of the impact of ocean acidification and climate change on marine organisms. This led to a resurgence of interest in marine science and recognition of an urgent need for federating existing regional and international marine station networks and encouraging the formation or reconstruction of new ones. Accordingly, Mike directed his energy towards many large-scale European and International projects. He acted as coordinator for the Association of European Marine Biological Laboratories (ASSEMBLE; https://www.assembleplus.eu/), facilitating access to over 30 marine biological stations and installations in various regions of the world's oceans and seas. He was also Scientific Coordinator and member of the Steering Committee for the European Marine Biological Resource Centre (EMBRC; https://www.embrc.eu/), a European research infrastructure that provides researchers and companies with access to marine organisms and the facilities to study them, including experimental facilities and technological platforms. Between 2008 and 2012, he was president of MARS (https://www.marinestations.org/), the European Network of Marine Research Institutes and Stations, and with the World Association of Marine Stations (WAMS), Mike recently signed a communiqué highlighting the critical need to support marine stations to achieve the goals of the United Nations Decade of Ocean Science for Sustainable Development (https://www.marinestations.org/wams/). Thus, Mike not only promoted the importance of marine stations, but marine research in general. He was instrumental in the development of EuroMarine, founded in 2014, which is a network of European academic or research organizations that are active in marine sciences (https://euromarinenetwork.eu/). Mike was also the Swedish representative on the European Marine Board. Already an Elected Fellow of the Royal Swedish Academy of Sciences since 2004, Mike was awarded the KVA Linnaeus Gold Medal in 2011 for his contributions to marine genomics and the international development of marine research stations.

In the early 2000s, Mike recognized the importance of addressing key marine global challenges and, together with Sam Dupont, developed up-to-date facilities at KMRS to perform ocean acidification experiments. Together, they published some of the first articles addressing the biological impacts of ocean acidification (Dupont *et al.*, 2008, 2010; Stumpp *et al.*, 2012), hosted dozens of visiting scientists and became recognized as international experts in the field. They were among the first to highlight the effects of ocean acidification on animal larval stages and the importance of dissecting the energy budget beyond calcification (Stumpp *et al.*, 2011, 2012). Mike was on the Scientific Advisory Board of the European Project on Ocean Acidification (EPOCA), the German BIOACID project on the Biological Impacts of Ocean Acidification, and his work with Sam Dupont was highlighted in key policy documents, including recent reports of the Intergovernmental Panel on Climate Change (IPCC) and the United Nations World Ocean Assessment Panel. Ocean acidification was also central in the work of the Centre for Marine Evolutionary Biology (https://www.gu.se/en/cemeb-marine-evolutionary-biology), which was established in 2008 at the University of Gothenburg with the support of a 10-year grant and has had an impressive scientific footprint at an international level (Johannesson *et al.*, 2022).

Post retirement, Mike continued to actively promote and contribute to those projects close to his heart. From 2014, Mike held positions as Emeritus Distinguished Chair in Experimental Marine Biology from the Royal Swedish Academy of Sciences, Professor in the Department of Biological and Environmental Sciences at the University of Gothenburg and Guest Professor at the University of Groningen where he contributed to the BSc course in *Marine Biology*. He was Editor-in-Chief for the *Journal of the Marine Biological Association of the United Kingdom* (JMBA) from 2012 to 2017. In 2016, he edited a special issue of JMBA on the emerging field of *Ocean and Human Health*, marking a significant departure from the normal content of the journal, in part due to collaborative work with Fiona McGowan, a social scientist. The content of this issue expanded to disciplines such as the Social Sciences (including economics and the law), and the biomedical and public health communities (McGowan *et al.*, 2016). He also continued his support for marine infrastructures as a member of the Scientific Advisory Boards of marine stations, including the Dove Marine Laboratory, the Finnish Marine Research Infrastructure, and the Marine Alliance for Science and Technology for Scotland.

In the last few years of his life, Mike and Fiona travelled many times to the island of Eleuthera in the Bahamas, where they were involved in local community outreach programmes. Going beyond his role as member of the Advisory Board of the Centre

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for Ocean Research and Education (CORE), Mike personally contributed to the involvement of young Bahamian students and communities in collection of marine data. He also secured funding through a Coordinated Research Project of the International Atomic Energy Agency (IAEA) to perform research on the effects of ocean acidification on seafood and to explore adaptation strategies for aquaculture and seafood industries. The work performed on the local conch is currently under analysis.

What this impressive catalogue of accomplishments does not capture is Mike's special personality. He was friendly, kind, generous, humorous and humble and it was these characteristics, together with his infectious enthusiasm and energy, that made Mike so effective in uniting and mobilizing people to accomplish objectives internationally. Accordingly, Mike's many important contributions to marine sciences will surely have long-lasting impact. Mike was also a loving husband, father and grandfather who had many interests outside of science, perhaps most especially a passion for music in all its forms. It was for us an honour, as for so many others, to be Mike's colleague and friend.

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