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MICROPALAEONTOLOGICAL EXAMINATION OF ROCK SAMPLES FROM THE NORTHWEST BASIN, WESTERN AUSTRALIA.

by

I. CRESPIN.

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This report on a collection of rocks made by M.A. Condon from the Northwest Basin, is divided into two sections:-

A. Detailed description of lithology and microfaunal content of the samples.

B. Stratigraphic and Faunal Notes.

Under heading A, the samples are listed in numerical order. These are grouped under general locality headings, and each sample is given its precise locality as stated by M.A. Condon, (see also accompanying locality plan). Samples N.W.C. 1 to 9 come from Cape Cuvier Area which is about 100 miles south of the southern boundary of the plan.

Under heading B, the samples are grouped under the general locality headings, but where possible are listed in stratigraphic sequence.

A. Detailed description of lithology and microfaunal content of the samples.

NWC/1 — 1 mile south of Quobba Homestead.

Buff, sandy limestone with minute foraminifera.

Foraminifera:

Amphistegina sp.
cf. Anomalinella
Cibicides cf. mundulus
Cibicides cf. refulgens
Discorbis cf. globularis
Discorbis spp.
Elphidium crispum
cf. Eponides
Globorotalia crassa
Gyroidina soldanii

Cape Cuvier

NWC/2 — Sea Cliff, 1 mile northwest of Cape Cuvier

Hard, cream, crystalline limestone with foraminifera and fragments of mollusca.

Foraminifera:

Austrotrillina howchini
Flosculinella bontangensis
Marginopora vertebralis
Triloculina tricarinata

NWC/3. Bed one foot thick, below NWC/2, Cape Cuvier

Hard, fawnish, fine-grained, with poorly preserved, minute foraminifera.

NWC/4 Bed 3 feet thick, below NWC/3, Cape Cuvier

Yellowish green porous limestone with casts of indeterminate mollusca. No recognisable foraminifera.

NWC/5. Bed 3 to 8 feet thick, below NWC/4, Cape Cuvier

Hard cream, crystalline limestone with foraminifera small flat echinoids (Scutellina patella) and indeterminate mollusca (Personella cf. javana).

Foraminifera:

Elphidium sp.
Marginopora vertebralis
Pyrgo sp.
Quinqueloculina sp.
Sorites marginalis
Triloculina tricarinata

NWC/6. Up tp 50 feet thick, below NWC/5, Cape Cuvier.

Hard, cavernous, pinkish to cream and ochreous crystalline limestone with foraminifera, echinoid spines and poorly preserved mollusca (Glycymeris sp., Conus sp., Natica sp.). Foraminifera are in fine groundmass of?minute algae and broken foraminifera.

Foraminifera:

Globigerinoides trilobus
Nodosaria radicula
Sorites marginalis
Triloculina tricarinata

Warraroo Anticline

NWC/7 West Shore of Salt Marsh, east of Gnaraloo Homestead

Hard, white, crystalline limestone, with Flosculinella bontangensis on polished surface. Limestone has fine groundmass of ? minute algae and foraminifera.

Foraminifera:

Elphidium sp.
Flosculinella bontangensis
Marginopora vertebralis
Sorites marginalis

NWC/8 Road 6 miles north of NWC/7

Hard, cream, crystalline limestone with Flosculinella bontangensis and Marginopora vertebralis on fractured surface.

Foraminifera:

Epistomaria polystomelloides
Flosculinella bontangensis
Marginopora vertebralis
Sorites cf. marginalis
Triloculina tricarinata
Valvulina davidiana
Valvulina fusca

NWC/9. Bed of deep gully at road 13 miles north of NWC/8

Hard, dense, crystalline limestone with Austrotrillina howchini and Peneroplis planatus of fractured surface. Matrix of rock consists of fragments of minute algae and foraminifera.

Foraminifera:

Austrotrillina howchini
Flosculinella bontangensis
Marginopora vertebralis
Peneroplis planatus

Cape Range

NWC/10 Pilgramunna Creek, Point 63, Photo 30, Run 5, Mandu

Friable, whitish, coarse sandstone with subangular to rounded quartz grains.

NWC/11 Bed of Mandu Creek, Point 70, Photo 25, Run 4, Mandu

Friable to hard, cream chalky foraminiferal limestone with numerous small Lepidocyclinae and small to large Cycloclypeus. Both microspheric and megalospheric forms of Cycloclypeus present, the former measuring up to 25 mm. and the latter between 3 and 5 mm. Numerous small foraminifera also present in the crushed material.

