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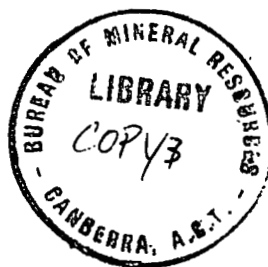
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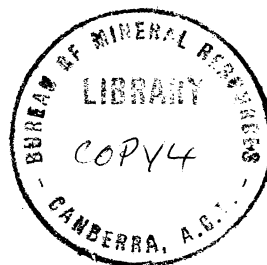
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Progress in the Study of Cambrian Fossils from the  
Northern Territory and N.W. Queensland

by

A.A. <sup>"</sup>Opik

Records-1951/26



MATERIAL

The material being studied consists of large collections made in the Barkly Tableland by members of the Bureau of Mineral Resources, and a selected set of fossils borrowed from the Australian Museum. In addition, a comparatively complete collection from the Ord River and Mt. Panton is available for comparison.

The material does not represent the total area of Cambrian rocks in the north of Australia. No fossils have yet been collected from the Cambrian Daly River Group, and the Cambrian sandstones at Berries Caves, west of Soudan in the Barkly Tableland, are awaiting examination. The Cambrian limestones in the Rankine-Soudan-Camooweal area are known by their fossils superficially only, and the "Georgina Limestone" in western Queensland is practically unknown. South of the Barkly Tableland, between the Georgina River (Lake Nash) and the Stuart-Highway, Cambrian fossils have been collected from two places only. One is 40 miles south-east of Elkedra Station, described by Etheridge Jr.; the other is west of Lake Nash, visited by D.M. Traves 1948. Cambrian reported by Madigan from Loves Creek, east of Alice Springs and the Jarvois/Ranges, remains an open problem. In Western Australia the Cambrian at Carlton also needs more field-work and collecting.

WORKERS

O. Singleton (University, Perth) is studying the trilobites from the Ord River and Mt. Panton. They comprise two species of Redlichia and one species of the genus Xystridura. His material is not part of the collections of the Bureau of Mineral Resources.

Dr. C. Teichert (University, Melbourne) is in charge of the Plaeospongia (archaeocyathids) from the Barkly Tableland collected by D.M. Traves and A.A. Opik. Dr. Teichert is studying the nautiloids also.

J. Veevers (student in the University of Sydney) is working in collaboration with A.A. Opik, Canberra, on Cambrian brachiopods from near Alexandria Station, N.T., with the intention of extending the study over all Cambrian brachiopods from the northern part of Australia.

A.A. <sup>"</sup>Opik (Bureau of Mineral Resources, Canberra) is working on trilobites from the Barkly Tableland, from Gum Ridge, Banks-Banks, and from west of Lake Nash. Besides these he is also studying Cambrian faunas from Carlton (W.A.) and Tasmania (Banks).

PRESENT STATE OF RESEARCH DONE BY A.A. OPIK

A.A. Opik works on the following problems and papers for publication:-

1. A monograph on the trilobite genus Xystridura.
2. The Middle Cambrian age of the Redlichia fauna in the north of Australia.
3. Middle Cambrian fossils collected by D.M. Traves west of Lake Nash.

Fossils which will be described in these papers are now photographed; 210 photographs have been made. Literature has been studied nearly exhaustively, and the work of diagnosing new forms is making good progress.

Further papers are planned, and the study is going on. The will represent:-

4. A monograph of Australian Pagetia, their anatomy and ontogeny. The material is selected, separated from the matrix, put in order, and diagnosed in a preliminary way. The next step will be photographing and preparation of illustrations. About 60 single photographs are needed. To finish this paper a study of the material in the Australian Museum will have to be made also.
5. A revision of the Cambrian sequence in northern Australia, with a description of new fossils. It will consist mainly of a discussion of the position of the Split Rock Sandstone and its fauna.
6. Palaeogeography of the Australian Middle Cambrian.

PARTICULARS OF THE PAPERS PLANNED

1. A monograph of the trilobite genus Xystridura. This must be done first because the names of new species are needed for further fossil lists, and for stratigraphical, as well as palaeogeographical considerations.

Previously two species of Xystridura have been described. They are X.saint-smithi (Chapman) from Queensland and X.browni (Etheridge). The existence of a third species in the Redlichia Beds in Queensland is mentioned by Whitehouse, and C. Teichert records X. cf. saint-smithi from Mt. Panton.

