Kinetics of phosphorus in Daphnia at different food concentrations and carbon:phosphorus ratios

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ABSTRACT: We examined the assimilation efficiency, excretion, and efflux of phosphorus (P) in adults and juveniles of *Daphnia magna* under different food levels (2-40 µg P L^{-1}) and dietary carbon : phosphorus (C : P) ratios (90-930 in molar) with *Chlamydomonas reinhardtii* as food. The P assimilation efficiencies calculated by regression analysis were 38-85% and 66-89% for adults and juveniles, respectively, and were constant at food concentrations >24 µg P L^{-1}, but increased significantly when the diet shifted from P-sufficiency to P-deficiency. The mass-specific excretic rate of adults and juveniles was 1.1-33.2 ng P mg dry weight (DW)$^{-1}$ h^{-1} and 3.0-63.4 ng P mg DW^{-1} h^{-1}, respectively, and was influenced by the food concentration and decreased with an increase i dietary C: P ratio. The efflux rate constants of the adults and juveniles were 0.182-0.298 d^{-1} and 0.096-0.185 d^{-1}, respectively. Food concentration did not affect the efflux, but an increase in dietary C: P ratio reduced the P efflux, suggesting stoichiometric regulation. Among the differer routes involved in P loss from *Daphnia*, molting was the most important, contributing 44-75% of tl total loss for the juveniles and adults. The mass specific loss rates were 13-54 ng P mg^{-1} h^{-1} and 4 110 ng P mg^{-1} h^{-1}. The relative and absolute P loss from each compartment (except the dissolved release in adults) was independent of food concentration. Increasing the dietary C: P ratio decreased the mass-specific release rates by molting, dissolved P release, and reproduction, indicating the animals[] endeavor to maintain P stoichiometric homeostasis.