COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES GEOLOGY AND GEOPHYSICS

RECORDS:

1967/47

CRETACEOUS STRATIGRAPHY OF THE WISO BASIN, NORTHERN TERRITORY

(Preliminary Report)

by

S.K. Skwarko

5928/65

CRETACEOUS STRATIGRAPHY OF THE WISO BASIN, NORTHERN TERRITORY

(Preliminary Report)

by

S.K. SKWARKO

RECORD NO. 1967/47

C O N T E N T S

FIGURES

SUMMARY

Cretaceous sediments on the Larrimah, Daly Waters, Victoria River Downs, and Delamere Sheet areas are:

1. The 'plateau sediments', which form a low plateau, bound on the west by a dissected scarp, and extends - though usually covered by Quaternary sediments - over most of the Larrimah, and Daly Waters Sheet areas;
2. The Mt. Sullivan and the associated remnants of the once continuous but now largely stripped mantle of Cretaceous sediments west of the plateau;
3. The hitherto unexplored outcrops known through photo-interpretation to be present in the middle-northern portion of the Delamere Sheet area.

In the plateau sequence, the lowest unit is the plant-bearing non-marine sandstone which is up to 45 feet thick, and which consists of marginal, poorly sorted conglomerate, and saccharoidal sandstone away from the Cretaceous lake margins. This sandstone represents locally the ?Neocomian, Aptian Lees Sandstone (Unit A) of the Mullaman Beds on the basis of its stratigraphical position, lithology, fossil content, and depositional environment.

The Lees Sandstone is overlain by up to 140 feet of marine claystone and siltstone, sandy in places, locally with coarser lithology near the base, characterised by compactional slickensiding, and the presence of molluscan fauna of Aptian age. This unit, here referred to as 'Unit 6', is probably a lateral correlate of Unit 6 of the Coastal Belt suite of the Mullaman Beds, which extends in a belt along the southern and western margin of the Gulf of Carpentaria.

A new unit, Unit 6a, is recognised to include a persistent layer of sandstone up to 48 feet thick, characterised by abundant worm borings, which overlies, probably conformably, Unit 6. Unit 6a is represented in the Coastal Belt by localities TT47 and TT48.

The stratigraphically highest lithology in the plateau sequence is a marine claystone almost 100 feet thick which is the local equivalent of the Polland Shale (Unit C) which is widely distributed in the northern part of the Northern Territory and in western Queensland. It contains an assemblage of arenaceous Formaninifera and its age is regarded as Albian.

At Mt. Sullivan and the neighbouring outcrops, the stratigrphical section may be essentially similar to that in the plateau outcrops or it may contain a thickness of sediment below the Lees Sandstone unrepresented elsewhere in the Northern Region.

INTRODUCTION

The systematic geologic mapping of the Northern Territory to the scale of 1:250,000 by the Bureau of Mineral Resources geologists was continued during 1966 with the mapping of an area enclosed by the Larrimah and the Daly Waters Sheets and the eastern portions of the Delamere and the Victoria River Downs Sheets. Cretaceous strata cover much of this area. The results of a month's observations, which are summarised in this report, are of particular interest as they fill the gap in the systematic study of the Cretaceous sediments in the Northern Territory conducted during the 1960-1962 field seasons and summarised in the Bureau of Mineral Resources Bulletin 73 (Skwarko, 1966). The boundaries of the area under discussion are shown on Figure 1, while its relationship to the areas covered by previous surveys, and summarised in the Bureau of Mineral Resources Bulletin 73, is shown in Figure 2.

The Cretaceous stratigraphy of the area, as presented here, is however incomplete: evidence as yet not thoroughly scrutinised suggests that in contrast to other areas of the Northern Territory the Lees Sandstone (Unit A) may not be the earliest of the non-marine units laid down in the non-marine sedimentary cycle. M.C. Brown of the Bureau of Mineral Resources, who examined sections at Gallery Hill, records no less than 40 feet - and perhaps as much as 65 feet - of presumably Cretaceous section below a coarse-grained sandstone. There is more than one way of interpreting sections at and near Mt. Sullivan and at Gallery Hill which so far I have not seen; photo-interpreted outcrops in the north-central part of the Delamere Sheet area have never been examined, and one is reluctant to draw any conclusions regarding the pre-Lees Sandstone Cretaceous sedimentation in the area until all these areas are examined.

STRATIGRAPHY

Only these Cretaceous strata are here discussed which crop out over the part of the Wiso Basin enclosed by the Delamere, Victoria River Downs, Larrimah and the Daly Waters 1:250,000 Sheet areas. Though hitherto undescribed, they are in fact part of the Mullaman Beds already discussed in 1966 (Skwarko, 1966). For the purpose of the description of their lithology and fossil content and the discussion of their age they are best treated under three headings which reflect their areas of outcrop.

The Cretaceous 'plateau sediments' form a plateau which extends over practically the whole of the Daly Waters and most of the Larrimah Sheet areas and overlaps on to the eastern part of the Delamere and the Victoria River Downs Sheet areas, where their western extension ends in a low dissected scarp. To the west of the scarp there are two groups of isolated remnants of the once extensive but now almost totally stripped Mesozoic cover. One is at Mt. Sullivan and Frayne's Knob on the Victoria River Downs Sheet area, while the other, larger, and so far not explored group of outcrops is in the north-central part of the Delamere Sheet area.

The Cretaceous 'plateau sediments'

The plateau is a continuation of the Cretaceous Mullaman Beds to the north, east, and possibly south, already discussed in the past (Skwarko, 1966). Its western continuation terminates at a scarp formed by the headward erosion of streams which flow to the west and the west-north-west and drain from the area of Cretaceous sediments into the Joseph Bonaparte Gulf. This easterly retreating scarp is low and extends in an almost continuous if frilled and sinuous line from the south-eastern corner of the Victoria River Downs Sheet area to the north-eastern corner of the Delamere Sheet area. East of the scarp, i.e. on the plateau, outcrops of Cretaceous sediments are limited in surface expression because of extensive cover of post-Cretaceous - mostly Quaternary - sediments such as soils and sand cover, which in many cases are but weathering products of the underlying Cretaceous beds. Where Cambrian and earlier strata crop out on the plateau, erosion may have stripped the Cretaceous cover, but the original thickness, and indeed presence, of Cretaceous sediments was surely governed by relief in the pre-Cretaceous erosion surface at any particular place.