Now ten distinct species have to be described. In the Northern Territory two of them belong to the Redlichia Beds, three to the next stage (Alexandria Beds), and one to the top of the Alexandria Beds. None of these six species occurs in Queensland, where three other species occur in the "Templeton Series" not counting the form from the Redlichia stage mentioned by Whitehouse, which I have not yet seen. The tenth species is the one from the Redlichia Beds of Mt. Panton at the western border of the Northern Territory.

For two species, X.browni and X.saint-smithi, the complete ontogenetic development from late protaspis to the holaris stage will be described and illustrated. The meraspid stage of Xystridura can be compared with Lower Cambrian adult olenellids of the genera Paedeumias and Elliptocephala. Xystridura browni in accordance with Etheridge Jr. and contrary to the concept of Whitehouse has no anterior facial sutures and is by this peculiarity "an integricephalid olenellid" trilobite. The suture of X.browni is obliterated in the early meraspid stage. These observations are positive evidence that the olenellid cephalic pattern represents a specialization, and that the olenellids themselves are not "primitive" at all. As the obliteration of sutures occurs independently in different trilobite families, it is now of no importance for establishing higher taxonomical units. The orders "Integricephalida" and "Suturicephalida" are thus artificial units.

The genotype of Xystridura is Olenellus browni Etheridge, known as yet from a single incomplete head shield (fig. 1). In fig. 2 is given a reconstruction of Xystridura browni based on the new material. Obviously Xystridura is nearest to Centropheura Angelin or Anopolemus Salter.

## 2. The Middle Cambrian age of the Redlichia fauna in the North of Australia.

In Persia, India, Manchuria, Korea, Indo-China, and Australia (i.e. in south and east Asia and in Australia), the oldest known Cambrian fauna is characterized by the presence of the trilobite Redlichia. Because 1. the Redlichia fauna in this region is followed by well-established Middle Cambrian faunas, 2. no older faunas are known from the region (except Korea), and 3. Redlichia has been considered a primitive type, most palaeontologists postulate an Upper Lower Cambrian age for Redlichia. This is the current interpretation in Australia also. Only King, working with Persian collections, claims an early Middle Cambrian age for this stage. In the Northern Territory (Gum Ridge, Owen Hills) Redlichia has been considered a primitive type, most palaeontologists postulate an Upper Lower Cambrian age for Redlichia. This is the current interpretation in Australia also. Only King, working with Persian collections, claims an early Middle Cambrian age for this stage. In the Northern Territory (Gum Ridge, Owen Hills) Redlichia is accompanied by the trilobites Pagetia, Peronopsis, Oryctocephalus (?), and the sponge Chancelloria. It is a Middle Cambrian fauna and shows close relationship to the Middle Cambrian of British Columbia, and, though low in the Middle Cambrian, it still does not represent the bottom of it. Therefore the fossils from around Tennant Creek are the first direct and indisputable evidence of the Lower Middle Cambrian age of Redlichia in Australia as well as in south-east Asia.

## 3. Middle Cambrian fossils collected by D.M. Traves west of Lake Nash.

These fossils include two of the species of Xystridura common in Alexandria Beds in the Northern Territory, as well as Pagetia significans (Stth.) and Peronopsis. So the age within the Australian Cambrian fauna is fixed quite well. But together with these forms some trilobites of the Spence Shale (Lower Middle Cambrian) of Idaho and British Columbia occur west of Lake Nash. In other words the fauna from west of Lake Nash is a key for long-range correlations with the Middle Cambrian faunas of very remote places. Of special interest is the occurrence of the trilobite Oryctocara. Only one specimen of this was known previously - from the American Spence Shale. Now it seems possible that the mysterious trilobite Arthrocephalus Bergeron from Indo-China is an Oryctocara also.

## ILLUSTRATIONS

- Fig. 1. Xystridura browni (Etheridge Jr), semi-diagram of the holotype, and the only described specimen, enlarged 6 times. The cracks on the cheeks are described by Whitehouse as anterior facial sutures.
- Fig. 2. Xystridura browni (Eth. Jr.), restored, from several specimens in the Bureau of Mineral Resources, Canberra. As in Olenellus, no anterior branches of the facial sutures exist. The thorax is "Anoplolepis" - like. Note the serrate border of the pygidium and of the posterior pleurae, also the three different pleural terminations. Enlarged twice.

