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DEPARTMENT OF SUPPLY AND SHIPPING.

Bureau of Mineral Resources.

MICRO-PALAEONTOLOGICAL EXAMINATION OF NO.1 BORE, DIMBOOLA, WESTERN VICTORIA.

Report No. 1946/30.

Introduction.

No.1 Bore, Dimboola, is situated on Crown Allotment 38, Parish Watchegatheca, County Lowan, in the Wimmera district of Western Victoria. The samples were submitted for micro-examination by the State Rivers and Water Supply Commission of Victoria. The bore was drilled by percussion methods, the diameter of the hole being 10 inches.

This bore at Dimboola is the first in the district to be examined palaeontologically since R.L. Jack, J. Stirling and E. Checchi, in 1897, gave a short report on Bore No.51, Nhill, about 25 miles to the northwest of Dimboola, and Chapman reported on a sample at 332-380 feet in the Nhill Water Trust (1916). Chapman's reports on the Mallee Bores (1916) form the basis of comparison for results given in this report on the Dimboola Bore, which lies to the south of the Mallee area. In making this comparison, the Stage name "Balcombian" as used in this report replaces, for the most part, the term "Janjukian" used by Chapman in 1916, for since that time evidence indicates that the Balcombian overlies the Janjukian in the Victorian Tertiary sequence.

Attention has been paid primarily to the micro fossils, the foraminifera and ostracoda. These forms have been examined in detail because of the value, especially of the foraminifera, as zone fossils, and it is hoped that this report will form a basis for any further work to be carried out on bores in the area. Bryozoa, corals and mollusca are common in some of the samples. Only a few species have been determined, but these help to support the age which will be suggested for the beds through which the bore passed. At the present time it is found more satisfactory to zone the marine Tertiary deposits of Victoria by means of the foraminifera rather than by the larger fossils.

In listing the fossils in the samples, only species of zonal significance are given. A full list of foraminiferal species with their distribution in the samples will be given at the end of the report.

DETAILED DESCRIPTION OF SAMPLES.

3-14 feet. Fine grained, pinkish sandstone, with rounded to angular quartz grains.

14-25 feet. Pinkish sandstone.

25-31 feet. Limonitic sandstone.

31-54 feet. Yellowish sandstone with polished sand grains.

54-61 feet. Coarse ochreous sandstone.

61-67 feet. Sandstone with abundant glauconite, which frequently replaces fossils.

FORAMINIFERA: Streblus beccarii

ANTHOZOA: Echinoid spines replaced with glauconite.

67-80 feet. Fine dark grey, micaceous sandstone with fossils.

FORAMINIFERA: Streblus beccarii, Elphidium crispum

80-101 feet. Worn shell sand, with abundant fossils.

FORAMINIFERA: Amphisorus hemprichii, Clavulinoides difformis, Sigmomorphina subregularis, Gypsina howchini, ? Epistomaria polystomelloides, Crespinella umbonifera, Calcarina verriculata, Cibicides victoriensis, Discorbis cycloclypeus, Notorotalia howchini, Heronallenia lingulata, Astrononion australe, Elphidium crespinae, E. chapmani, Nonion victoriense, Amphistegina lessonii.

ANTHOZOA: Monsea tenisoni

VERMES: Ditrupa cornea var. wormbetiensis

BRYOZOA: Catenicella ventricosa, Cellaria robusta, C.gracilis, C.contigua, C.rigida, C.rigida var. perampla, Nellia oculata, Caberea grandis, Thalamoporella gracilis, Crateropora magnilabris, Conescharellina phillipinensis, Otionella cupola var. spiralis, Smittinella tatei, Retepora rimata, Crisia acropora, Idmonea milneana, I.trigona, Mecynoecia proboscidea, Supercytis digitata.

MOLLUSCA: Dentalium lacteolum, Emarginula sp.

OSTRACODA: Macrocypris tumida, Cythere dictyon, C.militaris, C.postdeclivis, Cytheura capillifera, Cytherella lata.

CIRRIPEDIA: Balanus amphitrite var. acuta

101-111 feet. Friable sandstone with fossils scarce.

111-131 feet. Shell grit with abundant fossils.

FORAMINIFERA: Austrotrillina howchini, Sigmoilina sigmoidea var. compressa, Liebusella hantkeni, Bolivina hebes var. victoriensis, Sigmomorphina subregularis, Crespinella umbonifera, Discorbis balcombensis, Cibicides sp.2, C. victoriensis, Marginopora vertebralis, Cancris intermedius, Eponides scabriculus, Elphidium adelaidensis, E.chapmani, E.crespinae, E.striatopunctatum, Amphistegina lessonii, Operculina victoriensis.

ANTHOZOA: Bathyactis lens, B.beaumariensis, Conocyathus cyclocostatus, Sphenotrochus australis, S.emaciatus, Trematotrochus fenestratus, Notophyllia variolaris.

VERMES: Ditrupa cornea var.wormbetiensis.

BRYOZOA: Cellaria contigua, C.rigida var. perampla, Selenaria maculata, Otionella cupola, O.cupola var.spiralis, Lunulites rutella.

MOLLUSCA: Neotrigonia acuticostata, Limopsis beaumariensis, Arcoperna scapha, Venericardia spinulosa, Lissarca cincturata, Dentalium mantelli, Onoba chrysalida, Pyramidella jonesiana.

OSTRACODA: Cythere postdeclivis, Cytheropteron batesfordiense.

131-140 feet. Grey marl with fossils.

FORAMINIFERA: Spiroloculina disparsa, Gaudryina (Pseudogaudryina) crespinae, Globorotalia dehiscens, Calcarina verriculata, Crespinella umbonifera, Elphidium adelaidense, E.crespinae, Amphistegina lessonii.

OSTRACODA: Bythocypris tumefacta, Cythere caudispinosa, Krithe eggeri, Cytherelloidea auricula.

140-150 feet. Grey marl with fossils

FORAMINIFERA: Sigmoilina asperula, Astrononion australe, Amphistegina lessonii.

OSTRACODA: Cytherelloidea auricula

150-160 feet: Grey marl with fossils (foraminifera common especially Miliolines)

FORAMINIFERA: Pyrgo depressa, P.elongata, Pyrgoella sphaera, Quinqueloculina lamarckiana, Q.vulgaris, Triloculina tricarinata, Cornuspira crassiseptа, C.involvens, Sigmoilina asperula, Bolivina hebes var. victoriensis Cancris intermedius, Cibicides victoriensis, Elphidium adelaidensis, Amphistegina lessonii.

OSTRACODA: Cytherelloidea auricula, Bythocypris tumefacta.

160-170 feet. Grey marl with fossils, other than foraminifera, scarce.

FORAMINIFERA: Miliolines as in 150-160 feet, Sigmoilina sigmoidea var. compressa, Bolivina victoriana, Calcarina verriculata, Discorbinella planoconvexa Ceratobulimina haueri var. australis, Cibicides victoriensis.

MOLLUSCA: Filodrillia dilectoidea

OSTRACODA: Bythocypris tumefacta, Cythere caudispinosa, Krithe eggeri, Cytherelloidea auricula.

170-175 feet. Grey marl with fossils not common.

MOLLUSCA: Turritella tristira, Mathilda decorata, Cylichnella aratula.

175-192 feet. Pale grey bryozoal and shelly marl, with foraminifera common.

FORAMINIFERA: Miliolines not so common, Buliminella apiculata, Robertina sp., Cibicides victoriensis, Carpenteria proteiformis, Astrononion australe, Elphidium crespinae, Amphistegina lessonii, Operculina victoriensis.

MOLLUSCA: Venericardia compacta, Nucula spa chapmani, Turritella tristira, Marginella propinqua, Ataxocerithium concatenatum, Cerithella trigemata.

192-200 feet. Similar to 175-195 feet.

FORAMINIFERA: Buliminella apiculata, Carpenteria rotaliformis (common), Hofkerina semiornata, Cancris intermedius, Elphidium adelaidensis, Amphistegina lessonii, Operculina victoriensis.

MOLLUSCA: Venericardia compacta, Filodrillia dilectoidea, Semiactaeon micronlocus.

OSTRACODA: Bythocypris tumefacta, Alatacythere praeantarcticum, Cythere flexicostata, Cytherelloidea auricula.

200-205 feet. Shelly marl with foraminifera, especially Miliolines, common.

