DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOLOGICAL SURVEY

FORAMINIFERAL BIOSTRATIGRAPHY OF A SUITE OF SAMPLES FROM MANNUM FORMATION, RIVER MURRAY CLIFFS, Hd. Nildottie

by

J. MURRAY LINDSAY
ASSISTANT SENIOR PALAEONTOLOGIST
PALAEONTOLOGY SECTION

Rept.Bk.No. 70/3

19th January, 1970

DEPARTMENT OF MINES
SOUTH AUSTRALIA

FORAMINIFERAL BIOSTRATIGRAPHY OF A SUITE OF SAMPLES FROM MANNUM FORMATION, RIVER MURRAY CLIFFS, Hd. Nildottie

by

J. MURRAY LINDSAY
ASSISTANT SENIOR PALAEONTOLOGIST
PALAEONTOLOGY SECTION

CONTENTS

Rept.Bk.No. 70/3
G.S. No. 4392
Pal. Rept. 1/70
D.M. 1964/66

19th January, 1970.

DEPARTMENT OF MINES
SOUTH AUSTRALIA

Rept.Bk.No. 70/3
G.S. No. 4392
Pal. Rept. 1/70
D.M. 1964/66

FORAMINIFERAL BIOSTRATIGRAPHY OF A SUITE OF SAMPLES FROM MANNUM FORMATION, RIVER MURRAY CLIFFS

Hd. Nildottie

SUMMARY

A suite of rock samples from Lower Miocene and Longfordian Mannum Formation, River Murray cliffs, Hd. Nildottie, appears to span the internationally-significant Globigerinoides trilobus datum. The lowest two samples lack G.trilobus s.l. and it is inferred that they are from below the datum. The remaining three samples show increasing development of G.trilobus morphotypes up-section, and are from above the datum.

INTRODUCTION

A suite of 5 fossiliferous rock samples from River Murray cliffs, Hd. Nildottie, was submitted for micropalaeontological examination by Mr. R.J.F. Jenkins, Department of Geology, University of Adelaide. In particular it was desired to fix the biostratigraphic position of the samples as accurately as possible, with a view to dating associated fossil crabs.

Localities and measurements herein are as supplied by Mr. Jenkins.

"F" numbers given to the samples are catalogue numbers of the Palaeontology Section, Geological Survey of South Australia.

Abundances of foraminifera in routine picking of washed samples and bromoform flotations are denoted by:

A = abundant (more than 25 specimens)

C = common (11 - 25)

F = frequent (6 - 10)

R = rare (3 - 5)

V = very rare (1 - 2)

DESCRIPTION OF SAMPLES

Sample F128/69

Locality: Big Bend Reserve, cliff outcrop, 4½ miles south of Swan Reach. Section 64, Hd. Nildottie, Co. Albert, from approximately 28 feet above normal water level, River Murray.

Rock type: Yellow calcarenitic skeletal (bryozoal, echinoidal, foraminiferal) limestone, quartzose sandy, slightly ferruginous silty and clayey; somewhat recrystallized.

Formation: Mannum Formation.

Foraminfera a) benthonics include: Operculina victoriensis (f),, Sherbornina cuneimarginata (V), Crespinella sp. 1 (F), and Pararotalia sp. (R)

b) planktonics include: Globigerina woodi "connecta" (F), G. woodi woodi" (R), Globigerinoides sp. cf. G. primordius (one specimen only), and Cassigerinella chipolensis (v)

Stage: Sherbornina cuneimarginata is restricted to Longfordian Stage (Carter, 1964) of Lower Miocene age, and in the Murray Basin is not known to range above or below Mannum Formation (Ludbrook, 1961).

Planktonic foraminiferal zone: The presence of Globigerina woodi woodi, and absence of Globigerinoides trilobus trilobus suggests Globigerina woodi woodi zone of Ludbrook and Lindsay(1969).

Sample F129/69

Locality: Greenway's Landing, 2 miles north of Nildottie, Section 190, Hd. Nildottie, Co. Albert, from approximately 28 feet above normal water level, River Murray.

Rock type: very similar to F128/69. Rather recrystallized.

Formation: Mannum Formation.

Foraminfera: a) benthonics include: Opereulina victoriensis (R), Astrononion centroplax (v), Gypsina howchini (v) Pararotalia verriculata (v).

b) planktonics include: Globigerina woodi "connecta" (F), G. woodi "woodi" (v), Globigerinoides sp. aff. G. primordius (one specimen only).

Stage: Astrononion centroplax plus these planktonics suggests Longfordian Stage.

Planktonic foraminiferal zone: Globigerina woodi woodi zone, as for F128/69.

Sample F131/69

Locality: 100 yards north of Greenways Landing, 2 miles north of Nildottie, Section 190, Hd. Nildottie, Co. Albert, from basal part of 9 inch thick marl band, approximately 35 feet above normal water level, River Murray.

Rock type: Orange-brown calcarenitic marl with minor lumpy calcareous cementation.

Formation: Mannum Formation

Foraminifera: (a) benthonics include: Operculina victoriensis (c), Sherbornina cuneimarginata (c), Astrononion centroplax (F), Pararotalia verriculata (R), Planorbulinella plana (R); P. inaequilateralis (v), Crespinella sp. 1 (v), Gypsina howchini (R).

b) planktonics include: Globigerina woodi "connecta" (c), G. woodi "woodi" (c), Globigerinoides sp. cf. G. altiaperturus (one specimen), G. trilobus "immaturus" (one specimen), and one specimen intermediate between the latter two.

Stage: Longfordian Stage, as above.

Planktonic foraminiferal zone: High in Globigerina woodi woodi zone. Globigerinoides trilobus trilobus is not present, but G. trilobus "immaturus" has made its appearance.

