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MEMO: REVIEW PALYNOLOGY OF NERITA-1,
TORQUAY EMBAYMENT,
BASS BASIN, AUSTRALIA

TO: C. W. Waring, Amoco Australia

FROM: Roger Morgan, Palynologist

Date: 28th January, 1987

I INTRODUCTION

As part of a review of available palynology in the Torquay Embayment, Amoco requested a paper review of the Nerita-1 palynology reports by Dettmann (1967) and BIPM (1967). The following discussion sets the report into the context of the palyostratigraphy currently used by Amoco and presented as Figure 1.

II PALYNOSTRATIGRAPHY

A. 2106 ft. (swc): middle N.asperus Zone (middle to late Eocene) at the top and base on youngest and oldest Triorites magnificus respectively. Marginal marine on the very rare dinoflagellates.

B. 2270 ft.(swc)-2496 ft.(swc): lower N. asperus Zone (middle Eocene) at the top on the absence of younger indicators and at the base on oldest common Nothofagidites spp. including oldest N. deminutus. Oldest Areosphaeridium arcuatum (as Cordosphaeridium capricornum) at 2270 ft. provides corroborating dinoflagellate confirmation. Non-marine at 2496 ft. on the absence of dinoflagellates, brackish at 2270 ft. on the very rare presence of dinoflagellates.

C. 2570 ft. (swc) - 2682 ft. (swc) : age uncertain : probably lower N.asperus Zone (Middle Eocene) but could be as old as lower M.diversus to P. asperopolus Zones (Early Eocene). These two samples are not well characterised. Assignment to the lower N.