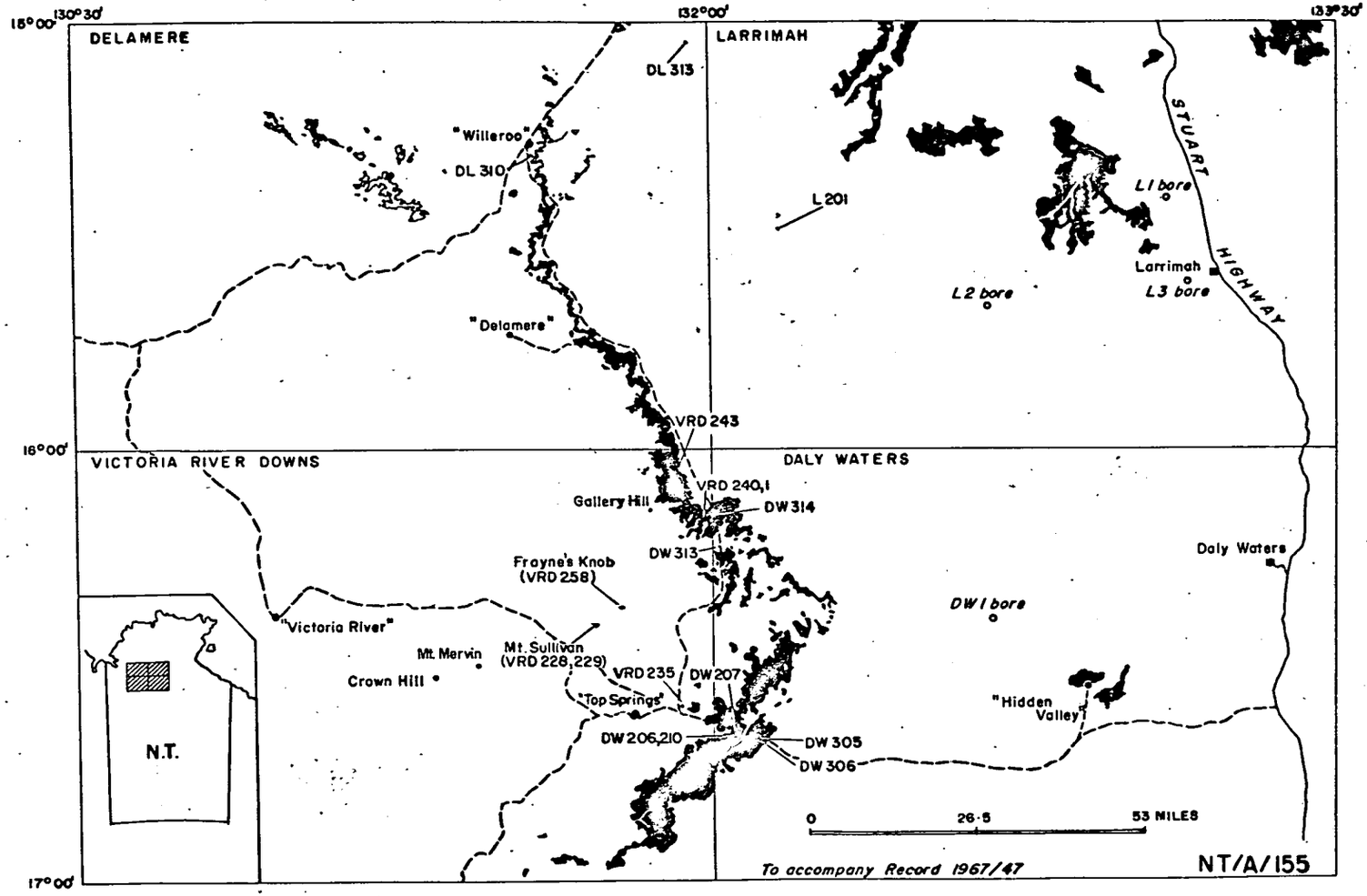


Fig. 1. Map showing the distribution of Cretaceous outcrops and fossil-bearing localities in the south-western portion of the Northern Region

