

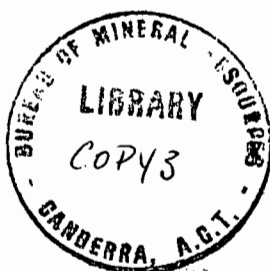
COMMONWEALTH OF AUSTRALIA.

DEPARTMENT OF NATIONAL DEVELOPMENT.  
BUREAU OF MINERAL RESOURCES  
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MESOZOIC STRATA AND FOSSILS OF NORTHERN TERRITORY

by

S.K. Skwarko

The information contained in this report has been obtained by the Department of National Development, as part of the policy of the Commonwealth Government, to assist in the exploration and development of mineral resources. It may not be published in any form or used in a company prospectus without the permission in writing of the Director, Bureau of Mineral Resources, Geology and Geophysics.

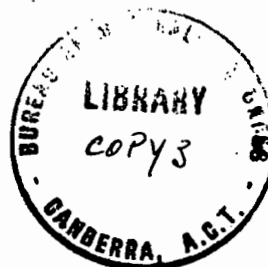
# MESOZOIC STRATA AND FOSSILS OF NORTHERN TERRITORY

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## I. INTRODUCTION

The purpose of this report is to show the present state of knowledge of the nature, the distribution, and the succession of the Mesozoic strata and fossils in the Northern Territory.

Outcrops of Mesozoic beds are widespread and often sporadic, yet they may cover as much as 20,000 square miles. The work done in the past seems inadequate as evidenced by a general lack of agreement between individual workers on the subdivision, detailed dating and correlation of strata concerned.

Collections of fossils, listed at the back of this report, have been few and obviously not exhaustive. Their examination suggests that greater effort in increasing their number and volume is possible and carries with it a promise of more positive results. Personal communication from Dr. A.A. Opik does not discourage this view.

The compilation of this report has been brought about as a result of a direct request by Dr. A.A. Opik.

## 2. HISTORICAL REVIEW

The presence of Mesozoic strata in the Northern Territory has been known since 1895 when ammonites and other fossils collected by H.Y.L. Brown from Point Charles, close to Darwin, were recognised to be of Cretaceous age by Etheridge Jun.; he identified the following genera and species,

Ammonites allied to A. varians Sby.      common

A. belus D'Orb.

A. gueltari D'Orb.      common

Ancyloceras or Hamites

Scaphites

Aucella

Nucula

Actually, the first fossils (Radiolaria) to come from beds of similar age were mentioned two years earlier by G.J. Hinde (1893), but no conclusive age determination could be obtained from them at the time. Hinde (p. 223-5) described and figured the following genera and species,

Cenellipsis sp.

Astrophacus sp. a

Astrophacus sp. b

Lithocyclia exilis n. sp.

Amphibrachium crassum n. sp.

" truncatum n. sp.

" fragile n. sp.

sp.

Spongodiscus expansus n. sp.

" spp. (2)

Spongolena symmetrica n. sp.

Dictyomitra australis n. sp.

Dictyomitra triangularis n. sp.

Lithocampe fusiformis n. sp.

Stichocapsa pinguis n. sp.

" chrysalis n. sp.

Subsequent collections of macrofossils were also described by Etheridge (1902, 1907) who regarded them as representative of a distinctive section in the Lower Cretaceous, which Whitehouse later (1926) considered to be Upper Albian (sub-studeri zone). Etheridge's lists of fossils from Point Charles, Port Darwin included the following (see 1902, 1907:15-7),

Aucella incurva

Baculites williamsoni

Nucula sejugata

Baculites sp.

Desmoceras carolensis

Crioceras sp.

Histrichoceras antipodeus

Ancyloceras (?) sp.

Scaphites cruciformis

Hamites (?) sp.

Belemnites sp.

There were also some dermal scutes and coprolites. Metacanthoplites rhotomagensis Brong. was described by the above author from Cretaceous strata of Melville Island (1907:18); this fossil, found by Brown, was associated with specimens of Inoceramus etheridgei. - *cf. Canis*

Whitehouse's (1926:278-9) revised list of the Northern Territory ammonite genera includes the following,

Desmoceras (sensu stricto)

Beudanticeras

Spathiceras (a new genus proposed for H. antipodeus Eth. Jun.)

