DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

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IDENTIFICATION AND DEPOSITIONAL ENVIRONMENT OF DRY CREEK SANDS, ANGAS HOME BORE (1940), PARAFIELD GARDENS

GEOLOGICAL SURVEY

by

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BIOSTRATIGRAPHY

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SOUTH AUSTRALIA

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IDENTIFICATION AND DEPOSITIONAL ENVIRONMENT OF DRY CREEK SANDS, ANGAS HOME BORE (1940), PARAFIELD GARDENS

ABSTRACT

A sample supplied from a water bore drilled in 1940 in the Salisbury area has been identified as to borehole and location. The lithology and microfauna are consistent with Dry Creek Sands, of Late Pliocene age. The dominant Marginopora vertebralis population, compared with various Australian records of present-day Marginopora, suggests (in agreement with previous assessments) that local Late Pliocene marine temperatures were distinctly higher than the present regime in Gulf St. Vincent; but from the absence of otherwise-expected distinctly "tropical" microfaunal elements it is inferred that conditions were not truly tropical, and not as warm as the early Middle Miocene climatic optimum.

BOREHOLE

Angus Home bore, SADME Borehole Unit No. 6628029WW05164; sunk by private driller in 1940; backfilled and abandoned (cemented to surface) by SADME in 1983.

LOCATION

Lat. 34°47'06"S, Long. 138°36'26"E; 3.5 km SW of Salisbury railway station; on property at corner of Martins Road and Shepherdson Road (Fig. 1) 92 Shepherdson Road, Parafield Gardens (now New Testament Church of God). ADELAIDE 1:250 000 mapsheet, SI 54-9. Adelaide 1:100 000 mapsheet, 6628-III. County Adelaide, Hundred of Yatala, Section 2259. Plotted on SADME 1:10 000 scale Bore Location Map 6628-29, as bore No. 5164. Geological province: St. Vincent Basin, Adelaide Plains Sub-Basin.

SAMPLE DATA

One sample, 6628 RS 02685, from the above bore, labelled "fine sievings, from 330 feet, Salisbury bore (Blind Institute), 1940, Dry Creek Sands?" Sample depth of 330 feet = 100.6 m. According to SADME bore records, this bore bottomed at 331 feet (100.9 m) in "shell sands", which corresponds to the depth and lithology of the sample provided - an off-white/pale brown, uncemented sandy shell-grit, with abundant small molluscs. The sand is quartzose (mostly fine-grained) calcarenite. The material provided is derived from what was probably a bottom-hole, cable-tool-drilled, sludge sample.

SUBMITTER

B. McHenry, K. Gowlett-Holmes, S.A. Museum.

METHOD

The sample provided did not need washing. It was picked for foraminifera under binocular microscope.

RESULTS

Foraminifera include:

Marginopora vertebralis Blainville	(Abundant)
Cellanthus adelaidense (Howchin and Parr)	(Frequent)
Ammonia beccarii (Linne)	(F)
Elphidium crassatum Cushman	(Rare)
Triloculina trigonula (Lamarck)	(R)
Epistomaroides polystomelloides (Parker and Jones)	(Very rare)
Notorotalia clathrata (Brady)	(V)
Quinqueloculina subpolygona Parr	(V)
Bulimina sp. cf. B. gibba Fornasini	(V)
Peneroplis sp.	(V)
Pyrgo sp.	(V)
Cibicides sp.	(V)
Reussella sp.	(V)
Rosalina sp.	(V)
Elphidium spp.	(V)

Molluscs and foraminifera are abundant in the sample; Ditrupa tubes are common, bryozoal and echinoid fragments frequent, ostracods and barnacle plates rare, and fish otoliths, fish bone fragments, and sponge spicules, very rare.

DISCUSSION

1. The microfauna, the lithology, and the depth of the sample at this locality, are all consistent with a stratigraphic determination of Dry Creek Sands (Lindsay, 1969) which continue to be dated Late Pliocene (Ludbrook, 1980, p. 46).
2. There are no distinctively Miocene elements present in the microfauna or lithology. This precludes both recycling (common in the basal beds of the Pliocene succession) and any intersection of Miocene Port Willunga Formation.
3. According to SADME records, the contemporary (driller's) log of the bore was:
   0-195 feet (0-59.4 m): clays, sandy and gravelly clays.
   195-248 feet (59.4-75.6 m): very fine drift sand.
   at 331 feet (100.9 m.): bore finished in shell sands.