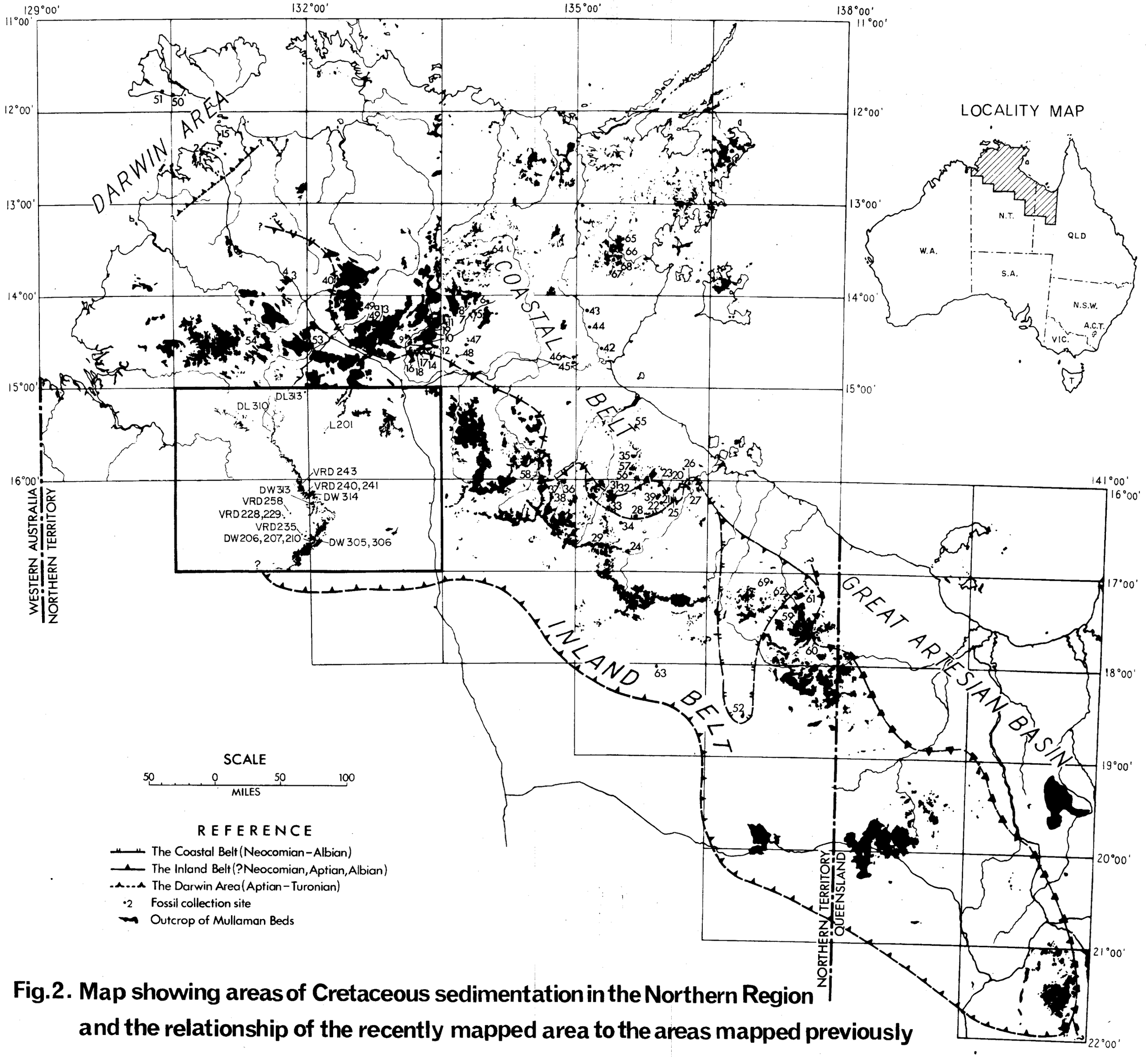


Fig.2. Map showing areas of Cretaceous sedimentation in the Northern Region and the relationship of the recently mapped area to the areas mapped previously

To accompany Record 1967/47

AUS 2-A 34

The Cretaceous sediments which make up the plateau and underlie it are no less than 165 feet thick as measured in the best exposed outcrops in the extreme western part of the plateau. Stratigraphic drilling carried out in 1966 in the eastern part of the area shows a minimum thickness of Cretaceous beds of 281 feet. These strata are heterogenous, and for ease of description and correlation are here subdivided on lithology into four units. It was found that three of these can be correlated with units already established in other areas of outcrop of Mullaman sediments. A new unit has been established to accommodate the fourth lithology, also represented east of the presently discussed area, but because of poor outcrop hitherto not separated from the other units. The naming or numbering system used here is similar to that used in the past (Skwarko, 1966), and the four units represented in this part of the Wiso Basin are in ascending order: the Lees Sandstone (Unit A), 'Unit 6', Unit 6a and the Polland Shale (Unit C).

The Lees Sandstone (Unit A) (?Neocomian, Aptian)

The name 'Lees Sandstone' was first used by Öpik (1961) in Queensland to describe a saccharoidal sandstone whose lithology, fossil content, and provenance duplicated that of Unit A sandstone of the Northern Territory with which it was laterally continuous and with which it was correlated (Skwarko, 1966).

The Lees Sandstone is the lowermost lithology in the Cretaceous plateau suite to be discussed in this report. It is of non-marine origin as evidenced by the presence of wood fragments and leaf impressions to the exclusion of fossilised remains of marine forms of life. The variation in its grain-size observed in outcrops in the western part of the plateau on the one hand, and in the central and northern part of the plateau on the other, is thought to reflect broadly the distance of these outcrops from the Lower Cretaceous coastline.

The south-westerly limit of outcrops of the Lees Sandstone is at locality VRD235 (Figure 1), where small and low remanent outcrops of ferruginised grit and angular cobble and pebble conglomerate with preserved impressions of fossil twigs, branches and logs overlie the old surface of Cambrian Montejinni Limestone. It is unlikely that a large concentration of wood and coarse detritus could have accumulated anywhere but at a short distance from shore, and it is inferred that the south-western margin of the lake or lakes in which the Lees Sandstone was deposited was situated in the south-west, and very near, locality VRD235. Similarly, very poorly sorted cobble and pebble conglomerate with sandstone is found at locality DL310 about 90 miles to the north of VRD235.

Apart from outcrops near Mt. Sullivan, the nearest known exposture of the Lees Sandstone from locality VRD235 is about 36 miles due north (Daly Waters Run 1 Photo 5105 Point VRD305) in the low plateau escarpment, where coarse-grained sandstone and basal conglomerate, made up of angular quartz pebbles set in claystone matrix, crop out at the base of the Cretaceous section. Only two feet of the conglomerate is visible, but its base can be seen about 10 miles to the north in the south-eastern corner of the Delamere Sheet area (Run 15 Photo 5169 Point DL301) where 10 feet of conglomerate and grit with fine kaolinitic matrix crop out in a creek bed overlying Lower Palaeozoic siltstone. Four miles south-east from the Delamere Homestead turn-off, and just west of the Willeroo - Top Springs road (Run 12 Photo 5224 Point DL303), this conglomerate and grit are replaced by large weathered boulders of clean, saccharoidal sandstone with plant remains, both of which are typical of numerous outcrops of the Lees Sandstone in many parts of the Inland Belt of non-marine sedimentation (Skwarko, 1966). In the north-eastern corner of the Delamere Sheet area (Larrimah Run 1 Photo 5103 Point DL313), the Lees Sandstone, which is here 15 feet thick, is medium-grained and friable and stained yellow and pastel brown. It contains identifiable plant impressions (see below), which further support the correlation of the local conglomerate and sandstone with the Lees Sandstone to the north and east of the area under discussion. A stratigraphical bore on the Larrimah Sheet area (L1) shows an easterly thickening of the Lees Sandstone of up to at least 45 feet.

It is concluded on the basis of scattered field observations that the south-western margin of the lacustrine sedimentary environment of the Northern Region (Skwarko, 1966) continued generally to the north-north-west roughly parallel to and west of the present-day scarp, and also to the west of Mt. Sullivan. This is suggested by the distribution of conglomerate and the progressive northerly and easterly reduction in grain-size and improved sorting of sediments, which indicate that water depth increased in both these directions. Further examination of outcrops during the 1967 field season will throw additional light on this problem. On the Delamere Sheet area the position of the old shore-line will be difficult to trace because of insufficient outcrops, particularly west and north-west of the escarpment. Outcrops in the north-central part of the sheet area may yield pertinent data, but in the south-central part the Cretaceous strata west of the scarp have been stripped by erosion.

Fossils and Age:

The only fossils collected in the Lees Sandstone both in the area under discussion and in the rest of the Northern Region are plant impressions. M.E. White (pers. comm.) identified the following and dated them as Lower Cretaceous:

Locality DL310: Ptilophyllum sp.

Locality DL313: Neorhacopteris minuta White
Microphyllopteris gleichenioides O. & M.
Otozamites bengalensis O. & M.

Locality VRD235: Indeterminate stems

Neorhacopteris minuta was hitherto known only from the 'Upper Jurassic-Lower Cretaceous' Callawa Formation of the Canning Basin. The remaining fossils were recently reported from the Lees Sandstone of the Northern Region (Skwarko, 1966, p.32). The age of the Lees Sandstone was discussed elsewhere (Skwarko, 1966) and it was concluded that it was deposited during part of the Aptian, but deposition may have commenced in the late Neocomian.

