

TERTIARY FORAMINIFERAL SEQUENCE - INTERSTATE'S WOOLSTHORPE-1

OTWAY BASIN - VICTORIA

Summary:-

150' - 570' upper Miocene - inner shelf - littoral
 570' - 930' lower Miocene - continental shelf - transgressive
 930' - 1020' upper Oligocene - shallow marine - transgressive
 1020' - 1040' ? Oligocene - brackish - marginal marine -
 initial marine
 1040' lower Cretaceous

Introduction:

Rotary cutting samples were examined from 150' to 1020'. Down hole contamination appeared to be negligible.

The sequence extended from Oligocene (at 1020') to upper Miocene. An initial brackish water sand was recognised in cutting sample 1020' - 1050' which is probably oligocene in age. Woolsthorpe-1 contains a Tertiary sequence typical of the northern margins of the Otway Basin and the absence of Eocene, Paleocene and upper Cretaceous sediment was to be anticipated.

UPPER MIOCENE 150' - 570'

The first fauna (down-hole) was encountered in sample 150' - 180' which consisted of worn bryozoal fragments, a sparse planktonic foraminiferal fauna of Orbulina universa and Globigerina praebulloides. The benthonic fauna was dominated by miliolids. Many of the bryozoal fragments are encrusted by Acerulina inhaerens, suggesting that the fragments were washed into a semi-littoral environment. Other benthonic fauna includes Cibicides opacus, C. subhaidingeri and Notorotalia clathrata. Biostratigraphic zonation is difficult because of the absence of Globorotalia spp., probably due to the shallow origin of the sediment. An upper Miocene rather than a Pliocene age is favoured.

The fauna described above persists to 390', with the suggestion that sedimentation below 240' was on the inner continental shelf (water depth 100' by analogy with recent faunas on southern Australia shelf). The benthonic fauna are more diverse with a number of arenaceous species including Ammosphaeroidina sphaeroidiniformis, Clavulinoides victoriensis, Pseudoclavulinoides rudis and Textularia spp. Elphidium arenea was first noted at 360' which can be correlated with Zonule D of Taylor's (1966) Gippsland scheme.

At 390' there is a marked increase in number and specific diversity of the planktonic fauna. Orbulina suturalis, Globigerinoides bisphericus, G. glomerosus and G. trilobus indicate Taylor's Zonule E at the base of the upper Miocene. It is noted that a two-fold division of the Miocene is now used by the author. The benthonic fauna is similar to that below 240' apart from a large population of Cibicides victoriensis at 540'.

LOWER MIOCENE 570' - 930'

Orbulina spp. were absent in the samples below 570' and specimens of Globigerinoides bisphericus were almost indistinguishable from G. trilobus. The benthonic fauna includes Cibicides perforatus and Astrononion centroplax. The overall faunal aspects indicate the lower Miocene. Unworn bryozoa become more frequent and sea-weed adherent foraminifera are common (e.g. Carpentaria rotaliformis). By analogy with the recent, the water depth would have been between 200' and 300', thus deeper than in the upper Miocene.

UPPER OLIGOCENE 930' - 1020'

The top of the Oligocene was taken as the highest appearance of Globigerina euapertura. Shallow water benthonic species such as Calcarina mackayi, Eponides repandus, Cibicides perforatus, miliolids and Gaudryina spp. were common. The bryozoal fragments were well worn with a smoothed iron oxide coating. The biofacies is identical with that of the upper Oligocene Clifton Formation of the Princetown area. Unfortunately Globorotalia spp. were absent (as for the whole sequence) so that precise zonation cannot be achieved.

? OLIGOCENE 1020' - 1040'

Directly above the lower Cretaceous Otway Group the cutting sample contained well rounded sand and a number of very coarsely arenaceous specimens of Haplophragmoides sp. ?. The nature of these specimens imply a brackish water environment. Zonation is not possible, but as there is no apparent sedimentation break with the overlying sediments an Oligocene age is suggested. After all, the basal unit of the Clifton Formation is often a non-calcareous sand.

CONCLUSIONS

The Woolsthorpe-1 Tertiary sequence shows:-

- (i) Paleocene and Eocene sedimentation did not reach the site or were removed by erosion in late Eocene times. Whatever the mechanism it is obvious that the lower Cretaceous Otway Group was structurally high in Oligocene time.

- (ii) Shallow marine influence reached the site by late Oligocene and the transgression reached its peak in lower Miocene with continental shelf deposition. However the site was isolated from oceanic currents as is evident by the absence of Globorotalia spp.

- (iii) Maximum transgression was in the lower Miocene with gradual regression during the upper Miocene.

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1st September, 1968.