

Two Assemblages of Polychaete Jaws from the Silurian of Gotland

By

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ABSTRACT.—Two assemblages of polychaete jaws are described. One of them, from the Hemse group, consists of the pairs of forceps, dental plates, and carriers. The other specimen, from the Mulde marl, consists of the pairs of forceps and dental plates only. No traces of paragnath elements or mandibulae have been found, but the other elements were preserved in their original arrangement in relation to each other.

Both specimens are closely similar to the genus *Paulinites* LANGE from the Lower Devonian Ponta Grossa shale of Paraná. As there is no base for judging the quality of different systematic characters in the polychaete jaw assemblages described hitherto, the best preserved of the two specimens is referred to this genus as *P. burgensis* n. sp. The other specimen, apparently belonging to the same genus, is too compressed to allow a specific determination or description.

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Introduction

Isolated jaws of *Polychaeta* “*errantia*”, called *scolecodonts*, are very common throughout the Silurian sequence of Gotland. They were recognized already by N. P. ANGELIN (HINDE 1882, p. 4), and in 1882 an abundantly illustrated treatise on material from Visby (“in strata of blue marly shale exposed in the bed of a small stream just outside the town”, presumably the Upper Visby marl) and Fröjel (“on the flat shores between Klintehamn and Fröjel”, presumably beds belonging to the Slite group) was published by HINDE (op. cit.). In HEDE’s descriptions of the bedrock in the explanations to the geological maps of Gotland (Sveriges Geologiska Undersökning, Ser. Aa, Nos. 156, 160, 161, 169–171, 180, and 183) they are frequently registered as annelid jaws. They are one of the most common by-products of current micropaleontological work on Gotland, both in washed ostracode samples from the marls and in etched samples with insoluble microfossils from the limestones.

Finds of jaw elements which have demonstrably belonged to the same

specimen or are preserved as more or less complete assemblages in their original position, are, on the other hand, extremely rare. LANGE (Portuguese edition 1947, English edition 1949), listed three Devonian, one Carboniferous, and one Jurassic species known before his own excellent Devonian material was described. Since then, ŠNAJDR (1951) has described jaw assemblages from the Silurian Budňany limestones of Bohemia and KOZŁOWSKI (1956) obtained a very well-preserved material by etching Ordovician erratics from the Baltic region. Furthermore, there are assemblages described by ROGER (1946) from the Cretaceous of Lebanon.

The records are, then, very few, and in the majority of cases the assemblages are dispersed or very incomplete. It is, therefore, justifiable to describe these two new finds from Gotland and contribute to the knowledge of forms which is necessary as a background for a taxonomy founded on hard and fossilizable polychaete parts.

Material and preparation

Both specimens described here are preserved in marls (calcareous shales) of the type common in the sequence of Gotland which usually allows a fairly good three-dimensional preservation of microfossils, but both were affected by compression. They were found on small marl pieces while examining washing residues for ostracodes.

One very small specimen, described below as the holotype of *Paulinites burgensis* n.sp., comes from the shaly beds of the Ludlovian Hemse group (cf. HEDE 1927b, pp. 23–24) at Västlaus, parish of Burs. It consisted of a pair of forceps, with the dorsal side towards the surface of the matrix piece, somewhat compressed and preserved in close connection with each other. Chitinous parts protruding near the anterior end of the forceps proved after preparation to be the dental plates, lying in the expected original position. Furthermore, a pair of rod-like pieces, apparently the carriers, were found at the proximal end of the forceps, at least one of them completely preserved, bent obliquely forwards to the right and thus concealing the conditions at the proximal end of the right forceps. It is, therefore, not clear whether this forceps has a basal plate of the kind known from closely related forms.

The preparation was carried out with specially ground needles and fine brushes. After removal of the elements mentioned the matrix was cautiously dug through grain by grain, but no traces of the mandibulae or the unpaired maxillar piece could be found. The paragnaths also proved to be entirely missing. Further calcareous matter was removed from the jaws by etching with acetic acid. Different stages of the preparation are shown in Plate I.

The other specimen, from the Mulde marl at the road–railway intersection at Däpps, parish of Fröjel (cf. HEDE 1927a, pp. 36–38), consists of the two forceps and two dental plates in the same position as in the above specimen but

in a strongly compressed condition and badly cracked. It was prepared with the same method as the above specimen, but the loose fragments had to be glued together and impregnated with a weak tragacanth solution. Consequently no preparation in order to find other maxillar or mandibular elements could be made. The specimen is described below as *Paulinites* sp.

Descriptions and comments on affinities

The present development in the taxonomy of fossil annelids seems to lead to two parallel systems, one of parataxa for the scolecodonts and one of taxa for the jaw assemblages, and to this can be added a third system built on trails, tracks, burrows, and tubes. In several cases scolecodont paraspecies have already been identified as components of assemblages, and different authors have taken different attitudes to the synonymy and priority questions, as nomenclatory conventions for cases of this kind are still lacking. In this case the parataxonomical problems become especially delicate as even the paired jaw elements are unsymmetrical and the elements from different sides can be given different names. Even if the elements from different moults (cf. KOZŁOWSKI, op. cit., Figs. 8–10) are fairly similar, it is, furthermore, possible that the same scolecodont from different parts of the ontogeny exists under different names.

