1980/37. Preliminary palynological investigation of Boobyalla DDH1, 1977-1979, north-east groundwater investigation.

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Abstract

In the conglomeratic sequence penetrated by Boobyalla DDH1 a latest Cretaceous (late Senonian) microflora belonging to either the *Tricolpites longus* zone or the *Tricolporites lilliei* zone occurs at 65 m depth. In four samples from 65 m to 245.1 m an early Mesozoic component occurs consistently in the microfloras. This component consists chiefly of palynomorphs occurring in Triassic coal measures and supports the lithological identification of clasts in the conglomerate as being derived from coal measure rocks. From 225 m and lower samples, apart from the Early Mesozoic palynomorphs, only meagre Late Mesozoic microfloras were obtained and some samples were barren. Excepting *Tricolpites* sp. cf. *T.gillii* Cookson, *T.* sp. aff *T.gillii* from 225 m, and a possible contaminant *Gambierina* sp. from 365.6 m, the few species found are more typical of earlier Cretaceous microfloras. *Cicatricosisporites* sp. cf. *C.australiensis* (Cookson) Potonié indicates that 347.5 m depth is not older than the Cretaceous. It is not known whether the Late Mesozoic palynomorphs below 65 m are reworked.

INTRODUCTION

Boobyalla DDH1 drilled a sequence of sedimentary rocks occupying a graben-like feature south of Boobyalla in far north-eastern Tasmania. Drilling terminated at 417.2 m before reaching basement. For the major part the drilled sequence consists of conglomerate with an impure muddy matrix that contains variable amounts of sand, silt, and granule grade detritus. The conglomerate clasts range from pebbles to boulders several metres thick, but slightly rounded cobbles predominate. The cobble framework ranges from closed to open and certain portions of the core consist of matrix only with no clast intersections. The larger clasts consist of dolerite, granitic rocks, quartzite and slate probably derived from the Mathinna Beds, quartz arenite, lithic arenite and grey siltstone probably derived from Triassic rocks. The dolerite is similar to that found as Middle Jurassic intrusions and provides a maximum age constraint on the inferred graben development. Matrix colour ranges from brick red through chocolate to almost black.

A series of core samples were selected by W.R. Moore, P.W. Baillie and the author for preliminary palynological analysis.

PALYNOLOGY

A list of sample data is given in Appendix 1. Samples were processed by standard hot HF, HCl treatment and oxidised from 5 to 10 minutes using Schultz solution. This was followed by treatment with dilute alkali and heavy liquid separation where warranted.

The residues are discussed below under depth headings.

Samples from 388.4 to 302.3 m

The more oxidised samples, with red-brown matrix from 302.3 m and medium brown-chocolate matrix from 328.1 m, contained no palynomorphs, although woody tissue may be present at 328.1 m. The matrix from 365.6 m

contained fine organic matter but no palynomorphs, excepting a well preserved but cleanly broken *Gambierina* sp. which may be a contaminant introduced during drilling. The matrix from 388.4 and 347.5 m contained cellular cuticle, xylem fragments and *Circulisporites* sp.. *Cicatricosisporites* sp. cf. *C.australiensis* (Cookson) Potonié and palynomorphs probably referrable to *Ceratosporites equalis* Cookson and Dettmann are also present at 347.5 m. *Lycopodiumsporites* sp. occurs at 388.4 m.

C.australiensis has been recorded from rocks as young as the *Nothofagidites senectus* zone (Stover and Partridge, 1973) but is more typical of the Neocomanian through Turonian (Dettmannand Playford, 1969). Should the broken specimen of *Gambierina* sp. not be a contaminant, then 365.6 m could be as young or younger than the *N.senectus* zone.

Samples from 225 to 245.1 m

The samples contain a mixture of Early and Late Mesozoic palynomorphs.

