NEW PALYNOLOGY OF WOOLSTHORPE-1,

ONSHORE OTWAY BASIN, VICTORIA

BY

ROGER MORGAN

for MINORA RESOURCES

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I SUMMARY

1100 ft. (cutts) : C. striatus Zone : early Albian : non-marine

2000 ft. (cutts) : upper C. hughesi Zone : late Aptian : non-marine

2500 ft. (cutts)-3900 ft. (cutts) : lower C. hughesi Zone : early Aptian : non-marine

4300 ft. (cutts)-6330 ft. (cutts) : ?lower C. hughesi to C. australiensis Zones : ?early Aptian-Neocomian : non-marine

	AGE		SPORE – POLLEN ZONES	DINOFLAGELLATE ZONES
Early Tertiary	Early Oligocene		P. tuberculatus	
Early Tertiary	Late Eocene		upper N. asperus	P. comatum
Early Tertiary	Late Eocene		middle N. asperus	V. extensa
Early Tertiary	Middle Eocene		lower N. asperus	D. heterophlycta
Early Tertiary	Middle Eocene			W. echinosuturata
Early Tertiary	Middle Eocene / Early Eocene		P. asperopolus	W. edwardsii
Early Tertiary	Early Eocene			W. thompsonae
Early Tertiary	Early Eocene		upper M. diversus	W. ornata
Early Tertiary	Early Eocene			W. waipawaensis
Early Tertiary	Early Eocene		middle M. diversus	
Early Tertiary	Early Eocene		lower M. diversus	W. hyperacantha
Early Tertiary	Paleocene		upper L. balmei	A. homomorpha
Early Tertiary	Paleocene		lower L. balmei	E. crassitabulata
Early Tertiary	Paleocene			T. evittii
Late Cretaceous	Maastrichtian		T. longus	M. druggii
Late Cretaceous	Campanian		T. lilliei	I. korojonense
Late Cretaceous	Campanian		N. senectus	X. australis
Late Cretaceous	Santonian		T. pachyexinus	N. aceras
Late Cretaceous	Santonian			I. cretaceum
Late Cretaceous	Santonian			O. porifera
Late Cretaceous	Coniacian		C. triplex	
Late Cretaceous	Turonian		C. triplex	C. striatoconus
Late Cretaceous	Cenomanian		A. distocarinatus	P. infusorioides
Early Cretaceous	Albian	Late	P. pannosus	
Early Cretaceous	Albian	Middle	upper C. paradoxa	
Early Cretaceous	Albian	Early	lower C. paradoxa	
Early Cretaceous	Albian	Early	C. striatus	
Early Cretaceous	Aptian		upper C. hughesi	
Early Cretaceous	Aptian		lower C. hughesi	
Early Cretaceous	Barremian		F. wonthaggiensis	
Early Cretaceous	Hauterivian		F. wonthaggiensis	
Early Cretaceous	Valanginian		upper C. australiensis	
Early Cretaceous	Berriasian		lower C. australiensis	
Juras	Tithonian		R. watherooensis	

FIGURE 1 ZONATION FRAMEWORK

II INTRODUCTION

Ed Kopson of Minora Resources submitted 15 cuttings samples from the Early Cretaceous for palynostratigraphy. This was on behalf of the operating group, as part of regional appraisal of the area. No earlier work nor logs were available to me.

Palynomorph occurrence data are shown as Appendix I and form the basis for the assignment of the samples to four spore-pollen units of Neocomian to early Albian age. The Cretaceous spore-pollen zonation is essentially that of Dettmann and Playford (1969), but has been significantly modified and improved by various authors since, and most recently discussed in Helby et al. (1987), as shown on figure 1. As discussed in Morgan (1986) (Appendix to the Connard report), I have found the Dettmann and Douglas (1976) subdivision unworkable in some respects. The zonation used herein is that of Helby et al (1987) as discussed by Morgan (1986). The C. hughesi Zone of Dettmann and Douglas (1976) is therefore not the same as that herein.

