PALYNOLOGY OF ESSO LAKE GEORGE-1

OTWAY BASIN

BY

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for Ultramar Australia

November, 1985.

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I SUMMARY

820 - 829 ft. (swcs) middle N. asperus Zone : (D. extensa Microplankton Zone) : Late Eocene : marine

877 ft. (swcs) : possibly lower N. asperus Zone : Middle Eocene : marginally marine

918 - 1277 ft.(swcs) P. asperopolus - upper M. diversus Zones :Middle and Early Eocene : marginally marine to possibly non-marine

middle M. diversus to T. lillei Zones (early Eocene to late Campanian) not seen

1495 - 1624 ft. (swcs) : N. senectus Zone (partly N. aceras Microplankton Zone) : Campanian

T. pachyexinus to A. distocarinatus Zones (Santonian to Cenomanian) : not seen

1914 - 1930 ft. (swcs) : P. pannosus Zone : late Albian : very marginally marine

2001 - 3312 ft. (swcs) : upper C. paradoxa Zone : middle Albian : non-marine

3596 ft.(swc): lower C. paradoxa Zone : middle Albian : non-marine

3810 - 4068 ft. (swcs) C. striatus Zone : early Albian : non-marine to brackish

4105 - 4219 ft. (swcs) : barren : presumed pre Mesozoic basement.

II INTRODUCTION

Lake George-1 was drilled by Esso in 1969 and its palynology reported by Evans and Mulholland (1970) in the well completion report. Species lists were provided in the running text.

Zonation refinements since then have included the zonal subdivisions of Dettmann and Douglas (1976) in the Cretaceous, and Stover and Partridge (1973) in the Tertiary. In addition, there are informal modifications and improvements now in use. It was thus necessary at least to translate the original report into the more recent zonal nomenclature.

Eight of the original twenty six samples have been re-examined. The zonation is essentially that of Dettmann and Douglas (1976) with modifications after Helby, Morgan and Partridge (in press). The range data is presented as Appendix I.

III PALYNOSTRATIGRAPHY

A. 820 - 829 ft. (swcs) : middle N. asperus Zone (D. extensa Microplankton Zone)

These samples were not re-examined, but the presence of Eisenackia ornata clearly indicates assignment to the D. extensa Microplankton Zone and its correlative, the middle N. asperus Spore pollen Zone. The other dinoflagellates confirm the assignment.

The presence of relatively common and diverse dinoflagellates amongst the abundant and diverse spores and pollen indicate nearshore marine environments.

B. 877 ft. (swc) : possibly lower N. asperus Zone

This sample, not re-examined, lacks either the younger dinoflagellate indicators, or the older indicator (fairly common Malvacipollis diversus¾. It is therefore likely to be, on purely negative evidence, assigned to the lower N. asperus Zone. The apparent absence of Nothofagidites falcatus further suggests assignment to the lower part of the lower N. asperus Zone.

The presence of a single dinoflagellate amongst abundant spores and pollen and cuticle, indicates marginally marine environments.

C. 918-1277 ft. (swcs) : P. asperopolus - upper M. diversus Zones

These samples, not re-examined, contain common Malvacipollis diversus and Proteacidites pachypolus. The interval of overlap of these features comprises the P. asperopolus and upper M. diversus Zones. The presence of Polycolpites esobalteus in both is consistent, but not strictly confirming the assignment. The presence of Cyathidites gigantis is apparently anomolous, as it usually occurs in the L. balmei and lower M. diversus Zones. Thus either P. pachypolus or C. gigantis is out of place . As the sample is a sidewall core, C. gigantis is presumed reworked.

The presence of Muratodinium fimbriatum (as Kenleyia fimbriata) at 1277 ft. confirms a M. diversus to P. pachypolus assignment.

The presence of low diversity dinoflagellates at 1277 ft., and their absence from 918 ft., amongst abundant and diverse spores and pollen, indicates initially marginally marine and later non-marine environments.

The section is thus dated as significantly younger than by Evans and Mulholland (1970). This is purely a result of advances in the available zonation.

D. middle M. diversus to T. lillei Zones : not seen

These zones were not identified although they may be represented by the unsampled and sandy section between 1277 ft and 1495 ft.

E. 1495 - 1624 ft. (swcs) : N. senectus Zone (partly N. aceras Microplankton Zone)

Two (1495 ft. and 1624 ft.) of the three samples in this interval were re-examined. The record by Evans and Mulholland (1970) of Tricolpites sabulosus from this interval was anomolous, in present understanding, with their assignment to the T. pachyexinus Zone. I observed rare Nothofagidites senectus in both samples,and this, coupled with T. sabulosus, indicates assignment to the N. senectus Zone.

