A Trilobite with North American Affinities from the Upper Cambrian of Sweden

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ABSTRACT.—*Taenicephalus*? *peregrinus* n.sp. is described from the Upper Cambrian *Olenus* beds in Sweden. It recalls North American genera of the families *Pterocephalidae* and *Paraboli-noididae*, and is regarded as one of the rare occasional invaders into the Upper Cambrian sea of Scandinavia.

Introduction

During an excursion to Västergötland in June 1956, Dr. V. JAANUSSON of Uppsala found a cranidium of an undescribed trilobite in the *Olenus* beds at Trolmen, Kinnekulle. A second, probably conspecific cranidium was collected there by me. This species, described below, is of particular interest because it apparently shows North American affinities and may thus be one of the rare occasional invaders into the Upper Cambrian sea of Scandinavia. The occurrence may be compared with that of *Irvingella*, and of *Drepanura*, described by WESTERGÅRD (1947, 1949), also from the Upper Cambrian of Sweden.

The specimens described belong to the Museum of the Palaeontological Institution of the University of Uppsala (U.M.). I wish to thank Miss B. MAURITZ for taking the photographs, Miss I. LOWZOW for preparing the drawing, and Dr. W. C. SWEET for reading the manuscript.

Description

Genus *Taenicephalus* ULRICH & RESSER, 1924

TYPE SPECIES.—*Conocephalites shumardi* HALL, 1863, by original designation.

Taenicephalus? *peregrinus* n. sp.

Pl. I; Text-fig. 1.

DERIVATION OF NAME.—From Latin: *peregrinus*, foreign.

MATERIAL.—Two incomplete cranidia, U.M. Nos. Vg. 705 (holotype) and Vg. 706.

HORIZON.—Both specimens occur in bituminous limestone (stinkstone), associated with *Olenus gibbosus* and *Agnostus* (*Homagnostus*) *obesus*, and thus belong to the Upper Cambrian zone of *Olenus*, subzone of *Olenus gibbosus* and *Olenus transversus* (cf. WESTERGÅRD, 1947).

LOCALITY.—Trolmen alum shale quarry at the west side of Kinnekulle in Västergötland, Sweden.

DIAGNOSIS.—Resembles *Taenicephalus shumardi* (HALL, 1863), but differs in having wider interocular cheeks, less distinct glabellar furrows, and apparently a smooth outer surface of the test.

DESCRIPTION.—The two known specimens are described separately.

Specimen 1 (the holotype, U.M. No. Vg. 705, Pl. I, Figs. 1–4).

A cranidium with the palpebral lobes and adjacent areas broken off and with damaged anterior border. The specimen is largely an internal mould, but the test is preserved in small areas, chiefly along the posterior border.

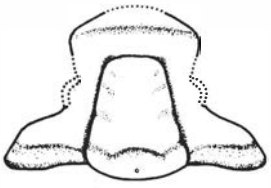

Fig. 1. *Taenicephalus*? *peregrinus* n.sp. Diagrammatic reconstruction of cranidium, based chiefly on specimen 1. Dotted parts of outline from specimen 2. × 1.6.

The cranidium is 21.0 mm wide and 13.0 mm long (restored length about 13.8 mm). The width of the frontal area is slightly more than half the width at the posterior border. The cranidium is of moderate convexity.

The cephalic axis tapers forward, is truncated in front, and has rounded anterior corners. The dorsal furrow is distinct, except in its mid-anterior part. The occipital ring carries a small node. The occipital furrow consists of a rather distinct, anteriorly convex midportion, and two less distinct, straight lateral portions which are essentially parallel to the three pairs of faint, shallow glabellar furrows.

The postocular cheeks are about $^5/_7$ as wide (tr.) as the occipital ring, and the posterior furrow is rather wide and slightly sigmoidal. The palpebral lobes are missing. However, a small incurvation preserved on the left cheek indicates that the palpebral lobe extended posteriorly to a point opposite the distal end of the preoccipital glabellar furrow (S1). The interocular cheeks are damaged, hence their width is unknown except at their posterior border. At this place the width is about $^1/_3$ that of the glabella at the same level.

The depressed and rather flat preglabellar field is about as long (sag.) as the occipital ring. It is traversed by anastomosing genal caeca, which are more or less normal to the anterior furrow and best developed in front of the glabella. There are also two sets of somewhat coarser ridges trending obliquely across

the preglabellar field, one set on each lateral part. The ridges are subparallel within each set, but the ridges of the two sets converge forwards. The anterior furrow is distinct, but is more a bend than a true furrow. The anterior border is elevated and slightly inflated, but is somewhat damaged and does not show the middle part of its anterior outline.

