

animal–microbe associations, such as the Ediacaran fauna of Mistaken Point, occur in deep-water settings⁸. The model presented by Gingras and co-authors does not explain associations between Ediacaran animal fossils and microbial-mat features in depositional environments beneath sunlit depths.

The fundamentally heterogeneous nature of dissolved oxygen concentrations in the marine environment should also be considered before this model is applied broadly to animal life in the Ediacaran. Oxygen concentrations vary widely in the present-day ocean⁶, and are strongly influenced by temperature and circulation, as well as local primary productivity and respiration rates^{9,10}. Phototrophic primary production is dependent on light that is limited to the near-surface environment, as well as on nutrients that are heterogeneously distributed in the surface ocean. Despite the overall lower concentration of oxygen during

Ediacaran times, there would undoubtedly have been considerable heterogeneity in oxygen concentrations in different parts of the world's oceans, as is found today. Indeed, geochemical indicators from this interval suggest temporal and spatial heterogeneity in oxygen concentrations¹¹. Thus concentrations of oxygen that were high enough to support animal life may not have been limited to phototrophic microbial mats. Furthermore, the oxygen-mining model of Gingras and co-authors does not exclude the possibility that Ediacaran metazoans were adapted to persistently low oxygen concentrations, as is the case with some modern animals¹².

The observations made by Gingras and co-authors² are exciting, and provide a potential modern analogue for the interactions of motile metazoans with Ediacaran matgrounds in shallow depositional environments. However, much work remains to be done before the book is closed on the palaeoecology of the earliest animals. □

Jake Bailey is in the Department of Earth Sciences, University of Minnesota – Twin Cities, Minneapolis, Minnesota 55455, USA.

e-mail: baileyj@umn.edu

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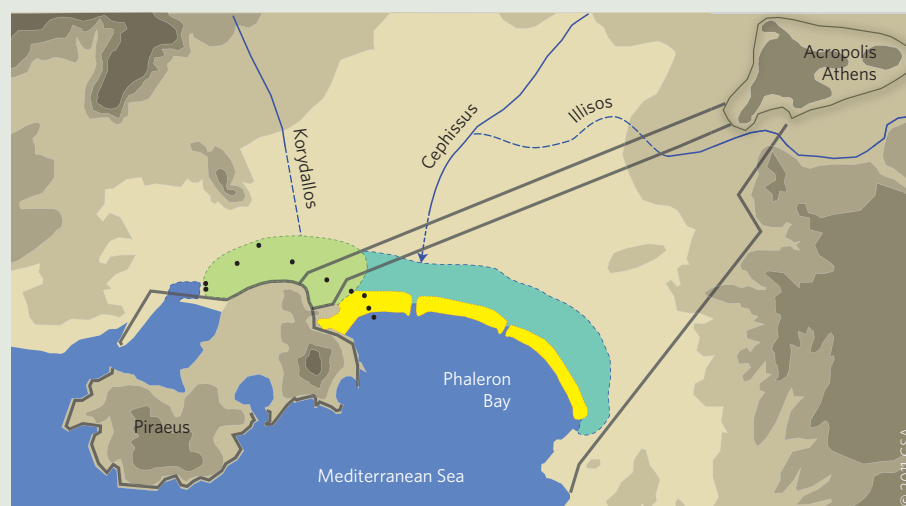
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GEOGRAPHY

Strabo's Greece

A wealth of tales and historical accounts paints a vivid picture of ancient Greece. The geography revealed by such narratives, however, often bears little resemblance to the Greek isles of today. Sea-level change alone cannot account for the extra islands, suggesting that ancient poets and geographers used a bit of creative licence. But at least in the case of the lost island of Ithaca, the formerly mythological homeland of Odysseus, a closer look suggested similarities between Homer's description of the isle and Paliki peninsula, now part of the island of Kefalonia. A stratigraphic analysis revealed that Kefalonia was once two islands separated by a narrow marine channel. Rockfalls over the intervening years filled the channel and linked the two islands. (*Nature Geosci.* **2**, 455–458; 2009).

Modifications of the landscape by the ancient Greeks themselves turn out to have had similar effects. In the fifth century BC, they built long walls that connected the rocky area of Piraeus to the Greek mainland. Piraeus was formerly an island, but it is unclear whether a connection to the mainland existed before the construction of the walls. Jean-Philippe Goiran of CNRS, France, and colleagues used borehole sediments to reconstruct the joining of the island of



Piraeus with mainland Athens (*Geology* **39**, 531–534; 2011).

The sediments reveal a slow and steady progression from isle to mainland. The island stood alone as late as 5,400 years ago. It was still separated from the mainland by a wide lagoon 3,500 years ago, but the shallow basin was periodically filled with sediments from the Cephissus and Korydallos rivers. Sometime before the sixth century BC, the lagoon was replaced by coastal marshes that hosted the walls erected the following century.

Thousands of years later, in the first century AD, the Greek geographer Strabo, who also wrote of the channel separating Paliki from Kefalonia, identified Piraeus as a former island. Whether he knew from Greek oral tradition or just correctly interpreted the relatively flat landscape surrounding the former isle, we will never know. But Strabo accurately captured one era of the rapidly changing landscape of the Greek islands.

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