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THE HUTTON CREEK BORE, QUEENSLAND

by

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THE HUTTON CREEK BORE, QUEENSLAND.

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Report No. 1944/12.

In the search for oil in Queensland, Drillers Limited, a subsidiary of Oil Search Limited, Sydney, put down a deep bore at Hutton Creek near Injune, in the parish of Simmie, county of Westgrove and 60 miles north of Roma. Drilling operations, which began in 1935 and ceased in 1938 when the depth of the bore was 4,688 feet, were carried out with a Commonwealth Government plant. The major part of the drilling was done by the percussion method, but cores were taken at various depths down to 4,678 feet. No samples were received for microscopic examination until the bore had reached the depth of 650 feet, but from this depth to the bottom of the bore-hole, 638 samples of cuttings and cores were examined. Core samples were taken at more frequent intervals towards the bottom of the bore-hole than higher up.

A study of the cores and cuttings from the bore-hole suggests subdivision of the section into three stratigraphic units:-

- (1) Marine sediments, containing foraminifera and brachiopod remains, from 657 feet to 886 feet.
- (2) Freshwater sediments with plant remains from 892 to 3,959 feet.
- (3) A mixed assemblage of marine (radiolaria) and freshwater fossils (plant remains) from 3,959 feet to the bottom of the hole at 4,688 feet.

(1) Marine sediments referable to the Permian were encountered at 657 feet and were present down to 886 feet. Fragments of brachiopod shells including productid spines were common from 657 feet down to 800 feet. Permian foraminifera (Ammodiscus milletianus Chapman and Trochammina sp.) were noted at 770-790 feet. Similar foraminifera have been found in sediments belonging to the Middle Bowen Series in the Springsure area, but this does not indicate that they are restricted forms.

(2) The first evidence in the drill cuttings of the presence of freshwater Permian sediments, was at 892 feet when fragments of dark carbonaceous shale were noted. These carbonaceous shales are present from this depth to the bottom of the bore-hole, but are only purely freshwater down to 3,959 feet. In the stratigraphic section of the bore compiled by Oil Search Limited, 25 feet of coal is shown from 900 feet to 925 feet. Further beds of coal were logged between 1,096 and 1,105 feet, 1,337 and 1,370 feet and 1,540 and 1,545 feet. The first fragment of Glossopteris recognised by the writer occurred at 1,814 feet, but according to the Company's records Dr. F. W. Whitehouse determined Glossopteris Browniana, G. indica and G. parallela from the coal band at 1,540 feet. Fragments of Glossopteris were observed in cuttings at 2,198 feet.

(3) The sediments from 3,959 feet down to the bottom of the bore at 4,688 feet consist of carbonaceous shales, sandstones, and indurated shale showing fracturing and slickensiding, and a decided dip. Fine bedding with a dip of about 30 degrees was first noticed in a core consisting of grey carbonaceous shale at 3,959 feet. A similar dip was observed down to 4,079 feet. Below that depth the cores recovered represent grey indurated shales showing a dip of 60 degrees. Glossopteris Browniana was present in a core at 3,959 feet and G. indica (determined by Dr. Whitehouse) at 4,325 feet, the specimens being

well preserved. Fragments of Glossopteris were noted in the cuttings at various depths down to 4,511 feet.

Many thin sections of cores from 3,595 feet down to 4,678 feet were examined. They all contain fine angular quartz grains in a carbonaceous groundmass and show evidence of bedding. Also present are numerous tests of radiolaria of the spumellarian type. These were identified in sections of cores taken at 4,263 feet, 4,323 feet, 4,337-4,339 feet, 4,345-4,350 feet, 4,354 feet, 4,448 feet, 4,465 feet, 4,571 feet and 4,678 feet. The genera include Cenosphaera, Carposphaera, Heliosphaera and Haliomma, all of which have been previously recorded from Palaeozoic rocks in Australia, but not from the Permian. The tests are large, a feature common in Palaeozoic radiolaria, the diameter of the tests varying from 30 microns to 90 microns. Many of the tests are well preserved and some are replaced by glauconite. Some minute siliceous sponge spicules are also present.

Radiolaria are exclusively marine organisms and, being planktonic have a wide distribution. The fact that at the present time they are found most abundantly in tropical waters, suggests that the sediments in which they are found fossil were deposited under warm climatic conditions. Usually radiolaria are deposited at considerable depth, from 12,000 to 25,000 feet, but they are known to be present in shallow water deposits. In the latter case the deposits are regarded as purely local. (Twenhofel, 1932). There is not enough evidence at present available regarding the occurrence of radiolaria in the Hutton Creek bore to indicate the exact origin of the deposit, but the association of radiolaria with carbonaceous shales containing Glossopteris suggests that the beds were laid down in shallow water under warm climatic conditions. Unfortunately there are no known surface deposits containing radiolaria in the area with which this part of the section can be correlated.

The fact that a marked change of dip was noted between the depths of 3,959 feet and 4,080 feet and that the sediments show evidence of deformation below 3,959 feet, has been interpreted in two ways. Some geologists have thought that the bore may have passed through an unconformity between the Permian and Devonian, others that a fault zone had been met with. In view of the evidence reviewed in this paper there cannot be much doubt that the latter hypothesis is the correct one and that the bore was in Permian sediments when drilling ceased.

The company's geologists report that the bore commenced in grey sandstones, which probably represents the Bundamba Sandstone, a member of the Upper Triassic, and an inspection of the company's log suggests that the base of this sandstone was at the depth of approximately 340 feet. It was considered by Dr. Frank Reeves, formerly attached to Oil Search Limited, that the Bundamba Sandstone overlaps the lower stages of the Triassic in the Hutton Creek area. His geological cross section of the area indicates the Bundamba Sandstone as directly overlying the Upper Bowen Series (Permian). The evidence reviewed in this paper suggests that the Upper Bowen Series may not be present at Hutton Creek and that the Bundamba Sandstone rests upon the Middle Bowen Series. Furthermore, the evidence points to the whole of the Hutton Creek bore section from 650 feet down to 4,688 feet being within the Middle Bowen Series.

No oil was recorded throughout the drilling of this bore, but some small gas showings were noted.

The diagrammatic log accompanying this paper, which summarises the geological evidence revealed by the bore, is compiled from the company's records and from the writer's observations.