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DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOLOGICAL SURVEY

EARLY MIDDLE EOCENE AGE OF THE MASLIN BAY FLORA SOUTH AUSTRALIA

by

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EARLY MIDDLE EOCENE AGE OF THE MASLIN BAY FLORA, SOUTH AUSTRALIA

A lens of carbonaceous clay in the North Maslin Sands at Maslin Bay, some 20 miles south of Adelaide, contains a rich and excellently preserved assemblage of plant fossils. These leaf beds are slightly higher than the leaf impressions described by Chapman (1935). Leaves, flowering structures, fruits, pods and seeds, fungi and a freshwater microfauna have been prepared by Dr. R.T. Lange in the Botany Department, University of Adelaide (pers. comm.; Lange, in press). In due course the assemblage will surely rank high in Tertiary palaeobotany and so its age is important.

In the section at Maslin Bay the North Maslin Sands at the base are succeeded by the South Maslin Sands, Tortachilla Limestone and Blanche Point Marls (Reynolds, 1953). Although a small molluscan fauna in the South Maslin Sands is reported to have an Upper Eocene aspect (Ludbrook, 1963, 1969), the Tortachilla Limestone is the lowest unit dated with some precision thus far; it is put low in the Upper Eocene (Lindsay, 1969). The North Maslin Sands could be assumed as Eocene in age by downward extrapolation.

Palynological studies indicate a correlation of the leaf beds with the Burrungule Member of the Knight Formation (Harris, 1966), in the Gambier Embayment of the Otway Basin, southeast South Australia. (Knight Formation = "Tartwaup Formation" of Ludbrook, 1969). The Burrungule

Member can be correlated in turn with the Hantkenina aragonensis zone in low-latitude planktonic foraminiferal sequences. This zone generally is placed in the earliest Lutetian, that is, the earliest Middle Eocene. The correlations discussed here are shown in Table 1.

The oldest Eocene microfloral assemblage recognised in southern Australia so far is characterised by the pollen species Proteacidites aff. P. pachypolus Cookson and Pike, P. pachypolus and P. confragosus Harris, MS. This is the Proteacidites confragosus zone (Harris, in prep.). It is clearly distinguished from Paleocene microfloras by the presence of these index species and by the absence of Stephanopollenites obscurus Harris and other Paleocene species. Moreover, the organic-walled microplankton assemblage found in this zone in the Burrungule Member differs significantly from those in the Paleocene Dartmoor and Dilwyn Formations. Although largely undescribed, it includes Baltisphaeridium cf. nanum (Deflandre), Hystrichokolpoma rigaudae Deflandre and Cookson, Samlandia cf. reticulifera Cookson and Deflandrea sp.nov.

The next microfloral unit, the Proteacidites pachypolus zone, is distinguished in part by the absence of P. aff. P. pachypolus and P. confragosus and by the presence of various undescribed species.

The leaf beds have a rich and diverse microflora including P. aff. P. pachypolus, P. pachypolus and P. confragosus. Therefore the beds belong in the P. confragosus zone and are correlated with the Burrungule Member. Although microfloral similarities are strong and correlation firm there are differences, as is to be expected between two distinct and regionally separated biofacies. These differences are ecological rather than temporal; the most obvious is the lack of marine microplankton in the leaf beds.

Planktonic foraminifera in the Burrungule Member include Planorotalites australiformis (Jenkins), Truncorotaloides collacteus (Finlay), "Globigerina" cf. G. higginsi (Bolli) and Guembelitria aff. G. columbiana (Howe) in the Planorotalites australiformis zone (Ludbrook and Lindsay, 1969). A tentative correlation with the Hantkenina aragonensis zone in Trinidad (Bolli 1957), or zone P.10 of Blow (1969) and Berggren (1969a) in low-latitude sequences in general, is strengthened by the report here of Pseudohastigerina wilcoxensis (Cushman and Ponton). P. micra (Cole) replaced P. wilcoxensis in the Truncorotaloides primitivus zone and is associated with Subbotina frontosa (Subbotina) in this zone and also in the Globigerapsis index zone (McGowran and Lindsay, 1969). This is consistent with a lowest occurrence of P. micra in zone P.10 (Blow, 1969) and in the lower Middle Eocene (Berggren et al., 1967). The P. wilcoxensis - P. micra phyletic transition reported in zone P.13 (Berggren, 1969a) seems too high. Assemblages from the G. index zone in South Australia are correlated most probably with the Globigerapsis kugleri zone (McGowran and Lindsay, 1969) so that evidence converges to suggest that the Burrungule Member is not younger than the Hantkenina aragonensis zone.