Sample depth (m)	*Early Mesozoic*	*Early-Late Mesozoic*	*Late Mesozoic*
245.1	*Aratrisporites* sp. cf. *A.banksi* Playford	*Leptolepidites* sp. *Osmundacidites* sp.	?*Cicatricosisporites* sp.
234.9	*Semiretisporis denmeadi* (de Jersey) de Jersey *Aratrisporites parvispinosus* Leschik *emend.* Playford *Clavatriletes* sp. cf. *C.hammenii* Herbst		?*Foraminisporis* sp.
225	*Falcisporites* spp. *Polypodiisporites ipsviciensis* (de Jersey) Playford & Dettmann *Semiretisporis denmeadi* (de Jersey) de Jersey *A. banksi* *Craterisporites rotundus* de Jersey *Neoraistrickia* sp. *Uvaesporites verrucosus* (de Jersey) Helby *Densoisporites playfordi* (Balme) Dettmann	*Leptolepidites* sp. *Cycadopites nitidus* (Balme) de Jersey Yellow cuticle and fungal remains	?*Cicatricosisporites* sp. *Klukisporites* sp. cf. *K.scaberis* (Cookson & Dettmann) Dettmann aff. *Reticulatisporites pudens* Balme *Tricolpites* sp. cf. *T.gillii* Cookson *T.* sp. aff. *T.gillii*

A brown specimen of *D.playfordi* is probably derived from Early Triassic rocks whilst the remaining yellow Early Mesozoic forms are typical of those occurring in Tasmanian Middle-Late Triassic coal measures. This supports the initial recognition based on lithology of clasts of Triassic coal measure rocks.

Many of the Cretaceous palynomorphs are poorly orientated due to

buckling. This may indicate reworking or movement of matrix and precludes positive identifications. However *Klukisporites scaberis* is probably present together with specimens of *Cicatricosisporites*. Simple triangular tricolpate pollen are present at 225 m including a form close to *T.gillii*.

Sample from 65 m

The residue consists of cellular cuticle, xylem fragments, a large range of fungal remains, plus a well preserved and fairly diverse microflora with *Tricolpites sabulosus* Dettmann and Playford (dispersed and tetrads common). *T.gillii* (common), *Proteacidites* spp. and *Nothofagidites senectus* Dettmann and Playford. *Uvaesporites verrucosus, Neoraistrickia taylorii* Playford and Dettmann, *Krauselisporites* sp. cf. *K.verrucifer* (de Jersey) and *Protohaploxypinus* indicate the presence of a Triassic component.

Palynomorphs tentatively identified are:

Leptolepidites sp.
C.equalis
Neoraistrickia sp. of *N.truncatus* (Cookson) Potonié
Stereisporites regium (Drozhastichich) Drugg
Tricolpites confessus Stover
T. sp. cf. *T.gillii*
T.longus Stover and Evans
Nyssapollenites sp.
Phimopollenites pannosus (Dettmann & Playford) Dettmann
Triorites sp. B
T. sp. C
Gambierina rudata Stover
Dilwynites granulatus Harris
Proteacidites sp. cf. *P. angulatus* Stover
P. sp. of *P.palisadus* Couper
P. sp. A
Phyllocladidites reticulosaccatus Harris
Tsugapollenites sp. cf. *T. segmentatus* (Balme)

Palynomorphs positively identified are:

Laevigatosporites ovatus Wilson & Webster
Baculatisporites disconformis Stover
Tricolpites gillii
T.renmarkensis Harris M.S.Partridge
T.sabulosus
Triorites sp. A
N.senectus
Araucariacites australis Cookson
Microcachyridites antarticus Cookson
Trisaccites microsaccatus (Couper) Couper
Phyllocladidites mawsonii Cookson and Couper

The microflora indicates assignment to either the *Tricolporites lilliei* zone or the *Tricolpites longus* zone (see Appendix 2) of the latest Cretaceous (Stover and Partridge, 1973; Partridge, 1976). Only a single tentatively identified *Dilwynites granulatus* was observed, therefore choice of zone assignment to the *Tricolpites longus* zone is not assured, although the low proportion of *Nothofagidites* (<2%) is consistent with such an age.

