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MICROPALAEONTOLOGY OF SAMPLES OF SEDIMENTS FROM THE GREAT ARTESIAN BASIN, QUEENSLAND.

by

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RECORDS 1960/25

CONTENTS

SUMMARY

Excellent assemblages of arenaceous and calcareous species of foraminifera of Lower Cretaceous age were found in many samples examined. Arenaceous tests dominated the surface samples except in the Tambo area where calcareous forms were common; calcareous tests were well represented in subsurface samples. Radiolaria-bearing rocks were recognized. Many of the foraminiferal species showed close affinities with those described from deposits outside Australia which are regarded as equivalent of the Albian of Europe. The assemblage of calcareous species in the Tambo beds and the Toolebuc Member, suggests that this marine unit is high in the Lower Cretaceous sequence and probably upper Albian. On evidence of the macrofossils, the assemblage found in beds in the Roma area is considered to be the equivalent of the Aptian. The stratigraphical position of the well-preserved arenaceous species in surface samples and of the calcareous species in subsurface samples, all of which have strong Albian affinities, will have to be considered together with evidence of the associated macrofossils.

INTRODUCTION

Approximately 300 samples from various localities throughout the Great Artesian Basin in Queensland, were submitted for micropalaeontological examination by members of the Great Artesian Basin Geological Party. These samples were collected during the 1958 and 1959 seasons from outcrops and bore sections covered by the 4 Mile Sheets of Springvale, Boulia, Glenormiston, Tambo, Gilberton, Georgetown, Machattie and Mt. Whelan; samples were also collected from the Roma area.

More than half the samples proved to be unfossiliferous. However, good assemblages of foraminifera were found in some of the samples. Arenaceous forms were predominant, especially in the surface samples, with many tests well preserved. Calcareous forms were present mainly in subsurface sediments, the exception being in surface samples from the Tambo area in which genera of the Lagenidae were well represented, and in a limestone in the Springvale area in which the planktonic genus Globigerina was common. Radiolaria were present in some rocks especially in the radiolarite and in subsurface samples in which the tests were almost entirely replaced by pyrite. A few ostracods were noted, chiefly in the Tambo samples.

All foraminiferal assemblages indicate a Lower Cretaceous age. A striking feature of many of the species and even some of the assemblages is the close resemblance to Lower Cretaceous Albian forms described from overseas. With increasing information regarding the stratigraphical sequence of the Lower Cretaceous deposits of the Great Artesian Basin, it will be possible to place in proper sequence the subsurface sections from which the writer described many species of Lower Cretaceous foraminifera in 1953. Nearly all these species have been recorded from the present collection.

DETAILED DESCRIPTION OF FOSSILIFEROUS SAMPLES

The fossiliferous samples are described in detail below and are arranged according to the 4 Mile Sheets. No attempt is made to assign them to formational units.

Springvale 4 Mile Sheet

S.1. 1½ miles north-west of Spring Creek Bore, Warra Station.

Fossiliferous calcareous Siltstone, mapped as Toolebuc Member, containing abundant fragments of Inoceramus prisms, fish remains - chiefly scales - some radiolaria (Dictyomitra cf. australis, Cenosphaera sp.) and many foraminifera (Globigerina cf. planispira).

S.27. 7 miles S.W. of Uka Yard, Springvale Station.

Calcareous sandstone with angular quartz grains and glauconitic replacement of indeterminate foraminifera and ostracoda.

S.107. Small inlier of Toolebuc Member, 8 miles S. of Springvale Homestead.

a. Pink calcarenite with numerous large tests of radiolaria and a few foraminifera.

Radiolaria: Acanthosphaera sp. (common)
Amphibrachium sp.
Cenosphaera sp.
Spongodiscus cf. expansus Hinde
Dictyomitra sp.

Foraminifera: Globigerina sp.

b. Coquinite with abundant Inoceramus prisms, some foraminifera (Globigerina sp.) and fish remains.

S.110. S.E. corner of paddock, N. of Deadfinish Creek and 3 miles E. of No. 9 Bore, Springvale.

a. Calcareous sandstone with angular quartz grains and glauconitic replacement of foraminifera (Globigerina) and ostracoda, and fish remains.

b. Calcareous sandstone with angular quartz grains and glauconitic replacement of foraminifera.

S.124d. About 1 mile W. of Gum Creek, 2½ miles N. of Gum Waterhole, Springvale.

?Travertinous limestone with indeterminate molluscan shells (freshwater).

S.134c. S.E. end of Warracoota Waterhole, Springvale

Siltstone with gypsum and indeterminate organisms.

S.156. Hills about 16 miles N.W. of Marion Downs Homestead (in Mt. Whelan 4 Mile Sheet).

Friable siltstone with gypsum and numerous large and many well preserved arenaceous foraminifera.

Foraminifera: Ammobaculites fisheri Crespin
A. subcretaceus Cushman and Alexander
A. minimus Crespin
Bathysiphon sp.
Flabellammina alexanderi Cushman
Haplophragmoides chapmani Crespin
H. concavus Chapman
H. globosa Lozo
Involutina cretacea (Reuss)
I. sp. nov.
Pelosina sp.
Reophax deckeri Tappan
Spiroplectammina ammovitrea Tappan
S. edgelli Crespin
Trochammina depressa Lozo
Verneuilina howchini Crespin
Verneuilina sp.

S.209. Creek bank about 1 mile S. of No. 5 Bore, Lucknow.

Siltstone with a few Inoceramus prisms.

S.210. Basal shales in scarp ½ mile W. of No. 5 Bore, Lucknow.

Friable ochreous and white siltstone with poorly preserved arenaceous foraminifera.

Foraminifera: Haplophragmoides sp.
Spiroplectammina sp.

S.216. S.E. side of Elizabeth Springs, just above Toolebuc Member.

Limestone, with a few indeterminate shell fragments.

S.221. About 3 miles N.W. of Lorna Downs Homestead.

Calcilutite, with numerous radiolaria and a few foraminifera.

Radiolaria: Acanthosphaera sp.
Cenosphaera sp.
Spongodiscus sp.
Dictyomitra sp.

Foraminifera: Globigerina cf. planispira Tappan

S.222. Low Scarp of Toolebuc Member, ½ mile E. of Dilarrbidgerrie Waterhole, Lorna Downs.

Coquinite with abundant Inoceramus prisms and Globigerinae.

Foraminifera: Globigerina planispira Tappan (abundant)
G. infracretacea Glaessner (common)

S.223. 3½ miles N.E. of Corrabulka Homestead at side of Springvale road.

White, clayey organic silica rock with poorly preserved arenaceous foraminifera.

S.224. 11½ miles W. of Coorabulka Homestead on track to Old Coorabulka.

Ochreous limestone with indeterminate shell fragments.

S.226a. Base of Hills, S. of road to Taradi Waterhole from Breadalbane Homestead.

Clayey organic silica rock with radiolaria (Acanthosphaera, cf. Spongotripus)

S.234a. 6 miles S.E. of Springvale Bore No. 8, on top of low Hills.

Limonitic siltstone with Inoceramus prisms.