FORAMINIFERA: Gaudryina (Pseudogaudryina) crespinae, G.collinsi, Buliminella apiculata, Bolivina hebes var. victoriensis, Hofkerina semiornata, Miniacina miniaceum, Carpenteria rotaliformis, Operculina victoriensis.

SPONGIDA: Ecionema newberyi

OSTRACODA: Bythocypris tumefacta, Cythere flexicostata, Cytherella auricula.

205-210 feet. Similar to 200-205 feet.

FORAMINIFERA: Miliolines not as common as in 200-205 feet, Gaudryina collinsi, G.(Pseudogaudryina) cresspinae, Buliminella apiculata, Sigmomorphina subregularis, Guttulina irregularis, Discorbinella biconcava, Cibicides victoriensis, Spirillina inaequalis, S.pectinimarginata, Eponides scabriculus, Elphidium howchini, E.parri, Operculina victoriensis.

MOLLUSCA: Salaputium commune, Aloidis (Notocorbula) myxidata.

OSTRACODA: Bythocypris tumefacta, Cythere flexicostata, C.caudispinosa, Alatacythere praeantarcticum, Cytherella subtruncata.

210-220 feet. Grey, bryozoal, shelly marl with foraminifera common.

FORAMINIFERA: Quinqueloculina vulgaris (common), Q.schreibersiana (c), Triloculina tricarinata (c), Pyrgoella sphaera (c), Cornuspira crassiseota (c), Ammobaculites calcareum, Planularia cf.dentata, Cresspinella umbonifera, Cibicides victoriensis, Carpenteria rotaliformis, Operculina victoriensis.

OSTRACODA: Bythocypris tumefacta, Cytherelloidea auricula.

220-230 feet. Similar to 210-220 feet.

FORAMINIFERA: Miliolines very common as above, Ammobaculites calcareum, Buliminella apiculata, Planularia cf.dentata, Globorotalia dehiscens, Discorbis bertheloti var.papillata, Eponides scabriculus, Elphidium parri, Operculina victoriensis.

OSTRACODA: Bythocypris tumefacta, Krithe eggeri, Cythere flexicostata, Cytherelloidea auricula.

230-240 feet. Dark grey, bryozoal, shelly marl , with foraminifera less common.

FORAMINIFERA: Buliminella apiculata, Bolivina victoriana, Planularia cf.dentata, Eponides scabriculus, Discorbis tuberculata var.australiensis, Astrononion australe, Elphidium cresspinae.

OSTRACODA: Bythocypris tumefacta, Cytherelloidea auricula.

240-248 feet. Fossiliferous grit with angular to rounded quartz grains.

FORAMINIFERA: Miliolines common, Elphidium howchini, E.crassatum, Amphistegina lessoni.

OSTRACODA: Bythocypris tumefacta, Cytherella subtruncata, Cytherelloidea auricula, Alatacythere praeantarcticum.

248-253 feet. Friable fossiliferous sandstone, with numerous foraminifera (Clavulinoides szaboi var.victoriensis common)

FORAMINIFERA: Miliolines as listed previously, Triloculina tricarinata large, Clavulinoides szaboi var.victoriensis, Pseudoclavulina sp., Gaudryina (Pseudogaudryina) cresspinae, Bolivina sp.nov., B.victoriana, Buliminella apiculata, Uvigerinella sp., Globorotalia dehiscens, Discorbis balcombensis, D.bertheloti var.papillata, Cibicides sp.2., Calcarina verriculata.

OSTRACODA: Bythocypris tumefacta, Krithe eggeri, Alatacythere praeantarcticum, Cytherelloidea auricula.

253-261 feet. Similar to 248-253 feet.

FORAMINIFERA: Clavulinoides szaboi, var. victoriensis (c)

MOLLUSCA: Conomitra othone, Turritella aldingae, Buchozia hemiothone.

261-270 feet. Similar to 248-253 feet.

FORAMINIFERA: Liebusella hantkeni, Clavulinoides szaboi var. victoriensis, Gaudryina (Pseudogaudryina) crespinae, Bolivina victoriana, B. sp.nov., Loxostoma sp., Frondicularia cf. compta var.villosa, Carpenteria rotaliformis (c), C.proteiformis, Hofkerina semiornata, Cibicides sp.2., Discorbinella planoconvexa, Discorbis balcombensis, D.bertheloti var.papillata, Spirillina pectinimarginata, Elphidium adelaidensis, E.chapmani, Operculina victoriensis.

270-278 feet. Shelly marl, with pyrites common and brown glauconite.

FORAMINIFERA: Clavulinoides szaboi var.victoriensis (c), Gaudryina collinsi, Tubulogenerina mooraboolensis, Lenticulina sp.1, Discorbis balcombensis, Carpenteria rotaliformis, Hofkerina semiornata, Amphistegina lessonii, Operculina victoriensis.

278-285 feet. Bryozoal shelly marl, with fossils less common and some glauconite.

FORAMINIFERA: Clavulinoides szaboi var.victoriensis, Liebusella hantkeni, Bolivina victoriana, B.sp.nov., Frondicularia cf. compta var.villosa, Cibicides sp.2., Discorbinella biconcava, Discorbis balcombensis, Carpenteria rotaliformis, Cancris intermedius, Eponides scabriculus, Amphistegina lessonii, Operculina victoriensis.

OSTRACODA: Cythere flexicostata, C.caudispinosa.

285-290 feet. Similar to 278-285 feet, with glauconite grains common. Fossils also similar.

290-300 feet. Similar to 285-290 feet.

300-312 feet. Similar to 285-290 feet but with glauconite absent.

312-320 feet. Similar to 278-285 feet, with a little glauconite.

320-329 feet. Similar to 278-285 feet, with fossils less common.

FORAMINIFERA: Clavulinoides szaboi var. victoriensis, Pseudocluvulina sp., Cibicides sp.2., Discorbis balcombensis, Carpenteria rotaliformis, C.alternata.

329-338 feet. Bryozoal marl, with foraminifera similar to those listed from 320-329 feet.

338-345 feet. Shelly glauconitic marl, with numerous foraminifera, many replaced with glauconite.

FORAMINIFERA: Miliolines less common, Buliminella apiculata, Planularia cf.dentata, Gyroina howchini, Globorotalia dehiscens, Spirillina pectinimarginata, Discorbis balcombensis, Miniacina miniaceum.

BRYOZOA: Adeonellopsis obliqua (common), A.symmetrica.

MOLLUSCA: Limopsis morningtonensis, Nuculana chapmani, Lissarca rubricata, Triforis wilkinsoni, Nassarius tatei, Mathilda decorata.

OSTRACODA: Bythocypris tumefacta, Cytherelloidea auricula, Cytherella subtruncata.

345-355 feet. Glauconitic sandstone, with poorly preserved fossils.

FORAMINIFERA: Pyrgo bulloides, Quinqueloculina vulgaris, Q.lamarckiana, Sigmoilina sigmoidea var.compressa, Triloculina tricarinata, Cornuspira foliacea, Clavulinoides agaboi var.victoriensis, Bulimina pupula, Guttulina problema, G.(Sigmoidina) silvestri, Sigmomorphina sp.

355-365 feet. Glauconitic grit with some mica flakes, and broken and worn fossils.

FORAMINIFERA: Quinqueloculina vulgaris, Q.seminulum, Triloculina tricarinata, cf. Massilina tarquayensis, Cassidulina oblonga, Glandulina laevigata, Pseudoolymorphina cf.tasmanica, Spirillina decorata.

MOLLUSCA: Limopsis chapmani (common).

365-370 feet. Concretionary calcareous sandstone and glauconitic sandstone, with rounded to angular quarts grains and poorly preserved fossils.

FORAMINIFERA: Quinqueloculina vulgaris, Q.seminulum, Trifarina bradyi, Cassidulina oblonga, Cassidulinoides chapmani, Anomalina glebrata, Cibicides cf.sorrentae.

MOLLUSCA: Cuna concentrica, Lissarca rubricata, Teinostoma calva, Triforis wilkinsoni.

OSTRACODA: Krithe eggeri.

370-379 feet. Dark green basic rock.

NOTES ON THE STRATIGRAPHIC SEQUENCE.

The following stratigraphic horizons are present in the bores:

Pleistocene to Recent	- 3 feet down to 61 feet.
Upper Pliocene	- 61 feet down to 80 feet.
Mixed? Middle Pliocene and Middle Miocene	- 80 feet to 111 feet.
Middle Miocene (Balcombian Stage)	-111 feet down to 370 feet.
Palaeozoic	-370 feet down to 379 feet.

