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# Shallow Stratigraphic Drilling Southern Carpentaria Basin, 1969

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RECORDS 1970/38

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## SUMMARY

Shallow stratigraphic drilling was carried out during 1969 in the southern Carpentaria Basin. The program was designed to supplement surface mapping of poorly exposed units, to elucidate certain structural problems and to provide fresh rock for palaeontological studies.

Drilling produced useful cores of Allaru Mudstone, Kamileroi (Toolebuc) Limestone, Blackdown (Wallumbilla) and Gilbert River Formations, and Eulo Queen Group. Structural information in the vicinity of the Boomarra Ridge was obtained. Preliminary palaeontological studies have aided correlation with the northern Eromanga Basin Sequence.


## INTRODUCTION

Shallow stratigraphic drilling was carried out in conjunction with field mapping in the southern portion of the Carpentaria Basin during August and September, 1969, using a Fox 500 rig. (Fig. 1). Five holes were drilled, to a total footage of 2135', with 325' of coring, average recovery being 85%.

The general object of the drilling programme was to provide stratigraphic information in the southern part of the Carpentaria Basin as a check on surface mapping. Specific objectives were: -

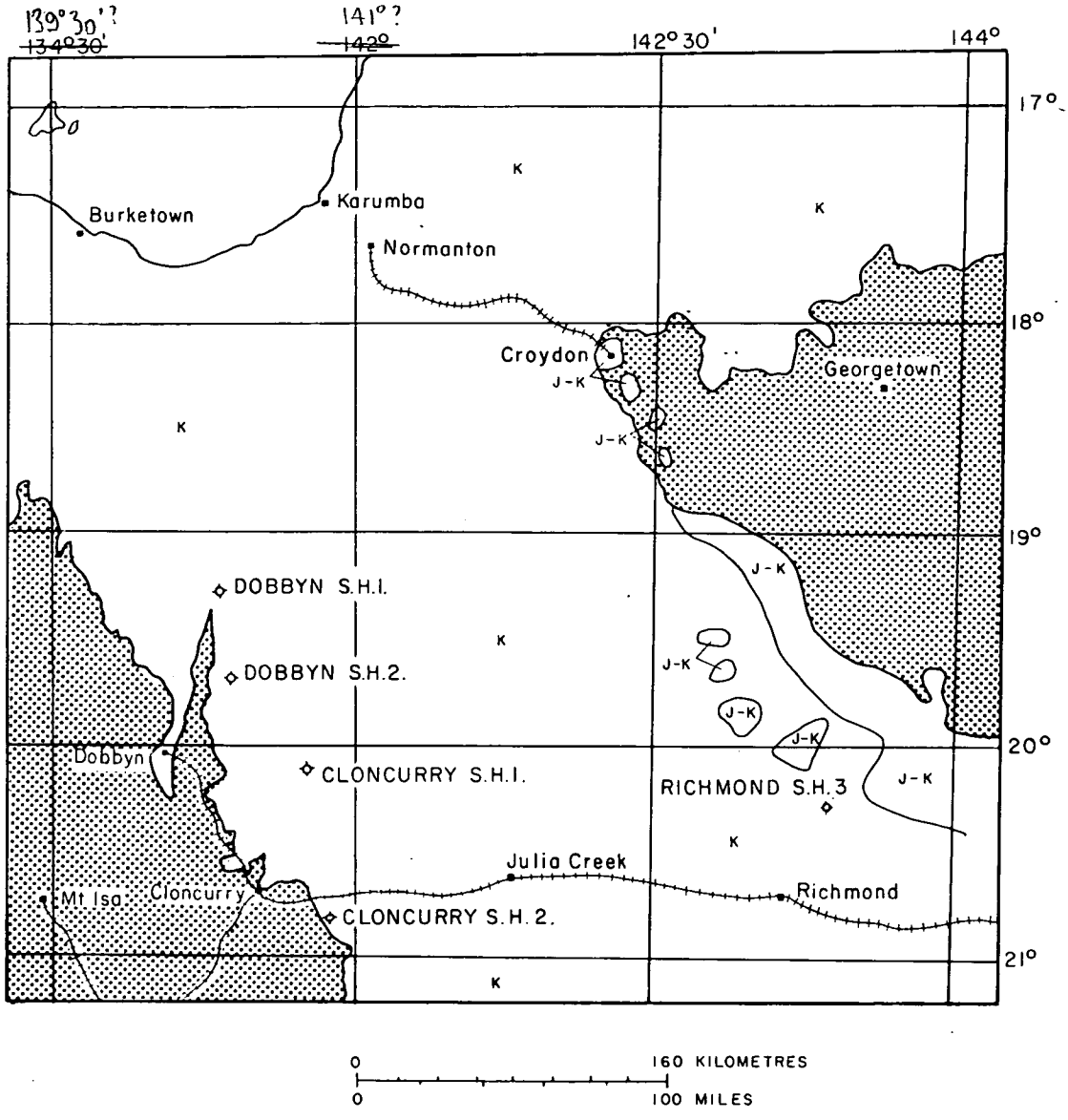
(1) to obtain fresh lithological samples from unexposed or poorly exposed units.

