



Preface: Recent Developments in Taxonomy and Biodiversity of Symbiotic Copepoda (Crustacea)—A Volume in Celebration of the Career of Prof. Il-Hoi Kim

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Symbiosis is one of the most successful modes of life displayed by aquatic organisms, as measured by the number of times it evolved and how many symbiotic species are presently in existence. Among the Crustacea copepods utilize an extraordinary range of hosts, occurring on virtually every phylum of marine macroinvertebrates and, jointly with the monogeneans, are the most speciose group of metazoan ectoparasites of marine fishes (Rhode 2005). Several species have a major impact on global finfish and shellfish aquaculture, causing significant effects on farm production, economic viability and sustainability (Shinn *et al.* 2015). Parasitism by copepods on other metazoans has evolved independently numerous times in the evolutionary history of animal life on Earth and has led to an exceptional diversity in morphologies, physiologies, life-strategies and habitat preferences of its members. Reflecting the diversity of hosts, copepods show an amazing variety of adaptations which secure infection of and survival on the hosts. Since the first descriptions of parasitic copepods occurring on fish by Linnaeus (1758) and the first report of a copepod utilizing an invertebrate host by Say (1818) (*Clausidium caudatum* (Say, 1818)) the number of described symbiotic copepods has seen a steady increase over a 200-yr period, culminating in a total of 5,306 valid species recognized today. About 38% of all described copepod species utilize either vertebrate (2,450 spp.) or invertebrate hosts (2,856 spp.), however, many host groups have not been thoroughly examined, and for this reason even approximate estimates of true species numbers are futile. Plotting the proposal of new species by decade (Fig. 1) shows a sharp rise since 1950 with 67% of the species having been described in the preceding 65 years. This period of exceptionally rapid progress can be attributed to a number of highly prolific investigators such as Arthur Humes, Il-Hoi Kim, Ju-shey Ho and Jan Stock who, single-handedly or in collaboration with other authors, described 698, 356, 290 and 246 species, respectively. Historically, the number of described copepod species parasitizing fish typically outnumbered those known to be associated with invertebrates. Only during the mid-1970s the species curves of both categories converged and during the last 30 years the discovery of new species associated with invertebrate hosts appears to progress more rapidly. Despite a significant drop in the number of specialists working on symbiotic copepods the steady addition of new taxa shows that the dynamism of their taxonomy is clearly set to continue.

The scientific programme of the 12th International Conference on Copepoda (ICOC) held from 14–18 July 2014 at Hanyang University in Seoul and organized under the auspices of the World Association of Copepodologists (WAC), included a special session dedicated to the outstanding contributions made by Prof. Il-Hoi Kim to the study of associated and parasitic copepods. During the conference Prof. Kim was awarded the WAC Award of Research Excellence by his former mentor Prof. Ju-shey Ho (California State University, Long Beach). This special issue of *Zootaxa* is dedicated as a Festschrift to Prof. Kim in celebration of his achievements and (ongoing) career. The volume comprises the majority of the oral presentations and posters on symbiotic copepods presented during the special session, plus additional contributions from fellow copepodologists who were unable to attend the conference in Seoul. A total of 24 manuscripts on systematics and biodiversity of symbiotic copepods were accepted for publication following peer review. Forty-nine specialists, representing 14 countries contributed to the Festschrift. This spread across six continents illustrates the global importance of symbiotic copepods and is a fitting tribute to a great scholar who stamped his authority on the field for the last thirty years. The volume is divided in four sections, *i.e.* (1) fish parasites, (2) copepods associated with invertebrate hosts, (3) parasitic Copepoda in marine plankton, and (4) symbiotic Harpacticoida.

During the associated preconference training workshop held from 8–12 July 2014 at Chonnam National University, Yeosu, the sad news arrived of the passing of Dr Zbigniew (Bob) Kabata. Bob was the Founding President of the World Association of Copepodologists until his retirement (1984–1987) and was instrumental in drafting the by-laws of the

Society. At the 3rd ICOC in London he was the first to present the Maxilliped Lecture, a new addition to the programme of our copepod conferences in order to honour outstanding achievements in copepodology. George W. Benz and Tim Goater poared their heart and soul into producing an *In Memoriam* for this volume. Tragically, George passed away at his home in Tennessee from complications from surgery on February 9, 2015, just days after completing the *In Memoriam*. His former graduate student Stephen (“Ash”) Bullard is currently coordinating a tribute.

I would like to acknowledge Eduardo Suárez-Morales, President of the World Association of Copepodologists, for his editorial assistance, and the following reviewers for their dedicated efforts and time spent on reviewing and improving the quality of the manuscripts: Eugenia Bandera, George Benz, Geoffrey Boxshall, Mercedes Conradi, Susan Dippenaar, Masahiro Dojiri, Hoda El-Rashidy, Mark Grygier, Ju-shey Ho, Rodrigo Johnsson, Kazuya Nagasawa, Susumu Ohtsuka, Eduardo Suárez-Morales, Danny Tang and Balu Alagar Venmathi Maran. Special thanks are due to Wonchoel Lee and the members of the local organizing committee of the host conference in Seoul for their assistance and wholehearted support of the special session on symbiotic copepods.

