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With best wishes,
Shigeko Ooishi

SHIGEKO OOISHI (1927-2014), COPEPODOLOGIST WITHOUT BORDERS

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Shigeko Ooishi was Japan's first woman carcinologist, for the most part a student of the ascidicole copepods. For those unfamiliar with this interesting subset of copepods associated with ascidians, they are not so arcane as might be expected. They were recorded in our science in Redi's (1684) extensive "Observations concerning the living animals that one finds within living animals." In the centuries since, they have had considerable exposure through the specialist works of such great practitioners as George Allman, Ernest Brément, Eugène Canu, Édouard Chatton, Wilhelm Giesbrecht, Eugène Hesse, Adolf Schellenberg, and Tamerlane Thorell, names familiar to all copepodologists. Canu's (1892) monograph is a classic of copepod literature, worth looking at even if you are not a student of these copepods.

Shigeko was born in Kumamoto on 2 June 1927 (in the cyclic Year of the Rabbit). Kumamoto is a port city on the East China Sea, on Kyushu, the southernmost of Japan's three largest islands. Her father Sohkichi Ooishi and mother Ei Ooishi were owners of a popular soba restaurant, specializing in buckwheat noodles as the foundation for colorful and exotic dishes. She had an older brother, and a younger brother and sister, all predeceasing her. Her oldest brother was killed in World War II; her younger brother inherited the family restaurant.

Shigeko attended local public schools, graduating from the municipal high school. In 1945, she entered the Nara Women's Higher Normal College. This was founded in 1908 as an imperial school for teachers; it is now the Nara Women's University. Nara Prefecture is on the western

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border of Mie Prefecture on the Pacific coast of central Honshu, Japan's main island. Both areas were significant in Shigeko's life. After earning a bachelor's degree from Nara College in 1949, she taught high school science in Kumamoto.

In May 1951, Shigeko's world merged with crustaceans when she became an assistant to Sueo Shiino (1908-1978) at the Prefectural University of Mie. The university was founded in 1874, always with a strong agricultural component, including fisheries. The prefecture is famous for its oyster/pearl culturing, and Shigeko taught zoology to students in these subjects. Shigeko concurrently worked on her doctorate at the Nagoya University, founded in 1871 on the Pacific coast north of Mie in Japan's third-largest city. In 1965, she was awarded the Doctor of Science for publications on the embryology of decapods (Ooishi, 1959, 1960). Guided by Shiino's lifelong studies of the copepods parasitic on fishes, Shigeko turned toward copepods associated with invertebrates, in particular to the ascidicoles, beginning publications on these in 1961. Shiino had been a student of the copepodologists Taku Komai (1886-1972), who studied at Woods Hole, and Yo Okada (1891-1973), who studied under Maurice Caullery (1868-1958) in France. Shigeko, therefore, continued an honored academic line of carcinologists.

> A distinguished carcinologist, a highly responsible researcher, and a much loved friend of his colleagues and students, Dr. Shiino has left them a much greater legacy than can be found in his 137 publications – the legacy of a devoted scientist, teacher and friend (Ooishi, 1979).

Shiino became the head of the university's new Faculty of Fisheries in 1949. By 1964, Shigeko was a lecturer at the university in Mie. She was named an Associate Professor in February 1975 and was a Professor from 1980 until her retirement in May 1991.

A second turning point in Shigeko's life came in 1965 when she met Paul Illg (1914-1998), a Professor from the University of Washington visiting Japan (Hadfield, 1998). Illg (1958), an established researcher of ascidicoles, invited her to Seattle and Friday Harbor.

> I thank you for all you did for me during the two years I served as a Research Associate at the University of Washington. It was my greatest pleasure that I could work on the Taxonomy and Life History of Haplostominea with you and learn the modern taxonomy from you. I am particularly grateful and do appreciate it very much indeed. . . . Looking forward eagerly to meeting you and your family again and extending my deepest thanks for the wonderful time which I had at your charming home, the Laboratories, the University and many other places (Ooishi letter to Illg, 18 September 1967).

