PALYNOLOGICAL ANALYSIS OF SAMPLES FROM SNAIL-1, TORQUAY SUB-BASIN

by

M.K. MACPHAIL

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The Shell Company of Australia Ltd.

Consultant Palynologist, 20 Abbey St., Gladesville, NSW 2111

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PREAMBLE

Spore-pollen and dinoflagellates are amongst the most valuable tools available to the petroleum explorationist for dating and correlating rock units and interpreting the environment of deposition. However a number of important limitations exist. These are chiefly related to sample quality and differences in the time ranges of some species between sedimentary basins:

(A) DATING

Palynological zones are usually defined by overlaps in the vertical [= time] range of several to many spore-pollen or dinoflagellate species. Zone boundaries are mostly defined by first appearances, less often by extinctions. A few rare species are confined to one zone only.

It is important to remember that the times of first appearance and extinction of a species may differ over the geographical range of that species and zonation criteria developed for one basin may not be reliable in adjoining basins.

Nevertheless the zonation scheme developed by Esso Australia Ltd. for the Gippsland Basin has been found to provide reliable dates for conventional cores and, unless gross mud cake contamination has occurred, for sidewall cores in the adjoining basins along the southern margin of Australia. Age-determinations based on cuttings are usually unreliable because of difficulties in distinguishing between in situ, caved and [less frequent] recycled species. The reliability can only be improved by analysing a suite of closely spaced cuttings. Other criteria that are useful include relative abundance, differences in preservation and kerogen type [palynofacies] .

(B) PALAEOENVIRONMENT

The abundance and diversity of dinoflagellates provide a reliable indication of open and restricted marine environments, e.g. shoreface, tidal flat and lagoonal conditions. Several types of algal cysts are good evidence for freshwater lacustrine environments. The absence of dinoflagellates is assumed to indicate the absence of a marine influence

The great majority of spores and pollen recovered in both on- and offshore wells have been transported by wind and/or water from dryland plants, some growing at considerable distance. A variety of plant communities will be represented but because of uncertainties in the ecology of mostly extinct species, spore-pollen can only provide a general indication of the palaeoenvironment, e.g. coastal plain, and climate, e.g. warm humid, if coastal tropical rainforest species are present. The most common terrestrial sediments preserving spore-pollen are fluvial and lacustrine silts and clays.

Some indication of relative abundance is necessary. As with dating, cuttings do not provide a reliable indication of palaeoenvironment.

INTRODUCTION

Revised age-determinations presented in this report are mostly based upon palynological slides prepared from two conventional core and seven sidewall core samples for Dr. W.K. Harris in 1973. The majority of these preparations contain well-preserved palynomorphs but yields are very low. The age-determination for an eighth SWC [1938ft.] was revised using species data provided in Harris (1973).

Conventional and SWC core material was still available for four samples and this was reprocessed along with two additional cuttings samples - giving a total of fourteen samples representing the depth 1938-4031ft. in Snail-1.

Lithological units and palynological determinations for the interval reviewed [1938-4031ft.] are summarized below. Zonal determinations are based on the detailed palynological zonation scheme established for the Bass Strait basins by Esso Australia Ltd. rather than Harris' (1965, 1971) Otway Basin zonation used in his (1973) report.

Interpretative and basic data are given in Tables 1 and 2 respectively. Check lists of all species recorded are attached. Lithological and electric log data were not available.

SUMMARY

AGE	UNIT	ZONE	DEPTH RANGE (ft.)	ENVIRONMENT
Oligo-Miocene	JAN JUC MARL?	P. tuberculatus	1938	Open marine?
- - - - -	- - - -	- unconformity? -	- - - -	- - - - -
Late Eocene	DEMONS BLUFF FORMATION?	Middle N. asperus	2450-2783	Marginal marine
- - - - -	- - - -	- unconformity -	- - - -	- - - - -
Paleocene	EASTERN VIEW FORMATION	Upper L. balmei	2820-2865	Coastal plain
- - - - -	- - - -	- unconformity -	- - - -	- - - - -
Middle Albian	OTWAY GROUP	C. paradoxa	2907-3449	Fluvio-lacustrine
Lower Albian?	"	C. striatus?	3840-4031	"

TD 1234m

GEOLOGICAL COMMENTS

1. The major difference between the age-breakdown presented in this report and that of Harris (1973) is that the interval 2450-2783ft. is dated as Late Eocene, Middle N. asperus Zone rather than Middle Eocene P. pachypolus [equivalent to the Lower N. asperus Zone of Stover & Partridge, 1973], based on the consistent presence of Triorites magnificus.