S.236. 8 miles N.W. of Old Ingledoon Bore on road to Coorabulka

Calcareous sandstone with glauconitic infillings of foraminifera and ostracoda.

S.237. 3½ miles N.W. of Old Ingledoon Bore.

Calcareous sandstone with glauconitic infillings of foraminifera and ostracoda.

S.239. From walls of Mooraka Tank, Springvale

Siltstone, with poorly preserved arenaceous foraminifera (Haplophragmoides sp., Trochammina sp.), Inoceramus prisms and fish remains.

S.241a. Shaly beds from lowest part of No. 2 Tank, Springvale.

Foraminifera: Haplophragmoides sp.
Trochamina minuta Crespin
Verneuilinoides aff. perplexa (Loeblich)

S.243. No. 2 Bore, Warra (composite sample from bore cuttings), 0-536 feet.

Fragments of limestone, glauconitic sandstone and siltstone with pyrites, pyritic replacement of radiolaria, calcareous and arenaceous foraminifera and shell fragments.

Radiolaria: Cenosphaera sp.
Porodiscus sp.
Dictyomitra cf. australis Hinde (common).

Foraminifera: Ammobaculites fisheri Crespin
A. subcretaceus Cushman and Alexander
Haplophragmoides chapmani Crespin
H . sp.
Involutina cretacea (Reuss)
Spiroplectammina cushmani Crespin
Siphotextularia sp.
Trochammina minuta Crespin
Lagena globosa (Mont.)
Robulus gunderbookaensis (Crespin)

S.245a, b. No. 1 Bore, Warra (composite samples from bore cuttings, 0-261 feet).

a. Yellowish siltstone to fine grained sandstone, with a few poorly preserved foraminifera (Haplophragmoides sp.) and a few radiolaria (cf. Acanthosphaera).

b. Grey siltstone, with arenaceous and calcareous foraminifera and indeterminate ostracoda.

Foraminifera: Haplophragmoides chapmani Crespin
Trochammina minuta Crespin
Gyroidina cf. nitida (Reuss)
Marginulinopsis australis Crespin
Nodosaria aff. obscura Reuss
Robulus warregoensis (Crespin)

Broken Dam Bore, Canary Station

45 feet. Sandstone. No fossils

45-51 feet. Siltstone with abundant glauconite and arenaceous foraminifera.

Ammobaculites australe (Howchin)
A. subcretaceus Cushman and Alexander
A. fisheri Crespin
Flabellammina alexanderi Cushman
Haplophragmoides chapmani Crespin
H. concavus Chapman
Involutina cretacea (Reuss)
Reophax deckeri Tappan
Spiroplectammina cushmani Crespin
S. edgelli Crespin
S. sp. nov.

51-53 feet. Grey glauconitic siltstone with arenaceous foraminifera.

Ammobaculites australe (Howchin)
A. fisheri Crespin
A. sp. nov.
Flabellammina cf. alexanderi Cushman
Haplophragmoides chapmani Crespin
Involutina cretacea (Reuss).
Reophax deckeri Tappan
Spiroplectammina sp. nov.

76 feet. Hard siltstone. No fossils.

105 feet. Friable grey siltstone with a few poorly preserved foraminifera.

Haplophragmoides sp.
Involutina cretacea (Reuss)
Trochammina sp.
Robulus sp.

120-125 feet. Siltstone with pyrite and arenaceous and calcareous foraminifera and numerous pyritic replacement of radiolaria.

Radiolaria: Cenosphaera sp.
aff. Porodiscus
Dictyomitra sp.

Foraminifera: Ammobaculites fisheri Crespin
Haplophragmoides globosa Lozo

Pelosina lagenoides Crespin
Siphotextularia sp.
Trochammina minuta Crespin
Verneuilinoides cf. schizea (Cushman and Alexander).
Anomalina mawsoni Crespin
Esosyrinx sp. nov.
Epistomina australiensis Crespin
Eponides sp.
Gyroidina nitida (Reuss)
Lenticulina australiensis Crespin
Lingulina aff. furcillata Berthelin
Marginulinopsis australis Crespin
Marginulina sp.
Patellina jonesi Howchin
Reophax deckeri Tappan
Robulus spp.
Saracenaria sp.
Tristix excavatum (Reuss).

130 feet. Pyritic, calcareous sandstone. No fossils.

140-144 feet. Green calcareous, sandstone with pyrite

156-176 feet. Calcite and pyrite.

305-308 feet. Silty sandstone. No fossils.

Lower Gidyea Bore, Lorna Downs

Dark grey to black silty sandstone with arenaceous foraminifera.

Ammobaculites fisheri Crespin
Spiroplectammina cushmani Crespin
Trochammina minuta Crespin

Jack's (New Limestone) Bore, Canary Station.

Calcareous sandstone with glauconite, Inoceramus prisms, arenaceous and calcareous foraminifera and pyritic replacement of radiolaria.

Radiolaria: Porodiscus sp.
Dictyomitra australis Hinde

Foraminifera: Ammobaculites fisheri Crespin
Arenobulimina sp.
Neobulimina minima Tappan
Verneuilina howchini Crespin
Epistomina australiensis Crespin
Globigerina planispira Tappan (rare)
Marginulinopsis australis Crespin
Valvulineria infracretacea Crespin

Netting Bore, Paton Downs.

Siltstone and sandstone with gypsum and calcareous and arenaceous foraminifera, many of the large arenaceous tests being composed of coarse quartz grains.

Ammobaculites subcretaceus Cushman and Alexander
A. fisheri Crespin
Bathysiphon sp.
Haplophragmoides globosa Lozo
H. sp. 1
Proteonina sp.
Reophax deckeri Tappan
Spiroplectammina cushmani Crespin
Trochammina raggatti Crespin
Marginulinopsis subcretaceus (Crespin)
Gyroidina cf. loetterlei Tappan
Valvulineria infracretacea Crespin

Boulia 4 Mile Sheet

B.97. Hills 2 miles W. of Brighton Bore (Pathungra), St. Lucia Station.

White radiolarite with radiolaria and poorly preserved arenaceous foraminifera.

Radiolaria: Cenosphaera sp.
Porodiscus sp.
cf. Stylosphaera

Foraminifera: Haplophragmoides sp.

B.98. Just E. of Momedah Anticline, St. Lucia Station, 5 miles S.W. of Brighton Bore

White chalky radiolarite with poorly preserved arenaceous foraminifera (Haplophragmoides sp., Spiroplectammina cushmani Crespin, Trochammina sp.).

B.174. From Toolebuc Member, 2 miles E. of 1BC Bore on Lorrett Downs.

Yellow calcarenite with radiolaria (Cenosphaera sp., Dictyomitra sp.) and foraminifera rare (Globigerina sp.)

B.196. Creek W. of track on road to Springvale from Lucknow, 3 miles S. of turn-off to No. 15 Bore.

Sandy claystone with indeterminate radiolaria, foraminifera rare (? Gavelinella) and Inoceramus prisms.

B.310. Scarp near track 1-2 miles E. of Herrod's Tank, Buckingham Downs.

Ochreous sandstone with arenaceous foraminifera rare (Spiroplectammina sp.)

B.336. From Rubble from Reid's Well, Windsor Park

Cherty radiolarite.

