

## **Planktonic Phases in Symbiotic Copepods: a Review**

### **ABSTRACT**

In symbiotic copepods, most naupliar stages are typically planktonic, playing a primary role in dispersal, while the first copepodid usually represents the infective stage. Later copepodid stages, including adults, are associated with host organisms. Many symbiotic copepods have abbreviated life cycles, with a reduced number of naupliar stages and two different feeding habits. These patterns are presumably related to distinct life cycle strategies. Exceptional cases are exemplified by members of the Monstrillidae and Thaumatopsyllidae, both of which are protelean parasites, with infective nauplii and non-feeding planktonic adults. In the Caligidae, the life cycle follows a generalized pattern, but adults of many species like *Caligus undulatus* seem to exhibit a dual mode of life involving host switching. Adults leaving the first host become temporarily planktonic before attaching to the final host. This dual mode of life is also found in adults of the Ergasilidae. Abbreviation of the planktonic phase is characteristic for some symbiotic taxa, thus suggesting that they have evolved to become highly efficient in locating and infecting new hosts without needing long-distance larval dispersal. The life cycle of copepods associated with zooplankters is also briefly reviewed. Zooplankters are clearly less used as hosts by copepods than benthic invertebrates. It is likely that symbiotic copepods dynamically utilize planktonic phases in their life cycle, thus maintaining the balance between dispersal, host location, reproduction, and predator-avoidance strategies.