Hamites

Anisoceras

Labeceras

Appurdiceras

Scaphites

Tricoloceras (a new genus for Ptychoceras (?) closteroides Eth. Jun.)

Woolnough (1912) mapped Cretaceous strata in the northern part of the Territory and Jensen (1915) recognised Mesozoic strata to the east of Willeroo.

In 1936, the first Mesozoic freshwater beds were reported from south east of Darwin by P.S. Hossfeld (1937:5), who found plant remains in Buldiva area. From this collection, Dr. Walkom identified Otozamites bengalensis, a form well known from Jurassic strata in Australia but present in Triassic as well as Lower Cretaceous beds elsewhere. Walkom considered the lacu-

strine beds to be of Jurassic age. Shales from Buldiva area have also yielded Radiolaria which Miss Crespín compared with those from Darwin area. Plant remains, mostly O. bengalensis were also found in the vicinity of the Newcastle Waters and Cresswell in the Barkly Tablelands.

Voisey's (1938) map of Northern Territory shows Cretaceous beds around Darwin and Jurassic beds further to the south.

Noakes found plant remains in Roper Valley in 1947, and extended the marine Mesozoic still further to the south-east. He established that the marine beds, which he named the Darwin Formation, are younger than the freshwater strata, which he did not name but included also in the Mullaman Group (see Noakes, 1949). The maximum observed thickness of the Mullaman Group in the north-western part of this region is 210 feet; Hossfeld (1954:150), however, thought that the average thickness would probably be of the order of 100 feet.

The 1954 (p. 39) article by Noakes and Traves which sums up the geological data gathered during the 1947-8 survey of the Barkly Region emphasises the successful correlation of the Mullaman Group from the Katherine-Darwin region to the northern portion of the Barkly Basin. The beds in this area are mostly marine consisting of shale, siltstone and limestone, the maximum thickness of the group being 500 feet, i.e. considerably greater than that of the beds to the north-west.

Noakes' subdivision of the Mullaman Group was applied successfully by Traves in the Barkly Region and in the Ord-Victoria Region (1955:2). Traves described sequence of Mullaman Group strata at Willeroo.

Porcellanite with marine microfauna ✱  
Coarse ferruginous sandstone with plant stems  
Lateritised fine conglomerate (20 feet)  
Lateritised shaly sandstone (1 foot)  
Antrim Plateau Volcanics.

(✱ Radiolaria: cf. Cenosphaera,  
Dictyomitra Foraminifera: cf.  
Haplophragmoides)

Partly successful attempts have been made to correlate the above sequence with beds to the south-west.

B.P. Walpole has recently suggested that strata grouped under the name of "Mullaman Group" should rather be referred to as "Mullaman Beds". This suggestion has been accepted by the Stratigraphical Nomenclature Sub-Committee but, as yet, this change has appeared only on several published 1 mile maps of the Katherine-Darwin area. (Pers. Comm. B.P. Walpole).

### 3. AGE LIMITS.

Noakes concludes his remarks on the Mesozoic strata by stating that: "The freshwater beds apparently lie conformably below the Lower Cretaceous marine shales, which are not older than Aptian; hence the writer considers that these beds should be regarded as Lower Cretaceous rather than Upper Jurassic, and suggests a possible correlation with portion of the Blythesdale 'Series' of Queensland (Bryan and Jones, 1946, 1955)."

This is not in agreement with Walkom's dating of the freshwater beds. R.O. Brunnschweiler (in Traves, 1955) inspected the floras from sandstone beds of lacustrine origin and recognised the following genera and species:

Filicales:	<u>Gladophlebis</u> cf. <u>C. roylei</u> Arber
	<u>Gladophlebis</u> sp. nov., aff. <u>C. roylei</u> Arber
Bennettitales:	<u>Taeniopteris</u> <u>spatulata</u> McClelland
	<u>Taeniopteris</u> sp. cf <u>T. tenison-woodsii</u> Eth. Jun.
	<u>Otozamites</u> sp. ident.
Coniferales:	<u>Elatocladus</u> cf. <u>E. plana</u> (Feistm.)

He considers beds represented by this flora to be of Jurassic (probably Middle, and possibly Upper Jurassic) age, although the marine macro- and microfossil faunas in the apparently conformably overlying Darwin Formation are both indicative of Lower Cretaceous age. Brunnenschweiler does not consider the group to be "Series comprehensive", and emphasises the great gaps in our knowledge in this Group.

