



Abraham Fleminger  
1925–1988

Abraham Fleminger died 13 January 1988 in La Jolla, California, of peritonitis. Kidney failure and a failed kidney transplant had complicated his health problems. He was 62.

Abe is very difficult to categorize. He was an intelligent man, very well-read, who took an eclectic approach to research problems. He enjoyed marine biology, and on occasion spoke of himself as a natural historian; copepodologist indicates his choice of crustaceans, but I believe that zoogeographer/systematist is the best descriptor. Abe was

interested in a wide range of fundamental problems about copepods and, more generally, marine organisms. He was knowledgeable about distributional ecology, biogeography, feeding and reproductive behavior, and structural and functional morphology. Abe did more than discuss these topics separately. He impressed both his readers and listeners with a unique ability to explain how concepts in one topic could be integrated with another to solve a problem in yet a third.

Abe graduated from Brooklyn College and



received both a master's degree and a doctorate (under Elizabeth Deichmann) from Harvard University. While at Harvard, he was influenced by the writings of Ernst Mayr; the biological species concept and allopatric model of speciation were fundamental to Abe's approach to copepod zoogeography. After completing his dissertation on calanoid copepods of the Gulf of Mexico, Abe served briefly with the United States Fish and Wildlife Service in Galveston, Texas. In 1960 he moved to the Scripps Institution of Oceanography in La Jolla, California, for the remainder of his career.

In his research Abe studied morphological variability among groups of copepods and attempted to correlate that variability with spatial separation of the groups. Whenever possible he tried to associate such correlations with natural history events, particularly as these events may have interrupted gene flow and shaped future populations. In his descriptions Abe was careful to establish the degrees of polymorphism within the species, using this information to provide the foundation for all further analyses.

Abe contributed to an understanding of the development and variation in primary sexual characters, but he usually focused his attention on the skeletal morphology of calanoids, where many secondary sexual characters are expressed. Abe believed that characters which separated populations were not neutral, but had adaptive significance. Reinforcement of secondary sexual characters resulted from contact between previously isolated populations; its cause was behavioral selection against hybridization, and thus gamete wastage, between populations. Pontellid copepods, like many heterarthrandrian calanoids, exhibit elaborate diversity in secondary sexual characters such as the male grasping antenna, leg 5, spermatophore coupler, and the urosome of both sexes. Abe found that these variations were sufficient to allow differentiation of populations and yet structured enough to allow subsequent integration into species groups. Several amphiscandrian families offered a more challenging analytical problem for Abe because clausocalanids, eucalanids, and calanids do not exhibit as striking a divergence of secondary sexual characters. With the latter two families, Abe emphasized diversity

and patterns of integumental organs as aids in separating and grouping populations. A list of Abe's copepods new to science is appended. He also established two new calanoid genera, *Parundinella*, and the spinocalanid *Isaacsicalanus* with which he remembered a close friend, John Isaacs.

The spatial systems that Abe studied include the oceanographic provinces of the Pacific Ocean, equatorial regions of the world's oceans, and coastal zone regions of the Americas and the Indo-west Pacific. He discussed the effects of the final breakup of Tethyan circulation around the Panamanian isthmus on isolation of equatorial oceanic populations, as well as their coastal zone relatives, and clarified the concept of circumglobal distributions. Abe considered Pleistocene sea-level changes as a cause of isolation of American coastal zone pontellids, and the historical extension of upwelling in the Flores, Timor, and Banda Seas which influenced speciation of the pontellids of that region.

Abe made many basic contributions to marine science. I believe that his most significant study provides evidence for an oceanographic component of Wallacean marine diversity. In a 1986 paper Abe is at his best, integrating morphological affinity, zoogeographical distributions, and the ecology of calanoid copepods. By adding recent advances in historical geology, Abe was able to make a compelling case that the diversity of marine organisms centered around Wallace's Line is as much a product of Pleistocene oceanography as it is of the movement of the earth's tectonic plates.

Abe Fleminger is remembered to copepodologists with an Atlantic cyclopoid copepod, *Paroithona flemingeri*. A boreal Pacific *Neocalanus* is being named for him by Charles Miller. Other species remembering Abe will certainly be added. However, Abe's ideas, particularly his magical syntheses, will be his lasting legacy.

Copepods New to Science Described by  
Abraham Fleminger

*Candacia paenelongimana* (with Thomas E. Bowman in 1956)

*Pontella mimocerami*, *P. polydactyla*, *Labidocera mirabilis* (in 1957)

*Parundinella spinodenticula*, *P. manícula* (in 1957)

*Bradyidius arnoldi*, *Euchaeta paraconcinna*, *Stephos deichmannae* (in 1957)

*Labidocera johnsoni* (in 1964)

*Labidocera wilsoni* (with Engchow Tan in 1966)  
*Labidocera kolpos*, *L. diandra* (in 1967)  
*Clausocalanus lividus*, *C. ingens*, *C. jobei*, *C. brevipes*, *C. parapergens* (with Bruce Frost in 1968)  
*Eucalanus sewelli*, *E. parki*, *E. langae* (in 1973)  
*Pontellina platychela*, *P. mortii*, *P. sobrina* (with Kuni Hulsemann in 1974)  
*Labidocera barbadiensis*, *L. panamae* (with Euna Moore in 1977)  
*Labidocera barbudae*, *L. antiguae* (in 1979)  
*Labidocera carpentariensis*, *L. papuensis* (with Bin Haji Ross Othman and Jack Greenwood in 1982)  
*Isaacsicalanus paucisetus* (in 1983)  
*Calanus ponticus* (with Kuni Hulsemann in 1987)

*Pontella rostraticauda* (with Susumu Ohtsuka and Takashi Onbé in 1987)

In a forthcoming issue of the Proceedings of the Biological Society of Washington, Abe's new species of *Parastephos* will honor Calvin Esterly.

— Frank D. Ferrari, Smithsonian Oceanographic Sorting Center, Smithsonian Institution, Washington, D.C. 20560.

(A slightly shorter version of this note will be found in the copepod newsletter *Monoculus*, number 16.)