COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES GEOLOGY AND GEOPHYSICS

RECORDS:

1966/216

SUMMARY OF THE PALAEONTOLOGY OF THE BARKLY TABLELAND REGION.

by

C.G. Gatehouse

5928/65

SUMMARY OF THE PALAEONTOLOGY OF THE BARKLY TABLELAND REGION

by

C.G. Gatehouse

RECORD NO. 1966/216

CONTENTS

SUMMARY OF THE PALAEONTOLOGY OF THE BARKLY TABLELAND REGION

by

C.G. Gatehouse

SUMMARY

This paper summarizes the palaeontological information from the Brunette Downs, Alroy, Ranken, and Avon Downs 1:250,000 Sheet areas of the Northern Territory. They form part of the Barkley Tableland, and contain fossiliferous sedimentary strata of Palaeozoic, Mesozoic, and Cainozoic age. The oldest Cambrian rocks found in outcrop contain Redlichia Cossman, 1902; the youngest contain Xystridura browni (Etheridge Jr, 1897), Pagetia significans (Etheridge Jr, 1902) and species of Peronopsis Hawle & Corda, 1847 which indicate early Middle Cambrian. Asthenopsis Whitehouse, 1939 and Papyriaspis Whitehouse, 1934 in the re-worked top of the Ranken Limestone are evidence of marine conditions in the middle to upper Middle Cambrian. Early Upper Cambrian fossils are noted in residuals.

A marine Tertiary foramifer - Ammonia beccarii Linnè, 1758 - has been identified from a limestone on Brunette Downs Sheet area.

Fossil localities, including bores, are listed

INTRODUCTION

This record is a summary of the palaeontology of the Brunette Downs, Alroy and Avon Downs Sheet areas as presented in published and unpublished papers. The purpose of the paper is as a supplement to the explanatory notes on the above four-mile sheet areas. No new work is presented here other than the updating of some of the fossils lists by Dr. A.A. Öpik. At the end of this paper is a list of all known fossiliferous localities from each of the sheet areas.

PALAEOZOIC

The Palaeozoic era is represented in this region by carbonate rocks of Cambrian age, which underlie much of the area; they rest on Proterozoic rocks and are overlain by Mesozoic and Cainozoic strata.

The Cambrian strata of this region form a 'thin horizontal blanket' (Öpik 1956b, p.42). The Cambrian deposits here are of lower and middle to upper Middle Cambrian age. Early Upper Cambrian sediments may have been deposited and later eroded.

Ranken Limestone

Known outcrops of Ranken Limestone occur in the valley of the Ranken River between Soudan and Gidyea Yard. The limestone is interpreted as a shoreline deposit on the evidence of oolites, limestone pebbles, shell-in-shell structure, and ripple marks (Öpik, 1956b, p.41).

Dr. Öpik has supplied the following list of fossils, which he has revised from the list he gave in 1956 (loc. cit):

Asthenopsis Whitehouse, 1939
Papyriaspis Whitehouse, 1939
Kootenia Walcott, 1888
Proasaphiscidae
Peronopsis Hawle & Corde, 1847
Archaeocyathus cf. atlanticus
Biconulites hardmani (Etheridge Jr, 1890)
Hyolithes Eichwald, 1840; several forms.
Helcionella Grabau & Shimer, 1909
Cymbionites Whitehouse, 1941
Peridionites Whitehouse, 1941
Eocystis Haeckal, 1896
Acrothele Linnarsson, 1876

Lingulella Salter, 1866
Bohemiella? Schuchert & Cooper, 1931
Nisusia Walcott, 1905
and orthoid and syntrophoid brachiopods

Asthenopsis Whitehouse, 1939, and Papyriaspis Whitehouse, 1939, occur at one locality in the Ranken Limestone. They are fossils of the Zone of Ptychagnostus nathorsti or lower Leiopyge laevigata Zone of Middle Cambrian times. Boulders resting on Camooweal Dolomite east of Ranken River containing a fauna of similar age, and an Amphoton at Avon Downs Homestead, indicate a marine ingression in upper Middle Cambrian time (Opik 1956b, P.41).

