



PALYNOLOGICAL REPORT

MOYNE FALLS NO.1, 1,289-3,050 FEET

by

Dr. M.E. Dettmann - University of Queensland

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PALYNOLOGICAL REPORT ON MOYNE FALLS No.1

WELL, 1289 - 3050 FEET

1. Introduction

The present account details the results obtained from a palynological examination of selected sidewall cores taken from Moyne Falls -1 well, 1289 - 3050 feet. The study, carried out at the request of Shell Development (Australia) Pty. Ltd., was made possible through the courtesy of, and the facilities offered by, the Mines Department of Victoria and the Department of Geology in the University of Queensland; and through the technical assistance of Mr. C. Lennie of Shell Development (Australia) Pty. Ltd. Acknowledgment to these persons and organisations is gratefully recorded.

The samples were prepared for palynological examination by a method (see Dettmann 1968) involving the use of hydrofluoric acid, zinc bromide, and ultrasonic vibration. Portions of the resultant residues were mounted in glycerine jelly and the preservation quality of the plant microfossils assessed (Table 1).

The remainder of the residues were further treated with Schulze solution for two minutes followed by washing in weak alkali (1% ammonium hydroxide) before specific analysis of the microfloras was carried out.

All but the lowest sample yielded plant microfossils including spores, pollen grains, and wood and cuticular material. The microfossils are mainly fairly preserved, showing slight decrease in preservation quality with increase in depth (see Table 1). As evidence below, the plant microfossil

assemblages are of Lower Cretaceous age and contain species indicative of the following spore-pollen biostratigraphic units delineated by Dettmann and Playford (1969) and Dettmann (1969^{a, b}); the Coptospora paradoxa Zone; the Crybelosporites striatus Subzone; and the Cyclosporites hughesi Subzone (in which the Foraminisporis asymmetricus and the Rouseisporites reticulatus Units are represented). Thus, the strata examined range in age from Neocomian-Aptian to Albian.

2. MICROFLORAL CONTENT AND AGE OF SAMPLES

The spore-pollen assemblages identified in the samples are tabulated below with reference to their qualitative and quantitative content; the quantitative estimates are expressed in the following terms:- Ab (abundant) - numerical representation of a particular species totals at least 5% of total microflora, C (common) - numerical representation of a species forms 1 - 5% of total microflora, and R (rare) - numerical representation of a species is less than 1% of total microflora.

A. 1289 feet

Plant material extracted from the sample is fairly preserved and includes commonly occurring spores and pollen grains together with wood and cuticular tissue. Species identified include:

Spores:	<u>Baculatisporites comaumensis</u> (Cookson)	C
	<u>Balmeisporites holodictyus</u> Cookson & Dettmann	R
	<u>Cicatricosisporites australiensis</u> (Cookson)	Ab
	<u>Crybelosporites striatus</u> (Cookson & Dettmann)	C
	<u>Cyathidites asper</u> (Bolkhovitina)	R
	<u>C. australis</u> Couper	C
	<u>C. minor</u> Couper	Ab
	<u>Gleicheniidites circinidites</u> (Cookson)	C
	<u>Krauselisporites majus</u> (Cookson & Dettmann)	R

	<u>Lycopodiumsporites austroclavatidites</u> (Cookson)	C
	<u>Rouseisporites reticulatus</u> Pocock	R
	<u>Stereisporites antiquasporites</u> (Wilson & Webster)	Ab
	<u>Trilobosporites trioreticulosus</u> Cookson & Dettmann	C
	<u>T. tribotrys</u> Dettmann	R
Pollen:	<u>Alisporites similis</u> (Balme)	C
	<u>Classopollis</u> cf. <u>classoides</u> Pflug	C
	<u>Microcachrydites antarcticus</u> Cookson	C
	<u>Podocarpidites</u> cf. <u>ellipticus</u> Cookson	Ab

The content of Trilobosporites trioreticulosus, T. tribotrys, and Kraeuselisporites majus indicates that the sample is from the Coptospora paradoxa Zone (unnamed unit) and thus of Albian age (see Dettmann 1969a).