Foraminifera :

Anomalina glabrata
Anomalina nonionoides
Anomalinella cf. rostrata
Bolivina cf. lobata
Bolivina cf. sumatrensis
Bolivina cf. victoriensis
Bolivina spp. nov.
Carpenteria proteiformis
Cassidulina cf. delicata
Cibicides lobatulus
Cibicides cf. Lobatulus
Cibicides sorrentae
Cibicides refulgens
Cibicides sp.
Cycloclypeus indopacificus Form A
Cycloclypeus indopacificus Form B
Dentalina communis
Discorbis operculatis
Discorbis tuberculata var australiensis
Discorbis sp.
Elphidium cf. hispidulum
Eponides repandis
Glandulina laevigata
Globigerinoides trilobus

Globulina gibba
Gypsina globulus
Gaudryina sp.
cf. Hauerina
Lagena globosa
Loxostomum cf. limbatum
Lepidocyclina (Trybliolepidina) gippslandica
Lepidocyclina (Trybliolepidina) martini
(common)
Lepidocyclina (Nephrolepidina) sp.
Miogypsina thecidaeformis
Nodosaria sp.
Nonion depressulum
Nonionella sp.
Operculina victoriensis
Patellina sp.
Quinqueloculina sp.
Reussella spinulosa

✓ NWC/12. S.E. of Milyering Well, Point 73, Photo 52, Northwest Cape Tie Run

Hard cream to pinkish calcareous sandstone with a few foraminifera and casts of mollusca (Natica sp.)

Foraminifera:

Amphistegina sp.
Small rotalines indeterminate

✓ NWC/13 S.E. of Milyering Well, 50 feet stratigraphically below NWC/12 Point 73A, Photo 52, Northwest Cape Run.

Hard, white calcareous sandstone similar to NWC/12, with fragmentary formainifera.

Foraminifera:

Amphistegina sp. (small form)

Giralia

East limb of Giralia Anticline, North of Giralia-Bullara Road

✓ NWC/14 50 feet east of Point 1, Photo 100, Giralia

Hard to friable chalky limestone with a few foraminifera, and bryozoa; also numerous rhombs of cf. calcite.

Foraminifera:

Guembelina cf. globulosa
Gyroidina sp.
Nodosaria cf. radicula

✓ NWC/15 270 feet east of Point 1, Photo 100, Giralia

Hard, yellowish green bryozoal limestone with foraminifera, grains of gree glauconite and some ironstaining of formainifera and bryozoa.

Foraminifera:

Ammobaculites sp.
Anomalina cf. perthensis
Globigerina sp.
Gyroidina cf. depressa
Planulina sp.

NWC/16 400 feet east of Point 4, Photo 100 Giralia

Hard, brownish crystalline limestone, with many foraminifera and bryozoa replaced with green glauconite and brown limonite.

Foraminifera:

Anomalina sp.
Cibicides sp.
Discocyclina sp. (small species)
Gyroidina sp.
Spiroplectammina sp.

NWC/17 Point 5, Photo 100, Giralia

Hard, buff, crystalline limestone with numerous cavities, also with foraminifera, chiefly filled with green glauconite, fragments of mollusca (Chlamys sp.) and grains of green glauconite.

Foraminifera:

Anomalina sp.
Discocyclina sp. (small species)
Globigerina sp.
cf. Pellatispira orbitoidea

NWC/18. Point 8, Photo 100, Giralia, stratigraphically immediately above NWC/17.

Hard, brown, crystalline/limestone with foraminifera (Discocyclina) and ? corals, most foraminifera ironstained.

Foraminifera:

Acervulina inhaerens
Bolivinopsis sp.
Discocyclina cf. chudeaui
Discocyclina cf. dispansa
Globigerina sp.
Operculina sp.

NWC/19 1,000 feet, east of Point 9, Photo 100, Giralia, immediately below laterite.

Hard, brown laminated, crystalline limestone with foraminifera (Operculinoides cf. ocalanus) radiolaria, and angular quartz grains in limonitic groundmass.

Radiolaria:

Small Spumellaria

Foraminifera:

Globogerina sp.
Nodosaria cf. radicula
Operculinoides cf. ocalanus

NWC/20 1270 feet east of Point 9, Photo 100, Giralia.

Moderately hard, cream, chalky limonitic limestone with numerous small foraminifera.

Foraminifera:

Bolivina sp.
Anomalina perthensis
Cibicides peseudoconvexus
Cibicides umboniferus
Cibicides spp.
Discorbis sp.
Eponides cf. cocoaensis
Globigerinoides cf. trilobus
Eloborotalia sp.
Globorotalia (Truncorotalia)spinulosa
Gyroidina soldanii
Lenticulina cf. limbosa
Lenticulina sp.
Pulvinulinella obtusa var. westraliensis
Vaginulinopsis cf. cretacea
Vaginulina sp.
Verneulina parri
Valvulineria sp.

NWC/21 Point 10, Photo 100, Giralia

Hard, dark grey crystalline foraminifera limestone with hematiteestaining and with minute foraminifera, chiefly miliolines, in matrix.