   I am puzzled why Wayne Harris assigned a P. pachypolus Zone to this interval given that the index species of his Late Eocene [Triorites magnificus] Zone (Harris, 1971 p.72-74), Triorites magnificus, was recorded [see Harris, 1973 p.3).

2. Nevertheless as discussed in the Biostratigraphy Section, the Middle N. asperus date is not confident since most samples also contain a pollen species which ranges no higher than the Middle Eocene in the Gippsland and Bass Basins.

   The minimum thickness, 333ft., is against the unit being bioturbated/condensed and it is more probable that the time ranges of the key species differs slightly between these and the Torquay Sub-basin. Irrespective of dating uncertainties, this marginal marine unit is likely to be the same as that sampled between 2160-70ft. in Nerita-1A [provisionally correlated with the Demons Bluff Formation (Macphail, 1989b).

3. The unconformity between the above unit and the Eastern View Formation occurs between 2783-2820ft. It is unclear whether Early Eocene sediments are present in Snail-1 wellsite but, if present, are less than 37ft. thick. Paleocene sediments between 2820-2865ft. are likely to be a correlative of the Pebble Point Formation [deposited during cycle ET 1.1?].

   As in Anglesea-1 and Nerita-1A, some facies within the Paleocene section of the Eastern View Formation are marine-influenced. Those in Snail-1 are provisionally correlated with A. homomorpha Zone sediments sampled at 1090-1234ft. in Anglesea-1 (Macphail, 1989a)

4. The unconformity between the Eastern View Formation and Otway Group occurs between 2865-2907ft. If present, Sherbrook Group Equivalent sediments are thin - less

than 40ft. thick, compared with a minimum thicknesses of 395ft. in Nerita-1A.

5. Sediments of Middle Albian, C. paradoxa Zone form the top of the Otway Group in Snail-1. Whilst it is not certain that sediments of this age are absent in Anglesea-1, Nerita-1A and Hindhaugh Creek-1 (Macphail, 1989a,b,c), it is probable that the post C. striatus Zone cover has been eroded at these three wellsites.

6. Unless Snail-1 is situated over a basement high, it is improbable that the well penetrated Neocomian sediments below 3449ft.

PALAEOENVIRONMENTS

As with Anglesea-1 and Nerita-1A, the Snail-1 wellsite was affected by at least one Paleocene marine transgression. Whether the marine-influence at 2820-2865ft. represents the earliest encroachment by the Southern Ocean is unknown but certainly the local environment from this time to the Late Eocene was a coastal plain complex. Cretaceous sediments appear to have accumulated in a fluvio-lacustrine environment within a rift valley setting.

BIOSTRATIGRAPHY

Zone and age-determinations have been made using criteria proposed by Stover & Partridge (1973), Partridge (1976) and Helby et al. (1987), augmented where necessary by time-range data presented in Dettman (1963), Harris (1965, 1971), Burger (1980), Morgan (1980) and Backhouse (1988) and unpublished observations made on Bass Strait wells drilled by Esso Australia Ltd.

Unlike onshore wells in the Torquay Sub-basin, the Early Cretaceous palynomorphs in Snail-1 are not thermally mature, and preservation was adequate to allow reliable identification of most types. Nevertheless it is possible that the more delicate types have not always been preserved, e.g. the zone index species Coptospora paradoxa and Crybelosporites striatus below 3449ft. Not infrequently, the confidence of age-determinations has been reduced by the low yields of the 1972 preparations. Recycled Paleozoic and Early Mesozoic spores are present in many samples.

