

ANNOUNCEMENT

In Memoriam



Professor George William Benz died from heart complications on the evening of Sunday 9 February 2015 at the age of 61 at his home in Murfreesboro, Tennessee, U.S.A. One is lucky to know a person who has a big mind and a big heart. George was that person. For students and colleagues that he trained and collaborated with, George was as if a big brother, little brother, best friend, father, or combination of those depending on the situation. As demonstrated by his fierce loyalty to, and reverence for, his advisors and mentors, I believe he considered himself as if a son to those who trained him. He dedicated much of his life to advocating for his students and helping others succeed; swelling with pride for others' successes.

George's research interests were broad, but he especially loved the siphonostomatoid copepods that infect the skin, gill, and "snouts" of elasmobranchs. While becoming established as an authority on that group, he also became expert on fish diseases for the

public aquarium industry, freshwater aquatic conservation issues in the southeastern United States, and Arctic biology via studies of sleeper sharks and their polar ecosystem. He built a research institute from the ground up, and, although he became a professor late in life, throughout his career he maintained productive professional collaborations with university faculty and their students as well as state and federal aquatic biologists. George and coauthors proposed a new family and 5 genera as well as described 17 new species; among them copepods, pentastomes, monogenoids, and leeches. In addition to publishing 76 peer-reviewed articles, 12 book chapters and proceedings, a book, and numerous book reviews and critical comments, George was a potent spokesperson for parasitology, aquatic conservation, and marine biology; his investigations being featured on television (*National Geographic Channel*, *British Broadcasting Channel*, *Discovery Channel*) as well as in print media (*National Geographic*, *Discover*, *Highlights for Children*, *Der Spiegel*). In addition to being a professor and distinguished researcher at Middle Tennessee State University (MTSU), he was a research associate and adjunct faculty with the National Marine Fisheries Service (Narragansett, Rhode Island), Mote Marine Laboratory (Sarasota, Florida), Tennessee Aquarium (Chattanooga, Tennessee), Warnell School of Forest Resources (University of Georgia, Athens, Georgia), and the School of Fisheries, Aquaculture, and Aquatic Sciences (Auburn University, Auburn, Alabama).

George was a natural-born mentor, and, wherever he was, always created space and time for introducing students to the methods and philosophies of science. He believed, "everyone deserves an at bat," i.e., a chance to be a productive worker given the appropriate initial training, feedback, and access. He went out of his way to give opportunities to eager students as well as second and third chances to those who stumbled. He chaired 7 graduate committees and served as a committee member for numerous other graduate students at MTSU, the University of Connecticut, the University of Georgia, Saint Mary's University, the University of Tennessee Chattanooga, and the

University of Windsor. He was a long-time member of the Southeastern Society of Parasitologists (president 2000; vice president 1997), American Society of Parasitologists, American Fisheries Society, American Elasmobranch Society, and World Association of Copepodologists. He was an editor for the *Journal of Parasitology* (2000–2009) and *Acta Ichthyologica et Piscatoria* (2003–2015), and he provided expert ad hoc reviews for 28 journals covering parasitology, ichthyology, marine biology, and aquatic sciences. As a dedicated scientific citizen, George's ad hoc reviews could be as long as or longer than the manuscript being reviewed. He pored over manuscripts and provided excellent feedback, seldom refusing a review assignment, and even providing the authors with a handwritten, red-marked hardcopy (later as a scanned PDF) of grammatical and editorial comments covering the title of work through the last reference. He also refereed for the National Science Foundation, Natural Sciences and Engineering Research Council (Canada), National Geographic Society, U.S. Geological Survey, and Smithsonian Institution's Scholarly Studies Program. Two parasites are named in his honor: *Kroeyerina benzorum* Deets, 1987 and *Selachohemecus benzi* Bullard, Overstreet, and Carlson, 2006. The 2015 meeting of the Southeastern Society of Parasitologists (Blacksburg, Virginia) was held in his honor, and Izawa (2015, *Crustaceana* 88[3]:359–384) is dedicated to his memory.

George said that his 2 best life decisions were partnering with Judi ("Jude" to George) and studying parasitic copepods. George and Judi were married in 1974 and, as newlyweds, could be observed at shark fishing tournaments in Long Island or Rhode Island, sleeping in their car, or dissecting sharks dockside in pursuit of parasitic copepods. Those of us who knew George are lucky to also know Judi: a professional woman of superhuman work ethic, patience, warm kindness, adaptability, and physical strength (Judi won back-to-back Ms. Universe Light Heavyweight Division titles in 1987 and 1988 plus 18 national and regional titles). George often referred to Judi as his "rock," and she counterbalanced George such that his various idiosyncrasies and adventures in life never became pathological. She was there for everything significant that happened in George's life.

