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Mesozooplankton clearance rate on phytoplankton is reduced by increasing carnivory degree of omnivorous assemblage at coastal and estuarine water

In order to understand the relationship between mesozooplankton assemblages and the efficiency they act as primary consumers, we carried out a monthly investigation on mesozooplankton composition at two contrasting stations of Hong Kong coastal and estuarine waters and simultaneously conducted bottle incubation feeding experiments. Our result showed that the assemblage of mesozooplankton were overall omnivorous at both stations with varying omnivory degree (the degree of feeding preference of protozoa and animal food to phytoplankton) and the variations of omnivory degree were significantly associated with microzooplankton biomass (ciliates for the coastal station, both ciliates and dinoflagellates for the estuarine stations) and physical environmental parameters (primarily salinity). Mesozooplankton clearance rate on phytoplankton, calculated from the log response of chlorophyll *a* concentrations by the introduction of bulk grazers after one-day incubation, was significantly reduced by increasing carnivory degree of the mesozooplankton assemblage. The mechanism for the reduction of mesozooplankton clearance rate with increasing carnivory degree was primarily due to less efficient of filtering feeding and stronger trophic cascades due to suppression of microzooplankton. As mesozooplankton assemblage also selectively fed on phytoplankton based on sizes, large-sized phytoplankton were often cleared with high rates, while small-sized phytoplankton were often cleared with low rates, with the trophic cascade effect acting in the opposite direction. The trophic cascades indirectly induced by mesozooplankton carnivorous feeding can be observed by the negative clearance rate on small-sized phytoplankton.

**KEYWORDS:** Mesozooplankton, Clearance rate, Grazing, Trophic cascade, Carnivory, Omnivory