

APPENDIX 1

GUDGEON 1

Palynological Analysis

**Palynological Analysis
of Core and Cuttings
Near Top of Latrobe in
Gudgeon-1, Gippsland Basin.**

by

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INTERPRETATIVE DATA

Summary

While the well Gudgeon-1 was still drilling seven samples from core-1 and one cuttings interval were analysed to check the age at the Top of Latrobe. The following results were obtained:

Cuttings	3045-3055m	CAVED Oligocene- Miocene ASSEMBLAGE. <i>P. tuberculatus</i> Spore-pollen Zone and <i>Operculodinium</i> Microplankton Superzone with assemblage all caved from overlying Seaspray Group. Although a few rare Eocene fossils were recorded they are not zone diagnostic.
Core-1	3064-3078m	Maastrichtian. Upper <i>T. longus</i> Spore-pollen Zone and <i>M. druggii</i> Microplankton Zone (only at 3072m)

Introduction

The samples were shipped to Laola Pty Ltd on Friday 31 March 1995, processed the next day and collected and analysed on Sunday 2 April. The initial verbal report on that day was followed by a written Provisional Report sent as a facsimile on 3 April. Additional palynological slides were prepared upon a subsequent request to confirm the age dating in the core samples and a revised provisional report was provided on 20 April 1995.

Approximately 15 grams of the samples were processed for palynological analysis. Residue yields from the cuttings was very low although palynomorph concentration was high. In contrast the cores gave high yields with low to occasionally very low palynomorph concentrations. Preservation of palynomorphs was generally poor to fair in rushed palynological slides but improved to fair to occasionally good in second batch of slides. Spore-pollen diversity was generally moderate whilst the only significant microplankton diversity was recorded in the cuttings and most of those species were caved.

The interpretative data with zone identification and Confidence Ratings are recorded in Table-1 and basic data on residue yields, preservation and diversity are recorded on Tables-2. Species identified in the samples are listed on Tables-3

Zone and age determinations are based on the zonation schemes described by Stover & Partridge (1973) and Helby, Morgan & Partridge (1987), with the addition of the *Operculodinium* Superzone which is a modification of the dinoflagellate zonation scheme discussed in outline by Partridge (1975, 1976). Author citations for most spore-pollen species can be sourced from Stover & Partridge (1973, 1982) and Helby, Morgan & Partridge (1987), and those for dinoflagellates from the indexes of Lentin & Williams (1985, 1989). Species names followed by "ms" are unpublished manuscript names.

***P. tuberculatus* Spore-pollen Zone and *Operculodinium* Microplankton Superzone**

The assemblage from the cuttings is dominated by dinoflagellates the great majority of which are caved from the overlying Seaspray Group. Although the assemblage is highly diverse the species recorded have been restricted to the common or index species sufficient to adequately demonstrate the caved origin of the assemblage. The restricted species is necessary because the Oligocene and Miocene assemblages in the Gippsland Basin are still largely undocumented. Typical of long ranging species found throughout most of the Seaspray Group are *Operculodinium centrocarpum*, *Lingulodinium machaerophorum*, *Hystriocholpoma rigaudae*, *Systematophora placacantha* and the ubiquitous *Spiniferites* spp. In addition there are species typical of the basal Oligocene part of the Seaspray Group most of which are unpublished manuscript species. These include *Pyxidnopsis pontus* ms, *Protoellipsodinium simplex* ms, *P. mamilatus* ms and *Tectatodinium marlum* ms. Then there are a number of species are restricted or more common in the Miocene part of the group, including *Melittasphaeridium choanophorum* and *Tuberculodinium vancompoae*. The possibility of some Eocene component in the sample is suggested by the observation of single specimens of *Areosphaeridium capricornum* and *Wetzeliella articulata* in the slides. Unfortunately, these species are not diagnostic of a single zone and because of their rarity they could just as easily be reworked like a number of the spore-pollen recorded. The assemblage of the latter consists mainly of long ranging species except for the frequent occurrence of the spore *Cyatheacidites annulatus* which is diagnostic of the *P. tuberculatus* Zone.