Ornamentation: Minute tubercles were developed on the inner side of the test. However, since only the mould of this surface is seen, these tubercles are represented by pits. Thus the preglabellar field is densely covered by minute pits (Pl. 1, Fig. 4). Similar but less distinct pits are seen on other parts of the cheeks, where they seem to be more widely spaced, except at the dorsal furrow. Furthermore they occur in the occipital furrow. The preserved parts of the outer surface of the test seem to be smooth.

Specimen 2 (U.M. No. Vg. 706, Pl. I, Figs. 5–6).

An incomplete external mould of a cranidium, with the test partly preserved. Length 21 mm.

Except for its larger size this specimen agrees on the whole with the corresponding parts of specimen 1. However, the dorsal furrow appears more undulating at the sides of the glabella and is interrupted by an inflation somewhat behind the anterior corners of the glabella. The left interocular cheek and palpebral lobe and the middle part of the anterior border are preserved in the present specimen. A rather wide inflation trends obliquely across the interocular cheek from the middle of the palpebral furrow to somewhat behind the anterior corners of the glabella. The palpebral lobe is crescent-shaped, and extends from opposite L3 to opposite the distal end of S1. The sagittal length of the anterior border is about $^{5}/_{6}$ that of the preglabellar field.

Ornamentation: This specimen is not as well preserved as the holotype, but there seems to be a fine tuberculation on the inner side of the test in the preglabellar field, corresponding to the pits on the holotype (internal mould). Where the test is missing, the mould of the outer surface appears smooth.

REMARKS.—Since both cranidia are imperfect, only some parts can be compared. Except for some minor differences (e.g. in the appearance of the dorsal furrow), the comparable parts seem to agree rather well. The dissimilarities may be due to difference in growth stage, since specimen 2 is considerably larger than specimen 1. The probability that both specimens belong to the same species is strengthened because they are the only known representatives of this group of trilobites in the Upper Cambrian of Europe, and come from the same horizon and locality.

AFFINITIES.—Although *peregrinus* is apparently related to a group of trilobites common in the Upper Cambrian of North America, it is difficult to assign it with confidence to any particular genus. It recalls members of both the *Pterocephalidae* KOBAYASHI, 1935 (as defined by LOCHMAN, 1956) and the *Parabolinoididae* LOCHMAN, 1956. The glabella and anterior outline of the

cranidium agree rather well with those of the pterocephalid *Aphelaspis*, especially a specimen of *A. walcotti* figured by PALMER (1954, Pl. 84, Fig. 4). Furthermore, the related genus *Dytremacephalus* PALMER, 1954 has an elevation crossing the dorsal furrow somewhat behind the anterior corners, as in specimen 2 of the present species. However, *peregrinus* differs from *Aphelaspis* and related genera in having a rather depressed preglabellar field and a postocular cheek area which is longer (exsag.) and has a more convex lateral outline. In these respects it agrees better with typical genera of the *Parabolinoididae*, as *Parabolinoides* and *Taenicephalus*. However, *Parabolinoides* has smaller and more anteriorly situated eyes and a glabella which is more rounded in front, whereas *Taenicephalus* usually has narrower (tr.) interocular cheeks, tuberculate outer surface of the test, and better defined glabellar furrows. Probably *peregrinus* should be assigned to a new genus, but the material is too incomplete for the erection of one. Consequently, I am assigning it provisionally to *Taenicephalus*, which it seems to resemble more than it does any other genus. It may be significant that some of the species of *Taenicephalus* described by RESSER (1942) have fainter glabellar furrows than the type species, in this respect approaching *T.? peregrinus*, and that some apparently have a smooth outer surface of the test. Futhermore, *T. quinnensis* RESSER, 1942 has even wider interocular cheeks than *T.? peregrinus*, although it differs in other respects. If the *Parabolinoididae* developed from the *Pterocephalidae*, which I believe is possible, the present species may be more or less intermediate between the two families.

Bearing on Correlation

The occurrence of occasional invaders from other faunal provinces can often be of great help in correlation. It is therefore most unfortunate that I have not been able to refer the species with certainty to any North American genus, especially as the correlation between the Upper Cambrian of the Acado-Baltic and North American provinces is as yet uncertain. If the new species is closest to *Aphelaspis*, this would suggest that the *Olenus* zone should be correlated with the *Aphelaspis* zone in the North American sequence. In this connection it is interesting that WILSON (1954) has found an *Olenus* species and *Glyptagnostus reticulatus* (occurring in the *Olenus* beds in Scandinavia) associated with an *Aphelaspis* fauna (including *Aphelaspis*) in Cambrian boulders in the Woods Hollow shale from the Marathon uplift in Texas. If, on the other hand, the present species is intermediate between the *Pterocephalidae* and the *Parabolinoididae*, or closest to the later, the *Olenus* zone might correspond to the *Elvinia* zone (or a part of it, as suggested by LOCHMAN, 1956, p. 447), or even to a part of the *Conaspis* zone. One should not overlook the possibility that the *Olenus* zone may correspond to more than one zone of the Upper Cambrian in North America.