Crybelosporites striatus Zone 3840-4031ft. Lower Albian

The two [contaminated] SWC samples in this interval lack Crybelosporites striatus but are tentatively assigned to this zone based on the occurrence of frequent Cicatricosisporites australiensis and Coptospora paradoxa at 3449ft. The sample at 3840.0ft. is no older than C. hughesii Zone, based on Pilosisporites notensis and Crybelosporites punctatus: that at 4031ft. is no older than C. australiensis Zone, based on the presence of the nominate species.

Coptospora paradoxa Zone 2907-3449ft. Middle Albian

Three samples are assigned to this zone based on the occurrence of Coptospora paradoxa at 3449ft. The excellent preservation and occurrences of Balmeisporites holodictyus and B. tridictyus are consistent with a lacustrine depositional environment. Crybelosporites striatus occurs in this sample and at 3157ft.

The sample picked as the top of the Early Cretaceous in Snail-1 [2907ft.] is exceptionally diverse and contains two acritarchs [Leiosphaeridia, Micrhystridium] but can only be dated as no older than C. hughesii Zone. A feature of this and the SWC at 3157ft. is the abundance of recycled Palaeozoic spore-pollen. No palynofloras of Late Cretaceous age were recorded.

Upper Lygistepollenites balmei Zone 2820-2865ft. Paleocene

The two palynofloras assigned to this Zone are dominated by one or more of gymnosperms such as Araucariacites, Dilwynites and Phyllocladidites, angiosperms such as Nothofagidites kaitangata and Proteacidites and ferns spores such as Gleicheniidites.

The lower [SWC] sample contains frequent Lygistepollenites balmei and Australopollis obscurus as well as species which first appear in the Upper L. balmei Zone [Proteacidites annularis, P. grandis] or which range no higher than this zone [Camarozonosporites bullatus, Gambierina rudata, Polycolpites langstonii and (?) Integricorpus antipodus].

The cuttings sample at 2820-40ft. contains L. balmei and G. rudata and therefore is no younger than Upper L. balmei Zone.

Dinoflagellates including Apectodinium homomorpha are present in both samples. Possible contamination or bioturbation is indicated by a specimen of the Early Cretaceous dinoflagellate Cordosphaeridium inodes at 2865ft.

No palynofloras of Early or [unequivocal] Middle Eocene age were recorded.

Middle Nothofagidites asperus Zone 2450-2783ft. Late Eocene

Six samples are provisionally assigned to this zone.

All yielded palynofloras dominated by Nothofagidites emarcidus-heterus and, with the exception of the SWC at 2546ft., all contain the Middle N. asperus Zone index species Triorites magnificus. Most include the accessory species Tricolpites thomasii. Dinoflagellate are present throughout, including Rhombodinium glabrum, Cordosphaeridium inodes, Homotryblium tasmaniense and Areosphaeridium diktyoplokus at 2675.0m.

This last species is virtually restricted to the Lower N. asperus Zone in the Gippsland Basin. Similarly Proteacidites asperopolus which occurs consistently throughout the interval [2450-60, 2546, 2626, 2675 and 2783ft.] is not known to range above the Lower N. asperus Zone in this basin except in [bioturbated] condensed sequences.

At present it is not clear whether Triorites magnificus first appears earlier in the Torquay Sub-basin than in the

Gippsland and Bass Basins, whether the local extinction of _Proteacidites asperopolus_ occurs later in the Torquay Sub-basin or whether geological factors are responsible for the mixing of species assemblages of different age.

Proteacidites tuberculatus Zone 1938ft. Oligocene-Early Miocene

The presence of _Cyatheacidites annulatus_ and _Tricolporites retequetrus_ (Harris, 1973) confirm a _P. tuberculatus_ Zone age for this SWC sample.