III PALYNOSTRATIGRAPHY

A. 1100 ft. (cutts) : *C. striatus* Zone

Assignment to the *Crybelosporites striatus* Zone is clearly indicated at the top by the lack of younger indicators at 1100 ft. or caved deeper in the section. Oldest *C. striatus* indicates the assignment at the base. *Cyathidites* spp, *Falcisporites* spp and *Stereisporites* are frequent. *Dictyotosporites speciosus* and *Pilosisporites notensis* occur in this sample.

Non-marine environments are indicated by the common and diverse spores and pollen and only rare lacustrine algal *Schizosphoris*.

These features are normally seen in the mid Eumeralla Formation.

B. 2000 ft. (cutts) : upper *C. hughesi* Zone

Assignment to the upper *Cyclosporites hughesi* Zone is indicated at the top by youngest *C. hughesi* without *C. striatus*, and at the base by the absence of older indicators. *Cyathidites* spp. are dominant, with other spore taxa frequent, including *P. notensis*. Caving appears to be insignificant.

Non-marine environments are indicated by the common and diverse spores and pollen, large cuticle fragments, and absence of spiny acritarchs. Algal *Schizosporis* suggest minor lacustrine influence.

These features are normally seen in the mid to lower Eumeralla Formation.

C. 2500 ft. (cutts)-3900 ft. (cutts) : lower C. hughesi Zone

Assignment is indicated at the top by youngest Cooksonites variabilis. The base is harder to pick, but the absence of Microfasta evansii (first seen at 4300 ft.) is favoured here. P. notensis is consistently seen down to 3600 ft., but at 3900 ft. P. notensis, F. asymmetricus and Cicatricosisporites are absent, and P. linearis first occurs. This might suggest the lower C. hughesi Zone only to 3600 ft., with F. wonthaggiensis at 3900 ft., but is not conclusive. Inertinite dominates this interval, with subordinate cuticle and spore pollen.

An influx of amorphous sapropel at 3450 ft. and 3600 ft. suggests some oil source potential. Cyathidites are the most common forms.

Non-marine environments are indicated by the common and diverse spores and pollen, frequent cuticle, and absence of spiny acritarchs. Rare Schizosporis indicate minor lacustrine influence.

These features are normally seen in the lower Eumeralla Formation.

D. 4300 ft. (cutts)-6330 ft. (cutts) : ?lower C. hughesi to C. australiensis Zones

This interval is not easily assigned, as caving appears to be significant to substantial, and zonal subdivision is most effective on oldest occurrences. The caving makes this impossible. However, youngest Microfasta evansii and influxes of Contignisporites cooksoniae and Ischyosporites punctatus occurs at 4300 ft. and have been seen in other wells in the lowermost *C. hughesi* or topmost *F. wonthaggiensis* Zones. The Zone boundary therefore probably lies in this vicinity. Within the interval, few significant events can be seen. A major influx of *Cyathidites* spp. at 5100 ft. may have some correlative value. Some samples in the interval (4700 ft., 5100 ft., 5280 ft.) contain only extremely scarce Aptian indicators which may therefore be caved. Inertinite dominates most samples with subordinate cuticle and spore/pollen.

Non-marine environments are indicated by the common and diverse spores and pollen, and absence of spiny acritarchs. Lacustine influence is suggested by consistent *M. evansii*.

IV CONCLUSIONS

A. The cuttings studied appear to be relatively clean towards the top of the section, but may be more contaminated near the base. consequently, zonal definition is good near the top, but poor near the base.

B. The studied sequence appears to be complete from the Neocomian to mid Albian, with the late Albian upper Eumeralla Formation truncated.