In 1972, then 18-year-old George enrolled as an undergraduate biology student at the University of Connecticut (Storrs). He first gained exposure to parasitology in the classroom and laboratory of Lawrence Raymond (Larry) Penner (1913–1985; Professor of Para-

sitology, University of Connecticut, Storrs [UConn]). Larry was George's first parasitological mentor and had a big influence on him as a young scientist. Soon after Larry died in 1985, George named *Dermophthirius penneri* Benz 1987, an ectoparasitic monogenoid that infects the skin of blacktip sharks to honor his "good friend and advisor" (Benz, 1987). Around this time, George began attending big game fishing tournaments along the New England coast in Long Island as well as Rhode Island, sampling sharks and amassing a diverse collection of parasites, which he worked up in Larry's laboratory. In 1976, George graduated with his B.Sc. from UConn and began a M.Sc. in Renewable Natural Resource Conservation with Walter (Wally) R. Whitworth (Professor of Fisheries, UConn). In 1977, at 23 years old, George attended the Southern New England chapter meeting of the American Fisheries Society (Danvers, Massachusetts). There, he introduced himself to Harold L. (Wes) Pratt, Jr., who was stationed at the Northeast Fisheries Science Center, National Marine Fisheries Service (NMFS; Narragansett, Rhode Island) and who immediately introduced George to his boss John G. (Jack) Casey. Jack founded and managed the NMFS Cooperative Shark Tagging Program. Since George and Judi were routinely attending and collecting parasites from shark fishing tournaments, George began to regularly cross paths with Wes, Jack, and other NMFS personnel who were likewise using the tournaments to collect vital data on landed sharks. As a Ph.D. student, George would later name the parasitic copepod *Kroeyeria caseyi* Benz and Deets, 1986 in honor of "good friend and shark expert" Jack, whom had ultimately come to serve on George's M.Sc. committee at UConn.

In 1978, George went to sea with the NMFS troops to longline for swordfish and sharks in the northwestern Atlantic Ocean aboard the cooperating Polish fishing vessel *Wieczno*, and in 1979 George graduated with his M.Sc. degree from UConn. The samples for his resulting thesis were sourced from New England shark fishing tournaments plus the 1978 *Wieczno* cruise. Cruises aboard the National Oceanic and Atmospheric Administration (NOAA) R/V *Delaware II* occurred thereafter, and George's parasite collections from these cruises resulted in several published papers on parasitic copepods of sharks. The bench work for these published papers occurred in Larry's laboratory at UConn. After completing his M.Sc. degree, in 1980, for a short time George worked in the laboratory of Dr. Eugenie (Genie) Clark (The Shark Lady, 1922–2015; Department of Zoology, University

of Maryland, College Park). This put George within a prestigious academic lineage: one that traces back ultimately to George Cuvier (1769–1832) via Genie's Ph.D. advisor Carl Leavitt Hubbs (1894–1979), Hubbs' advisor David Starr Jordan (1851–1931), and Jordan's advisor Louis Agassiz (1807–1873), who was Cuvier's student. George's first scholarly works were submitted from Genie's laboratory.

Later that year, George began working as a fisheries biologist with the State of Connecticut while moonlighting as a parasitologist, analyzing animals in Larry's laboratory at night. In the early summer of 1984, George and Judi met Gregory (Greg) B. Deets during a trip to California. Greg had corresponded by mail with George previously after the two had become aware of each other's published works on siphonotomatoid copepods, but from opposite sides of the country. Soon after their meeting, both George and Greg began planning the next phase of life in pursuit of copepods: moving to the University of British Columbia (UBC) in Vancouver to work with Daniel (Dan) R. Brooks, who at that time had recently just arrived to UBC and whose interests in cladistic analyses and parasitology were a good fit. Soon thereafter, George attended the Second International Conference on Copepoda (ICOC) held in Ottawa, Canada, on 13–17 August 1984. There, he had the incredible good fortune of meeting and interacting with several gods of copepodology: Bob Kabata, Arthur Grover Humes (1916–1999, Boston University, Woods Hole Oceanographic Institution), and Roger Frank Cressey (1931–2001, National Museum of Natural History, Smithsonian Institution, Washington, DC; a student of Humes) as well as then rising stars (now established authorities on copepods) Kazuya (Kai) Nagasawa (also a student of Humes) and Geoff A. Boxshall.