Radiolaria: Cenosphaera sp.
Astrophacus sp.
Amphibrachium sp.
Lithocyclia cf. exilis Hinde

B.417. Sandy Creek Well, N. of Badalia Homestead, but on Herbert Downs Station.

Sandstone with a few arenaceous foraminifera and some siliceous sponge spicules.

Foraminifera: Ammobaculites minimus Crespin
Spiroplectammina cushmani Crespin
Trochammina minuta Crespin

B.637. 1 mile N.W. of Gidyea Creek Bore, Stockport.

Siltstone with arenaceous foraminifera.

Foraminifera: Ammobaculites fisheri Crespin
A. minimus Crespin
A. subcretaceus Cushman and Alexander
Ammobaculoides cf. pitmani Crespin
Haplophragmoides chapmani Crespin
H. globosa Lozo
Hyperammina sp.
Involutina cretacea (Reuss)
Spiroplectammina cushmani Crespin
S. edgelli Crespin
Trochammina minuta Crespin

B.705. W. of Momedah Anticline near track on S. side of Momedah Creek, 4 miles N.N.W. of Little Bore, St. Lucia.

Limonitic and grey sandy siltstone with glauconite, gypsum and arenaceous foraminifera.

Foraminifera: Ammobaculites fisheri Crespin
Ammobaculoides pitmani Crespin
Haplophragmoides sp. nov.
Trochammina minuta Crespin

B.720. Toolebuc Member, 3½ miles N.E. of Old Kheri Outstation, Toolebuc Road.

Limestone with indeterminate radiolaria and minute foraminifera (Globigerina planispira Tappan).

B.721. Toolebuc Member, 4½ miles N.E. of old Kheri Outstation, Toolebuc Road.

Limestone with radiolaria (Cenosphaera sp.) and minute foraminifera (Globigerina planispira Tappan).

B.781. Creek about 1 mile E. of 9 mile Bore, Granton

Sandy siltstone with arenaceous foraminifera.

Foraminifera: Ammobaculites fisheri Crespin
A. minimus.
Haplophragmoides sp.
Siphotectularia sp.
Spiroplectammina cf. edgelli Crespin

Kingdom Bore, Alderby Station.

Sandstone with arenaceous foraminifera.

Foraminifera: Ammobaculites minimus Crespin
A. fisheri Crespin
A. subcretaceus Cushman and Alexander
A. cf. viriosus Loeblich and Tappan
Haplophragmoides chapmani Crespin
H. sp.
Spiroplectammina cushmani Crespin
Trochammina minuta Crespin

Gilberton 4 Mile Sheet

Gil.11. 200 yards E. of the Etheldale-Pialah track crossing of Mill Mill Creek

a. Ochreous sandy siltstone with arenaceous foraminifera.

Foraminifera: Ammobaculites fisheri Crespin
A. minimus Crespin
A. subcretaceus Cushman & Alexander
Haplophragmoides globosus Lozo
cf. Involutina
Reophax deckeri Tappan
Spiroplectammina longa Tappan
S. sp.
Trochammina depressa Lozo
Verneuilinoides cf. schizea (Cushman & Alexander)
Verneuilina howchini Crespin

b. Limestone with patches of ? hematite, radiolaria, with the delicate structure of some forms outlined by ? hematite, and some diatoms.

Diatoms: Navicula sp.
Melosira sp.

Radiolaria: Cenosphaera sp.
Acanthosphaera sp.
Lithocyclia sp.

Exley Bore, Glenmore

Surface. Hard calcarenite with small foraminifera (Globigerina cf. planispira), Inoceramus prisms and fish remains.

340-342 feet. Grey siltstone with arenaceous foraminifera rare (Bathysiphon sp.).

385 feet. Glauconitic sandy siltstone with arenaceous and calcareous foraminifera.

Foraminifera: Ammobaculites australe (Howchin)
Ammobaculoides pitmani Crespin
Haplophragmoides cf. chapmani Crespin
Verneuilinoides schizeus (Cushman and Alexander)
Anomalina mawsoni Crespin
Globigerina cf. graysonensis Tappan
Gyroidina cf. nitida (Reuss)

Pseudoglandulina regularis Crespin
Robulus warregoensis (Crespin)
Saracenaria sp.

395 feet. Grey siltstone with pyritic replacement of radiolaria, small foraminifera, and indeterminate ostracoda.

Radiolaria: Cenosphaera sp.
Dictyomitra sp.

Foraminifera: Haplophragmoides sp.
Trochammina sp.
Involutina sp.
Globigerina aff. washitensis Carsey
Marginulina sp.
Pseudoglandulina regularis Crespin
Valvulineria infracretacea Crespin

New (1959) Bore, Etheldale

0-50 feet. Siltstone with arenaceous foraminifera.

Foraminifera: Ammobaculites fisheri Crespin
Dorothia filiformis (Berthelin)
Reophax sp.
Spiroplectammina cushmani Crespin
Trochammina sp.
Verneuilina sp.

Glenormiston 4 Mile Sheet

Caps of low hills, 3-4 miles S. of Tarrie Rockhole

G.134. Radiolarite with indeterminate radiolaria

G.135. Purplish to brownish radiolarite with indeterminate radiolaria.

G.141a. Hard, whitie organic silica rock (? radiolarite), with indeterminate radiolaria.

G.146. 4 miles N.E. of Chummy Tank, from top of small Cretaceous outlier on W. side of Smoky Creek

Hard, white radiolarite with minute radiolaria.

G.148. W. of Yarrie Rockhole near Carandotta boundary; 2 miles S.E. of Top Yarrie Bore

Reddish radiolarite, with angular quartz grains and indeterminate radiolaria.

G.158. Basal bed in hills S. of track, 5 miles from Snake Creek Bore, on track to Junction Bore, Alderly.

Ochreous to cream siltstone with numerous small arenaceous foraminifera.

Foraminifera: cf. Bigenerina
Hyperammina sp.
Haplophragmoides sp.
Reophax deckeri Tappan
Spiroplectammina cushmani Crespin (common)
Textularia aff. delrioensis Tappan (common)

G.159. Gaffney's No. 1 Tank, Herbert Downs

a. (Base). Siltstone and ironstained material with foraminifera, many tests distorted, and sponge spicules.

Foraminifera: cf. Bigenerina
Hyperammina sp.
Haplophragmoides sp.
cf. Spiroplectammina cushmani Crespin
Siphotextularia sp.

b. (2-3 feet above base). Siltstone, slightly crystallune, with arenaceous foraminifera, tests chiefly large and distorted.

Foraminifera: Haplophragmoides cf. globosa Lozo
H. sp.
Involutina cf. gaultina (Berthelin)
I. cretacea (Reuss)
Verneuilina howchini Crespin

c. (as b.). Ochreous siltstone with quartz grains, large arenaceous foraminifera and many small poorly preserved tests in fine washings.

Foraminifera: Ammobaculites fisheri Crespin
A. minimus Crespin
Haplophragmoides globosa Lozo
H. sp.
Involutina cretacea (Reuss)
Spiroplectammina cushmani Crespin
Trochammina raggatti Crespin
T. minuta Crespin

Mt. Whelan 4 Mile Sheet

W.13. From top 5 feet of siliceous white siltstone, below the chalcedony cap, on the north peak of Mt. Whelan

Siliceous siltstone with a spiny variety of siliceous sponge spicules, and arenaceous foraminifera Ammobaculites sp., ?Trochammina).