Wonarah Beds

Lithologically the Wonarah Beds comprise a fissile siliceous shale containing frequent interbeds of silicified oolitic limestone and chert. Rocks considered to be Wonarah Beds crop out in the north-western corner of the Avon Downs Sheet area, the south-west of the Ranken Sheet area, and in the Alroy Sheet area. These outcrops are scattered within a general cover of black soil, gravel, and sand.

Opik gives the following updated fossil list from the Wonarah Beds:

'Anomocarella' Whitehouse, 1939
✓ Eurostina trigona Whitehouse, 1939
✓ Xystridura browni (Etheridge Jr, 1897)
Xystridura aff. X browni (Etheridge Jr, 1897)
✓ Xystridura Whitehouse, 1936, sp. nov.
Xystridura sp. indet.
✓ Pagetia significans (Etheridge Jr, 1902)
Oryctocephalus Walcott, 1886
✓ Peronopsis cf. P. elkedraensis (Etheridge Jr, 1962)
Peronopsis Hawle & Corda, 1847, spp.
Ptychopariidae (3 genera including Lyriaspis)
Brachiopods
Wimanella Walcott, 1908
Helcionella
Stenotheca (Salter MS) Hicks, 1872
Biconulites hardmani (Etheridge Jr, 1890)
Hyolithes Eichwald, 1840
?Archaeocyathus Billings, 1861

Two fossiliferous outcrops (localities AV3 and RK64) occur near Barries Caves. At locality AV3 is a limestone, attributable to the Wonarah Beds, containing Xystridura sp. nov. (Öpik pers. comm.). Rocks at locality RK64 contain Drepanopyge Lu, 1961, Biconulites hardmani (Etheridge Jr, 1890), a granulose Redlichia-like trilobite, and Proasaphiscidae. Possibly the Proasaphiscidae are similar to trilobites which also occur at locality RK109 (Alexandria Beds or Burton Beds) in the Ranken Sheet area and also in the Ranken Limestone. Öpik (1959) puts the age-range of the Wonarah Beds as Redlichia-time to about the middle of the Middle Cambrian Zone of Ptychagnostus gibbus.

Burton Beds ('Alexandria Beds' of Öpik, 1956b)

The 'Alexandria Beds' (Öpik 1956b p.40) crop out in the north-western corner of the Ranken Sheet area near Alexandria Homestead. 'The main outcrop of the 'Alexandria Beds' is the old well on Alexandria Station 7 miles north-west of the Homestead, with a section of 120 feet of Cambrian sediments resting on a late Precambrian sandstone' (Öpik, 1956b, p.40). Öpik's fossil list from this locality (Smith & Roberts, 1963) is

- ✓ Xystridura browni (Etheridge Jr, 1897)
- ✓ Xystridura Whitehouse, 1936; two species
- Lyriaspis alroiensis (Etheridge Jr, 1919)
- ✓ Eurostina trigona Whitehouse, 1939
- ✓ Pagetia significans (Etheridge Jr, 1902)
- Oryctocephalus Walcott, 1886
- ✓ Peronopsis elkedraensis (Etheridge Jr, 1902)
- Peronopsis Hawle & Corda, 1847, species
- Beyrichona Matthew, 1885
- Stenotheca Hicks, 1872
- Obolidae
- Acrotreta Kutorga, 1848
- Lingulella Salter, 1866
- Acrothele Linnarsson, 1876
- Biconulites hardmani (Etheridge Jr, 1890)