Pleistocene to Recent.

Unfossiliferous sandstones which extend from 3 feet down to 61 feet, range in age from Pleistocene up to Recent. Similar sandstones cover the Mallee area to the north.

Upper Pliocene.

The fine, dark grey sandstone containing glauconite and foraminifera from 61 feet down to 80 feet is referred to the Upper Pliocene. The foraminifera, Streblus beccarii and Elphidium crispum, are characteristic of shallow marine and estuarine deposits and are to be found in the Recent shore line sands around the coast of Australia.

Mixed? Middle Pliocene and Middle Miocene.

The friable sandstone from 80 feet down to 111 feet is of considerable importance on account of its mixed faunal assemblage of Pliocene and Middle Miocene species.

Pliocene to Recent foraminiferal species such as Clavulinoides difformis, Amphisorus hemprichii, ? Epistomaria polystomelloides, Discorbis cycloclypeus, Elphidium adelaidensis, intermingle with typical Balcombian (Middle Miocene) species such as Gypsina howchini, Crespinella umbonifera, Cibicides victoriensis, Astrononion australe, Elphidium crespinae and E.chapmani. The importance of the presence of the Pliocene and Recent species listed above, lies in the fact that they have only been recorded previously from bores in Adelaide Basin, such as the Abbatoirs Bore, from which the foraminifera were studied by Howchin and Parr in 1938. This extension of subtropical conditions, suggested by these species, in Pliocene times as far east from the Adelaide Basin as Dimboola, has not been recorded previously, and according to available information they did not extend as far north as the Mallee area, where temperate conditions as were known to exist in the Lower Pliocene (Kalimnan) times in Victoria, were present.

Bryozoal species in the sample, 80-101 feet, such as Cellaria gracilis, C.contigua, Caberea grandis and Thalamoporella gracilis, though characteristic of the Pliocene, range up from the Balcombian Stage in Gippsland, [illegible]. The cirriped, Balanus amphitrite var.acuta is typical of the Kalimnan Stage in Victoria.

There is some controversy as to the exact position in the Pliocene of the beds in the Adelaide Basin which contain the Pliocne to Recent assemblage of foraminifera. Howchin (1937) and Howchin and Parr (1938) considered them to be Upper Pliocene, while Ludbrook (1941) stated that they "should be classified as Lower-Middle Pliocene". The writer is inclined to the view that they represent an intermediate stage in the Pliocene. She hopes to be able to confirm this after completing a micro-examination of bores in the Adelaide Basin, recently submitted by the South Australian Mines Department.

Middle Miocene (Balcombian Stage).

Sediments referable in age to the Balcombian Stage, are present from 111 feet down to 370 feet. These beds are tentatively zoned according to the writer's classification of the Victorian Tertiaries (1943):

Batesford substage - 111 feet down to 248 feet.
Longford substage - 248 feet down to 370 feet.

Typical Balcombian foraminifera are present from 111 feet down to 370 feet and include such species as Gaudryina (Pseudogaudryina) crespinae, Bolivina hebes var. victoriensis, B.victoriana, Cassidulina chapmani, Carpenteria rotaliformis, C.alternata, Discorbis balcombensis, D.bertheloti var.papillata, D.tuberculata var.australiensis, Spirillina pectinimarginata, Tubulogenerina mooraboolensis, and Operculina victoriensis.

Associated with the above are assemblages of species which are characteristic of the middle and lower substages of the Balcombian instituted by Crespin (1943) namely the Batesord substage and the Longford substage. The assemblage suggesting the Batesford substage contains Austrotrillina howchini which is recorded at 111-131 Gypsina howchini, Hofkerina semiornata and Calcarina verriculata. A.howchini has not been recorded above or below the Batesford in the Victorian Tertiary, but the other species do occur occasionally in the underlying Longford substage, but never in the overlying Bairnsdale substage.

At 248 feet, Clavulinoides asaboi var.victoriensis is very common and is moderately common down to 285 feet. This species is regarded by the writer (1943) as the zonal species for the Longford substage. Therefore it is suggested that the beds from 248 feet down to 370 feet be referred to that substage.

These beds which are referred to the Balcombian Stage can be correlated not only with the lower part of some of the Mallee Bores but with bores in the Adelaide Basin. Calcarina verriculata, Sigmomorphina subregularis and Crespinella umbonifera were originally

described from this horizon in the Abbatoirs Bore.

Palaeozoic.

The bore finished at 379 feet in a dark brown basic rock.

NOTES ON THE FOSSILS FAUNA.

As stated above, a detailed examination was made only of the micro-fossils, the foraminifera and ostracoda. However, a cursory investigation of the corals, bryozoa and mollusca has been carried out so as to support the evidence given by the foraminifera as to the age of the beds.

Foraminifera.

209 species of foraminifera have been identified in the Dimboola bore samples. Many of these have a restricted stratigraphic range, whilst others occur throughout the Miocene and Pliocene up to Recent. Assemblages have been recognised which indicate stages and substages within the Middle Miocene and the species comprising these assemblages have been noted in the previous section. Several new species have been determined and these may prove to be of zonal value when further bores have been examined in the area.

The outstanding feature of the distribution of the foraminifera in samples from 111 feet down to 320 feet is the abundance of well preserved specimens of genera belonging to the family Miliolidae. The forms include Pyrgo, Quinqueloculina, Triloculina, Sigmoilina, and Cornuspira. The quiet off-shore conditions of sedimentation and a temperate climate during that sedimentation were suitable for the development of these forms.

In the sample 80-111 feet, the mixed assemblage of Middle Miocene and Pliocene species and the worn nature of the specimens and quartz grains, indicate open shore-line conditions where there was a considerable amount of denudation of the older sediments. Towards the base of the bore, bathymetric conditions were again nearly shore line, but the abundance of glauconite, suggests that currents were not strong.

Notes on some of the more important species of foraminifera are given below:

Amphisorus hemprichii Ehren. found at 80-101 feet, is a Recent species which is common in tropical waters in the Indo-pacific and elsewhere. Howchin and Parr (1938) recorded it from beds referred to the Upper Pliocene in bores in the Adelaide Basin.

?Spistomaria polystomelloides (P. & J.) also from 80-101 feet in the Dimboola bore is also recorded by Howchin and Parr from bores in the Adelaide Basin and it is found living in the warm waters of the Indo-pacific. Large specimens are fairly common at Dimboola.

Elphidium adelaidensis described by Howchin and Parr from the Upper Pliocene beds in the Abbatoirs Bore, occurs in the Dimboola bore at 80-101 feet and at certain depths in the bore included in the Balcombian.

Discorbis cycloclypeus was originally described by Howchin and Parr from the Upper Pliocene in the Cowandilla Bore in the Adelaide Basin. It was recorded at 570-620 feet in the Abbatoirs Bore and at 80-101 feet at Dimboola.

Marginopora vertebralis is present in the Dimboola Bore in Balcombian sediments at 111-131 feet. It is found in the Pliocene in the Adelaide Bores and in the Balcombian in the Mallee Bores Nos. 1,2,9 and 11. It is associated with numerous specimens of Austrotrillina howchini, typical of the Batesford substage, in No.2

Mallee Bore at 211-240 feet. It is also present in the Upper and Middle Miocene in bores in Gippsland. M.vertebralis is a typical warm water species and is common in the tropical seas around Northern Australia.

Austrotrilline howchini which is present at 111-131 feet, has a very restricted stratigraphic range in the Victorian Tertiaries. It has not been found above or below the Batesford substage. It was originally described by Schlumberger from the Balcombian (then considered to be Eocene) deposits at Clifton Bank near Hamilton, where it is associated with Lepidocyclina, the zonal form for the Batesford substage. In its single occurrence in Gippsland, in Skinner's Section, Mitchell River, it is also associated with Lepidocyclina. Chapman recorded the species from Mallee Bores Nos. 2, at 200-240 feet (abundant at 211-240 feet) No.11 at 267-270, and in a bore in Ph. Pallarang, Allot. 28 where it was common at 298-448 feet. In all occurences in the Mallee Bores it was associated with forms similar to those in the Dimboola Bore.

Calcarina verriculata another form typical of the Batesford substage, occurs in the Dimboola Bore in the mixed assemblage at 80-101 feet and in a few samples below that depth in the Balcombian. The species was originally described by Howchin and Parr from the Miocene in the Abbatoirs Bore at 710-775 feet. Chapman recorded it in the Mallee Bores as Rotalia calcar.

