

## In Memoriam Madhu Paranjape

I first met Madhu during the summer of 1964 at the Friday Harbor Laboratory of the University of Washington when he was a student in the Zooplankton Course which Karl Banse and I taught — and a very good student he was! Two fellow students from those days were Richard Strathmann, who spoke warmly of his 'scientific abilities and personal qualities', and Ted Packard, for whom Madhu helped to displace 'the abstract world of molecular biology and biochemistry' with the 'organismic world of phytoplankton-zooplankton interactions'. He studied a variety of plankton problems and published several papers while working on his Ph.D., which sadly he never completed. I moved to Canada in 1966 to join the Fisheries Research Board at the newly founded Marine Ecology Laboratory (MEL) in Dartmouth, Nova Scotia, which at that time was initiating ecosystem studies in several local inlets. In the summer of 1968 we started a zooplankton community study in St. Margaret's Bay and were able to hire a technical person to help with the field work and enumerate the zooplankton. I remembered Madhu from Friday Harbor days and so he came to Canada.

For the next 3 years he played a key management role in the zooplankton program in St. Margaret's Bay and participated in virtually all of the 33 cruises. In July 1970 he was promoted to Biologist, a position which allowed him greater freedom to develop his own research program. In the early 1970s our zooplankton research efforts shifted to Bedford Basin, a fjord-like inlet adjacent to Halifax and Dartmouth, in which zooplankton had a much longer residence time and which, with its proximity to the Bedford Institute, further facilitated short- and long-term studies of neritic zooplankton behavior and life cycles. Over the same period Madhu developed an interest in microzooplankton, particularly the tintinnines, and in 1977 initiated his own 18 month study of this group, leading to 2 papers. During this period he had quite good success in culturing the common Bedford Basin form, *Helicostomella subulata*, and in 1981 he collaborated with Dr Ken Gold to run a NATO workshop on cultivation of marine protozoans, held in association with a CNRS Colloquium on Marine Pelagic Protozoa and Microzooplankton Ecology at Villefranche-sur-Mer.

In 1980 Madhu extended his investigations of microzooplankton across the Scotian Shelf in a joint paper in which we attempted to evaluate the relative importance of micro- and macrozooplankton as consumers of



Madhu Paranjape, 1939–1996

phytoplankton production just prior to the spring bloom. This investigation provided some background for further offshore work in the Canadian Arctic. He examined grazing impact by microzooplankton in Baffin Bay and Jones Sound and the distribution and biomass in Baffin Bay, Lancaster Sound, and as far west as Barrow Strait, concluding that such high arctic populations were of similar population density and physiological activity as those of temperate environments.

In 1987 Madhu left MEL to take up a Research Scientist position at the Northwest Atlantic Fisheries Centre in St. John's, Newfoundland, and initially continued JGOFS research with several BIO colleagues, including also his pioneering work on 'the importance of marine protists in marine food webs', to quote Barry Sherr. In July 1988 he was an invited speaker at a NATO Advanced Study Institute on Protozoa and their Role in Marine Processes, where he gave a 'super' overview on 'sampling field populations of protozooplankton', according to Peter Burkill, one of the Institute's organizers; he was also able to complete a seasonal study of microzooplankton grazing on the Grand Bank, which contributed significantly to the understanding of the production dynamics of the Bank. With the collapse of the northern cod stocks in 1991 and the initiation of the Northern Cod Science Program, Madhu and a colleague, Dr Ray Sheldon, co-hosted an international workshop on the 'Biomass-Size Spectrum for Estimating Northern Cod Stocks'. He also collaborated with Suzanne Roy on 'pigment transformations by microzooplankton' and with Cynthia McKenzie,

Don Deibel and Ray Thompson on the nutritional biology of the mixotrophic chrysophyte *Dinobryon balticum*, as part of the Cold Ocean Productivity Experiment in Conception Bay, Newfoundland. Other interests included phycotoxins, and he was involved in the organization of 5th Canadian Workshop on Harmful Marine Algae held at St. John's on September 11 to 13, 1996. Madhu recognized the importance of long-term recording of biological events and was instrumental in reinstating Continuous Plankton Recorder data collections in Newfoundland waters and in the institution of biological sampling at the long-maintained temperature and salinity sampling site, Station 27 off St. John's, as well as establishing a seasonal sampling program for plankton and related information in Newfoundland offshore waters.

In the late summer of 1995 Madhu was diagnosed with an inoperable cancer and underwent an extensive round of chemotherapy. His prognosis was initially quite good but his condition worsened and he died quite suddenly in March 1996. A kind person with an optimistic point of view, he was well organized, an excellent scientist and a good colleague. His unexpected death at 57 was indeed unfortunate and he will be greatly missed by many. He leaves his wife Chitra and 2 daughters, Kena in university and Renita in high school.

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