B. 1385 - 1576 feet

1385 feet

The sparse microflora obtained from the sample is composed of one to several examples of the following species:

Spores:	<u>Baculatisporites comaumensis</u> (Cookson)
	<u>Cicatricosisporites australiensis</u> (Cookson)
	<u>Coptospora striata</u> Dettmann
	<u>Cyathidites australis</u> Couper
	<u>Foraminisporis asymmetricus</u> (Cookson & Dettmann)
	<u>Leptolepidites verrucatus</u> Couper
	<u>Rouseisporites reticulatus</u> Pocock
	<u>Stereisporites antiquasporites</u> (Wilson & Webster)
Pollen:	<u>Classopollis</u> cf. <u>classoides</u> Pflug
	<u>Microcachrydites antarcticus</u> Cookson
	<u>Podocarpidites</u> cf. <u>ellipticus</u> Cookson

1444 feet

A small residue containing rare spores and pollen grains was extracted from the sample. Examples of the following species were observed:

Spores:	<u>Baculatisporites comaumensis</u> (Cookson)
	<u>Cicatricosisporites australiensis</u> (Cookson)
	<u>Coptospora striata</u> Dettmann
	<u>Rouseisporites reticulatus</u> Pocock

Pollen: Classopollis cf. classoides Pflug
Microcachryidites antarcticus Cookson

1576 feet

Plant material extracted from the sample includes abundant woody tissue and a restricted spore-pollen suite.

Types identified include:

Spores:	<u>Aequitriradites spinulosus</u> (Cookson & Dettmann)	R
	<u>Baculatisporites comaumensis</u> (Cookson)	Ab
	<u>Cicatricosporites australiensis</u> (Cookson)	Ab
	<u>Cyathidites asper</u> (Bolkhovitina)	C
	<u>C. australis</u> Couper	Ab
	<u>C. minor</u> Couper	C
	<u>Foraminisporis asymmetricus</u> (Cookson & Dettmann)	R
	<u>F. wonthaggiensis</u> (Cookson & Dettmann)	R
	<u>Lycopodiumsporites austroclavatidites</u> (Cookson)	Ab
	<u>Rouseisporites reticulatus</u> Pocock	R
	<u>Stereisporites antiquasporites</u> (Wilson & Webster)	Ab
Pollen:	<u>Alisporites grandis</u> (Cookson)	C
	<u>Araucariacites australis</u> Cookson	Ab
	<u>Classopollis</u> cf. <u>classoides</u> Pflug	C
	<u>Cycadopites nitidus</u> (Balme)	R
	<u>Microcachryidites antarcticus</u> Cookson	Ab
	<u>Podocarpidites</u> cf. <u>ellipticus</u> Cookson	Ab

Insufficient representation of diagnostic species precludes precise zonal attribution of sediments between 1385 feet and 1576 feet. However the presence of Coptospora striata at 1385 feet and 1444 feet indicates that the sediments belong to the Dictyotosporites filosus Unit or the Crybelosporites striatus Subzone (see Dettmann 1969a).

C. 1732 feet

The following diverse assemblage of spores and pollen grains occurs in the sample:

Spores:	<u>Aequitriradites spinulosus</u> (Cookson & Dettmann)	R
	<u>Baculatisporites comaumensis</u> (Cookson)	Ab
	<u>Ceratospores equalis</u> Cookson & Dettmann	C
	<u>Cicatricosporites australiensis</u> (Cookson)	Ab

	<u>Crybelosporites striatus</u> (Cookson & Dettmann)	R
	<u>Cyathidites australis</u> Couper	Ab
	<u>C. minor</u> Couper	Ab
	<u>Dictyotosporites speciosus</u> Cookson & Dettmann	R
	<u>Foraminisporis asymmetricus</u> (Cookson & Dettmann)	R
	<u>F. wonthaggiensis</u> (Cookson & Dettmann)	C
	<u>Klukisporites scaberis</u> (Cookson & Dettmann)	R
	<u>Leptolepidites verrucatus</u> Couper	Ab
	<u>Lycopodiumsporites austroclavatidites</u> (Cookson)	Ab
	<u>L. eminulus</u> Dettmann	R
	<u>L. facetus</u> Dettmann	R
	<u>Rouseisporites reticulatus</u> Pocock	R
	<u>Stereisporites antiquasporites</u> (Wilson & Webster)	Ab
	<u>Velosporites triquetrus</u> (Lantz)	R
Pollen:	<u>Araucariacites australis</u> Cookson	R
	<u>Alisporites grandis</u> (Cookson)	C
	<u>A. similis</u> (Balme)	C
	<u>Classpollis</u> cf. <u>classoides</u> Pflug	Ab
	<u>Cycadopites nitidus</u> (Balme)	C
	<u>Podocarpidites</u> cf. <u>ellipticus</u> Cookson	Ab
	<u>Tsugaepollenites dampieri</u> (Balme)	R
Remanié:	<u>Aratrisporites</u> sp. - Triassic	R
	<u>Lundbladispora denmeadi</u> (de Jersey) - Triassic	R

