TWO CAINOZOIC FOSSILIFEROUS SANDS FROM WATERLOO BAY YORKE PENINSULA, S.A.

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South Australia —

DEPARTMENT OF MINES
SOUTH AUSTRALIA

Pal.Rept. 15/72

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Hd. Melville, Co. Fergusson

by

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ABSTRACT

One sand has benthonic foraminifera of Upper Eocene age, and is referred to Rogue Formation, correlating also with basal Port Willunga Beds. The other sand is from a Pleistocene "aeolianite" sequence, Bridgewater Formation. Its microfauna, mostly benthonic, is noteworthy in that several species of planktonic foraminifera are present. Both sands are of nearshore marine origin.

INTRODUCTION

Two samples of fossiliferous sand were collected by Mr. C.B. Foster (University of Adelaide) from coastal cliffs at Waterloo Bay, southern Yorke Peninsula, in connection with his Honours Degree project. They were submitted by him for foraminiferal examination and stratigraphic comment as being representative of two kinds of fossiliferous sands which overlie the Permian strata at Waterloo Bay between Troubridge Hill and Port Moorowie, under the "heel" of Yorke Peninsula, KINGSCOTE map sheet.

The Tertiary sand, here shown to be of Upper Eocene age, represents "polyzoal limestone" beds mapped as "Te", early Tertiary age, by King et al. (1954), and as "To-m", Oligo-Miocene age, by Crawford (1965, Text Fig., "Yorke

Peninsula - generalized geological map of Pre-Quaternary rocks, 8 miles to 1 inch").

The Pleistocene sand represents beds mapped as "Qpe" by King et al. (1954) i.e. "consolidated dune limestone (Aeolianite) of the coastal areas."

Sample numbers (F122/72, F183/72) refer to numbers used by the Palaeontology Section, S.A. Department of Mines.

DESCRIPTION OF SAMPLES

F183/72: Locality: coastal cliff outcrop, at aeolianite headland, Waterloo Bay, 6.8 km (4¼ mls) northwest of Troubridge Hill, southern Yorke Peninsula; hundred Melville, county Fergusson. C.B. Foster sample L1; slide 28672.

Sampling position: from a well-bedded quartzose sand about 2 m maximum thickness in an "aeolianite" sequence which rests unconformably on Permian clays.

Lithology: Pale brownish-grey speckled dark brown off-white, quartz sand, calcareous, skeletal (calcarenitic), foraminiferal; friable, incoherent.

A 19 gm sample treated with excess dilute hydrochloric acid lost 2 gm in weight i.e. the sample has 11% by weight of acid soluble components. The residue is mostly quartz, with minor dark red-brown ferruginous grains.

The quartz grains are mostly water-polished, but some are frosted; most are fine to medium-grained, and subrounded to subangular.

Fossil fragments: foraminifera common; ostracodes, bryozoa, echinoids, and molluscs rare.

Foraminifera are mostly benthonic forms, but a few planktonics are present. The microfauna includes:

Planktonics:

Turborotalia inflata (d'Orbigny). (frequent)

Globigerinoides aff. ruber (d'Orbigny). (rare)

Globigerina bulloides d'Orbigny. (very rare)

Orbulina universa d'Orbigny. (very rare)

Benthonics:

Discorbis mira Cushman. (common)

Elphidium macellum (Fichtel and Moll). (common)

Cibicides refulgens Montfort. (common)

Elphidium crispum (Linnaeus). (common)

Elphidium rotatum Howchin and Parr. (frequent)

Notorotalia clathrata (Brady). (frequent)

Rosalina aff. australis (Parr). (frequent)

Discorbis acervulinoides (Parr). (rare)

Ammonia beccarii (Linnaeus). (rare)

Guttulina regina (Brady, Parker and Jones). (rare)

Quinqueloculina sp. (rare)

Triloculina sp. (rare)

Pyrgo sp. (very rare)

Marginopora vertebralis Blainville. (very rare fragments)

Discorbis cycloclypeus Howchin and Parr. (very rare)

Discorbinella biconcava (Jones and Parker). (very rare)

Elphidium crassatum Cushman. (very rare)

Elphidium (Parrellina) verriculatum (Brady). (very rare)

Textularia spp. (very rare)

Age determination: The "aeolianite" sequence (Bridgewater Formation) is considered to be of Middle Pleistocene age in southern Australia (e.g. Firman, 1967, 1969). Although foraminifera cannot as yet pin-point this date, it is worthwhile to record such microfaunas as the present one with the aim of eventually recognizing patterns of stratigraphic distribution. The planktonic species, though of considerable interest as environmental indicators, are of limited stratigraphic value. According to Blow (1969), T. inflata, G. bulloides, and G'oides ruber range from late Miocene to the present; and O. universa from Middle Miocene to the present. Of the benthonics, Discorbis mira is typically common in the marine Pleistocene of South Australia, though not limited to it, and D. acervulinoides tends to replace D. cycloclypeus in deposits younger than Pliocene. The remaining benthonics are common to Quaternary and Pliocene deposits of S.A., but in the latter, Ammonia beccarii is characteristically common rather than rare as here.

