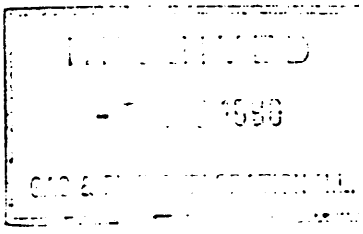

PALYNOLOGY OF GAS AND FUEL PINELODGE-1,

OTWAY BASIN, AUSTRALIA

BY

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for GAS AND FUEL

NOVEMBER 1990.

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BY 10

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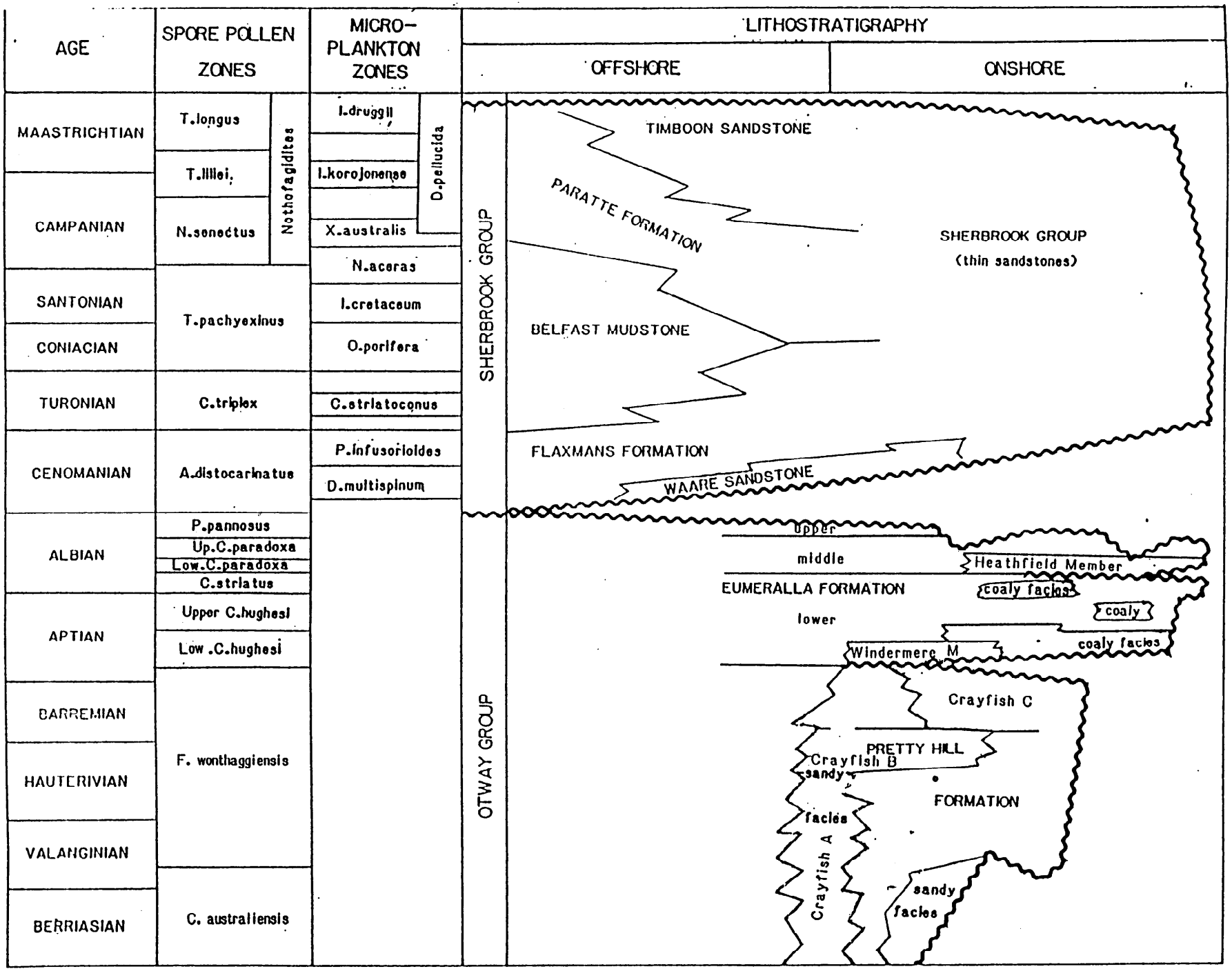