(2) to obtain fresh material for palynology for comparison with equivalent Cretaceous units to the south, and for local zoning.

(3) to check thicknesses of units and possible lateral variations, particularly close to basement outcrops or buried ridges.

(4) to test structural hypotheses in selected areas.

# LOCALITY MAP




K — Cretaceous mudstone and labile sandstone (with Cainozoic cover)

J - K — Jurassic – Cretaceous sandstones

Basement

Stratigraphic hole

Fig. 1.

To accompany Record 1970/38

File No Q/A 321

Despite the limited number of holes drilled, a considerable amount of useful information was gained. Good cores were obtained of Allaru Mudstone, Kamileroi (Toolebuc) Limestone, Blackdown (Wallumbilla), and Gilbert River Formations and Eulo Queen Group. Useful structural information was obtained, particularly from the Dobbyn Scout Holes. A good section of Gilbert River Formation and Eulo Queen Group was obtained from Richmond 3 for palynological studies.

Logging was carried out in the field by members of the field party (K.G. Grimes, G.S.Q. and John Smart, B.M.R.) using a binocular microscope. Certain cores, in particular those of Kamileroi (Toolebuc) Limestone and Gilbert River Formation were re-examined for macro and micro fossils.

Naming of the holes is by 1:250,000 sheet areas, i.e. B.M.R. Dobbyn 2 refers to the second shallow hole drilled by B.M.R. in the Dobbyn 1:250,000 sheet area. Localities of the Cloncurry and Dobbyn holes will be shown on the Preliminary (1970) and Second Editions of these sheets. The position of B.M.R. Richmond 3. will not appear on the First Edition of the 1:250,000 geological map as it is already in press. Grid references given in the descriptions of individual holes refer to the Australian 10,000 yard grid. Approximate locations are shown in Fig. 1.

B.M.R. Dobbyn 1. (Figure 2)

Position: DOBBYN. Grid Reference 310595, 18 miles N.E. of Kamileroi Station, 5 miles west of Julia Creek - Normanton road. Spudded into weathered Allaru Mudstone.

Objectives:- (a) to delimit the northern extent of the Boomarra Ridge.

(b) to obtain lithological information in the absence of surface exposure.

(c) to determine the depth of the Kamileroi Limestone and obtain core thereof.

(d) to obtain fresh core of Allaru Mudstone, and Blackdown and Gilbert River Formations for palynology.

