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TITLE: Biomass distribution in marine planktonic communities

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ABSTRACT:

Patterns in primary production and carbon export from the euphotic zone suggest that the relative contribution of planktonic heterotrophs to community biomass should decline along gradients of phytoplankton biomass and primary production. Here, we use an extensive literature data survey to test the hypothesis that the ratio of total heterotrophic (bacteria + protozoa + mesozooplankton) biomass to total autotrophic biomass (H : A ratio) is not constant in marine plankton communities but rather tends to decline with increasing phytoplankton biomass and primary production. Our results show that the plankton of unproductive regions are characterized by very high relative heterotrophic biomasses resulting in inverted biomass pyramids, whereas the plankton of productive areas are characterized by a smaller contribution of heterotrophs to community biomass and a normal biomass pyramid with a broad autotrophic base. Moreover, open?ocean communities support significantly more heterotrophic biomass in the upper layers than do coastal communities for a given autotrophic biomass. These differences in the biomass structure of the community could be explained by the changes in the biomass?specific rates of phytoplankton production that seem to occur from ultraoligotrophic to eutrophic marine regions, but other factors could also generate them. The patterns described suggest a rather systematic shift from consumer control of primary production and phytoplankton biomass in open ocean to resource control in upwelling and coastal areas.

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