Annales de la Société Géologique de Belgique, T. 95, 1972, pp. 399-400 1973

DEVONIAN REEF COMPLEXES OF THE CANNING BASIN, WESTERN AUSTRALIA

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(2 figures dans le texte)

The Middle and Upper sequence of the northern Canning Basin includes some of the world's best-preserved reef complexes. They are spectaculary exposed in a belt of rugged limestone ranges, 250 km long (fig. 1).

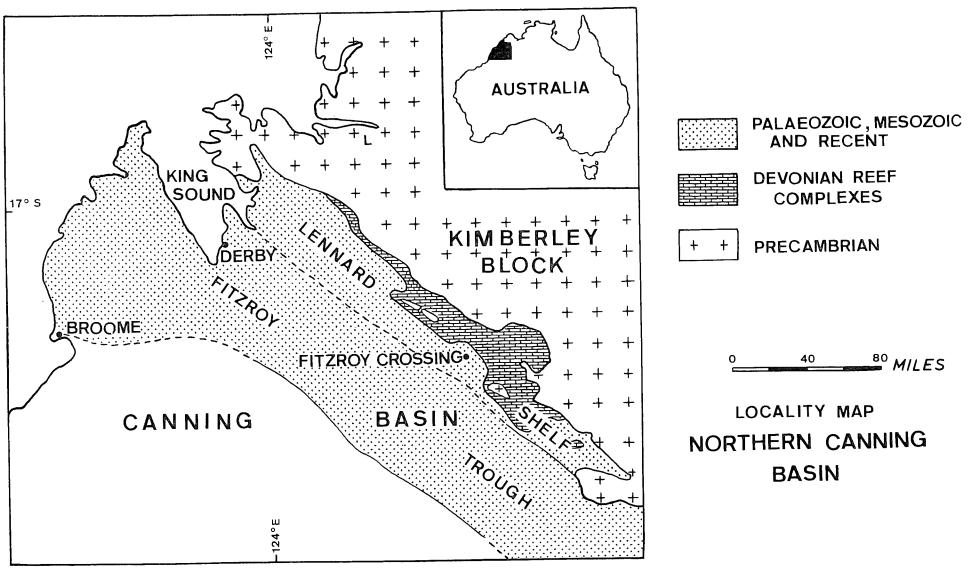

Fig. 1

Reef, back-reef, fore-reef, and inter-reef facies are recognized (fig.2). The reef and back-reef deposits make up limestone platforms that rose some tens to hundreds of metres above the adjacent sea floor. They cover areas from a few hectares to hundreds of square km in extent, and some may exceed 2,000 m in thickness.

Most of the reefs grew on Precambrian rocks, along the shore of the Kimberley Block and around islands and submerged ridges, but at least one grew on Ordovician carbonates. They may be described as barrier reefs, fringing reefs, atolls, and patch reefs. The reef facies normally occurs as a narrow rim around the platform margin, but it is discontinuous in some areas. The main reef frame-builders were skeletal and non-skeletal calcareous algae and stromatoporoids, but corals were also important in the older (Givetian and early Frasnian) reefs.

The back-reefs deposits (fig. 2) were laid down in the shelf lagoon behind the reef rim of each platform. They consist of well-bedded stromatoporoid, algal, coral, oncolite and oolitic limestones.

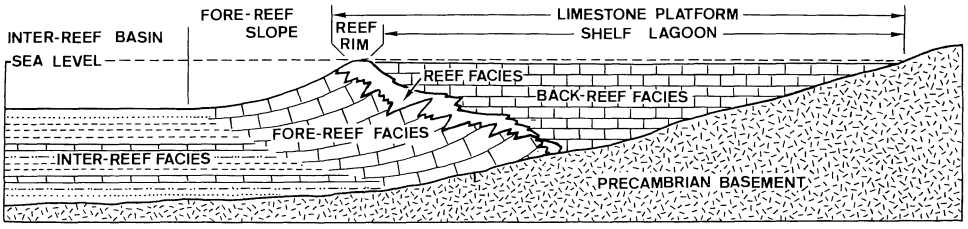

Fig. 2. — Diagrammatic cross section illustrating development and structure of a typical reef complex of the nothern Canning Basin.

The fore-reef facies (fig. 2) consists of talus derived from the reefs and (to a lesser extent) the shelf lagoons, together with variable contributions from indigenous organisms and terrigenous sources. Large allochthonous blocks of reef limestone are common, and locally they form megabreccias. Depositional dips in the fore-reef deposits are commonly as high as 35 degrees in loose talus, and range up to near vertical where the deposits have been bound by algae.

The inter-reef facies (fig. 2) is composed largely of terrigenous sediments, with some thin limestones, and is characterized by a pelagic fauna. The depth of water in the inter-reef basins may have exceeded 300 m in some areas.

The complexes are dated as Late Givetian to Late Famennian by ammonoids, conodonts, foraminifers, corals, and brachiopods. Extinction during the late Famennian may have resulted from shallowing of the inter-reef basins by terrigenous sedimentation, followed by deposition of non-reefal sediments over the entire area.

Large masses of terrigenous conglomerate interfinger with the reef complexes in some areas. They were probably shed from active fault scarps.

The limestones have been dolomitized in some areas, but dolomitization is rarely extensive. Tectonic deformation of the strata is generally mild, with local faulting, folding, and tilting. Certain faults were active during the Devonian.