
# PALYNOLOGY OF BRIDGE VOGEL-1

## OTWAY BASIN, AUSTRALIA

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for BRIDGE OIL

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CONTENTS

## I SUMMARY

591.7m (swc) : lower L. balmei Zone : Paleocene : nearshore marine : usually Pebble Point and correlatives

1028.7m (swc) : T. lillei Zone (I. korojonense Dinoflagellate Zone) : Campanian : offshsore marine : immature : usually Paaratte and correlatives

1196.0 (swc) - 1216.3m (swc) : T. pachyexinus Zone : Santonian : offshore to nearshore marine : immature : usually Belfast and correlative Paaratte/Flaxmans

1281.6 (swc) : C. triplex Zone : Coniacian - Turonian : nearshore marine : immature : usually Flaxmans

1310.0m (swc) : A. distocarinatus Zone : Cenomanian : nearshore marine : immature : usually Flaxmans/Waare

1362m (cutts) : P. pannosus Zone : late Albian : non-marine : immature : usually topmost Eumeralla.

## II INTRODUCTION

Seven sidewall cores and one cuttings sample were processed, to provide information on age, environment and maturity for the completion report.

Palynomorph occurrence data are shown as Appendix I and form the basis for the assignment of the samples to six spore-pollen units of early Paleocene to late Albian age. The Cretaceous spore-pollen zonation is essentially that of Dettmann amd 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.

Maturity data was generated in the form of Spore Colour Index, and is plotted on figure 2 Maturity profile of Bridge Vogel-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 Cololur Index of 2.7) to dark brown (3.6). These correspond to vitrinite reflectance values of 0.6% to 1.3%.