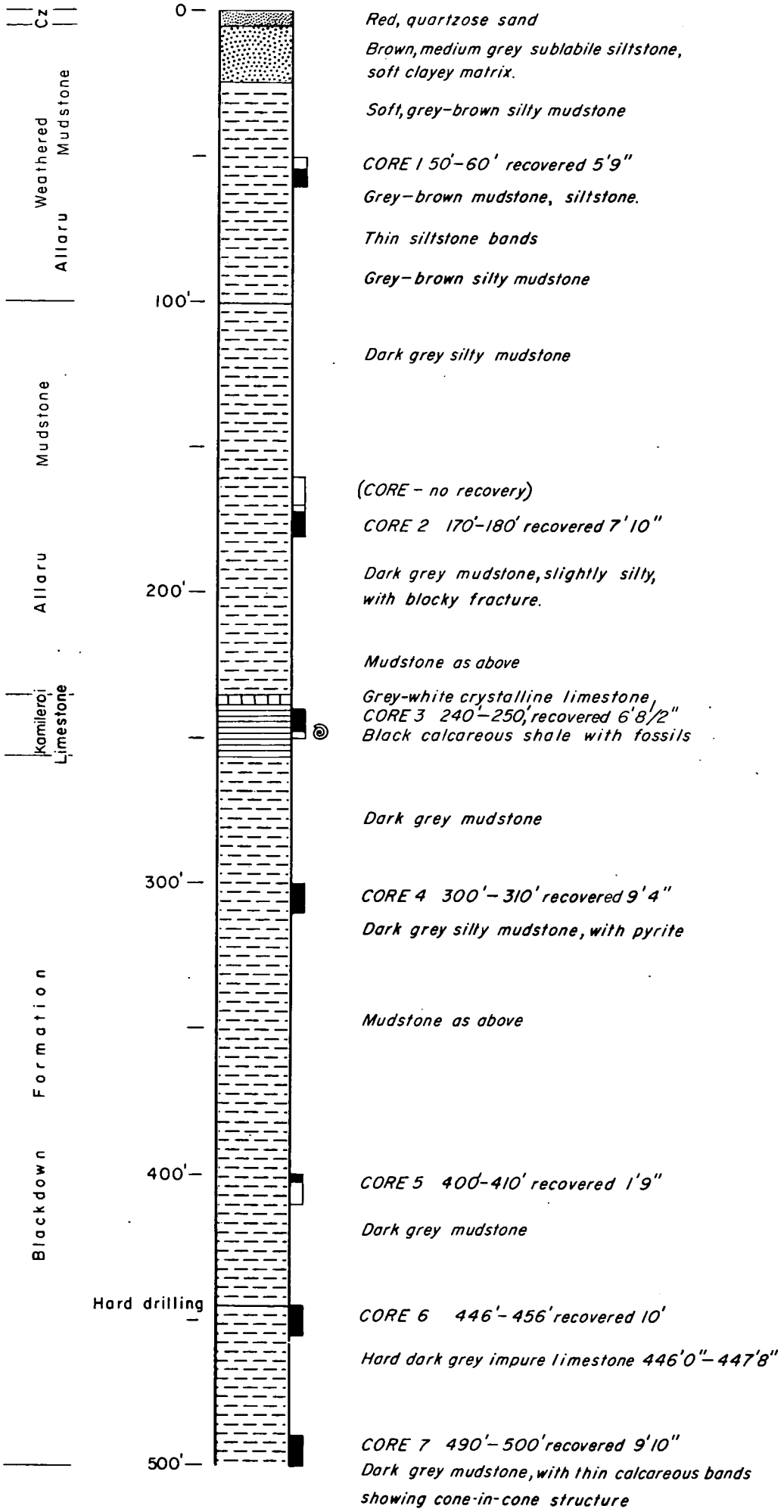



Fig. 2 B.M.R. DOBBYN 1

To accompany Record 1970/38

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At the time the hole was drilled, no information regarding formation thicknesses was abailable; in view of subsequent data from gamma ray logs, it is now evident that it was impossible to achieve all the objectives in a 500' hole.

Drilling: Drilled with air to 80' at which point the compressor broke down and drilling was continued with mud. Drilling in the mudstones was slow as the formation swells considerably when wet. No water was encountered.

Results: 0'-100' weathered zone of Allaru Mudstone: grey brown siltstone and mudstone, some sandstone. Becoming greyer with depth.

100'-235' Allaru Mudstone: dark grey silty mudstone with blocky fracture.

235'-256' Kamileroi Limestone: hard, grey-white crystalline limestone, 235'-238'; remainder fossiliferous black, calcareous shale.

Skwarko (pers. comm.) reports numerous fragments and tests of Inoceramus spp. and Aucellina hughendenensis from Core 3 (240' 0" - 250' 0").

Age: Upper Albian

Burger (pers. comm.) did not find any pelynomorphs in Core 3. Work on other cores is yet to be done.

256'-500' Blackdown Formation: dark grey silty mudstone with scattered thin, hard, limey bands, commonly with cone-in-cone structure.

Basement was not reached and the exact depth to basement is uncertain, but assuming the Blackdown Formation to be 500' thick, and the Gilbert River Formation up to 100', basement (the northern end of the Boomarra Ridge) would be at 800'-850'.