W.26. Coogiebung Tank, Marion Downs.

Ochreous siltstone with numerous arenaceous foraminifera, including many coarsely grained, large distorted tests.

Foraminifera: Ammobaculites fisheri Crespin
A. subcretaceus Cushman & Alexander
A. sp. 1.
A. subgoodlandensis Vanderpool
Flabellammina alexanderi Cushman
Hyperammina sp.
Haplophragmoides chapmani Crespin
H. concavus Chapman
H. globosa Lozo
Involutina cretacea (Reuss)
Pelosina sp. nov.
Reophax subgoodlandensis Vanderpool
R. deckeri Tappan
R. sp. nov.
Spiroplectammina edgelli Crespin
S. cf. longa Tappan
Verneuilina howchini Crespin.

W.32. Small section of blue gypsiferous clay, 3 miles S. of Carlo Springs, Glenormiston Station.

Siltstone containing abundant gypsum, glauconite, arenaceous foraminifera, and radiolaria with their tests entirely replaced with ? iron.

Radiolaria: Dictyomitra cf. australis Hinde

Foraminifera: Ammobaculites minimus Crespin
Haplophragmoides chapmani Crespin
H. dickinsoni Crespin
H. sp.
H. cf. concavus Chapman
Hyperammina sp.2.
Involutina cretacea (Reuss)
Spiroplectammina edgelli Crespin
Siphotextularia sp.
Verneuilina howchini Crespin

W.37. 16 miles S. of Polly's Lookout on Marion Downs.

Ochreous sandy limestone with calcareous foraminiferam (Valvulineria infracretacea Crespin), indeterminate ostracoda and fish teeth.

W.40. Mt. Whelan

a. Whitish and purplish siltstone (?), with poorly preserved arenaceous foraminifera and radiolaria (Dictyomitra).

b. Bluish green claystone with abundant glauconite grains and numerous arenaceous foraminifera.

Foraminifera: Ammobaculites fisheri Crespin
A. minimus Crespin
A. australe (Howchin)
A. subcretaceus Cushman & Alexander
Dorothia filiformis (Berthelin)
Flabellammina alexanderi Cushman
Haplophragmoides chapmani Crespin
Involutina cretacea (Reuss)
cf. Proteonina
Reophax deckeri Tappan
Spiroplectammina edgelli Crespin
S. sp. nov.
Trochammina raggatti Crespin
Verneuilina howchini Crespin
Verneuilina sp. nov.

W.69. In creek 7 miles W.S.W. along fence from Rocky Waterhole on Sherbrook (Jewlery) Creek.

Silty sandstone with poorly preserved arenaceous foraminifera (Haplophragmoides cf. globosa, Involutina cretacea, cf. Sacculinella).

W.80. 4 Miles N.W. of Kidman's Bore, Marion Downs.

Silty sandstone with numerous arenaceous foraminifera, many tests composed of coarse quartz grains.

Foraminifera: Ammobaculites fisheri Crespin
A. minimus Crespin
A. sp.
A. subgoodlandensis Vanderpool
Flabellammina alexanderi Cushman (triserial)
Haplophragmoides globosa Lozo
H. sp.2.
Hyperammina sp.
Involutina cretacea (Reuss)
Trochammina cf. raggatti Crespin
Verneuilina howchini Crespin

W.105. Small folded hills, 3½ miles E. of Mirrica Springs, N.E. part of Simpson Desert.

Cream radiolarite with small amount of quartz silt and radiolaria (Cenosphaera sp., cf. Dictyomitra).

W.205. 7½ miles S. of 8 mile yard, near track to Whitewood Tank on Herbert Downs.

Siltstone with a few poorly preserved arenaceous foraminifera (Haplophragmoides).

W.206. 4 miles S.W. of W.205 locality (above).

Ironstone and whitish siltstone with arenaceous foraminifera many tests large and coarsely arenaceous.

Foraminifera: Ammobaculites subcretaceus Cushman & Alexander
A. minimus Crespin
Flabellammina alexanderi Cushman (triserial)
Involutina cretacea (Reuss)
Haplophragmoides globosa Lozo
H. concavus Chapman
Proteonina cf. lagenarius Berthelin
Pelosina sp.
Reophax deckeri Tappan
Spiroplectammina cf. edgelli Crespin
Verneuilina howchini Crespin
V. sp. nov.

W.261. 1 mile W. of gate aling fence, 5 miles N.W. of Hilary Dam, Marion Downs.

Siltstone with abundant gypsum and large arenaceous foraminifera, some Haplophragmoides very large but crushed.

Foraminifera: Ammobaculites fisheri Crespin
A. minimus Crespin
Haplophragmoides chapmani Crespin
H. globosa Lozo
Involutina cretacea (Reuss)
Flabellammina alexanderi Cushman
Reophax deckeri Tappan
R. sp.2.
Spiroplectammina edgelli Crespin
S. sp. nov.
Verneuilina howchini Crespin

W.262. 9 miles from Hilary Dam on track to Watchee Bore, Marion Downs.

Greenish grey to ochreous siltstone with abundant gypsum, some glauconite and arenaceous foraminifera (Haplophragmoides large and crushed).

Foraminifera: Haplophragmoides chapmani Crespin
H. globosa Lozo
Flabellammina alexanderi Cushman
Involutina cretacea (Reuss)
Spiroplectammina cf. edgelli Crespin
Verneuilina howchini Crespin

W.266. Hills 9½ miles W. of Hilary Dam, 3 miles N. of track to Watchee Bore.

Limonitic siltstone with gypsum, quartz grains, glauconite, and a few arenaceous foraminifera.

Foraminifera: Haplophragmoides chapmani Crespin
H. globosa Lozo
Involutina cretacea (Reuss)
Spiroplectammina sp.

W.285. Marion Downs Homestead, side of track 4 miles S. of where it joins track between Bucket Creek Bore and Whitewood Tank.

Brownish siltstone with gypsum, glauconite and abundant arenaceous foraminifera.

Foraminifera: Ammobaculites fisheri Crespin
A. subgoodlandensis Vanderpool
A. subcretaceus Cushman & Alexander
Ammomarginulina cf. cragini Loeblich & Tappan
Haplophragmoides chapmani Crespin
H. globosa Lozo
H. sp.
Flabellammina alexanderi Cushman
Involutina cretacea (Reuss)
Pelosina lagenoides Crespin
Spiroplectammina ammovitrea Tappan
S. edgelli Crespin
Verneuilina howchini Crespin

Peanunga Well, Glenormiston.

Bluish grey sandstone with a little glauconite and arenaceous foraminifera.

Foraminifera: Ammobaculites fisheri Crespin
A. cf. subcretaceus Cushman and Alexander
Haplophragmoides chapmani Crespin
H. globosa Lozo
Involutina cretacea (Reuss)
I. sp. nov.
Proteonina sp.
Spiroplectammina sp.
Reophax deckeri Tappan
Textularia sp.
Trochammina sp. nov.

