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THE STRATIGRAPHIC PALYNOLOGY
of
SPEKE No. 1,
GIPPSLAND BASIN.

for: AUSTRALIAN AQUITAINE PETROLEUM PTY. LTD.

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SPEKE No. 1. SUMMARY of STRATIGRAPHIC PALYNOLOGY

Depth (m)	SPORE POLLEN ZONE	DINOFLAGELLATE ZONE	AGE	PALEOENVIRONMENT
1814 to 1825A	? Middle *N. asperus*	?	? Late Eocene	marginal marine
1825B		-		non marine
1835		?		marginal marine
1848.5	Middle *N. asperus*	*C. incompositum*	Late Eocene	
1865	BARREN			
1907.5	? Lower *N. asperus*	?	? Mid Eocene	marginal marine
1946 to 1994.5		-		non marine
2070 to 2204	INDETERMINATE			
2304	*M. diversus*-*P. asperopolus*	?	Early Eocene	marginal marine
2325 to 2648.5	*L. balmei*	-	Paleocene	non marine
2671.5	? *T. longus*		? Maastrichtian	
2688 to 2750.5	*T. longus*		Maastrichtian	

Helene A. Martin September 1984.

INTRODUCTION

Most of the assemblages from this well are poorly preserved. The finer morphological features may be obliterated by corrosion and the grains may be broken, preventing reliable identification which is especially important for the diagnostic species. Consequently, zone determinations may be based on slender evidence. If there is any independant evidence, it should be used to resolve some of the questionable zone determinations based on weak evidence.

SPORES and POLLEN

The spores and pollen identified are listed in Table 1 and the ranges of diagnostic species are shown on Figure 1. The species in Table 1 are grouped into three categories:-

1) Spores, mostly from ferns and their allies.
2) Gymnosperm pollen: pines e.g. hoop pine, Huon pine etc. These would have been mostly forest trees. Their relatives are found today in forests of Tasmania, New Zealand, New Caledonia and New Guinea. Only a few grow on the Australian Mainland and they are restricted to rainforests and the wetter climates.
3) Angiosperm pollen: flowering plants. These may have been trees or shrubs.

An assessment of the abundance of plant tissue debris is included in Table 1. Plant tissue debris is abundant in non marine swamps but less so in fresh water lakes. Plant tissue debris is not abundant in marine environments unless the location is close to a river outlet. However, other factors are involved with the abundance of plant tissue debris, e.g. preservation. Poor preservation may destroy or render unrecognisable much of the plant tissue debris.

Spore pollen zonation follows Stover & Partridge (1973). Partridge (1976) modified the ages of the zones somewhat and subdivided some of the zones. The Lower *N. asperus* Zone of Stover & Partridge (1973) is subdivided into an older Lower and a younger Middle *N. asperus* Zone, without diagnosis or description (Partridge 1976). A discussion of the Middle *N. asperus* Zone in Stover & Partridge (1982) shows that it is based on the species which first appear in the upper part of the Lower *N. asperus* Zone (in Stover & Partridge, 1973), e.g. *Triorites magnificus*. This discussion in Stover & Partridge (1982) is used as a diagnosis of the Middle *N. asperus* Zone.

1. 2688 - 2750.5m. *T. longus* Zone, Maastrichtian into earliest Paleocene.

These assemblages are very restricted, containing mostly long ranging species. The diagnostic spore *Latrobosporites amplus,* whose range terminates at the top of the *T. longus* Zone, is found at 2688m. It is, however, poorly preserved and only one specimen has been seen, so the evidence for the *T. longus* Zone is not very strong.

2. 2671.5m. ? *T. longus* Zone.

This assemblage contains one very poor specimen of possibly *Tricolpites confessus* whose range terminates at the top of the *T. longus* Zone. Evidence for the *T. longus* Zone is thus weak.

3. 2325 - 2648.5m. *L. balmei* Zone, Paleocene into earliest Eocene.

Lygistipollenites ellipticus which is restricted to the *L. balmei* Zone is found in the lowermost level and in most of the assemblages of this interval. Species which first appear in the *L. balmei* Zone, viz., *Haloragacidites harrisii, Nothofagidites flemingii* and *Rugulatisporites mallatus* are found here too.