The sediment contains Dictyotosporites speciosus and Crybelosporites striatus and is thus probably from within the Crybelosporites striatus Subzone but may be as young as the Dictyotosporites filus Unit. Remanié types observed are of rare occurrence and are of Triassic origin.

D. 1802 - 2022 feet

1802 feet

A diverse assemblage of spores and pollen grains was extracted from the sample. Species identified include:

Spores:	<u>Aequitriradites spinulosus</u> (Cookson & Dettmann)	Ab
	<u>Baculatisporites comaumensis</u> (Cookson)	Ab
	<u>Cicatricosporites australiensis</u> (Cookson)	R
	<u>Cooksonites variabilis</u> Pocock	C
	<u>Cyathidites australis</u> Couper	Ab
	<u>C. minor</u> Couper	C
	<u>C. punctatus</u> (Delcourt & Sprumont)	Ab
	<u>Foraminisporis asymmetricus</u> (Cookson & Dettmann)	R
	<u>F. wonthaggiensis</u> (Cookson & Dettmann)	C
	<u>Gleicheniidites</u> cf. <u>circinidites</u> (Cookson)	R

	<u>Ischyosporites punctatus</u> Cookson & Dettmann	C
	<u>Lycopodiumsporites austroclavatidites</u> (Cookson)	C
	<u>L. circolumenus</u> Cookson & Dettmann	R
	<u>Klukisporites scaberis</u> (Cookson & Dettmann)	R
	<u>Matonisporites cooksonii</u> Dettmann	R
	<u>Pilosisorites notensis</u> Cookson & Dettmann	R
	<u>P. parvispinosus</u> Dettmann	R
	<u>Trilobosporites purverulentus</u> (Verbitskaya)	R
	<u>Rouseisorites reticulatus</u> Pocock	R
Pollen:	<u>Alisporites grandis</u> (Cookson)	C
	<u>Classopollis</u> cf. <u>classoides</u> Pflug	R
	<u>Microcachryidites antarcticus</u> Cookson	C
	<u>Podocarpidites</u> cf. <u>ellipticus</u> Cookson	Ab
	<u>Tsugaepollenites dampieri</u> (Balme)	R
Remanié:	<u>Dulhuntyspora</u> sp. - Permian	R
	<u>Lundbladispora denmeadi</u> (de Jersey) - Triassic	R

1902 feet

Plant matter extracted from the sample includes abundant wood and cuticular fragments and less frequent spores and pollen grains. Species identified include:

Spores:	<u>Baculatisporites comaumensis</u> (Cookson)	Ab
	<u>Ceratosporites equalis</u> Cookson & Dettmann	C
	<u>Cyathidites australis</u> Couper	Ab
	<u>C. minor</u> Couper	Ab
	<u>Dictyotosporites speciosus</u> Cookson & Dettmann	R
	<u>Klukisporites scaberis</u> (Cookson & Dettmann)	C
	<u>Leptolepidites verrucatus</u> Couper	R
	<u>L. major</u> Couper	R
	<u>Lycopodiacidites asperatus</u> Dettmann	R
	<u>Lycopodiumsporites austroclavatidites</u> (Cookson)	Ab
	<u>Pilosisorites parvispinosus</u> Dettmann	C
Pollen:	<u>Alisporites similis</u> (Balme)	C
	<u>Classopollis</u> cf. <u>classoides</u> Pflug	C
	<u>Microcachryidites antarcticus</u> Cookson	C
	<u>Podocarpidites</u> cf. <u>ellipticus</u> Cookson	Ab
	<u>Tsugaepollenites dampieri</u> (Balme)	C
Incertae		
Sedis:	<u>Schizosporis reticulatus</u> Cookson & Dettmann	R
	<u>S. spriggi</u> Cookson & Dettmann	R