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APPENDIX I

COMPOSITE PALYNOMORPH RANGE DATA

WOOLSTHORPE #1 PALYNOLOGICAL DATA - COMPOSITE -

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C L I E N T: Minora Resources

W E L L: Woolsthorpe #1

F I E L D / A R E A: Otway Basin

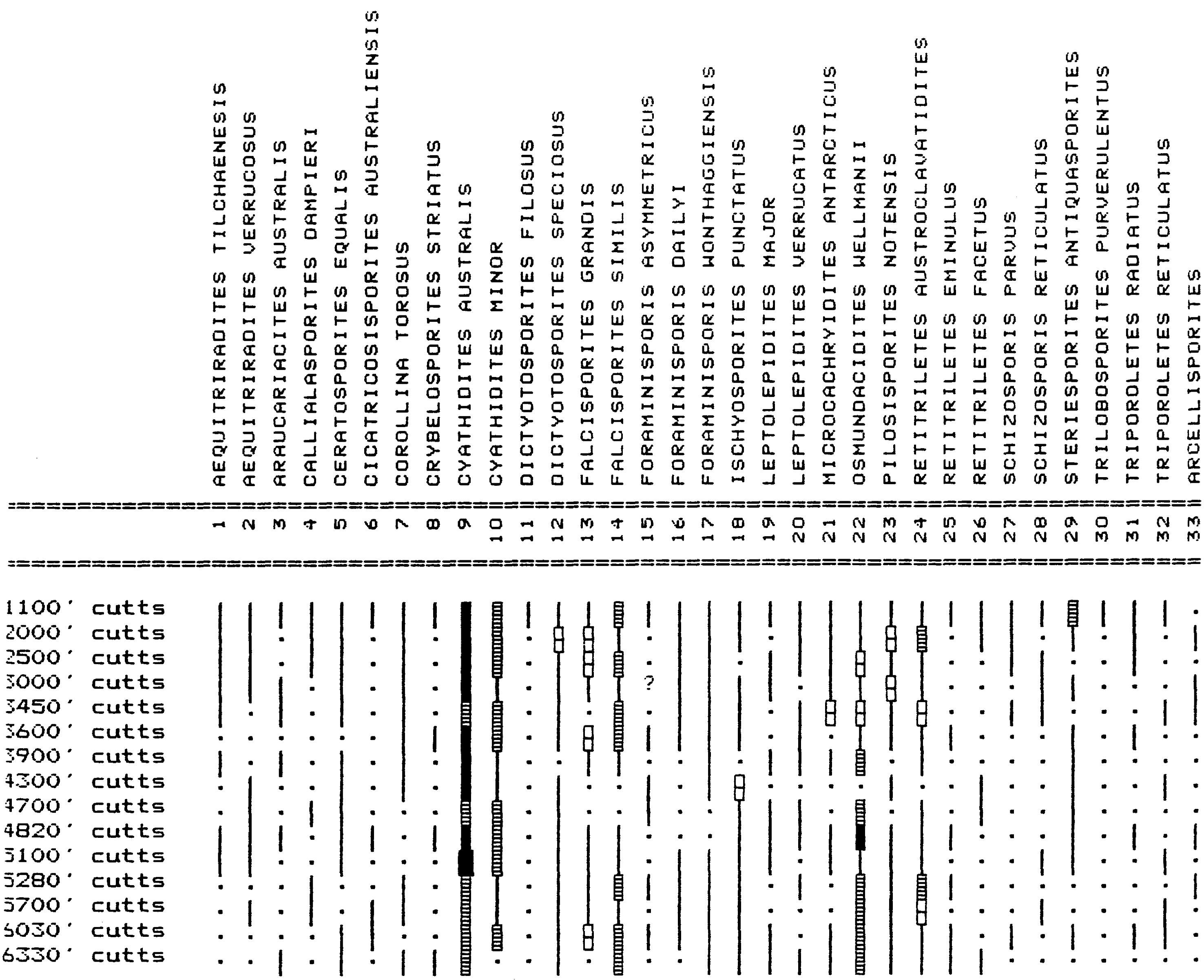
A N A L Y S T: Roger Morgan D A T E : November '88

