COMMONWEALTH OF AUSTRALIA.

DEPARTMENT OF NATIONAL DEVELOPMENT.

BUREAU OF MINERAL RESOURCES

GEOLOGY AND GEOPHYSICS.

RECORDS.

1957/52

OSTRACODA FROM BORE CORES AND CUTTINGS FROM SISTERS NO.1 BORE, FITZROY BASIN, WESTERN AUSTRALIA.

by

P. J. Jones.

OSTRACODA FROM BORE CORES AND CUTTINGS FROM SISTERS No.1 BORE, FITZROY BASIN, WESTERN AUSTRALIA.

by P.J. Jones.

RECORDS No. 1957/52

CONTENTS

1. INTRODUCTION

This report is based on cores and cuttings submitted for micropalaeontological examination by Associated Freney Oil Fields, N.L., from the Sisters No.1 Bore located about 34 miles E. 37° N of Grant Range No.1 Bore and about 66 miles W.26°N of B.M.R. Bore No.2, Laurel Downs, at approximately longitude 124° 25'E, and latitude 17°43'S. The cores examined, Nos.7, 8, 9, 10, 12 and 14, were taken between the depths of 5,600 feet and 9,728 feet, and cuttings between 6,435 feet and 7,650 feet. The samples are, in part, richly fossiliferous, yielding ostracods, bryozoa, brachiopod spines scolecodonts, annelids, small gastropods, pelecypods, crinoid columnals, and shell fragments. The following description is mainly concerned with the ostracods.

2. DETAILED EXAMINATION OF CORES AND CUTTINGS.

Core 7. Depth 5,600 - 5,605 feet. Hard black limestone with pyrite concretions and calcite veins. No fossils found in the washings. Examination of the residues from dilute hydrochloric acid, and dilute acetic acid treatment, also gave negative results. No cuttings were received between core 7 and core 8.

Core 8. Depth 6,083 - 6,093 feet. Hard black limestone. Ostracods were found, but were not sufficiently diagnostic to be used for age determination.

Ostracoda: Bairdia sp., a different species from those found in the Laurel Beds.

Cavellina sp. indet.

Cuttings Depth 6,435 - 6,440 feet. Ostracod specimens picked out by well-site geologist.

Ostracoda: Cryptophyllus sp.

Graphiadactyllis sp.

Cuttings Depth 6,460 - 6,465 feet. A crushed specimen of Cryptophyllus, also picked out by the well-site geologist.

Core 9. Depth 6,730 - 6,738 feet. Sandy, pyritic calcareous dolomite, (petrological description by W.B. Dallwitz). Two samples of this core were examined, in thin section and washings, but no fossils were found.

Cuttings from 6,770 feet to 7,650 feet. Cuttings were selected for examination at approximately every 50 feet, since time did not permit the examination of every sample.

6,770 - 6,771 feet. Impure pyritic limestone and siltstone containing bryozoa, brachiopod spines, a small gastropod (bellerophontid?), ostracods common, crinoid columnals, and a thick rhomboid fish scale.

Ostracoda: Cryptophyllus sp.
Graphiadactyllis sp.
Paraparchites sp.

6,775 - 6,780 feet. Impure pyritic limestone and siltstone containing bryozoa, brachiopod spines, a scolecodont, ostracods rare, crinoid columnals and shell fragments.

Ostracoda: Cryptophyllus sp.

6,795 - 6,800 feet. Impure pyritic limestone and siltstone containing bryozoa, brachiopod spines, a small gastropod cf. Anematina, ostracods rare, and crinoid columnals.

Ostracoda: Cryptophyllus sp.
Graphiadactyllis sp.

6,832 - 6,835 feet. Impure limestone and siltstone containing bryozoa, brachiopod spines, a scolecodont, a few poorly preserved ostracods, and crinoid columnals.

Ostracoda: Cavellina sp.
Cryptophyllus sp.
Kloedenella ?sp.

6,865 - 6,870 feet. Impure pyritic limestone and siltstone containing a few ostracods.

Ostracoda: Bairdiocypris ? sp. (a broken specimen)
Cavellina sp.
Graphiadactyllis sp.
Lochriella sp.

6,870 - 6,875 feet. Impure pyritic limestone and siltstone containing fragments of brachiopod spines, one broken crinoid columnal, and a broken indeterminate ostracod.

6,895 - 6,900 feet Impure pyritic limestone and siltstone containing very few ostracods.

