Resolution of Respect

Stanley Ivan Dodson

1944–2009

Stanley was born on 26 July 1944 in Lincoln, Illinois to Ivan Frank Dodson and Dorothy Wanda Dodson. When he was 10 years old his family moved to Grand Junction, Colorado where his father had an opportunity to prospect for uranium. It was there that Stanley learned his love of the West, deserts, mountains, and ponds. After graduating from Grand Junction High School in 1962, Stanley attended Yale University and obtained a Bachelor of Science degree in 1966, conducting research with John Brooks for his undergraduate Honors Thesis. While at Yale he met Virginia Elizabeth Joseph, and they married on 16 January 1967. Stanley and Ginny enrolled in doctoral programs with Tommy Edmondson at the University of Washington, where Stanley received his Doctorate in Zoology in 1970. He spent his entire professional career on the faculty in Zoology at the University of Wisconsin in Madison from 1970 until his retirement in 2008. Stanley's life was cut short on 23 August 2009 when he died of injuries sustained in an accident while bicycling at the Colorado National Monument near Grand Junction. He is survived by his wife, Ginny, his daughter, Sarah Emily Dodson Wilson, his son-in-law, Ian David Sobaczewski Wilson, his grandchildren, Kate Lorraine Wilson and Henry August Wilson, his mother, and his sisters Dian April Dunn (Frank) and Sarah Annette Martin. He was predeceased by his father.

Contributions to ecological science

Stanley Dodson made many important contributions to aquatic ecology and to ecological science in general. He began his distinguished research career working with John Brooks during his second year as an undergraduate at Yale. Stanley may be best known as a coauthor of the widely cited classic paper published in *Science* (Brooks and Dodson 1965, cited over 1800 times), which established two hypotheses to explain variation in the size composition of zooplankton over space and time in Connecticut lakes: (1) "size-selective predation" by planktivorous fish (alewives) eliminates larger-bodied species; and (2) larger-bodied species have a competitive advantage over small zooplankton where alewives are absent ("the size–efficiency hypothesis"). This work became the subject of his undergraduate honors thesis.

Intriguingly, Stanley's subsequent dissertation research on the freshwater zooplankton communities of ponds in the Mexican Cut Preserve near the Rocky Mountain Biological Laboratory (RMBL) in Western

Colorado experimentally disproved the "size–efficiency hypothesis", demonstrating that larger herbivorous zooplankton were not superior competitors to smaller species (Dodson 1974*a*). Alternatively, Stanley demonstrated that larger, predatory zooplankton consumed smaller species, explaining why larger species predominated in the absence of vertebrate planktivores (Dodson 1970). It also embroiled him in ongoing debates among community ecologists about the relative influence of predation and competition in explaining community structure.

While Stanley is best known for his innovative work on the effects of size-selective predation on zooplankton communities, the realm of his research was much broader. During a presentation he gave at his retirement party in May 2009 entitled "Widening Ripples," Stanley described the progression of his research as having three phases: fundamental community ecology, toxicology, and applied community ecology. His published work is primarily on the community ecology of ponds in a wide variety of environments including mountains, deserts, Arctic, and agricultural environments. He also trained and collaborated with graduate and undergraduate students, resulting in a number of important studies of stream community ecology. Stanley was a keen observer and an extraordinarily talented naturalist, with knowledge extending beyond aquatic systems to mushrooms, wildflowers, birds, and even rocks! Those skills were fundamental to his success as a field ecologist, and attest to the breadth of questions that he investigated during his career.

Stanley's research was transformative and influenced many aspects of ecology, including predation and community structure, phenotypic plasticity and inducible anti-predator defenses, factors influencing species richness in lakes, and cladoceran and copepod systematics. A more detailed review of his work appears in Havel (2009). Here I briefly summarize the progression of his post-graduate research.

As a natural progression from his early focus on the role of size-selective predation (by both vertebrate and invertebrate predators) in aquatic ecosystems, Stanley proposed a novel idea to explain the enormous diversity of polymorphisms within individual cladoceran species he observed while collecting zooplankton from Wisconsin lakes (Dodson 1974*b*). His testable hypothesis was that helmets or spines were predator-induced polymorphisms that protected cladocerans from invertebrate predators that detected prey nonvisually, without increasing their apparent size to vertebrate predators that feed visually. Many elegant experimental studies by Stanley and his students confirmed definitively the general mechanism that chemicals (kairomones) produced by invertebrate predators (e.g., *Chaoborus*) induced the observed antipredator polymorphisms in *Daphnia* (Krueger and Dodson 1981, reviewed in Dodson 1989). Similarly, Stanley and his students also demonstrated experimentally that chemical cues from fish were one of the proximal causes of observed patterns of diel vertical migration whereby zooplankton reduce their exposure to visual predators (Dodson 1990).