DISCUSSION

Subsequent to undertaking this study further samples of carbonaceous mudstone have become available from shallow drilling a few kilometres east of Boobyalla DDH1. This mudstone contains microfloras with common *Nothofagidites senectus, Gambierina rudata, Tricolpites sabulosus, T.gillii* with *Proteacidites* spp. including *P.palisadus, Triorites* sp. A and possibly *Aequitriradites spinulosus*.

Although there is always a degree of uncertainty regarding the origin

of microfloras in conglomerates, the bedded nature of the rocks at 65 m and the lack of such diverse Late Cretaceous microfloras at greater depths suggests that the microflora at 65 m was not derived by reworking from the other Late Cretaceous sediments nearby, but is approximately coeval with them.

Early Mesozoic microfloras have been recycled into the conglomerate, but it is by no means clear whether the meagre Cretaceous microfloras below 65 m are recycled or deposited directly into the conglomerate.

CONCLUSIONS AND RECOMMENDATIONS

The rocks at 65 m contain a latest Cretaceous (late Senonian) microflora belonging to the *Tricolporites lilliei* zone or the *Tricolpites longus* zone. This microflora is not regarded as being recycled and implies that the basin developed before the Tertiary. Microfloras most likely derived from the Triassic coal measures sequence indicate that this sequence was contributing detritus into the graben during the Cretaceous. The rock at 347.5 m containing *Cicatricosisporites* sp. cf. *C.australiensis* was deposited during the Cretaceous and may be significantly older than the shallower rocks encountered during drilling.

Further information could possibly be derived by processing larger samples to obtain further specimens for study. Samples obtained from towards the centre of the basin may be less affected by reworking from older rocks. As all stanniferous deposits dated so far in north-eastern Tasmania belong to the *Proteacidites tuberculatus* zone or to Quaternary age sediments (Harris, 1968), any stanniferous deposits in Cretaceous rocks should be carefully documented to aid tin exploration in this area.

As this is the first record of sedimentary rocks of Cretaceous age from onshore Tasmania, further study is warranted. The nearest known rocks of similar age occur in the offshore oil exploration hole Durroon I. It is recommended that the sequence encountered by Boobyalla DDH1 be drilled through to basement.