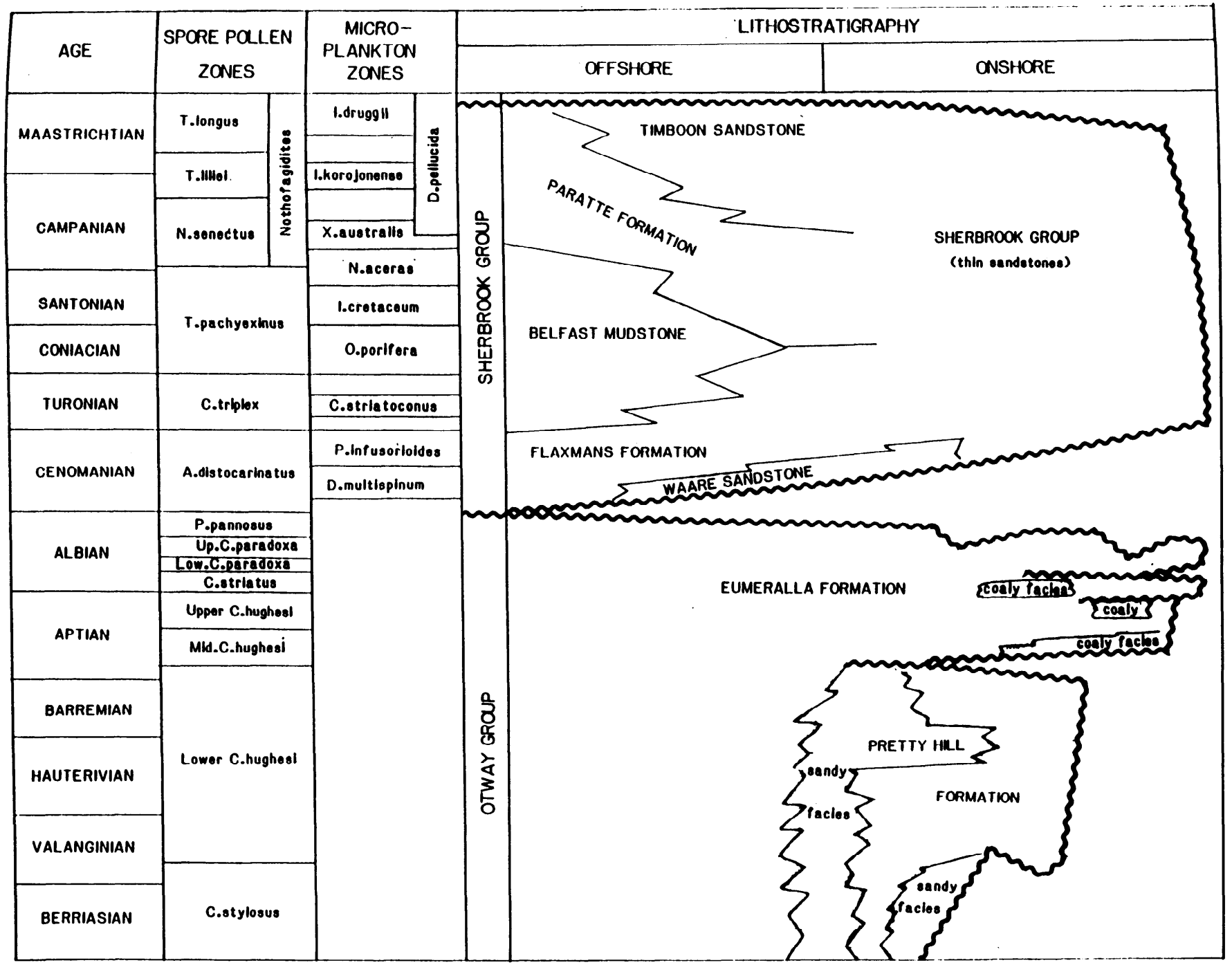


FIGURE I. CRETACEOUS REGIONAL FRAMEWORK, OTWAY BASIN

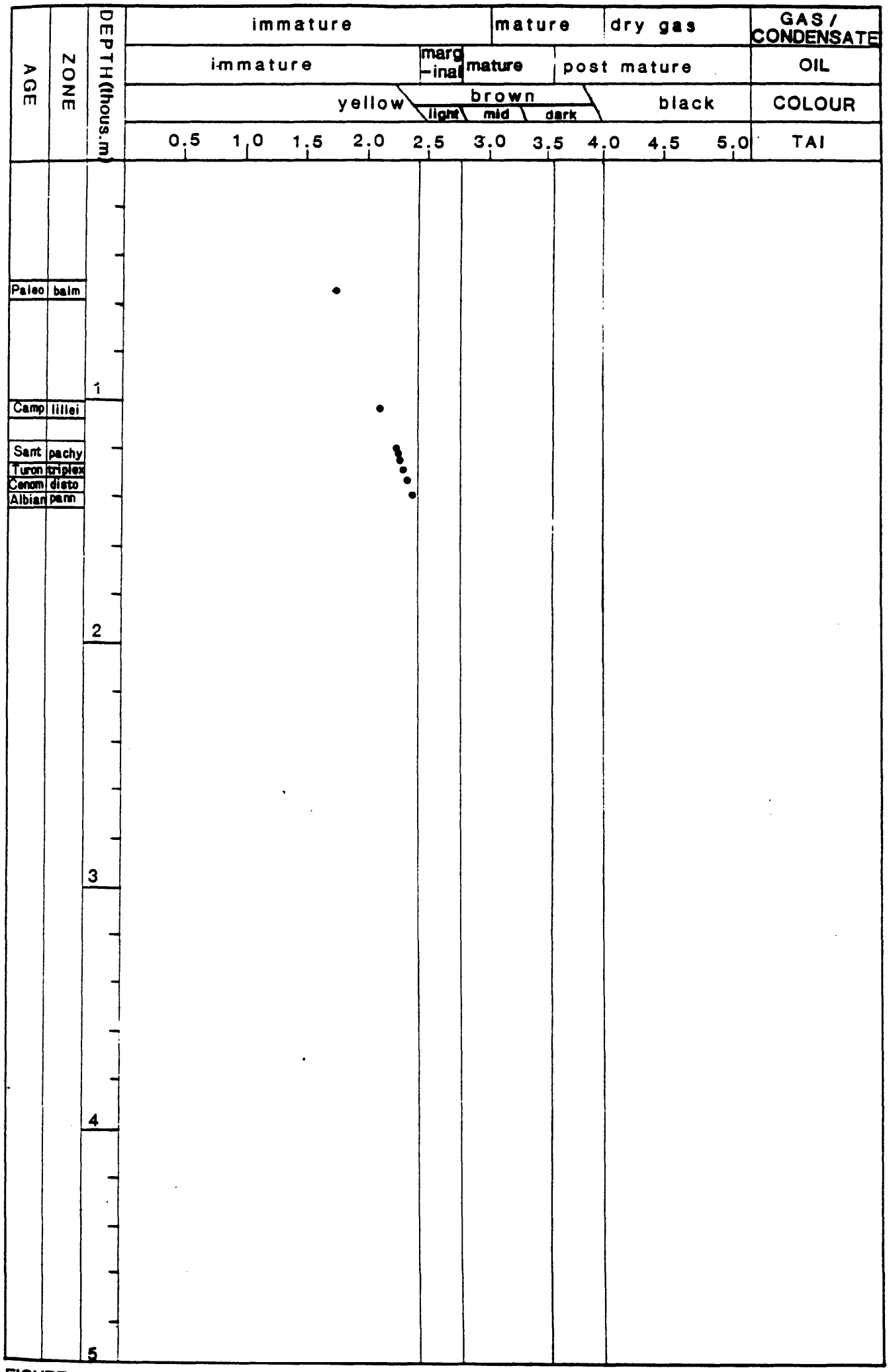


FIGURE 2 MATURITY PROFILE BRIDGE VOGEL 1

## III PALYNOSTRATIGRAPHY

### A 591.7m (swc) : lower L. balmei Zone

Assignment to the lower part of the Lygistepollenites balmei Zone is indicated at the top by youngest common L. balmei without younger indicators, and at the base by oldest L. balmei without older indicators, and is confirmed by the dinoflagellates. Proteacidites and L. balmei are common in a low diversity assemblage.

The dinoflagellates present include Deflandra spp (including D. speciosa and D. dartmooria) and Alisocysta rugolirata without more definite zonal indicators. The age is certainly Paleocene, probably in the poorly characterised interval between the circumtabulata and evitti zones.

The dominance of spores and pollen over the subordinate dinoflagellates indicates nearshore marine environments.

These features are normally seen in the Pebble Point Formation and correlatives.

Colourless palynomorphs indicate immaturity for hydrocarbon generation.