FIGURE 1. CRETACEOUS REGIONAL FRAMEWORK, OTWAY BASIN

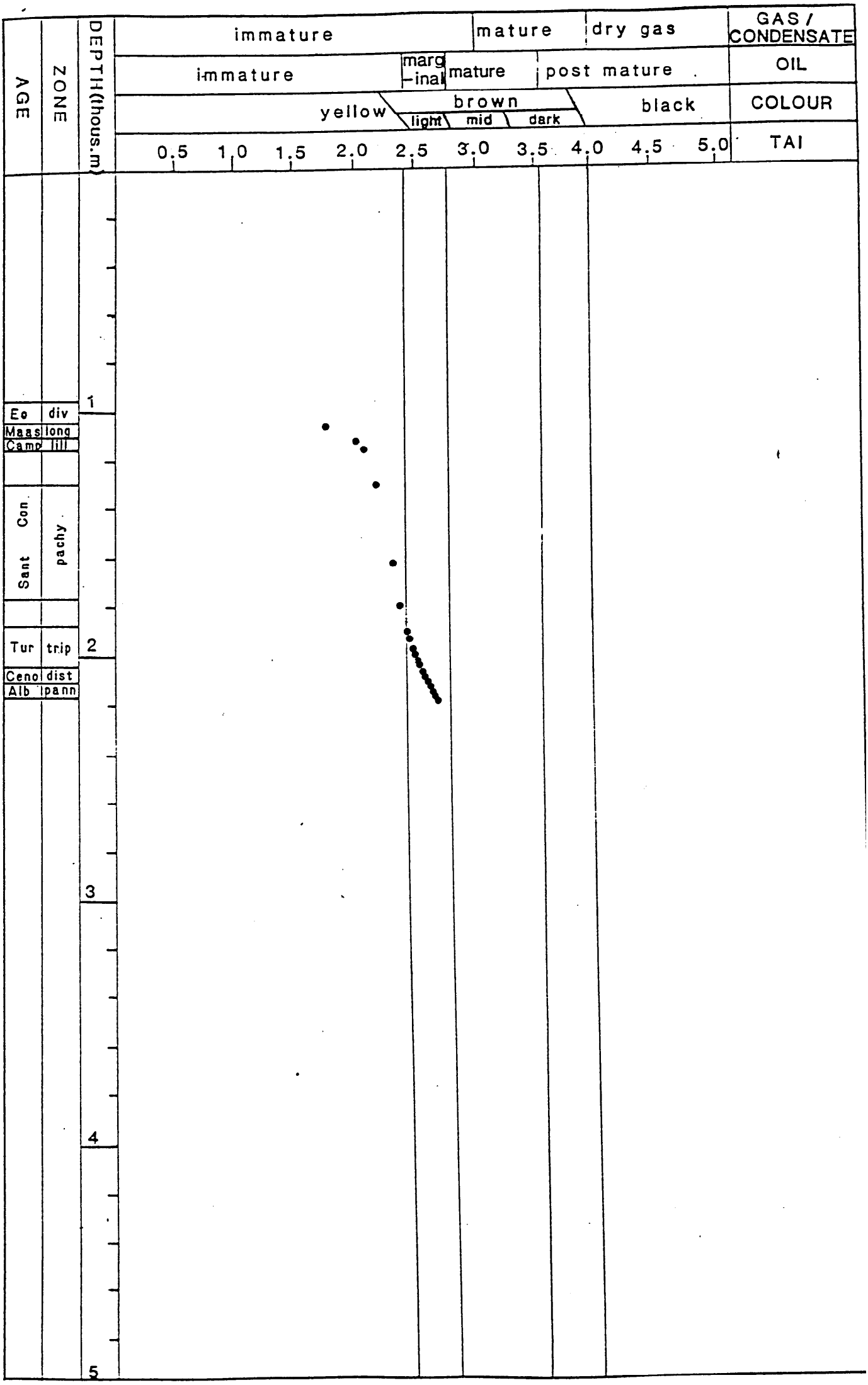

FIGURE 2 MATURITY PROFILE PINELODGE 1

I SUMMARY

1030m (swc) : upper M. diversus Zone : Early Eocene : nearshore: marine : immature : usually associated with the Dilwyn Formation.

1079m (swc) : upper T. longus Zone (and M. druggii Dinoflagellate Zone) : late Maastrichtian : nearshore marine : immature : usually associated with top Curdies or Paaratte.

1123.5m (swc) : mixed T. lillei Zone with presumably mud contaminating L. balmei Zone : Campanian with caved Paleocene : marginal marine : immature : usually associated with the Timboon/Paaratte interval.

1300m (swc) - 1789m (swc) : T. pachyexinus Zone (1300m is N. aceras Dinoflagellate Zone, 1624m is I. cretaceum Dinoflagellate Zone) : Santonian - Coniacian : nearshore marine : immature : usually associated with the Belfast Mudstone and correlatives.

1885m (cutts) (1886.5m swc) - 2030m (swc) : C. triplex Zone : Turonian : nearshore to marginal marine : early marginally mature : usually associated with the lower Belfast Mudstone and Flaxmans Formation.

2033m (cutts) (2041m swc) - 2087m (swc) : A. distocarinatus Zone : Cenomanian : marginal to nearshore marine : marginally mature : usually associated with the Flaxmans Formation and Waare Sandstone.

2109m (swc) - 2135 (swc) : P. pannosus Zone : late Albian : non-marine : marginally mature : usually associated with the topmost Eumeralla Formation.

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SUMMARY OF HOT PALYNOLOGY OF GAS AND FUEL PINELODGE-1

On six occasions during the drilling of Pinelodge-1, urgent palynology was performed. A total of eight samples were examined, providing the following breakdown. As most samples are cuttings, this breakdown may alter significantly once sidewall cores from the interval are examined.

1885m (cutts), 1890m (cutts), 1894m (cutts), 1982.0m (CORE), *C. triplex* Zone : Turonian : nearshore marine

2033m (cutts), 2085m (cutts) : *A. distocarinatus* Zone : Cenomanian : nearshore marine

2110m (cutts), 2132m (cutts) : *C. paradoxa*-*P. pannosus* Zones : Albian : presumed non-marine

Roger Morgan
10/9/90.
REF: SD.OTW.PINELODG

II INTRODUCTION

Seventeen sidewall cores one conventional core and five cuttings of favourable lithology were processed, to provide information on age, environment and maturity for the completion report.

Palynomorph occurence data are shown as Appendix I and form the basis for the assignment of the samples to seven spore-pollen units of late Albian to early Eocene 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 and modified by Morgan (1985) for application in the Otway Basin. The Tertiary zonation is that of Stover and Partridge (1973) and Stover and Evans (1973) as modified by Partridge (1976).

Maturity data was generated in the form of Spore Colour Index, and is plotted on figure 2 Maturity profile of Gas & Fuel Pinelodge-1. The oil and gas windows in figure 2 follow the general consensus of geochemical literature. The oil window corresponds to spore colours of light-mid brown (Staplin Spore Colour Index of 2.7) to dark brown (3.6). These correspond to vitrinite reflectance values of 0.6% to 1.3%.

III PALYNOSTRATIGRAPHY

A 1030m (swc) : upper *M. diversus* Zone

Assignment to the upper *Malvacipollis diversus* Zone is indicated by oldest *Proteacidites pachypolus* and *Spinizonocolpites prominatus*, and youngest *Malvacipollis diversus* and *Proteacidites grandis* without younger indicators. *Proteacidites* spp and *Cyathidites* dominate the assemblage and confirm a pre *asperus* assignment. *Nothofagidites* spp were not seen.

Microplankton comprise about 20% of palynomorphs but are mostly the freshwater *Paralecaniella indentata*. Some dinoflagellates are present and include frequent *Muratodinium fimbriatum*, consistent with the spore-pollen zonal assignment .

Nearshore marine environments are indicated by the dominance and diversity of the spore-pollen and rare low diversity dinoflagellates.