The record of Nelsoniela aceras from 1570 ft. (Evans and Mulholland data), indicates assignment of that sample to the N. aceras Microplankton Zone. The other samples probably also belong to that Zone although the scarcity of the zone index precludes confident assignment.

The presence of very rare dinoflagellates amongst the abundant spores and pollen indicates marginal marine environments.

F. T. pachyeximus to A. distocarinatus Zones : not seen

These zones were not identified, although they may be represented by the unsampled sandy section between 1624 ft. and 1914 ft.

G. 1914 - 1930 ft. (swcs) : T. pannosus Zone

The toprange of Coptospora paradoxa at 1914 ft., and the baserange of Phimopollenites pannosus at 1930 ft. (Esso data) indicate assignment of these samples to the P. pannosus Zone. P. grandis has its toprange at 1930 ft., within the P. pannosus Zone. These samples have not been re-examined.

Rare dinoflagellates and acritarchs amongst the common and diverse spores and pollen indicate very marginally marine or brackish environments.

This assignment is identical to that of Evans and Mulholland (1970).

H. 2001 - 3312 ft. (swcs) : upper C. paradoxa Zone

The presence of Coptospora paradoxa without younger indicators (such as P. pannosus) or older indicators (such as D. speciosus) indicates assignment to the upper C. paradoxa Zone. The baserange of P. grandis occurs at 3312 ft. (Evans and Mulholland data), and confirms the assignment. Three samples in this interval have been re-examined.

Non-marine environments are indicated by the absence of spiny acritarchs or dinoflagellates from the abundant spore and pollen assemblages. Non-marine non-spiny acritarchs of the genus Schizosporis suggest lacustrine conditions.

This assignment is consistent with the raw data of Evans and Mulholland (1970).

I. 3596 ft. (swc) : lower C. paradoxa Zone

Assignment to the lower C. paradoxa Zone is indicated by the coincident baserange of Coptospora paradoxa and toprange of Dictyotosporites speciosus in this sample, which has been re-examined.

The presence of rare non-spiny acritarchs (Schizosporis spp.) indicates lacustrine non-marine environments.

J. 3810-4068 ft. (swcs) : C. striatus Zone

The presence of Crybelosporites striatus to the interval base without younger elements indicates assignment to the C. striatus Zone. D. speciosus occurs throughout, C. hughesi occurs at 3810 ft. where it may be reworked, and P. notensis first occurs at 3905 ft. (Evans and Mulholland data). Two (3810 ft. and 4068 ft.) of the three samples in this interval were re-examined.

Environments are generally non-marine, as shown by the abundant and diverse spores and pollen. Very rare spiny acritarchs (Micrhystridium) were seen only in my re-examination of the sample from 3810 ft., suggesting brackish environments.

K. C. hughesi and C. stylosus Zones : not seen

These zones were not seen and are presumably lacking from the well section, as basement occurs at about 4090 ft.

L. 4105 - 4219 ft. : barren : presumed pre-Mesozoic

These samples failed to yield recognizable palynomorphs and are probably from pre-Mesozoic basement.

IV CONCLUSIONS

A. This section is substantially shorter at the base than many others in the basin. Sedimentation apparently commenced in early Albian time (C. striatus Zone).

B. The Albian to Eocene section is normal for the basin. The Albian is represented by a thick non-marine Eumeralla Formation accumulation, with minor brackish conditions in the early Albian and latest Albian.

C. The Late Cretaceous is represented by a relatively thin largely barren nearshore marine sandy section, as elsewhere nearby.

D. Thin Tertiary section completes the samples section. The Tertiary is largely or entirely Eocene, with some minor marine influence throughout.

E. This study does not modify the existing report in any minor way, but does update the existing information and provide higher precision.