'Unit 6' and Unit 6a (Aptian)

In the plateau, the Lees Sandstone is overlain disconformably by a marine Mollusca-bearing claystone and siltstone more than 30 feet thick (possibly 140 feet in DW1 bore), which is in turn overlain, apparently conformably, by a marine, fossiliferous medium-grained sandstone. This sandstone layer was in fact encountered previously about 200 miles to the north-east (see Figure 2) at localities TT47 and TT48 (Skwarko, 1966), which are isolated outcrops with eroded tops and obscured bases (Skwarko, 1961, unpubl.). At the time, I tentatively included the sandstone at these two localities in Unit 6 on the basis of the presence of a gastropod, Neritokrikus tuberosus. Unit 6 was, however, erected to include a claystone and siltstone horizon with an Aptian molluscan fauna - such as occurs at localities TT20, TT21 and TT22 (see Figure 2) which also have obscured bases and erosional tops. Strata at locality TT33 (Skwarko, 1966) were also included in Unit 6 on lithology and because of the presence of Neritokrikus tuberosus (this fossil was also found at locality TT20), though no pelecypods were found at this locality (Skwarko, 1966, pp. 28, 57).

In the Wiso Basin, the marine fossiliferous sandstone layer is a well defined and persistent unit (see below) whose stratigraphical position above 'Unit 6' and below the Polland Shale is established. It is therefore separated from the underlying 'Unit 6' and named provisionally Unit 6a. Localities TT47, 48 of the Coastal Belt are correlated with it with some confidence because of both the lithological and fossil similarities.

	LEES SSTN			UNIT 6								UNIT 6a			NOT KNOWN	
	VRD 235	DL 310	DL 313	L 201	DW 206	DW 207	DW 310	DW 313	VRD 240	VRD 241	VRD 243	DW 305	DW 306	DW 314	VRD 228.9	VRD 258
Grammatodon robusta							X	X	X	X	X					
Pseudavicula anomala								?			?					
Yoldia cf. *elongata*					cf.			X	X	X	X					
Trigonia juv. indet.					X											
Pelecypoda indet.				X	X		X	X		X					X	
Belemnites not identified								X				X			X	X
Belemnites indet.					X	X	X			X	X				X	
Rhizocorallium sp.												X	X	X		
Worm borings												X	X	X		
Neritokrikus tuberosus												X	X	X		
Glyphea cf. *aborinsularis*							X									
Ammonites indet.								X			X					
Plant remains	X	X	X												X	

Fig.3 The distribution of Cretaceous macrofossils in the Wiso Basin localities and units

To accompany Record 1967/47.

E52/A4/7

The correlation of the marine fossiliferous claystone between Unit 6a and the Lees Sandstone with the Unit 6 of the Coastal Belt suite of sediments is less certain. In both cases the lithologies are fine-grained, but differ from each other; in both cases the faunas are of Aptian age, but have few species or even genera in common. Evidence from superposition is lacking as in the Coastal Belt no sections showing the relationship between Unit 6a and Unit 6 have been hitherto encountered. It is felt, however, that the two groups of outcrops are laterally equivalent and the Mollusca-bearing claystone outcrops of the Wiso Basin (DW 201, 206, 207, 310, 313, VRD 240, 241, 243) are tentatively correlated with Unit 6 localities of the Coastal Belt (TT20-22 and TT33).

Parts of sections numbered TT20-22 and TT33 are retained in Unit 6 of the Coastal Belt and its definition remains unchanged (Skwarko, 1966, p. 28).

'Unit 6':

The Mollusca-bearing claystone crops out in many places in the area under discussion, the most revealing and richly fossiliferous sites being in the western portion of the Daly Waters and eastern portion of the Victoria River Downs Sheet areas.

The unit is more than 30 feet thick in surface outcrops, and 140 feet thick in scout hole DW1 where its upper contact with Unit 6a is a transistional one. It overlies disconformably the Lees Sandstone and is in turn overlain, apparently conformably, by the newly defined Unit 6a (see below). It consists of leached creamy claystone and siltstone with numerous consolidational slip features, irregular, closely spaced, and iron stained joint planes, and contains marine fossils which are not abundant and are absent in some outcrops. Locally, the lower part of this unit contains quartz grains.

In the Wiso Basin, outcrops of the 'Unit 6' were traced over a distance of about 120 miles, and the surface area of about 10,000 square miles. If correlation with Unit 6 of the Coastal Belt suite is in fact correct (see above), then the area of distribution of the Unit is increased at least two-fold.

Fossils and Age:

Macrofossils were found in Unit 6 at six localities on the Daly Waters Sheet area, and at three localities on the Victoria River Downs Sheet area. The individual lists of fossils for each collection appears on page 14-16 of this record and the composite fossil distribution table for the unit as well as other units is in Figure 3.

Some idea of the microfossil content of 'Unit 6' can be gathered from scout hole DW1 Core No. 3 and DW1B Core No. 1 (=Core 4 in Figure 4) which contain the following:

Haplophragmoides cf.gigas Cushman, 1927,*
Haplophragmoides sp., Ammobaculites subcretaceous Cushman & Alexander, 1930,
A. cf.succinctus Crespin, 1963,
Ammobaculites sp., Verneuilina howchini Crespin, 1953,
Trochammina sp., Textularia cf.anacooraensis Crespin, 1953,
Miliammina sproulei Nauss var.gigantea Mellow & Wall, 1956,+
Dorothia sp.