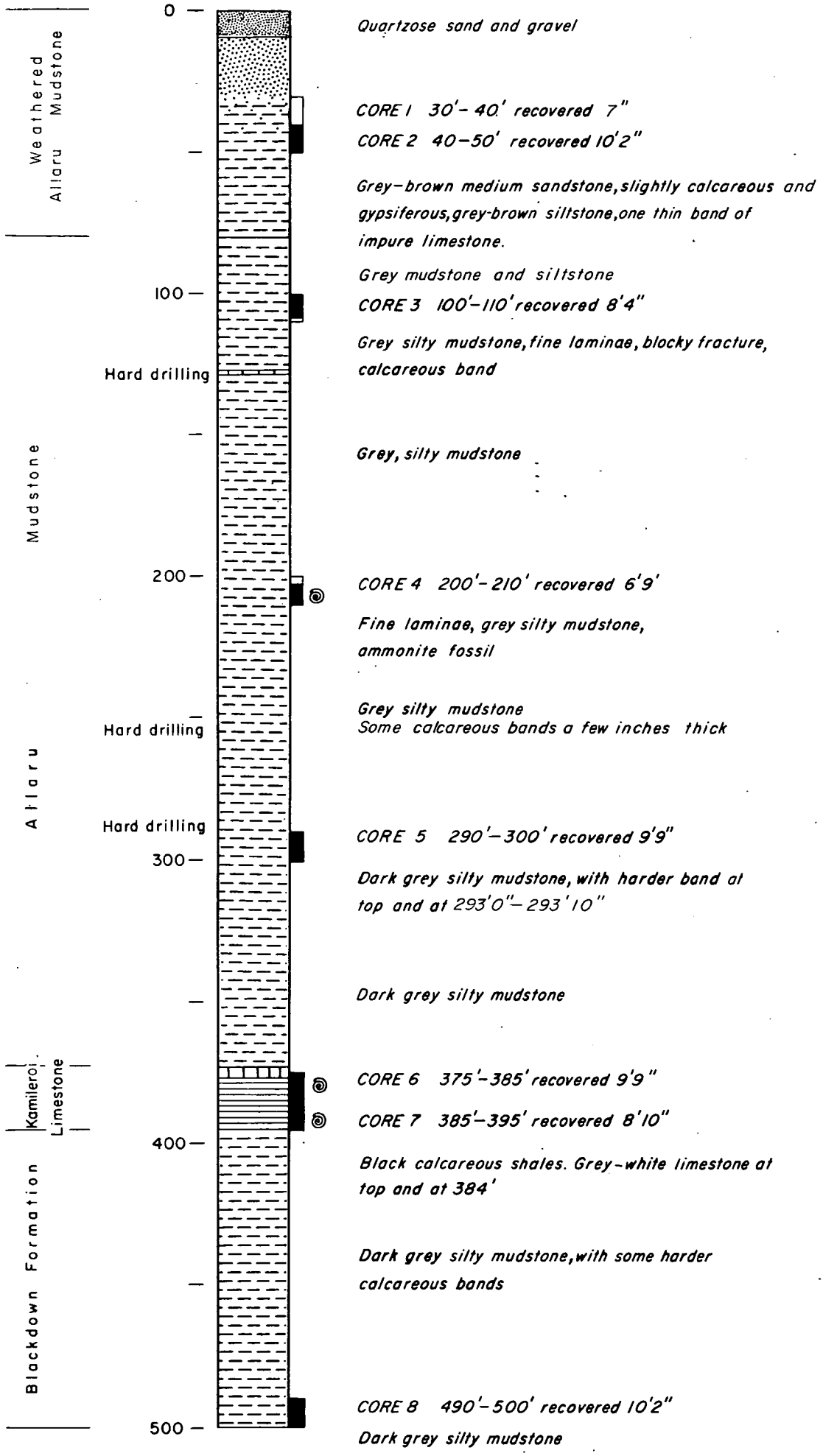


Fig 3 B.M.R. DOBBYN 2

To accompany Record 1970/38

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B.M.R. Dobbyn 2. (Figure 3)

Position:- DOBBYN Grid Reference 328524. 200 yards east of Cloncurry-Normanton road, on road to Melinda Downs Hs. Spudded into Allaru Mudstone.

Objectives:- (a) To test the hypothesis that the eastern margin of the Boomarra Ridge is a post-Mesozoic fault.

(b) To obtain core of the complete Kamileroi Limestone for petrographic and palaeontological studies.

(c) To obtain core of the Gilbert River Formation

To obtain maximum benefit of the drill's 500' depth limitation, the hole was sited as close to the position of the inferred fault as possible.

Drilling:- Drilled with air to 200'. Water injection was then tried but compressor capacity was inadequate and drilling was continued with mud. Formation swelling caused jamming of the drill pipes, so much time was spent reaming and conditioning the drilling mud. No water was encountered.

Results:- 0'-80' weathered Allaru Mudstone; sandstones and siltstones.
80'-373' Allaru Mudstone: dark grey silty mudstone, with blocky fracture. Some siltstone occurs in upper portion. Scattered calcareous bands up to 3' gave harder drilling. Core 4 (200' 00"-210' 00") contained at least one species of Inoceramus, indicating Lower Cretaceous age (Skwarko, pers. comm.).
373'-395' Kamileroi Limestone: consist of:-

| | | |
|---|---|---|
| hard grey/white crystalline limestone | 2'0" | (not cored) |
| hard grey/white crystalline limestone | 2'0" | Cores 687 375'-395 |
| black calcareous shale, with fossils | 7'3" | |
| hard grey/white crystalline limestone | 0'7" | |
| black calcareous shale with fossils | 10'0" | |
| Total thickness of Kamileroi Limestone | 21'10" | |

The lower band of crystalline limestone appears to be the concretionary horizon often seen in outcrop.