1952 feet

An abundant and diverse assemblage of spores and pollen grains occurs in the sample. The following species were observed:

Spores:	<u>Aequitriradites spinulosus</u> (Cookson & Dettmann)	R
	<u>Baculatisporites comaumensis</u> (Cookson)	Ab
	<u>Ceratosporites equalis</u> Cookson & Dettmann	C
	<u>Cicatricosisporites australiensis</u> (Cookson)	C
	<u>Cooksonites variabilis</u> Pocock	R
	<u>Cyclosporites hughesi</u> (Cookson & Dettmann)	C
	<u>Cyathidites australis</u> Couper	Ab
	<u>C. asper</u> (Bolkhovitina)	R
	<u>C. minor</u> Couper	Ab
	<u>Dictyotosporites complex</u> Cookson & Dettmann	R
	<u>D. speciosus</u> Cookson & Dettmann	C
	<u>Dictyophyllidites crenatus</u> Dettmann	R
	<u>Couperisporites tabulatus</u> Dettmann	R
	<u>Foraminisporis dailyi</u> (Cookson & Dettmann)	R
	<u>F. wonthaggiensis</u> (Cookson & Dettmann)	R
	<u>Klukisporites scaberis</u> (Cookson & Dettmann)	R
	<u>Leptolepidites major</u> Couper	C
	<u>L. verrucatus</u> Couper	C
	<u>Lycopodiumsporites austroclavatidites</u> (Cookson)	Ab
	<u>L. eminulus</u> Dettmann	Ab
	<u>Neoraistrickia truncata</u> (Cookson)	C
	<u>Stereisporites antiquasporites</u> (Wilson & Webster)	Ab
Pollen:	<u>Alisporites grandis</u> (Cookson)	R
	<u>Araucariacites australis</u> Cookson	C
	<u>Classopollis</u> cf. <u>classoides</u> Pflug	C
	<u>Cycadopites nitidus</u> (Balme)	C
	<u>Microcachryidites antarcticus</u> Cookson	C
	<u>Podocarpidites</u> cf. <u>ellipticus</u> Cookson	Ab
	<u>Vitreisporites pallidus</u> Reissinger	R
Incertae		
Sedis:	<u>Spheripollenites psilatus</u> Couper	C
Remanie:	<u>Aratrisporites</u> sp. - Triassic	R

2022 feet

The following diverse assemblage of spores and pollen grains was extracted from the sample:

Spores:	<u>Baculatisporites comaumensis</u> (Cookson)	Ab
	<u>Ceratosporites equalis</u> Cookson & Dettmann	R
	<u>Cicatricosisporites australiensis</u> Cookson	C
	<u>Cooksonites variabilis</u> Pocock	R
	<u>Cyathidites australis</u> Couper	Ab
	<u>C. minor</u> Couper	Ab
	<u>Dictyotosporites speciosus</u> Cookson & Dettmann	R
	<u>Foraminisporis asymmetricus</u> (Cookson & Dettmann)	R
	<u>F. wonthaggiensis</u> (Cookson & Dettmann)	R
	<u>Klukisporites scaberis</u> (Cookson & Dettmann)	R
	<u>Leptolepidites verrucatus</u> Couper	R

	<u>Lycopodiumsporites austroclavatidites</u> (Cookson)	Ab
	<u>L. nodosus</u> Dettmann	R
	<u>Neoraistrickia truncata</u> (Cookson)	C
	<u>Pilosporites notensis</u> Cookson & Dettmann	R
	<u>Rouseisporites reticulatus</u> Pocock	R
	<u>Stereisporites antiquasporites</u> (Wilson & Webster)	Ab
Pollen:	<u>Alisporites grandis</u> (Cookson)	R
	<u>A. similis</u> (Balme)	C
	<u>Araucariacites australis</u> Cookson	C
	<u>Classopollis cf. classoides</u> Pflug	R
	<u>Cycadopites nitidus</u> (Balme)	C
	<u>Microcachryidites antarcticus</u> Cookson	Ab
	<u>Podocarpidites cf. ellipticus</u> Cookson	Ab
	<u>Podosporites microsaccatus</u> (Couper)	R

Samples from between 1802 feet and 2022 feet are referred to the Foraminisporis asymmetricus Unit because of their content of Dictyotosporites speciosus, Cyclosporites hughesi, Foraminisporis asymmetricus, and Cooksonites variabilis. Moreover, the last-named species indicates that the sediments are from the basal portion of the Foraminisporis asymmetricus Unit (see Dettmann 1969a).