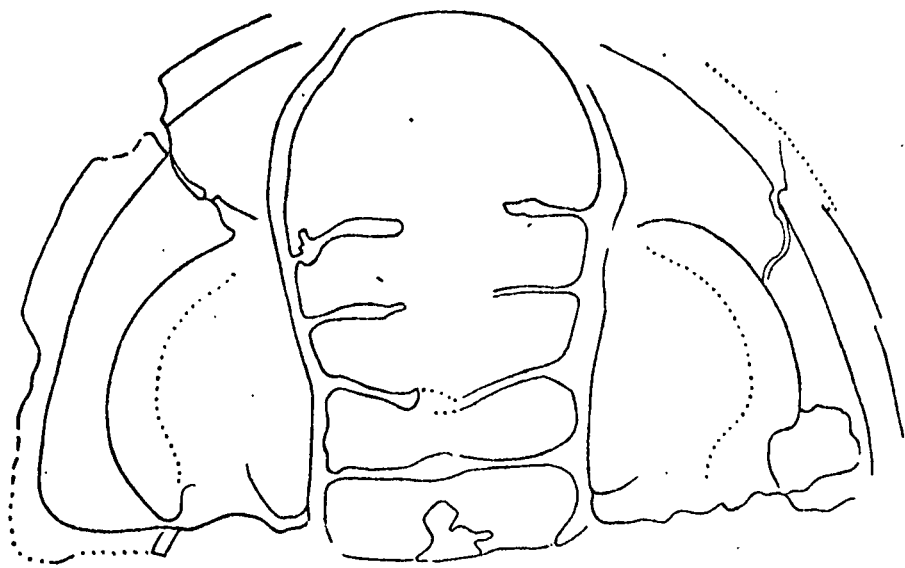


Fig. 1

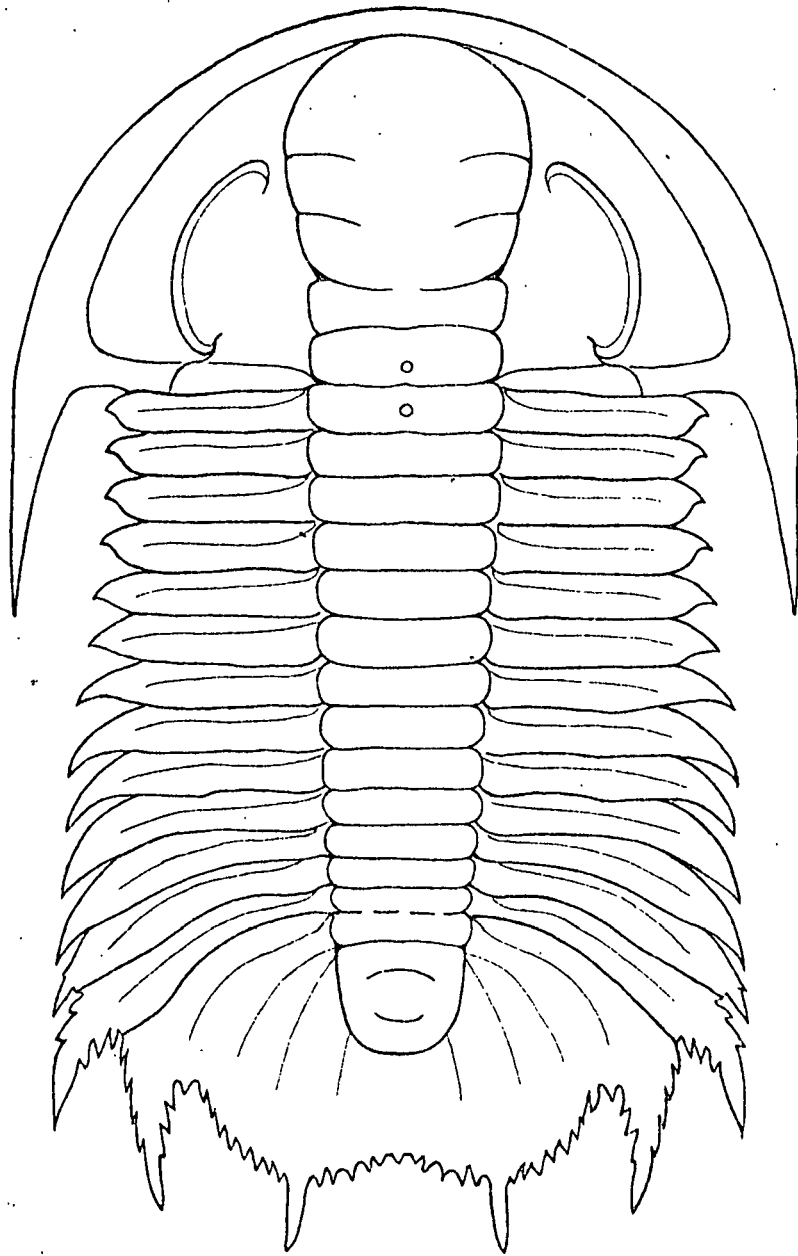


Fig. 2