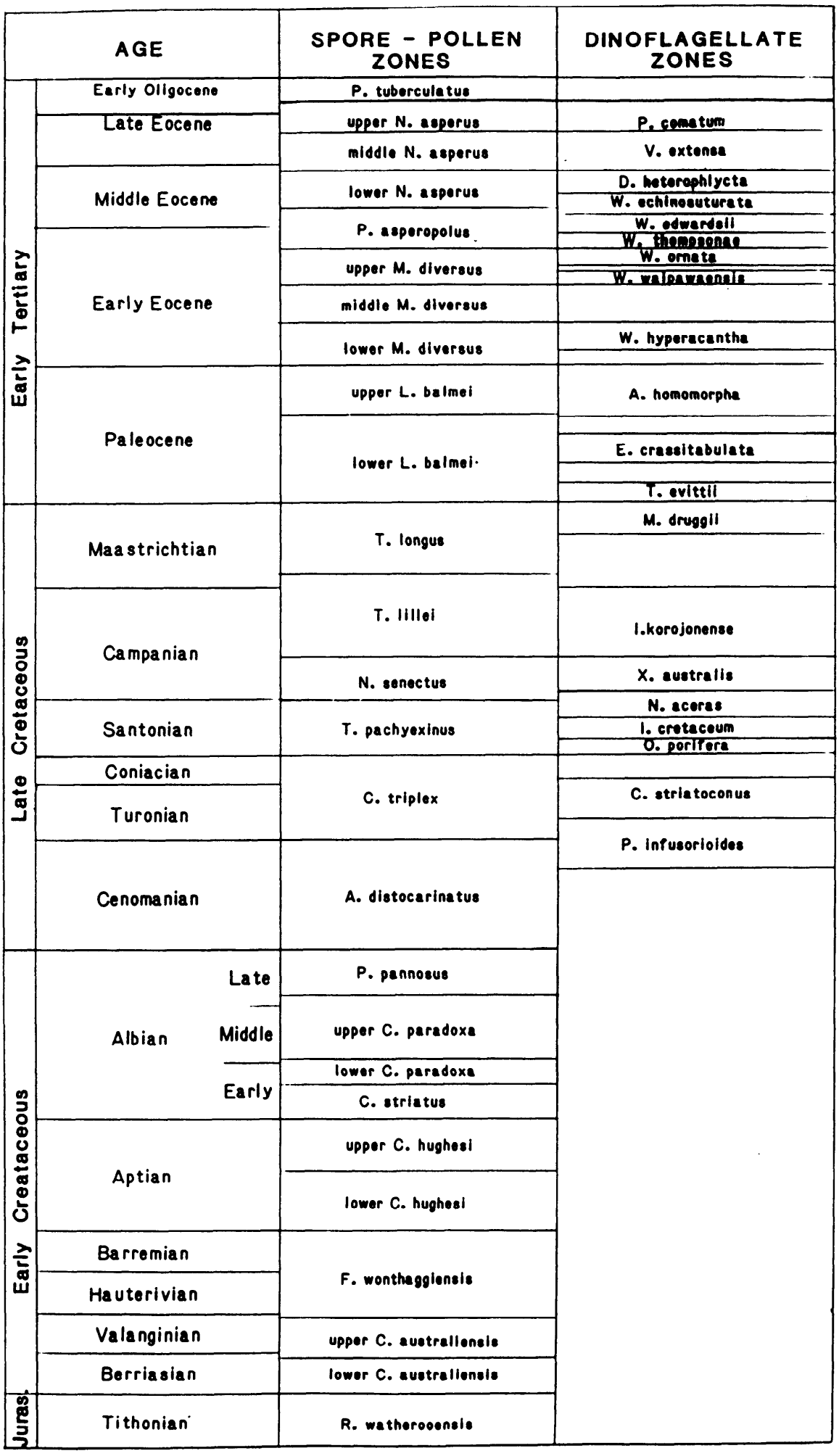

FIGURE 1 ZONATION FRAMEWORK

Cordosphaeridium capricornum and the dominance of N. emarcida over H. harrisii at 2682 ft. However, these could be caved in the low yielding sidewall core at 2682 ft. Assignment to the P. asperopolus to M. diversus interval is suggested by the dominance of Haloragacidites harrisii over Nothofagidites at 2570 ft. and youngest Spinozonocolpites prominatus at 2682 ft. Brackish environments are suggested at 2682 ft. by the rare dinoflagellates but, as discussed above, these may be caved.

D. 2846 ft. (swc) : upper L. balmei Zone (Late Paleocene) at the top on youngest Gambierina rudata (as aff. Triorites edwarsii) and Australopollis obscurus and at the base on oldest Proteacidites incurvatus. Some taxa, such as Proteacidites ornatus are inconsistent with this assignment, but are interpreted as caved or misidentified. Non-marine on the absence of dinoflagellates.

E. 3048 ft. (swc) - 3867 ft. (swc) : lower L. balmei (early Paleocene) at the top and base on the consistent presence of Gambierina rudata (as aff. Triorites edwardsii) and G. edwardsii without younger or older indicators respectively. Oldest Lygiste pollenites balmei at 3867 ft (swc) confirms the assignment. Non-marine to occasionally brackish on the usual absence, but occasional rare presence of dinoflagellates.

F. 4065 ft. (swc): age uncertain in the range lower L. balmei (early Paleocene) - T. lillei (Maastrichtian - Campanian). Youngest Tricolporites pachyexinus suggests penetration of the late Cretaceous but is not usually consistently present above the N. senectus Zone and not usually seen above the T. lillei Zone. As the Dettmann report predates much of the taxonomy of this interval, most of the other key species have not been identified. If T. pachyexinus is reworked (as seems likely,) the sample could belong to the lower L. balmei Zone. If it is in place, it may be as old as the T. lillei Zone. Non-marine on the absence of dinoflagellates.

G. 4245 FT. (swc) : T. lillei (Campanian-Maastrichtian) to possibly T. longus (Maastrichtian). The presence of

Tricolporites lillei indicates assignment to the T. longus to T. lillei interval. The relative scarcity of Nothofagidites senectus suggests assignment to the T. longus Zone, but the presence of common Tricolporites pachyexinus suggests more strongly assignment to the T. lillei Zone. Restudy in the light of recent taxonomy is required to resolve this interval. Non-marine on the absence of dinoflagellates.

H. 4273 ft. (swc) - 4660 ft. (swc) : probably all T. lillei Zone (Campanian) at the top on youngest common Nothofagidites senectus (supported by youngest common Tricolporites pachyexinus) and at the base on oldest common N. senectus and Gambierina rudata (as aff. Triorites edwardsi). Restudy is required to find the recently described species and clearly resolve the sequence. Non-marine on the absence of dinoflagellates.

a. 4782 ft. (swc) : probably N. senectus Zone (Campanian) at the top on the absence of younger indicators and at the base on oldest Tricolpites sabulosus. Brackish marine on the presence of very rare dinoflagellates.