At Alexandria Homestead on the Playford River, Hyolithes and Eurostina have been collected from a limestone interbedded with soft friable mudstone and slightly bituminous hard siliceous shale (Öpik, 1956b, p. 40). Another locality, "East of Alexandria" (Öpik 1956b, p.40) where "a silicified shoreline coquina consisting of trilobite fragments with cystid ossicles and oolites rests on the slope of a low rise of Precambrian sandstone" (Öpik 1956b, p.40) contains:

Xystridura Whitehouse, 1936, sp. nov.
Pagetia significans (Etheridge Jr, 1902)
Kootenia Walcott, 1888
Lyriaspis Whitehouse, 1939
Dolichometopiidae
Peronopsis Hawle & Corda, 1847

Similarly, north north-east of the Homestead, again, near the junction with the Precambrian, is a chert with:-

Xystridura Whitehouse, 1936
Oryctocephalus Walcott, 1886
Peronopsis, Hawle & Corda, 1847
Archaeocyathus Billings, 1861

This is underlain by:
Redlichia Cossman, 1902
Pagetia Walcott, 1916
Peronopsis Hawle & Corda, 1847
Biconulites hardmani (Etheridge Jr, 1890)

On the Ranken Sheet area material containing a complete Xystridura (Öpik, pers comm) was collected from locality RK103 by M.A. Randal.

Öpik (1959), has shown the "Alexandria Beds" (Burton Beds of Smith & Roberts, 1964) as ranging from Redlichia-time to middle Gibbus time.

Gum Ridge Formation

In the Tennant Creek area the Gum Ridge Formation "rests partly on the Precambrian basement ....." (Öpik in Ivanac, 1954). Öpik (1956b, p.42) interprets the depositional environment as a shoreline deposit of an island in the Tennant Creek area. The fauna of this unit, as listed in Öpik (loc. cit.) is:-

Xystridura aff. browni (at base)
Peronopsis cf. P. elkedraensis (Etheridge Jr, 1902)
Pagetia cf. P. significans (Etheridge Jr, 1902)
Redlichia (several species)
Eifelia Walcott, 1920
Billingsella cf. humboldti Walcott
Biconulites hardmani (Etheridge Jr, 1890)

Öpik (1956b, p.42) considers that the Gum Ridge Formation corresponds to the upper part of the Cambrian sequence at Negri River and also at Mount Panton near the Western Australian border in the Hardman Basin, but that this fauna is not related to the early Middle Cambrian faunas of western Queensland.

The Wonarah Beds, its lateral equivalent the Ranken Limestone, and the Burton Beds all of the Northern Territory may be correlated with each other and also with the Yelvertoft Beds, Thorntonia Limestone, and Beetle Creek Formation, of Queensland (Öpik 1956b, p.42). The faunal difference between the formations in the Northern Territory and those of Queensland has been attributed by Öpik (1956c, p.253) to the influence of a "Meridional Divide".

In the Barkly Tableland no sedimentation took place in the Middle Cambrian from Gibbus-time through until Nathorsti-time, when a westward transgression of the sea from the Undilla Basin reworked part of the Ranken Limestone (Öpik, 1956b, p.41). According to Öpik (1956b, p.50) the ingression into the Northern Territory "persisted into Upper Cambrian and Ordovician time". In the early Upper Cambrian, Öpik (pers. comm.) has observed trilobite fragments referable to the family Damesellidae which indicates that former presence of early Upper Cambrian sediments in this region. The rocks have been eroded but remnants of chert rubble occur on the northern part of the Avon Downs Sheet area south of the Barkly Highway.

MESOZOIC

Mesozoic sedimentary rocks crop out in the central-southern and central-northern areas of Ranken and Alroy Sheet areas, also near the northern edge of the Brunette Downs Sheet area. These rocks are included in the area known as the Inland Belt (Skwarko, Bull. 73, in press).

The flora contained in these rocks comprises poorly preserved plant fossils (Öpik, pers. comm., in Randal & Brown, 1962b). Skwarko (pers. comm.) considers that these are part of his Unit A which is of ?Neocomian-Aptian age.