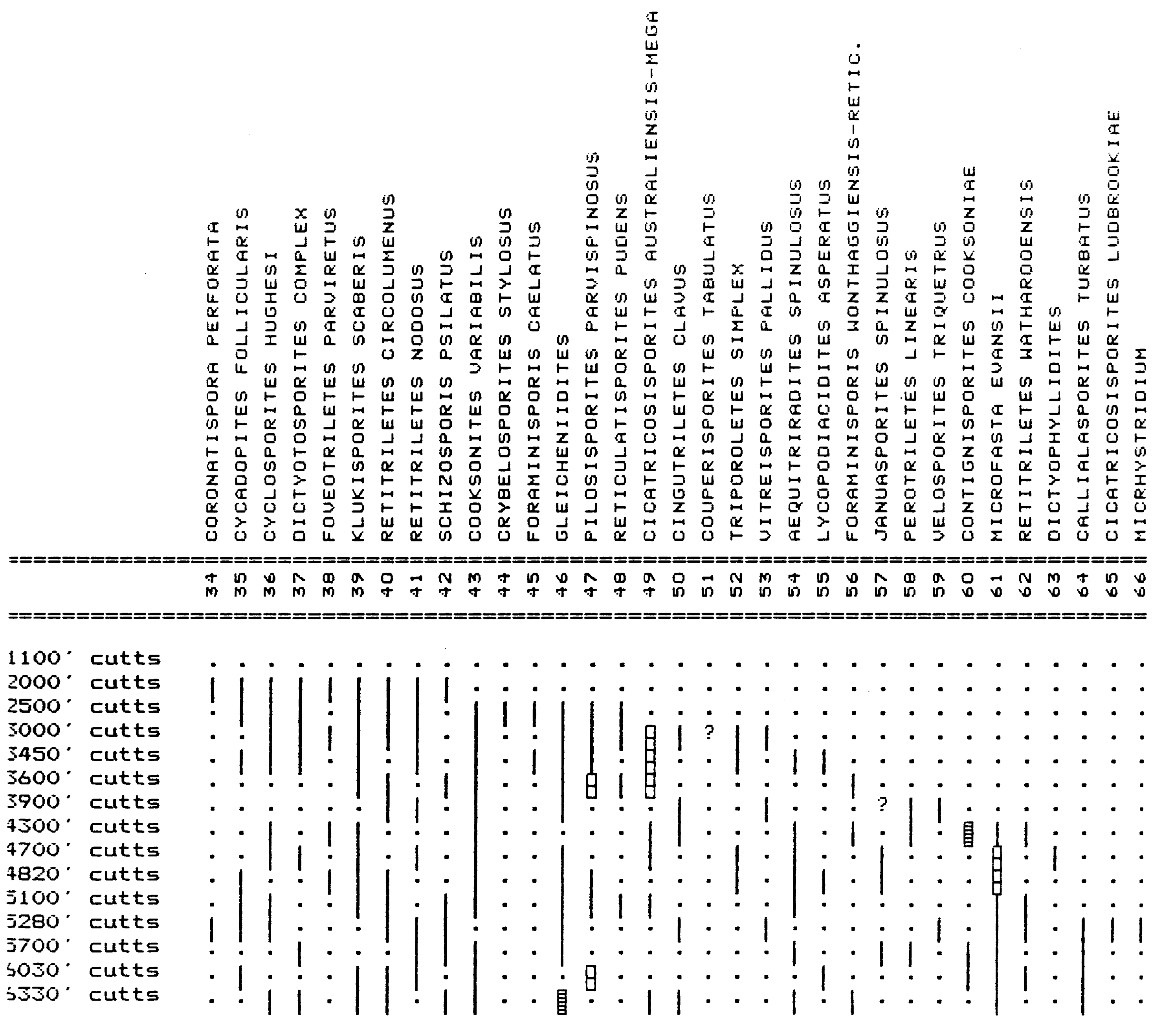
N O T E S: Analysis has been done on cuttings
All sample depths are in feet.