Ostracoda: Birdsallella sp. cf. B. devonica Corvell & Malkin 1936.
Cryptophyllus sp.

6,940 - 6,945 feet. Impure pyritic limestone and siltstone containing brachiopod spines, a part of a low-spired turbinate gastropod, ostracods are rare, and crinoid columnals.

Ostracoda: Cryptophyllus sp.
Graphiadactyllis sp.

6,970 - 6,975 feet. Impure pyritic limestone and siltstone containing very few fossils. Bryozoal fragments, ostracods rare, and crinoid columnals.

Ostracoda: Cryptophyllus sp.

6,995-7,000 feet. Impure limestone containing Cryptophyllus, a few indeterminate ostracod fragments, and one crinoid columnal.

No cuttings were received from the interval 7,000-7,140 feet.

7,140 - 7,145 feet. Impure limestone and siltstone containing bryozoa, a broken scolecodont, ostracods, crinoid columnals, and shell fragments. Ostracods common, but difficult to extract from the calcareous matrix.

Ostracoda: Cavellina n.sp.2
Cryptophyllus sp.
Graphiadactyllis sp.
Lochriella n.sp.1
Primitia sp.

7,146 feet approximate. Impure pyritic limestone and siltstone in which ostracods and crinoid columnals are common, but difficult to extract from matrix.

Ostracoda: Lochriella n.sp.1

7,145 - 7,150 feet. Impure limestone, in which Cryptophyllus and indeterminate ostracod fragments are common, but difficult to extract from the matrix.

7,200 - 7,205 feet. Impure limestone and siltstone containing the annelid Spirorbis, the ostracod Cryptophyllus, and a few indeterminate ostracods.

7,250 - 7,255 feet. Impure limestone and siltstone. No fossils found.

7,295 - 7,300 feet. Impure limestone and siltstone, in which ostracods are common, generally as broken fragments; nevertheless well-preserved complete identifiable specimens occur.

Ostracoda: Cavellina n.sp.2
Cryptophyllus sp.
Jonesina crategera (Jones & Kirby) 1886?
Parparchites sp.
n.gen. et sp.

No cuttings were received from the interval 7,300 - 7,400 feet, The well-site geologist picked a fossil specimen from cuttings from 7,310 - 7,315 feet, which was forwarded for examination, and has been identified as the annelid Spirorbis.

7,400 - 7,405 feet. Impure limestone and siltstone containing numerous small ostracods, tentatively identified as cf. Primitia sp.

7,440 - 7,445 feet. Impure limestone and siltstone, in which ostracods are common.

Ostracoda: Aparchites spp.
Bythocypris sp.
Cavellina n.sp.2
Cryptophyllus sp.
Hollinella ? sp.
Sulcella sp.
Paraparchites sp.

7,500 - 7,505 feet. Impure limestone and siltstone containing a small gastropod, possibly cf. Anematina sp., numerous ostracods and a few crinoid columnals.

Ostracoda: Aparchites sp.
Cavellina sp.
Cryptophyllus sp.
Hollinella ?sp.
Paraparchites sp.

7,545 - 7,550 feet. Impure limestone and siltstone containing a few ostracods and crinoid columnals.

Ostracoda: Aparchites ? sp.
Cryptophyllus sp.
Primitia ?sp.

7,600 - 7,605 feet. Impure pyritic limestone and siltstone containing bryozoa, crinoid columnals, and mumerous ostracods.

Ostracoda: Aparchites sp.
Cavellina n.sp.2
Cryptophyllus sp.
Glyptopleura sp.
Phlyctiscapha ? sp.
Primitia sp.

7,645 - 7,650 feet. Impure pyritic limestone and siltstone containing bryozoa, crinoid columnals, and numerous ostracods.

Ostracoda: Aparchites ?sp.
Cavellina sp.
Cryptophyllus sp.
Primitia sp.
gen. unidentified.

Core 10. Depth 7,769 - 7,779 feet. Impure limestone, dark green siltstone, and black shale.

Black shale: crowded with worm trails, and external moulds of pelecypods, the latter tentatively identified by J.M. Dickins, (oral communication) as cf. Sanguinolites. Ostracods are abundant, but are poorly preserved as steinkerns and external moulds.