E. 2166 - 2330 feet

2166 feet

Abundant spores and pollen grains extracted from the sample comprise the following diverse assemblage:

Spores:	<u>Aequitriradites verrucosus</u> (Cookson & Dettmann)	R
	<u>Baculatisporites comaumensis</u> (Cookson)	Ab
	<u>Ceratosporites equalis</u> Cookson & Dettmann	R
	<u>Cicatricosisporites australiensis</u> (Cookson)	C
	<u>Couperisporites tabulatus</u> Dettmann	R
	<u>Cyclosporites hughesi</u> (Cookson & Dettmann)	R
	<u>Cyathidites australis</u> Couper	Ab
	<u>C. minor</u> Couper	Ab
	<u>Dictyotosporites complex</u> (Cookson & Dettmann)	R
	<u>D. speciosus</u> (Cookson & Dettmann)	R
	<u>Dictyophyllidites crematus</u> Dettmann	C
	<u>Foraminisporis wonthaggiensis</u> (Cookson & Dettmann)	R
	<u>Klukisporites scaberis</u> (Cookson & Dettmann)	R
	<u>Leptolepidites verrucatus</u> Couper	C
	<u>Lycopodiumsporites austroclavatidites</u> (Cookson)	Ab

	<u>L. circolumenus</u> (Cookson & Dettmann)	R
	<u>L. eminulus</u> Dettmann	Ab
	<u>Neoraistrickia truncata</u> (Cookson)	R
	<u>Rouseisporites reticulatus</u> Pocock	R
	<u>Stereisporites antiquasporites</u> (Wilson & Webster)	Ab
Pollen:	<u>Alisporites grandis</u> (Cookson)	C
	<u>Araucariacites australis</u> Cookson	C
	<u>Classopollis</u> cf. <u>classoides</u> Pflug	C
	<u>Cycadopites nitidus</u> (Balme)	C
	<u>Microcachryidites antarcticus</u> Cookson	Ab
	<u>Podocarpidites</u> cf. <u>ellipticus</u> Cookson	C
Acritarcha:	<u>Micrhystridium</u> sp.	R
Remanie:	<u>Nuskoisporites</u> sp. - Permian	R

2330 feet

Spores and pollen grains occur commonly in the sample and constitute the following restricted assemblage:

Spores:	<u>Baculatisporites comaumensis</u> (Cookson)	C
	<u>Cicatricosisporites australiensis</u> (Cookson)	C
	<u>Cyclosporites hughesi</u> (Cookson & Dettmann)	R
	<u>Ceratospores equalis</u> Cookson & Dettmann	R
	<u>Cyathidites australis</u> Couper	Ab
	<u>C. minor</u> Couper	Ab
	<u>Dictyotosporites speciosus</u> Cookson & Dettmann	R
	<u>Dictyophyllidites crenatus</u> Dettmann	R
	<u>Foraminisporis dailyi</u> (Cookson & Dettmann)	R
	<u>Leptolepidites major</u> Couper	R
	<u>L. verrucatus</u> Couper	Ab
	<u>Lycopodiumsporites austroclavatidites</u> (Cookson)	Ab
	<u>L. eminulus</u> Dettmann	Ab
	<u>L. nodosus</u> Dettmann	R
	<u>Neoraistrickia truncata</u> (Cookson)	C
	<u>Rouseisporites reticulatus</u> Pocock	R
Pollen:	<u>Classopollis</u> cf. <u>classoides</u> Pflug	C
	<u>Microcachryidites antarcticus</u> Cookson	C
	<u>Podosporites microsaccatus</u> (Couper)	R
	<u>Podocarpidites</u> cf. <u>ellipticus</u> Cookson	Ab

Samples from 2166 feet and 2330 feet contain the continued presence (down section) of Dictyotosporites speciosus, Cyclosporites hughesi, and Rouseisporites reticulatus and lack Foraminisporis asymmetricus. They are accordingly referred to the Rouseisporites reticulatus Unit (see Dettmann 1969a). Rare examples of Micrhystridium sp., referable to

the Acritarcha, and of the Permian genus Nuskoisporites were recovered from the sample at 2166 feet.