Foraminifera:

Austrotrillina howchini
Elphidium sp.
Flosculinella bontangensis
Marginipora vertebralis (common)
Peneroplis sp.
Valvulina davidiana

NWC/22 Point 11, Photo 120, Run 3, Giralia

Green and yellowish brown glauconitic sand with abundant foraminifera, brachiopods, ammonites, nautiloids, gasteropods and rounded quartz grains

Foraminifera:

Ammobabulites sp.
Anomalina ammonoides
Anomalina rubiginosa
Anomalina velascoensis
Arenobulimina preslei
Bathysiphon sp.
Bolivina cf. cretosa
Bolivina incrassata
Bolivinita cf. selmenensis
Bolivinoides decorata
Bolinivipsis clotho
Bulimina cf. aspera
Bulimina cf. kickapooensis
Bulimina cf. prolexa
Buliminella cf. carseyae
Cibicides cordieriana
Cibicides lobatulus
Cibicidella variabilis
Clavulinoides cf. disjuncta
Coleites cf. reticulosus

Dentalina aculeata
Dentalina basiplanata
Dentalina catenula
Dentalina lorneiana
Dentalina megalopolitana
Dentalina pauperata
Dentalina cf. plummerae
Dentalina cf. solvata
Dentalina sp.
Dorothia bulletta
Dorothia cf. bulletta
Dorothia cf. conula
Dorothia cf. concinna
Dorothia cf. retusa
Eouvigerina cf. austiniana
Eggerella cf. trochoides
Frondicularia cf. angustata
Frondicularia inversa
Frondicularia cf. ungeri
Frondicularia cf. watersi
Frondicularia sp.
Gaudryina cf. rudita
Gaudryina sp.
Globigerina cf. belli
Globigerina cretacea
Globigerina pseudotriloba
Globigerinella involuta
Globorotalia cf. membranacea
Globorotalia micheliniana
Globotruncana arca
Globotruncana arca var.
Globulina lacrima
Globulina prisca
Guembelina globulosa
Guembelina cf. globulosa
Gyroidina cf. arkadelphinana
Gyroidina girardana
Lagena apiculata
Lagena aspera
Lagena hexagona
Lagena semilineata
Lagena orbignyana
Lagena orbignyana var.
Lenticulina discrepans
Lenticulina macrodiscus
Lenticulina munsteri
Lenticulina navicula
Lenticulina cf. taylorensis
Lenticulina williamsoni
Lenticulina sp.
Lituola cf. taylorensis
Lituola sp. nov.
Marginulina bulletta
Marginulina cf. jarvisi
Marginulina plummerae
Marginulina sp.
Marssonella oxyxona
Marssonella cf. ellisorae
Nodosaria affinis
Nodosaria paupercula
Nodosaria radicula
Nodosaria cf. subrecta
Nodosaria sp.
cf. Nubecularia
Palmularia rugosa
Pseudoclavulina cf. eggeri

Pseudollandulina cf. lagenoides
Pseudotextularia varians
Placopsilina cenomana
Pulvinulinella cf. velascoensis
Quinqueloculina sp.
Spiroplectammina sp.
Triloculina cf. tricarinata
Vaginulina suturalis
Verneuilina limbata
Verneuilina parri

NWC/23A. Point 14, Photo 120, Run 3, Giralia.

Friable to hard, cream, chalky limestone with foraminifera and abundant Inoceramus prisms.

Foraminifera:

Ammodiscus cf. cretacea
Anomalina cf. ammonoides
Anomalina velascoensis
Anomalina sp.
Bolivinoides decorata
Bolivinopsis cf. clotho
Bulimina cf. prolixa
Cibicides corderiana
Cibicides lobatulus
Cibicides sp. nov.
Frondicularia cf. frankei
Globigerina cf. cretacea
Gyroidina depressa
Gyroidina girardana
Marssonella oxycona
Planulina sp. nov.

West limb of Giralia Anticline, North of Giralia-Bullara Road.

NWC/23 Point 15, Photo 123, Run 3, Giralia.

Hard buff, crystalline, bryozoal limestone with foraminifera green glauconite and ironstaining.

Foraminifera:

Lagena laevis
cf. Marssonella oxycona
Operculina sp.
cf. Stichocibicides
Textularia sp.

NWC/24 Point 16, Photo 123, Run 3, Giralia, about 10 feet below NWC/23.

Hard brownish crystalline limestone with foraminifera, grains of buckshot gravel, limonitic replacements of foraminifera and angular quartz grains. Many foraminifera and bryozoa have been rolled.

Foraminifera:

Alveolina sp.
Discocyclina sp.
Frondicularia sp.
cf. Hantkenina

Lagena laevis
Nummulites sp.
Operculinoides sp.
cf. Pellatispira
Sprioplectammina sp.
Vaginulinopsis sp.

NWC/25 Well, 7 miles south of Bullara Homestead

Hard, cream crystalline, limestone with foraminifera (miliolidae common) and poorly preserved mollusca (Conus sp.)

Plantae:

Lithothamnium ramossisimum

Foraminifera:

Bigenerina sp.
Clavulina cf. difformis
Discorbis sp.
Elphidium sp.
Marginopora vertebralis
Sigmomorphina sp.
Textularia sp.
Triloculina tricarinata
Valvulina fusca

West limb of Giralia Anticline, North of Remarkable Hill.

NWC/26 Point 17, Photo 134, Run 6, Marilla

Soft, dark, greyish brown siltstone with gypsum, a little rounded quartz, a few foraminifera.

Foraminifera:

Haplophragmoides sp.

NWC/27. Point 18, Photo 132, Run 6, Marilla, below NWC/26.

Friable, whitish to buff siltstone with abundant radiolaria.

Radiolaria:

Cenosphaera sp.
Dictyomitra australis

NWC/28 Point 19, Photo 132, Run 6, Marilla

Friable, cream to grey siltstone with numerous radiolaria and some nodules of barytes.