V REFERENCES

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APPENDIX I

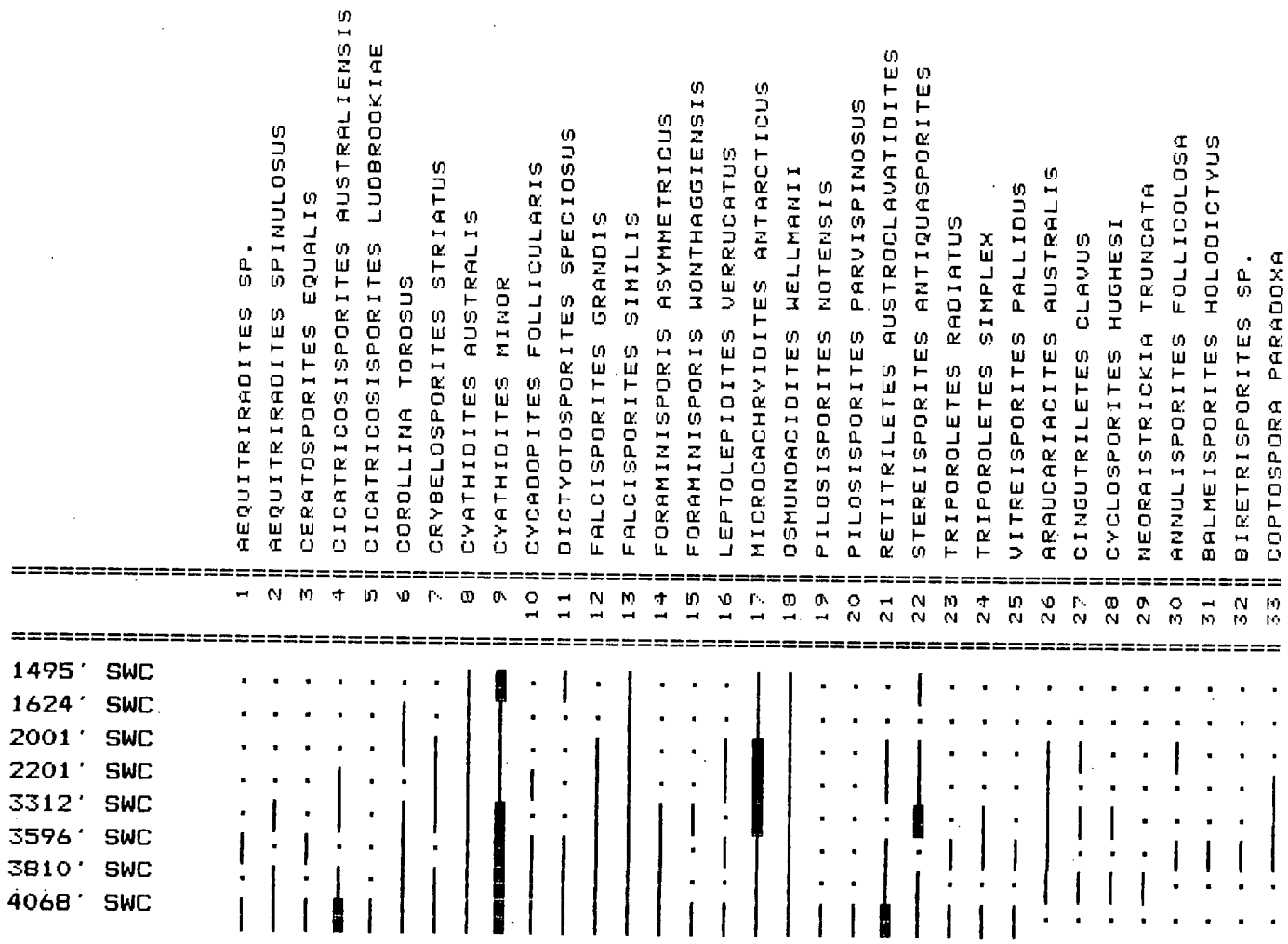
SPECIES DISTRIBUTION CHARTS

- SPORES AND POLLEN
- MICROPLANKTON

LAKE GEORGE #1

CHECKLIST OF GRAPHIC ABUNDANCE BY LOWEST APPEARANCE

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



		34 DICTYOPHILLIDITES HARRISII	35 LYCOPODIACIDITES ASPERATUS	36 CONTIGNISPORITES GLEBULENTUS	37 DICTYOTOSPORITES COMPLEX	38 GLEICHENIIDITES	39 ROGALSKISPORITES CICATRICOSUS	40 CALLIALASPORITES DAMPIERI	41 AUSTRALOPOLLIS OBSCURUS	42 NOTHOFAGIDITES SENECTUS	43 PHIMOPOLLENITES PANNOSUS	44 PHYLOCLADIDITES MAWSONII	45 PROTEACIDITES AMOLOSEXINUS	46 PROTEACIDITES SPP.	47 TRICOLPITES GILLII	48 TRICOLPITES SABULOSUS	49 TRICOLPORITES PACHYEXINUS	50 CAMEROZONOSPORITES OHAIENSIS	51 HERKOSPORITES ELLIOTII	52 PHYLOCLADIDITES VERRUCOSUS	53 PODOSPORITES MICROSACCATUS	54 TRICOLPITES CONFESSUS
1495'	SWC	I	.	.	.	I	.	.	I	I	.	I	I	I	?	.	.	I	I	I	I	I
1624'	SWC	.	.	.	.	.	.	.	I	I	I	I	I	I	I	I	I	.	.	.	.	.
2001'	SWC	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2201'	SWC	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3312'	SWC	.	I	I	I	I	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3596'	SWC	I	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3810'	SWC	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4068'	SWC	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

SPECIES LOCATION INDEX

Index numbers are the columns in which species appear.