Green Siltstone: Plant remains identified by J.Gilbert-Tomlinson (oral communication) as Leptophloeum, a genus typical of the Upper Devonian and Lower Carboniferous.
Impure Limestone: Examination of polished surfaces shows the presence of shell fragments, crinoid columnals, and abundant ostracods. Washings from crushed samples yielded well-preserved ostracods.

Ostracoda: Cavellina sp. The same species as those found at 3,000 - 3,013 feet in B.M.R. Bore No.2 Laurel Downs.

Aparchites sp.

Core 12. Depth 8,896 - 8,902 feet. Dark grey laminated siltstone containing fragments of crinoid columnals, and small pelecypods tentatively identified by J.M. Dickins (oral communication) as ? Grammysia sp. and a possible pectinid. No ostracods found.

Core 14. Depth 9,721 - 9,728 feet. Dark grey laminated siltstone containing plant remains of Leptophloeum (J.Gilbert-Tomlinson, oral communication), and small pelecypods tentatively identified by J.M. Dickins (oral communication) as ? Buchiola sp. and a pectinid. No ostracods found.

3. NOTES ON THE OSTRACOD ASSEMBLAGES, STRATIGRAPHICAL VALUE, and CORRELATION WITH B.M.R. BORE No.2. LAUREL DOWNS.

By evaluating the evidence afforded by several fossil groups, the strata below 1,697 feet in B.M.R. Bore No.2, Laurel Downs, are considered to be Upper Devonian. An approximate correlation can be made between a part of the Upper Devonian sequence of the Laurel Downs Bore and the samples from 7,140 feet to 7,779 feet in the Sisters No.1 Bore, based on the common occurrence of the same diagnostic ostracod species. The following discussion is a comparison between the Devonian ostracods of the Sisters No.1 Bore and those of Laurel Downs Bore.

(a) In the Devonian sections of both bores some ostracod species are not sufficiently diagnostic to distinguish them from their Carboniferous successors. It is particularly difficult to draw a distinction between the Carboniferous and Devonian forms of some species of Cavellina and Paraparchites.

(b) The ostracod fauna of the Devonian sequence of the Sisters No.1 Bore contains a greater number of genera than that of the Laurel Downs Bore. For example, Bairdiocypris, Birdsallella, Cryptophyllus, Graphiadactyllis, Hollinella, and Sulcella have not been found in the latter; conversely, apart from one doubtful specimen, the genus Phlyctiscapha is virtually absent in the Sisters Bore, but it is quite common in the Laurel Downs Bore.

(c) The ostracod species common to the Devonian strata in both Sisters No.1 Bore and Laurel Downs Bore include, Cavellina n.sp.2 (In B.M.R. Bore No.2, not found above 1,775 - 1,785 feet, and last recorded occurrence at 2,800 - 2,810 feet); Lochriella n.sp.1.(In B.M.R. Bore No.2, not found below 1,775 - 1,785 feet); n.gen et sp. (found in cuttings between 2,385 and 2,565 feet in B.M.R. Bore No.2); Jonesina crategera ? (found at 3,010 -3,013 feet in B.M.R. Bore No.2). Also core 10 of the Sisters No.1 Bore (7,769 - 7,779 feet) contains the same species of Cavellina,C n.sp. 1. In the record on the ostracods from the Laurel Downs Bore (B.M.R. Record 1957/11), both Lower Carboniferous and

Devonian forms were referred to this species. A detailed statistical study of these forms may reveal sufficient differences between them to justify the erection of at least two new species.

(d) By using the ostracod species common to the Devonian in both the Sisters No.1 Bore and B.M.R. Bore No.2, Laurel Downs, an approximate correlation can be made at three levels, according to the following chart.

SISTERS NO.1.	B.M.R. No.2 (LAUREL DOWNS)	OSTRACOD SPECIES IN COMMON TO BOTH BORES.
7,140 - 7,145 feet. (cuttings)	1,775 - 1,785 feet. (core)	Cavellina n.sp.2 and Lochriella n.sp.1
7,295 - 7,300 feet (cuttings)	2,385 - 2,565 feet (cuttings)	Cavellina n.sp.2 and n.gen. et sp.
7,769 - 7,779 feet (core)	3,000 - 3,013 feet (core)	Cavellina n.sp.1.

The above correlation must be regarded as provisional, as it is partly based on cuttings, and the lower limits of the ranges of the species concerned, are at present, unknown.

(e) In the record on the ostracods from the Laurel Downs bore (B.M.R. Records 1957/11), it was shown that the strata between the depths of 2,129 feet and 3,265 feet were definitely of Devonian age, but the ostracods could not be used to diagnose Upper Devonian.