RANGE CHART OF GRAPHIC ABUNDANCES BY HIGHEST APPEARANCE

Key to Symbols

- = Very Rare
- = Rare
- = Few
- = Common
- = Abundant
- ? = Questionably Present
- . = Not Present





34 CORONATISPORA PERFORATA
35 CYCADOPITES FOLLICULARIS
36 CYCLOSPORITES HUGHESI
37 DICTYOTOSPORITES COMPLEX
38 FOVEOTRILETES PARVIRETUS
39 KLUKISPORITES SCABERIS
40 RETITRILETES CIRCOLUMENUS
41 RETITRILETES NODOSUS
42 SCHIZOSPORIS PSILATUS
43 COOKSONITES VARIABILIS
44 CRYBELOSPORITES STYLOSUS
45 FORAMINISPORIS CAELATUS
46 GLEICHENIIDITES
47 PILOSISPORITES PARVISPINOSUS
48 RETICULATISPORITES PUDENS
49 CICATRICOSISPORITES AUSTRALIENSIS-MEGA
50 CINGUTRILETES CLAVUS
51 COUPERISPORITES TABULATUS
52 TRIPOROLETES SIMPLEX
53 VITREISPORITES PALLIDUS
54 AEQUITRIRADITES SPINULOSUS
55 LYCOPODIACIDITES ASPERATUS
56 FORAMINISPORIS WONTHAGGIENSIS-RETIC.
57 JANUASPORITES SPINULOSUS
58 PEROTRILETES LINEARIS
59 VELOSPORITES TRIQUETRUS
60 CONTIGNISPORITES COOKSONIAE
61 MICROFASTA EVANSII
62 RETITRILETES WATHAROOENSIS
63 DICTYOPHYLLIDITES
64 CALLIALASPORITES TURBATUS
65 CICATRICOSISPORITES LUDBROOKIAE
66 MICRHYSTRIDIUM
1100′ cutts
2000′ cutts
2500′ cutts
3000′ cutts
3450′ cutts
3600′ cutts
3900′ cutts
4300′ cutts
4700′ cutts
4820′ cutts
5100′ cutts
5280′ cutts
5700′ cutts
6030′ cutts
6330′ cutts
?
?

	67	68	69	70	71	72	73	
	AEQUITRIRADITES SP.A.	CAMEROZONOSPORITES RAMOSUS	CONTIGNISPORITES GLEBULENTUS	NEORAISTRICKIA	PERINOPOLLENITES ELATOIDES	PEROTRILETES WHITFORDENSIS	SESTROSPORITES PSEUDOALVEOLATUS	
1100' cutts	.	.	.	.	.	.	.	1100' cutts
2000' cutts	.	.	.	.	.	.	.	2000' cutts
2500' cutts	.	.	.	.	.	.	.	2500' cutts
3000' cutts	.	.	.	.	.	.	.	3000' cutts
3450' cutts	.	.	.	.	.	.	.	3450' cutts
3600' cutts	.	.	.	.	.	.	.	3600' cutts
3900' cutts	.	.	.	.	.	.	.	3900' cutts
4300' cutts	.	.	.	.	.	.	.	4300' cutts
4700' cutts	.	.	.	.	.	.	.	4700' cutts
4820' cutts	.	.	.	.	.	.	.	4820' cutts
5100' cutts	.	.	.	.	.	.	.	5100' cutts
5280' cutts	.	.	.	.	.	.	.	5280' cutts
5700' cutts	|	.	.	.	.	.	.	5700' cutts
6030' cutts	.	|	|	|	|	|	.	6030' cutts
6330' cutts	.	.	.	.	.	.	|	6330' cutts

SPECIES LOCATION INDEX

Index numbers are the columns in which species appear.