395'-500' Blackdown Formation: dark grey silty mudstone, with some calcareous bands which gave harder drilling.

Basement was not reached by this bore, but by comparison with adjacent water bores, subsequently logged, it should lie at about 550' below the Kamileroi Limestone, i.e. at 900'-950'. As basement is around 100' in bores a few miles west, with no outcrop of Kamileroi Limestone in the vicinity, the presence of a fault is the best interpretation.

B.M.R. Cloncurry 1. (Figure 4)

Position:

CLONCURRY Grid Reference 363482. 1½ miles north of Clonagh homestead, on the side of Clongah - Illistrin road. Started in Cainozoic sediments.

Objectives:

(a) To obtain structural data on the western margin of the southern part of the Carpentaria Basin.

(b) To determine the depth and thickness of the Toolebuc Limestone.

(c) To obtain lithological and palynological samples of the Allaru Mudstone and Wallumbilla Formation.

(d) To attempt to reach basement and determine the presence or absence of the Gilbert River Formation or its equivalents.

No reliable dip data were available at the time of drilling and the hole was sited one and a half miles basinwards of an outcrop of the Toolebuc Limestone to ensure that this formation was penetrated high in the hole, so as to drill as far as possible below the limestone in an attempt to reach the Gilbert River Formation and/or basement.