Upper *T. longus* Spore-pollen Zone and *M. druggii* Microplankton Zone

older than the Upper *T. longus* Zone based on the common occurrence of *Gambierina rudata* and presence of *Stereisporites* (*Tripunctisporis*) spp. in most samples. An age no younger than this zone is based on at least eleven species considered not to range above this zone, unless as reworked specimens. Described species are *Battenipollis sectilis*, *Beaupreaidites orbiculatus*, *Forcipites* (al. *Tricolpites*) *longus*, *Quadruplanus brossus*, *Tricolpites confessus* and *Tricolporites lilliei*. Manuscript species are *Camarozonosporites horrendus*, *Propylipollis crotonoides*, *Proteacidites clinet* and *P. reticuloconcavus*. The presence of *Grapnelispora evansii* in five of the seven samples suggests a position low within the zone as this form is not consistent or not present in the upper part of the zone.

Several of the samples contained organic fragments suggestive of *Manumiella*-like microplankton but only the sample at 3072m contained identifiable specimens. Although poorly preserved *Manumiella conorata* was confidently identified enabling assignment of that sample to the *M. druggii* Zone. The only other fossil identified as a microplankton is *Amosopollis cruciformis* now considered a algal cyst following Helby, Morgan & Partridge (1987, p.55).

References

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Table-1: Interpretative Palynological Data for Gudgeon-1, Gippsland Basin.

Sample Type	Depth (m)	Spore-Pollen Zone	*CR	Microplankton Zone	*CR	Comments or Key Species
Cuttings	3045-3055	<i>P. tuberculatus</i>	D3	<i>Operculodinium</i> Superzone	D3	Assemblages overwhelmed by cavings from the Lakes Entrance Formation. Zones not accurate to depth.
Core-1	3064.0	Upper <i>T. longus</i>	A1			Several specimens of <i>Steretsporites (Tripunctisporis)</i> spp. and common <i>Gambierina rudata</i> recorded.
Core-1	3066.0	<i>T. longus</i>	A3			No species diagnostic of Upper subzone recorded.
Core-1	3067.0	Upper <i>T. longus</i>	A1			A single specimens of <i>Steretsporites (Tripunctisporis)</i> spp. and common <i>Gambierina rudata</i> recorded.
Core-1	3071.0	Indeterminate				Palynomorph concentration too low.
Core-1	3072.0	Upper <i>T. longus</i>	A1	<i>M. druggii</i>		<i>G. rudata</i> common. Poorly preserved <i>Manumiella conorata</i> confirms microplankton zone.
Core-1	3074.0	Upper <i>T. longus</i>	A1			<i>Steretsporites (Tripunctisporis)</i> spp. and common <i>Gambierina rudata</i> confirm Upper subzone.
Core-1	3078.0	Upper <i>T. longus</i>	A2			A single specimen of <i>Steretsporites (Tripunctisporis)</i> spp. recorded.

***Confidence Ratings**

Alpha codes: Linked to sample type

A	Core
B	Sidewall core
C	Coal cuttings
D	Ditch cuttings
E	Junk basket
F	Miscellaneous/unknown
G	Outcrop

Numeric codes: Linked to fossil assemblage

1	Excellent confidence:	High diversity assemblage recorded with key zone species.
2	Good confidence:	Moderately diverse assemblage recorded with key zone species.
3	Fair confidence:	Low diversity assemblage recorded with key zone species.
4	Poor confidence:	Moderate to high diversity assemblage recorded without key zone species.

BASIC DATA

Table 2: Basic Palynomorph Data for Gudgeon-2, Gippsland Basin.

Sample Type	Depth (m)	Residue Yield	Palynomorph Concentration	Palynomorph Preservation	Number S-P Species	Number MP Species
Cuttings	3045-3055	Low	High	Poor-good	14+	18+
Core	3064	High	Moderate	Poor-fair	29+	1?
Core	3066	High	Low	Poor-fair	15+	1
Core	3067	High	Low	Poor-fair	21+	1
Core	3071	High	Very low	Poor	5+	
Core	3072	High	Low	Poor	21+	1
Core	3074	High	Low	Poor-fair	27+	
Core	3078	High	Low	Poor	16+	