Illg became a second professor and fatherly figure to Shigeko. Patricia Dudley (1929-2004), one of Illg's students, was also working with these copepods and they all became lifelong friends (Dudley, 1966; Damkaer, 2004). Shigeko was supported by grants from the National Science Foundation, by the University of Mie, and by her own funds. She wanted to stay but she was required by her faculty to return to Japan.

The Friday Harbor Laboratories were established in 1904, as the Puget Sound Marine Station, for the University of Washington, on the largest island of the archipelago between Washington State and Vancouver Island, British Columbia. The area, one of remarkable biological diversity, is commonly known as northern Puget Sound. It is charmingly remote, requiring then as now an hour's ferry ride from a mainland terminal about two hours' travel time north from Seattle. The physical surroundings must have reminded Shigeko of Japan's coastal villages. For over a century, the laboratories have been an essential center for a mutually supporting and friendly family of resident and visiting teachers and researchers. Shigeko became a valued member of that community in the long tradition of the station, returning at least during the summers of 1973, 1977, 1982, 1984, and 1987; she moved to Friday Harbor permanently as an independent investigator after her retirement in 1991, interspersed with short visits to Mie and Kumamoto.

Shigeko made her visiting countrymen at home by serving traditional meals recollected from her family's restaurant. She also did this for colleagues that I occasionally brought to the laboratories. Shigeko learned to drive her own automobile here, but she seemed oblivious to the outside and was never a good driver.

Shigeko traveled widely for connections and collections, making friends wherever she went. This included California (1979, 1987), Denmark (2001), Florida (1995), France (1989, 1992, 1996), Germany (1996), Hawaii (1974, 1985, 1993, 1994), Holland (1972), Ireland (1995), Italy (1989), Mexico (1975, 1983, 1991), New Zealand (1996, 2001), Norway (1992), Okinawa (1985, 1986), Palau (1974), and Vancouver Island (1991, 1993). She gave presentations at the second through the seventh meetings of the World Association of Copepodologists, in Canada (1984), England, Japan, United States, Germany, and Brazil (1999). An army of international admirers and collaborators included Donald Abbott, Jose Bresciani, Fenner Chace, Marit Christiansen, Oliver Coleman, Daniele Defaye, Vivian Gotto, Josephine Hart, Dora Henry, Gayle Heron, Ju-Shey Ho, Lipke Holthuis, Arthur Humes, Eugene Kozloff, George and Nettie MacGinitie, Claude Monniot, Sigeru Motoda, Makoto Omori, Janet Reid, Jan Stock, and Takasi Tokioka.

In 1975, Shigeko was asked by Taisoo Park to look at marine plankton cyclopoids in his collections at Texas A&M University.

> I am not going to become a planktonologist like Taisoo (Ooishi letter to Illg, 22 April 1975).

Shigeko hoped to work during some weekends with Illg, but the project and the distances were too demanding. Even though she enjoyed looking at new kinds of copepods, she only stayed in Texas for 6 months, returning to Japan by way of the Gulf of California and Seattle.

Shigeko was a charter member of The Crustacean Society and a member of the Biological Society of Washington, the Carcinological Society of Japan, the Japanese Society of Systematic Zoology, and the Zoological Society of Japan.

The Friday Harbor Laboratories have long had close ties with Japan through exchange of scholars. This was formalized in 2012 with the Morse Foundation, named for the American Edward Sylvester Morse (1838-1925), the University of Tokyo's first Professor of Zoology (Gorbman, 1964). Shigeko's role was acknowledged in 2013 when she was named an honorary fellow of the foundation.

Shigeko's marine copepods are so regularly associated with solitary and compound ascidians (sessile tunicates) that they were taxonomically assigned to a family Ascidicolidae, now seen to be from several families: Archinotodelphyidae, Ascidicolidae, Botryllophillidae, Buproridae, Enterocolidae, Enteropsidae, and Notodelphyidae, all gnathostome cyclopoids. Except for a few species from octocorals, all are bound to ascidians. Most species live in the host's pharynx or atrium, living as commensals stealing filtered food; some are embedded in the host's tissues and are true parasites in some stages. Their body form ranges from active cyclopiform to restricted vermiform, "penetrating further into the host's larder than others" (Gotto, 1979). Shigeko described many of the cyclopiform males for the first time, adding considerably to knowledge of particular genera. She expanded information on the specificity of hosts and on geographic distribution, areas that still need attention.

