

TRIBUTE

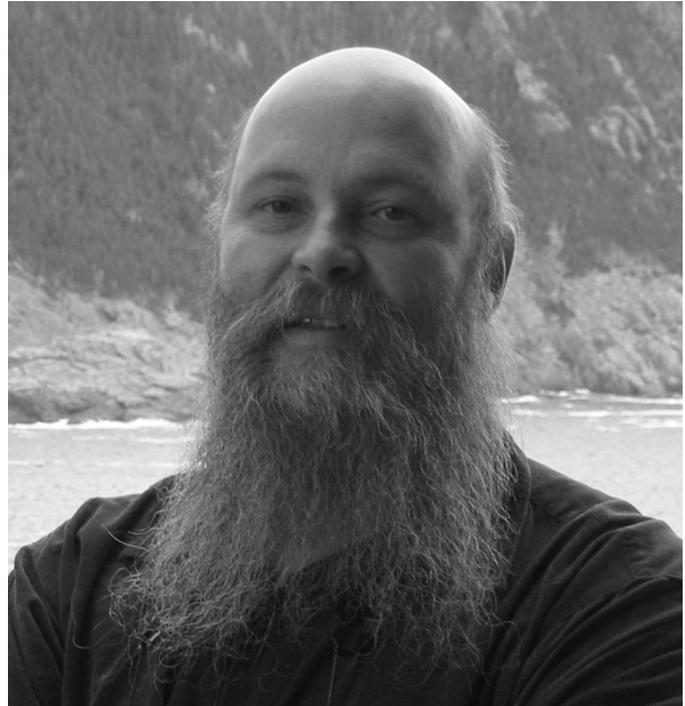
Joseph Albert Brown, Ph.D.

Many in the fish biology community were shocked to hear of the sudden death of Dr. Joseph Brown (shown here in front of the cliffs that were outside his office in Logy Bay, Newfoundland), or Joe as he preferred to be called, at his home in Shoe Cove, Newfoundland, on 3 September 2005. An American at birth, a Canadian by choice, and a true Newfoundlander at heart, Joe was an outgoing and humorous individual who became the social centre of nearly every room he walked into. It is for this as much as his professional achievements that his absence will be felt the most.

Joe's university training began shortly after he completed high school in Maine, when he came to Canada and obtained a B.Sc. at St. Francis Xavier University (Antigonish, Nova Scotia) in 1968. He then served for 2 years in the US army by "invitation". Fortunately for all concerned, "G.I. Joe" caught pneumonia during basic training and served as an army clerk in Germany instead of an infantryman in Vietnam. An opportunity afforded by the G.I. Bill soon led him to begin graduate studies at Memorial University of Newfoundland (MUN, St. John's, Newfoundland), where he initially worked with Dr. John Lien on seagull behaviour but soon became interested in the behavioural ecology of fishes. Under the guidance of Dr. John Green, Joe studied aggression and territoriality in the Arctic shanny (*Stichaeus punctatus*) and received his M.Sc. in 1976. His first paper was also published in that year (J.A. Brown and J.M. Green. *Can. J. Zool.* **54**: 1904–1907 (1976)). After 2 years working as a farm labourer, laboratory demonstrator, and museum curator in Nova Scotia, Joe moved to Kingston, Ontario.

As a Ph.D. student with Dr. Patrick Colgan at Queen's University (Kingston, Ontario), Joe studied the ecology and ontogeny of feeding behaviour and predator avoidance in young-of-the-year centrarchids. In collecting observational data for this work, Joe spent many hours seated in front of experimental aquaria while at the Queen's University Biological Station on Lake Opinicon, Ontario. As his work continued at the station, he gradually took over an entire building, affectionately known as the "Joe Brown Palace", with his holding tanks (a scientific term for "plastic kiddie pool") and observational aquaria. He received his Ph.D. in 1983 but stayed at Queen's for an extra year as a postdoctoral fellow with Dr. Peter Johansen, a fish physiologist and toxicologist. It was here that Joe began to show his ability and desire to apply his knowledge and interest in the behaviour and ecology of the early life stages of fish to other fields of study. He published five papers on the effects of the environmental contaminant pentachlorophenol on juvenile fish.

The next major phase of Joe's career began when he returned to MUN in 1984 to rejoin Dr. John Green's laboratory as a research associate. He was appointed to the faculty of the Ocean Sciences Centre (then the Marine Sciences Research Laboratory) in 1985. Joe's terms of reference on appointment were to set up a strong research program in his field, the behavioural ecology of fish, and to use this as a platform to support the emerging aquaculture industry in Newfoundland. The bulk of Joe's contribution in this area was still a decade away, however, as he and his students focused on a different problem. Towards the end of the



1980s, a growing body of work demonstrated significant kin discrimination abilities based on waterborne chemosensory cues in a variety of freshwater fishes. Joe's laboratory was among the first to demonstrate that kin discrimination occurs as a result of learned phenotype matching (G.E. Brown, J.A. Brown, and A.M. Crosbie. *Anim. Behav.* **46**: 1223–1225 (1993)) and that the recognition of full siblings in the presence of unrelated conspecifics is dependent upon the relative concentrations of odour present (M.J. Hiscock and J.A. Brown. *Can. J. Zool.* **78**: 278–282 (2000)). Joe and his collaborators then examined the functional benefits associated with kin discrimination in juvenile salmonids, publishing 11 papers on this topic (e.g., G.E. Brown and J.A. Brown. *Anim. Behav.* **45**: 863–871 (1993); G.E. Brown and J.A. Brown. *Behav. Ecol.* **7**: 24–29 (1996)). Other significant fields to which Joe contributed include juvenile cod – habitat interactions, environmental – genetic components to phenotypic variation, and comparative physiology – ecology of marine organisms using lipid biochemistry.