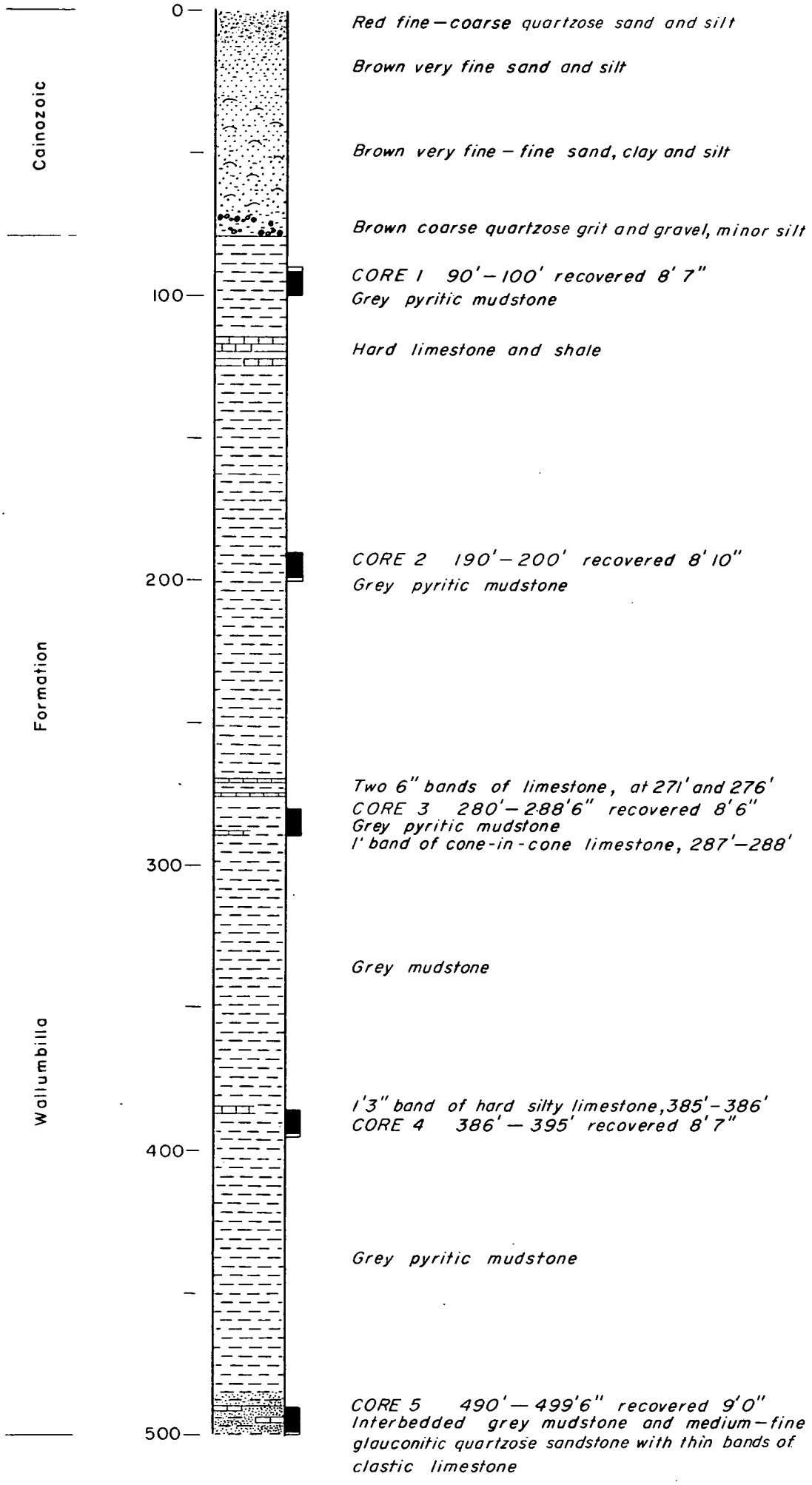


Fig. 4. B.M.R. CLONCURRY I

To accompany Record 1970/38

F54/A2/24

Drilling:

Drilled with air to 55' at which point water was struck in the Cainozoic sediments. The supply was very small but was sufficient to prevent further drilling with air and the rest of the hole was drilled with mud. Mudstone was first encountered at 80' and drilling and coring were slow for the remainder of the hole.

Results:

0'-80' Cainozoic sediments: red and brown fine sand and silt with minor clay. Seven feet of gravel and very coarse sand at the base. Water was first struck at 55'.

80'-499' Wallumbilla Formation:

80'-115' dark grey mudstone with a few belemnite fragments and blebs of pyrite. Palynomorphs are discussed below.

115'-125' bands of white crystalline limestone and hard shale.

125'-485' grey pyritic mudstone with thin beds of hard silty limestone exhibiting cone-in-cone structure. Small and indeterminate shell fragments and a Dentalium sp. were found in core 2 between 193' and 198'10". Some fragments of bivalves and belemnites were found at 282'. No dating closer than Lower Cretaceous was possible from the macrofossils (Skwarko pers. comm.). Palynomorphs are discussed below.

485'-499' sandy member of the Wallumbilla Formation: interbedded grey shale and mudstone with soft, grey, medium to fine grained glauconitic quartzose sandstone, and thin bands of clastic limestone. The core between 490' and 499' contained a number of shell fragments too incomplete for identification (Skwarko pers. comm.).

The Toolebuc Limestone was not intercepted owing to a greater than expected thickness of Cainozoic sediments combined with a low regional dip. The limestone bed between 115' and 125' is tentatively placed in the Wallumbilla Formation as the overlying mudstone contains microfossils regarded by Burger (pers. comm.) as characteristic of the

Ranmoor member of the Wallumbilla Formation (see below). Basement was not reached and its exact depth is uncertain. The sandstone beds at the bottom of the hole (485'-499') are not considered to be part of the Gilbert River Formation but are correlated with a thin sandstone interval found within the Wallumbilla Formation in neighbouring water bores.

Palynology:

Palynological investigations of the cores are being carried out. Burger (pers. comm.) reports that Core 1 at 99'5" contains microfossils belonging to the ?K1d spore unit which he considers to be not younger than the lower Ranmoor, Core 2 at 190'01" contains microfossils of the K1d spore unit of lower Ranmoor age, and Core 4 at 387'8" contains Dingodinium cerviculum which is found in the Doncaster and Jones Valley members. All the assemblages are marine.

B.M.R. Cloncurry 2. (Figure 5)

Position:

CLONCURRY Grid Reference 376399., three quarters of a mile north of the Cloncurry - McKinlay road. 5 miles west of Wynberg Homestead. Started in gravelly black soil.

Objectives:

(a) To determine whether the Gilbert River Formation pinches out at the basin margin.

(b) To obtain lithological and palynological samples of the basal Cretaceous sediments in the area.

To ensure that basement was struck within the range of the drilling rig, the hole was sited as close to the Precambrian outcrops as was feasible in order to penetrate a useful thickness of Cretaceous sediments.

Drilling:

Drilled with air to 60'. The interval from 50' to 60' consists of a soft dry sand which caved badly and the driller changed to mud in order to prevent further caving.