The outcrop on the Brunette Downs Sheet area, recorded on the 1:250,000 Sheet map as locality BT60 and as locality TT63 by Skwarko (in press), is small and fossiliferous. The locality is given as 7 miles

south-east of Creswell on the Creswell Downs-Brunette Downs road. Mary E. White (in Randal & Nichols, 1963) identified the following fossils:-

Ptillophyllum pecten (Phillips, 1829)
Brachyphyllum)
) conifer stems
Pagiophyllum)
Pterophyllum fissum Feistmantel, 1879
Thinnfeldia pinnata Walkom,
Otozamites bechei Brogniart, 1828
?Otozamites bengalensis (Oldham & Morris, 1863)
Otozamites bengalensis (Oldham & Morris, 1863)
Taeniopteria spatulata (McClelland, 1850)

Skwarko (loc. cit.) considers that the environment was non-marine and that sedimentation did not commence prior to Neocomian times. To the north of this region, on Walhallow Sheet area, are marine sediments with non-marine fossils admixed. This is interpreted as a marginal near-shore environment (Skwarko, loc. cit.); hence the seashore in this area during part of Lower Cretaceous times was situated a short distance to the north of Brunette Downs Sheet area.

CAINOZOIC

Brunette Limestone

The name Brunette Limestone was first proposed by Noakes & Traves (1954) for the Tertiary limestones which form outcrops near Brunette Downs Homestead.

The Brunette Limestone is distributed as scattered outcrops on the eastern and western parts of Brunette Downs Sheet area, west of Ranken store on the Ranken Sheet area, and on Alroy Sheet area.

Randal & Brown (1962a) regard the limestone as a veneer; Noakes & Traves (1954) considered it as of terrestrial origin, Randal & Brown (1962b) stated that the limestone was deposited in a near shore fresh-water or brackish lake in the Ranken area. However, in the Brunette area Randal & Nichols (1963, p.20) considered that it had 'some marine influence'; and Lloyd (in press) is of the opinion that the environment was that of a near-shore fresh-water lagoon subjected to a brief marine incursion.

Fossils have been collected from two localities on Brunette Downs Sheet area (Randal & Nichols, 1963). The locations are BT167 (near Bore No. 18 on Rockhampton Downs Station) which contains algae; and BT169 (two miles north-east of Bore 18) which contains:-

an ostracod
Ammonia beccarii (Linné, 1758)
Corbiculina sp.
Plotiopsis sp.
Syrioplanorbis hardmani (Wade, 1924)

The molluscs at this locality are all freshwater types.

Austral Downs Limestone

The name Austral Downs Limestone was first proposed by Noakes (1952). Noakes & Traves (1954) noted the similarity between this unit and the Brunette Limestone. According to Randal & Brown (1962b) the limestone occurs in and about the Georgina River valley and along the lower reaches of the Ranken River. It extends east and south onto Sheet areas adjacent to Avon Downs Sheet area (Nichols, 1965). The limestone unconformably overlies Middle Cambrian carbonate rocks but has not been observed to overlie the Mesozoic rocks of the region (Randal & Brown, 1962b).

The Austral Downs Limestone is confined to the broad valleys of major watercourses; Randal & Brown (1962b) regarded the environment as lacustrine to brackish; the sediments accumulating in small lakes behind temporary dams in streams. Lloyd (in press) considers that the Austral Downs Limestone was subjected to a brief marine incursion at Roxburgh Downs on the evidence of foraminifers.

Paten (1964) lists fossils from two localities outside this region. At Carrandotta (48 miles north-west of Roxburgh Downs and east of the Georgina River) he found:-

Charophyte stems
Cyrgonites (fruiting bodies)
Ostracods

From the junction of Manner Creek and the Georgina River on Roxburgh Downs Station he has listed:-

Ostracods
Foraminifers - rotaline and globigerine forms.