Radiolaria:

Cenosphaera sp.
Porodiscus sp.

NWC/30 100 feet west of Point 30, Photo 130, Run 6, Marilla.

White, chalky limestones with abundant foraminifera and Inoceramus.

Foraminifera:

Anomalina ammonoides
Anomalina cf. rubiginosa
Anomalina cf. grosserugosa
Anomalina velascoensis
Cibicides cf. stephensoni
Cibicides sp.
Dorothia bulletta
Dorothia cf. retusa
Dorothia cf. conula
Dentalina aculeata
Dentalina cf. basiplanata
Eponides sp.
Globigerina cf. belli
Globigerina cretacea
Globorotalua micheliniana
Globotruncana canaliculata
Globotruncana arca
Guembelina globulosa
Gyroidina depressa
Gyroidina girardana Gyroidina nitida
Haplosticha cf. texanus
Haplosticha sp.
Lenticulina cf. discrepans
Lenticulina munsteri
Lenticulina cf. williamsoni
Lenticulina spp.
Marssonella oxycona
Nodosaria catenula
cf. Nubecularia
Planularia cf. dissona
Planulina sp. nov.
Planulina cf. taylorensis
Spiroplectammina laevis var. cretosa

NWC/31 50 feet stratigraphically above NWC/30

Cream chalky limestone with foraminifera and abundant Inoceramus

Foraminifera:

Anomalina rubiginosa
Anomalina velascoensis
Cibicides cordieriana
Cibicides lobatulus
Globorotalia micheliniana
Gyroidina globosa
Lenticulina sp.
Marssonella oxycona
Planulina cf. taylorensis
Spiroplectammina cf. semi-complanata

NWC/32 Point 22, Photo 130, Run 6, Marilla.

Green glauconitic sand with abundant foraminifera, also bryozoa, brachiopoda, mollusca, ammonites, nautiloids and quartz grains.

Foraminfera:

Anomalina ammonoides
Anomalina cf. rubiginosa
Anomalina velascoensis
Bolivinoides decorata
Bulimina cf. prolixa
Bulimina reussi
Cibicides cf. lobatulus
Cibicides sp. nov.
Cibicides cordieriana
Cibicidella variabilis
Coleites cf. reticulosus
Dentalina basiplanata
Dentalina catenula
Dentalina solvata
Dentalina sp.
Dorothia bulletta
Dorothia cf. concinna
Dorothia cf. retusa
Dorothia sp.
Frondicularia frankei
Gaudryina sp.
Globiferina cf. belli
Globigerina cf. triloculinoides
Globorotalia cf. membranacea
Globotruncana canaliculata
Globulina lacrima var. subsphaerica
Guttulina adherens
Guttulina trigonula
Gyroidina girardana
Lagena aspera
Lenticulina munsteri
Lenticulina cf. munsteri
Lenticulina cf. williamsoni
Lenticulina spp.
Lituola sp. nov.
Marginulina cf. jarvisi
Marssonella cf. ellisorae
Nodosaria affinis
Nodosaria cf. confluens
Nodosaria sp.
Palmularia rugosa
Planulina cf. texana
Pseudoclavulina sp. nov.
Pseudopolymorphina cuyleri
Pulvinulinella cf. texana
Sigmomorphina sp.
Spiroloculina sp.
Spiroplectammina sp.
Triloculina tricarinata
Vaginulinopsis cretacea
Verneulina parri

NWC/33. Immediately above top of NWC/32

Ochreous glauconitic, chalky limestone with numerous foraminifera and glauconitic replacement of many tests.

Foraminifera:

Anomalina rubiginosa
Anomalina sp.
Arenobulimina preslii

Cibicides spp.
Cibicidella variabilis
Clavulinoides sp.
Dentalina cf. lorneiana
Dorothia bulletta
Globigerina cretacea
Globigerina triloculinoides
Globorotalia cf. membranacea
Globulina lacrima
Guttulina cf. adherens
Guttulina trigonula
Guembelina cf. globulosa
Lagena acuticosta
Lagena hexagona
Lagena hispida
Lenticulina macrodiscus
Lenticulina spp.
Marginulina aff. elongata
Marssonella oxycona
Nodosaria affinis
Planularia advena
Planulina cf. texana
Planulina sp.
Pseudoclavulina sp.
Pulvinulinella sp.
Sigmomorphina sp.
Spiroplectammina laevis var. cretosa
Textularia spp.
Vaginulinopsis cretacea
Verneulina parri

NWC/34. 50 feet stratigraphically above NWC/32

White chalky limestone with formainifera, bryozoa, brachiopoda, a few prisms of Inoceramus and angular quartz grains.

Foraminifera:

Anomalina ammonoides
Anomalina cf. texana
Anomalina sp.
Cibicides cf. beaumontianus
Cibicides lobatulus
Cibicidella variabilis
Dentalina cf. lorneiana
Dentalina sp.
Dorothia bulletta
Eouvigerina sp.
Globigerina cf. triloculinoides
Guttulina cf. trigonula
Gyroidina nitida
Lagena laevis
Lenticulina cf. macrodiscus
Lenticulina spp.
Marssonella oxycona
Pullenia cf. jarvisi
Vaginulina cf. texana
Verneulina parri

NWC/35. Interbedded with NWC/34.