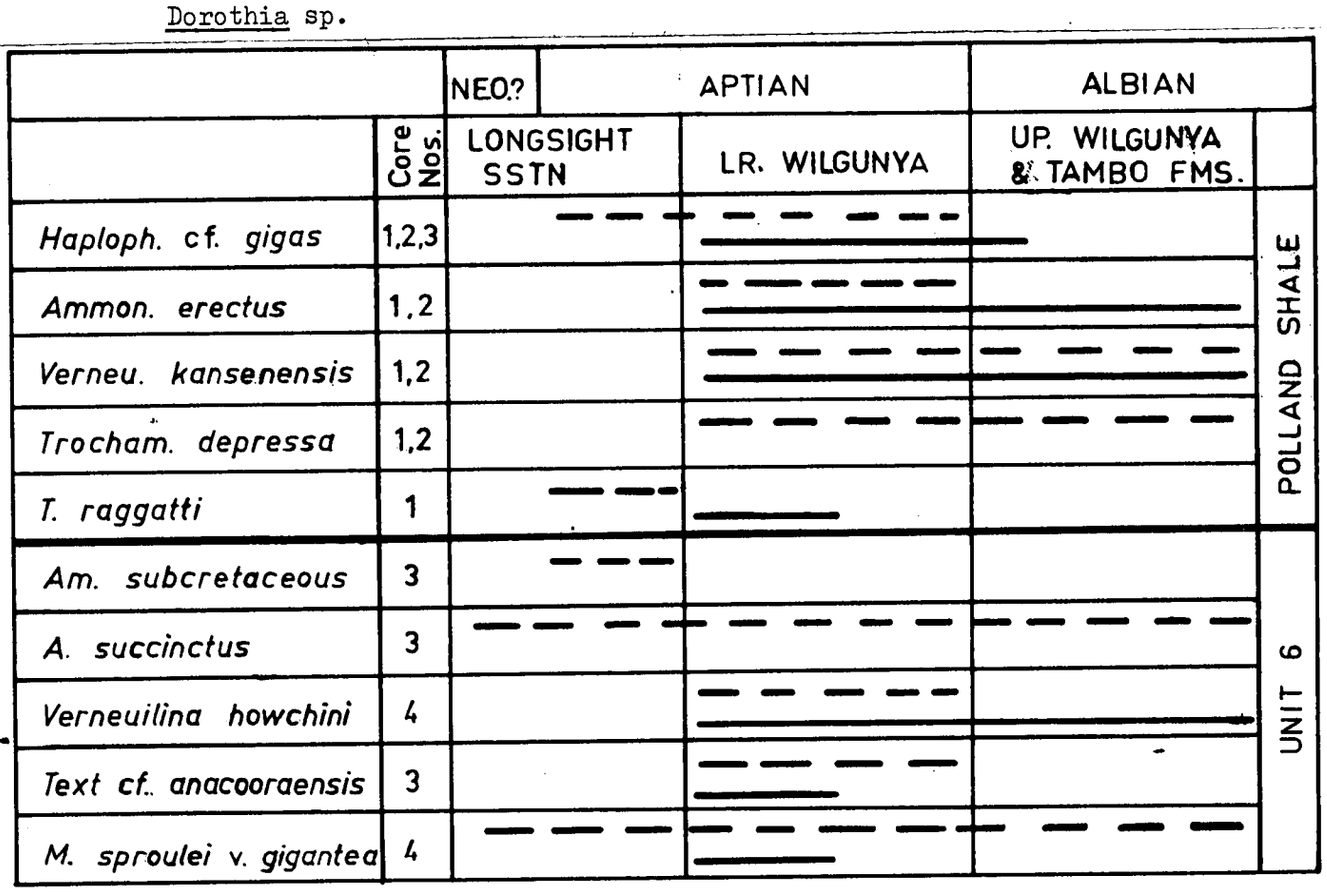


Figure 4. Table showing Foraminifera identified from scout holes DW1 and DW1B and their known stratigraphic ranges according to Crespin (1963, broken line) and Ludbrook (1967, solid line). Identifications of genera only are not included.

Their known stratigraphic range is plotted on Figure 4 and suggests Aptian age which, in the case of 'Unit 6', is supported both by the macrofossil content and stratigraphic relationships. At the present stage of knowledge Cretaceous arenaceous Foraminifera can, however, be hardly regarded as a reliable dating tool within the Lower Cretaceous in Australia.

---

* H.gigas Crespin (non-Cushman) = H.audax Ludbrook, 1967.

\+ M.sproulei var.gigantea Crespin (non M. & W., 1956) = M.inferior Ludbrook, 1967.

Unit 6a:

In the outcrops of the western scarp, Unit 6a consists of about 15 feet of indurated quartz sandstone which is yellow, brown, or rarely red in colour, medium-grained, micaceous, and richly fossiliferous, and which in places contains a large percentage of glauconite. The best known outcrops in the Wiso Basin are at localities DW305 and DW306 in the south-western corner of the Daly Waters Sheet area. The unit was traced to locality DW314, about 37 miles due north of DW306 - still along the western escarpment of the Cretaceous plateau. It is 48 feet thick in scout hole DW1 in the middle of the Daly Waters Sheet area.

Unit 6a overlies, probably conformably, 'Unit 6' and is in turn overlain, probably disconformably, by the thick and widespread Polland Shale. It does not crop out on the surface of the plateau except in one or two places in the road cuttings along the Stuart Highway. Isolated hills of Unit 6a, capped by claystone which may or may not be Polland Shale, were identified at localities TT47 and TT48 on the Urapunga Sheet area, at a distance of about 200 miles from DW305.

Fossils and Age:

Unit 6a is richly fossiliferous, but its fauna mostly consists of hitherto undescribed worm-borings. Rhizocorallium is well represented both in the Wiso Basin localities and in the Urapunga Sheet area where it is accompanied by Diplocraterion. The gastropod Neritokrikus tuberosus occurs in this unit in the Wiso Basin as well as in the Urapunga Sheet localities from which it was originally described (Skwarko, 1966, p. 121); it was also found in the underlying Unit 6. Apart from the indeterminate internal cast of a Nototrigonia found at locality TT47 the only other fossils hitherto encountered in Unit 6a are the unidentified belemnites.

The Unit 6a assemblage is indicative of Aptian age.

Polland Shale (Unit C) (Albian)

Overlying Unit 6a, there are up to 100 feet of predominantly fine-grained rock whose lithology, secondary alteration products, stratigraphic position, and fossil content are similar to those of many outcrops in the entire Northern Region. Öpik (1961) gave the name 'Polland Shale' to outcrops of this lithology in Western Queensland, and similar outcrops in the Northern Territory were provisionally referred to as Unit C. It is proposed to refer to it here as Polland Shale.

The Polland Shale is made up of micaceous siltstone and claystone which in Victoria River Downs Sheet area grade upwards into grit and pebble conglomerate near the top. Where present, this coarser lithology does not exceed four feet in thickness and may indeed mark the top of the Polland Shale. In most outcrops, however, the claystone persists to the erosional surface, where protracted weathering may give the uppermost several feet of the sediment an appearance of breccia. The lower contact is probably disconformable.

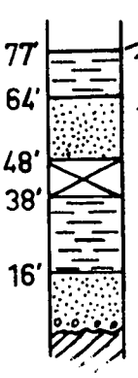
As in the other parts of the Northern Region, the fossil content of the Polland Shale in the area under discussion is limited to a microfauna which consists of the following Foraminifera:

Haplophragmoides cf .gigas Cushman, 1927, Haplophragmoides sp., Ammobaculites erectus Crespin, 1963, Verneuilia sp., Verneuilioides kansasensis Loeblich & Tappan, 1950*, Trochammina depressa Lozo, 1944, T.raggatti Crespin, 1944, Trochammina sp., Inoceramus prisms.

