XENUSION - ONYCHOPHORAN OR COELENTERATE?

by

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Summary

The affinities of the Pre-Cambrian problematical fossil Xenusion auerswaldae, from a presumed Pre-Cambrian boulder from Sweden, are discussed; it is shown to be comparable with the Pre-Cambrian genera Rangea, from South-West Africa, and Charnia, from Charnwood Forest, Leicestershire. These organisms are considered to be probably colonial coelenterates.

Introduction

Following the recent discovery of Pre-Cambrian fossils in Charnwood Forest (Ford 1958, 1962, 1963) and in the Ediacara Hills in South Australia (Glaessner & Daily 1959, Glaessner 1961, 1963), there has been a revival of interest in Pre-Cambrian faunas in general. For example, the fossils described by Gürich (1930, 1933) from the Nama Formation of South West Africa have received further attention. In contrast, the fossil Xenusion auerswaldae, described by Pompeckj (1927) has received only passing mention. The purpose of this short note is to discuss Xenusion in the light of our present knowledge of Pre-Cambrian fossils.

Description and Discussion

Xenusion is preserved as a natural mould in a quartzite erratic of Cambrian or Pre-Cambrian age from Sweden. It has achieved a degree of fame as a result of being interpreted as an onychophoran, and thus possibly a connecting link between the two major phyla Arthropoda and Annelida. The living onychophorans are found under the barks of trees in tropical forests of Africa, Asia and South and Central America; they are rather caterpillar-like in appearance, being two to three inches long, but they show no external segmentation apart from their legs or parapodia. These latter are not jointed but bear claws. The Middle Cambrian Burgess Shale from British Columbia has produced a fossil onychophoran, Aysheaia pedunculata Walcott; this is reasonably similar to the living Peripatus apart from the segmental appearance of the body, which gives it a more worm-like aspect. Aysheaia is preserved as a carbonaceous film, as is appropriate for such a soft bodied organism.

In marked contrast to the Burgess Shale fossil, Xenusion is preserved as an impression in a quartzite with the structures in high relief (see Plate 4). Furthermore the dimensions of Xenusion are approximately four times those of all known onychophorans. The perfect bilateral symmetry of the fossil

suggests that the organism in question was comparatively rigid and somewhat frond-like. It seems reasonable to conclude that Xenusion is unlikely to have been an onychophoran.

The solution to the affinities of Xenusion are to be found among the material described by Gürich as Rangea schneiderhoehni, from the Pre-Cambrian Nama Formation of South-west Africa. This fossil is preserved in the same manner as Xenusion; its structures are of the same size and, to my mind, cannot be distinguished in any significant detail. In both Rangea and Xenusion there is a central axis that narrows distally and from which there arise, at either side, a series of distally diminishing branches which are themselves subdivided into short segments. The two genera differ in the nature of the axis; this, in Xenusion, bears a row of paired nodes, which are not present in Rangea. The segmented branches in Rangea appear to be confined by an outer lateral border, whereas they are free in Xenusion. Glaessner (1961) has compared Rangea to the living sea-pens, a group of coelenterates, but these differ from Rangea in exactly the same way that Xenusion does. The branches are not rigidly confined by any lateral structure.

The discoveries of Ford (1958, 1963) throw further light on this question. It is now evident that the original material of Charnia (a fossil from the Pre-Cambrian Woodhouse Beds of Charnwood Forest, Leicestershire, first described by Ford, 1958) represented the opposite surface of a Rangea. The 'ventral' surface shows no sign of a median axis, with the segmented branches meeting each other in the midline to form a zig-zag line. The new material of Charnia (Ford, 1963), showing the 'dorsal' surface, reveals the central axis.

It now appears that Rangea and Xenusion represent the 'dorsal' surface of an organism and Charnia the 'ventral'. In fact these three genera clearly belong to the same group of organisms. Indeed, had the 'ventral' surface of Xenusion been preserved, rather than the 'dorsal', it would never have been placed anywhere near the onychophorans.

Affinities

Glaessner (1961) and Ford (1963) have discussed the possible affinities of the Rangea-Charnia group, suggesting coelenterate and algal affinities respectively. On balance, the arguments for some type of colonial coelenterate seem marginally stronger and hence I would now tentatively assign Xenusion to such a position in the animal kingdom.

