

## UPPER CAMBRIAN FOSSILS FROM FENGTIEN.

BY Y. C. SUN.

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## INTRODUCTION.

The upper Cambrian of Fengtien was studied by Dr. Andersson who made the following section and kindly permitted me to use it. (Fig. 1) The upper Cambrian rest disconformably upon the pre-Cambrian rocks, which are of Sinian age. Upwards it is succeeded probably with a disconformity by the Ordovician.

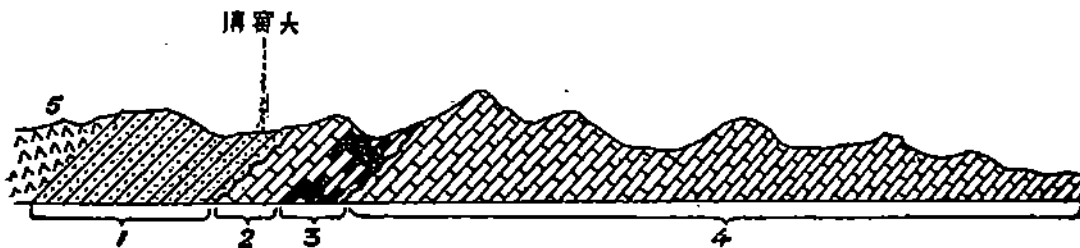


Fig. 1. 1. Carboniferous, 2. Ordovician, 3. Upper Cambrian, 4. Sinian, 5. Igneous rock.  
Section of paleozoic strata of Sha Kuo T'un (沙鍋屯) (Modified after J. G. Andersson)

The upper Cambrian is here a thin-bedded limestone (usually called calcilutite). The most typical fossils are:

## Brachiopoda,

*Eoorthis shakoutunensis* Sun sp. nov.

## Trilobita

*Ptychaspis chinhsihsiensis* Sun sp. nov. (3 Specimens)

*Ptychaspis nodosa* Sun sp. nov.

*Ptychaspis acamus* Walcott

*Ptychaspis cf. campe* Walcott

*Ptychaspis* sp.

*Anomocare leei* Sun sp. nov.

## UPPER CAMBRIAN OF FENGTIEN, CHIHLI AND SHANTUNG COMPARED.

In Shantung, we have Manto shale for the Lower Cambrian, Chang-hia limestone and Kushan shale for the Middle and Chaumitien limestone for the Upper Cambrian. The Chaumitien limestone has the thickness of nearly 500 feet and contains many characteristic fossils. The following species of *Eoorthis*, *Ptychaspis* and *Anomocare* have been recorded by Walcott.

*Eoorthis doris* Walcott

„ *kayseri* Walcott

„ *linnarssoni* (Kayser)

„ *pagoda* Walcott

*Anomocare* sp. undt. Walcott*Ptychaspis calchas* Walcott

„ *callisto* Walcott

„ *calyce* Walcott

„ *campe* Walcott

„ *ceto* Walcott

„ *acamus* Walcott

„ *cadmus* Walcott

„ *baubo* Walcott

„ *brizo* Walcott

„ *cacus* Walcott

It is seen that the upper Cambrian fauna of Shantung is characterized by 4 species of *Eoorthis*, 1 species of *Anomocare* and 10 species of *Ptychaspis*. In Fengtien we also have 1 species of *Eoorthis*, 1 species of *Anomocare* and 5 species of *Ptychaspis*. Two species of *Ptychaspis* are common both to Shantung and Fengtien. (*Ptychaspis acamus* and *Ptychaspis cf campe*.)

It is probable that this formation is the equivalent to Chaumitien limestone in Shantung, the sea in which Chaumitien limestone was deposited covering this part of Manchuria.

But the Fêngshan limestone of Chihli, as I mentioned in previous paper is much younger than this formation, being indeed the highest Cambrian known in China. It contains two new species of *Ptychaspis* (*Ptychaspis suni*, *Ptychaspis subglolosa*.)

The Upper Cambrian fauna from Fengtien is characterized by genera that are well developed in the same fauna in North America. The genus *Ptychaspis* is particularly prominent in species and numbers in the Upper Cambrian both in China and in North America.

CHARACTERISTICS OF UPPER CAMBRIAN FAUNA OF FENGTIEN\*

*Ptychaspis chinhsiensis* Sun is one of the most typical fossil in this formation. It is characterized by moderately convex glabella, narrow fixed cheeks and deep dorsal furrows; the whole surface faintly marked by pustules. This species is represented by 3 cranidia and a few free cheeks associated with them.

*Ptychaspis acamus* Walcott is represented by several glabella and free cheeks. It is characterized by its glabella being moderately convex at the back and strongly convex on the frontal lobe. It is divided by a strong backward arching furrow, which separates the posterior portion as a transverse lobe and the anterior as a large lobe about as long as broad. This species was also found in the Chaumitien limestone of Shantung.

*Ptychaspis nodosa* Sun is strongly pustulated as in *Ptychaspis acamus* Walcott, but it differs from it in having a very pronounced node at the middle of the occipital ring. It also differs from *Ptychaspis walcott* Mansuy\* in the length of the anterior lobe and in having no anterior furrows.

*Ptychaspis cf campe* Walcott is characterized by three pairs of very short and narrow furrows which are joined at the center. I refer it to this species, because the form of our specimen is quite similar to that found in the Chaumitien limestone; but it differs from the latter in the small eye-lobe, in its surface granulation and also in size.

*Anomocare leei* Sun is represented by only one cranidium. The glabella is marked by three pairs of very short and deep furrows, the frontal part regularly rounded; the frontal limb shallow and broad; frontal rim moderately convex, bending downwards. This species is named after

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\*The fossils of this region will be more fully discussed by the writer in "Cambrian Fossils from China", *Palaeontologia Sinica*, Series B, vol. 1, fascle 4. (in preparation)

‡ Mansuy-Faunes Cambriennes de l'extrême-orient méridional Vol. V, fasc. 1, planche V, Fig. 10.

Prof. J. S. Lee of the National University.

*Eoorthis shakuotunensis* Sun is characterized by its transverse form which is usually broader than long; surface marked by rounded radiating ribs and slightly wider interspaces; a few ribs bifurcate. Several species of this genus were found in the Chaumitien limestone of Shantung.

#### CONCLUSION.

The Upper Cambrian beds are characterized by 4 species of *Ptychaspis* and one species of *Eoorthis*, and may represent a part of the Chaumitien limestone of Shantung (late Upper Cambrian), but it is absent in this formation. Unfortunately we have not sufficient materials from this horizon, but we anticipate to make more extensive collections in future. The Fengtien limestone, however, represents a lower horizon than the Fêngshan limestone, as we know *Ceratopyge* was abundantly found in the latter.