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ABSTRACT

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The earliest known stromatoporoid and its contribution to reef construction

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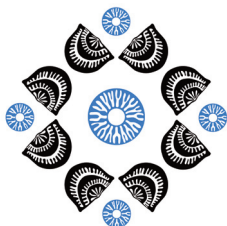
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Stromatoporoid-type hypercalcified sponges are known to have contributed to the global reef system since the late Middle Ordovician until their major disappearance in the latest Devonian. However, the timing of their appearance and how the earliest stromatoporoids were incorporated into the reef ecosystem remains a mystery. A stromatoporoid taxon was previously reported from the lower Floian of South China, but this example limitedly occurs within the cryptic space of a lithistid-*Calathium* reef and has negligible importance in reef construction, unlike the later stromatoporoids that formed the major reef frameworks during the Palaeozoic.

In this study, we describe the earliest known definitive stromatoporoids and the reefs constructed by them in the upper Tremadocian to the lower Floian of South China. The reef framework is dominated by various growth forms of stromatoporoids – ranging from laminar, domical, bulbous to digitate morphologies – that alternate with other organisms such as the calcimicrobe *Girvanella* and stalked echinoderms. Stromatoporoids have played a significant role in frame-building and binding associated with other reef components, contributing to the construction of a complex reef community similar to those found in the late Middle Ordovician and onwards.

In South China, late Cambrian microbial-dominant reefs were rapidly substituted by newly-emerging metazoan reef-builders in the Early Ordovician, such as lithistid sponges, quasi-sponge *Calathium*, bryozoans, echinoderms, the problematic *Pulchrilamina* and stromatoporoids. This is in contrast to other palaeocontinents where lithistid-microbial reefs dominated throughout the late Cambrian and Early Ordovician, with *Calathium* being incorporated in the Early Ordovician. This finding supports the idea that there was regional heterogeneity in reef evolution during this critical time of the Great Ordovician Biodiversification Event.



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