



## Mixotrophic versus photoautotrophic specialist algae as food for zooplankton: The light : nutrient hypothesis might not hold for mixotrophs

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**ABSTRACT:** We reared mixotrophic (*Ochromonas tuberculata* and *Cryptomonas* sp.) and photoautotrophic specialist algae (*Scenedesmus obliquus*) at different light : phosphorus supplies and compared their effects as food for zooplankton (*Daphnia magna*). According to the light : nutrient hypothesis (LNH), biomass and nutrient stoichiometry of phototrophic specialists depend strongly on light : phosphorus supplies. If this is true, herbivore growth and fecundity should be limited by food quantity at low light intensities and by stoichiometric food quality at high light intensities. In turn, phosphorus fertilization should cause a transition from limitation by food quality to limitation by food quantity. In contrast to the LNH, biomass and nutrient stoichiometry of mixotrophs were almost unaffected by alterations in the supply of light and dissolved nutrients. Bacterial counts indicate that mixotrophs compensated for light or phosphorus deficiency by heterotrophic nutrition. Compared to phototrophic specialists, a diet of *Cryptomonas* sp. therefore enabled a similar or higher and more stable secondary production at most light : nutrient supplies. *O. tuberculata*, however, appeared to be toxic. Our results indicate that mixotrophs might have a balancing effect on variations in transfer efficiency caused by perturbations to light and nutrient supplies.

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