A NEW SILURIAN ARTHROPOD FROM LESMAHAGOW, SCOTLAND

by P A SELDEN *and* D E WHITE

ABSTRACT. A single incomplete specimen of an arthropod of uncertain affinities, *Pseudarthron whittingtoni* gen. et sp. nov., from the Ludlow Series of the Lesmahagow Silurian Inlier, Scotland, is described. It has an oval shape and is characterized by a small cephalic region and a thorax of at least seven tergites, each traversed by a pronounced ridge and shallow furrow. The expansive dorsal covering is considered to have served to conceal and protect the appendages. *Pseudarthron* was probably a member of a fresh- or brackish-water, vagrant epifaunal benthos. Certain morphological features indicate a possible relationship to the Upper Ordovician *Triopus-draboviensis* Barrande, 1872 and suggest similarities to the Lower Devonian *Cheloniellon calmani* Broili, 1932. *P whittingtoni* also has features in common with the Upper Devonian *Oxyuropoda ligioides* Carpenter and Swain, 1908 and with *Camptophyllia eltringhami* Gill, 1924 and *C. fallax* Gill, 1924 from the Coal Measures (Upper Carboniferous). Of these, *Cheloniellon* is chelicerate-like but the remainder, like *Pseudarthron*, are of doubtful affinities.

IN conjunction with a recent revision of the Hamilton (23SW) Sheet by the South Lowlands Unit, Institute of Geological Sciences (I.G.S.), Edinburgh, the Palaeontology Unit investigated the Silurian biostratigraphy of the Lesmahagow Inlier During the course of this work, a single example of an unusual arthropod was found, which is described below as *Pseudarthron whittingtoni* gen. et sp. nov

It occurred in greenish-grey, slightly silty, shaly mudstone at the top of the south face of the easternmost (C) of three disused quarries to the east of South Hill farm (text-fig. 1), in the northern part of the Inlier.

From this mudstone several rod-like structures (GSE 13873; 3E 4549–4557, 4559, 4563 of the IGS Scottish collections) were also collected, with dimensions of the order of 10 mm long and 2–3 mm wide (text-fig. 2A). Most have an imbricate structure and well-preserved examples are sinistrally striated, both of which are features exhibited by some coprolites (Häntzschel *et al.* 1968, p. 2, fig. 1, pl. 3, figs. 8, 20, 21). Their chemical composition is not known but they appear to consist of greenish-grey clay. If they are coprolites, the animal from which they originated might be fish or arthropod, but, on the basis of size, not *P whittingtoni.*

No other fossils were found at this locality during the present survey. However, the I.G.S. Scottish collections contain several fish specimens including *Ateleaspis tessellata* Traquair, *Birkenia elegans* Traquair, *Lanarkia horrida* Traquair, and *L. spinosa* Traquair from the 'third quarry and third field east of South Hill farm' which is almost certainly quarry C. The collection also includes *Pachytheca*?, *Dictyocaris* sp., and several examples of *Taitia catena* Crookall, all problematical fossils of possible algal affinities, together with possible coprolites identical with those found with *Pseudarthron whittingtoni.* These fish and problematical fossils are preserved in a finely laminated siltstone and were collected by D. Tait in 1900. This fish bed probably immediately underlies the bed from which *P whittingtoni* was obtained and is evidently no longer exposed.

Approximately along strike from quarry C, in the middle quarry (B of text-fig. 1), near the top of the section, '*Glauconome*' is fairly common in a maroon, finely micaceous, argillaceous siltstone (GSE 3E 4538–4548). Specimens of this problematical fossil from the '*Glauconome*' Band of the Fish Bed Formation in the Hagshaw Hills Inlier have been described and figured by Rolfe (1961, p. 260, pl. 15A). He concluded that it is not a bryozoan, but if 'a peculiarly "jointed" plant, it is of doubtful affinities'

Stratigraphy. Walton (1965, pp. 195–198) summarized the lithostratigraphy of the Lesmahagow Inlier, based on unpublished work by Jennings (1961). The Silurian succession consists of three major divisions—the Priesthill (oldest), Waterhead and Dungavel (youngest) Groups. Within the Waterhead Group, the Dippal Burn Formation and, approximately 150 m higher in the sequence, the Slot Burn Formation each contain fish beds. Although the fish-bearing horizons of the two formations are lithologically and faunally indistinguishable (Ritchie 1968, p. 320), the fish bed formerly exposed near South Hill farm has been mapped as part of the Slot Burn Formation.