Verneuilina sp. nov.
V. howchini Crespin

New Bore, Bucket Creek, Marion Downs Station.

Sandstone and limestone with ? foraminifera and ostracoda, and casts of bivalve shells.

Tambo 4 Mile Sheet

Tam. 2. From walls of Homestead earth tank, Jynoomah Station.

Sandy siltstone with arenaceous and calcareous foraminifera, indeterminate ostracoda, Inoceramus prisms and fish teeth.

Foraminifera: Ammobaculites subcretaceus Cushman & Alexander
Haplophragmoides sp.
Verneuilina sp.
Cibicides sp.
Dentalina sp.
Lenticulina sp.
Marginulinopsis jonesi (Reuss)
M. lenticuliroides Tappan
Pseudoglandulina sp.
Robulus gaultinus (Berthelin)
Vaginulina exilis (Reuss) var. crispata Chapman.

Tam. 3. Limestone lenses weathered out of soil at side of road, 2½ miles from Jynoomah Homestead on Tambo road

Fossiliferous limestone with poorly preserved foraminifera (Lenticulina australiensis Crespin) and fragments of pelecypoda including Inoceramus prisms.

Tam. 4. Road-side samples from 1 mile E. of Tam. 3 locality.

Similar to Tam. 3, with foraminifera rare (Cibicides sp.) and shell fragments.

Tam. 5. From walls of earth tank 4½ miles from Tambo-Minnie Downs road on road to Jynoomah Homestead (1 mile E. of Tam. 4 locality)

a. Coquinite, with arenaceous and calcareous foraminifera, abundant Inoceramus prisms and ostracoda.

Foraminifera: Ammobaculites subcretaceus Cushman & Alexander.
Trochammina minuta Crespin
Dentalina sp.
Gavelinella minima (Vieaux)
Lenticulina spp.
Marginulinopsis australis Crespin
Robulus gaultinus (Berthelin)
Robulus sp. 1
Robulus sp. 2

Ostracoda: cf. Cytheropteron concentricum (Reuss)

b. Siltstone with gypsum, poorly preserved arenaceous foraminifera (Hyperammina sp., Trochammina minuta) and Inoceramus prisms.

Tam. 6. About 4 miles W. of Tambo-Minnie Downs road to Jynoomah; tough blue sandy limestone nodular boulders weathered out on surface.

Calcareous sandstone with angular quartz grains, and glauconitic replacement of indeterminate foraminifera and ostracoda.

Tam. 7. ½ mile N. of Jynoomah turnoff from Tambo-Minnie Downs road; outcrop similar to Tam. 6.

Calcareous sandstone with angular quartz grains, and glauconitic replacement of indeterminate foraminifera and ostracoda.

Tam. 12. About 7 miles S. from main Tambo-Blackhall road on road to Minnie Downs.

Siltstone with glauconite and a few poorly preserved arenaceous foraminifera (Haplophragmoides sp., Trochammina sp.)

Tam. 16. N. bank of Barcoo River on N. side of Tambo.

Sandstone with gypsum and a few poorly preserved arenaceous foraminifera (cf. Haplophragmoides, Ammobaculites minimus).

Machattie 4 Mile Sheet

Mac. 2. Small lenses of brown calcareous sandstone weathered out on surface at road-side 1½ miles S. of the Coorabulka-Monkira boundary.

Calcareous sandstone with glauconitic replacement of foraminifera and ostracoda.

Roma 4 Mile Sheet

Rom. 7. 11 miles N. of Roma, on Injune road.

Siltstone with poorly preserved arenaceous foraminifera, with crystals of black mineral, ? tourmaline, in matrix.

Foraminifera: Ammobaculites australe (Howchin)
Haplophragmoides sp.
Reophax sp.

Rom. 8a. 9¾ miles N. of Roma on Injune Road, S.E. of Euthulla

Siltstone with arenaceous foraminifera, tests very distorted.

Foraminifera: Haplophragmoides chapmani Crespin
Reophax cf. deckeri Tappan
Spiroplectammina sp.

Rom. 12. 5 miles from Roma on railway line to Injune

Ochreous limestone with patches of ? hematite and radiolaria, some tests large and partially replaced by ? hematite which has picked out the delicate ornament of the tests.

Radiolaria: Cenosphaera sp.
Lithocyclia cf. exilis Hinde
cf. Porodiscus
cf. Acanthosphaera
cf. Stichocapsa
cf. Stylodictya (Stylodictala)

Bungeworgorai Creek, Roma, N. of Mitchell road.

a. Top of section. Micaceous sandy siltstone with arenaceous foraminifera.

Foraminifera: Ammobaculites fisheri Crespin
A. subcretaceus Cushman & Alexander
A. australe (Howchin)
Ammobaculoides romaensis Crespin
A. pitmani Crespin
Bigenerina loeblichi Crespin
Haplophragmoides chapmani Crespin
H. concavus Chapman
Siphotextularia sp.

b. Base of section

Ammobaculoides romaensis Crespin
Haplophragmoides chapmani Crespin
Pelosina lagenoides Crespin

Bungeworgorai Creek, Roma, S. side of Mitchell road.

a. Middle of Section. Micaceous sandy siltstone with arenaceous foraminifera.

Foraminifera: Ammobaculoides romaensis Crespin
A. pitmani Crespin
Haplophragmoides chapmani Crespin
H. globosa Lozo
Proteonina cf. lagenarius Berthelin

b. Base of section

Foraminifera: Ammobaculioides romaensis Crespin
Haplophragmoides chapmani Crespin
Pelosina lagenoides Crespin

NOTES ON THE MICROFAUNAS

A. Foraminifera

The features of the foraminiferal assemblages in the samples described above are:

1. The abundance of the planktonic foraminiferal species Globigerina planispira in association with Inoceramus prisms, and at times, with radiolaria.

2. The scarcity of calcareous species other than G. planispira in outcrop samples and their persistence in subsurface samples.

3. The rich assemblage of well preserved arenaceous foraminifera in certain surface samples.

4. The close resemblance of species with those described from the Lower Cretaceous (Albian) of Europe and America.

In making comments on these features, the fourth one will be considered as a part of each of the other three.

1. The association of the planktonic foraminiferal species Globigerina planispira (and in sample S.222, G. infracretacea) with Inoceramus prisms, and at times radiolaria, apparently occurs as a distinct horizon in the different areas from which samples have been examined. This horizon is in a shaly sequence with fossiliferous limestone lenses. The fossils suggest that this horizon and the fossiliferous beds above are the upermost marine unit in the Lower Cretaceous of the Great Artesian Basin, at least in Queensland.