General comments: Some of the foraminifera are noticeably worn, and this is considered to be the result of penecontemporaneous abrasion in a nearshore environment of deposition, and possibly also limited aeolian transport and deposition. The planktonic component is rarely seen in South Australian Pleistocene deposits. It suggests more than usual exposure to open marine conditions.

F122/72: Locality: coastal cliff outcrop, Waterloo Bay, approximately 2½ km (1½ ml) northwest of Troubridge Hill, southern Yorke Peninsula; hundred Melville, county Fergusson.

Sampling position: from 2 m above Permian clays; within a sequence of fossiliferous limestones and sands 5.7 m thick, which are in turn overlain by calcreted calcarenite, and flaggy calcrete.

Lithology: Brown quartz sand, calcareous, skeletal (calcarenite-calcirudite), bryozoal; slightly silty and clayey; somewhat glauconitic (much is oxidized, brown) and ferruginous; friable, weathered, parts poorly calcareous-cemented.

An 18 gm sample treated with excess dilute hydrochloric acid lost 1 gm in weight i.e. the sample has 6% by weight of acid soluble components.

The quartz, which comprises about 90% of the sand by weight, consists of poorly-sorted very fine to very coarse grains, angular to subrounded; many are clear and water-polished, but some are frosted; brown ferruginous clayey films obscure parts of some grains.

Fossil fragments: Foraminifera and bryozoa abundant echinoids and molluscs common, and ostracodes rare.

Foraminifera are limited to benthonic forms which are mostly recrystallized. They include:

Sherbornina atkinsoni Chapman. (common)

Genus cf. Bolivinella sp. (of Ludbrook, 1961). (common)

Crespinina kingscotensis Wade. (common)

Porosorotalia aff. crassimura (Carter). (common)

Halkyardia aff. bartrumi (Parr). (frequent)

Cibicides vortex Dorreen. (frequent)

Carpenteria aff. globiformis Chapman. (rare)

Discorbis cf. finlayi Dorreen. (very rare)

Linderina sp. (very rare)

Glabratella crassa Dorreen. (very rare)

Age determination: Gen. cf. Bolivinella sp., Crespinina kingscotensis, Halkyardia aff. bartrumi, and Linderina sp., are only known from Eocene, mostly Upper Eocene, beds in South Australia e.g. Buccleuch Beds of the Murray Basin (Ludbrook, 1961; Lindsay and Bonnett, in press), and Upper Eocene formations of the St. Vincent Basin (Lindsay, 1967, 1969; Stuart, 1970). The absence of Pseudopolymorphina sp. (of Ludbrook, 1961) from the microfauna is considered to be significant, suggesting Upper Eocene age, and indeed middle to later rather than earlier Upper Eocene.

Stratigraphic position and correlation: The lithology and age suggest Rogue Formation (Stuart, 1970) and also correlation with basal Port Willunga Beds (Lindsay, 1967) certain facies of which are closely comparable with the sample.

General comments: The foraminifera are rather poorly preserved, many being recrystallized and worn or broken. Their abrasion is thought to be a result of penecontemporaneous wear in a nearshore environment of deposition. The sample represents an Upper Eocene transgression on to Permian rocks, at the western margin of the St. Vincent Basin.

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JML:CMH

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REFERENCES

Blow, W.H., 1969. Late Middle Eocene to Recent planktonic foraminiferal biostratigraphy. In: P. Brönnimann and H.H. Renz (Editors), Proceedings of the First International Conference on Planktonic Microfossils. Geneva, 1967. E.J. Brill, Leiden, Vol. I, pp. 199-422, pls. 1-54.

Crawford, A.R., 1965. The geology of Yorke Peninsula. Bull. geol. Surv. S. Aust., 39: 96 pp.

Firman, J.B., 1967. Stratigraphy of Late Cainozoic deposits in South Australia. Trans. R. Soc. S. Aust., 91: 165-178.

Firman, J.B., 1969. Quaternary Period. In: L.W. Parkin (Editor), Handbook of South Australian Geology. Geological Survey of S.A., Adelaide, pp. 204-233.

King, D., Sprigg, R.C., and Campana, B., 1954. KINGSCOTE map sheet, 1 inch to 4 miles series, geol. Surv. S. Aust.

Lindsay, J.M., 1967. Foraminifera and stratigraphy of the type section of Port Willunga Beds, Aldinga Bay, South Australia. Trans. R. Soc. S. Aust., 91: 93-110.

Lindsay, J.M., 1969. Cainozoic foraminifera and stratigraphy of the Adelaide Plains Sub-Basin, South Australia. Bull. geol. Surv. S. Aust., 42: 60 pp.

Lindsay, J.M., and Bonnett, J.E., (in press). Tertiary stratigraphy of three deep bores in the Waikerie area of the Murray Basin. Rept. Invest., geol. Surv. S. Aust., 38.

Ludbrook, N.H., 1961. Stratigraphy of the Murray Basin in South Australia. Bull. geol. Surv. S. Aust., 36: 90 pp.

Stuart, W.J., 1970. The Cainozoic stratigraphy of the south eastern coastal area of Yorke Peninsula, South Australia. Trans. R. Soc. S. Aust., 94: 151-178.