

OBITUARY

Jeffrey B. Graham

26 November 1941 – 8 December 2011



Fig. 1. Graduate student William Lowell (left) and Jeff Graham conducting an experiment on a leopard shark, *Triakis semifasciata*, in a swimming tunnel respirometer (one version of the ElasmotunaTron) at Scripps Institution of Oceanography, circa 1980. Photo from Scripps archives.

Jeffrey B. Graham (Fig. 1), a research physiologist, marine biologist and Senior Adjunct Lecturer at Scripps Institution of Oceanography, University of California San Diego, for over 30 years, succumbed to cancer on 8 December 2011 at his San Diego home. On 17 November 2011, only three weeks prior to his passing, Graham was honored with a day-long Festschrift held at Scripps, at which nearly 200 colleagues, current and former students, friends and family celebrated his scientific career and legacy. Jeff's long and distinguished research career focused on the evolution and comparative physiology, especially cardio-respiratory and locomotor physiology, of aquatic vertebrates. He published more than 165 papers, including a number in *The Journal of Experimental Biology*, many of them co-authored with students and colleagues from throughout the world. A total of 11 students received a PhD in his laboratory at Scripps.

As several speakers at the Festschrift noted, Jeff is best known for his work on species that 'break the rules', including air-breathing fishes, regionally endothermic fishes and the sea snake *Pelamis platurus*.

Jeff received a BA in Zoology in 1964 and an MS in Biology in 1967, both from San Diego State University (SDSU), where he worked with Richard Etheridge and Roger Carpenter. In 1970, he earned a PhD in Marine Biology at Scripps Institution of Oceanography under the direction of Richard Rosenblatt, followed by postdoctoral research at the Smithsonian Tropical Research Institute (STRI) in Panama. After seven years at STRI, where Jeff began his work on air-breathing fishes, tunas and *Pelamis platurus*, Jeff returned to SDSU as a lecturer, followed a year later by his appointment at Scripps. While at Scripps, Jeff served as Director of the Marine Biology Research Division and as Associate Director

of the Center for Marine Biotechnology and Biomedicine. In 1987 he received a John Simon Guggenheim Memorial Foundation Fellowship that allowed him to start work on a book, *Air-Breathing Fishes: Evolution, Diversity, and Adaptation*, which was published in 1997 and remains the authoritative reference on air-breathing fishes. As Tony Farrell stated at the Festschrift, Jeff's 'book is a marvelous example of the leadership he provided to our field. Absolutely nothing prior to this tome came close to its breadth and depth of coverage, and it will be a long time before its content is surpassed. Writing books is about leading others and this is exactly what Jeff's tome does.'

Jeff also made a number of other key advances in the field of comparative physiology, including discovering the function of the pericardio-peritoneal canal in sharks and hypothesizing about how late Paleozoic changes in global atmospheric oxygen and carbon dioxide levels affected the evolution of organismal physiology. A major accomplishment was the construction of the ElasmotunaTron, a large swimming tunnel respirometer that could be taken to sea to study locomotion, thermoregulation and cardiovascular function in large, regionally endothermic tunas and lamnid sharks, as well as related fish species (Fig. 1). Despite his many contributions, Jeff was not one to promote himself, but rather focused on moving the research forward, pushing students and colleagues to think more deeply about the data and to understand the underlying physiological mechanisms, and was driven to question how the unusual physiological characteristics he studied had evolved. In fact, he was working on several projects up until the time of his death.

In addition to his research, Jeff served as interim Executive Director of the Birch Aquarium at Scripps from 2000 to 2002. During his tenure, he revitalized the aquarium, helping to build the Lynne and Howard Robbins Shark Reef, a 13,000-gallon live shark exhibit, and introduced the aquarium's first seahorse exhibit, Secrets of the Seahorse, which received the Munson Aquatic Conservation Exhibit Award. Jeff recognized the Birch Aquarium's unique opportunity to communicate to the public the cutting-edge science being conducted at Scripps. To this end, Jeff started a monthly evening lecture series, in which Scripps scientists present public lectures on their research. The lectures continue to this day, as the popular Jeffrey B. Graham Perspectives on Ocean Science Lecture Series.

Not as widely known is the fact that Jeff was an accomplished artist who exhibited his work as a member of the Armchair Impressionists of San Diego County. He worked exclusively with oils on canvas and board. His subjects included both landscapes and seascapes, still life and portraits, including a fish-filled portrait of his good friend, Richard Rosenblatt (Fig. 2), which is displayed within the Scripps Institution of Oceanography Marine Vertebrate Collection. His artistic talents were often apparent in illustrations that were part of his scientific publications.



Fig. 2. Painting by Jeff Graham, showing his mentor Richard Rosenblatt in the center of a sea of fishes, which hangs in the Marine Vertebrate Collection of Scripps Institution of Oceanography. Photo credit: Nancy Graham.

In Jeff's own words, 'My scholarly journey began on land, moved into the sea, and considered the suite of physiological

adaptations acquired by groups moving between the two. Along the way I have enjoyed the generosity of mentors, the pleasures of discovery and the good camaraderie of like-minded friends and colleagues.' He will be missed by many, but his influence will continue through the students he has mentored and colleagues with whom he has worked.

Jeff is survived by his wife, Rosemarie, his son, Jeffrey, Jr, and daughters, Wendy and Erin, five grandchildren, his brothers, Doug and Barry, and his sister, Diana. To honor his memory, the Jeffrey B. Graham Perspectives on Ocean Science lectures will continue at the Birch Aquarium, and Scripps Institution of Oceanography has established the Jeffrey B. Graham Fellowship in Marine Biology to provide support for outstanding marine biology graduate students.

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