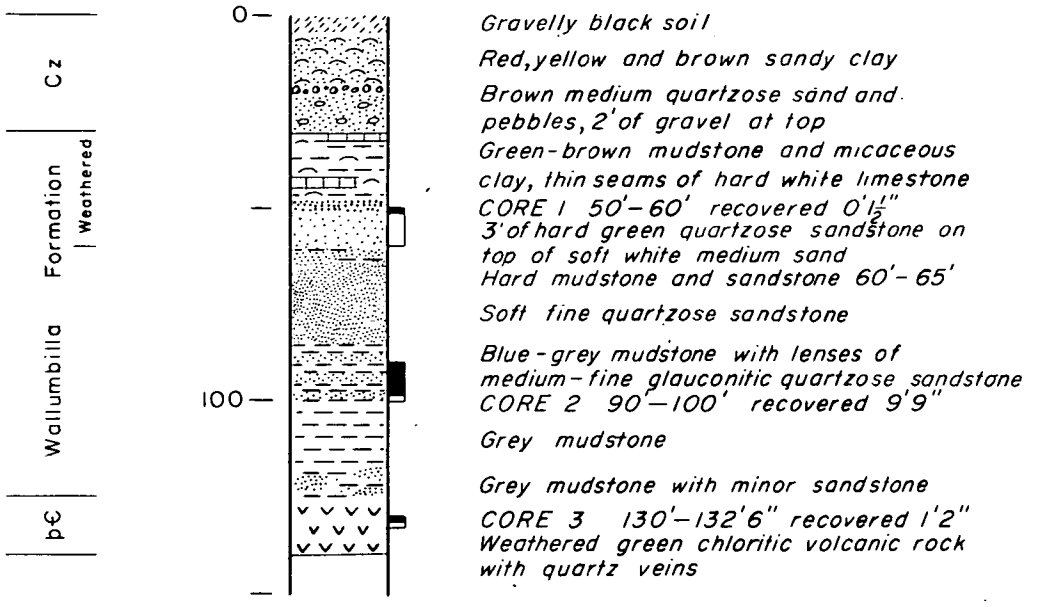


Fig 5 B.M.R CLONCURRY 2

Results:

0'-29' Cainozoic sediments: red, brown and yellow sandy clay and brown sand and gravel.

29'-125' Wallumbilla Formation:

29'-48', 19' of weathered green - brown micaceous mudstone with thin seams of hard white limestone.

48'-85', 37' of soft, white, fine to medium grained quartzose sandstone with minor beds of harder mudstone.

85'-100', 15' of grey mudstone with bands of glauconitic quartzose sandstone. Microfossils recovered from Core 2 at 96' are of spore unit K1 b-c and Dingodinium cerviculum dinoflagellate zone generally found in the lower half of the Wallumbilla Formation (Doncaster Member) (Burger, pers. comm.).

100'-125', 25' of grey mudstone with minor sandstone.

125'-140' Precambrian: weathered volcanic rock, with quartz veins.

No water was struck in the bore. The 37' of quartzose sandstone is assumed to be within the Wallumbilla Formation as there is a 40' sequence consisting mainly of mudstone below it. The Gilbert River Formation appears to be absent and must therefore pinch out to the east of the stratigraphic hole.

B.M.R. Richmond 3. (Figure 6)

Position:

RICHMOND Grid Reference 679458, 6 miles southeast of Coalbrook Homestead, beside the Richmond - Stawellton road. Started in weathered Wallumbilla Formation.

Objectives:

(a) To obtain palynological samples for age determination of the sandstone sequence below the Wallumbilla Formation.

(b) To correlate the subsurface sequence with the units outcropping to the north.

