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DISCOVERY OF FOSSILIFEROUS UPPER CAMBRIAN IN

CENTRAL AUSTRALIA

by

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RECORDS 1952/17.

In October, 1951, geologists G.F. Joklik and S.A. Tomich from the Harts Range party of the Commonwealth Bureau of Mineral Resources inspected the section along the Ross River in the Fergusson Ranges fifty miles east of Alice Springs. They collected fossils from several localities discovered by C.T. Madigan (1932a), who had regarded the higher fossiliferous horizon as basal Larapintine. He describes the rocks as "worm-eaten quartzite, with moulds suggesting Isoarca" and remarks that 'no good fossils were found'. It is this bed that has yielded the Upper Cambrian fossils.

Fossils collected in the deeper horizon generally confirm Madigan's observations.

For better orientation the section from Madigan along the Ross River is reproduced as Fig. 1 in this report (p.72), and in addition the fossil localities mentioned in this report are marked.

UPPER CAMBRIAN - ROCKS, FOSSILS AND AGE

Loc. No.1 East Bank of Ross River (about 5 miles south of Love's Creek Homestead) (Fig.1). The rocks at Loc. 1, Eastern Bank of Ross River correspond to those marked in Madigan's Section as "Lapapintine (Ordovician), No.4 Quartzite", which also outcrop on the west bank (Loc. No. 1 West Bank). The fossils were collected on the north-western slope of the hill. The rock is a well-bedded, laminated, fine and evenly grained, white and grey quartzose sandstone. It is so rich in fossils that the term coquinoid sandstone seems appropriate. Shales seem to be interbedded.

FOSSILS

Trilobitae:

Dikelococephalus sp., several cranidia
Prosaukia (Fam.Dikelococephalidae) sp., abundant
Dikelococephalidae gen. indet. very large fragments with smooth test.
Dikelococephalidae, gen. indet. very large fragments with axial spines and tuberculate test.
Burnetia sp. (or related genus), one cranidium
Several small forms, of various families, amongst them a genus of Menomonidae(?)

Lamellibranchiata: Two undescribed genera (Fam.Nuculidae), one is very abundant and has been observed by Madigan ("Isoarca")

Gastropoda: One raphistomid form.

Annelida: Diplocraterion ("worm-eaten quartzite" of Madigan)

Most probable the trilobite species are all new, and more material is needed for an adequate description. The age of the fauna is, generally speaking, Middle Upper Cambrian.

(Franconian, in American terms). The genus Burnetia has in America a Lower Franconian age, whereas Dikelocephalus is more common in the Upper Franconian. The species of Prosaukia occur mainly in the Upper Franconian.

Of course, instead of Dikelocephalus the genus Tellerina may be present here, but this can only be decided from pygidia, which are not yet collected.

Loc. No. 1 West Bank of Ross River (about 5.5 miles south of Love's Creek Homestead). As explained under Loc. No. 1, East Bank, the rock has been designated by Madigan as "Larapintine (Ordovician), No. 4 Quartzite". It is a yellow to off white, laminated, very fine-grained, comparatively soft sandstone.

FOSSILS.

Trilobitae: Calvinella sp. (Fam. Dikelocephalidae), abundant. Loganellus sp. (or related genus, same family) three cranidia.

Dictya, or a new genus related to Dictya, abundant.

Brachiopoda: Billingssells n.sp., numerous

The age of the fauna is relatively high in the Upper Cambrian. Calvinella is a genus which in U.S.A. follows Prosaukia in time. Dictya Kobayashi (1955) is also an Upper Upper Cambrian genus.

Stratigraphical relationship of the two Upper Cambrian faunas. No common genera occur in the collections from Loc. No. 1, West Bank, and Loc. No. 1, East Bank. Each locality represents a separate horizon. If the American succession of Upper Cambrian dikelocephalid trilobite genera is applicable in Australia, it seems that the fauna of the East Bank of the Ross River is stratigraphically the older, being of a Middle Upper Cambrian age. The fauna of the West Bank, with Calvinella, may be regarded as Upper Upper Cambrian. The following table explains the relationship.

Upper Cambrian in U.S.A. (simplified)		Ross River Section	
Stages	"Zones"	Range of Fossils	
Upper Trempealeauian		Position of Range of <u>Calvinella</u>	Sandstone with <u>Calvinella</u> , Loc. No. 1 West Bank
Upper Cambr. Trempealeauian		Position of Range of <u>Dikelocephalus</u>	
Middle Franconian		Range of <u>Prosaukia</u>	Sandstone with <u>Prosaukia</u> , Loc. No. 1 East Bank
Upper Cambr. Franconian		Position of <u>Burnetia</u>	
Lower Dresbachian			
Upper Cambr. Dresbachian			

But the order of superposition of the two faunas in the Ross River section is not yet clear enough. The supposed older horizon with Frosaukia on the east bank of the River is about half a mile north of the West Bank locality in the direction of the dip and nearer to the axis of a syncline. In contradiction to the fossil evidence the East Bank fauna may therefore be the younger.

On the other hand, the air photograph suggests a disjunctive structure, perhaps a shear thrust, separating the localities one from another, and trending for several miles north-east. This structure may be the cause of the contradiction above. Evidently to solve the problem more field work and fossil collecting is inevitable.