4. 2304m. *M. diversus - P. asperopolus* Zone, Early Eocene.

The presence of *Spinizonocolpites prominatus* which first appears at the base of the *M. diversus* Zone denotes the oldest possible age. All of the spore-pollen species present range into the Lower *N. asperus* Zone. However, the dinoflagellate *Muratodinium fimbriatum* is present (see discussion below) and its range is more restricted, from within the *M. diversus* Zone to within the *P. asperopolus* Zone (see Figure 2).

Lygistepollenites balmei and *Australopollis obscurus* are present also, but their ranges end at the top of the *L. balmei* Zone and hence are incompatible with *M. fimbriatum*. The former two species are thought to have been reworked.

5. 2070 - 2204m. Indeterminate.

The evidence here is so limited that it is not possible to place these assemblages in a zone.

6. 1907.5 - 1994.5m. ? Lower *N. asperus* Zone, ? Middle Eocene.
Nothofagidites vansteenisii is found throughout this interval and denotes at least the Lower *N. asperus* Zone. There are no definite, diagnostic species of the Middle *N. asperus* Zone. There is, however, some uncertainty as to whether *Verrucosisporites cristatus* begins its range in the top of the Lower *N. asperus* Zone or within the Middle *N. asperus* Zone. Thus the determination of Lower *N. asperus* Zone is based largely on negative evidence.

7. 1848.5m. Middle *N. asperus* Zone, Late Eocene.
There is no spore-pollen evidence to distinguish this assemblage from those in the preceding interval. However, the dinoflagellate *Vozzhennikovia extensa* is present (see discussion below), and its range is restricted to the Middle *N. asperus* Zone (see Figure 2).

8. 1835 - 1814m. ? Middle *N. asperus* Zone, ? Late Eocene.
These assemblages are stratigraphically above the Middle *N. asperus* Zone at 1848.5m, so must be this age or younger. There is no evidence, however, to indicate a more precise age which will require independant evidence.

There is some contradictory evidence. *Proteacidites pachypolus* is present but its range ends in the Lower *N. asperus* Zone, so it could be reworked.

DINOFLAGELLATES.

Dinoflagellate zonation follows Stover, Helby & Partridge (1979). The zones in this reference are much the same as those in Partridge (1976), with some minor amendments in the former. Neither of these references describe or diagnose the zones. In this report, zone determination relies upon the ranges of a few selected species (see Figure 2). Some assemblages, however, do not fit any named zone although the age can be deduced from the ranges of the species present.

For dinoflagellates identified, see Table 1.

1. 2304m. Early Eocene.

Muratodinium fimbriatum and *Kenlyia lophophora* both appear at the top of the *A. hyperacanthum* Zone in the Early Eocene. *M. fimbriatum* has the shortest range and terminates at the top of the *K. thompsonae* Zone, of probably Early Eocene age (see Figure 2). The longer ranging *Apectodinium homomorphum* is present also. Both *M. fimbriatum* and *A. homomorphum* are abundant.

2. 1907.5m. ?

One long ranging species and two poorly preserved, unidentifiable species are present. It is not possible to determine the zone or the age from this evidence.

3. 1848.5m. *C. incompositum* Zone, Late Eocene.

Vozzhennikovia extensa, whose range is restricted to the *C. incompositum* Zone, is present here.

4. 1835m. ?

Most of the dinoflagellates are corroded or broken, hence a reliable identification is not possible. The few which could be identified are of no diagnostic value.

5. 1814 - 1825Am. ? Late Eocene.

Deflandrea phosphoritica and one very poor specimen, probably *Alisocysta ornata*, are present in 1825Am. The species at 1814m are of no diagnostic value.

PALEOENVIRONMENT.

The sequence is non-marine up to 2325m. One dinoflagellate has been found at 2351.9m, but this is considered insufficient to indicate otherwise.

From 2304m to 1814m, there is a series of alternating marginal marine and non-marine environments. See the summary of the stratigraphic palynology for details.