With the existing limited material of jaw assemblages it is almost impossible to judge the norms for the distinction of higher taxa and their affinities to recent forms. It is generally agreed that the fossils of the type described here are apparently related to eunicean Polychaeta, especially to the families Euniciidae and Onuphidae (cf. LANGE 1949, pp. 57–63). LANGE distinguished a separate family, *Paulinitidae*, with the Devonian genus *Paulinites* as the type genus, differing from the two recent families mentioned mainly by the presence of denticulation in the forceps, the slenderness of the carriers, the articulation conditions of the carriers and mandibles, and some differences in the degree of development of the different elements.

The assemblages described here belong to this family, which seems to constitute a large part of the fossil annelids of the Silurian of Gotland, and they are strikingly similar to the type species of the type genus, *Paulinites paranaensis* LANGE. Both specimens are therefore referred to the genus *Paulinites*.

Paulinites burgensis n. sp.

Pl. I, figs. 1–5.

DERIVATION OF THE NAME. — *Burgensis*, coming from the parish of Burs.

HOLOTYPE. — An assemblage of jaws, consisting of a pair of forceps, a pair of dental plates, and a pair of carriers (Mus. Pal. Inst. Univ. Uppsala. No. G 209), the only known specimen.

TYPE STRATUM. — Hemse group, Ludlovian.

TYPE LOCALITY. — Ditch crossing the road at Västlaus, parish of Burs, Gotland.

DIAGNOSIS. — Forceps with fine and dense denticulation along the middle part of the inner margin and about 8 larger denticles along the anterior part, provided with a stout hook. The posterolateral corner has a small pointed process. Left dental plate with a stout hook at the anterior end. Right dental plate with the anterior end split into two large denticles. Carriers slender, rod-like.

DESCRIPTION OF THE HOLOTYPE. — Left forceps very acutely angular, terminating anteriorly in a stout hook strongly bent inwards. Its outer margin with a small, acute process posterolaterally; its inner margin with a fine denticulation along the portion immediately behind the middle and with 8 larger denticles along the anterior half, continuing onto the hook. Myocode suboval; the inner posterior corner of the jaw is provided with a wing-like process, directed inwards and downwards from the posterior part of the myocode.

Right forceps larger, with more subparallel sides than the left, tapering in a stout hook not so sharply bent inwards as the left one. Outer margin with a slight concave bend in the middle portion and with a small pointed process posterolaterally; the inner margin with a fine denticulation along the middle portion and 8 larger denticles continuing forwards onto the hook. The nature of the proximal part of this forceps, with the myocode and presumed basal plate, is not accessible for study owing to the position of the carriers.

Left dental plate with a stout hook anteriorly. The S-shaped inner margin is relatively coarsely denticulated, with 6 (7) larger denticles, directed backwards and inwards, along the posterior half, and 7 rounded denticles along the anterior half, continuing onto the hook. Outer margin more gently S-shaped, with a slightly bent shank. Myocode crescent-shaped, extending from the posterior end of the jaw to the end of the shank.

Right dental plate with two large denticles anteriorly. Its slightly convex inner margin has the same kind of denticulation as the left plate along its posterior half; between this denticulation and the two larger denticles there are two smaller, rounded denticles. Shank broader than in the left plate, not distinctly set off from the anterior part of the outer margin. Myocode similar to that of the left plate but drawn slightly forwards along the anterior process of the plate.

Carriers relatively long, rod-like and slender. One of them completely preserved lying along the posterior part of the right forceps. Other carrier parts also preserved (seen in different places in Plate I, figs. 1-3 and 4-5).

The jaw elements are somewhat compressed, the forceps more so than the dental plates. The left forceps is flattened, and the right forceps has an impressed groove along its ventral side. The fragments of the carriers were kept together by the matrix.

For dimensions, see Table 1.

Table 1. Dimensions of the jaw elements. Values obviously affected by compression or estimated for hidden parts are within brackets. Measures in microns.

Jaw elements	<i>Paulinites burgensis</i> (G 209)		<i>Paulinites</i> sp. (G 210)	
	left	right	left	right
Forceps				
Total length	760	860	2180	2120
Width over middle part	(200)	150	(630)	(540)
Dental plates				
Total length	630	640	(1530)	—
Width including shank	340	310	(630)	—
Width behind the shank	160	180	(310)	—
Carrier, length	310		—	—

REMARKS. — Only *Paulinites paranaensis* LANGE invites a comparison, and, as stated above, the similarity is very striking as far as the elements of *P. burgensis* are preserved. The only qualitative differences are the following:

(1) The denticulation of the forceps of *P. paranaensis* is coarser in the middle portion but is very fine along the anterior part, onto the hook.