### B 1028.7m (swc) : T. lillei Zone

Assignment to the Tricolporites lillei Zone is indicated on the dinoflagellate evidence. The spores and pollen are consistent, and the presence of Australopollis obscurus, Nothofagidites endurus and Tricolpites confessus in an extremely lean assemblage, indicates senectus or younger assignment. Proteacidites spp are common in a moderately diverse assemblage.

Dinoflagellates include the zonal index Isabelidinium korojonense indicating the korojonense dinoflagellate zone, correlative with the lillei spore-pollen zone. Heterosphaeridium spp dominate the moderate diversity assemblage.

Offshore marine environments are indicated by the dominance of the dinoflagellates, and the general starvation of palynomorphs far from shore.

These features are normally seen in the shaley interbeds of the Paaratte Formation and its equivalents.

light yellow palynomorphs indicate immaturity for hydrocarbon generation.

C 1196.0m (swc) - 1216.3m (swc) : T. pachyexinus Zone

Assignment to the Tricolpites pachyexinus (=Tricolporites apoxyexinus Zone) is indicated at the top by the absence of younger indicators, and at the base by oldest Tricolpites gillii and supported by the dinoflagellate data. Proteacidites and Phyllocladidites mawsonii dominate the spore pollen with Amosopollis cruciformis more common towards the top.

