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Field Summary of the Geology

of the

Barkly Tableland Area

by.

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A FIELD SUMMARY OF THE GEOLOGY OF THE BARKLY TABLELAND AREA.

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The oldest rocks found in the area are Pre-Cambrian, and the youngest are Recent but on the whole the area is one of great stability and not many of the periods of geological time are represented.

The Pre-Cambrian are found outcropping round the edge of the basin and for simplicity in field work, have been divided into five, although many of these will probably be placed in the one group later when further correlation has been done. The five divisions are :-

a. Tennant Creek.
b. MacArthur R.
c. Buldiva
d. Helen Springs
e. Barkly Downs.

a. Tennant Creek - outcrop at Tennant Creek and continue up the N.S. road to Banka Banka and 17 miles along the E.W. road. The rocks are metamorphosed shales and sandstones giving the purple slates and quartzites. These have been intruded by granitic rocks and veins of quartz and masses of gold-bearing haematite occur. Specimens of the igneous rock were collected at the proposed Dam site and also 40 miles N. of Tennants in a small laterite quarry. These specimens are all very weathered and until microscopic examination is made, the exact nature of the rock cannot be established. The rocks of the area have undergone movement and are now dipping nearly vertically and have a strike approximately E.W. This E.W. strike is a notable feature of the geology of the Tennant Creek goldfield. These rocks are the oldest in the area, probably Lower Proterozoic and equivalent to the Brock's Creek series of last year.

b. MacArthur River - These were found outcropping along the MacArthur River on the traverse from O.T. station to Anthony's Lagoon. They consist of quartzites, sandstones and limestones, generally well-bedded and only very slightly tilted. In earlier years these rocks have been examined by Jensen, Woolnough and Wade, who have placed them in the Cambrian but the Upper-Proterozoic is probably more correct.

c. Buldiva - This group was defined in last year's report, the rocks consisting of well-bedded sandstones and quartzites generally dipping about 10° - 15°. Ripple marks were rather common showing the shallow water origin of the sediments.

d. Helen Springs - Well illustrated at the turn-off to Helen Springs from the N.S. road, they outcrop along the N.S. road forming many lines of parallel ridges, one of which is the Ashburton Range. The northern limit is a few miles passed the Newcastle Waters turn-off at the Causeway where the topography levels out to the very gently undulating plain. The rocks are sandstones and quartzites, some very well bedded and showing current bedding but most of the outcrops have been severely laterised and now belong to the ferrugnious or mottled zone and silicification has occurred in many places making it difficult to distinguish between a quartzite and a billyised sandstone. The strike is N.S. and the average dip is 10° - 30° W. although steeper in some places.

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e. Barkly Downs - To the east of Barkly Downs homestead, the Pilpah Range consists of quartzites and sandstones, well-bedded and very gently dipping, with numerous ripple marks very evident. These quite possibly belong to the Mt. Isa series which itself would probably be correlated with the Buldiva Group.

The last four areas to be mentioned have very similar rock types and probably will all come under the Buldiva group of Upper Proterozoic age. In the Helen Springs area and further north outcrops of volcanic rock are found at the Helen Springs homestead the volcanic rock seems to be interbedded with the sandstones thus giving it an age of Upper Proterozoic. However the age of these volcanics, which also outcrop further north in the area surveyed last year, has been doubtful but they were placed in the Lower Cambrian, so that a detailed survey of this area may establish their age beyond doubt. Other outcrops were found at Huckadee Bore and a few miles west of Hutwood Downs homestead. The hand specimens seen to indicate a range from basalt to porphyrite but further work in the laboritory will be done on these specimens.

The Pre-Cambrian sediments were then uplifted and exposed to a cycle of erosion to form a basin which in Cambrian time formed a transgressive sea in which the Cambrian marine deposits of limestone, sandstone and shale were laid down.

The lowest known Cambrian sediments were very fossiliferous limestones of Lower Middle Cambrian, containing trilobites, brachiopods, pteropods and bolomites found in various places such as Bore 4 alroy, on the road between Soudan and Ranking, on the E.W. road 25 mile W. of Camooweal and on the Rankine River south of Avon. Probably many new species of trilobites were found, however all fossils will be examined and named later.