The H. aragonensis zone usually is placed at the base of the Middle Eocene and base of the Lutetian Stage (e.g. Bolli, 1966; Cita et al., 1968; Berggren, 1969a,b).

Finally, it must be noted that marine Lower Eocene has not been identified in the Otway Basin, nor has any Eocene spore-pollen assemblage below and distinct from the Proteacidites confragosus zone been recognised. The Planorotalites australiformis zone is correlated with the lower Truncorotaloides primitivus zone in New Zealand but the base of the latter is defined (Jenkins, 1965) by the

disappearance of Truncorotaloides crater (Finlay). That is, the essential evidence for correlation is negative, and the Burrungule Member conceivably could, in its climatic and facies regime, be somewhat older. Against this, several pollen species in the P. confragosus zone are found also in New Zealand microfloras (Couper, 1960) and indicate a Middle rather than Lower Eocene age.

REFERENCES

BERGGREN, W.A., OLSON, R., and REYMENT, R.A. (1967): Micropaleontology, 13, 265.

BERGGREN, W.A. (1969a): Micropaleontology, 15, 351.

BERGGREN, W.A. (1969b): in Brönnimann, P., and Renz, H.H. (eds.) Proceedings of the First International Conference on Planktonic Microfossils, Geneva 1967, Vol.1, 121 (Leiden: E.J. Brill).

BLOW, W.H. (1969): ibid., Vol. 1, 199.

BOLLI, H.M. (1966): Bol. inf. Asoc. Venez. Geol. Min. Petrol., 2, 3.

CITA, M.B., PREMOLI-SILVA, I., TOUMARKINE, M., BOLLI, H.M., LUTERBACHER, H.P., MOHLER, H.P., and SCHAUB, H. (1968): Mem. Bur. Rech. Geol. Min., 58, 611.

COUPER, R.A. (1960): N.Z. geol.Surv. paleont. Bull., 32, 1.

CHAPMAN, F. (1935): Trans. R.Soc. S.Aust., 72, 252.

HARRIS, W.K. (1966): Quart. geol. Notes geol. Surv. S.Aust., No. 20, 1.

JENKINS, D.G. (1965): N.Z. J. Geol. Geophys., 8, 1088.

LANGE, R.T. (in press): Aust. J. Bot., 17.

LINDSAY, J.M. (1969): Bull. geol. Surv. S.Aust., 42 (in press).

LUDBROOK, N.H., and LINDSAY, J.M. (1969): in Brönnimann, P., and Renz, H.H. (eds.) Proceedings of the First International Conference on Planktonic Microfossils, Geneva 1967, vol. 2 (in press).

LUDBROOK, N.H. (1963): Trans. R.Soc. S.Aust., 87, 5.

LUDBROOK, N.H. (1969): in Parkin, L.W. (ed.) Handbook of South Australian Geology, 172. (Adelaide Government Printer).

McGOWRAN, B., and LINDSAY, J.M. (1969): Quart. geol. Notes geol. Surv. S.Aust., No.30. (in press).

REYNOLDS, M.A. (1953): Trans. R.Soc. S.Aust., 76, 114.

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SOUTH AUSTRALIA		NEW ZEALAND	TRINIDAD etc.		
pollen-spores	planktonic	foraminifera			
Triorites magnificus	Globigerapsis index	Globigerapsis index	Globigerapsis kugleri P.11	LUTETIAN	MIDDLE EOCENE
Proteacidites pachypolus	Truncorotaloides primitivus	Truncorotaloides primitivus	Hantkenina aragonensis P.10		
Proteacidites confragosus	Planorotalites australiformis				
? ?	? ?	Truncorotaloides crater	Truncorotaloides densus P.9	CUISIAN-YPRESIAN	LOWER EOCENE

Table 1