Dinoflagellates are mostly longranging, not age diagnostic. with Heterosphaeridium spp the most common. Trithyrodinium marshalli does occur dowm to 1200.3m (swc) and is not usually seen beneath the pachyexinus spore-pollen zone and the correlative porifera dinoflagellate zone.

Nearshore environments are indicated by the low dinoflagellate content (10-20% of palynomorphs) and

their low to moderate diversity.

These features are normally seen in the Belfast Mudstone and the correlative parts of the Flaxmans and Paaratte Formations.

Light yellow spore colours indicate immaturity for hydrocarbon generation.

D 1281.6m (swc) : C. Triplex Zone

Assignment to the Clavifera triplex Zone (= P.mawsonii zone) is indicated at the top by the youngest Appendicisporites distocarinatus and by the absence of younger indicators, and at the base by oldest Phyllocladidites mawsonii and common P. eunuchus. Other common taxa include Corollina torosa and Cyathidites minor.

Dinoflagellates are extremely scarce and consist of long ranging forms. Their scarcity and the corresponding high dominance and diversity of the spores and pollen indicate nearshore environments.

These features are normally seen in the Flaxmans Formation and its correlatives.

Yellow spore colours indicate immaturity for hydrocarbon generation.

E 1310.0m (swc) : A. distocarinatus Zone

Assignment to the Appendicisporites distocarinatus spore-pollen zone is indicated at the top and base by A. distocarinatus without younger or older indicators. Saccate pollen including Falcisporites similis and

Microcachryidites antarcticus are dominant and minor Early Cretaceous reworking is indicated by the presence of Pilosisporites notensis and Dictyotosporites speciosus.

Dinoflagellates are extemely rare and longranging and so are not age diagnostic. Their scarcity and the dominant and diverse spores and pollen indicate nearshore marine environments.

These features are normally seen in the lower Flaxmans Formation and Waare Sandstone, if developed.

Yellow spore colours indicate immaturity for hydrocarbon generation.

F 1362m (cutts) : P. pannosus Zone

Assignment to the Phimopollenites pannosus Zone is indicated at the top by youngest Coptospora paradoxa and at the base by oldest P. pannosus. The top of spore dominated microfloras including Aequitriradites tilchaensis, Foraminisporis asymmetricus and F. wonthaggiensis also suggests the Early Cretaceous. The sample is only cuttings, and younger elements include Clavifera triplex, Nothgofagidites endurus and P. mawsonii but these are all presumed caved. The assemblage is dominated by Cyathidites minor and Cicatricosisporites australiensis is a significant component.

Dinoflagellates are absent except for Isabelidinium cretaceum which is clearly caved. Non-marine environments are indicated by the lack of "in situ" dinoflagellates and the dominance of cuticle and diverse and abundant spores and pollen.

These features are normally seen in the topmost Eumeralla Formation, although the fact that only cuttings are available must reduce confidence.

Yellow to yellow/light brown spore colours indicate immaturity but approaching marginal maturity for oil.

## IV CONCLUSIONS

The sampled section appears to comprise a late Albian to Paleocene section, although the interval is fairly thin and may be incomplete. Sampling is too broad to locate or accurately define all the palynological units in the interval, and the Albian age in the deepest sample is only based on cuttings.

## V REFERENCES

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Morgan, R.P. (1985) Palynology review of selected oil drilling, Otway basin, South Australia unpubl. rept. for Ultramar Australia