Traves believes that sedimentation of the Mullaman Group began in Upper Jurassic or Lower Cretaceous times on surfaces of gentle and low relief; this was followed by a transgression of a Lower Cretaceous sea, which covered the whole of Northern Australia.

It is interesting to note that Hossfeld (1954:150) does not agree with Noakes on some points regarding the stratigraphical sequence of the "Mullaman Group". He emphasises the fact that plant remains have been collected from a few and widely scattered localities which can hardly be correlated stratigraphically; similarly marine fossils have been collected only at a few scattered localities. The state of knowledge, in Hossfeld's opinion, can hardly support Noakes' broad generalizations regarding the relationship of the two formations included by Noakes in his Mullaman group.

Hossfeld states (p. 151): "The examination of the sequence in the Buldiva-Collia area, at Yeuralba, Pine Creek and south of Birdum by the present writer suggests that the whole of the group may well be of marine origin, and that small estuarine, and fluviatile deposits were responsible for the few remains of Otozamites, the only plant identified from these beds.

"Because of the overlap, terrestrial deposits and a few durable plant remains would be preserved near the base of the Group, but in successively younger beds. Conditions at Buldiva where high-level cassiterite-bearing gravels occur near, but not at the base of the sequence, indicate fluviatile deposits, possibly re-sorted by wave action. The plant remains were discovered just above this horizon.

"It is suggested here that the group was deposited as a result of a gradually transgressive epeiric sea which finally extended over the whole of North Australia...Deposition probably commenced in late Jurassic times and continued into the Lower Cretaceous sea of Queensland and the adjoining states, in the region which was to become the Great Artesian Basin..".

#### 4. CRETACEOUS STRATA AT RUMBALARA.

Cretaceous strata from the extreme southern portion of the Northern Territory were first reported in 1951 in a joint paper of C.J. Sullivan and A.A. Opik. The area described is small and includes an ochre mine which lies near Rumbalara railway

siding 120 miles by rail south of Alice Springs.

The age determination of beds overlying the ochre layer has been based primarily on identifications of macro-fossil collections which were gathered and determined by Dr. A.A. Opik. Previous, mainly economic investigations have been carried out by Sullivan in 1943 (see Sullivan 1944, 1946).

The stratigraphic sequence in the Rumbalara area is as follows (table modified after Sullivan and Opik, 1951:12):

Bed	Lithology and Fossil Content	Thickn.	Formation, Age.
"A"	Siliceous laterite (grey hilly)	10 ft. )	Rumbalara Shale (Lr.Cretaceous)
"B"	Ferruginous sstone (leached)	14 )	
"C"	Soft white kaolinic rock with hard bands of porcellanite. <i>Pseudouicula anomala</i> . <i>Tatella maranoana</i> . <i>Cyrene</i> sp.; <i>Fissilunula</i> cf. <i>clarkei</i> ; <i>Maccovella reflecta</i> ; <i>Panope</i> cf. <i>rugosa</i> .	76 )	
"D"	Relatively hard and sandy bed: Sponge horizon: <i>Purisiphonia clarkei</i> ; <i>Rhizo-</i> <i>corallum</i> sp.; <i>Purisiphonia</i> n.sp.	8 )	
"E"	Soft white Kaolinic rock with hard bands of porcellanite. <i>Radiolaria</i> and fragmental <i>pelecypoda</i> .	38 )	
	Yellow ochre probably of bacterial origin (cf. <i>Leptotrix ochracea</i> )	1.5- 4 )	
	Hard limonite. Limonitic layers contain quartzite boulders.	1.0-15 )	
"F"	Red and grey cross-bedded sandstone and grit with some conglomerate. <i>Scolithus</i> -like vertical pipes.	)	De Souza Sstone Age un- known.

The above sequence has been divided into two formations:

- (i) The lower, De Souza formation, is cross-bedded and contains some conglomerates; it is capped by hard limonite layer containing quartzite boulders. The age of this formation is not known with certainty but presence of *Scolithus*-like vertical pipes suggests Ordovician age. Eventually correlation with the adjoining "Finke Series", which is possibly of Ordovician age and similarly overlain by Cretaceous strata, may be effected.
- (ii) The fossil content of the unconformably overlying, but also flat-lying Rumbalara beds resembles that at Rolling Downs, near Roma, Queensland, described by Etheridge (1902), Whitehouse (1921), etc. The Rolling Downs fauna belongs to the Lower Cretaceous.