   Most of the clayey sequence no doubt represents Hindmarsh Clay, and the "very fine drift sand" (apparently unfossiliferous), Carisbrooke Sand. It is not clear at what depth shelly Dry Creek Sands were entered.
4. In relation to the microfauna, the depositional environment is probably indicated best by the dominant population of Marginopora vertebralis which comprises individuals ranging from juveniles 1 mm in diameter to a fragment of an adult estimated to have been 25 mm in diameter. Many specimens are 4-5 mm in diameter, and both microspheric and megalospheric generations are present. This abundance and size range compares with that reported for the Great Barrier Reef islands of tropical Queensland, where Collins (1958, p. 377) noted that the species forms a major constituent of the beach sands of the region, and ranges in size up to 22 mm diameter although the usual shore-sand specimens rarely reach more than 10 mm. Collins reported large specimens of Marginopora from a depth of 51 m, and other specimens from as deep as 68 m, but the abundant populations were in shallow waters. Ross (1972) reported that modern Marginopora of the Great

Barrier Reef is adapted to water shallower than 25 m, and has difficulty in reaching reproductive maturity at greater depths. Recently, Scoffin and Tudhope (1985) calculated a "mean depth" of 54 m for Great Barrier Reef M. vertebralis in an outer-shelf study area off Townsville. Marginopora still comprised 4% of skeletal constituents of "Inter-reef 1" facies, where mean water depth was 63 m. Some of these deeper specimens are perhaps displaced from shallower growth positions, but available data from these and other authors suggest a range of depth tolerance from inter-tidal, through a shallow optimum, down to at least 70 m in sufficiently clear water; and a range of salinity tolerance from normal marine to hypersaline.

The southward limit of Marginopora on the Australian east coast is not known, but it is not recorded from the central coast of New South Wales (Albani, 1968), and does not live today around the southeast coasts, nor, probably, in the South Australian gulfs. Chapman and Parr (1935) recorded M. vertebralis as frequent in bottom samples from the western Great Australian Bight at depths of 65-75 m. McKenzie (1962) recorded only two broken specimens from near Albany, W.A. The species was recovered in fresh condition, in rather sparse populations (up to 3 mm diameter) from near-shore, shallow bottom sands at Quindalup, Geographe Bay, west of Busselton (J.M. Lindsay, 1961, unpublished data). Carrigy (1956) noted the species living on seagrass on shallow marine sands at Warnbro Sound, south of Fremantle (depth 1-5 m temperature 18-20°C). At Shark Bay, subtropical W.A., Davies (1970) found Marginopora commonly colonising seagrass meadows (low water to 12 m; salinity 35 000-56 000 p.p.m.), and also intertidal to sublittoral sand flats: M. vertebralis and other Soritinae may there comprise up to about 10% of total skeletal grains on carbonate banks.

On the basis of the distribution of M. vertebralis outlined above, the Late Pliocene Dry Creek Sands population records a southward shift of warm-water mass of possibly as much as ten degrees latitude relative to the present regime. However, apart from Cellanthus adelaidense, which may prove to be a warm-water indicator, other "tropical"-type

foraminifera such as Alveolinella (e.g. present-day Shark Bay, and Great Barrier Reef islands), or even Amphistegina (presently living as far south as Sydney Harbour) are lacking from the Dry Creek Sands, so it is unlikely that the formation represents a truly tropical regime. Warm-water influence was also less than at the early Middle Miocene "climatic optimum" when southern Australian basins (including the St. Vincent Basin) did receive "tropical" elements such as Lepidocyclina and Flosculinella (an alveolinid), as well as Amphistegina, Operculina, etc. Nevertheless, the nature of the Marginopora population in the present sample of Dry Creek Sands is consistent with previous environmental evidence from the molluscan fauna which "is characterized by a considerable warm water element" (Ludbrook, 1973).