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TABLE I: SUMMARY OF INTERPRETATIVE PALYNOLOGICAL DATA

SNAIL-1

SAMPLE NO.	DEPTH	SPORE-POLLEN ZONE	DINOFLAGELLATE ZONE	AGE	CONFIDENCE RATING	COMMENTS
SWC	1938	P. tuberculatus	-	Oligocene-Early Miocene	o	C. annulatus
ctg	2450-60	Middle N. asperus	-	Late Eocene	1	T. magnificus, T. thomasii
SWC 27	2546	Middle N. asperus	-	Late Eocene	2	N. falcatus
SWC 24	2626	Middle N. asperus	-	Late Eocene	2	T. magnificus, P. asperopolus
Core 2	2675	Middle N. asperus	-	Late Eocene	2	As above + A. diktyoplokus
Core 2	2683'10"	Middle N. asperus	-	Late Eocene	1	T. magnificus
SWC 18	2783 598.2m	Middle N. asperus	-	Late Eocene	2	T. magnificus, P. asperopolus
ctg	2820-40 861-5	Upper L. balmei	A. homomorpha	Paleocene	1	L. balmei, G. rudata, A. homomorpha
SWC 17	2865	Upper L. balmei	A. homomorpha	Paleocene	0	L.balmei, C. gigantis, C. bullatus
SWC 15	2907	C. paradoxa	-	Middle Albian	2	No older than C. hughesii Zone
Core 3	3157	C. paradoxa	-	Middle Albian	2	As above
SWC 12 (reprocessed)	3449	C. paradoxa	-	Middle Albian	0	C. paradoxa
SWC 7	3840	C. striatus?	-	Lower Albian	2	No older than C. hughesii Zone
SWC 1	4031	C. striatus?	-	Lower Albian	2	No older than C. australiensis Zone

TABLE : SUMMARY OF BASIC PALYNOLOGICA ATA

SNAIL-1

DIVERSITY -	low	medium	high
S & P	less than 10	10-30	greater than 30
D	1-3	3-10	10

SAMPLE NO.	DEPTH	YIELD		DIVERSITY		PRESERVATION	LITHOLOGY	PYRIZATION	COMMENTS
		SPORE-POLLEN	DINOS	SPORE-POLLEN	DINOS				
SWC	1938	No data for this sample							
ctg	2450-60	high	medium	high	medium	good	-	-	
SWC 27	2546	low	low	medium	low	good	-	-	
SWC 24	2626	medium	low	high	medium	moderate	-	-	
Core 2	2675	high	medium	high	medium	good	-	-	
Core	2683'10"	low	low	medium	low	moderate	-	-	
SWC 18	2783	high	low	high	medium	good	-	-	
ctg	2820-30	high	low	medium	low	moderate	-	-	
SWC 17	2865	high	low	high	low	good	-	-	
SWC 15	2907	medium	-	high	-	good	-	-	abund. recycled spp.
Core 3	3157	medium	-	medium	-	good	-	-	abund. recycled spp.
SWC 12	3449	medium	-	medium	-	good	-	-	reprocessed
SWC 7	3840	high	-	medium	-	good	-	-	contaminated
SWC 1	4031	low	-	low	-	good	-	-	contaminated