Miss Crespín was responsible for determinations of the rather poorly preserved *Radiolaria*-members of the Orders *Spumellaria* (Genus *Cenosphaera*) and *Nassellaria* (Genus *Dictyomitra*). These were collected from Bed "E". She remarked upon wide distribution of the *Radiolaria*-bearing rock in Australia; yet it seems that nowhere outside Rumbalara is this microfauna associated with Roma-type Lower Cretaceous *Pelecypoda*.

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# 6. MESOZOIC FOSSILIFEROUS LOCALITIES OF THE NORTHERN TERRITORY AND THEIR CONTENTS

The list below does not include specimens contained and stored away in boxes. The only fossils listed are those housed at the Museum of the Bureau of Mineral Resources.

24.5 m.W. of Mulbooloo Outstation.  
Collected by : Vacuum Oil Co. (Jablonski 1930) Age: Cretaceous

Teredo cf. vastatis Eth. Jun.  
Dimitobelus cf. eremos (Tate) 3  
Glyphaea cf. arborinsularis Eth. Jun. 3  
Identified by : F. Chapman.

---

Buldiva. 14°10' 130°50'  
Collected by : P.S. Hossfeld 1936 Age: Jurassic

Plant remains  
Identified originally by: Dr. Walkom.

---

4 m.N. of Muckadee Station, N.T.  
Collected by : Traves (?) Age: Jura-Cret?  
Coniferales: Taxites cf. planus Feistm.  
Cycadophytes : Ptilophyllum cf. pecten (Phillips.)  
Identified by: R.O. Brunnschweiler

---

Rock hole 30 m. E. of Daly Waters, 40m. (?) below  
Elsey. 16°16' 134°00' (Approx.)  
Collected by : D.M. Traves Age: ?Mesozoic.

Coxiella sp.  
Bathinella sp.  
Planaris like shell

Identified by : R.O. Brunnschweiler (?)

---

9.1m. on O.T. Macarthur Rv. Traverse. 16°30' 136°00' (Approx.)  
Collected by D.M. Traves Age: ?Cretaceous  
Radiolarite (two lots of samples intermixed)

---

5 m. S. of Cresswell. 180°03' 135° 55'.  
Collected by D.M. Traves

Ptilophyllum (Williamsonia) 2

Identified by : R.O. Brunnschweiler Age: ?Jurassic

---

Causeway about 10.4 m. W. of Newcastle Waters.  
17°23' 133°15'  
Collected by : Traves (?) Age: Mesozoic

Otozamites sp.  
Elatocladus plana (Feistm.)  
Taxites cf. planus Feistm.

Identified by : R.O. Brunnschweiler

---

12.8 miles -on Elsey-Hodgson Traverse, S.E. of Elsey,

N.T. 15°03' 133°26'

Collected by : Traves (?)

Age: Jura.Cret.?

Class: Cycadophyta Ptilophyllum (Williamsonia) necten (Phillips)

Class: Coniferales Aracacites cf. polycarpa Tanison-Woods

Identified by: R.O. Brunnschweiler.

---

Ord River, E. Kimberleys, N.T.

Collected by: D.M. Traves

Age: Jura.Cret.?

Class: Coniferales, Cladocladus n.sp.

Class: Ginkgoales, Baiera sp. indet. (? bidens).

Class: Filicales, Cladophlebis australis

" " Phyllopteris cf. lanceolata Walkom

" (?) " Sphenopteris sp. indet. B

" (?) " Microphyllopteris cf. peclinata

Identified by: R.O. Brunnschweiler

---

Noakes No.10, Northern Territory

Collected by: Noakes

Age: Cretaceous ?

Turritella

Eulima

Identified by: R.O. Brunnschweiler

---

Myilly Point, Darwin.

Collected by: J.R. MacKay

Age: Cretaceous

Tellina sp.

Some Pelecypoda

Identified by: Not recorded

---

Gunn Point, Darwin, 12° 10' 131°00'

Collected by: W.G. Woolnough

Age: Cretaceous  
(? Albian)

Cephalopoda: cf. Simbirskites

cf. Scaphites

Ancyloceras

Hamites

cf. Beudanticeras

Eubaculites

Bivalves indet.

Identified by: Miss Crespin (?)