After beginning his Ph.D. program at UBC with Dan in the fall of 1985, George began focusing on the taxonomy and host–parasite relationships of siphonotomatoid copepods. When Dan relocated to the University of Toronto, Martin Adamson subsequently took over as George's committee chair. Also during this time, George and Greg were interacting routinely with Bob Kabata, who was thrilled about their interests in copepod taxonomy. Martin recalled, "I remember how much Bob Kabata loved them; I cannot overstate the degree to which he appreciated them." George and Greg flourished as scholars of parasitic copepods as well as miscellaneous other groups of parasites that captured their interests. George's publications from this period, many coauthored with Greg, treated para-

sitic copepod taxonomy, life history, and pathobiology as well as parasitic nematodes and flatworms. By the end of his Ph.D. program, George had published or submitted approximately 20 manuscripts since arriving at UBC.

In 1991, George and Judi both accepted positions at the Tennessee Aquarium (Chattanooga, Tennessee; hereafter "aquarium"), which at that time was the largest freshwater aquarium in the world. Judi was hired to manage retail ticket sales personnel, overseeing about 200 employees. George was hired to oversee setting up the exhibits, equipping the husbandry and water quality laboratories, and advising on aquatic animal health and quarantine procedures. George earned his Ph.D. from UBC in 1994 and was promoted to Chief Research Scientist at the aquarium. He would remain in this role until 2003, upon shifting to a tenure-track position at Middle Tennessee State University (Murfreesboro, Tennessee). Sharks are a mainstay attraction for the public aquarium industry, but some of their ectoparasites are serious pathogens in confinement. As such, George's years of experience in collecting, identifying, and studying the biology of shark parasites served him well in the aquarium industry. Not surprisingly, the industry soon identified him as one of several experts on control and treatment of diseases of captive sharks.

George soon convinced the aquarium's administration and board of directors to back a research institute. Opened in 1997, he was the founding director of the Southeast Aquatic Research Institute (SARI), the Tennessee Aquarium's research and conservation unit. SARI provided a platform with which to host research interns under the aquarium's umbrella, and George used it as a training ground for several students who would go on to become graduate students in the aquatic sciences and parasitology. George built the institute from the ground up, initially (1994–1996) hosting students in the top floor of the aquarium's main building. In 1994, George hosted the *Aquatic Fauna-in-Peril Conference* in Chattanooga, the first meeting of its kind specifically focused on imperiled fauna of the southeastern USA. As an outcome of that meeting, in 1998, he coedited the book *Aquatic Fauna In Peril: A Southeastern Perspective*. This was the first integrated and distilled information on imperiled aquatic species in the southeastern United States, which included an endorsement from Edward O. Wilson and chapter contributions from senior biologists who had been working in the region for decades. The book includes both conservation status and management

chapters for each major faunal group. In 1998, George hosted the TRAFFIC meeting, *Symposium on the Harvest, Trade, and Conservation of North American Paddlefish and Sturgeon*, organizing also its proceedings. In 1999, he hosted the inaugural meeting of the Freshwater Mollusk Conservation Society in Chattanooga.

These achievements are a testament to George's ability to engage others and very rapidly get up to speed on issues and complex problems. Before being hired at the aquarium, George had little experience with nongame inland fishes or freshwater invertebrates and, as a New Englander, he was a newcomer to the region and its culture. Yet, only a few years after immigrating to the southeastern United States, George had become deeply involved and familiar with, and was playing a leadership role in, regional conservation issues in Tennessee and adjacent states. Of course, all the while George maintained a steady stream of scholarly contributions on copepod taxonomy and parasitology, which he coauthored with his own SARI interns as well as colleagues abroad. George affected the lives of many students at SARI, including (chronologically) William (Bill) Sullivan, Joshua Kohl, Jeffery Braswell, Ryan Otting, Brian Smith, and Thomas Tarpley, as well as 3 students who would later go on to earn graduate degrees in Parasitology from Robin M. Overstreet (Gulf Coast Research Laboratory, Ocean Springs, Mississippi): Kristy Smedley, Josh Cook, and me.