[redacted] [redacted] T/[redacted] NO

Well Name SNAIL-1 Basin TORQUAY Sheet No. 1 of 6

SAMPLE TYPE OR NO. * / FOSSIL NAMES — DEPTHS (ft.)	T 2450-60	S 2546	S 2626	C 2675	C 2683'10"	S 2783	T 2820-30	S 2865	S 2907	C 3157	S 3449	S 3840	S 4031
Acanthotriletes spp. R									•				•
Aequitriradites spinulosus			R						•		•		•
Aglaoreidia qualumis	•												
Alangiopollis sp. of Foster 1982				•									
Alisporites grandis								•	•	•		•	•
A. similis				•					•	•		•	•
Amosopollis cruciformis													
Anacolosidites acutullus						•							
A. luteoides	•												
A. sectus													
Araucariacites australis			•	•	•	•	•	•	•				
A. sp. cf A. fissis													
Australopollis obscurus					•		•	•					
Baculatisporites comaumensis										•		•	
B. disconformis			•			•	•						
Balmeisporites holodictyus											•		
B. tridictyus											•		
Banksieaeidites arcuatus	•			•		•							
B. elongatus						•							
B. lunatus ms								•					
Basopollis mutabilis ms													
B. otwayensis ms								•					
Beaupreacidites elegansiformis													
B. orbiculatus													
B. trigonalis ms													
B. verrucosus	•	•	•			•	•						
Biretisporites spectabilis s.l.											•		
Bysmapollis emaciatus								•					
Camarozonosporites australiensis s.l.								•	•	•			
C. bullatus								•					
C. dumus ms								•					
C. spp. indeterminate				•	•		•						
Canthiumidites oblatus				•									
Ceratosporites equalis						R							
Cicatricosisporites australiensis	R	R	R					R	•	•	•	•	•
C. sp cf C. australiensis											•		
C. hughesii													
C. ludbrookii													
Clavifera triplex complex						•		•					
Clavatisporites glarius				•									
Conbaculites apiculatus ms						•							
Concavissimisporites penolaensis													
Contignisporites cooksoniae			R						•				
C. fornicatus													
Coptospora paradoxa											•		
Corollinia spp.				R				R	•	•	•	•	•
Crassiretitriletes vanraadshooveni	•												
Crybelosporites punctatus											•	•	
C. striatus									?		•		
C. sp. cf C. striatus of Burger 1980													
Cunoniaceae-type													
Cupanieidites orthoteichus	•	•	•	•	•	•	•						
Cyathidites australis			R						•		•	•	•
C. gigantis								•					
C. minor		•	•	•	•	•	•	•	•	•	•	•	
C. paleospora	•												

* C=CORE S=SIDEWALL CORE
T=CUTTINGS J=JUNK BASKET

R - REWORKED SP.
C - CONTAMINANT

Well Name SNAIL-1 Basin TORQUAY Sheet No. 1 of 6

SAMPLE TYPE OR NO. *	T	S	S	C	C	S	T	S	S	C	S	S	S
FOSSIL NAMES / DEPTHS (ft.)	2450-60	2546	2626	2675	2683'10"	2783	2820-30	2865	2907	3157	3449	3840	4031
Acanthotriletes spp. R									•				•
Aequitriradites spinulosus			R						•		•		•
Aglaoreidia qualumis	•												
Alangiopollis sp. of Foster 1982				•									
Alisporites grandis								•	•	•		•	•
A. similis				•					•	•		•	•
Amosopollis cruciformis													
Anacolosidites acutullus						•							
A. luteoides	•												
A. sectus													
Araucariacites australis			•	•	•	•	•	•	•				
A. sp. cf A. fissis													
Australopollis obscurus					•		•	•					
Baculatisporites comaumensis										•		•	
B. disconformis			•			•	•						
Balmeisporites holodictyus											•		
B. tridictyus											•		
Banksieaeidites arcuatus	•			•		•							
B. elongatus						•							
B. lunatus ms								•					
Basopollis mutabilis ms													
B. otwayensis ms								•					
Beaupreacidites elegansiformis													
B. orbiculatus													
B. trigonalis ms													
B. verrucosus	•	•	•			•	•						
Biretisporites spectabilis s.l.											•		
Bysmapollis emaciatus								•					
Camarozonosporites australiensis s.l.								•	•	•			
C. bullatus								•					
C. dumus ms								•					
C. spp. indeterminate				•	•		•						
Canthiumidites oblatus				•									
Ceratosporites equalis						R							
Cicatricosisporites australiensis	R	R	R					R	•	•	•	•	•
C. sp cf C. australiensis											•		
C. hughesii													
C. ludbrookii													
Clavifera triplex complex						•		•					
Clavatisporites glarius				•									
Conbaculites apiculatus ms						•							
Concavissimisporites penolaensis													
Contignisporites cooksoniae			R						•				
C. fornicatus													
Coptospora paradoxa											•		
Corollinia spp.				R				R	•	•	•	•	•
Crassiretitriletes vanraadshooveni	•												
Crybelosporites punctatus											•	•	
C. striatus									?		•		
C. sp. cf C. striatus of Burger 1980													
Cunoniaceae-type													
Cupanieidites orthoteichus	•	•	•	•	•	•	•						
Cyathidites australis			R						•		•	•	•
C. gigantis								•					
C. minor		•	•	•	•	•	•	•	•	•	•	•	
C. paleospora	•												