Hofkerina semiornata which occurs in the Dimboola Bore, at depths between 192 and 270 feet, was originally described by Howchin from the Balcombian deposits (Batesford substage) at Muddy Creek near Hamilton. It is characteristic of that substage and is not found in beds above that horizon, but occurs occasionally in the underlying Longford substage.

Gypsina howchini which occurs in the mixed assemblage in the Dimboola Bore at 80-101 feet and also at 338-355 feet, was described by Chapman from the Batesford limestone, and is considered to be an important member of the Batesford substage assemblage. It has been recorded from the upper part of the Longford substage in Gippsland. Chapman recognised it in the Mallee Bores, and Howchin and Parr listed it from the samples from 710 feet down to 820 feet in the Abbatoirs Bore.

Associated with the above species in all occurrences of the Batesford substage are Carpenteria rotaliformis, Amphistegina lessonii and Operculina victoriensis.

Amongst the foraminifera in that section of the Dimboola Bore referred to the Longford substage of the Balcombian, is Clavulinoides szaboi var.victoriensis which the writer (1943) named as zonal foraminifer for the substage. The species does not occur in the bore until 248-253 feet where it is common. It is present in varying numbers in subsequent samples until 320 feet. The varietal form of the species was described by Cushman from the type locality for the Balcombian Stage, at BalcombeBay,Mornington Peninsula.

Two associated species of rather uncommon occurrence and which apparently belong to the Longford substage elsewhere in Victoria, are Tubulogenerina mooraboolensis, Cushman (one specimen being noted at 260-270 feet) and Cassidulina chapmani Parr (one specimen at 365-370 feet.)

An interesting species is that referred to as Ammobaculites calcareum which was found at 210-220 feet and 220-230 feet. Several specimens were recorded.

Two species described by Howchin and Parr from the Middle Miocene samples in the Abbatoirs Bore and which are present in the Dimboola Bore are Crespinella umbonifera and Sigmomorphina subregularis. The former was common at 80-101 feet and was occasionally

present in samples down to 230 feet. It has been recorded in the Balcombian of Gippsland. The latter species is represented by three specimens only, at 80-101 feet, 111-131 feet and 200-210 feet.

Other species recorded from the Bore, and which were originally described by Chapman, Parr and Collins (1932) from Balcombian deposits around Port Phillip, include Spirillina pectinimarginata, Discorbis bertheloti var.papillata, D.balcombensis, D.tuberculata var. australiensis, Notorotalia howchini and Globorotalia dehiscens.

Species and varieties described by Cushman from the Balcombian include Gaudryina collinsi, G.(Pseudogaudryina) crespinae, Bolivina victoriana, B.hebes var.victoriensis, Cancris intermedius, Elphidium crespinae, E.chapmani and E.parri.

Anthozoa.

Corals are common at 111-131 feet. Amongst the species determined were Bathyactis lens, B.beaumariensis, Conocyathus cyclocostatus, Sphenotrochus alatus, S.emaciatus, Trematrochus fenestratus and Notophyllia variolaris. All these species are known from the Balcombian Stage in Victoria, and several of them are listed from the Mallee Bores.

Joints of Monsea tenisoni are occasionally present.

Spongida.

Spicules of the sponge Scleronema newberyi were recorded from various depths in the Dimboola Bore. They are fairly common at 290-300 feet which is included in the Longford substage. The spicules are characteristic of the substage at the type locality at Dowd's Quarry, near Longford, Gippsland.

Vermes.

Tubes of the varietal forms of the worm Ditrupa cornea, namely var.wormbetiensis and var.constricta are present in many samples. The variety constricta was described by Chapman from No.5 Mallee Bore at 163-175 feet.

Bryozoa.

Bryozoa are moderately common in many of the bore samples, but gradually decrease in number towards the last fossiliferous sample at 365-370 feet. The preservation varies, many specimens being worn and broken.

Species in sample 80-101 feet, include forms which are characteristic of the Kalimnan and of the Balcombian. Species determined in that sample are Cellaria robusta, C.rigida, C.rigida var.perampla, Crateropora magnilabris, Mollia oculata, Caberea grandis, Thalamoporella gracilis, Otionella cupola, O.cupola var. spiralis, Crisia acropora and Idmonea milneana.

Passing down to the true Balcombian beds, several species of Cellaria are very common in samples from 192 feet down to 280 feet but gradually decrease in abundance below that depth. Specimens of various species of Adeonellopsis are numerous at 329-338 feet, a few specimens persisting until the last sample at 365-370 feet. Adeonellopsis is one of the commonest genera in sediments towards the base of the Longford substage in Gippsland. Typical specimens of Otionella cupola var.spiralis are moderately common. Chapman described this varietal form from No.9 Mallee Bore at 315-320 feet.

Mollusca.

The mollusca in the Dimboola Bore have not been examined in detail, but species recognised are characteristic of the Balcombian.

Mollusca are scarce in the sample at 80-101 feet, Dentalium lecteolum and Emarginula sp. being the only recognisable forms.

Small specimens of Limopsis chapmani are common in the glauconitic grit at 355-365 feet. Most of the other shells in the sample are broken. Small mollusca are present in the last fossiliferous sample at 365-370 feet. They include Cuna concentrica, Lissarca rubricata, Teinostoma calva and Triforis wilkinsoni.

Species in other samples are Venericardia compacta, Nuculana chapmani, Salanutium commune, Conomitra othone, Nassarina tatei, Filodrillia dilectoidea, Semiactaeon microplocus, Conus ligatus, Nisopsila and Marginella winteri, all of which are recorded from the Mallee Bores.

Ostracoda.

Thirty three species of ostracoda have been recognised including seven species described by Chapman from the Balcombian deposits in the Mallee Bores. These species are Cythere postdeclivis, C.flexicostata, Bythocypris tumefacta, Krithe eggeri, Alatacythere (Cytheropteron) praeanteretiqua, Cytherella subtruncata and, C.auricula. Cytheropteron batesfordiense, recorded at 111-131 feet in the Dimboola Bore, was described by Chapman from the Batesford limestone. Cythere caudispinosa, which is present in several samples below 140 feet, was described by Chapman and Crespin from the Balcombian in the Sorrento Bore.

Cirrinedia.

Balanus amphitrite var.acuta which occurs at 80-101 feet, is characteristic of the Kalimnan Stage (Lower Pliocene) in Gippsland.

Pisces.

Indeterminate fish remains were present at 355-365 feet.

REFERENCES.

Chapman,F., 1916. Cainozoic Geology of the Mallee and other Victorian Bores. Rec.Geol.Surv.Vict. 3, (4).

Chapman,F., Parr,W.J., & Collins,A.C., 1934. Tertiary Foraminifera of Victoria, Australia - The Balcombian Deposits of Port Phillip. Part III. Journ.Linn.Soc.Lond. (Zool.) 38, 553-577.

Crespin,I., 1936. The Larger Foraminifera of the Lower Miocene of Victoria. Pal.Bull. No.2 (Dept. of the Interior, Canberra).

Crespin,I., 1943. The Stratigraphy of the Marine Tertiary Rocks of Gippsland, Victoria. Min.Res.Surv.Bull. No.9. (Pal.ser.No.4) (Mimeographed).

Cushman,J.A., 1936. Some New Species of Elphidium and Related Genera. Contr.Cush.Lab., 12,(4) pp.78-89.

Cushman,J.A., 1937. A Monograph of the Foraminiferal Family Valvulinidae. Contr.Cush.Lab.Foram.Res. Spl.Publ. No.8.

Howchin,W. 1889. The Foraminifera of the Older Tertiary of Australia (No.1. Muddy Creek, Victoria). Trans.Roy.Soc.Aust. 12, pp.1-20.

Howchin,W. 1935. Notes on the Geological Sections obtained by several Borings situated on the Plain between Adelaide and Gulf St.Vincent, Part 1. Ibid., 59, pp. 68-102; Part II, Cowandilla (Government) Bore, Ibid., 60, 1936, pp. 1-34.

Howchin, W., & Parr, W.J., 1938. Notes on the Geological Features and Foraminiferal Fauna of the Metropolitan Abattoirs Bore, Adelaide. Ibid. 62 (2) pp. 287-317.

Ludbrook, N.H., 1941. Gasteropoda from the Abbetoirs Bore, Adelaide, South Australia together with a List of Some Miscellaneous Fossils from the Bore. Ibid. 65, (1), pp.79-102.

DISTRIBUTION TABLE.