INDEX NUMBER	SPECIES
67	AEQUITRIRADITES SP.A.
54	AEQUITRIRADITES SPINULOSUS
1	AEQUITRIRADITES TILCHAENESIS
2	AEQUITRIRADITES VERRUCOSUS
3	ARAUCARIACITES AUSTRALIS
33	ARCELLISPORITES
4	CALLIALASPORITES DAMPIERI
64	CALLIALASPORITES TURBATUS
68	CAMEROZONOSPORITES RAMOSUS
5	CERATOSPORITES EQUALIS
6	CICATRICOSISPORITES AUSTRALIENSIS
49	CICATRICOSISPORITES AUSTRALIENSIS-MEGA
65	CICATRICOSISPORITES LUDBROOKIAE
50	CINGUTRILETES CLAVUS
60	CONTIGNISPORITES COOKSONIAE
69	CONTIGNISPORITES GLEBULENTUS
43	COOKSONITES VARIABILIS
7	COROLLINA TOROSUS
34	CORONATISPORA PERFORATA
51	COUPERISPORITES TABULATUS
8	CRYBELOSPORITES STRIATUS
44	CRYBELOSPORITES STYLOSUS
9	CYATHIDITES AUSTRALIS
10	CYATHIDITES MINOR
35	CYCADOPITES FOLLICULARIS
36	CYCLOSPORITES HUGHESI
63	DICTYOPHYLLIDITES
37	DICTYOTOSPORITES COMPLEX
11	DICTYOTOSPORITES FILOSUS
12	DICTYOTOSPORITES SPECIOSUS
13	FALCISPORITES GRANDIS
14	FALCISPORITES SIMILIS
15	FORAMINISPORIS ASYMMETRICUS
45	FORAMINISPORIS CAELATUS
16	FORAMINISPORIS DAILYI
17	FORAMINISPORIS WONTHAGGIENSIS
56	FORAMINISPORIS WONTHAGGIENSIS-RETIC.
38	FOVEOTRILETES PARVIRETUS
46	GLEICHENIIDITES
18	ISCHYOSPORITES PUNCTATUS
57	JANUASPORITES SPINULOSUS
39	KLUKISPORITES SCABERIS
19	LEPTOLEPIDITES MAJOR
20	LEPTOLEPIDITES VERRUCATUS
55	LYCOPODIACIDITES ASPERATUS
66	MICRHYSTRIDIUM
21	MICROCACHRYIDITES ANTARCTICUS
61	MICROFASTA EVANSII
70	NEORAISTRICKIA
22	OSMUNDACIDITES WELLMANII
71	PERINOPOLLENITES ELATOIDES
58	PEROTRILETES LINEARIS
72	PEROTRILETES WHITFORDENSIS
23	PILOSISPORITES NOTENSIS
47	PILOSISPORITES PARVISPINOSUS
48	RETICULATISPORITES PUDENS
24	RETITRILETES AUSTROCLAVATIDITES
40	RETITRILETES CIRCOLUMENUS
25	RETITRILETES EMINULUS

[illegible]	[illegible]
23	PILOSISPORITES NOTENSIS
47	PILOSISPORITES PARVISPINOSUS
48	RETICULATISPORITES PUDENS
24	RETITRILETES AUSTROCLAVATIDITES
40	RETITRILETES CIRCOLUMENUS
25	RETITRILETES EMINULUS
26	RETITRILETES FACETUS
41	RETITRILETES NODOSUS
62	RETITRILETES WATHAROOENSIS
27	SCHIZOSPORIS PARVUS
42	SCHIZOSPORIS PSILATUS
28	SCHIZOSPORIS RETICULATUS
73	SESTROSPORITES PSEUDOALVEOLATUS
29	STERIESPORITES ANTIQUASPORITES
30	TRILOBOSPORITES PURVERULENTUS
31	TRIPOROLETES RADIATUS
32	TRIPOROLETES RETICULATUS
52	TRIPOROLETES SIMPLEX
59	VELOSPORITES TRIQUETRUS
53	VITREISPORITES PALLIDUS