In memoriam:

Charlie D. Drewes (1946-2005)

Our colleague and friend, Dr. Charles D. Drewes (Charlie), passed away on 4 July 2005, in Ames, Iowa, USA, at the age of 58. Charlie was a University Professor and member of the Ecology, Evolutionary and Organismal Biology Department, Iowa State University (IaSU) in Ames. He is survived by his wife, Jacqueline Drewes, her parents Leo and Geraldine Doyle and family members; a son, Thomas and his wife Anne McLaughlin; a daughter Steffi; his parents, Henry and Meta Drewes; one brother, John Drewes and his beloved friend, Carol Warfel; and one sister, Ellen Drewes-Stoen and her husband, Erik Stoen.

Charlie was born on 11 September 1946 in Bertha, Minnesota. He completed elementary education in Floodwood, MN, then secondary education (7th grade-high school) at Mountain Lake Public School in Mountain Lake, MN, where his father served as district superintendent. While in high school, Charlie tried just about every sport offered, but his family’s affinity for education and biology likely nurtured Charlie’s interests in the biological sciences: his father was a math and science teacher, his brother a biology major, his mother regularly took her children out for nature walks, and often went bird-watching with Charlie, and his sister Ellen is a professor in the Health & Physical Education Department at Luther College, in Decorah, Iowa.

Soon after graduating from high school in 1964, Charlie enrolled as an undergraduate student at Augustana College in Sioux Falls, South Dakota, earning a bachelor’s degree in Biology from there in 1968. Later that year, Charlie entered Michigan State University (MSU) in East Lansing; soon after, he was accepted as a National Science Foundation pre-doctoral fellow, maintaining that status for the years 1969-1972. Charlie was awarded a masters degree from MSU in 1970; he continued his graduate education at MSU, receiving a doctoral degree in Zoology with specialty in Neurobiology in 1973. His doctoral thesis was entitled “Neuromuscular Physiology of the Longitudinal Muscle of the Earthworm, *Lumbricus terrestris* Linnaeus.”

Charlie joined the Zoology Department of Iowa
State University in 1974, was promoted to Professor in 1981, and was awarded the title of University Professor in 2003. During his tenure at IaSU, Charlie collaborated with numerous students (as well as other colleagues), in their conduct of research in the areas of invertebrate neurobiology, neurotoxicology, and environmental toxicology; together, they published 75 refereed articles and book chapters. He served as mentor for seven PhD and 12 MS students. One of Charlie’s most significant research contributions was the creation of a non-invasive technique for recording action potentials in the giant nerve fibers of moving earthworms – a technique that he subsequently applied to studying the process of nerve regeneration and to detecting sub-lethal levels of toxicants in the environment. He discovered and documented a totally new type of helical locomotion – worms propelling themselves in a screw-like fashion through the water. He also worked extensively with the aquatic oligochaetes Branchiura sowerbyi and Lumbriculus variegatus, presenting some of his research findings at two of the triennial International Symposia on Aquatic Oligochaete Biology: Baton Rouge, Louisiana, USA (1988), and Presque Isle, Maine, USA (1997).

Charlie was well known for his excellence in and love of teaching. He taught a variety of courses, including Advanced Vertebrate Physiology, Neurobiology, Invertebrate Zoology, and Bioethics. One graduate student, Karri Haen, said of him after taking his Bioethics course: “Dr. Drewes’ greatest accomplishment as a professor was his ability to inspire students about biological issues, not by teaching mere facts and figures, but by arming students with the vigilance of critical thinking”.

Charlie was known as a creative, witty, and enthusiastic teacher. One typical assignment in his invertebrate class was to have the students write a diary entry entitled: “A Day in the Life of…” written from the perspective of a worm, snail, or some other invertebrate. He was an ‘idea person’ who created new teaching techniques, strategies, or gadgets on a daily, if not hourly, basis; he was well known for sharing these ‘inventions’ with his students and fellow staff at IaSU, and always seeking opinions on its application, effectiveness, and aspects that might need improvement or modification. Charlie’s most obvious passion was encouraging teachers, at all levels, to use hands-on classroom activities, often involving invertebrate animals. Knowing that most teachers have small budgets, he invented and built less expensive alternatives for such things as dissecting scopes, fiber optic lights, and equipment for listening to muscle contractions, always making them available on a non-profit, cost-recovery basis. He shared all his creations by giving workshops at the Iowa Lakeside Laboratory near Milford, Iowa, by establishing and maintaining a website loaded with teaching resources, and by giving presentations at Iowa Science Teachers conferences and at the National Association of Biology Teachers. In 1996, Charlie was an invited presenter in several workshops and special courses related to biology education, including the Woodrow Wilson National Fellowship Foundation, for which he served as guest instructor during the Foundation’s summer institute in Neurobiology for high school biology teachers at Princeton University. Charlie was involved in the organization and presentation of over 60 workshops and special courses during his professional career. As an extension of his love for science education, he distributed boxes full of free materials and equipment for the teachers when he gave presentations – often to standing-room-only audiences. Brad Williamson (a high school science teacher in Iowa, USA, and past president of the National Association of Biology Teachers, stated (in pers. comm. to E. Farrar):

“Each of the last 5 years, my wife, in her capacity as science coordinator for our school district, has invited Charlie Drewes to present workshops to our teachers and advanced biology students. He’s always been invited back because he has proven to be both a valuable resource and an inspiration. He brings his physiology equipment, his worms, his homemade equipment, an infectious curiosity and his weird sense of humor. Each year we find more and more of Charlie’s influence showing up in our teachers’ lesson plans and in our students’ individual research projects.”