G. planispira was described by Tappan (1940) from the Grayson Formation, the topmost bed of the Washita Division, Comanche Series, Texas, which is considered to be Lower Cenomanian (basal Upper Cretaceous) in age. However, the species is common throughout the lower formations of the Washita which are referred to the upper Albian. In those lower formations, especially in the Duck Creek Formation in Oklahoma, the tests are larger and better developed than in the higher Grayson Formation. In Australia, the species has only been found in beds of the Great Artesian Basin, which, on evidence of macrofossils (Whitehouse, 1954) are considered to be equivalent of the Albian. Crespin (1956) recorded G. planispira as occurring sparingly in certain bores within the Basin, in northern New South Wales. Earlier she recorded the species under G. cretacea from bores in the south-western portion of the Great Artesian Basin (Records 1946/21). G. planispira was found in samples from the Kopperamanna Bore, South Australia (Records 1950/109). Since then it has been recorded in bores drilled in the Carpentaria Basin in Queensland, in the Wyabba Bore (Records 1957/109) and in the A.A.O. Karumba Bore No. 8 (Records 1958/93). In the latter bore the species was abundant in a core at 2191'-2191'7". It was noted in a few of the cores examined from the Weipa Bore in the same part of the Basin.

In Texas, G. planispira has been found associated with Inoceramus prisms in both the Grayson and Duck Creek Formations. In the latter, in both Oklahoma and the Gulf Coast regions, the species occurs with Albian species of Inoceramus and Ammonites.

Globigerina infracretacea was described by Glaessner (1937) from Albian beds of northwest U.S.S.R. It is typically a Lower Cretaceous species and has not, up to the present, been found in beds younger than the Albian.

2. Calcareous species other than Globigerina planispira were scarce in outcrop samples but were well distributed in subsurface material. Most of the Lower Cretaceous species described by Crespin (1944, 1953) from bores in southern Northern Territory and northern South Australia and New South Wales, were represented.

Calcareous pecies were recognised in only four surface samples; three were from the Tambo area, Tam. 2, 3, 5a, and one from Mt. Whelan area, W.37. The assemblage was dominated by calcareous forms; arenaceous tests were very rare. This assemblage contained some well-known species described from the Albian of Europe and England. Robulus gaultinus was the commonest form and the majority of tests were well-preserved. This species was described by Berthelin (1880) from the Albian of Montcley, Belgium; Vaginulina exilis var. crispata Chapman (1894) from the Gault of Folkstone, was found in sample Tam.2.

Well preserved but small tests of calcareous foraminifera were found in the following bores: Broken Dam Bore below 76 feet; Jack's Bore, Canary Station; Netting Bore, Paton Downs; Nos. 1 and 2 Bores, Narra; and Exley Bore, Glenmore. The species consisted of those described by Crespin (1944, 1953) from bores in the Great Artesian Basin as well as species from the Lower Cretaceous (Albian) of America and Europe. One form of zonal significance was Tristix excavatum described by Reuss (1862) from the Gault of Folkestone. This species was found in the Broken Dam Bore, Springvale 4 mile Sheet, at the depth of 120-125 feet. It is not known to range higher than Lower Cenomanian. It has been found in formations of the Washita Division, Texas, which are Albian to Lower Cenomanian in age. The only previous record in Australia was from the lower Gearle Siltstone (upper Albian) beds in Rough Range No. 1 Bore, Carnarvon Basin. It was associated in the Broken Dam material with Anomalina mawsoni, Lenticulina australiensis and Epistomina australiensis, all described by Crespin (1953), with Patellina jonesi described by Howchin (1895) from the old Marree Bore, northern South Australia, and a form closely allied to the Albian species, Lingulina furcillata Berthelin (1880). Another form is Gavelinella minima (Vieaux 1941) restricted to the lower part of the Washita Division.

3. Arenaceous foraminifera are widely distributed in both surface and subsurface samples; they dominate the assemblages in the former. Many of the tests are distorted or crushed making even generic determination often difficult. Excellently preserved, large, coarsely arenaceous tests were found in S.156, W.26, W.40, W.206a, W.261 and W.262. Many of these were referable to species described from Texas (Loeblich and Tappan, 1946, 1949; Tappan, 1940, 1943; Lozo, 1944, and others to species described by Crespin (1944, 1953). These latter species occur fairly consistently in the majority of fossiliferous samples and include Ammobaculites fisheri (common in many samples), A. minimus (common in some samples), Haplophragmoides chapmani, Trochammina raggatti, Spiroplectammina cushmani, S. edgelli, Pelosina lagenoides and Verneuilina howchini (common in some samples). In subsurface deposits these forms are often associated with calcareous species with Albian affinities.

The characteristic species in the samples from the Roma area was Ammobaculoides romaensis described by Crespin (1953) from the Bungeworgorai Creek section near Roma, which is regarded as the type section for the Roma Beds and, on evidence of macrofossils (Whitehouse, 1954), equivalent of the Aptian. A. romaensis occurs in abundance in the Roma sediments where it is often associated with another species described from the same section, A. pitmani. The occurrence of these two species outside the Roma area, is rare.

The majority of the species of arenaceous foraminifera described from beds outside Australia are known to be restricted to the Lower Cretaceous and mainly equivalent of the Albian of Europe. A few are known to range up to basal Upper Cretaceous (Cenomanian). The following species have been identified:

Texas

Ammobaculites subcretaceus - Lower Albian to Upper Cenomanian

Spiroplectammina ammovitrea, S. nuda, Reophax deckeri - Upper Albian to Lower Cenomanian

Flabellammina alexanderi - Upper Aptian to Lower Cenomanian

Ammobaculites subgoodlandensis, Haplophramoides globosa, Reophax subgoodlandensis, Verneuilinoides schizeus - Albian

England

Haplophragmoides concavus - Albian (Gault)

Belgium

Dorothia filiformis - Albian

The form referred to here as Ammobaculites subgoodlandensis Vanderpool (1933) has been placed in the genus Buccicrenata by Loeblich and Tappan (1949). In the limited study of the specimens in the Mt. Whelan samples, the characteristic cribrate wall structure of this genus was not observed. Reophax subgoodlandensis Vanderpool (1933), was considered by Lozo (1944) and Loeblich and Tappan (1949) to belong to the genus Lituola, but again the characteristic cribrate wall structure was not seen.

The problem of the persistent occurrence of arenaceous foraminifera, and the almost complete absence of calcareous forms in surface samples other than in the Tambo area, and the occurrence of numerous calcareous species associated with a few arenaceous forms in subsurface deposits is a difficult one. One opinion is that the calcareous forms were originally present in these outcrop rocks but have been dissolved away. The writer is of the opinion that calcareous forms never did exist in samples S.156, W.26, W.40, W.206a, W.261 and W.262, in which arenaceous tests were abundant, large and composed of coarse quartz grains. It is considered that palaeogeological conditions were not favourable for the development of calcareous tests. Whether or not calcareous tests were present in other samples it is difficult to say. However, the following table shows the

microfaunal sequence in two bore samples examined.

Bores	Globigerina + Inoceramus prisms	Arenaceous forams	Aren. + cal. forams	Aren. + cal. foram. + pyriti replac ment of rad.
Broken Dam	-	45-53 ft.	105 ft.	120-12 ft.
Exley	surface	340-342 ft.	385 ft.	395 f.

Composite samples were examined from two other bore in the Springvale area, namely Nos. 1 and 2, Warra. Arenace us and calcareous foraminifera were associated in a sample from . 2 Bore which also contained pyritic replacement of radiolarian sts such as ere present in the two bores shown above.

B. Radiolaria

Radiolaria were present in both surface and subsurf e samples in four different lithological types and in association with different microfaunas.