Table 3: Species list for Gudgeon-1

SPECIES	Core depths in metres						
	3064	3066	3067	3071	3072	3074	3078
SPORE-POLLEN							
<i>Araucariacites australis</i>	X	X	X		X	X	X
<i>Baculatisporites</i> spp.	F		X		X	X	X
<i>Battenpollis sectilis</i>						X	
<i>Beaupreaidites orbiculatus</i>	X						
<i>Camarozonosporites australiensis</i>	X		X	X		X	
<i>Camarozonosporites heskermensis</i>	X				X		
<i>Camarozonosporites horrendus</i> ms	X					X	
<i>Cicatricosisporites australiensis</i>	X					X	
<i>Cyathidites australis</i> RW	X		X		F	X	
<i>Cyathidites paleospora</i>						X	
<i>Cyathidites splendens</i>	X	X	X		F	X	
<i>Dilwynites granulatus</i>			X				
<i>Forcipites longus</i>	X		X		X	X	
<i>Gambierina rudata</i>	C	C	C	X	C	C	F
<i>Gleicheniidites circinidites</i>		X			X	X	X
<i>Grappnellispora evansii</i>	X	X	X		X		X
<i>Herkosporites elliotii</i>	X		X				
<i>Klukisporites scaberts</i> RW							X
<i>Laevigatosporites major</i>		X					
<i>Laevigatosporites ovatus</i>	X	X	X	X	X	X	X
<i>Latrobosporites amplus</i>	X		X		X	X	X
<i>Latrobosporites ohalensis</i>					X		
<i>Lygistepollenites balmei</i>	F		F		X	F	X

Table 3: Species list for Gudgeon-1 Cont...

SPECIES	Core depths in metres						
	3064	3066	3067	3071	3072	3074	3078
<i>Microcachrydites antarcticus</i>	X					X	
<i>Pentinsulapollis askinae</i>	X						
<i>Pentinsulapollis gillii</i>	X	X				X	
<i>Periporopollenites polyoratus</i>		X					
<i>Phyllocladidites mawsonii</i>	X	F	F		X	F	F
<i>Phyllocladidites verrucosus</i>						X	X
<i>Pilosporites notensis</i> RW	X						
<i>Podocarpidites</i> spp.	F	X	X		X	F	
<i>Podosporites microsaccatus</i>				F			
<i>Propylpollis crotonoides</i> ms	X	X			X	X	X
<i>Proteacidites clinei</i> ms					X		
<i>Proteacidites pallisadus</i>						X	
<i>Proteacidites reticuloconcaus</i> ms	F	X					
<i>Proteacidites reticulosabratus</i>					X		
<i>Proteacidites</i> spp.	F	F		C	F	C	F
<i>Quadruplanus brossus</i>						X	
<i>Retitriletes</i> spp.	X	X	X		X	X	X
<i>Steretsporites (Tripunctisporites)</i> spp.	G		X			F	X
<i>Steretsporites antiquisporites</i>	X	X	X			F	X
<i>Tricolpites confessus</i>			X				
<i>Tricolpites walparaensis</i>	X						
<i>Tricolporites lilliei</i>	X				X	X	
<i>Tricolporites marginatus</i> ms.			X				
MICROPLANKTON							
<i>Amosopollis cruciformis</i>		X	X				
<i>Manumiella conoratum</i>					X		
<i>Manumiella</i> sp. indet.					X		

- X = Present/Rare
- F = Frequent
- C = Common
- cf = Compare with
- ms = Manuscript name
- RW** = Reworked