The appended table shows the distribution and stratigraphic range of species of foraminifera and ostracoda in the bore samples. The forms are listed according to their first appearance in the bore samples. The letter designations indicate "c" for common, "f" for few and "r" for rare.

FOSSILS	Age	Up. Plio.	Mixed	Middle Miocene (Balcombian Stage)																		
				Batesford									Longford									
	Depth in Bore	61'-67' 67'-80'	80'-111'	111'-131'	131'-140'	140'-160'	160'-175'	175'-192'	192'-200'	200'-210'	210'-230'	230'-248'	248'-261'	261'-270'	270'-285'	285'-300'	300'-312'	312'-320'	320'-338'	338'-355'	355'-365'	365'-370'
Foraminifera																						
Streblus beccarii (Linné)		f f	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Elphidium crispum (Linné)		- c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Quinqueloculina vulgaris (d'Orb.)		- -	f	c	f	f	c	f	f	f	c	f	c	f	f	c	f	f	r	r	r	r
Quinqueloculina ammophila Parr .		- -	f	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Clavulinoides difformis (Brady)		- -	r	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bolivina dilitata Reuss		- -	r	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Textularia agglutinans d'Orb. ..		- -	f	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Textularia fistulosa Brady		- -	f	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T. cf. vertebralis Cushman		- -	r	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dorothia parri Cush.		- -	f	r	r	r	c	r	r	c	r	r	r	r	r	r	r	r	r	r	r	r
Gaudryina rugosa d'Orb.		- -	r	-	-	r	-	-	-	r	r	-	-	-	r	r	r	-	r	r	-	-
Chrysalidinella sp.		- -	r	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dentalina cf. obliqua (Linné) ...		- -	r	-	-	-	-	r	-	-	-	-	-	-	-	-	-	-	-	r	-	-
Sigmoidella elegantissima (P.&J.)		- -	r	f	r	-	-	-	-	r	r	-	-	-	r	r	-	-	-	-	-	-
Sigmoidella kaguensis C.& O. ...		- -	c	f	-	-	-	-	-	-	-	-	r	-	-	-	-	-	-	-	-	-
Guttulina problema (d'Orb.)		- -	r	-	-	-	-	-	-	r	-	-	-	-	-	-	-	-	-	-	r	-
Sigmomorphina subregularis Howchin &Parr		- -	r	r	-	-	-	-	-	r	-	-	-	-	-	-	-	-	-	-	-	-
Amphisorus hemprichii Ehren. ...		- -	r	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
?Epistomaria polystomelloides (P. & J.)		- -	f	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Discorbis cycloclypeus H. & P. .		- -	f	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Notorotalia howchini (C.P. & C.)		- -	r	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cymbalina howchini Chapman		- -	f	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	r	-	-
Cymbalina globulus Reuss		- -	r	-	-	-	r	-	-	-	-	-	-	r	-	r	-	-	r	-	-	-
Spirillina tuberculata Brady ...		- -	r	f	-	-	-	-	-	-	-	-	-	r	-	-	-	-	-	-	-	-
Crespinella umbonifera (H.& P.).		- -	c	r	r	-	-	-	-	-	r	-	-	-	-	-	-	-	-	-	-	-
Cibicides victoriensis Chap., Parr & Collins		- -	r	r	-	c	f	f	-	f	r	-	-	-	-	-	-	-	-	-	-	-
Cibicides ungerianus (d'Orb.) ..		- -	r	r	r	c	-	r	r	r	r	r	-	r	-	-	r	r	r	r	-	-
Astrononion australe Cush. & Edwards		- -	r	-	-	r	r	r	-	-	r	r	r	-	-	r	r	-	r	-	-	-
Heronallenia lingulata (B.& H.).		- -	r	-	-	-	r	-	-	r	-	-	r	r	r	r	r	-	r	r	-	-
Discorbis bertheloti (d'Orb.) ..		- -	r	-	-	-	r	-	-	r	r	-	r	-	-	r	r	-	r	r	-	-
Discorbis orbicularis (d'Orb.) .		- -	f	r	-	-	-	r	-	r	-	-	-	-	-	-	-	-	r	-	-	-
Discorbis australis Parr		- -	r	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Miniacina miniaceum (Pallas) ...		- -	r	-	-	-	-	-	-	r	-	-	r	r	-	-	r	r	-	r	-	-
Elphidium crespinae Cush.		- -	f	r	r	-	-	r	-	-	-	r	-	-	-	-	-	-	-	-	-	-
Elphidium chapmani Cush.		- -	c	c	-	-	r	-	-	-	-	-	-	r	-	-	-	-	-	-	-	-

FOSSILS	Age	Up. Plio.	Mixed	Middle Miocene (Balcombian Stage)																				
				Batesford										Longford										
	Depth in Bore	61'-67' 67'-80'	80'-111'	111'-131'	131'-140'	140'-160'	160'-175'	175'-192'	192'-200'	200'-210'	210'-230'	230'-248'	248'-261'	261'-270'	270'-285'	285'-300'	300'-312'	312'-320'	320'-338'	338'-355'	355'-365'	365'-370'		
Foreminifera																								
E.adelaidensis How. & Parr		- -	c	c	f	r	-	-	f	-	-	-	-	r	-	-	-	-	-	-	-	-	-	-
Elphidium sp.		- -	r	r	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Planorbulina mediterranensis d'Orb.		- -	r	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcarina verriculata (Howe. & Parr)		- -	f	-	r	r	r	-	-	-	-	-	r	-	-	-	-	-	-	-	-	-	-	-
Nonion victoriense Cush.		- -	r	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Amphistegina lessonii (d'Orb.).		- -	c	r	f	r	f	r	f	-	-	-	r	-	r	-	-	-	-	-	-	-	-	-
Textularia abbreviata d'Orb. ..		- -	r	-	-	-	-	r	r	r	r	r	-	-	-	-	-	-	-	-	-	-	-	-
Textularia sagittula Defr.		- -	r	r	r	r	-	f	r	f	r	r	c	c	r	r	-	-	r	-	-	-	-	-
Quinqueloculina agglutinans (d'Orb.)		- -	-	f	f	r	r	r	r	r	r	r	f	f	r	r	r	r	r	r	-	-	-	-
Quinqueloculina schreibersiana (d'Orb.)		- -	-	r	r	c	f	f	c	c	-	-	c	r	r	r	r	r	r	r	-	-	-	-
Massilina lapidigera Parr		- -	-	c	-	-	-	-	-	-	r	-	r	-	-	-	-	-	-	-	-	-	-	-
Austrotrillina howchini (Schl.).		- -	-	f	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Triloculina tricarinata (d'Orb.)		- -	-	f	r	f	c	f	r	c	c	f	c	c	r	r	r	r	r	r	r	-	-	-
Triloculina trigonula (d'Orb.).		- -	-	r	-	-	-	-	-	-	c	f	-	-	r	r	-	r	r	-	-	-	-	-
Pyrgo bulloides (d'Orb.)		- -	-	r	-	-	r	r	r	-	c	-	c	-	r	r	-	r	-	r	-	-	-	-
Pyrgo anomala (Schl.)		- -	-	r	-	-	-	-	-	f	f	r	f	-	-	-	-	-	-	f	-	-	-	-
Cornuspira involvens Reuss		- -	-	f	r	r	c	r	c	r	c	r	c	-	-	r	r	r	r	-	-	-	-	-
Sigmoilina sigmoidea (Brady) var.compressa Cush.		- -	-	r	-	f	f	r	f	f	f	r	f	f	r	r	-	-	r	r	-	-	-	-
Planispirinella exigua (Br.) ..		- -	-	f	-	r	-	r	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Haueriina sp.		- -	-	r	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Textularia stricta Cush.		- -	-	f	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Textularia rugosa (Reuss)		- -	-	r	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Liebusella hantkeni Cush.		- -	-	f	-	-	-	-	-	-	-	-	-	f	r	-	-	-	-	-	-	-	-	-
Bolivina lobata Brady		- -	-	r	-	-	-	-	-	r	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bolivina hebes Macf. var. victoriensis Cush.		- -	-	r	-	r	-	-	-	r	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Triferina bradyi Cush.		- -	-	r	-	-	-	-	-	-	r	r	r	-	-	-	-	r	-	-	-	r	-	-
Uvigerina cf.pigmea d'Orb.		- -	-	r	r	-	r	-	r	r	r	-	-	-	r	-	-	r	-	-	-	-	-	-
Dentalina obliqua Linne'		- -	-	r	-	-	-	-	-	-	-	-	r	-	r	r	-	r	-	-	-	-	-	-
Nodosaria raphanistrum (L.) ...		- -	-	r	-	-	-	-	-	-	f	-	-	-	-	-	-	-	-	-	-	-	-	-
Globigerinoides trilobus (d'Orb.)		- -	-	r	r	f	f	f	r	r	r	r	f	-	-	-	r	r	r	r	-	-	-	-
Cassidulina calabra Seg.		- -	-	r	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anomalina glabrata Cush.		- -	-	r	r	c	f	r	r	r	r	-	r	r	-	r	r	-	-	-	-	-	-	-
Discorbis balcombensis Chap., Parr & Coll.		- -	-	f	-	-	-	-	-	-	-	-	-	f	-	r	r	r	r	r	-	-	-	-
Discorbis dimidiata (P.& J.) ..		- -	-	r	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Elphidium striatopunctatum (F.& M.)		- -	-	c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eponides repandus (F.& M.)		- -	-	r	-	-	-	r	r	r	r	-	r	r	-	r	r	r	-	r	r	-	-	-
Eponides scabriculus (Chap.) ..		- -	-	r	-	-	-	-	-	f	r	r	r	-	f	r	r	-	r	r	-	-	-	-
Cibicides sp.2		- -	-	r	-	-	-	-	-	-	-	-	-	-	r	r	r	-	r	-	-	-	-	-
Operculina victoriensis Chap. & Parr.		- -	-	c	-	-	r	r	f	c	c	-	-	r	r	r	-	r	-	-	-	-	-	-
Marginopora vertebralis (Q.& G.)		- -	-	f	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Reophax sp.		- -	-	r	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cancris intermedius Cush.		- -	-	r	-	r	-	-	r	-	-	-	-	-	r	-	-	-	-	-	-	-	-	-
Spiroloculina dispansa Chap.& Cresp.		- -	-	-	r	r	r	f	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Quinqueloculina lamarckiana (d'Orb.)		- -	-	-	f	f	r	f	c	c	c	f	c	f	r	r	r	r	-	r	-	-	-	-
Pyrgo depressa (d'Orb.)		- -	-	-	r	f	r	r	-	r	c	f	c	-	f	r	f	-	-	-	-	-	-	-
Gaudryina (Pseudogaudryina) crespinae Cush.		- -	-	-	r	f	-	-	-	r	-	-	r	r	-	-	-	-	-	-	-	-	-	-