Age

The recognition of the relationship of Xenusion to Rangea-Charnia now enables the age of the erratic block concerned to be determined with a certain degree of confidence. This group of organisms appears to be characteristic of the uppermost Pre-Cambrian, which is now placed in the Varangian period. These animals can thus be considered as stratigraphical markers for the Varangian. In view of this it can be suggested that the erratic block containing Xenusion must be of Varangian age, rather than Cambrian.

Acknowledgements

My thanks are due to Professor W. Gross, formerly Director, Geological-Palaeontological Institute of Humboldt University, Berlin, for permission to examine the type specimen of Xenusion and to take casts of it. Photograph (Plate 4)by Mr. J. Watkins.

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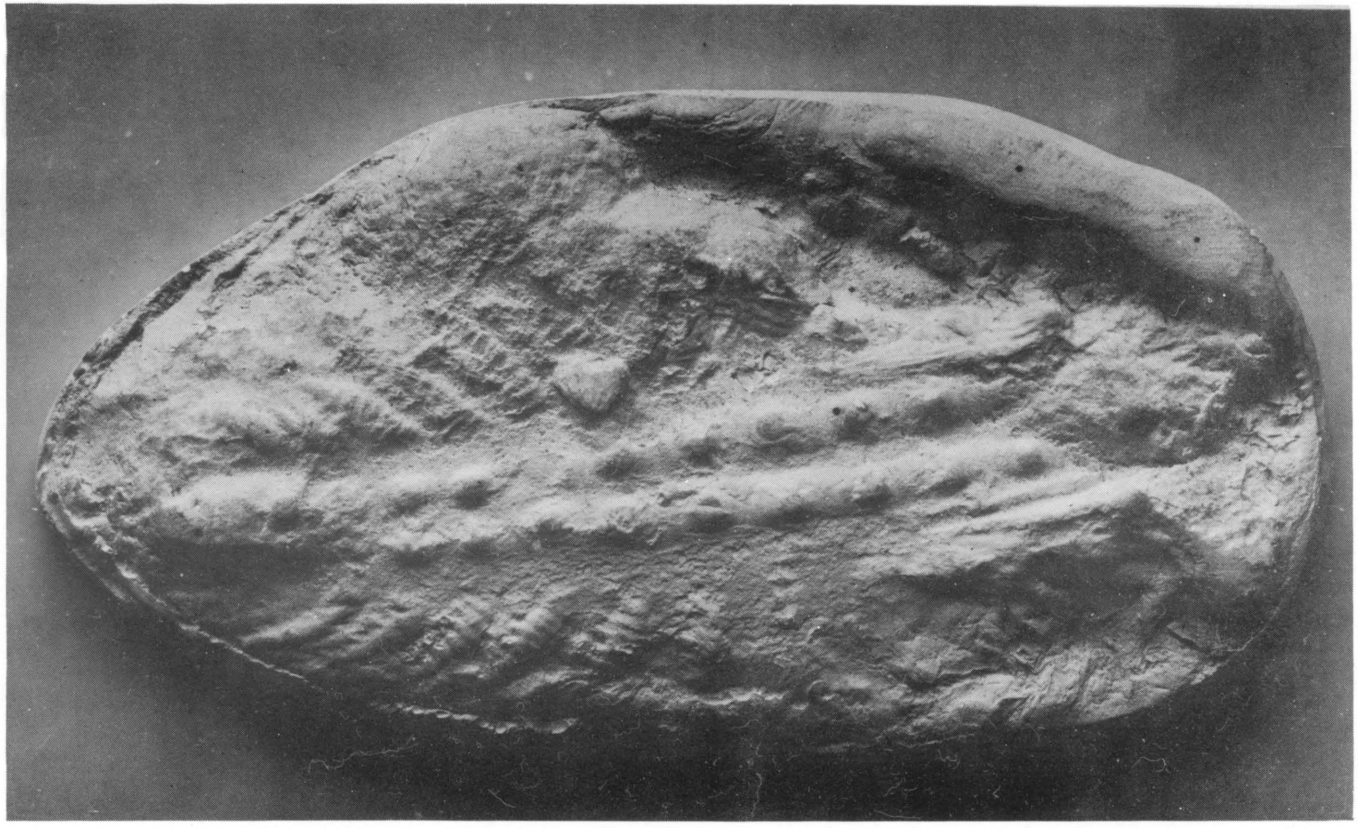

Cast of holotype of Xenusion aeurswaldae Pompeckj, x $1\frac{1}{2}$.
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Manuscript received 1st December, 1966