



Growth of marine planktonic copepods: Global rates and patterns in relation to chlorophyll a, temperature, and body weight

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ABSTRACT: We compiled a global data set of copepod in situ weight-specific fecundity and growth rates, together with measurements of their body weights, and the chlorophyll a and temperature of the natural water in which these animals were growing. Juveniles can achieve half-saturation of their growth (K_m) at chlorophyll a concentrations almost an order of magnitude lower than adult females can their weight-specific fecundity. Adult weight-specific fecundity rates in situ are correlated with temperature, but the Q_{10} s of 1.59 and 1.43 in broadcast and sac spawners, respectively, are much lower than under food saturated laboratory conditions (Q_{10} s of 2.75 and 3.98). By comparing the in situ and laboratory food saturated results we are able to assess food limitation in the environment. The degree of food limitation increases with increasing temperature for adults; in situ rates approximate food saturated rates at low temperatures (0-10° C), at 25° C they are on average only about one-fifth of those at food saturation. By contrast, in situ juvenile rates are more strongly temperature-dependent than their adults and close to food saturation even at high temperatures. Juveniles grow much more rapidly and closer to food saturation than do adults of a similar size. There are several possible reasons for this. Compounds needed for egg production may simply be more dilute than those used in somatic growth. However, it is also possible that food limitation acts very differently in adults than juveniles. Molting rates in juveniles are strongly temperature dictated, and if sufficient weight is not added between molts, these slower growing juveniles do not survive. Adults, by contrast, can survive for long periods without having sufficient food to produce eggs.

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