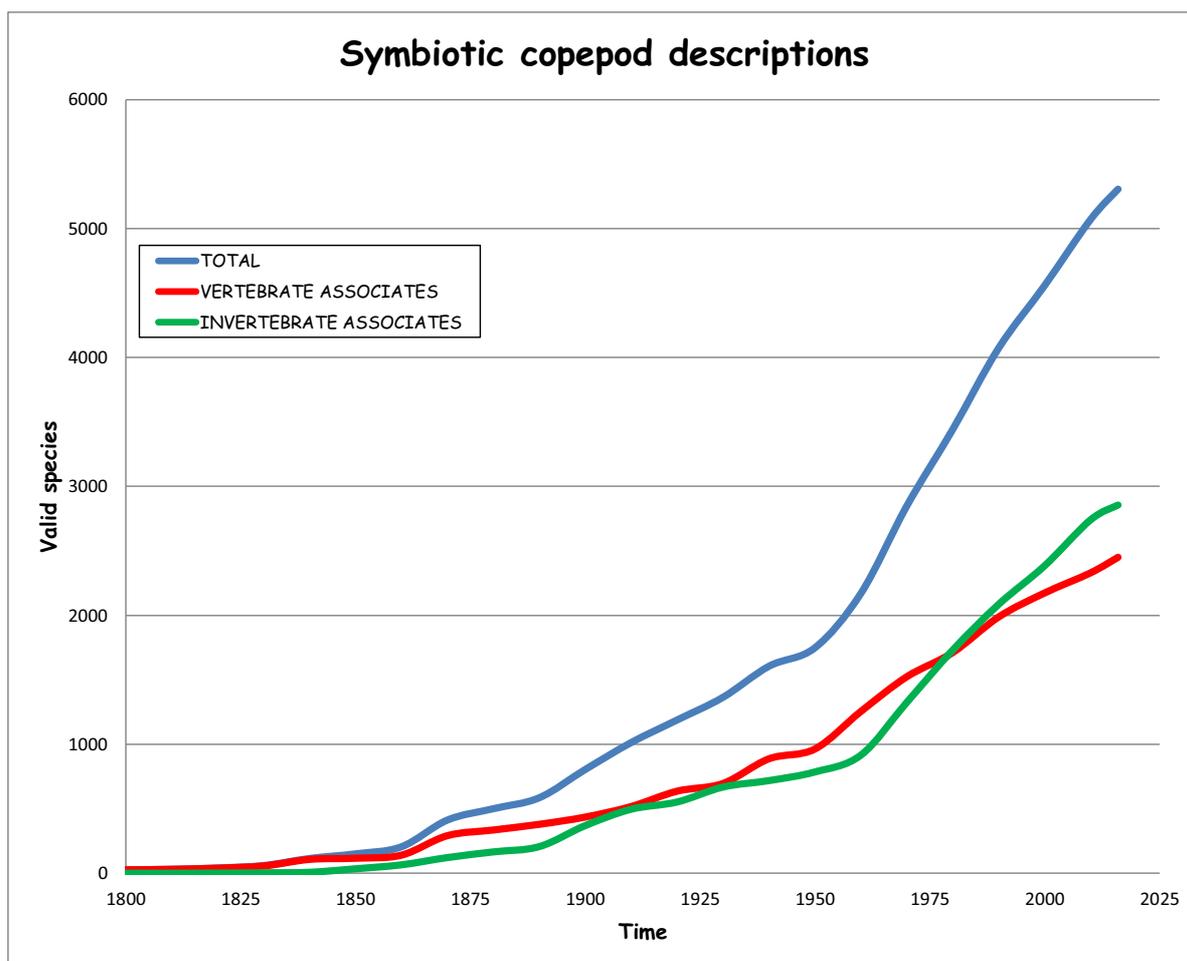


FIGURE 1. Cumulative number of valid described copepod species associated with vertebrate and invertebrate hosts by decade from 1800 to 2016.

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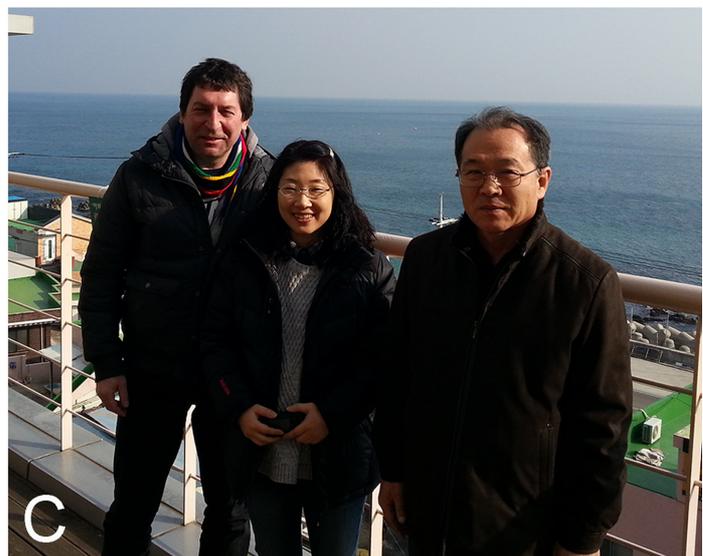


FIGURE 2. A, some participants of the special session on symbiotic copepods during the 12th International Conference on Copepoda (ICOC) at Hanyang University, Seoul (July 2014). First row (from left): Eduardo Suárez-Morales, Bruno Passarelli, Ju-shey Ho, Il-Hoi Kim, Kazuya Nagasawa, Max Murray, Danny Tang. Top row (from left): Julianne Kalman Passarelli, Geoffrey Boxshall, Susan Dippenaar, Fumitaka Kudoh, Balu Alagar Venmathi Maran, Seong Yong Moon. B, Cheon Young Chang and Il-Hoi Kim at the 12th ICOC. C, Rony Huys, Jimin Lee and Il-Hoi Kim outside the East Sea Research Institute (KIOST) in Uljin, Korea (December 2014).



FIGURE 3. A, Il-Hoi Kim and Ju-shey Ho at California State University, Long Beach in 1989. B, Pao-Hsi Ho, Ju-shey Ho and Il-Hoi Kim in Seoul (July 2014). C, Il-Hoi Kim accepting the Award of Research Excellence during the 12th International Conference on Copepoda.

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