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SYSTEMATIC PALAEONTOLOGY

ARTHROPODA

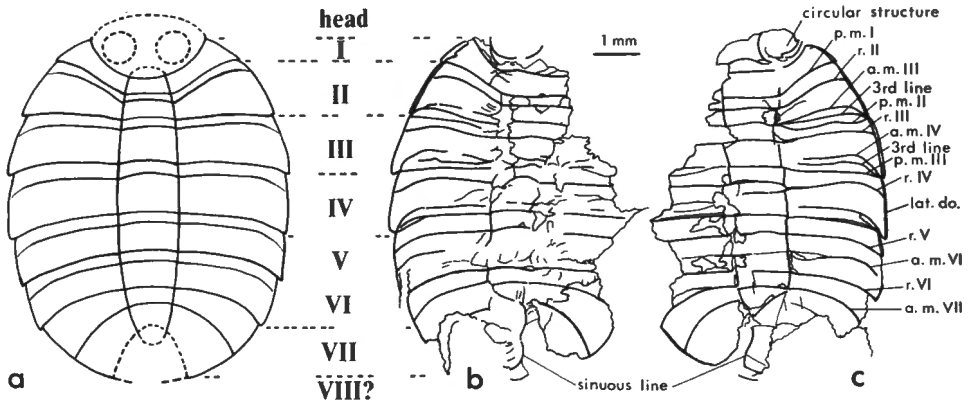
Phylum UNCERTAIN

Genus PSEUDARTHRON gen. nov

Type and only known species. Pseudarthron whittingtoni sp. nov.

Derivation of name. Greek: *Pseudes* (false) and *Arthron* (joint) referring to the transverse tergal ridges which give the impression of supernumerary tergites.

Diagnosis. Dorsoventrally flattened, trilobed arthropod of oval shape. Cephalic region small in relation to thoracic region. Thoracic region of at least seven tergites with broad pleurae: first pleura and anterior margin of second curved anteriorly, fourth to possible eighth pleura showing successively greater posterior curvature. Pronounced ridge and shallow furrow traversing axis and pleurae parallel to anterior margin of each tergite at a point just anterior of its mid-length, becoming less distinct towards narrow doublure of lateral margin. (Appendages and details of cephalic and caudal regions not known.)



TEXT-FIG. 3. *Pseudarthron whittingtoni* gen. et sp. nov., *a*, reconstruction of dorsal surface, tergites numbered I–VIII?, *b*, *c*, camera-lucida drawings of ventral mould, GSE 13871, and dorsal mould, GSE 13872, respectively. a. m., anterior margin of tergite; lat. do., lateral doublure; p. m., posterior margin of tergite; r., transverse ridge; Roman numerals indicate tergite numbers.

Pseudarthron whittingtoni sp. nov

Text-figs. 3, 4

Holotype. GSE 13871, 13872, part and counterpart of only known specimen; Institute of Geological Sciences, Edinburgh.

Horizon and locality. Slot Burn Formation, Waterhead Group, Ludlow Series; old quarry, 270 m ENE of South Hill farm [NS 72854070] (Quarry C, text-fig. 1).

Derivation of name. In honour of Professor H. B. Whittington, F.R.S.

Diagnosis. As for the genus.

Description. The overall shape of *Pseudarthron* is oval. The head region is incompletely preserved. It is suboval in outline (the major axis at right angles to that of body), and small in relation to the rest of the body. Under low-angle light, a circular structure is apparent laterally. The preserved tergites number seven, but there is

some previously described arthropods of uncertain affinities, especially the only known specimen of the Upper Ordovician *Triopus draboviensis* Barrande, 1872, now apparently lost (Chlupáč 1965). This resembles *Pseudarthron* in its oval outline and in details of its tergal characters: axial width about 0·25 of maximum width, seven tergites (possible eighth not preserved), pleurae expanded laterally, anterior borders of anterior tergites curved forwards, posterior borders of posterior tergites curved backwards, and the presence of prominent transverse ridges which fade laterally In both genera the head and tail regions are incompletely preserved. *Triopus* differs from *Pseudarthron* in possessing a large cephalic shield in relation to the rest of the body (as evidenced by the posterior border which is preserved), an axial region with longitudinal ridges, impersistence of the pleural ridge and furrow system across the axis, and slightly greater expansion of the pleurae laterally We consider that the first three of these characters are so distinct and recognizable as to merit the separation of *Pseudarthron* and *Triopus* at the generic level. At 35 mm in length the *Triopus* specimen is about twice the size of that of *Pseudarthron* (16 mm long).