A powerful field biologist, George thought that field work was critical in helping students learn about themselves and their career path. By working with his friend, Mark A. Grace (NMFS Southeast Fisheries Science Center, Pascagoula, Mississippi), who in 1995 had initiated shark longline surveys in the Gulf of Mexico, he developed a pipeline for sending SARI interns to sea to collect parasites from landed sharks. Beginning in 1995, these included cruises aboard the NOAA R/V *Oregon II* and later included NOAA R/Vs *Gordon Gunter* and *Pisces*. George cherished these cruises and felt great about the opportunity to place students on them as well.

In 1996, George accompanied professional photographer and filmmaker Nick Caloyianis to Arctic Bay (Baffin Island) on an expedition to document Greenland sharks swimming under the ice for National Geographic Magazine. George's gateway interest to sleeper sharks was, naturally, in the lernaecopodid, *Ommatokoita elongata*, which embeds its bulla (attachment structure) in the cornea of the Greenland shark. The exploits of this expedition are documented

in the September 1998 issue of National Geographic Magazine: *Greenland sharks* (1998; 194[3]: 60–71). The opening double-page wide image for the article is a Greenland shark with a female *O. elongata* dangling from its eyeball: only George could make an enigmatic parasitic copepod beneath the Arctic ice the star of a National Geographic article. George is featured in a full-page image wrenching a 3-m-long Greenland shark from the icy waters. In another large article photo, George's inverted image is seen through a shark eye lens. In May 1999, George and Greg Skomal accompanied Nick to the Arctic for a second expedition. They worked with local Inuit guides and transited many miles across the frozen Arctic sea acoustically tracking Greenland sharks. Cuts from this trip were spliced into Discovery Channel's *Jurassic Sharks* in July 2000. With titles like *Shark Research at the Top of the World*, *Sharks under ice!*, *In Search of the Ice Shark*, and *Putting the Bite on Jaws*, George also packaged these scientific adventures into public lectures for public aquaria. Audiences for these lectures included a large number of conservation-minded citizens, and George used these lectures as a teaching opportunity to discuss the process of biological investigation; including statements like, "sometimes we have to kill things to learn from them" (to introduce slides of seals used as shark bait as well as hemisected Greenland sharks). Additional media coverage of the Greenland shark work comprised *Corkscrew killer* (2009; National Geographic Explorer TV) and *Alaskan Killer Sharks* (2009; National Geographic Channel), as well as pieces in *Der Spiegel*, *Der Standard*, *Highlights for Children*, and *Discover*.

As SARI continued to grow with George at the helm, in 1998 he hired Paul D. Johnson (now at the Alabama Department of Conservation and Natural Resources, Marion, Alabama). In 1999, George and Paul moved SARI to the site of a former federal fish hatchery in Cohutta, Georgia. There, the institute occupied a large house across the street from the hatchery facility and took advantage of its recirculating aquaculture systems. They renovated and built new systems supporting sturgeon, snails, freshwater mussels, crayfishes, and various stream fishes. George again was entering into a new realm and charging full steam ahead. George, Paul, and colleagues handled a tremendous diversity of projects via SARI that covered several states: the Mobile River Basin freshwater mollusk recovery program, freshwater mussel inventories for the Upper Coosa River, Duck River, and Cahaba River, lake sturgeon reintroductions in the Tennessee



Figures 1–6. 1. George, aside the omnipresent 5-gallon specimen buckets marked “Benz,” bio-illustrating a copepod with aid of a Wild M-11 compound microscope equipped with drawing tube; probably in Dr. Larry Penner’s laboratory at the University of Connecticut, Storrs (ca. 1977); 2. National Marine Fisheries Service science crew aboard NOAA R/V *Delaware II* posing before a male bigeye thresher shark (*Alopias superciliosus*) landed in the Northwestern Atlantic Ocean. From left to right: Gregory B. Skomal, unidentified, John G. (Jack) Casey, Charles (Chuck) Stillwell, Nancy E. Kholer, Harold L. (Wes) Pratt Jr., John J. Hoey, George W. Benz. Crouching: Jill Scharold and Francis G. (Frank) Carey (ca. 1980); 3. George displays freshly trawled angel sharks (*Squatina dumerili*) during a National Marine Fisheries Service deepwater trawl survey aboard the NOAA R/V *Gordon Gunter* (14 October 2002); 4. George (right) and Eric Salmon dissecting killifishes in search of parasites after the 2010 BP *Deepwater Horizon* Oil Spill at the Grand Isle Marine Fisheries Laboratory, Barataria Bay, Louisiana (21 October 2010); 5. George with field team in Barataria Bay, Louisiana (left to right: Eric Salmon, Stephanie Cox, Clint Edds, the author, George, and Carlos Ruiz) 16 May 2011; 6. George and the author (aside) with members of the Aquatic Parasitology Laboratory at Auburn University (left to right: Margaret Maynard, Matthew R. Womble, and Raphael Orélis-Ribeiro).

