DEPARTMENT OF MINES AND ENERGY

GEOLOGICAL SURVEY

SOUTH AUSTRALIA

REPORT BOOK 96/2

PALYNOLOGICAL DATING AND CORRELATION OF MESOZOIC AND TERTIARY SEDIMENTS FROM EYRE PENINSULA, S.A.

DIAMOND VENTURES NL.

N F ALLEY

Biostratigraphy

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Palynological dating and correlation of Mesozoic and Tertiary sediments from Eyre Peninsula, S.A.
Diamond Ventures NL.

Neville F. Alley

Summary

Sediments analysed from VB06 and VB07 are correlative with an early phase of the Garford Formation, either in the Middle Miocene or the Early Miocene. Environment of deposition appears to have been fairly open marine, or at least an estuarine setting that was open to the ocean.

Sediments from VB09 and VB10 are correlative with the Eocene Pidinga Formation, possibly a Middle Eocene marine phase.

The assemblage from VB08 is ambiguous but is probably Mesozoic and thus a correlation with the Late Jurassic Polda Formation is indicated.

Introduction

Five samples from western Eyre Peninsula, S.A., were submitted by Diamond Ventures NL, Camberwell, Victoria, for palynological dating.

The samples include:

VB06-1
38-40 m

VB07-1
40-42 m

VB08-1
30-32 m

VB09-1
102-104 m

VB10-1
68-70 m

The laboratory processing was undertaken by Laola Pty. Ltd., Perth, and the microscope analyses, dating and correlation by Neville F. Alley, Principal Geologist, Mines and Energy, South Australia.

The data were processed and the details presented graphically using Stratabugs 1.2 and CorelDraw 5 software.

General composition of the palynofloras (Fig. 1)

The yields of palynomorphs from the samples are adequate for recording but not for undertaking counts for quantitative analyses. Yield and preservation are sufficient,however, to allow dating and correlation to be undertaken.

VB06-1
38-40 m
Fair preservation and yield containing common ***Nothofagidites*** spp. and relatively rare ***Proteacidites*** spp. The assemblage is dominated, by far, by marine microplankton (dinoflagellates), with at least 41 species being present.

VB07-1
40-42 m
Fair to good preservation and yield similar in aspect to VB06 except that ***Myrtaceidites eucalyptoides*** (***Eucalyptus***) is also relatively common. Dinoflagellates are again abundant with some 45 species present.

VB08-1
30-32 m
Fair preservation but poor yield. The assemblage is dominated by ***Alisporites grandis*** and ***A. similis***. This is an interesting assemblage in that it is dominated by Mesozoic pollen and spores but contains a significant amount of Tertiary pollen and minor dinoflagellates. This aspect is discussed below.

VB09-1
102-104 m
Poor preservation and yield. Common taxa include ***Haloragacidites harrisii*** and ***Nothofagidites*** spp. along with a reasonably diversity in the ***Proteacidites*** group. At least 12 species of dinoflagellates are present in the assemblage.

VB10-1
68-70 m
Poor preservation and fair yield; similar in aspect to the assemblage in VB09; at least 18 species of dinoflagellates are present.

Dating and correlation

VB06 and VB07

Due to the similarity of the palynofloras from these two samples they are treated together. They are correlated with the ***Proteacidites tuberculatus*** spore-pollen Zone of Stover and Partridge (1973). However, this particular interval of time in Australia is not only difficult to separate from latest Eocene palynofloras but also difficult to subdivide. Thus, all that can be said of the age of the palynofloras in the wells is that they are Oligocene to Early Miocene in age (Fig. 2 and Fig. 3).

This age determination is made on:

1) the preponderance of ***Nothofagidites*** spp. pollen,

2) the absence of diverse ***Proteacidites*** species typical of Eocene palynofloras, and

3) the absence of the Middle-Late Miocene marker species ***Triporopollenites bellus*** and its key associates ***Polypodiaceoisporites tumulatus*** and ***Symplocoipollenites austellus***, the earliest appearance of which mark the base of the ***T. bellus*** Zone (Fig. 2).

A few other general comments in support of this determination are worth making.

