## Tiny fossils hint at effects of ocean acidification

Sediment-bound specimens allow comparison of ancient and present responses to changing oceans.

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A rare find of stunningly intact fossils of prehistoric plankton will allow researchers to study how the tiny marine organisms cope with rising acidity in the oceans.

Finding such intact specimens of coccolithophores, micrometre-sized marine plankton encased in discs of calcium carbonate, is a real coup — searching for fossils of calcified single-celled organisms often yields only skeletal bits that have fallen to the ocean floor.

"Breaking open undisturbed 56-million-year-old sediment samples, we can image coccolithophores — right down to their intracellular vesicles — using a scanning electron microscope," said Paul Bown, a palaeoceanographer at University College London, who this week presented images of the fossils at the Third International Symposium on the Ocean in a High CO<sub>2</sub> World in Monterey, California.

A growing concern among scientists is that ocean acidification, driven by climate change, will reduce the abundance of calcium carbonate in the seas, making it difficult for algae to form their microscopic plating, essential for their survival. With intact fossils in hand, researchers can compare the sizes, shapes, thickness and growth rates of ancient and modern coccolithophores. They are looking for clues about past adaptations in coccolithophores before and during the Palaeocene-Eocene Thermal Maximum, a period of rapid ocean warming and acidification around 55 million years ago, considered the best natural analogue to current acidification. Preliminary results suggest that the growth rates of ancient coccolithophores were sensitive to rapid changes in ocean chemistry.

Bown and his colleague Samantha Gibbs, a palaeoceanographer at the University of Southampton, UK, collected specimens containing thousands of microscopic fossils from sites in California, New Jersey and Tanzania. "This is an enormous record that we can now tap into," says Bown.

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