These features are normally seen in the Dilwyn Formation. Colourless palynomorphs indicate immaturity for hydrocarbon generation.

B 1079m (swc) : upper *T. longus* Zone

Assignment to the upper part of the *Tricolpites longus* Zone is indicated at the base by oldest *Stereisporites punctatus*, *Tetracolporites verrucosus* and *Tricolpites longus*, and at the top by youngest *Tricolpites confessus*, *T. longus* and common *Gambierina rudata*. The assemblage is dominated by *Dilwynites* and *Proteacidites* with frequent *G. rudata*. Minor mud contamination of younger *Proteacidites* spp and *M. diversus* was noted.

Dinoflagellates include the age diagnostic Manumiella conorata and M. druggii, as well as the undescribed Canninginipsis "bretonica," all indicating the M. druggii Dinoflagellate Zone of latest Maastrichtian age. A single Nelsoniella aceras specimen is clearly reworked.

Nearshore marine environments are indicated by the low content and diversity of dinoflagellates, and the high content and diversity of spores and pollen.

These features are normally seen at the top of the Curdies Formation, but in nearby Wilson-1 and Henke-1 were seen in dark grey shale. This may represent a terminal Cretaceous transgressive event.

Colourless to light yellow spore colours indicate immaturity for hydrocarbons.

C 1123.5 (swc) : mixed T. lillei with presumed caved L. balmei.

This assemblage is clearly mixed, containing the Tricolporites lillei Zone (T. confessus, T. sabulosus, T. apoxyexinus, T. lillei, T. sectilis without younger indicators) and the Lygistepollenites balmei Zone (Haloragacidites harrisii, L. balmei, Nothofagidites brachyspinulosus). Because of the clean T. longus assemblage at 1079m above, the T. lillei assemblage must be in place, and the L. balmei assemblage caved. Common forms include Cyathidites and Proteacidites with frequent Clavifera triplex and Stereisporites antiquasporites. Rare Permian working was also noted.

Marginal marine environments are indicated by the very rare dinoflagellates (which are not age diagnostic),

and the common and diverse spores and pollen.

These features are normally seen in the Timboon Sandstone/Paaratte Formation interval.

Yellow spore colours indicate immaturity for hydrocarbons.

D 1300m (swc) - 1789m (swc) : T. pachyexinus Zone

Assignment to the Tricolpites pachyexinus Zone is indicated at the top by the absence of younger indicators and at the base by oldest frequent Amosopollis cruciformis (supported by oldest T. confessus and T. apoxyexinus at 1300m and oldest T. gillii at 1624m). Common forms include A. cruciformis, Cyathidites, Falcisporites and Gleicheniidites towards the base, and Osmundacidites and Proteacidites towards the top.

Dinoflagellates are minor (5-10% of palynomorphs), but include age diagnostic forms. At 1300m (swc), Nelsoniella aceras indicates the N. aceras Dinoflagellate Zone. At 1624m (swc), oldest Isabelidinium cretaceum without younger markers, indicates the I. cretaceum Dinoflagellate Zone. At 1789m (swc), zonal markers were absent.

Nearshore marine environments are indicated by the dinoflagellate content (5-10% of palynomorphs) and their low to moderate diversity (4-10 species). Spores and pollen are common and diverse.

These features are normally seen in the Belfast Mudstone and its correlatives.

Yellow spore colours indicated immaturity for hydrocarbon generation.

E 1885m (~~swc~~ cutts) - (1886.5m swc) - 2030m (swc) : C. triplex Zone

Assignment to the Clavifera triplex Zone is indicated at the top by the absence of younger markers and at the base by oldest Phyllocladidites mawsonii and Clavifera triplex. Cyatheacidites tectifera occurs at 1890m (cutts) only. Common forms include the saccate pollen Microcachyidites and Falcisporites with Cyathidites frequent towards the interval top.

Dinoflagellates are rare (1 to 5% of palynomorphs) but lack zone indicators. Heterosphaeridium spp are the most consistent, with the thinwalled Trithyrodinium "marshalli" a rare but distinctive component.

These features are normally seen in the Flaxmans Formation and the correlative lower Belfast Formation.

Yellow to light brown spore colours indicate early marginal maturity for oil, but immaturity for gas/condensate.

F 2033m (cutts) (2041m swc) - 2087m (swc) : A. distocarinatus Zone

Assignment to the Appendicisporites distocarinatus Zone of Cenomanian age is indicated at the top by the absence of younger indicators and confirmed by youngest A. distocarinatus at 2041m (swc), and at the base by the absence of older indicators and oldest A. cruciformis and A. distocarinatus. The base is also

confirmed by the dinoflagellate data. Common forms are the saccate pollen Falcisporites and Microcachryidites.

Dinoflagellates are rare (1 to 5% of palynomorphs) but lack zonal indicators. Heterosphaeridium spp are the most consistent; Trithyrodinium is absent.

Marginal to nearshore marine environments are indicated by the rare low diversity dinoflagellates and the common diverse spores and pollen.

These features are normally seen in the lower FLaxmans Formation and Waare Sandstone.

Light brown spore colours indicate marginal maturity for oil generation.

G 2109m (swc) - 2135m (swc) : P. pannusus Zone

Assignment to the Phimopollenites pannosus Zone is indicated at the top by youngest Coptospora paradoxa and the absence of younger indicators, and at the base by oldest P. pannosus. Common forms include the spores Cyathidites and Osmundacidites with saccate genera much less frequent. Other spores seen more consistently include Balmeisporites holodictyus, Crybelosporites striatus, and Foraminisporis asymmetricus.

Dinoflagellates are absent from the sidewall cores, and present only as minute caving in the cuttings. Non-marine environments are indicated by these features and the common and diverse spores and pollen.

These features are normally seen in the topmost Eumeralla Formation, (the Upper Eumeralla of Kopson and Scholefield, 1990).

Light brown spore colours indicate marginal maturity for oil and immaturity for gas/condensate.

IV CONCLUSIONS

A The sampled section includes correlatives of the entire sequence from the topmost Eumeralla to Dilwyn Formation.