The foraminifers have been identified by Lloyd (in press) as belonging to the one rotaline species Ammonia beccarii (Linné, 1758).

The age of the Austral Downs Limestone is regarded as Late Tertiary by Paten; Noakes & Traves (1954) give a tentative Miocene age. Lloyd (loc. cit.) states that Ammonia beccari (Linné, 1758) has a range from Lower Miocene to Recent, and that the Brunette Limestone and Austral Downs Limestone cannot be older than Lower Miocene, and are probably of Miocene age. The two limestones may be tentatively correlated on the grounds of superposition and fossils.

SUBSURFACE DRILLING OPERATIONS YIELDING FOSSILIFEROUS MATERIAL

Well	Interval	Fossils	Age
Brunette Downs No. 1	Core No. 2 (1009'-1019')	?Trilobite fragments Lingulella, Acrotreta Biconulites; a thick-shelled brachiopod.	Early Middle Cambrian.
	Core No. 7 (1550'-1559')	?Leiosphaeridia	
	Core No. 11 (2030'-2040')	?Leiosphaeridia	
BMR Grg No. 15	Core No. 1 (32'4"-41'8")	sponge spicules	
	Core No. 3 (85 6"-87'-5")	Xystridura, Peronopsis, Phosphatic brachiopods trilobites indet.	Early Middle Cambrian.
BMR Grg No. 15A	Core No. 5 (126'5"-133'6")	sponge spicules	
	Core No. 6 (133'8"-136'7")	Oryctocephalus Pagetia phosphatic brachiopods	Early Middle Cambrian.
	Core No. 7 (136'7"-141'11")	Oryctocephalus Pagetia Xystridura Peronopsis sponge spicules	Early Middle Cambrian.
	Core No. 8 (177'8"-181')	trilobite fragments	
	Core No. 9 (200'5"-205')	Xystridura Pagetia Acrotreta phosphatic brachiopods	Early Middle Cambrian.
	Core No. 11 (253'-263')	phosphatic brachiopods sponge spicules	
BMR Grg N° 16	Core No. 26 (210'8"-220'6")	sponge spicules	
	Core No. 27 (220'9"-230'2")	phosphatic brachiopods hyolithids	
	Core No. 28 (230'2"-240')	trilobites gastropods phosphatic brachiopods hyolithids	
	Core No. 29 (240'-250'1")	trilobites Biconulites hyolithids	Early Middle Cambrian.

Well	Interval	Fossils	Age
	Core No. 30 (250'1"-256'4")	hyolithids	
	Core No. 35 (290'5"-299'2")	Lithistid and lyssakid sponge spicules hyolithids	
	Core No. 36 (299'2"-303')	Lithistid and lyssakid sponge spicules	
Wonarah Water-bore	(325'-331')	Acrothele	Early Middle Cambrian
	(331'-337')	trilobites Brachiopoda (phosphatic?) sponges	Early Middle Cambrian

FOSSIL LOCALITIES IN THE BARKLY TABLELAND REGION

Formation	Locality	Position	Fossils	Age
Brunette Downs Sheet area				
Anthony Lagoon Beds	BT330	Barkly Stock Route, 1.5 miles E. of Desert Bore	Sponges? Algae?	Cambrian
Anthony Lagoon Beds	BT319	D19 Bore, 13.5 miles at 265° from Brunette Downs Homestead	Trilobites	Cambrian
Anthony Lagoon Beds	BT316	13 miles at 265° from Brunette Downs Homestead	Trilobites	Cambrian
Cretaceous Unit A	BT60 (TT63)	7 miles S.E. of Creswell on Creswell Downs-Brunette Downs Road	*Ptillophyllum pecten* *Brachyphyllum* *Pagiophyllum* *Pterophyllum fissum* *Thinnfeldia pinnata* *Otozamites bechei* ?*Otozamites bengalensis*	Neocomian-Aptian
Brunette Limestone	BT169	Rockhampton Downs	*Otozamites bengalensis* *Taeniopteris spatulata* *Ammonia beccarii* *Corbiculina* sp. *Plotiopsis* sp. *Syrioplanorbis hardmani* an ostracod	
Alroy Sheet Area				
Wonarah Beds	AL7	Mount Lamb, 21 miles S.E. of Alroy Homestead	*Xystridura* *Eurostina trigona* Ptychopariids *Biconulites* *Girvanella* hyolithids	Early Middle Cambrian
Wonarah Beds	AL14	No. 4 Bore Alroy Downs	*Xystridura* *Acrothele* *Lingulella* *Biconulites*	Early Middle Cambrian
Wonarah Beds	AL32	6 miles south by west from Dalmore No. 3 Bore on track from No. 13 Bore to No. 11 Bore via Kerringnew paddock corner	fossil fragments	Cambrian