FOSSILS	Age	Up. Plio.	Mixed Mio. & Plio.	Middle Miocene (Balcombian Stage)																		
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	Depth in Bore	61'- 67'	67'- 80'	80'-111'	111'-131'	131'-140'	140'-160'	160'-175'	175'-192'	192'-200'	200'-210'	210'-230'	230'-248'	248'-261'	261'-270'	270'-285'	285'-300'	300'-312'	312'-320'	320'-338'	338'-355'	355'-365'	365'-370'
Foraminifera																						
Lagena striata (d'Orb.)		-	-	-	-	r	r	f	-	-	-	-	-	-	-	-	r	-	-	-	r	-	-
Nodosaria raphanus (Linné)		-	-	-	-	r	r	-	-	-	-	-	r	-	-	r	-	r	-	-	-	-	-
Dentalina soluta Reuss		-	-	-	-	f	f	-	f	r	c	r	-	c	r	r	r	r	r	-	r	-	-
Dentalina consobrina d'Orb.		-	-	-	-	r	r	r	-	-	r	-	-	r	-	-	-	-	-	-	-	-	-
Uvigerina tenuistriata Reuss		-	-	-	-	r	-	-	-	-	r	-	-	-	-	-	-	-	-	-	-	-	-
Lenticulina rotulata (Lam.)		-	-	-	-	r	-	r	r	r	r	-	r	r	-	r	-	-	-	-	-	-	-
Lenticulina gibba (d'Orb.)		-	-	-	-	r	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orbulina universa d'Orb.		-	-	-	-	f	f	r	r	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pullenia quinqueloba (Reuss)		-	-	-	-	r	r	r	-	-	-	-	-	-	r	-	r	-	-	-	-	-	-
Globorotalia dehiscens Chap., Parr & Coll.		-	-	-	-	r	-	-	-	-	-	c	-	r	-	-	-	-	r	-	r	-	-
Sphaeroidina bulloides d'Orb.		-	-	-	-	r	f	r	r	r	r	f	-	r	r	r	r	r	r	-	r	-	-
Discorbis turbo (d'Orb.)		-	-	-	-	r	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eponides sp.		-	-	-	-	f	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anomalina ammonoides Reuss		-	-	-	-	r	f	-	r	-	r	r	-	r	f	-	r	r	r	-	r	-	-
Siphonina australis Cush.		-	-	-	-	r	f	r	-	c	r	-	c	r	r	r	r	r	r	r	r	-	-
Nonionella sp.		-	-	-	-	f	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cornuspira foliacea (Phil.)		-	-	-	-	r	r	r	f	r	r	f	r	-	r	-	r	-	r	-	f	-	-
Cornuspira crassiseptа Brady		-	-	-	-	r	c	f	r	r	c	c	c	f	r	f	r	r	-	r	-	-	-
Sigmoilina asperula (Karrer)		-	-	-	-	r	f	f	r	-	r	f	r	f	f	-	r	-	-	-	r	-	-
Lagena marginata (W.&B.)		-	-	-	-	-	c	r	r	f	r	r	c	-	r	r	-	r	r	-	-	-	-
Glandulina laevigata Reuss		-	-	-	-	-	r	r	-	-	-	r	-	r	-	-	r	-	-	-	r	r	-
Lenticulina mamilligera (Reuss)		-	-	-	-	-	r	r	-	-	-	r	-	-	-	-	-	-	-	-	-	-	-
Pyrgoella sphaera (d'Orb.)		-	-	-	-	-	f	r	-	-	-	c	f	r	f	r	r	-	r	r	r	-	-
Pyrgo elongata (d'Orb.)		-	-	-	-	-	f	r	f	f	r	-	-	r	r	-	-	-	-	-	-	-	-
Buliminella elegantissima (d'Orb.)		-	-	-	-	-	r	r	r	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lagena laevis (Montf.)		-	-	-	-	-	r	r	r	r	-	-	r	r	r	-	-	-	r	-	-	-	-
Lagena apiculata (Reuss)		-	-	-	-	-	r	f	r	-	r	-	-	-	-	-	-	-	-	-	-	-	-
Lagena distoma P. & J.		-	-	-	-	-	r	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lagena orbignyana (Seg.)		-	-	-	-	-	r	-	-	f	r	r	-	-	r	r	-	r	-	r	r	-	-
Lenticulina crepidula (F.& M.)		-	-	-	-	-	r	-	-	-	-	-	-	r	-	-	r	-	-	-	-	-	-
Nodosaria arundinea Schw.		-	-	-	-	-	r	-	r	-	-	-	r	-	-	-	-	-	-	-	-	-	-
Spirillina vivipara Ehren.		-	-	-	-	-	r	-	-	-	-	r	r	-	-	r	-	-	-	-	-	-	-
Pyrgo sarsi (Schl.)		-	-	-	-	-	f	r	r	r	r	-	r	f	f	r	r	-	-	r	r	-	-
Sigmoilina schlumbergeri (Silv.)		-	-	-	-	-	-	r	-	-	-	f	-	r	-	-	-	r	-	r	r	-	-
Bolivina victoriana Cush.		-	-	-	-	-	-	r	-	-	-	-	r	f	c	r	r	-	-	-	-	-	-
Bolivina robusta Brady		-	-	-	-	-	-	r	-	-	-	r	-	-	r	r	r	r	r	r	-	-	-
B. sp.		-	-	-	-	-	-	r	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lagena semistriata Willm.		-	-	-	-	-	-	r	-	-	r	-	r	r	-	-	r	-	-	-	-	-	-
Lagena acuticosta Reuss		-	-	-	-	-	-	r	r	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lagena plumigera Brady		-	-	-	-	-	-	r	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lagena marginata (W.& B.) var.		-	-	-	-	-	-	r	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Siphonodosaria scalaris (Batsch)		-	-	-	-	-	-	f	f	r	r	-	-	-	-	r	-	-	r	-	-	-	-
Frondicularia cf. inaequalis Costa		-	-	-	-	-	-	r	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Discorbinella planoconvexa (Chapm., Parr & Coll.)		-	-	-	-	-	-	r	-	-	-	-	-	-	r	r	-	-	-	r	-	-	-
Discorbis patelliformis (Brady)		-	-	-	-	-	-	r	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ceratobulimina haueri (d'Orb.) var. australis C.& H.		-	-	-	-	-	-	r	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ehrenbergina serrata Reuss		-	-	-	-	-	-	-	r	r	f	-	-	r	f	r	-	-	-	r	-	-	-
Listerella communis (d'Orb.)		-	-	-	-	-	-	-	r	-	-	r	-	r	-	r	-	-	-	-	-	-	-
Bolivina aff. dilitata Brady		-	-	-	-	-	-	-	r	r	-	r	-	-	-	-	-	-	r	-	-	-	-
Buliminella apiculata Chapm.		-	-	-	-	-	-	-	r	r	r	f	r	r	r	-	r	r	r	r	r	-	-
Carpenteria proteiformis Goes.		-	-	-	-	-	-	-	r	-	-	-	-	-	f	-	r	-	-	-	-	-	-