J. T. pachyexinus (Santonian) to C. paradoxa (mid Albian) Zones not seen and presumably absent by hiatus.

K. 4804 ft. (swc) : indeterminate Early Cretaceous due to very poor yields. However, youngest Foraminisporis asymmetricus suggests an Early Cretaceous rather than Late Cretaceous age.

L. 4944 ft. (swc) - 6068 ft. (swc) : C. striatus Zone at the top on the absence of younger indicators (approximately supported by youngest Dictyotosporites speciosus) and at the base by oldest Crybelosporites striatus. Non-marine partly lacustrine on the usual absence of microplankton, but the occasional presence of non-spiny algal acritarchs (Schizosporis).

M. 6456 ft. (swc) : possibly C. hughesi Zone at the top on the absence of younger indicators and at the base on oldest consistent Cicatricosisporites australiensis. However, it is not impossible that the sample belongs to the C. striatus Zone but

that C. striatus was not seen due to the poor yield and preservation. Non-marine on the absence of microplankton.

III CONCLUSIONS

A. Eumeralla Formation equivalent of ? Aptian to early Albian (? C. hughesi to C. striatus Zones) age exists below 4798 ft.

B. An unconformity at 4798 ft. marks the non-deposition or removal of time equivalents of the upper Eumeralla Formation of the Otway Group (mid to late Albian) and the lowest part of the Eastern View Formation (Cenomanian to Coniacian).

C. A thick portion of the Eastern View Formation of Santonian to Paleocene age (N. senectus to L. balmei Zones) exists between 2846 ft. (or slightly shallower) and 4798 ft. This section is marginal marine at the base but mostly non-marine with intermittent brackish episodes.

D. A short section of Eastern View Formation from 2555 ft (or shallower) to 2682 ft. (or deeper) is of uncertain age and is close to an unconformity (with angular relationships on seismic). The unconformity is placed at 2555 ft. in the completion report (presumably on lithological and siesmic velocity evidence).

The age of the uncertain section may be Middle Eocene (lower N. asperus Zone). If so, it is essentially conformable with the overlying section, the unconformity at 2555 ft. is a minor intra middle Eocene event, and a more major palynological unconformity (removing the Early Eocene) exists in the sample gap 2682 ft. to 2846 ft. Alternatively, the unconformity at 2555 ft. may have been picked too high, lie within the gap 2682 - 2846 ft. and be the only unconformity present.

The other age possibility for this section is condensed Early Eocene (within the M. diversus to P. asperopolus Zone interval). If so, then the unconformity at 2555 ft. may represent truncation of the condensed Early Eocene by the rapidly deposited Middle Eocene.

Of these, the most likely possibility may be the last, but they cannot be conclusively resolved without more palynology and checking of the unconformity location using sonic velocity data.

E. An upper Eastern View Formation (or Boonah Formation) exists between 2091 ft. and 2555 ft. and is of middle Eocene age (lower N. asperus to basal middle N. asperus) non-marine at the base, but becoming brackish to marginal marine towards the top.

F. Conformably overlying this, is the marginally marine Demon's Bluff Formation, usually of Middle Eocene age (middle N. asperus Zone).

IV RECOMMENDATIONS

Two unclear intervals require further work.

A. The uncertain interval between the well dated samples at 2496 ft. and 2846 ft. needs to be tested for the presence of the Early Eocene. If the original swc preparations from 2570 ft. and 2682 ft. are available, they would be vital. If not, 30 ft. cuttings would be adequate.

B. The Paleocene to Santonian interval (2846 - 4798 ft) was studied by Dettamann (1967) before publication of the taxonomy and biostratigrapphy of Stover and Partridge (1973). This interval needs restudy to crisply define the new zones. The original swc preparations would be adequate if available. If not, 200 ft. cuttings would suffice.

V REFERENCES

B.I.P.M. (1967) Palynological examination of Tertiary samples from well Nerita - 1, Otway Basin, Australia. unpubl. rept. to Shell

Dettmann, M.E. (1967) Palynological report on Shell Nerita No. 1 well, 2106 - 6456 ft. unpl. rept. to Shell.