---

Calvert Hill area, near Pack Saddle.

Collected by: Enterprise Exploration Co.

Age: Up.Jura. or  
Lr.Cret.

Genus Indet.

Buchia (= Aucella) sp. indet. 17°10' 137°11'

Trigonia (?) (Indotrigonia ?) sp. indet. 17°14.8' 137°25.5'

Identified by: R.O. Brunnschweiler

---

Rumbalara 25°20' 134°25'

Collected by: A.A. Opik

Age: Lr.Cretaceous

Pelecypoda: Meleagrinnella sp.

"Glycimeris" (Panope?) rugosa Moore

Tatella cf. maranoana Eth. Jun.

Tatella sp.

Identified by: A.A. Opik

---

12 m. N.W. to W.N.W. of Mitchiebo Waterhole;  
Mt. Drummond 4 mile sheet pt. I, photo 5233, Run 9  
Collected by: H.G. Roberts

Age: Lr. Cret.  
(? Neo-  
comnian)

Pelecypoda: Inoceramus sp. nov.  
Iotrigonia sp. nov.  
Trigoniidae gen. et sp.  
Large sp. cf. Fissilunula clarkei (Moore) 1870  
Belemnites: Part of a large rounded guard.  
Identified by: J.M. Dickins (see Dickins, 1960)

---

About 5 m. S.W. of Borroloola, on Borroloola-  
Barkly Tableland Road 16°08' 136°13' (Approx.)

Collected by Noakes, Traves

Age: Mid. Cretaceous

Pelecypoda  
Cephalopoda  
Corals

---

Bauhinia Downs 4m. sheet. Approx. 2 $\frac{1}{2}$  m. E. of  
Day's Lagoon. 16°15' 135°30' (Approx.)

Collected by: Mt. Isa Ltd. 25th Feb. 1957

Age: Cretaceous

Pelecypoda  
Identified by: J.M. Dickins

---

F 96428-30. Mullaman Beds. Siliceous quartzose  
sandstone.

2m. S.W. of Waterhouse Waterfall, which is 5 m.  
from Beswick Homestead.

Black Cap 1 mile sheet.

Collected by P. Dunn and R. Bryan, July 1958

Age: Jurassic-?Cret.

Belemnites spp.

? Elatocladus plana (Feist.) frag.

Indet. Plant Remains

Plant Roots

Identified by: S.K. Skwarko

---

F 96522,3. Mullaman Beds. Cream siliceous marl.  
Headwaters of Bukalorkmi Creek, where it cuts  
through Tableland.

Flying Fox Creek 1 mile sheet

Collected by: P. Dunn and R. Bryan, July 1958

Age: Upper Jurassic-  
Lr. Cretaceous

Plant Remains (Unidentified).

---

F 96524. Mullaman Beds. Ferruginous  
(? calcareous) sandstone.

9 m. S.E. of Beswick Homestead on isolated hill  
on N. branch of Chambers Rv. Waterhouse 1 mile  
sheet.

Collected by: P. Dunn and R. Bryan, July 1958

Age: Lr. Cretaceous.

Ammonite (as yet unidentified).

---

F 96525. Mullaman Beds. Ferruginous sandstone.  
Waterhouse 1 mile sheet. 8 m. S.W. of Beswick  
Homestead on Bluff facing Chambers Rv.

Collected by: P. Dunn and R. Bryan, July 1958

Age: Jurassic-Cret.

Ptilophyllum necten (Phillips)

Taeniopteris cf. spatulata McClelland

Identified by: S.K. Skwarko

---

F 96725. Mullaman Beds. Silicified <sup>quartzose</sup> sand-  
stone. At top of small hill immediately S. of  
track.  $8\frac{1}{2}$  m. east of Sugarbag Waterhole, and  
just beyond the nearest scarp. Waterhouse 1-mile  
sheet.

Collected by: P. Dunn and R. Bryan, July 1958

Age: ? Lr. Cret-  
aceous.

Possibly an inorganic structure.

---

F 96743. Mullaman Beds. Buff calcareous sand-  
stone.  $\frac{1}{2}$  m. W. of Black Cap; isolated hill.  
Urapunga 4-mile sheet (on Black Cap mile  
area).

Collected by: P. Dunn and R. Bryan, July 1958

Age: Jurassic-Cret.

Elatocladus n.sp. ?

Identified by: S.K. Skwarko