B The *distocarinatus* Zone is quite thin and lacks a typical Waare Sandstone at the base.

C The *triplex* Zone is of average thickness, and the cored sand near 1980m is younger than the typical Waare Sandstone and is more correctly a Flaxmans Sand in time terms.

D The *pachyexinus* Zone is thick, as usual, with a thin *senectus* - *longus* interval above.

E Although the Paleocene Pebble Point Formation does not appear to be sampled, its equivalents are presumably present, as evidenced by caving into the *lillei* Zone. The Paleocene dinoflagellate zones have been seen in nearby Henke-1 and Wilson-1, but are not sampled here.

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PINELODGE #1 palynological data

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C L I E N T: Gas & Fuel

W E L L: Pinelodge #1

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

A N A L Y S T: Roger Morgan Ph.D. D A T E : October '90

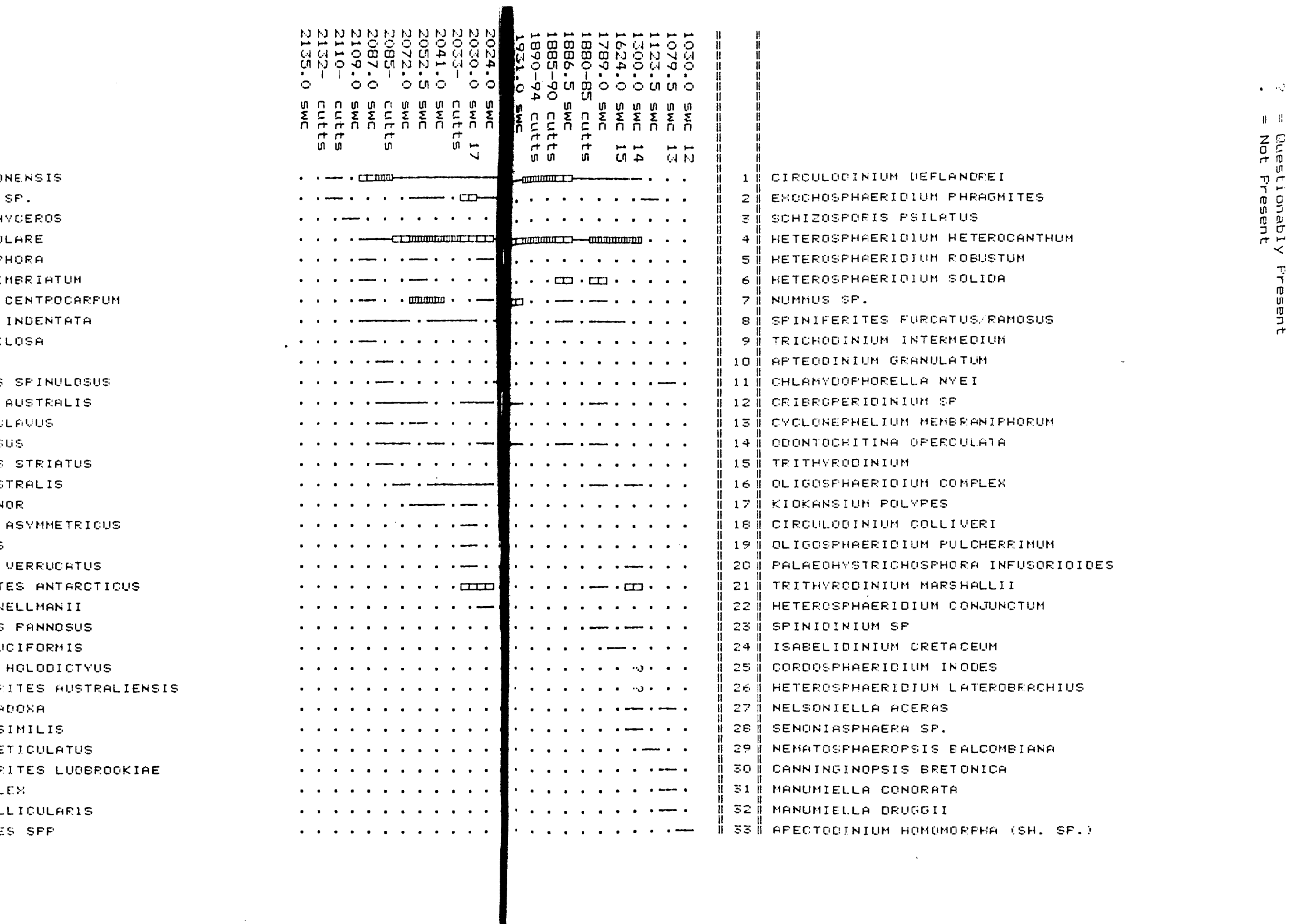
N O T E S: all sample depths are in metres

RANGE CHART OF GRAPHIC ABUNDANCES BY LOWEST APPEARANCE dinos & s/p

Key to Symbols

= Very Rare
= Rare
= Few
= Questionably Present
. = Not Present

CIRCULODINIUM DEFLANDREI
EXOCHOSPHAERIDIUM PHRAGMITES
SCHIZOSPORIS PSILATUS
HETEROSPHAERIDIUM HETEROCANTHUM
HETEROSPHAERIDIUM ROBUSTUM
HETEROSPHAERIDIUM SOLIDA
NUMMUS SP.
SPINIFERITES FURCATUS/RAMOSUS
TRICHODINIUM INTERMEDIUM
APTEODINIUM GRANULATUM
CHLAMYDOPHORELLA NYEI
CRIBROPERIDINIUM SP
CYCLONEPHELIUM MEMBRANIPHORUM
ODONTOCHITINA OPERCULATA
TRITHYRODINIUM
OLIGOSPHAERIDIUM COMPLEX
KIOKANSIUM POLYPES
CIRCULODINIUM COLLIVERI
OLIGOSPHAERIDIUM PULCHERRIMUM
PALAEOHYSTRICHOSPHORA INFUSORIOIDES
TRITHYRODINIUM MARSHALLII
HETEROSPHAERIDIUM CONJUNCTUM
SPINIDINIUM SP
ISABELIDINIUM CRETACEUM
CORDOSPHAERIDIUM INODES
HETEROSPHAERIDIUM LATEROBRACHIUS
NELSONIELLA ACERAS
SENONIASPHAERA SP.
NEMATOSPHAEROPSIS BALCOMBIANA
CANNINGINOPSIS BRETONICA
MANUMIELLA CONORATA
MANUMIELLA DRUGGII
AFFECTODINIUM HOMOMORPHA (SH. SF.)