Sample F132/69

Locality: As for F131/69, but from cliff approximately 45 feet above normal water level, River Murray.

Rock Type: Fawn, friable, calcarenitic (mostly bryozoal and foraminiferal) marly limestone.

Formation: Mannum Formation.

Foraminifera: a) benthonics include: Operculina victoriensis (C), Sherbornina cuneimarginata (F), Astrononion centroplax (F), Pararotalia verriculata (c), Planorbulinella plana (R), P. inaequilateralis (V), Gypsina howchini (v).

b) planktonics include: Globigerina woodi "connecta" (C), G. woodi, "woodi" (F), Globigerinoides trilobus "immaturus" (F, 10 specimens).

Stage: Longfordian Stage, as above.

Planktonic foraminiferal zone: High in G. woodi woodi zone as for F131/69. G. trilobus "immaturus" has increased in abundance but G. trilobus trilobus is not yet apparent.

Sample F130/69

Locality: Greenways pumping station, 1½ miles north of Nildottie,

Section 140, Hd. Nildottie, Co. Albert. From cliff 5 feet above pump platform, approximately 61 feet above normal water level, River Murray.

Rock Type: Yellow calcarenitic skeletal (echinoidal, bryozoal, foraminiferal) limestone; fine gr. quartzose sandy; somewhat recrystallized.

Formation: Mannum Formation, probably high in the unit.

Foraminifera: a) benthonics include Sherbornina cuneimarginata (v), Operculina victoriensis (F), Pararotalia verriculata (R), Astrononion centroplax (v),

b) planktonics include Globigerina woodi "woodi" (R), G. woodi "connecta" (v), Globigerinoides trilobus "immaturus" (C). Globigerinoides trilobus "trilobus" is present (R; 3 specimens), and there are 3 specimens of Globigerinoides sp. approaching G. sicanus (=G. bisphericus).

Planktonic foraminiferal zone: The sample is at least as high as Globigerinoides trilobus trilobus zone (Ludbrook and Lindsay, 1969) and the presence of morphotypes approaching Globigerinoides sicanus suggests a position high in the G. trilobus trilobus zone and/or near the lower boundary of the G. sicanus zone (=G. bisphericus zone of Ludbrook and Lindsay, 1969).

Stage: High in the Longfordian Stage.

DISCUSSION

The stratigraphic range represented by the samples is close to that between F129/69 and F130/69 (the lowest and highest samples at the Greenways Landing locality) i.e. about 33 feet. The interval, all in Lower Miocene and

Longfordian Mannum Formation, is of interest in that it appears to span the Globigerinoides trilobus datum, that is, the emergence (probably from Globigerina woodi "connecta") first of Globigerinoides primordius, then G. trilobus "immaturus" (and G. trilobus "altiaperturus"), followed soon after by G. trilobus "trilobus". The latter led to G. sicanus, Praeorbulina spp., Orbulina suturalis, and finally O. universa, in the Orbulina bioseries of Blow (1956).

Jenkins recorded this emergence of G. trilobus in New Zealand (1965), and in the type Burdigalian of France (1966). Bolli (1957) had earlier recognized the appearance of Globigerinoides in Trinidad B.W.I., first G. trilobus "immaturus" in the Globorotalia kugleri zone, then G. trilobus "trilobus" at the base of the following Catapsydrax dissimilis zone.

Other references in connection with the Globigerinoides trilobus datum include Jenkins (1966), Hornibrook (1967), and Reiss (1968).

Reciprocal information in due course on changes in local crab faunas at this level would be appreciated.

REFERENCES

BLOW, W.H., 1956. Origin and evolution of the foraminiferal genus Orbulina d'Orbigny. Micropalaeontology 2 (1): 57-70.

BOLLI, H.M., 1957. Planktonic foraminifera from the Oligocene-Miocene Cipero and Lengua Formations of Trinidad, B.W.I. Bull. U.S. natn. Mus. 215: 97-123, pls. 22-29.

CARTER, A.N., 1964. Tertiary foraminifera from Gippsland, Victoria, and their stratigraphic significance. Mem. geol. Surv. Vict., 23: 154 p., pls. 1-17.

HORNIBROOK, N. deB., 1967. New Zealand Tertiary microfossil zonation correlation and climate. pp. 29-39 in "11th Pacific Science Congress, Tokyo, 1966: Symposium No. 25, Tertiary correlations and climatic changes in the Pacific". Sasaki Printing and Publishing Co.Ltd.: Sendai, Japan.

JENKINS, D.G., 1965. The origin of the species Globigerinoides trilobus (Reuss) in New Zealand. Contr. Cushman Fdn. foramin. Res. XVI (3): 116-120.

JENKINS, D.G., 1966. Planktonic foraminiferal datum planes in the Pacific and Trinidad Tertiary. N.Z.J. geol. geophys. 9 (4); 424-427.

LUDBROOK, N.H., 1961. Stratigraphy of the Murray Basin in South Australia. Bull. geol. Surv. S.Aust. 36, 96 p.,pls. 1-VIII.

LUDBROOK, N.H., and LINDSAY, J.M., 1969. Tertiary foraminiferal zones in South Australia, pp. 366-375, pls. 1-2, figs.1-2. In "Proceedings of the First International Conference on Planktonic Microfossils, Geneva, 1967" (Brönnimann and Renz ed) Vol. II. E.J. Brill: Leiden

REISS, Z., 1968. Planktonic foraminiferids, stratotypes, and a reappraisal of Neogene chronostratigraphy in Israel. Israel J. Earth Sci. 17: 153-169.

J. M. Lindsay.

19.1.1970
JML:JKD

J.MURRAY LINDSAY
ASSISTANT SENIOR PALAEONTOLOGIST
PALAEONTOLOGY SECTION