INDEX NUMBER	SPECIES
1	AEQUITRIRADITES SP.
2	AEQUITRIRADITES SPINULOSUS
30	ANNULISPORITES FOLLICOLOSA
26	ARAUCARIACITES AUSTRALIS
41	AUSTRALOPOLLIS OBSCURUS
31	BALMEISPORITES HOLODICTYUS
32	BIRETRISPORITES SP.
40	CALLIALASPORITES DAMPIERI
50	CAMEROZONOSPORITES OHAIENSIS
3	CERATOSPORITES EQUALIS
4	CICATRICOSISPORITES AUSTRALIENSIS
5	CICATRICOSISPORITES LUDBROOKIAE
27	CINGUTRILETES CLAVUS
36	CONTIGNISPORITES GLEBULENTUS
33	COPTOSPORA PARADOXA
6	COROLLINA TOROSUS
7	CRYBELOSPORITES STRIATUS
8	CYATHIDITES AUSTRALIS
9	CYATHIDITES MINOR
10	CYCADOPITES FOLLICULARIS
28	CYCLOSPORITES HUGHESI
34	DICTYOPHILLIDITES HARRISII
37	DICTYOTOSPORITES COMPLEX
11	DICTYOTOSPORITES SPECIOSUS
12	FALCISPORITES GRANDIS
13	FALCISPORITES SIMILIS
14	FORAMINISPORIS ASYMMETRICUS
15	FORAMINISPORIS WONTHAGGIENSIS
38	GLEICHENIIDITES
51	HERKOSPORITES ELLIOTII
16	LEPTOLEPIDITES VERRUCATUS
35	LYCOPODIACIDITES ASPERATUS
17	MICROCACHRYIDITES ANTARCTICUS

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13	FALCISPORITES SIMILIS
14	FORAMINISPORIS ASYMMETRICUS
15	FORAMINISPORIS WONTHAGGIENSIS
38	GLEICHENIIDITES
51	HERKOSPORITES ELLIOTII
16	LEPTOLEPIDITES VERRUCATUS
35	LYCOPODIACIDITES ASPERATUS
17	MICROCACHRYIDITES ANTARCTICUS
29	NEORAISTRICKIA TRUNCATA
42	NOTHOFAGIDITES SENECTUS
18	OSMUNDACIDITES WELLMANII
43	PHIMOPOLLENITES PANNOSUS
44	PHYLOCLADIDITES MAWSONII
52	PHYLOCLADIDITES VERRUCOSUS
19	PILOSISPORITES NOTENSIS
20	PILOSISPORITES PARVISPINOSUS
53	PODOSPORITES MICROSACCATUS
45	PROTEACIDITES AMOLOSEXINUS
46	PROTEACIDITES SPP.
21	RETITRILETES AUSTROCLAVATIDITES
39	ROGALSKISPORITES CICATRICOSUS
22	STEREISPORITES ANTIQUASPORITES
54	TRICOLPITES CONFESSUS
47	TRICOLPITES GILLII
48	TRICOLPITES SABULOSUS
49	TRICOLPORITES PACHYEXINUS
23	TRIPOROLETES RADIATUS
24	TRIPOROLETES SIMPLEX
25	VITREISPORITES PALLIDUS

LAKE GEORGE #1 DINOS

CHECKLIST OF GRAPHIC ABUNDANCE BY LOWEST APPEARANCE

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

	MICRHYSTRIDIUM	SCHIZOSPORIS PSILATUS	SCHIZOSPORIS RETICULATA	VERYHACHIUM	OOONTOCHITINA COSTATA	TRITHYRODINIUM SP.	HETEROSPHAERIDIUM
01495' SWC		.	.	.	.	.	
01624' SWC	.	.	.	.			.
02001' SWC	.	.	.	.	.	.	.
02201' SWC	.	.	.		.	.	.
03312' SWC	.		.	.	.	.	.
03596' SWC	.			.	.	.	.
03810' SWC		.	.	.	.	.	.
04068' SWC	.	.	.	.	.	.	.