? = Questionably Present
. = Not Present
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1789.0 swc
1880-85 cutts
1886.5 swc
1885-90 cutts
1890-94 cutts
1931.0 swc
2024.0 swc
2030.0 swc 17
2033- cutts
2041.0 swc
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2087.0 swc
2109.0 swc
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2132- cutts
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3 SCHIZOSPORIS PSILATUS
4 HETEROSPHAERIDIUM HETEROCANTHUM
5 HETEROSPHAERIDIUM ROBUSTUM
6 HETEROSPHAERIDIUM SOLIDA
7 NUMNUS SP.
8 SPINIFERITES FURCATUS/RAMOSUS
9 TRICHODINIUM INTERMEDIUM
10 APTEODINIUM GRANULATUM
11 CHLAMYDOPHORELLA NYEI
12 CRIBROPERIDINIUM SP
13 CYCLONEPHELIUM MEMBRANIPHORUM
14 ODONTOCHITINA OPERCULATA
15 TRITHYRODINIUM
16 OLIGOSPHAERIDIUM COMPLEX
17 KIOKANSIUM POLYPES
18 CIRCULODINIUM COLLIVERI
19 OLIGOSPHAERIDIUM PULCHERRIMUM
20 PALAEOHYSTRICHOSPHORA INFUSORIOIDES
21 TRITHYRODINIUM MARSHALLII
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23 SPINIDINIUM SP
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28 SENONIASPHAERA SP.
29 NEMATOSPHAEROPSIS BALCOMBIANA