Palæontological Museum, University of Oslo, November 20, 1956.

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Uppsala 1957. Almqvist & Wiksells Boktryckeri AB

Plate I

Taenicephalus? *peregrinus* n. sp.

The specimens were whitened with ammonium chloride before photographing. The photographs are not retouched, except that the background of Fig. 3 has been blackened.

Specimen 1 (holotype)

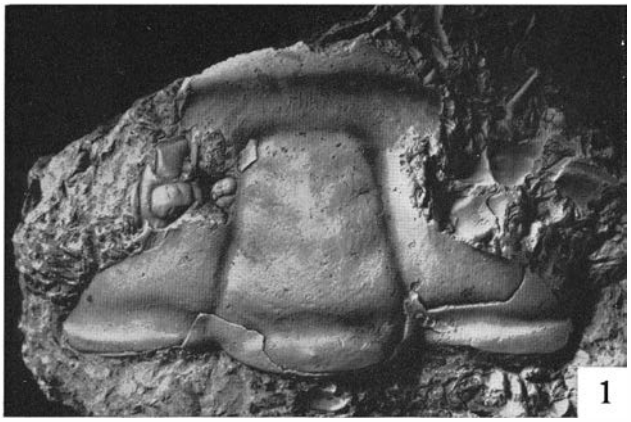
U.M. No. Vg. 705. Trolmen alum shale quarry, Kinnekulle, Västergötland. *Olenus* beds. Coll. V. JAANUSSON.

Fig. 1. Dorsal view. × 3.2.
Fig. 2. Left side view. × 3.2.
Fig. 3. Anterior view. × 3.2.
Fig. 4. Detail of preglabellar field (internal mould) in front of left half of glabella. × 20.

Specimen 2

U.M. No. Vg. 706. Same locality and horizon. Coll. G. HENNINGSMOEN.

Fig. 5. Dorsal view (external mould). × 3.2.
Fig. 6. Dorsal view of plasticine cast. × 3.2.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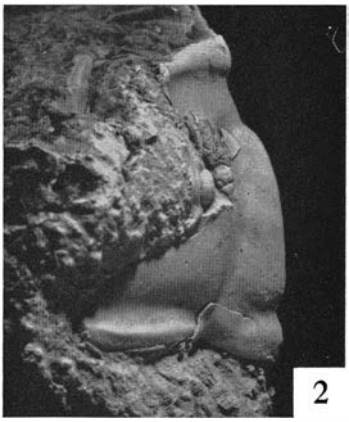
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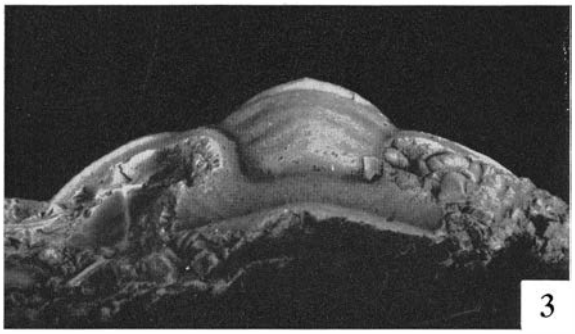
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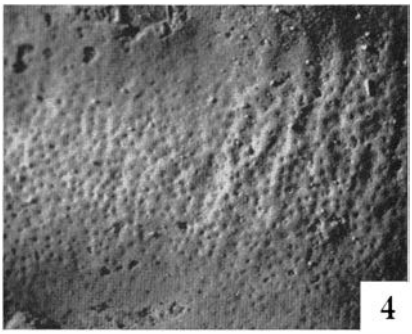
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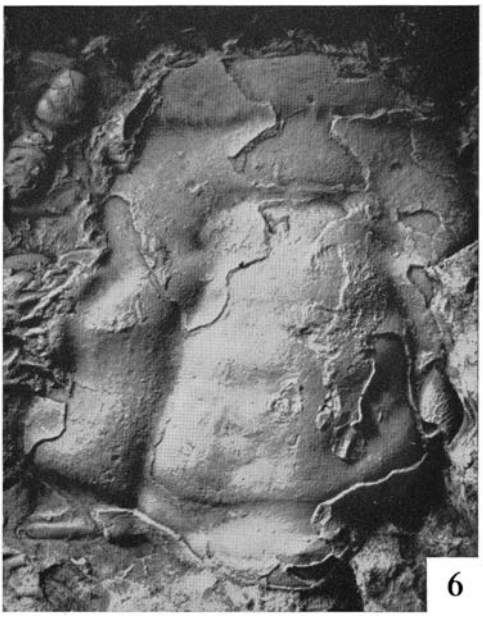
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