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Cyanobacteria as a carbon source for zooplankton in eutrophic Lake Taihu, China, measured by ¹³C labeling and fatty acid biomarkers

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ABSTRACT: Using a combined stable-isotope and fatty-acid approach, we examined carbon-transfer routes from the cyanobacterium Microcystis to zooplankton in eutrophic Lake Taihu, China. Microcystis is generally considered poor food for zooplankton, and we hypothesized that most Microcystis carbon flows to zooplankton via dissolved organic matter (DOM)-bacteria and detritusbacteria pathways rather than via direct grazing. The hypothesis was tested by analyzing '3C isotopes at natural abundance in field samples and in tracer experiments with 'aC-enriched Microcystis. '3C-enriched Microcystis was added as live Microcystis, Microcystis detritus, or Microcystis DOM to lake-water incubations with Bosmina sp. and Daphnia similis as the dominant species. The '³C isotope signatures of *Microcystis*, heterotrophic bacteria, and eukaryotic algae in seston were determined from isotope analyses of specific fatty acids, and the presence and labeling of these fatty acids were also analyzed in zooplankton consumers. Bosmina and Daphnia consumed carbon via all pathways, but the amount of carbon transfer from the Microcystis DOM was the highest, followed by the Microcystis detritus. Bosmina consumed relatively more live Microcystis than Daphnia. The presence and high '3C enrichment of bacteria-specific fatty acids in the zooplankton consumers showed that heterotrophic bacteria were an important link between Microcystis and zooplankton. Microbial pathways dominate the energy flow from cyanobacteria to zooplankton in eutrophic lakes with heavy cyanobacteria blooms, such as Lake Taihu.

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