J.M. Lindsay

22 July, 1987

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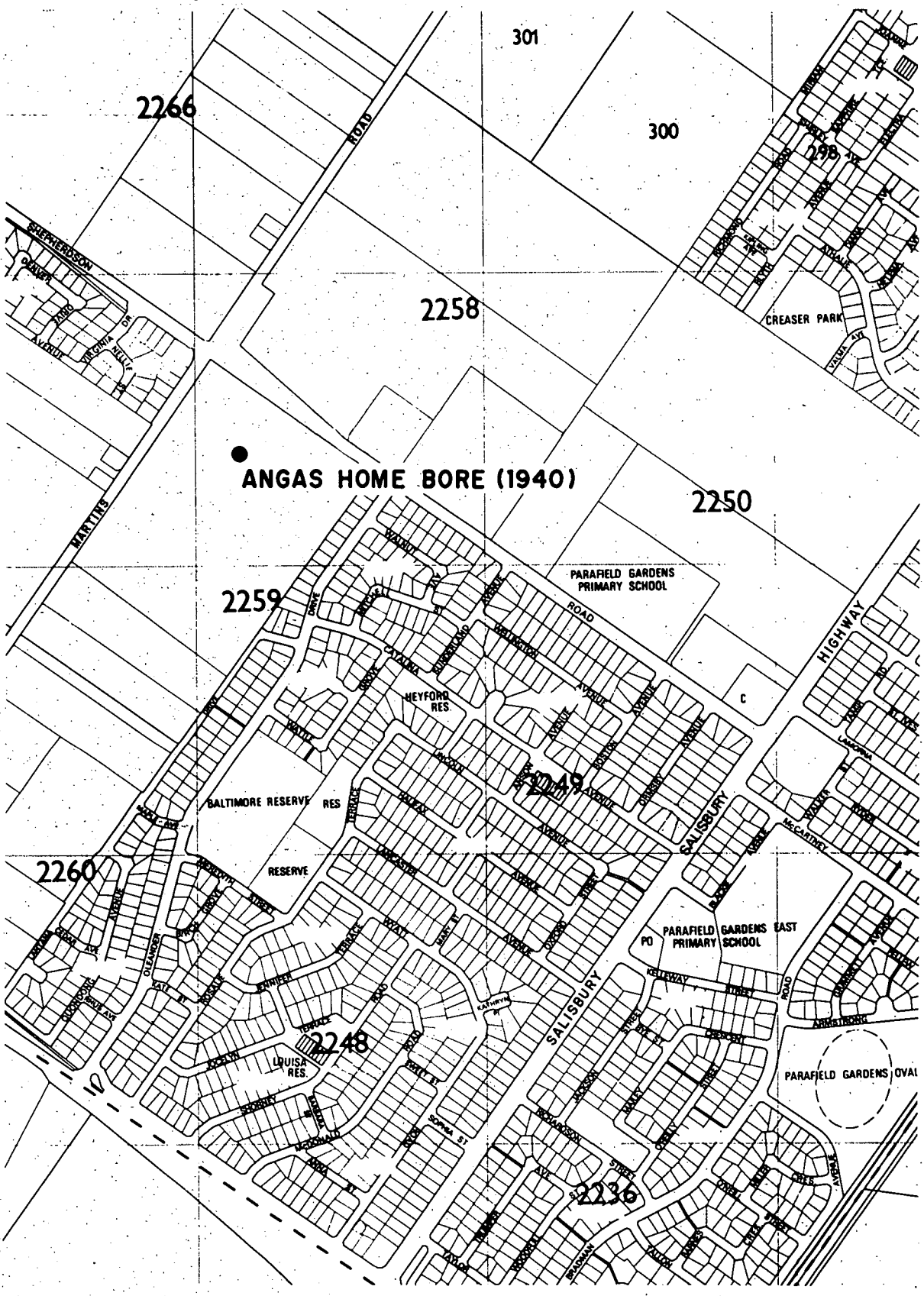

SCALE IN METRES

0 100 200 300 400 500 1000

Fig.....1

DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	COMPILED J.M.L.	C.D.O. DATE
ANGAS HOME BORE (1940) - PARAFIELD GARDENS SECTION 2259, HD. YATALA	DRAWN R.H.	SCALE AS SHOWN
	DATE July 1987	PLAN NUMBER.
LOCALITY PLAN	CHECKED	S19409

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