From his earliest work, it was clear that Joe always took a broad view of basic research questions, stressing the importance of both the proximate (mechanistic) and ultimate (evolutionary) causation of specific behavioural patterns. For him, it was not enough to ask "how" but also "why". This resulted in a significant contribution to understanding the feeding behaviour and ecology, habitat use, and predator avoidance of young fishes. Among other achievements, Joe and his students were among the first to test rigorously the predictions laid out in G.S. Helfman's (*Behav. Ecol. Sociobiol.* **24**: 47–58 (1989)) model of threat-sensitive predator avoidance, thereby making great inroads towards linking proximate and ultimate causation. For example, Bishop and Brown (T.D. Bishop and J.A. Brown. *Behav. Ecol. Sociobiol.* **31**: 133–139 (1992)) demonstrated that larval threespine sticklebacks (*Gasterosteus*

aculeatus) shift from risk-averse to risk-taking foraging, depending upon predation risk. In addition, they clearly demonstrated that this shift in foraging strategy is linked with the development of bony spines, a morphological predator deterrent. Similarly, Williams and Brown (P.J. Williams and J.A. Brown. *Mar. Ecol. Progr. Ser.* **76**: 53–60 (1991); P.J. Williams and J.A. Brown. *Mar. Ecol. Progr. Ser.* **88**: 185–193 (1992)) linked morphological development and predator avoidance behaviour in the larvae of several marine fish species.

Clearly, understanding the feeding ecology and social interactions of larval and juvenile fishes conferred on Joe and his students a particular advantage in developing a large aquaculture research and development program at MUN in the late 1990s. After all, determining ideal conditions for feeding and minimizing the negative consequences of agonistic interactions under crowded conditions are crucial for the successful rearing of fishes in a viable aquaculture enterprise. Some of the techniques developed in Joe's lab have been adopted worldwide, with little or no modification (J.A. Brown, G. Minkoff, and V. Puvanendran. *Aquaculture*, **227**: 357–372 (2003)). This aquaculture phase of Joe's career began with a project on Atlantic halibut (*Hippoglossus hippoglossus*) that was funded by the Natural Sciences and Engineering Research Council of Canada. This was followed by work on yellowtail flounder (*Limanda ferruginea*), a collaboration with Fishery Products International and the Canadian Centre for Fisheries Innovation, and brief work with witch flounder (*Glyptocephalus cynoglossus*), Arctic char (*Salvelinus alpinus*), and wolffishes (*Anarhichas* sp.). Perhaps the most publicized research, however, has been that related to Atlantic cod (*Gadus morhua*), beginning as a collaboration with Sea Forest Plantation and later with the governments of Canada and Newfoundland and Labrador and with several industry partners. Joe and his colleagues published 35 peer-reviewed papers from this applied research. He was named Researcher of the Year by the Canadian Centre for Fisheries Innovation in 1998 and received the Research Award of Excellence from the Aquaculture Association of Canada in 2001. In 2002 the Canadian Foundation for Innovation formally recognised Joe as one of Canada's leading aquaculture scientists. He played a major role in the establishment and operation of the Aquaculture Research and Development Facility at MUN, which was no mean achievement, as it required

close and effective liaison among the academic, government, and private sectors.

Joe published widely throughout his career (110 peer-reviewed papers published over a 30-year period). He obtained 55 research grants, which brought in a large amount of funding to MUN. To his colleagues, Joe was a tireless, consummate "team player" who did not shirk administrative tasks, serving on numerous departmental and university committees, as well as those of national research programmes such as AquaNet. He was President of the Aquaculture Association of Canada and Chair of the Ecology, Ethology and Evolution Section of the Canadian Society of Zoology and sat on numerous review boards and panels.

It was as an advisor and mentor of students, however, that Joe made his most enduring contribution. He was devoted to both undergraduates and graduates, and they to him. Students flocked to join his group, and his large "stable" of graduate students became one of the pillars of MUN's Ocean Sciences Centre. Despite a relatively short career, Joe supervised or co-supervised 72 theses (20 Ph.D., 34 M.Sc., 18 B.Sc.Hons), 16 of which were in progress at the time of his death. He attracted many students from afar, especially from developing areas including Brazil, India, Indonesia, Malawi, and Sri Lanka. He always had time for students, both in the laboratory and outside, and they were a central part of his lively social life. Joe gave them complete freedom to design their experiments: enough rope to do what they wanted, but not enough to hang themselves. This approach produced numerous independently thinking individuals, and many of Joe's students have gone on to academic, governmental science, or environmental consulting positions.

Joe will be sadly missed not only by his family, but also by his wide circle of friends, colleagues, students, and former students. The warm sentiments expressed at the gathering of family, friends, and colleagues to celebrate his life confirm that his work, but especially his friendships and his love of life, will be his legacy.

For more information about Joe's publications and the Dr. Joe Brown Scholarship Fund, please visit <http://www.osc.mun.ca/>.

C.F. Purchase, H.P. Benoit, D.L. Boyce, G.E. Brown, V. Gotceitas, B.J. Laurel, V. Puvanendran, and R.J. Thompson