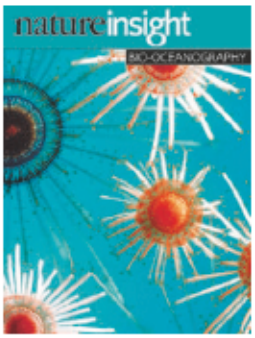

Cover illustration
The *Porpita* is a genus of bright-coloured Siphonophora found floating in the warmer parts of the ocean. It has a greenhouse-like husk and many photosynthentic zooxanthellae. (Credit: Peter Parks/ Imagequestmarine.com.)

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BIO-OCEANOGRAPHY

Two-thirds of our planet's surface is covered in water, yet the global importance of the oceans is only just becoming apparent. We now know, for example, that marine microbes are responsible for about half of the Earth's primary productivity. They mediate many of the key biogeochemical processes that drive global nutrient cycles, and feedback mechanisms between marine ecosystems and the atmosphere have a fundamental role in regulating world climate.

Technological advances, ranging from microbial genomics to satellite remote sensing, have furthered our understanding of biological processes in the oceans. Microbial ecologists have in recent years identified levels of microbial functional diversity that were beyond their wildest dreams. One example are the 'anammox' bacteria — miniscule lifeforms capable of anaerobic ammonium oxidation, leading to the loss of previously fixed nitrogen from the ocean back to the atmosphere. Another important advance is the ability to culture such newly discovered microbes in the laboratory.

There is still much to be learned from more traditional whole-ecosystem approaches such as those that focus on patterns of species' abundance, nutrient limitation, food webs and community structure. Such knowledge should help us to understand, and predict, the effects of climate change on fragile oceanic environments such as polar marine ecosystems. There will also be surprises along the way. It is only in the past decade or so that we have come fully to appreciate the importance of viruses in the sea and the effect that they have on the carbon cycle.

We hope this Insight will impart some of the excitement of this rapidly evolving field. The study of biological oceanography may well hold the key to understanding global nutrient cycles in a time of rapid environmental change.

Jane Rees, Senior Editor

REVIEW ARTICLES

nature insight