Table 4: Species list for Gudgeon-1

SPECIES	Cuttings at 3045-55m
SPORE-POLLEN	
<i>Araucariacites australis</i>	X
<i>Cyatheacidites annulatus</i>	F
<i>Cyathidites paleospora</i>	X
<i>Cyathidites splendens</i>	X
<i>Granulatisporites trisinus</i> RW	X
<i>Haloragacidites harrisi</i>	X
<i>Ischyosporites greuius</i>	X
<i>Ischyosporites irregularis</i> ms	X
<i>Laevigatosporites major</i>	X
<i>Lygistepollenites florinii</i>	X
<i>Microbaculatisporites nodosa</i> RW	X
<i>Matonisporites ornamentalis</i>	X
<i>Nothofagidites asperus</i>	X
<i>Phyllocladidites mawsonii</i>	X
<i>Podocarpidites</i> spp.	F
<i>Verrucatosporites alienus</i>	X
MICROPLANKTON	
<i>Achomosphaera alcornu</i>	X
<i>Areosphaeridium capricorum</i> *	X
<i>Apteodinium australlense</i>	X
<i>Cyclopsiella vieta</i>	X
<i>Dapsillidinium pseudocolligerum</i>	C
<i>Hystriochokolpoma rigaudae</i>	F
<i>Impagidinium</i> spp.	X
<i>Lingulodinium machaerophorum</i>	X
<i>Meltasphaeridium choanophorum</i>	X
<i>Nematosphaeropsis rhizoma</i> ms.	X
<i>Operculodinium centrocarpum</i>	F
<i>Pentadinium laticinctum</i>	X
<i>Protoellipsodinium mamillatus</i> ms.	X
<i>Protoellipsodinium simplex</i> ms.	C
<i>Pyxidinopsis pontus</i> ms.	C
<i>Spiniferites ramosus</i>	X
<i>Systematophora placacantha</i>	X
<i>Tectatodinium marlum</i> ms.	X
<i>Tuberculodinium vancampoae</i>	X
<i>Wetzelia articulata</i> *	X
OTHERS	
Microforaminiferal liners	C

RELINQUISHMENT LIST - PALYNOLOGY SLIDES

WELL NAME & NO: GUDGEON-1

PREPARED BY: A.D. PARTRIDGE

DATE: 26 APRIL 1995

Sheet 1 of 2

SAMPLE TYPE	DEPTH (M)	CATALOGUE NUMBER	DESCRIPTION
Cuttings	3045-55	P196658	Kerogen slide HCl sieved
Cuttings	3045-55	P196659	Kerogen slide
Core-1	3064	P196660	Kerogen slide
Core-1	3064	P196661	Oxidised slide 2
Core-1	3064	P196662	Oxidised slide 3
Core-1	3064	P196663	Oxidised slide 4
Core-1	3066	P196664	Kerogen slide
Core-1	3066	P196665	Oxidised slide 2
Core-1	3066	P196666	Oxidised slide 3
Core-1	3066	P196667	Oxidised slide 4
Core-1	3067	P196668	Kerogen slide
Core-1	3067	P196669	Oxidised slide 2
Core-1	3067	P196670	Oxidised slide 3
Core-1	3067	P196671	Oxidised slide 4
Core-1	3071	P196672	Oxidised slide 2
Core-1	3071	P196673	Oxidised slide 3
Core-1	3071	P196674	Oxidised slide 4
Core-1	3071	P196675	Oxidised slide 5
Core-1	3072	P196676	Kerogen slide
Core-1	3072	P196677	Oxidised slide 2
Core-1	3072	P196678	Oxidised slide 3
Core-1	3072	P196679	Oxidised slide 4
Core-1	3074	P196680	Kerogen slide
Core-1	3074	P196681	Oxidised slide 2
Core-1	3074	P196682	Oxidised slide 3
Core-1	3074	P196683	Oxidised slide 4
Core-1	3078	P196684	Kerogen slide
Core-1	3078	P196685	Oxidised slide 2
Core-1	3078	P196686	Oxidised slide 3
Core-1	3078	P196687	Oxidised slide 4

RELINQUISHMENT LIST - RESIDUES

WELL NAME & NO: GUDGEON-1

PREPARED BY: A.D. PARTRIDGE

DATE: 26 APRIL 1995

Sheet 2 of 2

SAMPLE TYPE	DEPTH (M)	DESCRIPTION
Core-1	3064	Kerogen residue
Core-1	3064	Oxidised residue
Core-1	3066	Kerogen residue
Core-1	3066	Oxidised residue
Core-1	3067	Kerogen residue
Core-1	3067	Oxidised residue
Core-1	3071	Kerogen residue
Core-1	3071	Oxidised residue
Core-1	3072	Oxidised residue
Core-1	3074	Kerogen residue
Core-1	3074	Oxidised residue
Core-1	3078	Kerogen residue
Core-1	3078	Oxidised residue