Hard, yellowish brown crystalline limestone with foraminifera and bryozoa.

Foraminifera:

Cibicides cf. lobatulus
Cibicides sp.
Globorotalia cf. membranacea
Lagena hispida
Lenticulina cf. munsteri
Marssonella oxycona

NWC/36. Point 23, Photo 130, Run 6, Marilla

Cream, chalky limestone with a few poorly preserved foraminifera.

Foraminifera:

cf. Cibicides sp.

NWC/37 Stratigraphically immediately above NWC/36

Friable, buff, limestone, composed entirely of facets of calcite.

NWC/39 Point 25, Photo 130, Run 6, Marilla

Hard white, crystalline limestone with a few radiolaria, small foraminfera, bryozoa, and green glauconite.

Radiolaria:

Small indeterminate Spumellarians

Foraminifera:

Bolivina sp.
Boliviniopsis cf. clotho
Clavulina sp.
Globigerina cretacea
Globigerina cf. triloculinoides
Guembelina globulosa

NWC/40. Point 28, Photo 130, Run 6, Marilla

Hard, brownish, crystalline limestone with foraminifera (small Discocyclina)limonitic replacement of foraminifera and small grains of buckshot gravel.

Foraminifera:

Anomalina sp.
Discocyclina cf. chudeaui
Discocylina cf. dispansa
Globigerina sp.
Lagena cf. apiculata

NWC/41 100 feet east of Point 28, Photo 130, Run 6, Marilla

A. Hard, buff, crystallin limestone with foraminifera and bryozoa in fine matrix.

Foraminifera:

Anomalina sp.
Discocyclina cf. dispansa
cream,

b. Friable, sandy limestone with poorly preserved foraminifera and fine angular grains of clear quartz.

Foraminifera:

Discocyclina sp.

NWC/42 150 feet east of Point 28, Photo 130, Run 6, Marilla and 20 feet below.

Hard, green glauconitic limestone with numerous small foraminifera, the majority of tests being replaced with green glauconite.

Foraminifera:

Anomalina sp.
Bolivinopsis sp.
Globigerina cretacea
Globorotalia cf. micheliniana
Guembelina globulosa
Planulina sp.

NWC/43 200 feet east of Point 28, Photo 130, Run 6, Marilla and 30 feet below.

Hard, buff, crystalline limestone with glauconite, small foraminifera, bryozoa and fine facets of calcite.

Foraminifera:

Globigerina sp.
Small indeterminate rotalines

NWC/44. 300 feet east of Point 28, Photo 130, Run 6, Marilla and 45 feet below

Friable, cream, chalky limestone with a few foraminifera and glauconite grains.

Foraminifera:

Lenticulina cf. limbosa

Centenary Bore, Cardabia Station.

NWC/45. Sludge from Bore.

Dark grey siltstone with formainifera.

Foraminifera:
Globigerina sp.
Hapliphragmoides sp.
Lenticulina cf. warregoensis
Lenticulina sp.
Marginulina sp.
Nodosaria affinis

NWC/46. Sample from Bore.
Centenary Bore, Cardabia Station.

Angular grains of clear quartz, fragments of limestone, foraminifera, indeterminate molluscan shells, bryozoa and ostracoda.

The foraminifera consist of a mixed assemblage of Miocene (including Lepidocyclina) and Eocene (including Discocyclina) forms.

NWC/47. Sample from Bore

Cream, sandy limestone with poorly preserved foraminifera and bryozoa.

Foraminifera:

Cibicides refulgens
? Discorbis sp.
Eponides sp.
Gypsina howchini
Operculina cf. victoriensis
Rotalia sp

NWC/48. Friable yellowish green sandstone with fragments of limestone, quartz grains, foraminifera too poorly preserved for determination and Inoceramus prisms

NWC/49 Sample from Bore
Light bluish grey siltstone with numerous foraminifera, abundant Inoceramus prisms and limonite after glauconite

Foraminifera:

Anomalina rubiginosa
Anomalina velascoensis
Arenobulimina preslii
Bolivinita eleyi
Bolivinoides decorata
Bolivinopsis clotho/Bulimina reussi
Cibicides falcata
Cibicides cf. lobatulus
Cibicides sp. nov.
Cibicides sp.
Cibicidella variabilis
Dentalina basiplanata
Dentalina cf. gracilis
Dentalina sp.
Dorothia bulletta
Dorothia sp.
Eponides sp.
Frondicularia cf. frankei
Frondicularia undulosa
Globigerina cretacea
Globigerina cf. triloculinoides
Globotruncana canaliculata
Globotruncana sp.
Globulina lacrima
Guttulina adherens
Gyroidina globosa
Gyroidina nitida
Haplophragmoides sp.
Lenticulina cf. munsteri
Lenticulina cf. oligostegius
Lenticulina cf. rotulata
Lenticulina cf. williamsoni
Marginulina bulletta
Marssonella oxycona