# VOGEL #1 palynological data

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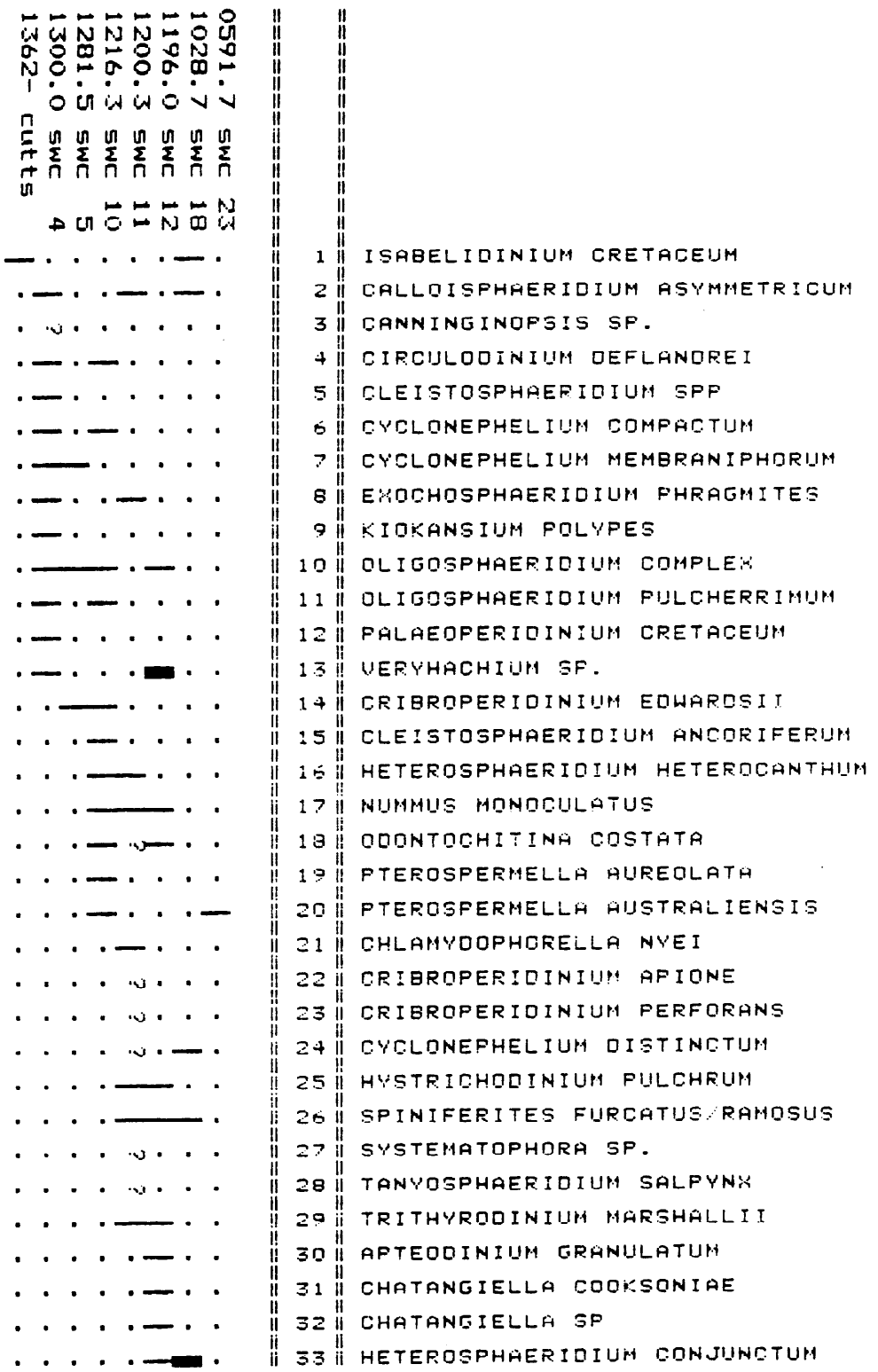
C L I E N T: Bridge Oil
W E L L: Vogel #1
F I E L D / A R E A: Otway Basin