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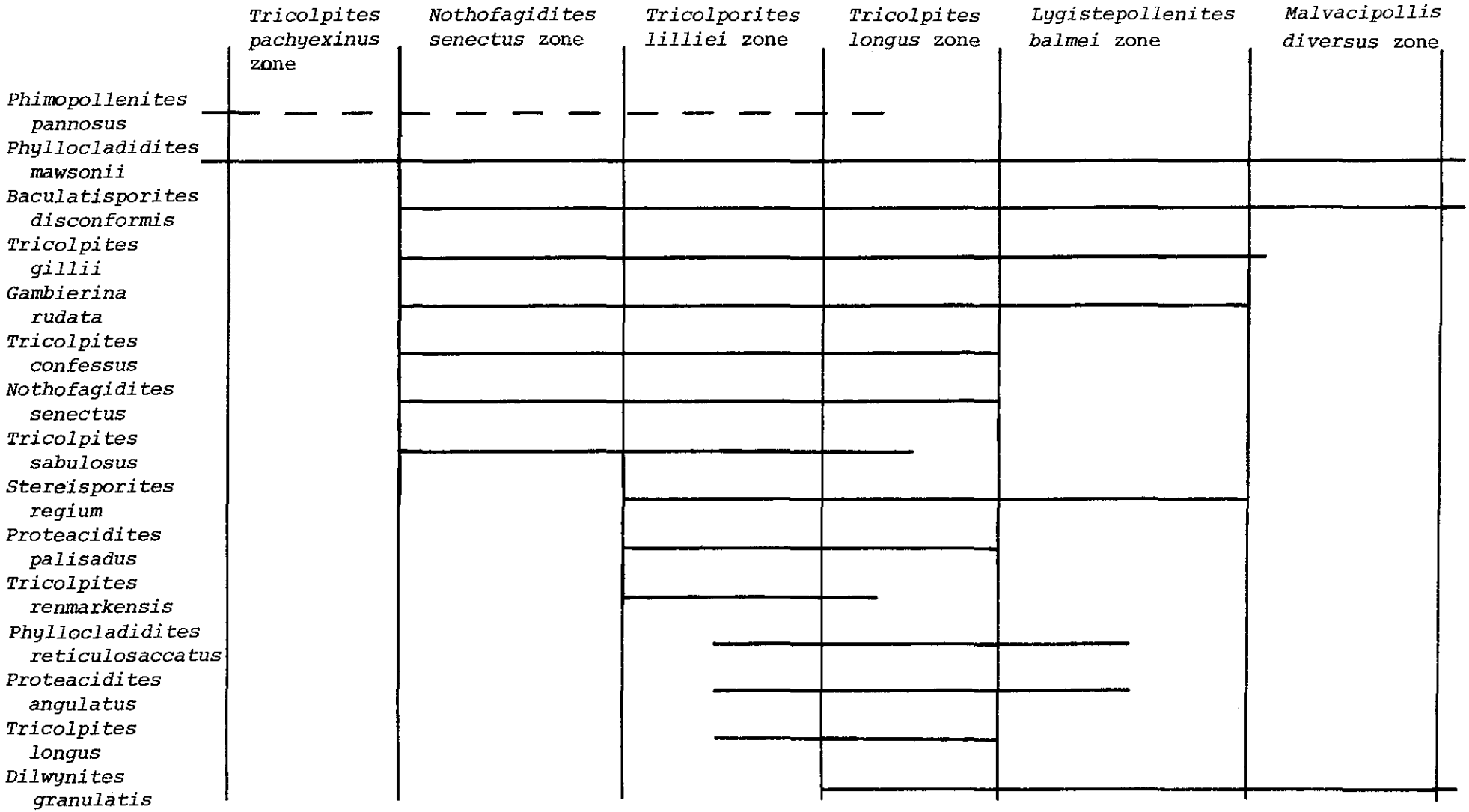
APPENDIX 1