Barrande (1872) referred *Triopus*, with reservations, to the trilobites. Novák (MS, *in* Chlupáč 1965, p. 22) and Neumayr (1887, p. 97) assigned it to the xiphosurans, and Jahn (1893) suggested that it could be a chiton. Chlupáč (1965) considered the affinity of *Triopus* with aglaspidids as unquestionable, comparing it with *Neostrabops* Caster and Macke, 1952. He also suggested that *Triopus* may represent the opisthosoma of one of the merostomes, such as *Zonozoe* or *Drabovaspis*, which are found in the same beds as *Triopus* but are known only from carapaces. Bergström (1968) took the last suggestion further, and attempted a restoration of *Triopus* as a xiphosurid, with a *D. complexa* carapace and a hypothetical telson. In our opinion *Triopus* (whether or not bearing the carapace of *Drabovaspis* or another supposed merostome) defies classification due to the lack of preserved appendages. Even where appendages are preserved in Palaeozoic xiphosuran-like arthropods, relationships may remain obscure: restudy of *Aglaspis spinifer* by Briggs *et al.* (1979) revealed that this animal is not a chelicerate, as previously supposed, and the relationship of the aglaspidids is problematic (see also Bergström 1980). Three xiphosuran specimens are known from the Lesmahagow Silurian Inlier, all from the Priesthill Group: *Neolimulus falcatus* Woodward, 1868, *Pseudoniscus* sp. (Eldredge 1974), and *Cyamocephalus loganensis* Currie, 1927 (Eldredge and Plotnick 1974). None of these are well preserved, and none particularly resembles *Pseudarthron*.

Pseudarthron shows some striking similarities to the early Devonian *Cheloniellon calmani* Broili (Broili 1932, 1933; Stürmer and Bergström 1978) in the overall shape of the animal, the tagmosis and trilobation, the expansions to the anterior and posterior pleurae, the transverse lines, and lateral doublures of the tergites. *Cheloniellon* differs from *Pseudarthron* in its greater size (64 mm for the smallest known *Cheloniellon versus* 16 mm) and apparently greater number of tergites (9 *versus* 8? in *Pseudarthron*).

The remarkable pyrite preservation in the Hunsrück Slate enabled Stürmer and Bergström (1978) to use an X-ray technique to redescribe *Cheloniellon*, and particularly the appendages, in fine detail. *Cheloniellon* was thus shown to have many features in common with the Xiphosura, as it also has with *Sidneyia* (Bruton 1981). Thus there is good evidence to place *Cheloniellon* close to the Chelicerata, but separate from that group as one of the many arthropod lines which arose from unknown, possibly Precambrian, ancestors (see Whittington 1979).

Two other arthropods of uncertain affinities which bear some resemblance to *Pseudarthron* are *Oxyuropoda ligioides* Carpenter and Swain, from the Upper Devonian of Kilkenny, Eire (Carpenter and Swain 1908; Rolfe 1969*b*), and *Camptophyllia eltringhami* Gill (also *C. fallax*), from the Coal Measures of Co. Durham, England (Gill 1924). The head of *Pseudarthron* may be similar in shape to that of *Oxyuropoda*, and circular structures are present in both (Rolfe 1969*b*, fig. 394). Also, each tergite of *Oxyuropoda* is traversed by a line at about 0·33 of its length (sagittally) from its anterior margin. *Oxyuropoda*, however, has a more slender outline than *Pseudarthron*, fewer thoracic tergites, and an abdominal region (not present in *Pseudarthron*). *Camptophyllia* is also more elongate in shape than *Pseudarthron* and its paratergal lobes are not directly comparable with the pleurae of *Pseudarthron*. *Camptophyllia* was referred with doubt to the Arthropleurida (Rolfe 1969*a*), and *Oxyuropoda* is regarded as Arthropoda *incertae sedis* (Rolfe 1969*b*). We consider

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P. A. SELDEN
Department of Extra-Mural Studies
University of Manchester
Manchester M13 9PL

D. E. WHITE
Institute of Geological Sciences
Exhibition Road
South Kensington
London SW7 2DE