Their known stratigraphical ranges are plotted on Figure 4 on the basis of data from Crespin (1963) and Ludbrook (1967). They tend to suggest Aptian more than Albian age for the Polland Shale. In this report, however, the age of this unit is regarded as Albian as in its other occurrences in the Northern Region.

SECTIONS AT AND NEAR MT. SULLIVAN AND MT. MERVIN

Very little of Cretaceous strata still remain west of locality VRD235 on the Victoria River Downs Sheet area. The three outcrops at and near Mt. Sullivan (including Frayne's Knob: VRD228, 9 and VRD258 on Figure 1), and outcrops of Mt. Mervin are the sole known remnants of the once continuous mantle of Cretaceous sediments in this area. M.C. Brown found the stratigraphical succession at the outcrops near Mt. Sullivan very similar. A generalised section at Mt. Sullivan itself is as follows (see also Figure 5).



To accompany Record 1967/47. E52/A4/5

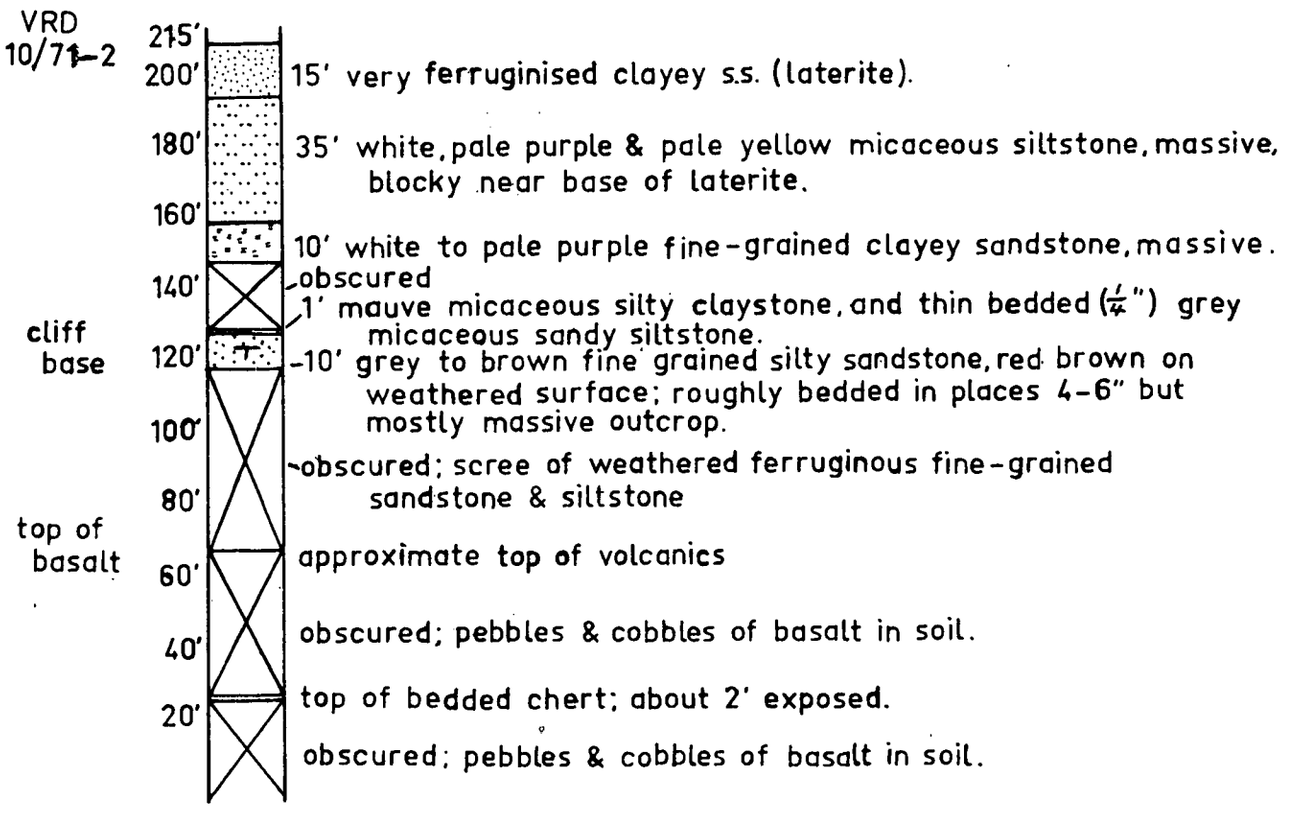
* V.kansasensis Crespin (non L. & T., 1950) = V.crespinae Ludbrook, 1967

The lowest lithology is coarse-grained and graded, and is similar to that at locality VRD235 (Lees Sandstone) except that it lacks the wood impressions, which occur there abundantly though rather sporadically. The overlying 22 feet of shale may be an equivalent of 'Unit 6' which overlies the Lees Sandstone in the plateau sections. However, this shale at Mt. Sullivan is unfossiliferous and lacks compactional slickensiding which characterises 'Unit 6' outcrops; the purple and red secondary(?) staining observed at Mt. Sullivan were not encountered in 'Unit 6' except possibly near the bottom of the scout hole DW1.

The next 10 feet of sequence are obscured from view, but higher up there are 16 feet of micaceous medium to fine-grained variegated sandstone. In this sandstone as well as at other levels Brown observed structures resembling plant impressions or burrows. A similar section is encountered in the plateau sections, where a persistent 15 feet layer of medium to fine-grained sandstone (Unit 6a) overlies the 30 feet of 'Unit 6'. This Unit 6a contains an abundant worm burrow fauna - which however is not always easy to recognise to an untrained eye - and gastropods and belemnites, which are not common and tend to be absent from some outcrops. It is thus possible that the 16 feet layer at Mt. Sullivan represents Unit 6a.

The hitherto considered part of the Mt. Sullivan section seems to correspond to the plateau section. The highest horizon, however, consists of 13'6" of claystone and clayey siltstone which does not greatly resemble the Polland Shale but the lower 13 feet of which - apart from the apparent lack of marine molluscs - seem to be identical with the 'Unit 6'. Above this, there is a 6 inch layer of hard, yellow, clayey siltstone rich in belemnites and wood fragments and containing some pelecypods. The contact between the yellow claystone and the white clayey silstone is sharp at this outcrop which is probably coincidental as the colouration is secondary and at the Frayne's Knob the belemnites occur in both 'layers' the contact between them being mottled and diffuse. It is likely that the whole 13'6" thickness is a marginal facies of 'Unit 6'. If this proves to be the case then the whole interpretation of the Mt. Sullivan section suggested above will have to be adjusted accordingly. Further speculation seems to be pointless at this stage; it is hoped that the planned re-examination of the Mt. Sullivan section will result in the finding of diagnostic fossils which will help to resolve the existing problem.