Nodosaria radicula
Planulina cf. spissocostata
Planulina sp. nov.
Quinqueloculina sp.
Saracenaria italica
Spiroplectammina cf. laevis var. cretosa
Triloculina sp.
Valinulinopsis cf. cretacea
Verneulina parri

East limb of Giralia Anticline, Approximately 12 miles S.W. of Giralia Homestead

NWC/50 Point 29, Photo 163, Run 5, Giralia

Washings from large nautiloids, in bed of hard yellowish brown limestone with glauconite

Foraminifera:

Anomalina ammonoides
Anomalina rubiginosa
Anomalina spp.
Cibicides spp.
Cibicides cf. lobatulus
Clavulinoides sp.
Dentalina sp.
Discorbis cf. bertheloti
Dorothia bulletta
Globigerina cf. asperula
Globigerina cretacea
Globigerina cf. triloculinoides
Globulina lacrima
Guttulina trigonula
Guttulina sp.
Gyroidina nitida
Lenticulina cf. munsteri
Lenticulina sp.
Lagena hispida
Palmularia sp.
Sigmomorphina sp.
Textularia sp.
Vaginulinopsis cf. cretacea
Verneuilina parri

South end of Cape Range, Structure, S.E. of Yardie Creek.

NWC/51 Hard, white to cream crystalline limestone, with abundant foraminifera and calcareous algae.

Plantae:

Lithothamnium ramossissimum

Foraminifera:

Discorbis cf. cycloclypeus
Elphidium cf. adelaidensis
Marginopora vertebralis
Rotalia cf. beccarii
Sorites marginalis
Spiroloculina excavata
Valvulina fusca

NWC/52 Point 137, Photo 89, Run 4, Bundera

Hard cream, crystalline limestone with foraminifera including Lepidocyclina and bryozoa.

Plantae:

Lithothamnium ramossissimum

Foraminifera:

Amphistegina lessonii
Austrotrillina howchini
Cycloclypeus sp.
Elphidium cf. adelaidensis
Epistomaria polystomelloides
Gypsina globulus
Gypsina howchini
Globigerina sp.
Lepidocyclina ferreroi
Lepidocyclina cf. verbeeki
Lepidocyclina sp. Form B
Operculina sp.
Spiroloculina sp.

B. Stratigraphic and Faunal Notes

This collection of fossiliferous rocks from the Northwest Basin contains specimens of Lower Cretaceous, Upper Cretaceous, Eocene, Middle Miocene, Pliocene and Pleistocene to Recent ages. Foraminifera are numerous in some samples especially those from the Upper Cretaceous and approximately 600 hundred determinations have been made. Several new species have been recognised. One genus Coleites, which is well represented in the Upper Cretaceous samples, has only been recorded previously from the Palaeocene and Eocene in America and from the Danian (Uppermost Cretaceous), Palaeocene and Lower Eocene in Europe.

NWC/1 from one mile south of Quobba Homestead, contains an assemblage of foraminfera, all of which belong to Recent species. This rock is not older than Pleistocene.

Cape Cuvier Area

The samples from Cape Cuvier which are arranged in descending stratigraphic sequence, are NWC/2,3,4,5, 6. All are Middle Miocene in age. NWC/2,5, and 6 contains recognisable zonal foraminifera, but those in NWC/3 and 4 are too poorly preserved for determination.

NWC/2 contains Austrotrillina howchini and Flosculinella bontangensis together with Marginopora vertebralis. NWC/5 also contains M. vertebralis and NWC/6, Sorites marginalis. This assemblage is widely distributed in the Northwest Basin and recent investigations in the area indicate that it is characteristic of an horizon near the top of the Middle Miocene.

Cape Range Area

Samples from this area are NWC/10, 11, 12, 13.

NWC/10 is a coarse unfossiliferous sandstone which may be Pliocene or younger. NWC/12 and 13 are calcareous sandstones containing a few foraminifera, the only recognisable forms being Amphistegina. These two samples are also Pliocene or younger.

NWC/11 is a chalky limestone containing numerous foraminifera including the larger zonal forms such as Miogypsina, Lepidocyclina and Cycloclyeus. Both the microspheric and meglaospheric forms of Cycloclypeus are present, the former measuring up to 25 mm. in diameter. The species is C. indopacificus Tan which belongs to the sub-section of Cycloclypeus which has its origin in the Middle Miocene. Lepidocyclinae are moderately common but the chalky mode of preservation makes sectioning difficult and consequently specific determinations have been few. The majority of the forms belong to the subgenus Trybliolepidina . L. (T.) martini seems to be the commonest species. The first record of (L. (T.) gippslandica Crespin in the Northwest Basin also occurs in this limestone from Cape Range. Miogypsina thecidaeformis another zonal Middle Miocene species in the Indo-Pacific also occurs here together with an assemblage of smaller foraminiferal species which is characteristic of the Lepidocyclina horizon in Victoria.

This Middle Miocene rock is lower in the stratigraphic sequence than samples NWC/2, 3, 4, 5, and 6 from Cape Cuvier.

Giralia Area

Samples from the Giralia area are NWC/14,15,16, 17,18, 19,20, 21,22,23,23A,24,25,26,27,28,30,31,32,33,34,35,36,37,39, 40,41,42,43, and 44.

