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## **PROTISTS AND THE PRECAMBRIAN-CAMBRIAN SKELETONIZATION EVENT**

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Protists have a long fossil and geochemical record dating back to at least 2.7 ga with fossils appearing at about 1.6 ga, and they remain common until the present. However, along with the metazoans, Precambrian protists were unskeletonized while those with skeletons appeared at or near the base of the Cambrian and radiated later. These protistan skeletal types included as wide a variety as exists in today's seas--agglutinated, siliceous, calcareous, organic walls. Foraminifera, ciliates, radiolarians, and algal cysts all radiate in the Cambrian. Their diversity increases through the Cambrian through the Ordovician and into the Silurian. This pattern grossly matches that of the metazoans.

The protistan record suggests that the skeletonization event at the Precambrian-Cambrian boundary was not restricted to metazoans, and was therefore not caused by an intrinsic feature of animals. Because the event affected benthic and planktonic and on-shore and off-shore organisms simultaneously, the causal factors must have acted across ecosystem boundaries. Of all the possibilities, one that accounts for the most features of the event is increasing trophic complexity, most likely made possible by increases in ocean nutrient supplies and primary production. This accounts for the distribution of fossils, their diversity, and the diverse modes of skeletons.