The plant Leptophloeum australe which occurs at 2,498 feet is typical of the Upper Devonian and the Lower Carboniferous (M.E. White, 1957), but the presence of the brachiopod cf, Cyrtospirifer in core 43 (3,890 - 3,900 feet) indicated an Upper Devonian age at this depth, (Thomas, in Henderson 1956) and for the overlying Devonian strata. The ostracods in core 18 (1,775 - 1,785 feet) could not be used for age determination, but a tentative Devonian age was suggested based on the occurrence of the conchostracan genus Rhabdostichus. Balme (1956) however, has found Devonian plant spores in core 17 (1,697 - 1,707 feet).

The available palaeontological evidence indicates that the Upper Devonian sequence in B.M.R. Bore No.2 ranges from 1,697 feet, to at least 3,900 feet. The boundary between the Lower Carboniferous and the Upper Devonian is not yet fixed, as the lowest occurrence of Lower Carboniferous ostracods is at 1,010 feet, and no fossils have been found in the cores between 1,010 feet and 1,697 feet. Core samples taken from this interval have been sent to B.E. Balme for spore analysis, and the results of his examination are awaited.

It would follow, therefore, that if the approximate correlation between Sisters No.1 Bore and B.M.R. Bore No.2 is correct, then Core 10 (7,769 - 7,779 feet) of the Sisters bore is in Upper Devonian strata

(f) The presence of Cryptophyllus in the lowest cuttings at 7,645 - 7,650 feet, has shown that in the Fitzroy Basin, this genus has a long stratigraphical range from Upper Carboniferous to Upper Devonian. The genus Graphiadactyllis has been previously found in the Noonkanbah Shale (Lower Permian) of Nerrima No.1 Bore at 129 feet, and the B.M.R. Bore No.1 at about 400 feet. Although so far, Graphiadactyllis has not been recorded from the Carboniferous of Western Australia, its presence in Upper Devonian strata in the Sisters No.1 Bore at 7,140 - 7,145 feet, indicates that the stratigraphical range of this genus must pass through the Carboniferous. Therefore, the association of Cryptophyllus and Graphiadactyllis at 6,435 - 6,440 feet could indicate either a Carboniferous or a Devonian age.

The first indication of the presence of Devonian strata is found in the cuttings at 6,865 - 6,870 feet, which contain a broken specimen tentatively referred to the genus Bairdiocypris. This genus occurs in the Middle Devonian of Germany, Poland and Czechoslovakia, and has recently been recorded from the Middle Devonian Buchan Group of Victoria (Krommelbein, 1954). Also a specimen found in cuttings at 6,895 - 6,900 feet, is referred to the genus Birdallella, and possesses an outline similar to that of B.devonica Coryell & Malkin 1936, a North American Middle Devonian species.

This would mean that the boundary between the Lower Carboniferous and the Upper Devonian must be situated between the depths of 6,093 feet (based on D.Hill's determination of the tetracoral Zaphrentites n.sp. cf. Z. delanouei) and 6,865 feet.

Core 14, the last core examined, taken between the depths of 9,721 feet and 9,728 feet, is believed to be still in Upper Devonian strata,as it contains Leptophloeum, a plant unknown from the Middle Devonian.

4. REFERENCES.

BALME, B.E., 1956 - Palynological Report on Samples submitted by West Australian Petroleum Pty.Ltd. C.S.I.R.O. Coal Research Section. Report No.99, 9.11.56

HENDERSON, S.D. 1956 - Stratigraphic Bore B.M.R.2 Laurel Downs, Fitzroy Basin, Western Australia. Bur.Min.Resour.Aust.Rec.1956/95.

JONES, P.J., 1957 - Ostracods from Bore Cores from Bore B.M.R. No.2 Laurel Downs, Fitzroy Basin, Western Australia. Bur.Min. Resour.Aust.Rec. 1957/11

KROMMELBEIN, K., 1954 Devonische Ostracoden aus der Gegend von Buchan und von der Kuste der Waratah Bay, Victoria, Australien Senckenbergiana Lethaea, 35 (3/4) 193-229.

WHITE, M.E., 1957 - Report on Plant Fossils in Stratigraphic Bore B.M.R. 2, Laurel Downs, Bur.Min.Resour.Aust.Rec. 1957/53