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Tiny Heroes of the Sea: The Role of Phytoplankton in Marine Ecosystems and Carbon Cycling

Short Answer Key

1. Phytoplankton perform photosynthesis, a process where they use sunlight, carbon dioxide, and nutrients to produce energy and organic matter. This process is crucial as it provides the foundation of the marine food web by generating food for herbivorous zooplankton and other marine organisms.
2. Phytoplankton are the primary producers in marine food webs. For example, krill, small herbivorous crustaceans, feed on phytoplankton. These krill are then consumed by various marine species, including whales, seals, and penguins, illustrating the importance of phytoplankton in supporting higher trophic levels.
3. Phytoplankton absorb carbon dioxide from the atmosphere during photosynthesis. When they die or are consumed, some of the carbon they contain sinks to the deep ocean, a process known as the biological pump. This sequesters carbon away from the atmosphere, helping to regulate global carbon levels.
4. Phytoplankton face challenges such as ocean acidification, rising sea temperatures, and changes in nutrient availability. Monitoring their populations is essential because shifts in phytoplankton abundance can impact entire marine ecosystems, affecting the availability of food for zooplankton and other organisms.
5. Phytoplankton play a vital role in maintaining the balance of marine ecosystems by providing the base of the food chain. Additionally, their role in global carbon cycling helps regulate carbon dioxide levels in the atmosphere, contributing to climate stability. Protecting phytoplankton is crucial for both marine biodiversity and climate regulation.