Throughout his career, and often influenced by his students, Stanley shifted his research focus via the recognition that humans were accelerating environmental change of the landscape, which has a downstream effect on aquatic ecosystems (Dodson and Hanazato 1995, Dodson et al. 1995). His most recent publications addressed the role of pond productivity on zooplankton species richness in lakes (Dodson et al. 2000), the overwhelming importance of watershed land use in structuring lake communities (Dodson et al. 2005, 2008, 2009, Dodson 2008), the far-reaching effects of toxic chemicals on aquatic populations, communities, and biodiversity (Dodson and Hanazato 1995, Kashian and Dodson 2002, Dodson et al. 2005, 2007).

This work often involved highly innovative experimental methods, for which Stanley and his students developed a patent (Dodson et al. 2000).

As an avid naturalist and keen observer, it is not surprising that Stanley also did comprehensive and meticulous work on zooplankton taxonomy (e.g., Dodson 1985, Santos-Flores and Dodson 2003), using a variety of multivariate and phylogenetic analyses in order to identify diagnostic morphological characters (Dodson and Lee 2006), and often working on difficult groups of cladocerans (Dodson 1981) and copepods (Dodson 1994, Dodson et al. 2003). He also coauthored a chapter on the ecology and systematics of cladocerans and other branchiopods for three editions of a volume edited by Thorp and Covich (Dodson and Frey 1991, 2001, Dodson et al. 2009). Perhaps lesser known but equally scholarly is his careful taxonomic work on the chironomids of ponds and streams in western Colorado (Peckarsky et al. 1985).

Teaching and mentoring

Stanley was an extraordinary mentor who was respected and loved by his students. Many came to his retirement party and wrote tributes then and after he died. He was so much more than an advisor; he was a trusted friend to all of us, well beyond our years in his laboratory. Many of his 22 Ph.D and 24 Masters students and post docs were international; and he often "adopted" students from other labs or universities who were working on projects for which they sought his advice. One such student was D. Carolina Peñalva-Arana, who expressed what Stanley meant to so many of us: "That was Stanley, always there for you, in the good and bad times, ready to help you celebrate or reflect on the meaning of life."

Stanley was also a gifted classroom teacher of undergraduates in limnology and general ecology, having written or edited textbooks on both subjects (Dodson 2005, Dodson et al. 1998, 1999). Characteristically, he was always looking for creative ways of teaching and often experimented with different teaching techniques. Famously, in preparing the students in General Ecology for a field trip to the International Crane Foundation, Stanley invited a Tai Chi instructor to class, and coaxed 100 students plus staff onto the lawn outside Birge Hall to practice crane movements. "This example epitomizes a mainstay of Stanley's teaching philosophy—one should involve the whole person, not just the intellect, in science—and science should intersect with our daily lives. He broadened the lives of a whole generation of undergraduate science majors here, in addition to teaching them ecology." (Susan Will-Wolf, August 2009).

Stanley's accomplishments as a scientist were surpassed by his value as a person

Stanley was a warm and gentle soul. He was always smiling. He loved life. He was a phenomenal role model to his students. His approach to science and life served as an example to many generations of aquatic ecologists. Even his earliest work illustrates the many lessons we learned from Stanley:

1) Use simple experimental designs to answer complex questions.
2) Trust your observations even if they fly in the face of accepted dogma.
3) Challenge existing dogma. Come up with new dogma.
4) Embrace the challenge of interpreting counterintuitive or unexpected results, because that is how to learn, grow, and create new ideas.
5) Keep an open mind at all times. Be open to new perspectives.
6) Very famous scientists operate under the same rules as beginning graduate students.
7) Do not ignore negative results, even if they are difficult to publish within the prevailing culture. "NO" is a better answer than "maybe, perhaps and sometimes."
8) The benefits of coming closer to the truth outweigh the costs of taking too much time to get there.
9) Maintain balance between personal and professional life. Put family first.

10) Work hard and play hard. Lie on your belly beside a pond. Stand on your head on the tops of mountains.

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Stanley I. Dodson
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