The presence of ***N. falcatus*** indicates that the sediments analysed cannot be any older than the Middle Eocene, since the earliest appearances of this species marks the base of the Middle Eocene Lower ***Nothofagidites asperus*** Zone. The palynofloras also lack ***Triorites magnificus*** which is generally restricted to the Late Eocene zone bearing that name (Fig. 2). Since the palynofloras also lack the key species for the Middle-Late Miocene ***Triporopollenites bellus*** Zone, then the palynofloras from the wells are correlative with the ***Proteacidites tuberculatus*** Zone. This is supported by the presence of ***Acaciapollenites myriosporites*** (ie. wattle) which is consistently present in Australian palynofloras from the Early Oligocene onwards, and by the lack of pollen of the Chenopodiaceae (eg. saltbush) and Asteraceae (eg. daisy family - although one specimen is present in VB07) which become increasingly more common in the Miocene and Pliocene.

However, bearing in mind the position of the wells, the depth and lithology of the sediments sampled, the abundance of the dinoflagellates and the known Tertiary stratigraphy of the Eucla Basin the following correlation can be made.

No organic-rich clayey sand and clay are known from the Oligocene to Early Miocene in the Eucla Basin (Benbow ***et al.***, 1995). Marine facies of the Middle Miocene part of the Garford Formation are present in the Port Kenny area (Benbow ***et al.***, 1995). These sediments comprise dark carbonaceous sand and clay similar to those in VB06 and VB07. The very high species diversity in the dinoflagellate assemblages in the latter two samples suggests fairly open marine conditions prevailed during deposition, which, however, is unknown from the Garford Formation so far.

Thus:
The sediments at 38-40 m in VB06 and at 40-42 m in VB07 could be correlated with the Middle Miocene marine facies of the Garford Formation. This would imply that the palynological date given above is incorrect and that the key species for the ***Triporopollenites bellus*** Zone are not present in the samples.

The sediments could alternatively represent a hitherto unknown earlier phase of the Garford Formation deposited during a peak in sea level in the Early Miocene, coincident with the deposition of an early phase of Nullarbor Limestone (Benbow ***et al.***, 1995).

In any event at least an Early to Middle Miocene age is indicated.

VB09 and VB10

These samples have a number of characteristics in common and are thus treated together.

Although key fossils on which a palynological zonation could be made are not present, the following comments are relevant to the dating and correlation of the samples:

The abundance of ***Nothofagidites*** spp., the presence of ***Nothofagidites falcatus*** and the reasonable species diversity in the ***Proteacidites*** group indicate that the assemblages can be no younger than Late Eocene and no older than Middle Eocene.

.***Spinizonocolpites*** (the pollen of the coastal palm, ***Nypa***) is present in VB10 and this taxon is believed to range from the Early to Middle Eocene).

Thus the assemblages are at least Middle to Late Eocene and possibly Middle Eocene. The lack of the Late Eocene marker species ***Triorites magnificus*** supports a Middle Eocene designation.

The dark sand to sandy clay lithologies present, the depth of the samples, the presence of dinoflagellate assemblages of moderate to high species diversity and the age indicate a correlation of the Middle Eocene marine facies of the Pidinga Formation (Alley and Beecroft, 1993; Benbow ***et al.***, 1995).

VB09

Due to the poor yield of palynomorphs a palynological zonation for this sample is not possible. However, a broad age of Jurassic can be suggested on the basis of the following evidence.

Although the assemblage contains a mixture of Mesozoic and Tertiary pollen and spores, the Mesozoic forms are by far the most abundant, especially ***Alisporites grandis/A. similis***. Thus, the latter are here regarded as ***in situ*** and the presence of the Tertiary forms (including the few dinoflagellates) are believed to be due to downhole contamination, probably from overlying marine Garford Formation.

The presence of the Late Jurassic Polda Formation at shallow depth (similar to that of VB09) in the western part of the Polda Basin (Alley, 1992, 1993) suggests that the sediment sampled in VB09 is correlative with the Polda Formation.

Conclusions

Sediments analysed from VB06 and VB07 are correlative with an early phase of the Garford Formation, either in the Middle Miocene or the Early Miocene. Environment of deposition appears to have been fairly open marine, or at least an estuarine setting that was open to the ocean.