1. In surface radiolarite as in S.107a, S.226a and B.9

2. In surface limeston s with abundant Globigerina planispira as in S.222 and B.720.

3. Pyritic replacement of tests in siltstones in bore samples as in Broken Dam Bore at 120-125 feet, Exley Bore at 395 feet and Nos. 1 and 2, bores, Warra.

4. In limestones in which tests were partially replace by ? hematite, as in Gil.11b and Rom.12.

The radiolaria recognised from all samples belonged ainly to the Suborder Spumellina and included genera such as Cenosphaera, Acanthosphaera, Lithocyclia, and Spongodiscus. The suborder Nasselina was represented by Dictyomitra, chiefly in subsurface samples.

Probably the most interesting occurrence of radiola a was in the limestones, Gil.11b and Rom12, in which many of th tests were partially replaced with ?hematite which outlined t delicate structures of the tests. In sample Rom.12, this mode of preservation revealed the planispiral initial arrange nt of some of the tests which the writer had not previously observed in any Australian assemblage of radiolaria. The fo has been tentatively referred to Stylodictya (Stylodictula).

Another rare feature of these limestones was the pr ence of frustules of diatoms, Navicula and Melosira, in associatio with radiolaria. Both of these genera are known from marine sediment

C. Ostracoda

Ostracoda were scarce in the samples, with the exception of those from the Tambo area. The well-known Cretaceous species referred to Cytheropteron concentricum Reuss was present in the Tambo material; other species were not identifiable.

D. Fish Remains

Indeterminate fish remains were associated with Globigerina and Inoceramus in S.107b and in the calcareous glauconitic sandstone of S.110a.

E. Miscellaneous Fossils

Gil.15a and Tam. 21. contained numerous hollow tubes, probably worm remains. S.124d. contained indeterminate freshwater mollusca

An interesting rock-type was represented in samples S.27, S.110, S.236, S.237, Tam. 6 and Tam. 7, Mac. 2. The rock is a calcareous sandstone containing angular quartz grains, and glauconitic replacement of foraminifera and ostracoda. It is understood that this bed is near the top of the Lower Cretaceous sequence and as such should be a useful marker horizon.

SUGGESTED STRATIGRAPHIC POSITION OF THE MICROFAUNAS WITHIN THE LOWER CRETACEOUS SEQUENCE

As previously stated, no attempt is made in this report to place formally the present collection of Lower Cretaceous fossiliferous samples from the Great Artesian Basin in Queensland in a definite stratigraphic sequence, based on evidence of the foraminifera. However, tentative suggestions are indicated; these will be confirmed or otherwise after the examination of associated macrofossils has been completed.

Although the European Lower Cretaceous stage names, Albian and Aptian, are commonly used in stratigraphic work in the Great Artesian Basin, and incidentially in this report, it would be more appropriate if the stratigraphic sequence of surface outcrops in the Basin could be worked out satisfactorily with the establishment of local stage names. Later, long distance correlation with the European Albian and Aptian could be attempted.

On present evidence the foraminiferal assemblages of both calcareous and arenaceous species in the material examined are characterised by species, which, in the Lower Cretaceous of Texas at least, where the stratigraphic ranges of Lower Cretaceous foraminifera has been closely studied (Frizzell, 1954), are common to beds regarded as the equivalent of the Albian; this evidence is supported by the presence of zonal Ammonites and other macrofossils. It may so happen in the Great Artesian Basin that species, especially the calcareous ones, which have been described from beds regarded as equivalent of the Albian elsewhere, may have appeared earlier in Australia. If this is so, it is most important that the Australian Lower Cretaceous sequence should be determined by firm fossil evidence.

The only definite facts relating to the foraminiferal sequence in the Great Artesian Basin are:

1. The calcareous foraminifera in the Tambo samples and the Globigerina-Inoceramus bed of the Toolebuc Member, are apparently in the uppermost marine unit of the Lower Cretaceous in the Basin.

2. The arenaceous foraminiferal assemblage in the rocks from the Roma area are towards the base of the sequence.

The following microfaunal assemblages are prominent in the samples examined, three of them suggesting a definite position in the stratigraphic sequence.

1. The assemblage of calcareous foraminiferal species in the Tambo beds and the Toolebuc Member, is most probably the equivalent of the Upper Albian. The Upper Albian affinities of the species have been discussed in a previous section of this report.

2. The assemblage of radiolaria in the siliceous rocks is similar to that found in radiolaria-bearing rocks of Lower Cretaceous age elsewhere in Australia, which on macrofaunal evidence (Brunnschweiler, 1959) have been referred to the Lower Albian.

3. The assemblage of arenaceous foraminifera in surface samples and the arenaceous-calcareous species associated at times with pyritic replacement of radiolaria in subsurface samples, show close relationship with similar assemblages in deposits overseas regarded as equivalent of the Albian. These species with Albian affinities have been discussed in a previous section of this report.

4. The foraminiferal assemblage in the beds from the Roma area, based on evidence of the macrofossils (Whitehouse, 1954), is considered to be equivalent of the Aptian. The assemblage in surface samples consists entirely of arenaceous species, the most prominent being Ammobaculoides romaensis Crespin. The writer studied the foraminifera of this area in detail a few years ago. Since then a core taken between 157 feet and 159 feet in A.A.O. No. 1 Bore, Hospital Hill, Roma, was examined. Again the assemblage was dominated by arenaceous species, especially A. romaensis and Spiroplectammina cushmani Crespin, a species very common in the Bungil Creek section at Minmi Crossing, north of Roma. Two calcareous species Marginulinopsis australis and Robulus warregoensis described by Crespin (1944, 1953) from subsurface sediments within the Basin, were also found at the same depth.

NOTES ON THE SEQUENCE IN BORES EXAMINED IN THE SOUTH-WESTERN PORTION OF THE GREAT ARTESIAN BASIN

In 1945-1946, the writer examined for microfaunas a collection of 527 samples from water bores from southern Northern Territory, and north and northeastern South Australia (Records 1946/21), and later in 1949, samples from the Koppcramanna Bore, N.E. South Australia (Records 1949/109). In the present investigation of the Lower Cretaceous sediments in Queensland, interesting microfaunal assemblages have been recognised and with this information available it seems that these assemblages recorded in the reports prepared more than ten years ago may now be assigned a more specific position in the Lower Cretaceous stratigraphical sequence. Because of some of the details in these early reports, being generally unavailable, a summary of the lithology and micropalaeontological sequence of four of the bores in northeastern South Australia is given below. It is unfortunate that large gaps between depths exist in some of the bores, but this does little to affect the general picture.

1. Goyder's Lagoon

0-440 feet. Grey carbonaceous sandstone and shale

440-1080 feet. Sandstone with glauconite

1080-1180 feet. Grey shale with coal

1180-2320 feet. Grey carbonaceous shale and sandstone.

2329-3434 feet. Grey sandstone and shale with Inoceramus prisms, especially abundant at 2620-2860 feet.

4051-5462 feet. Grey sandstone and shale with calcareous foraminifera rare.

4562-4620 feet. Carbonaceous shale.