F. 3050 feet

The sample failed to yield plant material of any description.

3. CONCLUSIONS

Palynological evidence indicates that the strata investigated in Moyne Falls -1 well include horizons of the Coptospora paradoxa Zone, the Crybelosporites striatus Subzone, and the Foraminisporis asymmetricus and Rouseisporites reticulatus Units of the Cyclosporites hughesi Subzone. Thus the section ranges in age from Neocomian-Aptian to Albian (Dettmann and Playford 1969, Dettmann 1969a). A microfloral unconformity may occur between 1732 feet and 1802 feet, since the upper horizon is referable at the oldest to the Crybelosporites striatus Subzone and the lower to the basal portion of the Foraminisporis asymmetricus Unit.

Remanie types of Triassic and Permian origin occur in horizons of the Crybelosporites striatus Subzone and in stratigraphically lower samples. Plant microfossils of uncertain derivation but possibly referable to the Acritarcha were observed in samples of the Foraminisporis asymmetricus and Rouseisporites reticulatus Units.

Comparison of the Moyne Falls section with the Lower Cretaceous developments in Eumeralla No.1 and Pretty Hill No.1 (see Dettmann 1969a) wells/indicates that:

- 1) the youngest Lower Cretaceous horizons developed in Eumeralla No.1 and Pretty Hill No.1 (Tricolpites pannosus Zone and 2 portion of Coptospora paradoxa Zone, unnamed unit) are not represented in Moyne Falls -1.
- 2) the possible unconformity in Moyne Falls -1 does not appear to embrace the same time interval as the unconformities occurring between Units 1 and 2 of the Eumeralla Formation in both Pretty Hill No.1 and Eumeralla No.1 wells.
- 3) the oldest productive horizons investigated in Moyne Falls -1 well are within the Rouseisporites reticulatus Unit and are thus younger than, or equivalent in age to the lower intersections of the Eumeralla Formation in Eumeralla No.1 well and older than basal horizons of the same formation in Pretty Hill No.1 well.

4. REFERENCES

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Mary E. Dettmann,
Department of Geology,
University of Queensland,
St. Lucia, Qld.

EXPLANATION OF TABLE 1

Preservation and zonal attribution of plant microfossil assemblages in sidewall cores of Moyne Falls -1 well, 1289 - 3050 feet.

Abbreviations:

Yield expresses frequency of spores and pollen grains in the palynological residues as follows:-

Ab = abundant

C = common

Sp = sparse

B = barren

Colour and Preservation. Spores, pollen, wood and cuticle present in the residues are denoted by their colour (col.) and quality of preservation (pres.) thus:-

DY = dark yellow

Br = brown

Bl = black

fair = fairly preserved

poor = poorly preserved

Spore-pollen Zones are those defined by Dettmann and Playford (1969) and Dettmann (1969a,b).

TABLE 1

Depth (feet)	Yield	Spore-Pollen		Wood		Cuticle		Spore-Pollen Zone	STRATI - GRAPHY	
		Col.	Pres.	Col.	Pres.	Col.	Pres.			
1289	C	DY-Br	fair	Br-Bl	fair	Y-Br	fair	<i>Coptospora paradoxa</i> (unnamed unit)	EMERALLA FM UNIT 1	OTWAY GROUP
1385	Sp	"	"	"	"	"	"	<i>Dictyosporites filiosus</i> or		
1444	"	"	"	"	"	"	"	<i>Crybelosporites striatus</i>		
1576	C	"	"	"	"	"	"	<i>Crybelosporites striatus</i>		
1732	"	"	"	"	"	"	"	<i>Foraminisporis</i> <i>asymmetricus</i>	EMERALLA FM UNIT 2	OTWAY GROUP
1802	"	"	"	"	"	"	"			
1902	"	"	"	"	"	"	"			
1952	Ab	"	"	"	"	"	"			
2022	C	"	"	"	"	"	"	<i>Rouseisporites reticulatus</i>	EMERALLA FM	OTWAY GROUP
2166	Ab	"	"	"	fair-poor	"	poor			
2330	C	"	"	"	"	"	"	indet.	EMERALLA FM	OTWAY GROUP
3050	B	"	"	"	"	"	"			

Upper-Middle
Lower Albian
Neocomian - Aptian