Sediments from VB09 and VB10 are correlative with the Eocene Pidinga Formation, possibly a Middle Eocene marine phase.

The assemblage from VB08 is ambiguous but is probably Mesozoic and thus a correlation with the Late Jurassic Polda Formation is indicated.

References

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DIAMOND VENTURERS

Palynological Range Chart
Style :Presence/Absence
Author: N.F. Alley
Date :11-January-1996
Palynology Eyre Peninsula

Department of Mines and Energy
Parkside, South Australia

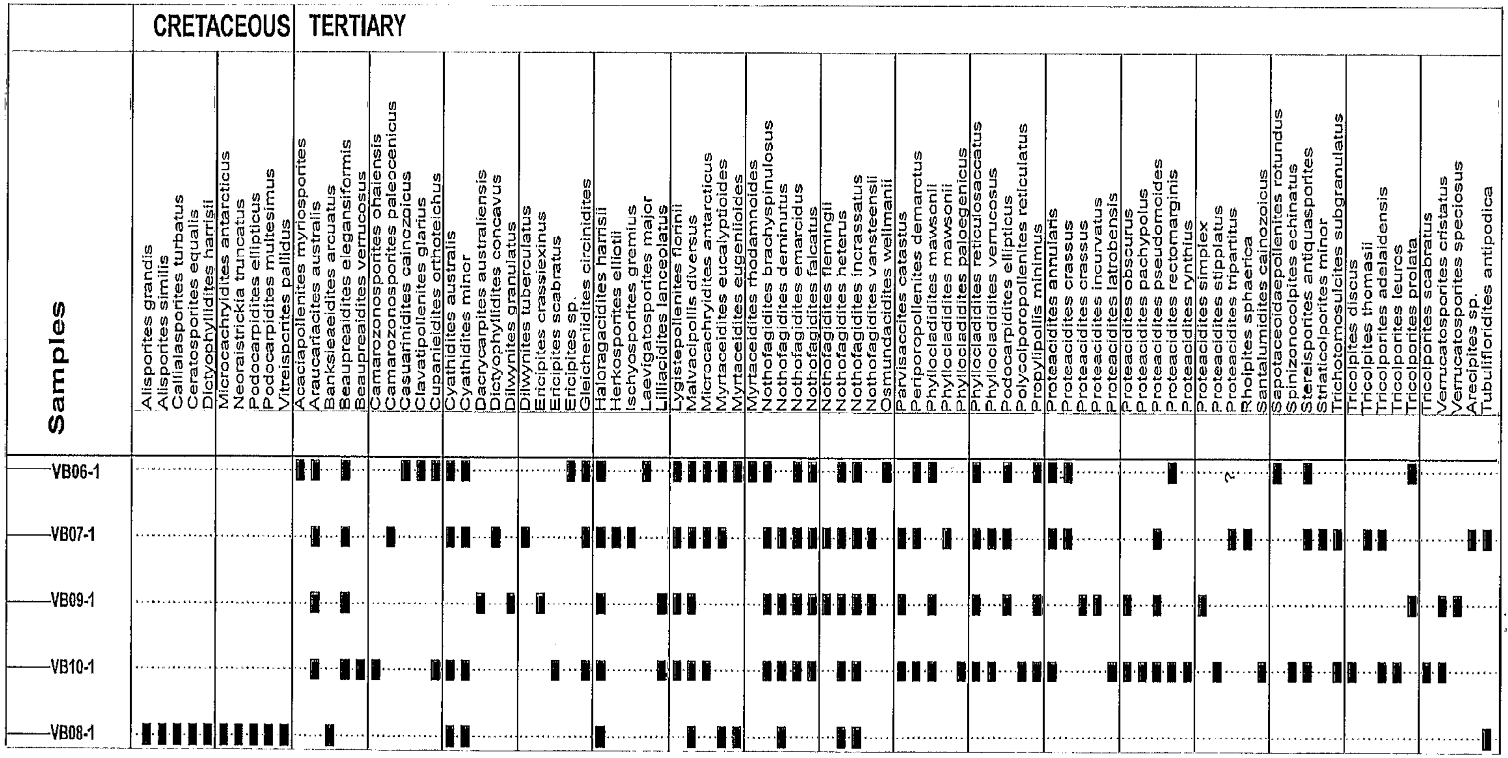


Figure 1

Plan No. 1996-0720

Plan No. 1996-0721

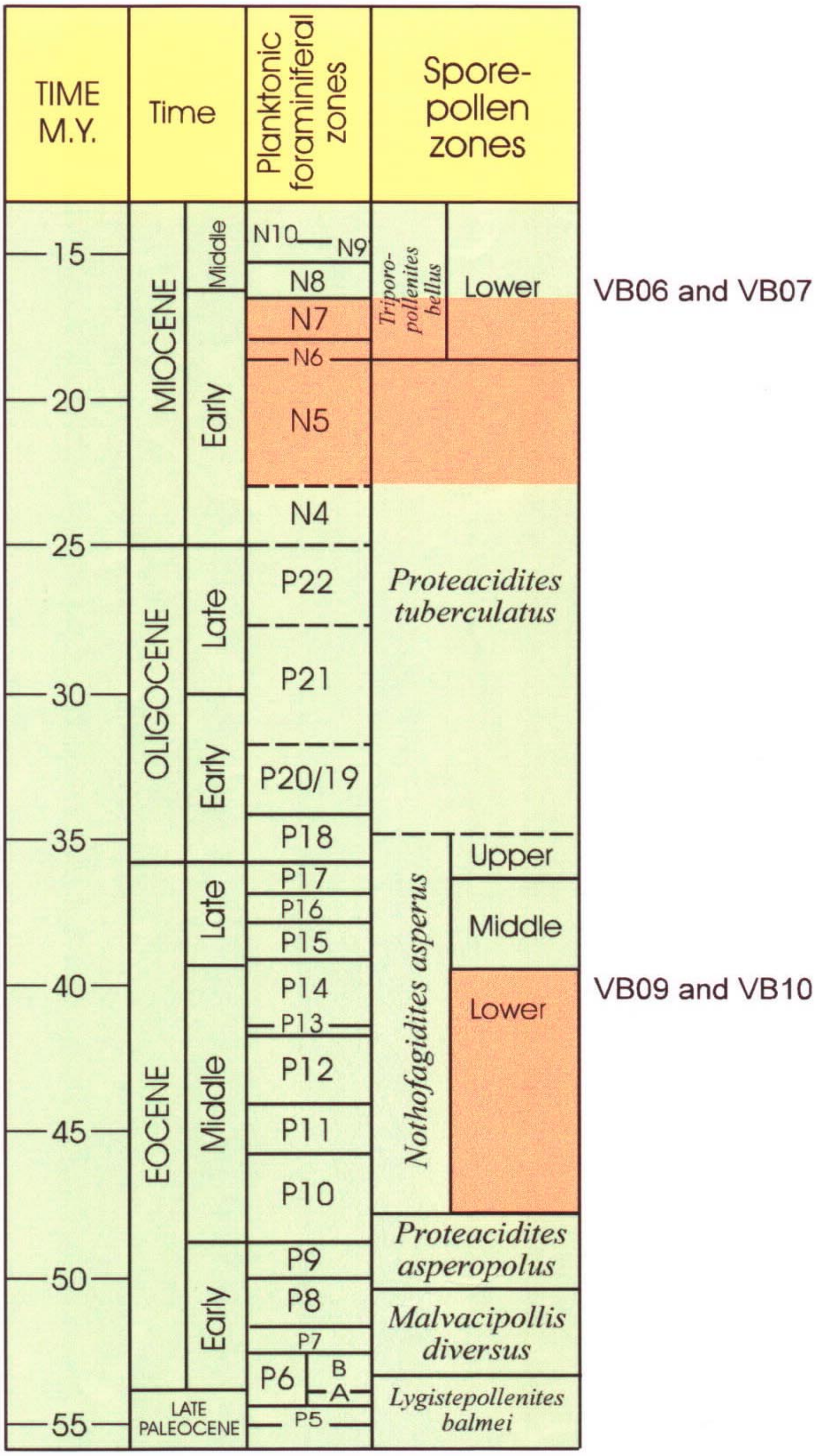
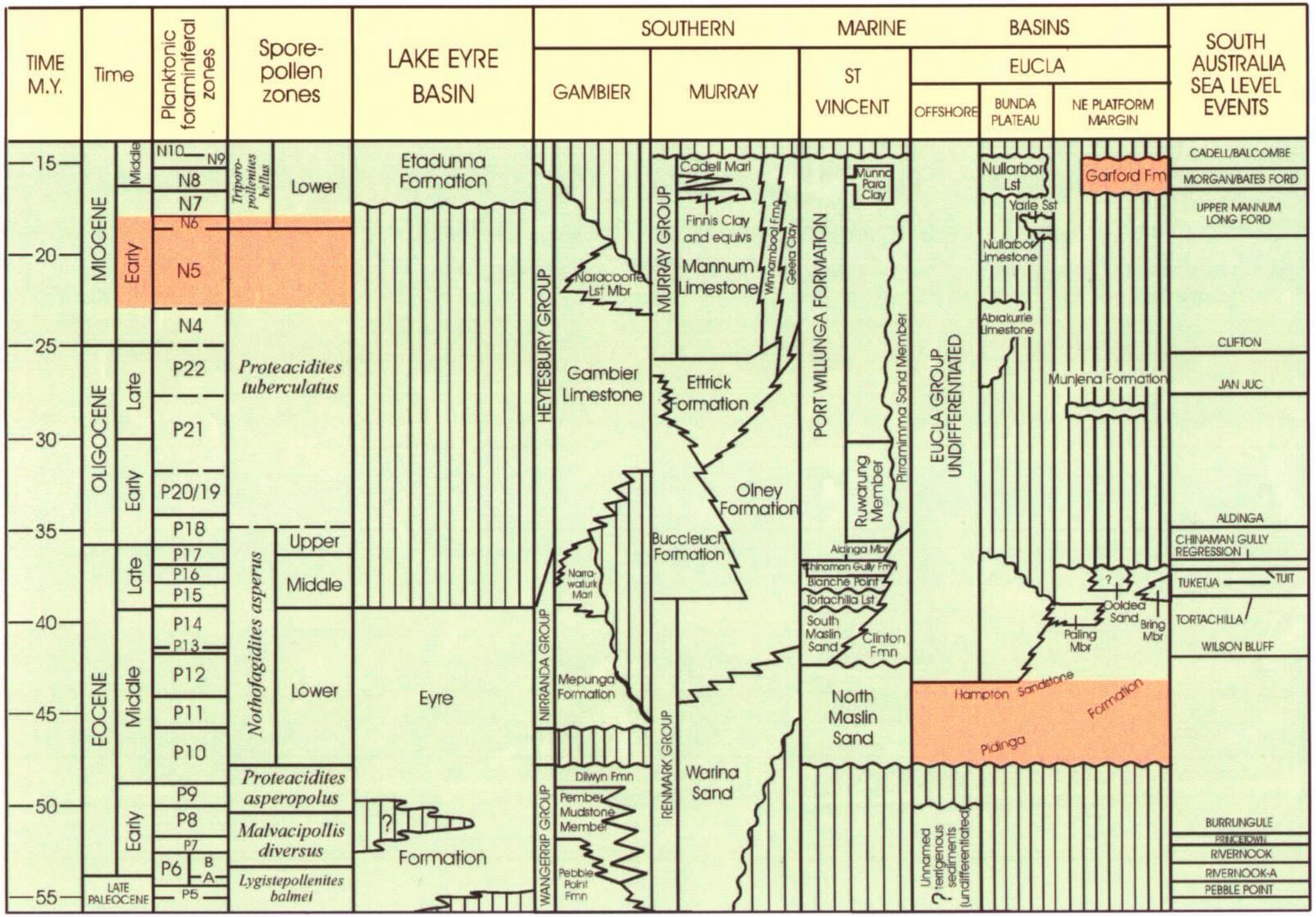


Figure 2



Plan No. 1996-0722

Figure 3