FOSSILS	Age	Up. Plio.	Mixed	Middle Miocene (Balcombian Stage)																
				Batesford									Longford							
	Depth in Bore	60'- 67'	67'- 80'	80'-111'	111'-131'	131'-140'	140'-160'	160'-175'	175'-192'	192'-200'	200'-210'	210'-230'	230'-248'	248'-261'	261'-270'	270'-285'	285'-300'	300'-312'	312'-320'	320'-338'	338'-355'	355'-365'	365'-370'
Foraminifera																							
Robertina sp.		-	-	-	-	-	-	-	r	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lagena hexagona Willm.		-	-	-	-	-	-	-	r	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Saracenaria italica (Defr.)		-	-	-	-	-	-	-	r	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrgo angusta (Chapman)		-	-	-	-	-	-	-	r	r	-	-	-	-	r	-	r	-	-	r	-	-	-
Verneuilina briquetra (Munst).		-	-	-	-	-	-	-	-	r	-	r	r	-	r	-	-	-	-	-	-	-	-
Bolivina sp.nov.		-	-	-	-	-	-	-	-	r	-	-	-	-	-	-	-	-	-	-	-	-	-
Nodosaria pyrula d'Orb		-	-	-	-	-	-	-	-	r	r	-	-	r	-	-	-	-	-	-	-	-	-
Acervulina inhaerens Schultz.		-	-	-	-	-	-	-	-	f	r	r	-	r	-	-	-	-	r	r	-	-	-
Uvigerina asperula (Czj.)		-	-	-	-	-	-	-	-	r	-	-	-	-	r	-	-	-	-	-	-	-	-
Dyocibicides biserialis Cush.		-	-	-	-	-	-	-	-	r	-	-	-	-	-	-	-	-	-	-	-	-	-
Carpenteria rotaliformis Chapm. & Cresp.		-	-	-	-	-	-	-	-	c	r	f	-	-	c	f	r	-	r	-	r	-	-
Hofkerina semiornata (Howe.)		-	-	-	-	-	-	-	-	r	r	-	-	-	r	-	-	-	-	-	-	-	-
Bolivina cf.tortuosa Brady		-	-	-	-	-	-	-	-	-	r	-	-	-	-	-	-	-	-	-	-	-	-
Lagena sulcata (W.& B.)		-	-	-	-	-	-	-	-	-	r	-	-	r	-	r	-	-	-	-	-	-	-
Lagena favosopunctata Brady		-	-	-	-	-	-	-	-	-	r	r	-	-	r	-	-	r	r	-	-	-	-
Nodosaria costulata Reuss		-	-	-	-	-	-	-	-	-	r	-	r	-	-	-	r	-	-	-	-	-	-
Dentalina fissicostata (Gumb.)		-	-	-	-	-	-	-	-	-	r	-	-	-	-	-	-	-	-	-	-	-	-
Globigerina bulloides d'Orb.		-	-	-	-	-	-	-	-	-	f	r	-	r	r	-	r	r	r	r	-	-	-
Gaudryina collinsi Cush.		-	-	-	-	-	-	-	-	-	r	f	-	-	r	-	r	r	r	-	r	-	-
Reussella spinulosa (Reuss)		-	-	-	-	-	-	-	-	-	r	-	-	-	-	-	-	r	-	-	r	-	-
Guttulina irregularis (d'Orb.)		-	-	-	-	-	-	-	-	-	r	-	-	-	-	-	-	-	-	-	-	-	-
Lenticulina cultrata (Mont.)		-	-	-	-	-	-	-	-	-	r	r	-	-	r	-	-	-	-	-	-	-	-
Lenticulina lata (Corneul)		-	-	-	-	-	-	-	-	-	f	r	-	-	-	-	-	-	-	-	-	-	-
Discorbinella biconcava (P.& J.)		-	-	-	-	-	-	-	-	-	r	-	-	-	-	-	-	-	r	-	-	-	-
Spirillina inaequalis Brady		-	-	-	-	-	-	-	-	-	r	-	-	-	-	-	-	-	-	-	-	-	-
Spirillina pectinimarginata Chapm., Parr & Coll.		-	-	-	-	-	-	-	-	-	r	-	-	-	c	-	-	-	-	-	r	-	-
Elphidium howchini Cush.		-	-	-	-	-	-	-	-	-	f	-	r	r	-	-	-	-	-	-	-	-	-
Elphidium parri Cush.		-	-	-	-	-	-	-	-	-	r	r	-	-	-	-	-	-	-	-	-	-	-
Ammobaculites calcareum Brady		-	-	-	-	-	-	-	-	-	-	f	-	-	-	-	-	-	-	-	-	-	-
Vaginulina legumen (Linné)		-	-	-	-	-	-	-	-	-	r	-	-	-	-	r	r	-	-	-	-	-	-
Lenticulina sp.1		-	-	-	-	-	-	-	-	-	r	-	-	-	f	r	-	-	r	r	-	-	-
Cassidulina subglobosa Brady		-	-	-	-	-	-	-	-	-	r	r	r	r	-	-	r	-	r	-	r	r	r
Planularia cf.dentata (Karr.)		-	-	-	-	-	-	-	-	-	f	-	-	-	-	-	-	-	-	-	r	-	-
Nonion pompilioides (F.& M.)		-	-	-	-	-	-	-	-	-	c	r	r	r	-	r	-	-	-	-	-	-	-
Ceratobulimina hauerii (Brady)		-	-	-	-	-	-	-	-	-	r	-	r	-	-	-	-	-	r	-	-	-	-
Discorbis berthaloti (d'Orb.) var.papillata Ch., P.& C.		-	-	-	-	-	-	-	-	-	r	-	r	r	r	-	-	-	-	-	-	-	-
Dentalina communis d'Orb.		-	-	-	-	-	-	-	-	-	-	r	r	-	-	-	-	-	-	-	-	-	-
Lenticulina articulata (Reuss)		-	-	-	-	-	-	-	-	-	-	r	r	-	-	r	-	-	r	-	-	-	-
Discorbis tuberculata (B.& W.) var.australiensis C.,P.& C.)		-	-	-	-	-	-	-	-	-	-	-	r	-	-	-	-	-	-	-	-	-	-
Spiroloculina cf.ferussacii (d'Orb.)		-	-	-	-	-	-	-	-	-	-	-	r	-	-	-	-	-	-	-	-	-	-
Virgulina sp.		-	-	-	-	-	-	-	-	-	-	-	r	-	-	-	-	-	-	-	-	-	-
Elphidium crassatum Cush.		-	-	-	-	-	-	-	-	-	-	-	r	-	-	-	-	-	-	-	-	-	-
Clavulinoides asaboi (Hantk.) var.victoriensis Cush.		-	-	-	-	-	-	-	-	-	-	-	-	c	c	f	r	r	r	r	-	r	-
Spiroloculina cf.affixa Terq.		-	-	-	-	-	-	-	-	-	-	-	-	r	-	r	-	-	-	-	r	-	-
Bolivina sp. (beaded)		-	-	-	-	-	-	-	-	-	-	-	-	f	r	-	-	-	-	-	-	-	-
Pyrulina cylindroides (Roemer)		-	-	-	-	-	-	-	-	-	-	-	-	r	-	-	-	-	-	r	-	-	-
Sigmoilina sp.		-	-	-	-	-	-	-	-	-	-	-	-	f	r	-	-	-	-	-	-	-	-
Quinqueloculina seminulum (L.)		-	-	-	-	-	-	-	-	-	-	-	-	r	-	-	-	-	-	r	-	-	r
Loxostoma sp.		-	-	-	-	-	-	-	-	-	-	-	-	f	r	-	-	-	-	-	-	-	-
Pseudoclavulina sp.		-	-	-	-	-	-	-	-	-	-	-	-	c	-	-	-	-	-	f	-	-	-
Uvigerinella sp.		-	-	-	-	-	-	-	-	-	-	-	-	r	-	-	-	-	-	-	-	-	-
Lagena hispida Reuss		-	-	-	-	-	-	-	-	-	-	-	-	r	-	-	-	-	-	-	-	-	-