4620-4740 feet. Grey micaceous sandstone

4740-4850 feet. Coarse sand.

2. Mungeranie Bore (40 miles N. of Kopperamanna Bore)

0-97 feet. Sandstone and shale with gypsum.

97-1516 feet. Carbonaceous shale and sandstone.

1516-1694 feet. Carbonaceous shale with Inoceramus prisms.

1740-2728 feet. Grey carbonaceous shale, calcareous sandstone and a little limestone with a few calcareous and arenaceous foraminifera (Globigerina at 2275-2325 feet) and Inoceramus prisms, common at 2083-2104 feet and 2275-2325 feet.

2728-2795 feet. Green glauconitic sandstone, with foraminifera rare, and a few shelly particles.

2795-3009 feet. Carbonaceous shale and sandstone with a few foraminifera.

3009-3269 feet. Black to grey carbonaceous shale.

3296-3297 feet. Carbonaceous sandstone.

3360-3370 feet. Fine quartz sand.

3. Kopperamanna Bore

1150 feet. Fine micaceous sandstone with a little glauconite.

1166 feet. Similar to 1150 feet with a few arenaceous foraminifera.

1907 feet. Grey sandstone with abundant pyrite, numerous arenaceous and calcareous foraminifera, many tests replaced with pyrite, ostracoda and fish remains. Globigerina planispira present.

1910 feet. Dark grey siltstone with a few foraminifera.

1930-1950 feet. Dark grey carbonaceous sandstone with a few foraminifera and Inoceramus prisms.

1990 feet. Dark grey carbonaceous siltstone with a little quartz, numerous foraminifera, chiefly calcareous forms, Inoceramus prisms, and small fish teeth.

2110 feet. Glauconitic sandstone with numerous foraminifera, chiefly arenaceous, ostracoda and small fish teeth.

2285 feet. Sandstone with numerous but poorly preserved foraminifera and radiolaria.

2813-2950 feet. Laminated siltstone and carbonaceous siltstone.

4. Patchawarra Bore

0-485 feet. Sandstone

1460-4470 feet. Carbonaceous shale and sandstone with coal at 3390 feet.

4520 feet. Carbonaceous shale with fragments of pelecypoda.

4850-4906 feet. Grey shale with foraminifera (Globigerina planispira common at 4890, 4906 feet) and Inoceramus prisms (common at 4950 feet).

4980-5161 feet. Grey shale with foraminifera.

5408 feet. Grey shale. No foraminifera.

Three important facts stand out on a reappraisal of these bore sections and the microfaunal assemblages.

a. The high position in the marine sequence of the bed containing abundant Inoceramus prisms and Globigerina planisp ra.

b. The rich assemblage of calcareous species of foraminifera especially in the Kopperamanna Bore, at 1907 fe from which some of the new species described by Crespin (195 were taken. Many of the species recorded at this depth had Albian affinities.

c. The considerable depth (4520 feet) at which the fir t record of marine fossils were recorded in the Patchawarra Bo , indicating the thickness of the sediments overlying the marin beds in this part of the Great Artesian Basin.

REFERENCES

BERTHELIN, M., 1880. Memoire sur les Foraminiferes Fossiles de l'etage Albien de Montcley (Doubs). Mem. geol. Soc. France, 3 (1), 5.

BRUNNSCHWEILER, R.O., 1959 New Aconeceratinae (Ammonoidea) from the Albian and Aptian of Australia. Aust. Bur. Min. Resour. Bull. 54.

CHAPMAN, F., 1891-1898. The Foraminifera of the Gault of Folkestone. Parts 1-10. J. Roy. Micro. Soc. London.

CRESPIN, I., 1944. Some Lower Cretaceous Foraminifera from Bores in the Great Artesian Basin, Northern New South Wales. J. Roy Soc. N.S.W., 78, 17-24.

CRESPIN, 1946. Preliminary Report on the Microscopic Examination of samples from Bores in the Great Artesian Basin of northern and northeastern South Australia and southern Northern Territory. Bur. Min. Resour. Records 1946/12 (unpubl.)

CRESPIN, I., 1949. Micropalaeontological Report on Samples from Kopperamanna Bore, South Australia. Ibid. 1949/109. (unpublished).

CRESPIN, I., 1953. Lower Cretaceous Foraminifera from the Great Artesian Basin, Australia. Cush. Fdn. Foram. Res. 4 (1), 26-36.

CRESPIN, I., 1956. Distribution of Lower Cretaceous Foraminifera in Bores in the Great Artesian Basin, northern New South Wales. J. Roy. Soc. N.S.W., 89, 78-84.

CUSHMAN, J.A., 1928. Additional Genera of the Foraminifera. Cush. Lab. Foram. Res. 4 (1), 1-5.

CUSHMAN, J.A., and ALEXANDER, C.I., 1930. Some Vaginulinas and other Foraminifera from the Lower Cretaceous of Texas. Ibid. 6 (1), 1-10.

FRIZZELL, D.L., 1954. Handbook of Cretaceous Foraminifera of Texas. Bur. Econ. geol. Rept. Invest. 22, 7-230.

GLAESSNER, M.F., 1937. Planktonforaminiferen aus der Kreide und dem Eozan und ihre stratigraphische Bedeutung. Studies Micropaleont. (Moscow), 1 (1), 27-52.

HINDE, G.J., 1893. Note on a Radiolarian Rock from Fanny Bay, Port Darwin, Australia. Quart. J. geol. Soc. 49 (2), 221-226.

HOWCHIN, W., 1895. Two new species of Cretaceous Foraminifera. Trans. Roy. Soc. S. Aust. 19, 198-200.

LOEBLICH, A.R., and TAPPAN, H., 1946. New Washita Foraminifera. J. Paleont. 20 (3), 238-258.

LOEBLICH, A.R., and TAPPAN, H., 1949. Foraminifera from the Walnut Formation (Lower Cretaceous) of northern Texas and southern Oklahoma. Ibid. 23 (3)1 241-266.

LOZO, F.E., 1944. Biostratigraphic Relations of some northern Trinity and Fredericksburg (Comanchean) Foraminifera. Amer. Midland Nat. 31 (3), 513-582.

REUSS, A.E., 1862. Die Foraminiferen des norddeutschen Hils und Gault. S.B. Akad. Wiss. Wien. 46, 5-100.

SPRIGG, R.C. et al. 1958. The Great Artesian Basin in South Australia. J. Geol. Soc. Aust. 5 (2), 88-101 (for 1957).

TAPPAN, H., 1940. Foraminifera from the Grayson Formation of Northern Texas. J. Paleont. 14 (2), 93-126.

TAPPAN, H., 1943. Foraminifera from the Duck Creek Formation of Oklahoma and Texas. Ibid. 17 (5), 476-517.

VIEAUX, D.G., 1941. New Foraminifera from the Denton formation in northern Texas. Ibid. 15 (6), 624-628.

VANDERPOOL, H.C., 1933. Upper Trinity microfossils from southern Oklahoma. Ibid. 7 (4) 406-411.

WHITEHOUSE, F.W., 1954. The Geology of the Queensland portion of the Great Australian Artesian Basin. Appendix G. Artesian Water Supplies in Queensland. 1-30.