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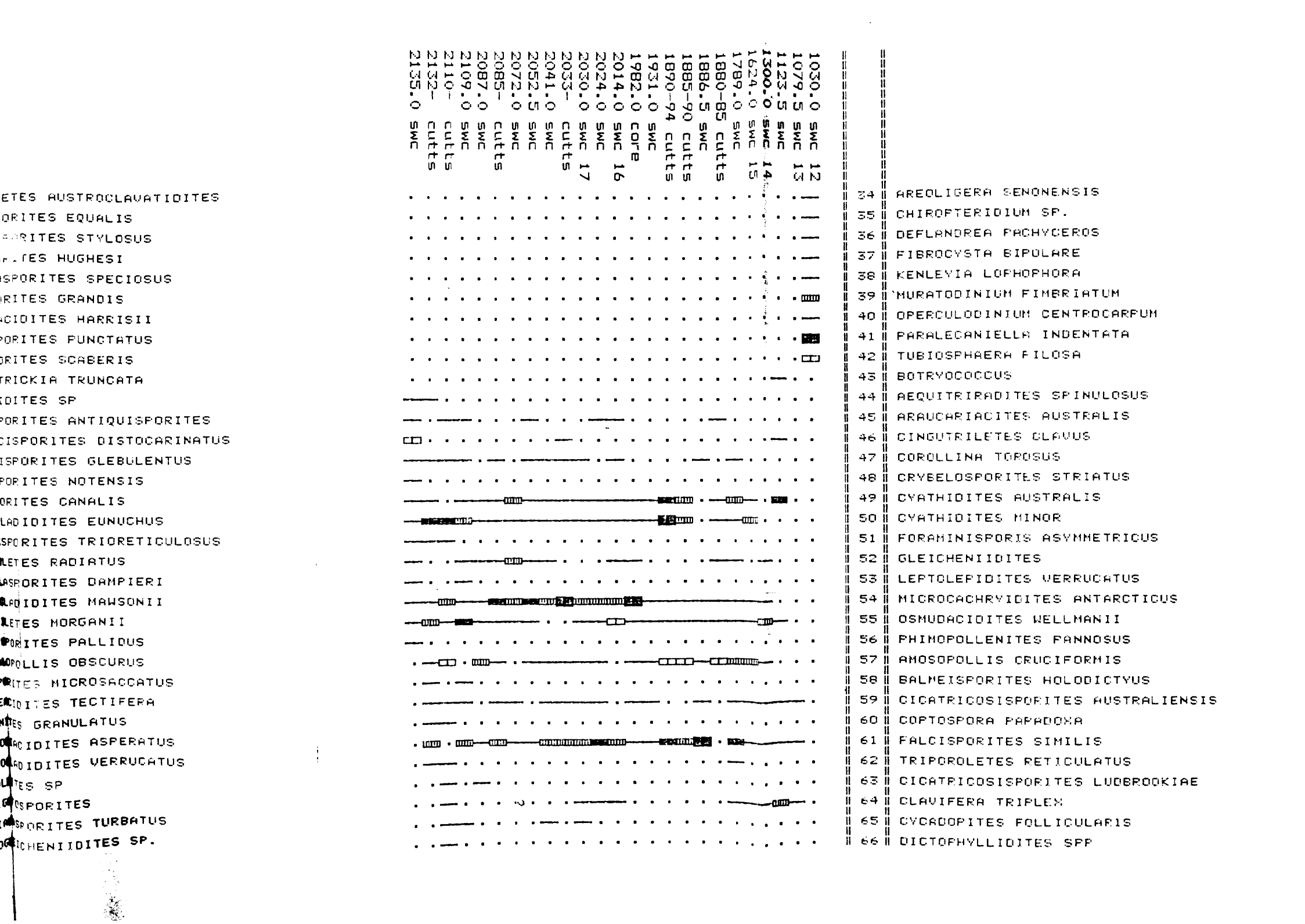
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PORITES PUNCTATUS
RITES SCABERIS
TRICKIA TRUNCATA
IDITES SP
PORITES ANTIQUISPORITES
CISPORITES DISTOCARINATUS
ISPORITES GLEBULENTUS
PORITES NOTENSIS
ORITES CANALIS
LADIDITES EUNUCHUS
SPORITES TRIORETICULOSUS
LETES RADIATUS
ASPORITES DAMPIERI
LADIDITES MAWSONII
LETES MORGANII
PORITES PALLIDUS
MOPOLLIS OBSCURUS
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2110- cutts
2132- cutts
2135.0 swc
34 AREOLIGERA SENONENSIS
35 CHIROPTERIDIUM SP.
36 DEFLANDREA PACHYCEROS
37 FIBROCYSTA BIPOLARE
38 KENLEYIA LOPHOPHORA
39 MURATODINIUM FIMBRIATUM
40 OPERCULODINIUM CENTROCARPUM
41 PARALECANIELLA INDENTATA
42 TUBIOSPHAERA FILOSA
43 BOTRYOCOCCUS
44 AEQUITRIRADITES SPINULOSUS
45 ARAUCARIACITES AUSTRALIS
46 CINGUTRILETES CLAVUS
47 COROLLINA TOROSUS
48 CRYBELOSPORITES STRIATUS
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56 PHIMOPOLLENITES PANNOSUS
57 AMOSOPOLLIS CRUCIFORMIS
58 BALMEISPORITES HOLODICTYUS
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60 COPTOSPORA PARADOXA