W.J. Perry, Bureau of Mineral Resources, examined Cretaceous sections near Mt. Mervin, and his section from about 2½ miles south-east from this hill is reproduced below without an attempt at correlation with the plateau section. The Mt. Mervin section will be re-examined in the forthcoming field season.



To accompany Record 1967/47. E52/A4/6

THE SUBSURFACE DATA

Four stratigraphical scout holes were put down in the area under discussion (DW1, L1, L2, L3 on Figure 1). One of these, DW1 in the middle of the Daly Waters Sheet area, penetrated a large thickness of Cretaceous sediments, while the remaining three, on the Larrimah Sheet area, went through only a small thickness of Cretaceous strata.

In scout hole DW1 the top 93 feet of claystone (see Figure 5) is thought to represent the Polland Shale because of lithologic similarity and Foraminiferal content (see p. 10). The underlying 45 feet of sandstone is probably Unit 6a rather than the Lees Sandstone because of the stratigraphical position and also because it contains glauconite and Foraminifera indicative of a marine origin. The underlying 140 feet of claystone, siltstone, and fine-grained sandstone with Foraminifera may be

'Unit 6' as inferred by its stratigraphical position between the suggested Unit 6a and the underlying sandstone, which is a coarse-grained loose sandstone of unknown, but probably limited, thickness above the basement rock.

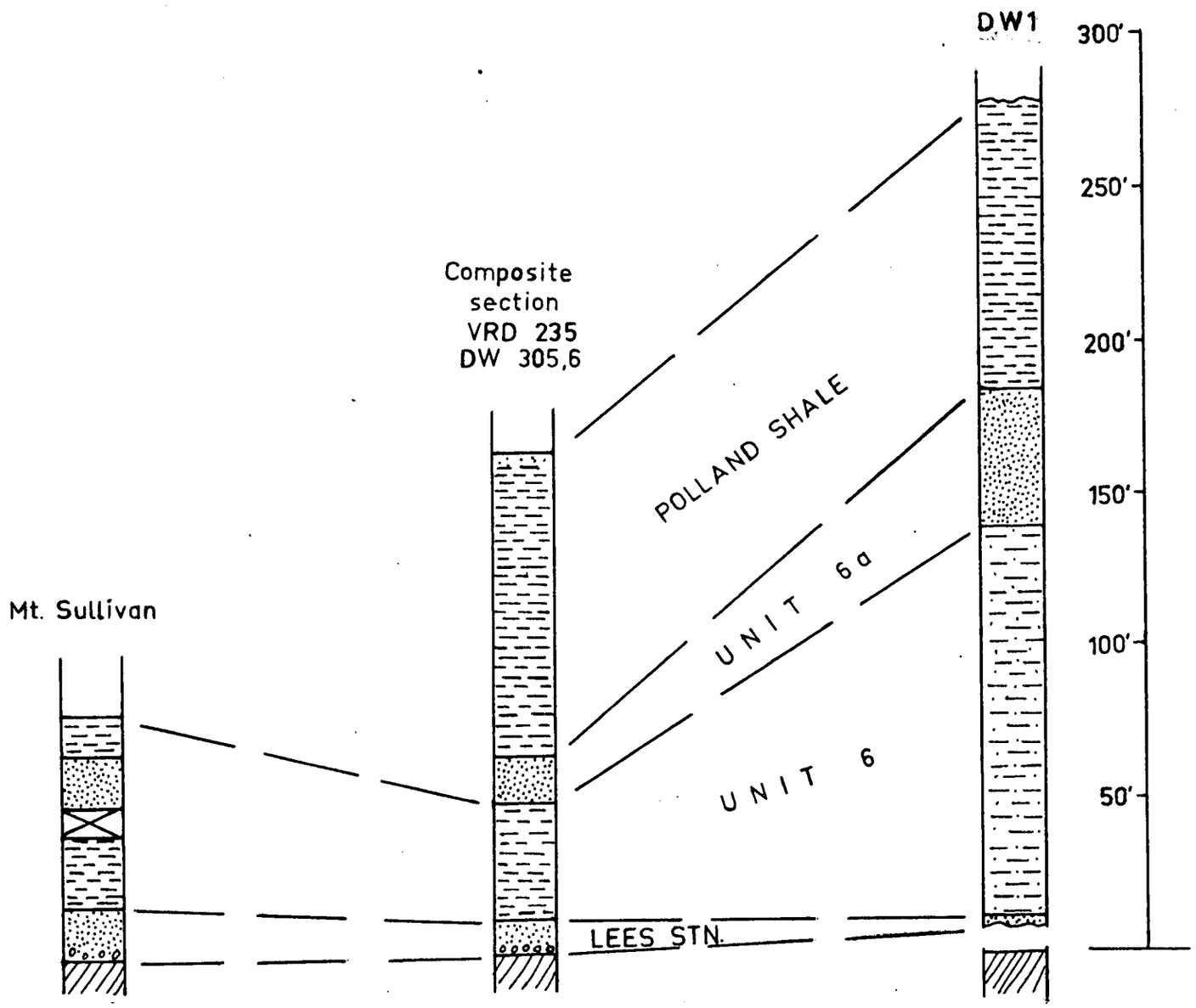


Fig. 5 Preliminary correlation of the more important Cretaceous sections in the the Wiso Basin, N.T.

To accompany Record 1967/47. E52/A4/8

A preliminary correlation of the more important Cretaceous sections in the Wiso Basin is proposed in Figure 5. The correlation of scout hole DW1 with the strata outcropping in the western escarpment presents no major problems, although it is rather difficult to pinpoint the lower limit of Unit 6a. Correlation with Mt. Sullivan is much more uncertain at this stage, and it is hoped that the forthcoming field season will throw additional light on this problem.

DESCRIPTION OF FOSSIL-BEARING LOCALITIES AND THEIR CONTENT

LARRIMAH 1:250,000

L201: 6 miles south along track from No. 5 bore, Dry River Stock Route, on west side of track, near level of creek bed. Run 4 Photo 5159 Point L201. Collected by M.C. Brown, October, 1966.

Pelecypods indet.