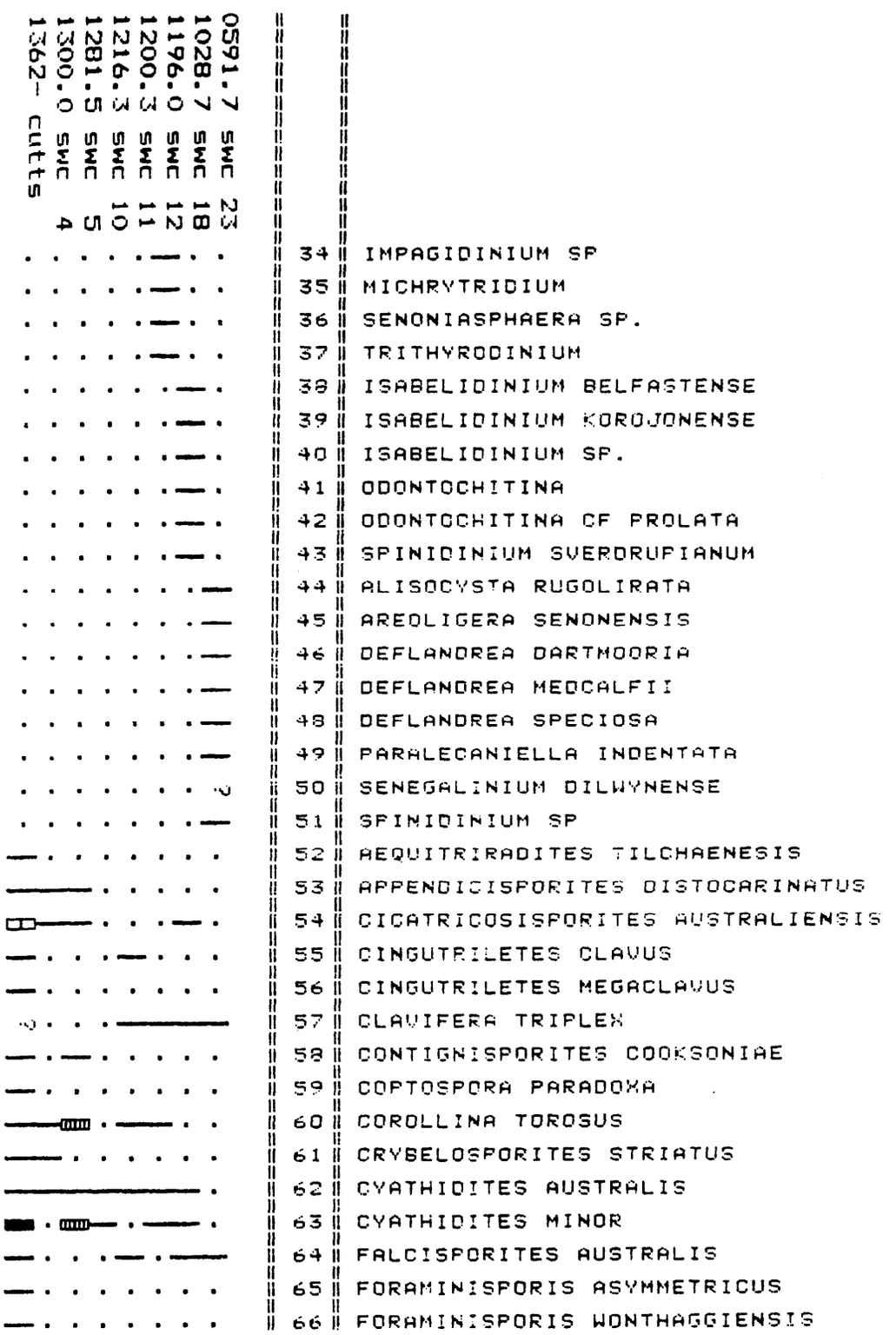
A N A L Y S T: Roger Morgan  D A T E : August '90
N O T E S: all sample depths are in metres

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

Key to Symbols

| = Very Rare
▯ = Rare
▮ = Few
▮ = Common
▮ = Abundant
? = Questionably Present
. = Not Present