61 FALCISPORITES SIMILIS
62 TRIPOROLETES RETICULATUS
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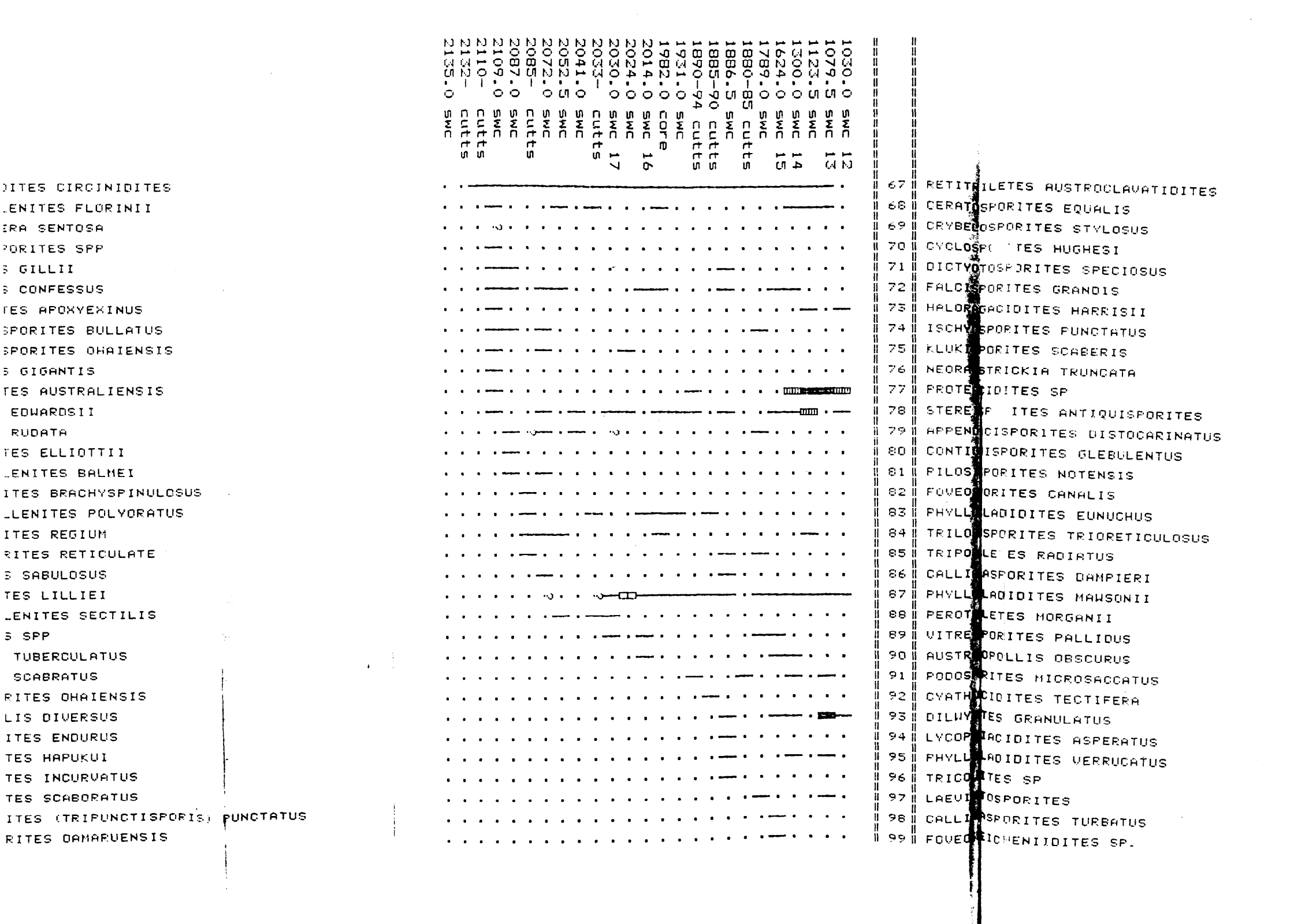
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2110- cutts
2132- cutts
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ITES CIRCINIDITES
LENITES FLORINII
ERA SENTOSA
PORITES SPP
S GILLII
S CONFESSUS
TES APOXYEXINUS
SPORITES BULLATUS
SPORITES OHAIENSIS
S GIGANTIS
TES AUSTRALIENSIS
EDWARDSII
RUDATA
TES ELLIOTTII
LENITES BALMEI
ITES BRACHYSPINULOSUS
LLENITES POLYORATUS
ITES REGIUM
RITES RETICULATE
S SABULOSUS
TES LILLIEI
LENITES SECTILIS
S SPP
TUBERCULATUS
SCABRATUS
RITES OHAIENSIS
LIS DIVERSUS
ITES ENDURUS
TES HAPUKUI
TES INCURVATUS
TES SCABORATUS
ITES (TRIPUNCTISPORIS) PUNCTATUS
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69 CRYBELOSPORITES STYLOSUS
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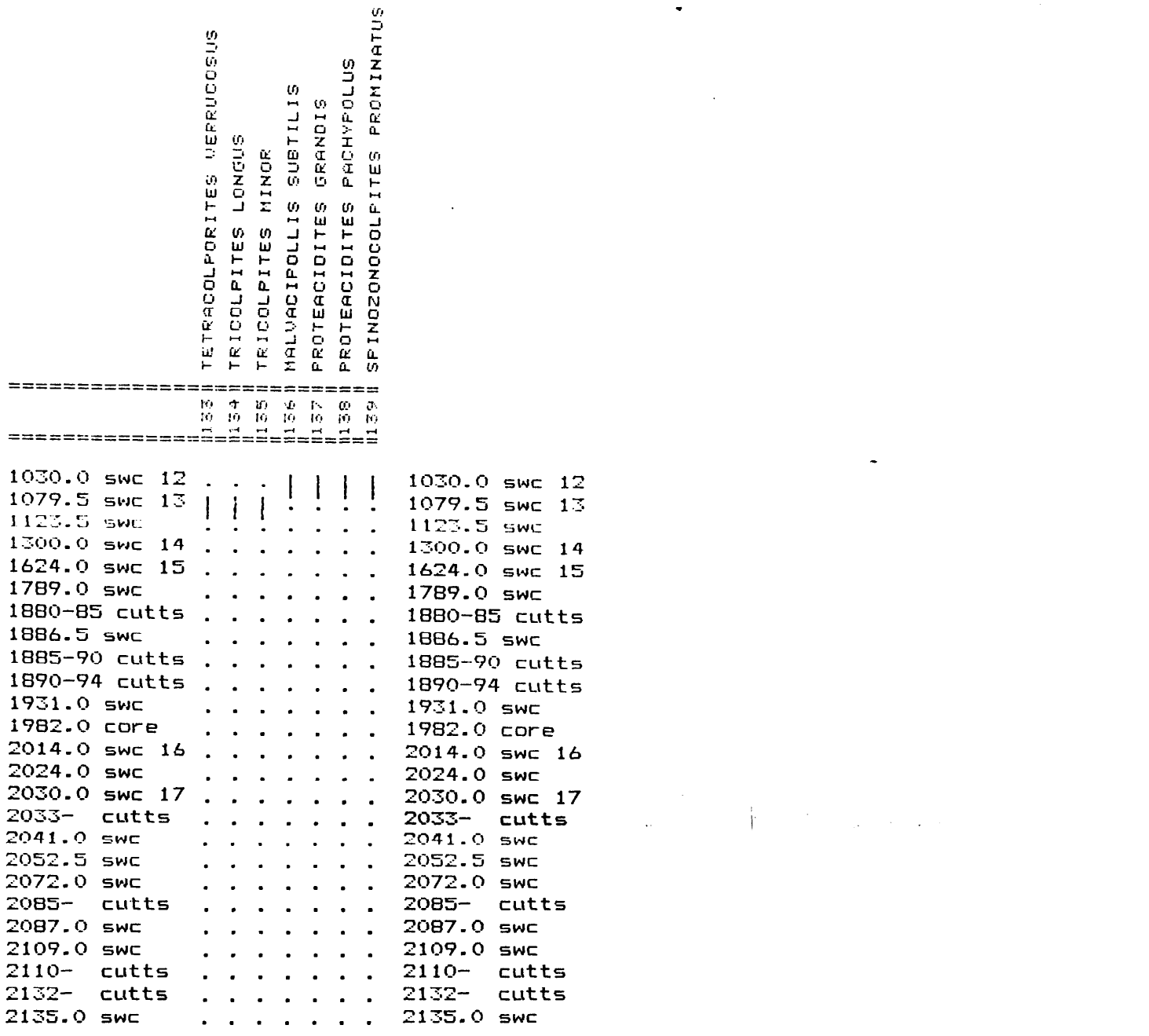
	#129	PROTEACIDITES INCURVATUS
	#130	PROTEACIDITES SCABORATUS
	#131	STEREISPORITES (TRIPUNCTISPORIS) PUNCTATUS
	#132	TETRACOLPORITES OAMARUENSIS

