Does predation control adult sex ratios and longevities in marine pelagic copepods?

We assess the causes of adult sex ratio skew in marine pelagic copepods by examining changes in these ratios between the juveniles and adults, sexual differences in juvenile stage durations, and mortality rates of adults in the field and laboratory (when free from predators). In the field, late copepodite stages (CIV and CV) commonly have sex ratios that are either not significantly different from equity (1 : 1), or slightly male biased. By contrast, in adults, these ratios are commonly significantly biased toward female dominance. Sex ratio skews are therefore primarily attributable to processes in adults. Members of the non-Diaptomoidea have especially skewed adult ratios; in the members Oithonidae and Clausocalanidae this is not generated from differences between male and female adult physiological longevity (i.e., laboratory longevity when free of predators). In the genera Acartia, Oithona, and Pseudocalanus, we estimate that predation mortality contributed $69$% of the field mortality rate in adult males, whereas in Acartia, Oithona, and Calanus adult females, this is $36$%. We conclude that (1) adult sex ratio skew in pelagic copepods is primarily due to differential mortality of the sexes in the adult stage and not in juveniles, (2) mortality rates of adult Acartia, Pseudocalanus, and Oithona are dominated by predation mortality rather than physiological longevity (except under extreme food limitation), and (3) in Pseudocalanus and Oithona, elevated mortality rates in adult males to females is predominantly due to higher predation on males. Our work demonstrates that we now need to develop a more comprehensive understanding of the importance of feeding preferences in predators.