NWC/14,15,16,17,18,19,20,21,22, and 23A are from the eastern limb of the Giralia anticline in the area north of the Giralia-Bullara road, and NWC/23,24,25,26,27,28,29,30,31,32,33, 34,35,36,37,39,40,41,42,43,44 and 50 are from localities on the western limb of the anticline, all but NWC/23,24 and 50 coming froma localities north of Remarkable Hill, NWC/23 and 24 coming from north of the Giralia-Bullara road and NWC/50 from southwest of the Giralia Homestead.

1. Eastern Limb of the Giralia Anticline

Rocks of Middle Miocene, Upper Eocene and Upper Cretaceous age are represented in this section, the downward stratigraphic sequence being NWC/50,21,20,19.18,17,16,15,14,22 and 23A.

Middle Miocene

NWC/21 contains a characteristic assemblage of Middle Miocene foraminifera including Austrotrillina howchini (Schlum.), Flosculinella bontangensis (Rutten), associated with Marginopora which is common. This rock is identical in lithology and microfaunal content with the samples, NWC/2,5 and 6 from Cape Cuvier.

Eocene

The samples containing foraminifera of Eocene age are NWC/20,19,18,17,16,15 and 14 in downward stratigraphic sequence. Two lithological types which are apparently interbedded and which contain different microfaunas are present:

(a) Hard to friable chalky limestone with small formainifera;

(b) Hard, yellowish brown, crystalline limestone with large zonal foraminifera (Discocyclina)

Type (a) is represented by NWC/20, 15 and 14. Numerous small foraminifera occur in NWC/20 but they are fairly scarce in the other two samples. The assemblage of species include many described by Parr from the King's Park Bore, Perth and recently recognised in samples examined from localities close to the Giralia-Bullara road near Bullara. Distinctive species are Anomalina perthensis Parr, Cibicides pseudoconvexus Cushman, Pulvinulinella obtusa (B. and H.) var. westraliensis Parr, and Globorotalia (Truncorotalia) spinulosa Cushman the latter species being described from the Lower Eocene of Cuba and being referred to in earlier reports as Globoratalia af. fimbriata Cushman, a Recent species. An Upper Cretaceous element in this assemblage is shown by the presence of several specimens of Verneuilina parri Cushman, which was described from the Gingin Chalk, and of a Vaginulinopsis which is closely allied to V. cretacea Plummer, both forms being present in the Upper Cretaceous samples.

Type (b) is represented by NWC/19,18,17, and 16. The foraminiferal assemblage is dominated by small Discocyclina, the species being difficult to determine because the tests have been rolled and partially replaced with limonite and glauconite. Operculinoides is also recorded. Bryozoa, replaced with limonite and glauconite is also common in these limestones.

These Eocene beds are most probably Upper Eocene, the general assemblage of small forms being similar to the Upper Eocene of Eastern and Central United States.

Upper Cretaceous

The Upper Cretadeous is represented by two samples, NWC/22 and 23A, in descending stratigraphic order. NWC/22 is a glauconitic sand in which foraminifera are very abundant. NWC/23 is a limestone with large fragments of Inoceramus shells and in which foraminifera are not as common as in the previous sample.

Several species recorded by Chapman from the Gingin chalk are present such as Verneulina parri (= V. polystropha) Cushman, Geumbelina globulosa (Ehren.), Lenticulina macrodiscus (Reuss), Palmularia rugosa (d'Orb.), Globigerina cretacea d'Orb., Globotruncana canaliculata (Reuss) and Cibicides cordieriana (d'Orb.). Associated with these species are forms described by Cushman, Plummer and others from the Upper Cretaceous beds of Eastern and Central United States, such as Anomalina rubiginosa Cushman, A. velascoensis Cushman, Dentalina basiplanata, (Cushman) Dorothia bulletta (Carsey) Marginulina plummerae Cushman, and Globotruncana arca (Cushman). Many species are tentatively referred to American species, but some of them may ultimately prove to be new species. Also present are many species which have been described from well known Upper Cretaceous sections in Europe.

A distinctive arenaceous form, Lituola, is fairly common in the glauconitic sand of NWC/22 some of the tests resembling L. taylorensis Cushman and Waters from the Upper Cretaceous of Texas where it is used as a marker species for the Taylor marl. The discovery of the genus Coleites in sample NWC/22 is of great importance. This is the first record of the genus in Australia. In America it is restricted to the Palaeocene and Lower Eocene, but in Europe, as in Sweden, it is been recorded from the Danian (Upper Cretaceous).

2. Western Limb of the Giralia Anticline

Rocks of Pliocene, Eocene, Upper Cretaceous and Lower Cretaceous are represented in this section, the downward sequence being NWC/25, 23, 24, 40, 41, 42, 43/44, 39, 37, 36, 35, 34, 33, 32, 31, 30, 26, 27, 28.

Pliocene

Sample NWC/25 contains an assemblage of species which is characteristic of the Pliocene rocks of Northwest Australia, of the Eucla Basin and of the Adelaide Plains.

Eocene

Rocks of Eocene age are represented by samples NWC/23,24, 40, 42, 43 and 44 in downward stratigraphic sequence.