Upper Cambrian sediments were probably also seen, such as the brown and cream crystalline limestones at Corari Creek, the sandstones at Barrie's Caves, and the sandstones at 7A Bore and Anthony's Lagoon. Some of the sandstones mentioned may be found to be Mullaman residuals.

The two Cambrian basins, i.e. the Katherine and the Barkly Tableland do not seem to be connected but separated by a divide of Pre-Cambrian running E. of Dunmara and outcropping at such places as Rock Hole and Maranboy.

After the Cambrian sediments were laid down the sea receded and for a long time (right through the Paleozoic and part of the Mesozoic) this area seems to have been a low stable land surface draining northwards. However sometime before the Mullaman, there must have been some faulting or warping in the centre so that the sediments could be eroded down to the Middle Cambrian at Alroy and Soudan whilst Upper Cambrian still remained at Corari Creek and other places. Also the occurrence of Cambrian cherts outcropping at Government Bore 6, and then at Bore 7A the driller recording 185' of sandstone before reaching limestone needs explaining. Seem to be two possible ways at the present time. 1. Faulting in the Cambrian. 2. Was the site of a large Post-Cambrian valley in which Cretaceous sediments were deposited later at a lower depth topographically than the existing Cambrian on the banks.

The next change from the stable land surface came in Upper Jurassic or Lower Cretallous when lacustrine conditions existed and fresh water sediments of the Lower Mullaman were

laid down, mainly sandstones and shales and possibly some limestone. Some of the sandstone outcrops are extremely rich in plant fossils, specimens being collected from an outcrop of silicified sandstone five miles south of Cresvell homestead and from an outcrop of billyised sandstone and coarse friable sugary sandstone or fine grit at the Causeway, a few miles north of Newcastle Waters.

Then towards the end of the Lower Cretaceous, a small warp must have occurred to form the Dunmara-Walhallow divide which would give rise to the internal drainage basin now existing and would also account for the absence of the Upper Mullaman marine beds such as those exposed round Darwin. Then during Upper Cretaceous, Eocene, Oligocine and Miocene, the land was fairly stable, with slight dissection but no sedimentation.

The pluvial period of the Pliocene brought about laterisation of the exposed rocks and because of the internal drainage, much of the area would be lakes, with laterites forming on the protruding ridges. The lime leached from the laterite profile would collect in the lakes and also would expect a certain amount of alluviation such as the heavy grey soil found in small areas round dunmara. Then as the rainfall decreased the lakes would dry out, the concentration of lime becoming greater until when the lakes are more channels, the limestone would be deposited, thus the occurrence of the Pliocene limestone round the present day water-ways.

A repetition of this probably occurred towards the end of the Pliocene, giving a second laterisation, a source for the silicification of limestones already formed, and the formation of more limestone, possibly containing pebbles of ferruginous laterite as have been found in different places, e.g. the limestones at Alexandria homestead.

Following on came the arid Lower Pleistocene, with the lowering of lake levels and decrease in vegetation which would give rejuvenation of streams and some dissection. Then in Upper Pleistocene another pluvial period which probably gave some limestone, and certainly gave large areas of grey and olive grey alluvial downs especially in the Western portion of the Tableland, probably formed from truncation of the laterites, lime from spings and Pliocene alluvium.

Since Pleistocene the rainfall has fluctuated, but on the whole, decreased, recent limestones from springs have been formed in small basins, the topography has continued with some dissection and some deposition of alluvium in present day swamps which now form the blue-bush and coolibah lakes.

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Katherine.
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Relation of Rocks to Soils in Barkly Tableland Area.

1. Pre-Cambrian Rocks.
   Skeletal sandy soil, also truncated laterites.

2. Cambrian rocks.
   Grey pebbly group, grey brown pebbly downs, also trunc. lats.

3. Mullaman.
   Lateritic residuals (lat. flats and lat. pods,) and tunc lats, and N. of Top Springs a heavy grey rolling downs.

4. Pliocene limestones.
   Cap downs (i.e. lime on surface)

5. Alluv. Pliocene.
   Heavy grey soil such as in small area near Dunmara.

6. Alluv. Pleistocene.
   Grey and olive grey alluvial downs - f.n.f.

7. Recent.
   Grey soils with lime to surface; Coolibah and bluebush vegetation.

Also get desert loams on Tert. limestones, and desert loams and grey bmown downs on volcanics.
Light textured alluv. deserts in Pleistocene and Recent.