DALY WATERS 1:250,000

DW206: Low lancewood-covered hill 100 yards north of Dunmarra - Top Springs road, and about 50 yards NNW from DW207; about 1¼ miles east from No. 14 bore (Murranji Stock Route). Fossil band is about 8 feet below top of hill. Run 6 Photo 5140 Point DW206. Collected by M.C. Brown, M.A. Randal, D.J. Guppy, August, 1966.

cf. Yoldia cf. elongata (Etheridge, 1892)
'Trigonia' sp. indet. juv.
Fragments of large pelecypods
Belemnites fragments indet.

DW207: Low knoll of white rocks covered by lancewood, on north side of Top Springs - Dunmarra Road, about 1¼ miles east of No. 14 bore Murranji Stock Route. Fossils occur about 18 inches below the top of knoll. Run 6 Photo 5140 Point DW207. Collected by M.C. Brown, July 1966.

Belemnites indet.

DW305: In creek crossing Dunmarra - Top Springs beef road, almost 5 miles WNW from turn off to No. 13 bore, Murranji Stock Route. Run 6 Photo 5140 Point DW305. Collected by S.K. Skwarko, 21/8/1966.

Belemnites not identified
Rhizocorallium sp.
Worm borings
Neritokrikus tuberosus Skwarko, 1966

DW306: Near junction of two creeks about ½ mile south of Dunmarra - Top Springs beef road, about 5 miles WNW from turn off to bore No. 13 Murranji Stock Route. Run 6 Photo 5140 Point DW306. Collected by S.K. Skwarko, 21/8/1966.

Rhizocorallium sp.
Worm borings
Neritokrikus tuberosus Skwarko, 1966

DW310: Just north of Dunmarra - Top Springs road, about 15 miles east from Top Springs. Run 6 Photo 5140 Point DW310. Collected by S.K. Skwarko, 22/8/1966.

Grammatodon (I.) robusta (Etheridge Snr., 1872)
Pelecypods indet. 3 spp.
Belemnites indet.
Glyphea cf. arborinsularis Etheridge Jnr., 1917

DW313: 0.3 mile north of creek situated 6.3 miles north of Nelly Waterhole, along Dry River Stock Route. Run 2 Photo 5164 Point DW313. Collected by S.K. Skwarko, 23/8/1966.

Grammatodon (I.) robusta (Etheridge Snr., 1872)
?Pseudavicula anomala (Moore, 1870)
Yoldia cf.elongata Etheridge Jnr. 1892
Small pelecypods and gastropods indet.
Uncoiled ammonite indet.
Belemnites not identified.

DW314: Creek crossing on Dry River stock route, about 11½ miles north of Nelly Waterhole. Run 2 Photo 5164 Point DW314.
Collected by S.K. Skwarko, 23/8/1966.

Neritokrikus tuberosus Skwarko, 1966
Rhizocorallium sp.
Worm borings.

VICTORIA RIVER DOWNS 1:250,000

VRD243: About 19 miles NNE from Killarney, on east side of track, 2.9 miles in from Katherine - Top Springs road, and about 200 yards north of bend to west. Run 2 Photo 5007 Point VRD243. Collected by M.C. Brown, July 1966.

Grammatodon (I.) robusta (Etheridge Snr. 1872)
?Pseudavicula anomala (Moore, 1870)
Yoldia cf.elongata Etheridge Jnr., 1892
Ammonite frag indet.
Belemnites indet.

VRD228: Small outlier on east side of main mesa of Mt. Sullivan. Fossils are concentrated in a 6 inch band about 5 feet below the top of the outlier. Run 7 Photo 5071 Point VRD228, Collected by M.C. Brown.

Pelecypods indet.
Belemnites indet.
Wood fragments.

VRD229: East side of mesa capping on Mt. Sullivan. Fossil band is 2 feet below the mesa top. Run 7 Photo 5071 Point VRD229. Collected by M.C. Brown.

Belemnites not identified
Wood fragments.

VRD235: About 7½ miles east from Top Springs (old town site). ¾ mile SSE from old Katherine - Top Springs road at point 2 miles NE along road from intersection with new Dunmarra - Timber Creek beef road. Run 10 Photo 5161 Point VRD235. Collected by M.C. Brown, July 1966.

Indeterminate stems and wood fragments.

VRD240: 17 miles NNE from Killarney Homestead, on east side of new Willeroo - Top Springs road and ¼ mile south of creek crossing. Run 3 Photo 5077 Point VRD240. Collected by M.C. Brown, July 1966.

Grammatodon (I.) robusta (Etheridge Snr., 1872)
Yoldia elongata Etheridge Jnr., 1892

VRD241: 17 miles NNE from Killarney Homestead, on west side of new Willeroo - Top springs road and ¼ mile south of creek crossing. Run 3 Photo 5077 Point VRD241. Collected by M.C. Brown, July 1966.

Grammatodon (I.) robusta (Etheridge Snr., 1872)
Yoldia cf. elongata Etheridge Jnr., 1892
Pelecypod frags. indet.
Belemnites indet.

VRD258: Frayne's Knob. The fossil band is about 2 feet below top of hill. Point VRD258. Collected by M.C. Brown, July 1966.

Belemnites not identified.

DELAMERE 1:250,000

DL313: In escarpment, on both sides of track along east-west running fence in extreme north-eastern corner of sheet. Run 'Larrimah) 1 Photo 5103 Point DL313. Collected by S.K. Skwarko, 30/8/1966.

Neorhacopteris minuta White
Microphyllopteris gleichenioides O. & M.
Otozamites bengalensis O. & M.

DL310: First Cretaceous mesa along road south-east of Augusta Crown. Run 5 Photo 5163 Point DL310. Collected by S.K. Skwarko, 26/8/1966.

Ptilophyllum sp.

REFERENCES

Crespin, I., 1963 - Lower Cretaceous arenaceous Formaninifera of Australia. Bur.Min.Resour.Aust.Bull.66

Ludbrook, N.H., 1967 - Cretaceous biostratigraphy of the Great Artesian Basin in South Australia. Bull.Geol.Surv.S.Aust. 40

Öpik, A.A., Carter, E.K., & Noakes, L.C., 1961 - Explanatory notes on the Mount Isa 4-mile geological sheet. Bur.Min.Resour.Aust. expl.Notes 20

Skwarko, S.K., 1961 - Progress report on the field activities in the Northern Territory during 1961 field season. Bur.Min.Resour.Aust.Rec. 1961/153 (unpubl.)

Skwarko, S.K., 1966 - Cretaceous stratigraphy and palaeontology of the Northern Territory. Bur.Min.Resour.Aust.Bull. 73

Terpstra, G.R.J., 1967 - Report on the micropalaeontological examination of samples of scout bores DW1 and DW1B. Bur.Min.Resour.Aust.Rec. 1967/45 (unpubl.)