(2) *P. paranaensis* has not the well-developed, fairly sharply pointed posterolateral process in the forceps, but a small, denticular process can be observed in many specimens.

(3) The right dental plate of *P. paranaensis* is ordinarily split into three sharp denticles, but the only specimen of *P. burgensis* has two blunt denticles.

Other slight differences are merely quantitative, such as the relative length of the different parts and processes of the jaw elements, the sharpness of teeth and shanks, etc. The state of preservation of the carriers of *P. burgensis* does not allow a detailed comparison, but there is hardly room for any significant differences from *P. paranaensis*.

Paulinites sp.

Plate I, fig. 6.

MATERIAL. — Only one specimen known, from the Mulde marl (probably uppermost Wenlockian) in the railway cutting (the railway removed in 1959) at the railway-road intersection about 400 m NW of Däpps halt, parish of Fröjel (Mus. Pal. Inst. Univ. Uppsala. No. G 210).

DESCRIPTION. — The specimen is seriously compressed and cracked, but the elements are kept closer together than in the specimen described above. All visible parts agree, except with respect to size (cf. Table 1), with the description of the former specimen. The hook of the right forceps is bent round the

hook of the left one, and the right dental plate terminated by two blunt and stout denticles lies immediately in front of the forceps. The left dental plate is slightly separated from the corresponding forceps. The outer shank margin of this specimen has a faint groove. A separate piece at the base of the right forceps, clearly visible in the figure, is obviously the basal plate.

REMARKS. — The two specimens are so similar that with the present incomplete knowledge of polychaete jaw assemblages they could certainly be regarded as moults of different ages of the same species.

The only scolecodont described which can be compared with these *Paulinites* specimens is *Arabellites hamatus* HINDE (op. cit., Plate II, fig. 42), a left forceps with the same differentiation of the denticulation but with a stouter hook.

Conclusions

Though incomplete, these specimens contain the most differentiated elements of the polychaete jaw assemblages. They clearly prove the close relationships between the forms from the Lower Devonian of Paraná and the Upper Silurian forms of Gotland. Scolecodont finds suggest that paulinitid Polychaeta constitute large parts of the annelid faunas of the Silurian sequence of this island. There is ample reason to hope that a systematic searching would yield still more polychaete jaw assemblages from the marls of Gotland.

The difficulties of scolecodont systematics, combined with the rareness of the assemblages, which are illustrated by these and earlier finds make, at present, the scolecodonts rather in attractive objects for the zoologist and biostratigrapher. It is evident, however, that every new find provides us with valuable information that will help us to a grasp on the taxonomy and allow us to use at least the more characteristic elements, such as forceps and dental plates, in stratigraphic work.

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Explanation of plate I

Paulinites burgensis n.sp., holotype (Mus. Pal. Inst. Univ. Uppsala, No. G 209). 50 ×.

1. The assemblage in the matrix after removal of covering marl substance.
2. The same, shorter exposure time.
3. Dental plates in the matrix after removal of the forceps and the carriers.
4. The isolated elements of the same assemblage. The carriers are still attached to the right forceps. A carrier fragment is attached in an unnatural position to the matrix substance at the most proximal part of the same forceps. Dorsal view.
5. The same, ventral view.

Paulinites sp. (Mus. Pal. Inst. Univ. Uppsala, No. G 210). 30 ×.

6. The entire assemblage after preparation and conservation with tragacanth solution. Whitened with ammonium chloride.

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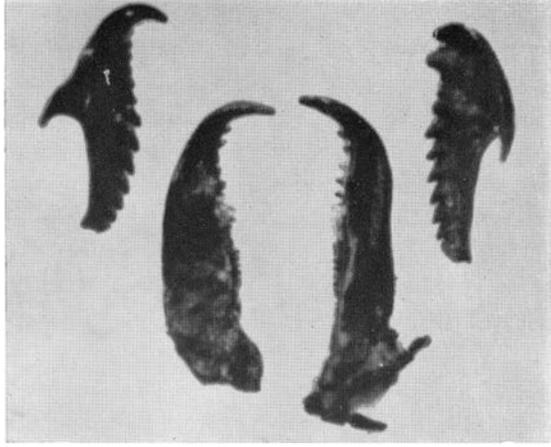
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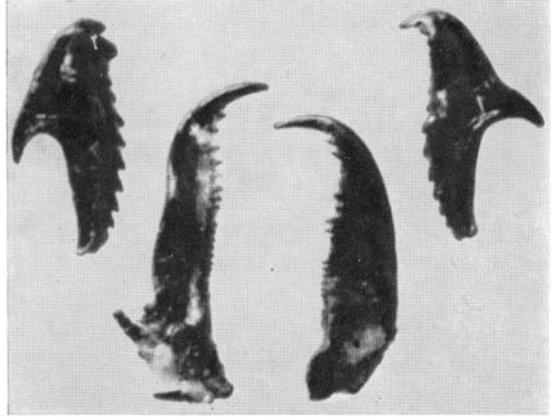
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