FOSSILS	Age	Up. Plio.	Mixed Mio.-Plio.	Middle Miocene (Balcombian Stage)																		
				Batesford									Longford									
	Depth in Bore	60'- 67'	67'- 80'	80'-111'	111'-131'	131'-140'	140'-160'	160'-175'	175'-192'	192'-200'	200'-210'	210'-230'	230'-248'	248'-261'	261'-270'	270'-285'	285'-300'	300'-312'	312'-320'	320'-338'	338'-355'	355'-365'	365'-370'
Foraminifera																						
Lagena gracillima (Seg.)		-	-	-	-	-	-	-	-	-	-	-	-	r	-	-	-	-	-	-	-	-
Lagena globosa (Montf.)		-	-	-	-	-	-	-	-	-	-	-	-	r	-	r	-	-	-	-	r	-
Cibicides refulgens (Montf.)		-	-	-	-	-	-	-	-	-	-	-	-	r	-	r	-	-	-	-	r	-
Globulina gibba (d'Orb.)		-	-	-	-	-	-	-	-	-	-	-	-	r	-	r	r	-	r	r	-	-
Frondicularia cf. comta Brady var. villosa H.-A. & E.		-	-	-	-	-	-	-	-	-	-	-	-	-	r	r	-	-	-	-	-	-
Uvigerina cf. bononensis Forn.		-	-	-	-	-	-	-	-	-	-	-	-	-	r	r	-	-	-	-	-	-
Discorbis globularis (d'Orb.)		-	-	-	-	-	-	-	-	-	-	-	-	-	r	-	-	-	-	-	-	-
Sinhonodosaria scalaris Batsch var. separans Brady		-	-	-	-	-	-	-	-	-	-	-	-	-	-	r	-	r	r	-	-	-
Heronallenia wilsoni (H.A.&E.)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	r	-	-	-	-	-	-
Tubulogenerina mooreboolensis Cush.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	r	-	-	-	-	-
Dorothia cf. bradyana Cush.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	r	-	-	-	-	-
Anomalina nonionoides Parr.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	r	-	-	-	-	-
Bulimina elegans d'Orb.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	r	r	-	-	-	-
Textularia carinata d'Orb.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	r	-	-	-	-
Cibicides lobatulus (W. & J.)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	r	r	r	-	-	-
Carpenteria alternata Chapm. & Cresp.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	r	r	-	-	-
Pyrulina fusiformis (Roem.)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	r	-	-	-
Textularia concava (Kerrer)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	r	-	-	-
Bulimina pupula Steche.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	r	-	-
Guttulina (Sigmomorphina) silvestri Cush. & Ozawa.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	r	-	-
Sigmomorphina sp.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	r	-	-
Pseudocolumorphina cf. tasmanica Parr & Coll.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	r	-
Cassidulina oblonga Reuss.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	r	r
Cibicides cf. sorrentae Chap. Parr & Coll.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	r	r
cf. Nonsilina torquayensis Chapman.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	r	-
Cassidulinoides chapmani Parr.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	r
Ostracoda																						
Cythere dictyon G.S.B.		-	-	r	-	r	c	c	-	r	r	r	r	f	r	r	-	-	-	r	r	-	r
Cythere militaris G.S.B.		-	-	r	-	-	-	r	-	-	r	-	-	r	-	-	-	-	-	-	-	-	-
Cythere postdeclivis Chapm.		-	-	r	r	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cytherella lata G.S.B.		-	-	r	r	-	r	r	-	r	r	c	c	c	-	r	r	r	r	-	-	r	r
Cytherura capillifera G.S.B.		-	-	r	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cythere demissa G.S.B.		-	-	-	r	-	-	-	-	-	r	r	-	-	-	r	-	-	-	-	-	-	-
Cythere dasyderma G.S.B.		-	-	-	r	-	-	r	-	-	-	-	r	r	-	-	r	-	-	-	-	-	-
Cytheropteron batesfordense Chapman.		-	-	-	r	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cythere lactea G.S.B.		-	-	-	-	r	-	-	-	-	r	-	-	-	-	-	-	-	-	-	-	-	-
Cythere scutigera G.S.B.		-	-	-	-	r	r	-	-	-	r	c	r	f	-	r	r	-	-	-	-	-	-
Cythere canaliculata G.S.B.		-	-	-	-	r	-	-	r	r	r	r	-	-	r	-	-	-	r	-	-	-	-
Cythere caudigeninosa Chapm. & Cresp.		-	-	-	-	r	r	-	-	r	-	-	-	-	r	r	r	r	r	-	-	-	-
Bairdia amygdaloides G.S.B.		-	-	-	-	r	-	-	-	-	r	c	r	c	-	-	-	-	-	r	-	-	-
Bythocypris tumefacta Chapm.		-	-	-	-	c	c	c	-	r	r	c	-	r	-	-	-	-	-	-	r	-	-
Krithe eggeri Chapman.		-	-	-	-	r	-	f	-	-	-	r	-	r	-	r	-	-	-	r	-	-	r
Cytherelloidea auricula (Chap.)		-	-	-	-	f	c	f	-	r	-	f	f	f	-	-	r	-	r	-	r	-	-
Cytherella cingulata G.S.B.		-	-	-	-	f	-	r	-	-	-	r	-	-	-	-	-	-	-	-	-	-	-
Cytherella punctata G.S.B.		-	-	-	-	r	r	r	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Xestoleberis variegata G.S. B.		-	-	-	-	-	r	-	-	-	-	r	-	-	-	r	-	-	-	-	-	-	-

FOSSILS	Age	Up. Plio.	Mixed M.P.28 M.	Middle Miocene (Balcombian Stage)																				
				Batesford									Longford											
	Depth in Bore	60'- 67'	67'- 80'	80'-111'	111-131'	131'-140'	140'-160'	160'-175'	175'-192'	192'-200'	200'-210'	210'-230'	230'-248'	248'-261'	261'-270'	270'-285'	285'-300'	300'-312'	312'-320'	320'-338'	338'-355'	355'-365'	365'-370'	
Ostracoda																								
Cythere obtusalata G.S.B.		-	-	-	-	-	-	-	r	-	r	-	-	-	-	-	-	-	r	-	r	-	-	
Cythere flexicostata Chapm. ..		-	-	-	-	-	-	-	-	r	r	r	-	-	-	r	-	-	-	-	-	-	-	
Aletacythere praeantarcticum (Chapman)		-	-	-	-	-	-	-	-	r	r	-	r	r	r	-	r	-	r	-	-	r	-	
Loxoconcha australis G.S.B. ..		-	-	-	-	-	-	-	-	-	r	-	-	r	-	-	-	-	-	-	-	-	-	
Cytherella subtruncata Chap. .		-	-	-	-	-	-	-	-	-	r	-	r	r	-	-	r	-	-	-	r	-	-	
Bythocythere sp.		-	-	-	-	-	-	-	-	-	r	-	-	-	-	-	-	-	-	-	r	-	-	
Cytherella nolita G.S.B.		-	-	-	-	-	-	-	-	-	r	r	-	-	-	-	-	-	-	-	-	-	-	
Macrocypris decora G.S.B.		-	-	-	-	-	-	-	-	-	-	r	r	r	-	-	-	-	-	r	-	r	-	
Cythere luddbeckiana G.S.B. ..		-	-	-	-	-	-	-	-	-	-	r	-	-	-	-	-	-	-	-	r	-	-	
Bairdia subdeltoidea G.S.B. ..		-	-	-	-	-	-	-	-	-	-	-	-	-	-	r	-	-	-	r	-	-	-	
Krithe producta G.S.B.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	r	-	-	-	
Cytherella sulcata G.S.B.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	r	r	-	-	
Cythere scabrocuneata G.S.B. .		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	r	-	-	

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(Irene Crespin)
Commonwealth Palaeontologist