Formation	Locality	Position	Fossils	Age
Wonarah Beds	AL100	On Barkly Highway 85 miles E. of Wonarah	fossil fragments	Cambrian
Avon Downs				
Wonarah Beds	AV1		Xystridura Acrothele Obolus	Early Middle Cambrian
Wonarah Beds	AV3	2 miles north of Barries' Caves	Xystridura Pagetia cf. significans Peronopsidae phosphatic brachiopods	Early Middle
Ranken Limestone	AV22	2 miles N.E. of Soudan on Barkly Stock Route	"Helcionella" Inarticulate brachiopods	Cambrian
Wonarah Beds	RK64	6 miles E.N.-E of Barries' Caves.	Drepanopyge Broasaphiscidae Biconulites	Cambrian
Ranken Sheet area				
Wonarah Beds	AV2	3.2m. N.W. of 170m. peg on Barkly Hwy.	ptychopariid trilobites	Cambrian
Not known	RK40	1.7m. south of Weaner Waterhole, on Wee Lingaree Creek.	Asaphiscid Biconulites hyolithids	Cambrian
Not known	RK41	Weaner Waterhole on Wee Lingaree Creek	brachiopods	Cambrian
Ranken Limestone	RK60	5.4m. north of Bore No. 18 on Alexandria Station	brachiopods Biconulites Archaeocyathus	Cambrian
Wonarah Beds	RK63	11.5m. west of south of Alexandria Bore No. 18	trilobites Biconulites "Helcionella" hyolithids cystid plates	Middle Cambrian
Ranken Limestone	RK65	2.4m. south-east of Bore No. 18 of Alexandria Station	trilobites Nisusia? "Heloionella"	Middle Cambrian
Ranken Limestone	RK70	4.5m. N. of Soudan on track on western bank of Ranken River	fragments of fossils	Cambrian
Burton Beds	RK103	2.5m. N.W. of Bore 47 on Brunette-Alexandria track	Xystridura Pagetia significans Peronopsis	Early Middle

Formation	Locality	Position	Fossils	Age
Burton Beds	RK104	1.5m. south of Bore No. 47 Alexandria	Lingulella Biconulites	Cambrian
Burton Beds	RK105	2.6m. downstream from Alexandria HS. in Playford River	Acrothele Biconulites	Cambrian
Burton Beds	RK109 111	3.8m. ESE of Ibis Waterhole in Playford River	Pagetia Peronopsis? Biconulites	Early Cambrian
Burton Beds	RK113	15.5m. east of Bore No. 4 Alexandria Station	trilobite fragments Biconulites hyolithids	Cambrian
Burton Beds	RK116	5.5m. N. of No. 3 Bore Alexandria, 0.3m. W. of track from Alexandria to No. 3 Bore	Biconulites hyolithids	Cambrian
Ranken Limestone	RK145	3.7m. SE of Alexandria Bore No. 17 in tributary of Ranken River	trilobites	Cambrian
Ranken Limestone	RK146	Ranken River at Gidyea Yard	trilobite pygidia (unidentified) Biconulites Xystridura browni (Etheridge Jr, 1897)	Early Middle Cambrian
Burton Beds	RK-F	Alexandria HS; exact location not known	Peronopsis	Early Middle Cambrian

REFERENCES

BRUNNSCHWEILLER, R.O. 1950 - Macropalaeontological report on Northern Territory Australia Regional Survey rock samples collected by L.C. Noakes, D.M. Traves, W.B. Dallwitz, in 1947-49. Bur. Min. Resour. Aust. Rec. 1950/13 (unpubl.).