0591.7 SWC 23
1028.7 SWC 18
1196.0 SWC 12
1200.3 SWC 11
1216.3 SWC 10
1281.5 SWC 5
1300.0 SWC 4
1362- cutts
1 ISABELIDINIUM CRETACEUM
2 CALLOISPHAERIDIUM ASYMMETRICUM
3 CANNINGINOPSIS SP.
4 CIRCULODINIUM DEFLANDREI
5 CLEISTOSPHAERIDIUM SPP
6 CYCLONEPHELIUM COMPACTUM
7 CYCLONEPHELIUM MEMBRANIPHORUM
8 EXOCHOSPHAERIDIUM PHRAGMITES
9 KIOKANSIUM POLYPES
10 OLIGOSPHAERIDIUM COMPLEX
11 OLIGOSPHAERIDIUM PULCHERRIMUM
12 PALAEOPERIDINIUM CRETACEUM
13 VERYHACHIUM SP.
14 CRIBROPERIDINIUM EDWARDSII
15 CLEISTOSPHAERIDIUM ANCORIFERUM
16 HETEROSPHAERIDIUM HETEROCANTHUM
17 NUMMUS MONOCULATUS
18 ODONTOCHITINA COSTATA
19 PTEROSPERMELLA AUREOLATA
20 PTEROSPERMELLA AUSTRALIENSIS
21 CHLAMYDOPHORELLA NYEI
22 CRIBROPERIDINIUM APIONE
23 CRIBROPERIDINIUM PERFORANS
24 CYCLONEPHELIUM DISTINCTUM
25 HYSTRICHODINIUM PULCHRUM
26 SPINIFERITES FURCATUS/RAMOSUS
27 SYSTEMATOPHORA SP.
28 TANYOSPHAERIDIUM SALPYNX
29 TRITHYRODINIUM MARSHALLII
30 APTEODINIUM GRANULATUM
31 CHATANGIELLA COOKSONIAE
32 CHATANGIELLA SP
33 HETEROSPHAERIDIUM CONJUNCTUM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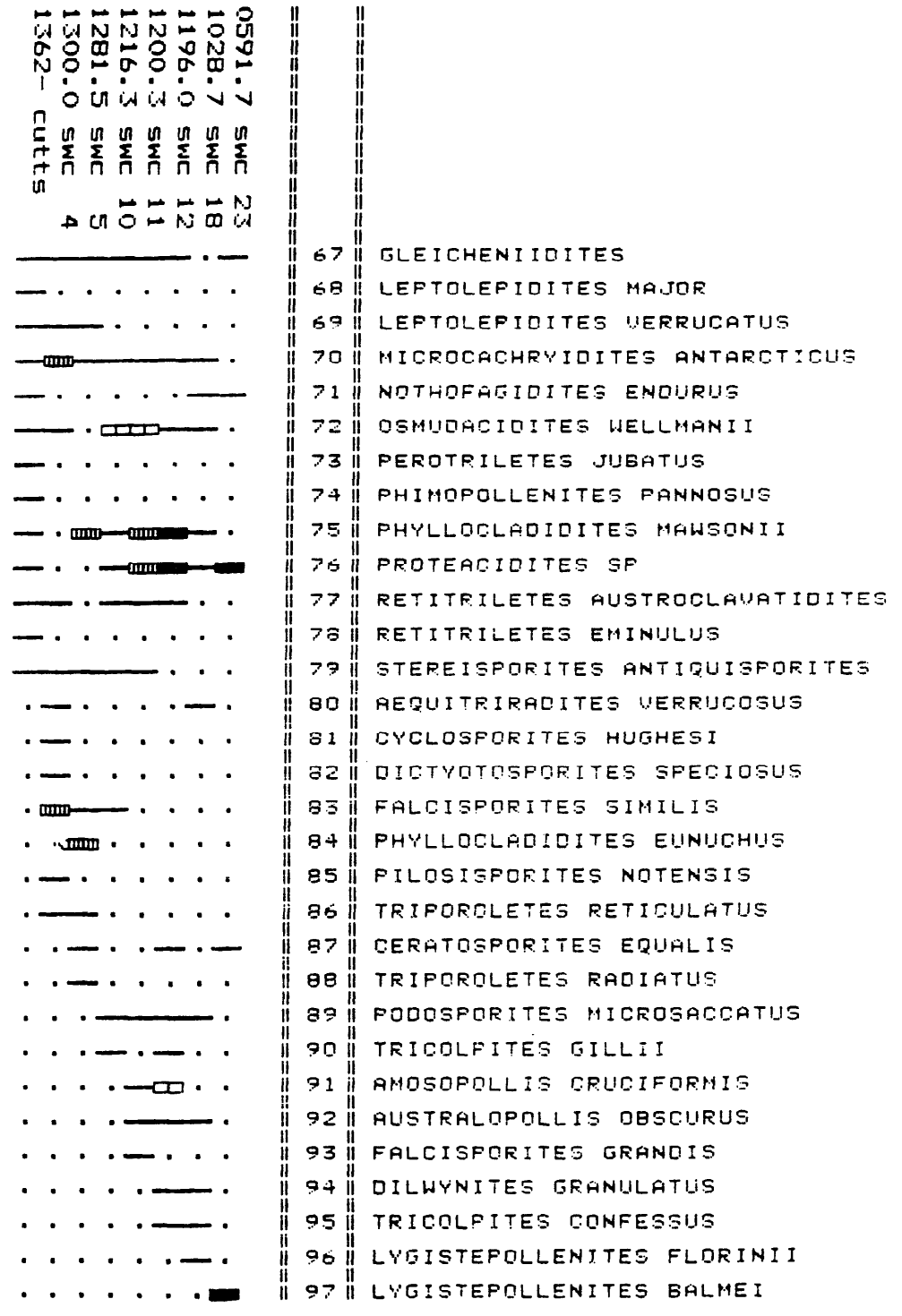
1216.3 SWC 10
1281.5 SWC 5
1300.0 SWC 4
1362- cuts