* C=CORE S=SIDEWALL CORE
T=CUTTINGS J=JUNK BASKET

R = REWORKED SP.
C = CONTAMINANT

Well Name SNAIL-1 Basin TORQUAY Sheet No. 2 of 6

SAMPLE TYPE OR NO. *	T	S	S	C	C	S	T	S	S	C	S	S	S
FOSSIL NAMES / DEPTHS (ft.)	2450-60	2546	2626	2675	2683'10"	2783	2820-30	2865	2907	3157	3449	3840	4031
Cyathidites splendens		•	•	•	•	•	•	•					
Cyclosporites hughesii									•	•			
Dacrycarpites australiensis				•									
Deltoidospora spp.				•		•							
Densoisporites velatus								•					
Dicotetradites clavatus		•	•	•	•		•						
Dictyophyllidites cf arcuatus		•		•	•	•							
D. crenatus	R		R										
Didecitriletes spp. R										•			
Dilwynites granulatus	•	•		•	•	•	•	•					
D. tuberculatus		•			•	•	•	•					
Dryptopollenites semilunatus													
Elaeocarpaceae-type													
cf Elphredripites notensis [65y]													
Ericipites scabratus		•			•	•	•	•					
Foraminisporis asymmetricus									•		•		
F. dailyii								R	•				
F. wonthaggiensis								R					
Forcipites longus													
F. renmarkensis ms													
F. sabulosus													
F. stipulatus													
F. spp. indeterminate													
Foveosporites canalis									•				
Foveotriletes balteus			•	•			•						
F. parviretus									•		•		
Gambierina edwardsii													
G. rudata							•	•					
G. tenuis ms													
G. verrucatus ms													
Gleicheniidites spp.	•			•	•	•	•	•	•			•	
Granodiporites nebulosus			•										
Haloragacidites harrisii	•	•	•	•	•	•	•	•					
Herkosporites elliotii	•						•	•					
Ilexpollenites angulоclavatus complex	•		•			•	•						
Integricorpus antipodus ms								•					
Intratriporopollenites notabilis						•							
Ischyosporites gremius		•	•	•		•	•						
I, irregularis ms					•		•	•					
I. punctatus									•	•			
Jaxtacolpus pieratus ms [12u]													
Klukisporites scaberis											•		
Kraeuselisporites spp.									•				
Kulyisporites waterbolkii			•	•		•							
Laevigatosporites spp.	•	•	•	•		•	•	•					
Latrobosporites amplus													
L. crassus				•		•		•					•
Leptolepidites major									•				
L. verrucatus		R							•				
Liliacidites bainii				•									
L. lanceolatus			•	•									
L. sernatus ms													
L. spp. indeterminate													
Lycopodiumsporites spp.		•	•	•	•	•	•	•	•	•	•	•	•
Lygistepollenites balmei							•	•					
L. florinii	•		•	•	•	•	•	•					