1030.0 swc 12
1079.5 swc 13
1123.5 swc
1300.0 swc 14
1624.0 swc 15
1789.0 swc
1880-85 cutts
1886.5 swc
1885-90 cutts
1890-94 cutts
1931.0 swc
1982.0 core
2014.0 swc 16
2024.0 swc
2030.0 swc 17
2033- cutts
2041.0 swc
2052.5 swc
2072.0 swc
2085- cutts
2087.0 swc
2109.0 swc
2110- cutts
2132- cutts
2135.0 swc

ITES VERRUCOSUS
LONGUS
MINOR
IS SUBTILIS
ES GRANDIS
ES PACHYPOLUS
LPITES PROMINATUS



SPECIES LOCATION INDEX

Index numbers are the columns in which species appear.

INDEX NUMBER	SPECIES
44	AEQUITRIRADITES SPINULOSUS
57	AMOSOPOLLIS CRUCIFORMIS
33	APECTODINIUM HOMOMORPHA (SH. SP.)
79	APPENDICISPORITES DISTOCARINATUS
10	APTEODINIUM GRANULATUM
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34	AREOLIGERA SENONENSIS
90	AUSTRALOPOLLIS OBSCURUS
58	BALMEISPORITES HOLODICTYUS
43	BOTRYOCOCCUS
86	CALLIALASPORITES DAMPIERI
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108	CAMEROZONOSPORITES OHAIENSIS
30	CANNINGINOPSIS BRETONICA
68	CERATOSPORITES EQUALIS
35	CHIROPTERIDIUM SP.
11	CHLAMYDOPHORELLA NYEI
59	CICATRICOSISPORITES AUSTRALIENSIS
63	CICATRICOSISPORITES LUDBROOKIAE
46	CINGUTRILETES CLAVUS
18	CIRCULODINIUM COLLIVERI
1	CIRCULODINIUM DEFLANDREI
64	CLAVIFERA TRIPLEX
80	CONTIGNISPORITES GLEBULENTUS
60	COPTOSPORA PARADOXA
25	CORDOSPHAERIDIUM INODES
47	COROLLINA TOROSUS
12	CRIBROPERIDINIUM SP
48	CRYBELOSPORITES STRIATUS
69	CRYBELOSPORITES STYLOSUS
92	CYATHEACIDITES TECTIFERA
49	CYATHIDITES AUSTRALIS
109	CYATHIDITES GIGANTIS
50	CYATHIDITES MINOR
122	CYATHIDITES SPP
65	CYCADOPITES FOLLICULARIS
13	CYCLONEPHELIUM MEMBRANIPHORUM
70	CYCLOSPORITES HUGHESI
110	DACRYCARPITES AUSTRALIENSIS
36	DEFLANDREA PACHYCEROS
66	DICTOPHYLLIDITES SPP
71	DICTYOTOSPORITES SPECIOSUS
93	DILWYNITES GRANULATUS
123	DILWYNITES TUBERCULATUS
124	ERICIPITES SCABRATUS
2	EXOCHOSPHAERIDIUM PHRAGMITES
72	FALCISPORITES GRANDIS
61	FALCISPORITES SIMILIS
37	FIBROCYSTA BIPOLARE
51	FORAMINISPORIS ASYMMETRICUS
99	FOVEOGLEICHENIIDITES SP.
82	FOVEOSPORITES CANALIS
111	GAMBIERINA EDWARDSII
112	GAMBIERINA RUDATA
52	GLEICHENIIDITES
100	GLEICHENIIDITES CIRCINIDITES
73	HALORAGACIDITES HARRISII
113	HERKOSPORITES ELLIOTTII
22	HETEROSPHAERIDIUM CONJUNCTUM
4	HETEROSPHAERIDIUM HETEROCANTHUM
26	HETEROSPHAERIDIUM LATEROBRACHIUS
5	HETEROSPHAERIDIUM ROBUSTUM
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5 HETEROSPHAERIDIUM ROBUSTUM
6 HETEROSPHAERIDIUM SOLIDA
24 ISABELIDINIUM CRETACEUM
74 ISCHYOSPORITES PUNCTATUS
38 KENLEYIA LOPHOPHORA
17 KIOKANSIUM POLYPES
75 KLUKISPORITES SCABERIS
97 LAEVIGATOSPORITES
125 LATROBOSPORITES OHAIENSIS
53 LEPTOLEPIDITES VERRUCATUS
94 LYCOPODIACIDITES ASPERATUS
114 LYGISTEPOLLENITES BALMEI
101 LYGISTEPOLLENITES FLORINII
126 MALVACIPOLLIS DIVERSUS
136 MALVACIPOLLIS SUBTILIS
31 MANUMIELLA CONORATA
32 MANUMIELLA DRUGGII
54 MICROCACHRYIDITES ANTARCTICUS
39 MURATODINIUM FIMBRIATUM
27 NELSONIELLA ACERAS
29 NEMATOSPHAEROPSIS BALCOMBIANA
76 NEORAISTRICKIA TRUNCATA
115 NOTHOFAGIDITES BRACHYSPINULOSUS
127 NOTHOFAGIDITES ENDURUS
7 NUMMUS SP.
14 ODONTOCHITINA OPERCULATA
16 OLIGOSPHAERIDIUM COMPLEX
19 OLIGOSPHAERIDIUM PULCHERRIMUM
40 OPERCULODINIUM CENTROCARPUM
102 ORNAMENTIFERA SENTOSA
55 OSMUDACIDITES WELLMANII
20 PALAEOHYSTRICHOSPHORA INFUSORIOIDES
41 PARALECANIELLA INDENTATA
116 PERIPOROPOLLENITES POLYORATUS
88 PEROTRILETES MORGANII
56 PHIMOPOLLENITES PANNOSUS
83 PHYLLOCLADIDITES EUNUCHUS
87 PHYLLOCLADIDITES MAWSONII
95 PHYLLOCLADIDITES VERRUCATUS
81 PILOSISPORITES NOTENSIS
91 PODOSPORITES MICROSACCATUS
103 POLYPODIISPORITES SPP
137 PROTEACIDITES GRANDIS
128 PROTEACIDITES HAPUKUI
129 PROTEACIDITES INCURVATUS
138 PROTEACIDITES PACHYPOLUS
130 PROTEACIDITES SCABORATUS
77 PROTEACIDITES SP
67 RETITRILETES AUSTROCLAVATIDITES
3 SCHIZOSPORIS PSILATUS
28 SENONIASPHAERA SP.
23 SPINIDINIUM SP
8 SPINIFERITES FURCATUS/RAMOSUS
139 SPINOZONOCOLPITES PROMINATUS
131 STEREISPORITES (TRIPUNCTISPORIS) PUNCTATUS
78 STEREISPORITES ANTIQUISPORITES
117 STEREISPORITES REGIUM
132 TETRACOLPORITES OAMARUENSIS
118 TETRACOLPORITES RETICULATE
133 TETRACOLPORITES VERRUCOSUS
9 TRICHODINIUM INTERMEDIUM
105 TRICOLPITES CONFESSUS
104 TRICOLPITES GILLII
134 TRICOLPITES LONGUS
135 TRICOLPITES MINOR
119 TRICOLPITES SABULOSUS
96 TRICOLPITES SP
104 TRICOLPORITES APOXYEXINUS

18	[illegible]
19	OLIGOSPHAERIDIUM PULCHERRIMUM
40	OPERCULODINIUM CENTROCARPUM
102	ORNAMENTIFERA SENTOSA
55	OSMUDACIDITES WELLMANII
20	PALAEOHYSTRICHOSPHORA INFUSORIOIDES
41	PARALECANIELLA INDENTATA
116	PERIPOROPOLLENITES POLYORATUS
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96	TRICOLPITES SP
106	TRICOLPORITES APOXYEXINUS
120	TRICOLPORITES LILLIEI
84	TRILOBOSPORITES TRIORETICULOSUS
85	TRIPOROLETES RADIATUS
62	TRIPOROLETES RETICULATUS
121	TRIPOROPOLLENITES SECTILIS
15	TRITHYRODINIUM
21	TRITHYRODINIUM MARSHALLII
42	TUBIOSPHAERA FILOSA
89	VITREISPORITES PALLIDUS