34 IMPAGIDINIUM SP
35 MICHRYTRIDIUM
36 SENONIASPHAERA SP.
37 TRITHYRODINIUM
38 ISABELIDINIUM BELFASTENSE
39 ISABELIDINIUM KOROJONENSE
40 ISABELIDINIUM SP.
41 ODONTOCHITINA
42 ODONTOCHITINA CF PROLATA
43 SPINIDINIUM SVERDRUPIANUM
44 ALISOCYSTA RUGOLIRATA
45 AREOLIGERA SENONENSIS
46 DEFLANDREA DARTMOORIA
47 DEFLANDREA MEDCALFII
48 DEFLANDREA SPECIOSA
49 PARALECANIELLA INDENTATA
50 SENEGALINIUM DILWYNENSE
51 SPINIDINIUM SP
52 AEQUITRIRADITES TILCHAENESIS
53 APPENDICISPORITES DISTOCARINATUS
54 CICATRICOSISPORITES AUSTRALIENSIS
55 CINGUTRILETES CLAVUS
56 CINGUTRILETES MEGACLAVUS
57 CLAVIFERA TRIPLEX
58 CONTIGNISPORITES COOKSONIAE
59 COPTOSPORA PARADOXA
60 COROLLINA TOROSUS
61 CRYBELOSPORITES STRIATUS
62 CYATHIDITES AUSTRALIS
63 CYATHIDITES MINOR
64 FALCISPORITES AUSTRALIS
65 FORAMINISPORIS ASYMMETRICUS
66 FORAMINISPORIS WONTHAGGIENSIS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1028.7 SWC 18
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74 PHIMOPOLLENITES PANNOSUS
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95 TRICOLPITES CONFESSUS
96 LYGISTEPOLLENITES FLORINII
97 LYGISTEPOLLENITES BALMEI

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