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GEOLOGY

Possible Microfossils found in the Roraima Formation in British Guiana

AFTER many years of speculation the Roraima Formation of British Guiana has now been found by McDougall *et al.*¹ and Snelling² to be not younger than Lower Proterozoic. The Formation is, therefore, of considerably greater antiquity than had been supposed and, in consequence, there is heightened interest in presumed microfossils which have been recently discovered in it. The tabular Roraima Formation has a total thickness in British Guiana in excess of 7,000 ft. (ref. 3) and consists of generally horizontal, dominantly arenaceous sediments. It forms the Pakaraima Mountains of the mid-western region of the country and also extends over considerable adjacent areas in Venezuela and Brazil, covering some 175,000 square miles in all.

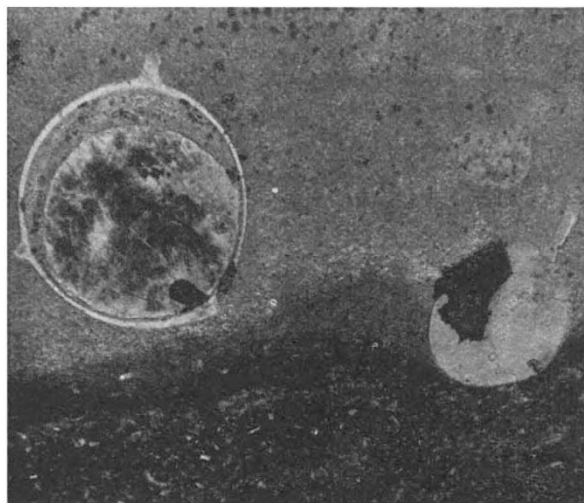


Fig. 1. $\times c. 72$

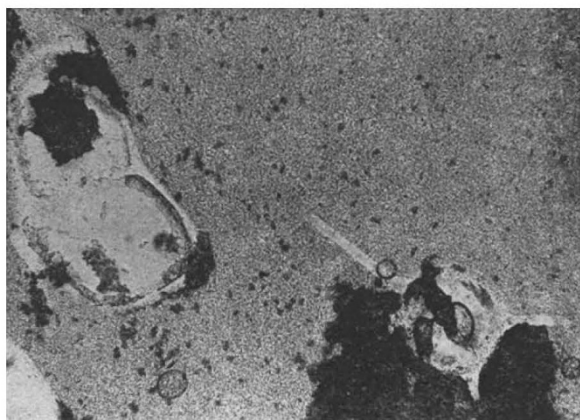


Fig. 2. Photomicrographs of fossil-like objects in a chert from the Roraima Formation, Kako River, British Guiana. Collection by P. B. H. Bailey. Geological Survey of British Guiana (specimen H 265) ($\times c. 84$)

Barbosa and Ramos⁴ report the occurrence of a fossil 'spongilite', in which Prof. Karal Beurlen identified sponge spicules, from the Roraima Formation in Brazil. Spicule-like objects have been observed from similar rocks in British Guiana although there is some suggestion that these may be volcanic shards.

A collection of specimens from stream pebbles and boulders at a locality on the Kako River⁵ included some which contain microscopic objects of apparent organic origin. On revisiting the locality on a later occasion⁶ unsuccessful search for the source was made; nevertheless there is little doubt that the material was derived from the Roraima Formation. The fossil-like objects occur in chert and jasper beds. They appear to be the tests of unicellular micro-organisms and sometimes occur abundantly in very narrow bands. Examples from specimen H 265 are shown in Figs. 1 and 2. In Fig. 1 the larger of the objects, which are spherical with a suggestion of tetrahedral symmetry, has a diameter of 0.4 mm with a wall thickness around 0.008 mm. Fig. 2 contains two objects. One is a globular mass about 0.16 mm in diameter with three radiating spine-like projections, one having a length of 0.18 mm. The other object is two-chambered, each chamber being around 0.18 mm diameter with walls about 0.012 mm in thickness. In other sections a variety of forms ranging in diameter from 0.6 mm to 0.1 mm may be seen, some reminiscent of Foraminifera and Radiolaria, but none of which can be identified with any certainty. There can be little doubt, however, of their organic origin.

It may be noted that in a recent communication⁶ attention has been drawn to other supposed fossils in the Early Proterozoic.

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Migrating Basins on the Old Red Continent

EVIDENCE of long-continued interplay of Old Red tectonic activity and sedimentation has recently been unravelled in the Hornelen Series of western Norway. This series has an estimated stratigraphical thickness of 20-25,000 metres of shallow-water clastic sediments¹. The enormous thickness probably is real because tectonic repetitions should not escape notice in this well-exposed, obsequent rift block mountain-area with barren homoclinal ridges and mountain peaks up to more than 1,600 metres above the fjords. The disposition of the bedding simulates an amphitheatre with regular eastwards dip in the middle.

The major part of the series is made up of green sandstone, but sedimentary breccia with boulders up to 1 m³ is fringing the faulted contact towards the underlying Caledonian rocks. A coarse bedding in the breccia is indicated by occasional graded bedding, by zones of imbricated fragments and by intercalated layers of sandstone which always have a channelled contact against the succeeding breccia bed. In spite of a stratigraphical thickness of several kilometres, the breccia intertongues basinwards into sandstone within less than 1.5 kilometres from the contact.

The disposition of breccia and sandstone indicates that the Hornelen series formed by deposition in a bolson