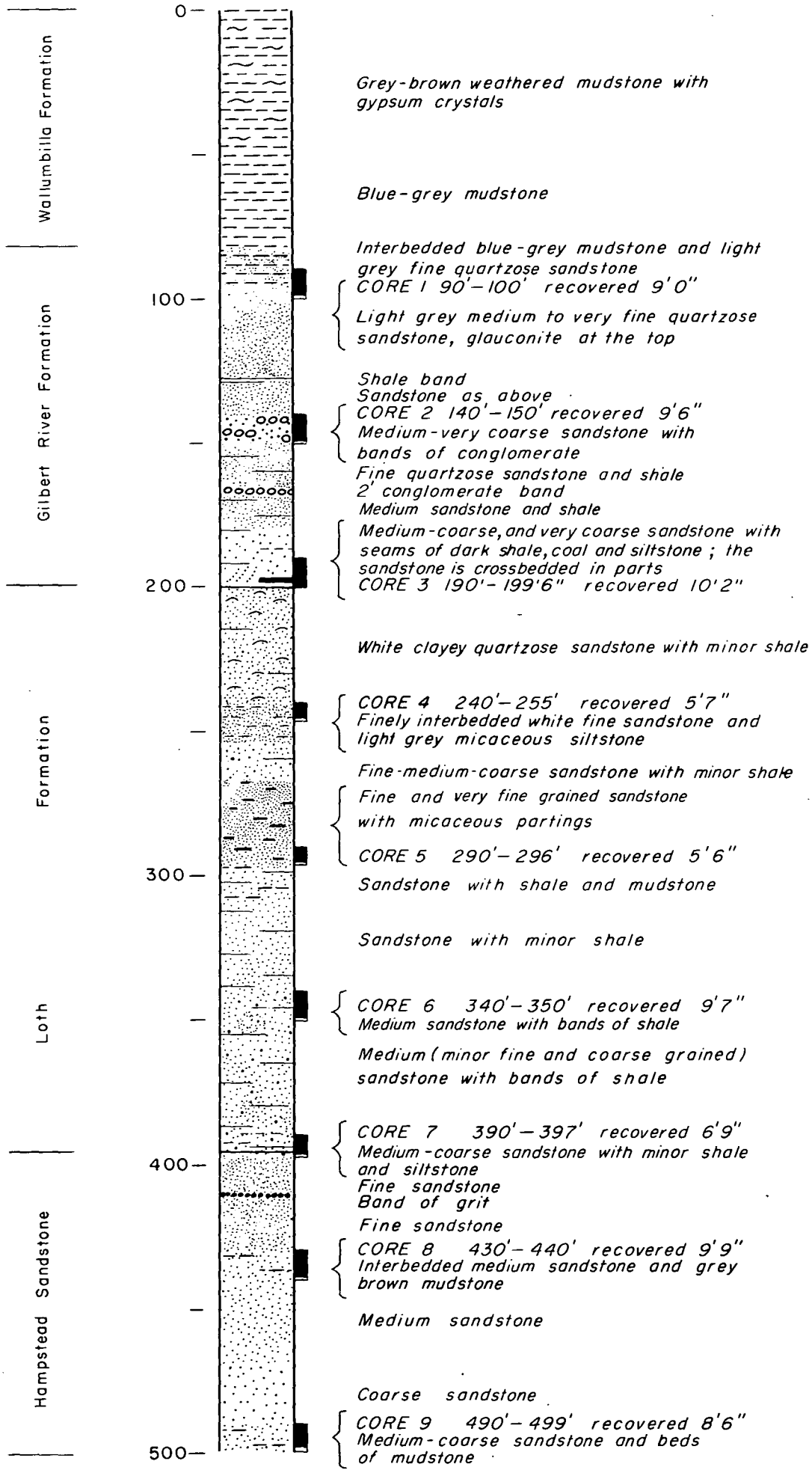


Fig.6. B.M.R. RICHMOND 3

To accompany Record 1970/38

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The hole was sited to obtain sufficient Wallumbilla cover to ensure that the top of the sandstone was unweathered and therefore suitable for palynological sampling.

Drilling:

Drilled with air to 380'. Water was first struck at 140' and the supply increased with depth. The air compressor was unable to lift the water below 380' and the remainder of the hole was drilled with mud. It was necessary to thicken the mud periodically owing to dilution from aquifers.

Results:

0'-83' Wallumbilla Formation: the upper 50' consists of grey-brown weathered mudstone with gypsum crystals. The remainder is composed of fresh blue-grey mudstone.

83'-200' Gilbert River Formation: 117' of light grey, coarse to medium, and fine quartzose sandstone with polymict conglomerate beds, and minor shale and coal beds. Crossbeds are present in one core. The uppermost 10' is interbedded with dark grey mudstone and contains minor glauconite. It is probably transitional with the overlying Wallumbilla Formation. Palynological investigations suggest that the age of this upper part of the formation falls into the upper K1a and the K1b spore units, and indicate a marine environment of deposition (Burger pers. comm.). No palynological data is available for the rest of the Formation.

200'-390' Loth Formation (Smart et al., in prep.; = Unit Jb of Vine, 1966): 190' of grey and white fine to medium and minor coarse-grained quartzose sandstone, finely interbedded with light grey micaceous siltstone and shale. Palynological determinations at 240' and 347' show the formation is in the upper J5-6 spore unit.

390'-500' Hampstead Sandstone (Smart et al., in prep.; = Unit Ja of Vine, 1966): 110+' of grey, medium to coarse, and fine grained sandstone, grit, and interbedded grey-brown mudstone. Microfossils belonging to the J5-6 spore unit are present at 437' (Burger pers. comm.).

Basement was not reached, and only the upper part of the Hampstead Sandstone was penetrated. Based on correlations with sections to the north, basement is probably at a depth of 750' or greater.

The water supply (using air lift by the rig's compressor) was estimated at 360 gallons per hour at 215', 420 g.p.h. at 240', 510 g.p.h. at 340', and 1,300 g.p.h. at 348'. No estimates of supplies were made below 380' as mud was used for drilling this section of the hole.

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VINE, R.R., 1966 - Recent geological mapping in the northern Eromanga Basin, Queensland. APEA J., 1966, 110-115.