Charlie gained state and national recognition for his teaching and received many awards such as an Outstanding Teacher Award from Iowa State in 1991
and the Distinguished Science Teaching Award from the Iowa Academy of Sciences in 1998. In 2001 he was presented an award from the Iowa Community College Teachers Association, a group he helped to organize. In 2004, the National Association of Biology Teachers http://www.nabt.org/named him the National College Biology Teacher of the Year. He was a recipient of numerous research grants during his career, and was successful in obtaining grants from several funding agencies to support workshops focused on science education, the development of biology teaching tools, and the organization of educational outreach initiatives.

Charlie was a colleague and dear friend to most with whom he interacted, both professionally and personally. Clark Ford (IaSU Associate Professor of Food Science and Human Nutrition) described Charlie as “a gentle soul, someone who cared about the world and about other people. He was real, and tended to shy away from the showy, the pompous, and the ostentatious.” Charlie loved and participated in many different sports during his lifetime. He was a football quarterback at IaSU for one year, but after sustaining an injury, decided that he would rather use his brain in a different way. He was an avid racquetball player, dominating the regional competition until ‘retiring’ from the sport in 1996. Charlie was an avid fossil hunter. He loved to read and discuss his favorite books, which included “Ishmael: An Adventure of the Mind and Spirit” by Daniel Quinn (1995), “The Hitchhikers Guide to the Galaxy” by Douglas Adams (1980), and “A Sand County Almanac” by Aldo Leopold (1989) – from which an appropriate reflection by IaSU graduate student Karri Haen is taken [Leopold’s description of the seasonal migration of geese]:

“The flock emerges from the low clouds, a tattered banner of birds, dipping and rising, blown up and blown down, blown together and blown apart, but advancing, the wind wrestling lovingly with each winnowing wing. When the flock is a blur in the far sky I hear the last honk, sounding taps for summer.”

Throughout his career, Charlie humbly crafted a living legacy for scientific research, and perhaps more importantly, for critical thinking and excellence in science education. This may be best expressed through one of his favorite proverbs “Learning without thought is useless. Thought without learning is dangerous” (Confucius, ~551-479 BC). With this philosophy, Charlie has helped to lead a generation of young Iowa State scientists and scholars into the future with more ethically and socially conscious minds. Other favorite and aphorisms of Charlie, often shared when teaching, are posted via a link from his website entitled Off the Beaten Path: Assorted biology images, musings, and antiquities.

The Zoology Department at IaSU continues to host the extensive website<http://www.eeob.iastate.edu/faculty/DrewesC/htdocs/> that Charlie established and continually enhanced with new information and resources during his life – an incredible repository of educational materials he developed for (and in collaboration with) biology teachers at all educational levels, as well as electronic images related to biology education. According to the retrieval ranking of ®Google, his website was, at the time of his death, ranked #1 for the search phrases ‘invertebrate biology’, ‘invertebrate locomotion’, ‘invertebrate biology teaching’, and ‘distance mentoring in biology’ (excluding the ranking for the Journal of Invertebrate Biology). Please be sure to visit this website, and incorporate the resources Charlie has so unselfishly provided for public use into your own teaching opportunities.

Dr. Charlie Drewes – educator, scientist, colleague, and friend – is greatly missed by his family and countless friends, teachers, students, and research collaborators. We can honor Charlie’s diverse, positive influences on our lives in a way that he certainly could appreciate – by living and sharing his philosophy: contributing to and maintaining excellence in science education, and demanding that all scientific research have an ethical base.

Acknowledgements

I thank Jacqueline Drewes, John Drewes, Ellen Drewes-Stoen, Karri Haen, and Dr. Jonathan Wendel (Professor and Chair, Ecology, Evolution, and Organismal Biology Department, Iowa State University) for their contributions to this memoriam. I also thank Eugenia Farrar, former administrative assistant in Charlie’s department at IaSU, and often the ‘first responder’ to Charlie when he had a new invention to demonstrate; an obituary prepared by Eugenia soon after Charlie died, then posted on an
IaSU website, provided the framework for this memoriam.

**Literature Cited**


**Publications of Dr. Charlie D. Drewes (listed chronologically)**


Drewes, C. D. M. R. Denney, B. O’Gara & E.P.


355-366.


Mark J. Wetzel
Division of Biodiversity and Ecological Entomology, Illinois Natural History Survey, USA.