DICKINS, J.M., 1960 - Probable Neocomian (Lower Cretaceous) fossils from the Northern Territory. Bur. Min. Resour. Aust. Rec. 1960/18 (unpubl.).

IVANAC, J., 1954 - The geology and mineral deposits of the Tennant Creek Goldfield, Northern Territory. Bur. Min. Resour. Aust. Bull. 22.

LLOYD, A.R., in press - An outline of the Tertiary geology of Northern Australia. Bur. Min. Resour. Aust. Bull. 80.

McMICHAEL, D.F., in press - Non-marine molluscs from Tertiary rocks in Northern Australia. Bur. Min. Resour. Aust. Bull. 80.

NICHOLS, R.A.H., 1965 - Sedimentary petrology of some units from the Sandover River Sheet area, Northern Territory. Bur. Min. Resour. Aust. Rec. 1965/211 (unpubl.).

NOAKES, L.C., 1951 - Explanatory Notes to the Urandangi four-mile. Bur. Min. Resour. Aust.

NOAKES, L.C., & TRAVES, D.M., 1954 - Outline of the geology of the Barkly Region 1947-48. Sci. Ind. Res. Org. Melb. Land. Res. Ser. 3 (3), 34-41.

" OPIK, A.A., 1956a - Cambrian geology of Queensland. In El Sistema Cambrico, su paleogeografia y el problema de su base. 20th. Int. Cong. Mexico, 1-24.

" OPIK, A.A., 1956b - Cambrian geology of the Northern Territory. Ibid., 25-54.

" OPIK, A.A., 1956c - Cambrian palaeogeography of Australia. Ibid., 239-284.

" OPIK, A.A., 1959 - Correlation chart of Cambrian and Ordovician in Australia. Bur. Min. Resour. Aust. 1959/52 (unpubl.).

" OPIK, A.A., 1960 - Cambrian and Ordovician Geology of Queensland. Jour. geol. Soc. Aust. 7, 89-114.

PATEN, R.J., 1964 - The Tertiary geology of the Boulia area, Queensland. Bur. Min. Resour. Aust. Rep. 77.

RANDAL, M.A. & BROWN, G.A., 1962a - Geology of the Ranken 1:250,000 Sheet area, Northern Territory. Bur. Min. Resour. Aust. Rec. 1962/55 (unpubl.).

RANDAL, M.A., 1962b - The geology of the Avon Downs 1:250,000 Sheet area, Northern Territory. Bur. Min. Resour. Aust. Rec. 1962/56 (unpubl.).

RANDAL, M.A. & NICHOLS, R.A.H., 1963 - The geology of the Alroy and Brunette Downs 1:250,000 Sheet areas, Northern Territory. Bur. Min. Resour. Aust. Rec. 1963/72 (unpubl.).

SKWARKO, S.K., 1962 - Notes on Australian Lower Cretaceous palaeogeography. Bur. Min. Resour. Aust. Rec. 1962/11 (unpubl.).

SKWARKO, S.K., in press - Cretaceous stratigraphy and palaeontology of the Northern Territory. Bur. Min. Resour. Aust. Bull. 73.

SMITH, J.W. & ROBERTS, H.G., 1964 - Mt. Drummond, Northern Territory - 1:250,000 Geological Series. Bur. Min. Resour. Aust. Explan. Notes. Sheet SE 53-12.