Stoichiometric regulation of carbon and phosphorus in P-deficient Daphnia magna

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ABSTRACT: *Daphnia magna* were fed phosphorus-sufficient (+P) and P-deficient (2P) green algae *Chlamydomonas reinhardtii* (carbon : phosphorus ratio of C: P = 90 and 930 in molar, respectively) for 5 d to produce different body C: P ratios. The dietary absorption as well as the elimination of body C and P were then quantified under contrasting dietary qualities (+P and 2P). The 2P animals fed with 2P algae had a higher absorption efficiency (AE) of both C (46%) and P (52%) than the control (+P animals fed +P algae) and the recovery group (2P animals fed +P food). During the physiological efflux, the 2P animals fed with 2P diet eliminated their body C at the highest rate (0.41 d'') and their body P at the lowest rate (0.10 d21) among the three groups of animals. Mass-specific C loss rates through dissolved release, respiration, and molting increased significantly, and the mass-specific P loss through dissolved release, molting, and reproduction decreased in the 2P animals compared with the +P animals, in agreement with the stoichiometric models. Consequently, the C: P ratio of dissolved release, molting, and reproduction all increased with the increase in P deficiency. The recovered *Daphnia* had medium values of AE, efflux rate constant, and mass-specific loss rates, indicating the reversibility of P limitation. Our study demonstrated that all the pathways (excretion, reproduction, molting, and respiration) may be involved in the stoichiometric regulation in *Daphnia*.