* C=CORE S=SIDEWALL CORE
T=CUTTINGS J=JUNK BASKET

R = REWORKED SP.
C = CONTAMINANT

Well Name SNAIL-1 Basin TORQUAY Sheet No. 3 of 6

SAMPLE TYPE OR NO. *	T	S	S	C	C	S	T	S	S	C	S	S	S
FOSSIL NAMES / DEPTHS (ft.)	2450-60	2546	2626	2675	2683'10"	2783	2820-30	2865	2907	3157	3449	3840	4031
Malvacipollis diversus	•		•	•		•							
M. duratus ms				•		•	•						
M. robustus ms			•	•	•	•							
M. subtilis	•	•	•	•	•	•	•						
Matonisporites ornamentalis			•	•		•		•					
M. sp. cf M. cooksonii									•	•		•	
Micrantheum spinyspora		•											
Microcachrydites antarcticus			•	•		•	•	•	•	•	•		
Milfordia homeopunctatus	•		•	•									
M. hypolaenoides													
Monolites alveolatus													
Myrtaceidites tenuis				•									
M. parvus-mesonesus		•	•	•	•	•	•						
Myrtaceoipollenites australis													
Neoraistrickia truncata									•	•	•		•
Nothofagidites asperus	•	•	•										
N. brachyspinulosus	•	•	•	•		•		•					
N. deminutus-vansteenii	•	•	•			•	•						
N. emarcidus-heterus	•	•	•	•	•	•	•	•					
N. falcatus	•	•	•	•	•		•						
N. flemingii	•	•	•	•		•	•						
N. kaitangata													
N. senectus s.l.								•					
N. cf waipawaensis [Late Cretaceous]													
Osmundacites wellmanii										•		•	
Parvisaccites catastus			•	•									
Peninsulapollis askinae													
P. gillii													
Periporopollenites demarcatus	•	•	•	•		•		•					
P. polyoratus	•					•	•	•					
P. vesicus		•		•		•							
Peromonolites bacculatus ms					•			•					
P. densus													
Phyllocladidites mawsonii	•	•	•	•	•	•	•	•					
P. reticulosaccatus [var. enuch]							•	•					
P. verrucosus							•	•					
Phyllocladus palaeogenicus													
Pilosisporites notensis								R					
P. parvispinosus									•				
Plicatipollenites spp. R									•			•	
Podocarpidites spp.	•	•	•	•	•	•	•	•	•	•	•	•	•
Podosporites microsaccatus	•		•	•		•	•	•			•		
Polycingulatisporites clavus									•	•			
P. spp. indeterminate									•	•		•	
Polyorificites oblatus		•	•	•									
Polypodiaceoisporites cf tumulatus				•									
Polypodiisporites spp.	•		•		•	•	•						
Polycolpites langstonii								•					
P. cf P. simplex ms													
Polycolporopollenites esobalteus		•	•	•									
Proteacidites adenanthoides			•	•	•	•		•					
P. ademonosus ms													
P. amolosexinus													
P. angulatus													
P. annularis	•		•	•	•	•	•	•					
P. asperopolus		•	•	•			•						

* C=CORE S=SIDEWALL CORE T=CUTTINGS J=JUNK BASKET

R - REWORKED SP.
C - CONTAMINANT

Well Name SNAIL-1 Basin TORQUAY

FOSSIL NAMES / DEPTHS (ft.)	2450-60	2546	2626	2675	2683'10"	2783	2820-30	2865	2907	3157	3449	3840	4031
SAMPLE TYPE OR NO. *	T	S	S	C	C	S	T	S	S	C	S	S	S
Proteacidites biporus				•			•						
P. callosus				•									
P. crassus		•	•	•	•	•	•						
P. differentipollis						•							
P. dierama ms													
P. dilwynensis-grandis complex	•		•	•	•	•	•	•					
P. incurvatus	•		•	•		•	•						
P. kopiensis				•									
P. latrobensis				•		•	•						
P. leightonii				•		•	•						
P. nasus													
P. obscurus						•							
P. ornatus						•	•						
P. otwayensis ms													
P. pachypolus	•	•	•	•	•	•	•						
P. pseudomoides													
P. recavus				•									
P. rectomarginis													
P. rectus					•	•	•	•					
P. reticulatus	•		•	•		•							
P. reticuloconcavus ms													
P. reticuloscabratus													
P. retiformis													
P. rugulatus			•										
P. scitus	•												
P. tenuiexinus								•					
P. tuberculatus	•												
P. tuberculiformis	•												
P. tuberculotumulatus ms													
P. spp. undescribed	•	•	•	•	•	•	•	•					
Protohaploxypinus spp. R									•				
Pseudowinterapollis calathus													
P. cranwellae													
P. wahooensis													
Pyrolobospora reticulata													
Reticulatisporites pudens													
Retistephanocolpites nixonii ms													
Riccia boxatus ms				•									
Rogalskaisporites cf canalis									•				•
Rotverrusporites stellatus ms													
Rouseisporites reticulatus	•												
R. simplex									•				
Rugulatisporites mallatus complex		•		•		•		•					
Santalumidites cainozoicus			•	•		•	•						
Sapotaceoidaepollenites rotundus		•	•	•		•	•						
Schizaea digitatoides													
Schizocolpus marlinensis		•											
S. rarus ms													
Selagosporis sp.			•										
Spinizonocolpites prominatus													
Stereisporites antiquisporites	•			•			•	•	•	•	•	•	•
S. australis f. crassa													
S. cf pocockii													
S. punctatus ms			•	•		•	•	•					
S regium ms													
S. spp. indeterminate				•		•	•	•	•	•	•		•

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TABLE NO.