List of samples, Boobyalla DDH1

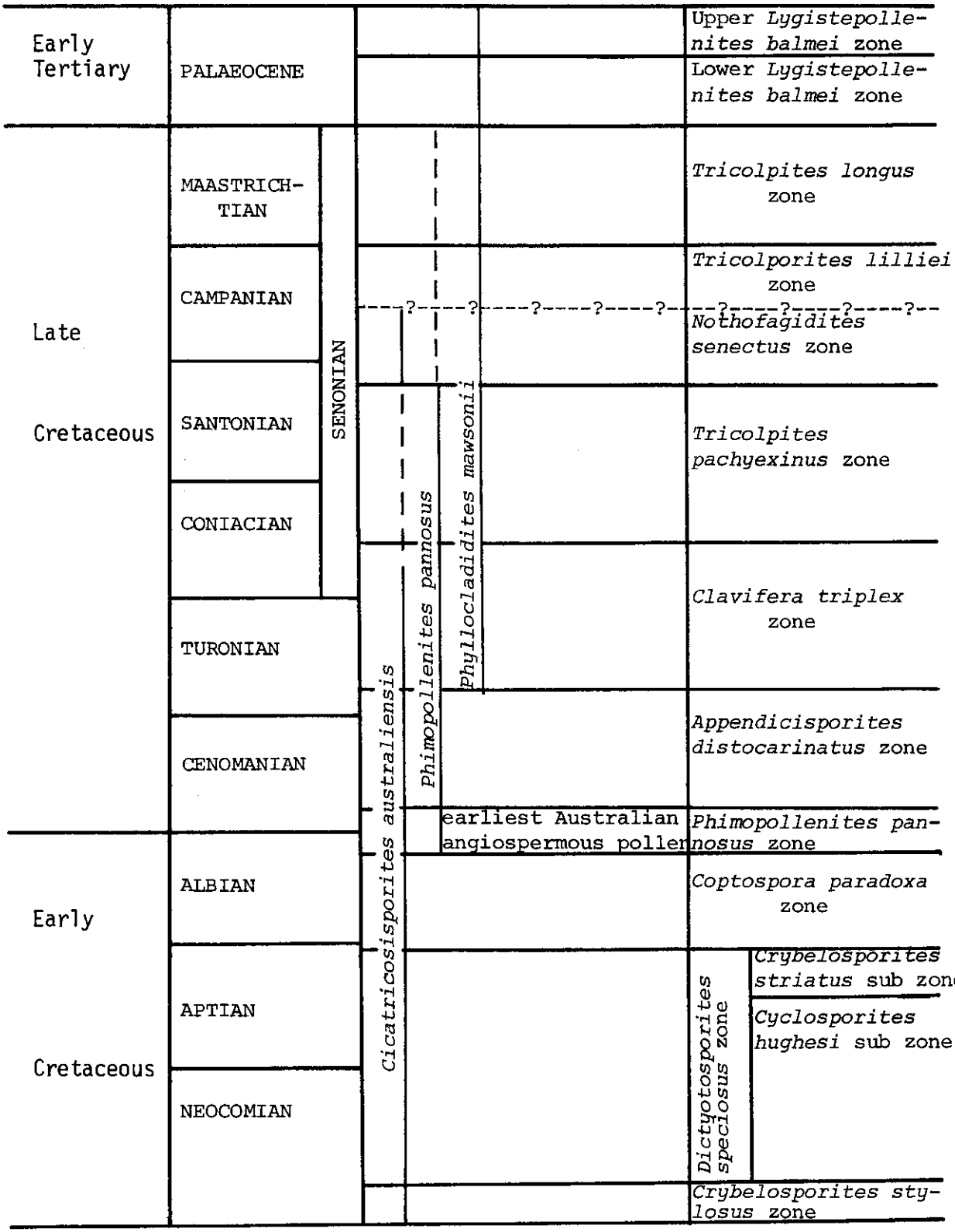
Sample depth (m)	*Lithology*	*Sample number*	*Preparation number*	*Palynological slides*
63.8	Coalified wood	SB10	P32	
65	Light grey coarse siltstone	SB9	P31	1127, 1128, 1135, 1136, 1138, 1139, 1140, 1141, 1142
225	Lithic sandstone and siltstone	SB7	P29	1123, 1124, 1131, 1132
231.9	Grey mudstone clasts	SB6	P28	1112, 1113, 1121, 1122
245.1	Grey muddy sandy matrix and sandstone clasts	SB8	P30	1125, 1126, 1133, 1134
302.3	Red-brown slightly sandy mudstone matrix of conglomerate	SB5	P27	1120
328.1	Medium brown-chocolate siltstone matrix of conglomerate	SB4	P26	1119
347.5	Chocolate coloured sandy mudstone matrix of conglomerate	SB2	P24	1129, 1130
365.6	Olive brown sandy granule mudstone matrix of conglomerate	SB3	P25	1116, 1117
388.4	Chocolate coloured slightly sandy mudstone matrix of conglomerate	SB1	P23	Temporary slide

APPENDIX 2

Ranges of selected palynomorph species



After Dettmann and Playford (1969), Stover and Partridge (1973), Stover and Evans (1973), and Partridge (1973).



Cretaceous microflora zones (after Dettmann and Playford, 1969; Stover and Partridge, 1973; Partridge, 1976).