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ALGAL STROMATOLITES IN THE DEVONIAN OF THE CANNING BASIN, WESTERN AUSTRALIA

Phillip E. PLAYFORD
Geological Survey of Western Australia

(1 figure dans le texte)

A study of algal stromatolites developed in Devonian reef complexes of the Canning Basin (cfr. figs. 1 & 2 p. 399, 400) has shown that some forms grew to depths of at least 45 m and probably more than 80 m below sea level. These occurrences negate the concept that algal stromatolites are restricted to intertidal and near-intertidal environments of deposition. This concept has been based primarily on occurrences of stromatolites growing today at Shark Bay in Western Australia.

The Shark Bay stromatolites (fig. 1) fringe the shores of Hamelin Pool, a hypersaline arm of the bay. Hitherto they have been said to be restricted to the intertidal and supratidal zones at Hamelin Pool. However, there are also some shallow subtidal occurrences of well-developed living columnar forms that extend to depths of at least 2 m. The subtidal forms are undergoing contemporary lithification. Most of the stromatolites at Hamelin Pool are crudely laminated to unlaminated columns showing characteristic birdseye textures.

In the Canning Basin reef complexes, algal stromatolites occur in the reef, back-reef, and fore-reef facies of the complexes. Those found in the reef and back-reef deposits are irregular columnar forms, and they commonly show birdseye textures. They are not as regularly laminated as the fore-reef stromatolites, and are believed to have formed in very shallow water. Morphologically and texturally they are closely similar to the modern intertidal and shallow-subtidal stromatolites of Hamelin Pool. However, the most abundant and varied stromatolites in the reef complexes are those found in the fore-reef facies.

The fore-reef stromatolites in the Canning Basin grew to considerable depths on depositional slopes having inclinations from a few degrees up to near vertical. They played an important role in maintaining the steep slopes by binding loose detritus and fossils. Many different types occur, and can be described as columar, longitudinal, undulatory, contorted-bulbous, mound-shaped or biohermal, planar, reticulate, and nodular stromatolites. Nonskeletal algae (possibly red-pigmented cyanophytes and/or heterotrophic forms) are believed to have been dominant in forming these deep-water stromatolites. However, recognizable skeletal algal species also occur, and bacteria may have contributed to some forms. Crinoid and coral holdfasts encrust some of the stromatolites, showing that these must have grown as rather hard and rigid bodies. Other conspicuous elements of associated open marine fauna include ammonoids, nautiloids, and conodonts.

The minimum water depth in which stromatolites grew on the fore-reef slope can be deduced in areas where the associated fore-reef bedding can be traced up to meet reef facies. Where the fore-reef slope is entirely depositional the minimum

water depth is obtained simply by measuring the present difference in elevation between the stromatolites and the top of the fore-reef slope where it meets reef facies. The equivalent reef crest is thought to have grown close to sea level. In this way it has been shown that some stromatolites in the Canning Basin fore-reef deposits grew in water at least 45 m and probably more than 80 m deep.

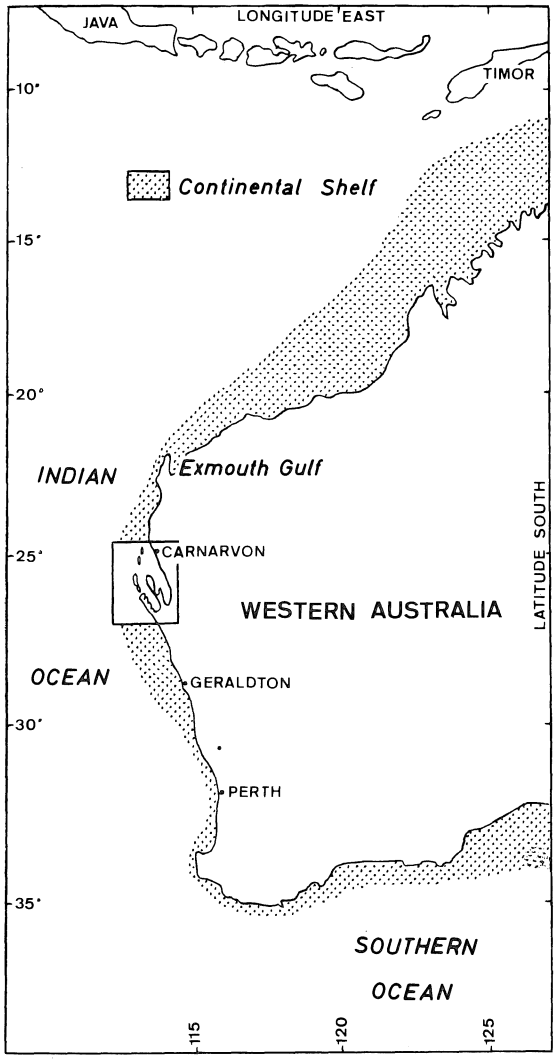

Fig. 1. — *Shark Bay, location map*; the bay, framed in a square south of Carnarvon shows two arms the more oriental of which is Hamelin Pool.