Zoogeographic Relationship. The dikelcephalid fauna of the Ross River is typically "Pacific", or Appalachian, and can be compared with the development in the Mississippi Valley where the fauna is of course very rich. Elements of this fauna occur in eastern Asia and may be expected in northern Tasmania. Two genera from the Ross River still deserve a special attention. One of them is Loranellus, as yet recorded only in eastern Canada. The other genus is Dictya, known from the higher beds of the Upper Cambrian in eastern Asia. But the Ross River form differs in many aspects from the typical forms of Dictya and is perhaps a separate new genus of the group.

THE PROBLEM OF LARAPINTINE OEDOVICIAN IN THE ROSS RIVER BASIN

In the Ross River section no Ordovician is present, the youngest bed being Upper Cambrian. Madigan (1932a, p.103) regarded this Upper Cambrian as the base of the Larapintine series, pointing out quite correctly (e.g. p.102) that the structure of the Fergusson Ranges is synclinal, with Larapintine remnants in the middle of the syncline (or synclines). This structure has been confirmed by Voisey (1939). From the airphotographs available the presence of thousands of feet of sediments above the Upper Cambrian Ross River sandstone in the synclinal cores is obvious. How much of them is Upper Cambrian, how much may be Tremadocian, and whether there is Larapintine Ordovician present, is a matter for future investigations.

The term "No. 4 Quartzite" used by Madigan in the Ross River section refers to the southern sandstone ridge south of Alice Springs. According to A. Opik (1949) the "No. 4 Quartzite" and the "No. 3 Quartzite" south of Alice Springs are identical in lithology and fossils, being in reality a duplication by strike structures. He regards them also as Cambrian. Though a direct correlation of the sandstones in the Western McDonnell Ranges with those in the east is very uncertain, there is still the problem of the presence of Upper Cambrian in the Alice Springs area to be solved.

OLDER CAMBRIAN AT ROSS RIVER.

Below the dikelcephalid sandstone follow oolitic and pisolithic limestones (Loc. No. 2 and 3), but the few hand specimens have no fossils. The age is unknown, the thickness is great. Perhaps they represent the lower part of the Upper Cambrian, about the age of the Lower Upper Cambrian in western Queensland, as described by Whitehouse (1936-1939).

From the lowermost beds of Palaeozoic rocks at Ross River, at Goat Camp (Loc. 4), fossiliferous Cambrian rocks have been mentioned by Madigan. It is now once more confirmed by Joklik's collection. In a specimen of a dark grey limestone, besides abundant cystid oscicles, fragments of two trilobites and a Hyolithus are present. It seems to be Middle Cambrian, comparable with the cystid-bearing Middle Cambrian rocks of the Barkly Tableland. From the vicinity of the Acacia Well, west

of Love's Creek, G.F. Jeklik collected two specimens of a problematical fossil which externally suggests an archaeocyathid. But the section reveals that they are wine-glass-shaped cavities in limestone filled with oolites. No conclusions as to the age and origin are possible, though they resemble structures of possible organic nature recorded from lower Palaeozoic rocks of other countries.

FOSSILIFEROUS PRE-CAMBRIAN

At Acacia Well, seven miles west of Love's Creek Homestead, from a locality previously mentioned by Madigan (1932a) and Howchin (1914), a hand specimen of "Cryptozoon limestone" has been collected. It seems to be a real Pre-Cambrian Collenia and not a Cryptozoon, which has a Cambrian age.

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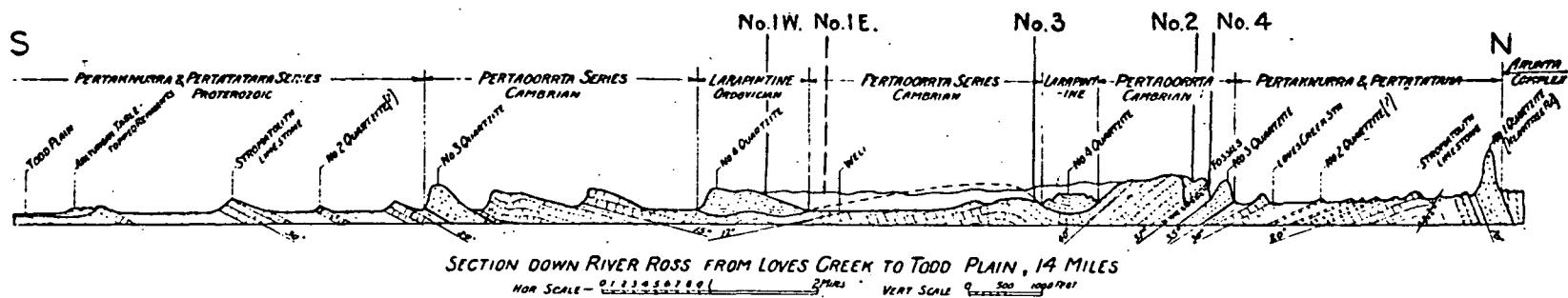


FIG I

Explanation of Fig. i in the Text.

This section is reproduced from Madigan 1932a, p. 72. The author of the present report has marked, in addition, the positions of the localities mentioned in the text by "No. 1 W., No. 1 E., No. 2, No. 3, No. 4", using the plottings, made by C.F. Joklik, on air photographs.