Well Name SNAIL-1 Basin TORQUAY Sheet No. 5 of 6

SAMPLE TYPE OR NO. *	T	S	S	C	C	S	T	S	S	C	S	S	S	
FOSSIL NAMES / DEPTHS (ft.)	2450-60	2546	2626	2675	2683'10	2783	2820-30	2865	2907	3157	3449	3840	4031	
Striatopodocarpidites spp. R									•					
Tetracolporites multistrixus ms								•						
T. palynius				•										
T. textus ms														
T. verrucosus														
Tetradopollis securus														
Tricolpites confessus														
T. gigantis ms														
T. phillipsii														
T. reticulatus			•											
T. simatus	•			•		•								
T. thomasii	•		•	•		•								
T. waiparensis														
Tricolpites spp. undescribed	•	•	•	•		•	•	•						
Tricolporites adelaidensis	•	•			•	•	•							
T. cf adelaidensis [longicolpate]														
T. angurium														
T. circumlumensus ms						•								
T. halis ms														
T. leuros		•	•											
T. lilliei														
T. moultonii ms								•						
T. paenestriatus				•										
T. retequetrus [sensu Stover & Partridge]														
T. scabratus complex			•											
T. sphaerica complex					•	•								
Tricolporites spp. undescribed	•	•	•	•	•	•	•	•						
Triletes tuberculiformis			•				•	•						
trilete spores indeterminate/undescribed	•	•	•	•		•	•	•	•	•	•	•	•	•
Trilobosporites tribotrys														
T. trioreticulatus	R		R							•				
Triorites magnificus	•		•	•		•								
Triporopollenites ambiguus	•						•							
T. crocodilus ms														
T. delicatus								•						
T. helosus			•			•	•							
T. scabratus	•			•			•							
T. sectilis complex														
Triporopollenites spp. undescribed														
Trisaccites spp.												•		
Tsugaepollenites spp.														
Velosporites triquetrus														
Verrucatosporites alienus					•	•								
V. attinatus ms		•	•											
Verrucosisporites kopukuensis complex	•	•	•	•	•	•	•	•						
Dictyotosporites speciosus	R								•			•	•	

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TABLE NOTE

Well Name SNAIL-1 Basin TORQUAY Sheet No. 6 of 6

FOSSIL NAMES / SAMPLE TYPE OR NO. *	T	S	S	C	C	S	T	S	S	C	S	S	S
DEPTHS (ft.)	2450-60	2546	2626	2675	2683'10"	2783	2820-30	2865	2907	3157	3449	3840	4031
DINOFLAGELLATES													
cf Achomosphaera alcicornu													
Apectodinium homomorpha							●	●					
A. hyperacantha													
Areosphaeridium capricornum	●		●										
A. diktyoplokus				●									
Chordosphaeridium inodes				●	●			●					
Deflandrea phosphoritica	●												
Glaphyracysta retiintexta								●					
Homotryblium tasmaniense				●									
Hystiocysta variata				●									
Hystrichosphaeridium rigaude	●												
Impagidinium spp.	●	●		●									
Nematosphaeropsis balcombiana	●												
Operculodinium centrocarpum			●										
Rhombodinium glabrum				●	●	●							
Schematophora speciosa	●												
Spinidium spp.													
Spiniferites spp.	●		●	●	●								
Thalassiphora spp.		●											
indeterminate/undescribed dinoflagelates	●			●	●	●							
ACRITARCHS													
Leiosphaeridia spp.									●				
Micrhystridium spp.									●				

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