River Basin, Tennessee River Gorge turtle conservation initiative, experimental fish host determinations for several Georgia freshwater mollusks, Georgia bog turtle conservation, and barrens topminnow restoration. Currently under the direction of Anna George and located in Chattanooga, Tennessee, the institute (now called the Tennessee Aquarium Conservation Institute [TNACI]) has expanded to occupy a state-of-the-art 14,000 ft² facility located on the banks of the Tennessee River. TNACI annually awards a fellowship in George's honor: The George Benz Fellowship. During his time as director of SARI George published 25 peer-reviewed articles, yet he remained keen on advising/chairing his own graduate students, lecturing on a big university campus, and being immersed in an academic setting and culture.

After flirting with a few such positions in Alabama and Mississippi, in 2003, George accepted a tenure-track position in the Department of Biology at Middle Tennessee State University (Murfreesboro). In 2008, George was promoted to Professor. At MTSU, George carried a heavy teaching load (12 or more contact hours per semester) and instructed undergraduate majors' core courses as well as electives and nonmajors' courses, including freshmen biology, ichthyology, marine biology, and graduate seminar. George was very happy at MTSU, having landed among a group of close colleagues with whom to converse and collaborate on a daily basis, including R. Stephen (Steve) Howard, Andrew (Andy) Van Zandt Brower, Sarah Bergemann, and Chris Herlihy. A valued departmental citizen but not always the voice of popular opinion, George spoke his mind and fought the good fight to keep standards high, pushing back on so-called (now ubiquitous) retention policies and the other forms of loosening or lowering of academic standards. George thought of lecturing as a wonderful privilege and put a lot of heart into his courses; spending an inordinate amount of time meticulously preparing or updating lecture notes and PowerPoint presentations for his undergraduate and graduate students. Although he toyed with the idea of having some of them converted for distance learning (online courses), his enjoyment in lecturing and interacting with his students first-hand precluded that from ever happening. For some courses, he would require extensive writing assignments, which he would evaluate at different stages of manuscript development by the student; in essence simulating the process of coauthoring a manuscript with a student.

While at MTSU, George trained graduate students Andrew McElwain (now at the State University of

New York, Oswego), David R. (Randy) Stewart (now at the U.S. Fish and Wildlife Service, Southwest Region, Albuquerque, New Mexico), and Eric R. Salmon, and he cochaired Ph.D. student Susan Dippenaar (now at the University of the North, South Africa). Subsequent to the 2010 BP *Deepwater Horizon* oil spill, George and I were funded by the National Science Foundation to explore the ecological effects of the spill in Barataria Bay, Louisiana. This project involved several undergraduate and graduate student trainees and required extensive field work around Grand Isle. George loved working in this area and relished in the opportunity to explore the marshes of southwestern Louisiana. His laboratory at MTSU also supported undergraduate researchers, Bailey McMeans, Joy M. Young (now at the Florida Fish and Wildlife Conservation Commission, Tequesta, Florida), and Kaitlen Howell. At MTSU George published 24 peer-reviewed articles and 2 book chapters treating topics ranging from the taxonomy and biology of fish parasites, to sleeper shark biology and movements, to stable isotopes, to inland fisheries biology, to host-parasite relationships. The last publication George completed is a beautiful presentation of the life of his hero, Bob Kabata, which George crafted in close partnership with Timothy (Tim) M. Goater (Vancouver Island University, Vancouver). Its title perhaps communicates George's desire to understand the makings of great scientists: *Zbigniew Kabata-Metamorphosis of a Parasitologist*. George was immensely proud of this work and spent the better part of the last year of his life writing it. George regarded Bob as a fearless gentleman and scholar.

Steve Howard, George's close friend and colleague at MTSU stated that, "George was the most fearless colleague that I knew." Throughout his career and threading through all of his actions and words, George put his students, colleagues, and friends before his own self interests. He was fearless.

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