The two lithological types of the eastern limb of the Giralia Anticline, with their characteristic foraminiferal assemblages, are agin represented on the western limb. Another type here is a hard, green, glauconitic limestone (NWC/42) which contains small foraminifera, the majority of the tests being replaced with glauconite.

The chalky limestone of Type (a) is represented by NWC/44 in which the foraminifera are poorly preserved.

The hard limestone of Type (b) are represented by NWC/23, 24, 40, 41, and 43. As on the eastern limb, many of the foraminifera have been rolled and replaced by limonite and glauconite making specific determination difficult. Operculinoides is again present as well as small species of Discocyclina. The first record of the genus Alveolina in the Eocne rocks of the Northwest Basin is in NWC/24, but the preservation is too poor for specific determination. This genus is characteristic of Eocene assemblages in New Guinea and the Netherlands East Indies.

It is most probably that these rocks are Upper Eocene in age.

Upper Cretaceous

Upper Cretaceous beds are represented by NWC/39, 37, 36, 35, 34, 33, 32, 31 and 30 in downward stratigraphic sequence.

NWC/37 is unfossiliferous and is composed entirely of facets of calcite.

NWC/39 is, for the present, included in the Upper Cretaceous but on the evidence available from the small foraminifera it is difficult to determine whether it may not be even Eocene. Its stratigraphic position, indicated by Condon, is between NWC/44 which is Eocene and NWC/37, which is unfossiliferous but which overlies NWC/36 which is Upper Cretaceous.

NWC/36, 34, 31, and 30 are white chalky limestones mostly with abundant Inoceramus. NWC/35 is a hard yellowush brown crystalline limestone which is apparently interbedded with NWC/34. These samples contain numerous foraminifera similar to those recorded fron NWC/23 on the eastern limb of the anticline.

NWC/32 is richly glauconitic and fossiliferous. It is closely comparable with NWC/22 on the eastern limb. Lituola cf. taylorensis is again fairly common and Coleites cf. reticulosus is again present.

Lower Cretaceous

NWC/26, 27 and 28 are of Lower Cretaceous age. Poorly preserved foraminifera are present in NWC/26. The siltstones of NWC/27 and 28 contain abundant radiolaria which are characteristic of a horizon in the Lower Cretaceous beds in the North-west Basin.

similar radiolarian siltstones occur in a tributary of Cardabia Creek.

Centenary Bore, Cardabia Station

Sample NWC/45, 46, 47, 48 and 49 come from the bore samples which are laid out on the surface at the bore site. Some of them show an admixture of species of different ages, while definite ages can be given to others.

NWC/46 and 47 are Tertiary. NWC/46 contains a mixed assemblage of Miocene and Eocene zonal foraminifera, including Lepidocyclina and Discocyclina. NWC/47 contains definite Middle Miocene species such as Gypsina howchini Chapman and Operculina victoriensis Chapman and Parr.

NWC/48 and 49 are Upper Cretaceous, the latter sample containing a rich assemblage of typical Upper Cretaceous foraminifera such as are found on the eastern and western limbs of the Giralia anticline.

NWC/45 is a dark grey siltstone containing foraminifera which are regarded as of Lower Cretaceous age.

South End of Cape Range Structure

Two samples, NWC/51 and 52, come from this area.

NWC/51 is referred to the Pliocene and is similar to NWC/25.

NWC/52 is Middle Miocene. It contains typical foraminifera such as Austrotrillina howchini (Schlum.), Cycloclypeus sp., Gypsina howchini Chapman and Lepidocyclina ferreroi Provale. This bed is either the equivalent of or slightly lower stratigraphically than samples NWC/2, 5, 6, 7, 8, 9 and 21.

I. Crespin

(I. Crespin).
Commonwealth Palaeontologist.

PLATE I

NORTH-WEST CAPE AREA

SAMPLE LOCATIONS

SCALE

MILES 4 3 2 1 0 4 8 12 MILES

+ NWC 50 — Location of Sample

Fences

Roads

"BULLARA" — Homestead

114°00'

22°00'

22°30'

"YARDIE CK."

Cape W.

Ned's W.

Kubura W.

Tantabiddy W.

Mowbowra Ck.

Mowbowra W.

Milyering W.
320 NWC 13
382 NWC 12

Tulki W.

RANGE

Bajirrajirra Ck.

Mt. King
1033'

EXMOUTH GULF

293 NWC 11

Mandu Mandu R.

CAPE

Hut

Pilgramunna Ck

375'

285 NWC 10

Mt. Lefroy
700'

LEARMONTH

Yardie Creek

458'

"EXMOUTH GULF"

Bundera W.

NWC 51

NWC 52

281'

Bunbury Bore.

ROUGH RANGE

386'

376'

NWC 14 - 21

NWC 22

NWC 23

NWC 24

"BULLARA"

"GIRALIA"

"NINGALOO"

NWC 50

NWC 25

NWC 30 - 39

NWC 28

NWC 26

NWC 27

NWC 40 - 44

Samples N.W.C. 1 - 9 taken at C. Cuvier 100 miles south of edge of this map.

Bureau of Mineral Resources, Geology and Geophysics, Nov., 1949.

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A.J.S.