> I think I was very lucky to meet you in 1965 to work on the ascidicole copepods (Ooishi letter to Illg, 29 August 1978).

Shigeko published 52 reports on copepods between 1961 and 2014, an average of essentially one per year. The papers were descriptions of new genera and species (22), redescriptions of established species (20), fauna of specific localities (5), essays on development and morphology (4), and Shiino's biography (1). Their geographical coverage is reflected in the places she visited (above) or in collections she received from others (Madagascar and the Philippines). She described 45 new species and the genus *Loboixys* Ooishi, 2006.

Characteristic of Shigeko's descriptions were her large and clear illustrations, rarely if ever exceeded in technical and artistic perfection. It is a daunting task to indicate copepod mouthparts in relation to each other, but such depictions were regular features of her work. The drawings required a mighty energy and except for her last few papers, when she ran out of time, her illustrations were simply breathtaking. Usually photographs are not useful in copepod descriptions, but Shigeko's were well crafted and added insight to particular features. This was especially so with electron microscope photos and color photos of living specimens (Ooishi, 1972, 1999, 2002a, 2004b, 2007b).

Ooishi and Illg (1977) was a significant contribution, describing 13 new species in 4 genera from the waters accessible from Friday Harbor in a world review of a large subfamily.

> Thank you very much for the copy just received of the reprint by you and Paul Illg on the San Juan haplostomines. It is a most impressive volume and one that should serve as a major exhibit in any case against those who maintain that the fauna of the world we live in is adequately known (Fenner Chace letter to Ooishi, 23 June 1978).

A number of these were hardbound and Shigeko hand-colored several plates in a few of those, leaving a rare memento for future bibliophiles.

> [Another] manuscript was first reviewed by two anonymous carcinologists. One of them does not look like a copepodologist, because he thinks me a man. Dr. Gotto later helped me with the corrected manuscript (Ooishi letter to Damkaer, 24 March 2004).

Shigeko, in her own final illness, modeled her departure on her admired professor:

> In spite of his illness, from which [Dr. Shiino] never recovered, he devoted himself to completing his paper on these animals and finally finished it before he went back to the University Hospital. . . . A few months before he passed away he had expressed to his family and colleagues his desire to donate all the literature and books he had collected to the Library of Mie University. One cannot avoid the impression that he already knew his end was near at that time, and his mind was filled with friendship in giving opportunities to anyone who would follow him in the study of carcinology (Ooishi, 1979).

Shigeko's incredible timing of finishing her manuscripts, leaving Friday Harbor in May 2014, and dying of cancer in her hometown hospital on 14 September 2014 must be viewed as a final gift to her friends and family who remember her long and enviable life.

Shigeko held an intriguing combination of shyness and obstinacy; she was comfortable in the background yet she was not to be pushed around. She never wanted to talk about her early days in spite of gentle prodding. Her career track was difficult and demanded sacrifices in an intense male-dominated culture. The closest she came to an acknowledgment of that in our 40-year acquaintance was a response to a biography of Maria Dahl (1872-1972), an early woman copepodologist:

> I was given an encouragement from Maria through your paper (Ooishi postcard to Damkaer, 1980).

Like her mentors Shiino and Illg, Shigeko finished her life in good order and handed down her work to the next generation, adding to the knowledge of the systematics, behavior, distribution, and impact of her intrusive little beasts. With her many reports, she will also be remembered through *Enterocola ooishiae* O'Reilly, 2008, a copepod associate of solitary ascidians in Scotland.

Claudia Mills and Chad Walter provided inspiration and details for this notice. The portrait, from ca. 1970, is through the courtesy of Keiji Baba and the Ooishi family. The signature is from 1984. It is fitting to repeat here a frequent acknowledgment of Shigeko's Friday Harbor colleagues Eugene Kozloff and Craig Staude for exceptional assistance and patience with editing, correspondence, and computers; her papers could not have been completed without their devoted help.

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Appendix: Copepodological Contributions of Shigeko Ooishi

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