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SOME MESOZOIC SCOLECODONTS CONGENERIC WITH RECENT FORMS

Abstract. — The principles of comparing the jaws of the fossil and Recent polychaetes are here discussed. A Jurassic jaw apparatus is described and assigned to the Recent genus *Ophryotrocha*. Other jaws of polychaetes not having composite apparatus are assigned to Recent genera *Glycera and ?Goniada*. It has been found that the *Paranereites*, a scolecodont genus common in the Mesozoic, is a synonym of the genus *Glycera*. Other scolecodonts, considered by some authors as ancestors of the Recent genera *Nereis* and *Glycera*, are not closely related to these polychaetes. The generic assignment of the Mesozoic scolecodonts, usually included in the genus *Goniada*, is not certain. It has also been found that the Mesozoic polychaetes are more closely related to the Recent rather than the Palaeozoic genera.

INTRODUCTION

Until recently, the Mesozoic scolecodonts have been almost unknown. Exceptional finds of complete bodies of polychaetes with fragmentarily preserved impressions or casts of jaws were described by Ehlers (1868, 1869) and Roger (1946). In 1939, Eisenack described two species of the Jurassic "scolecodonts", one of them, however, representing not the jaws of polychaetes but the armhooks of cephalopods (Kulicki & Szaniawski, 1972). A few scolecodonts from the Jurassic of Germany were described by Wetzel (1948) and one from the Jurassic of France by Valensi (1955). It has only been quite recently, that the Mesozoic scolecodonts were studied much more accurately by Kozur (1967, 1970, 1971), and Zawidzka (1971), who described their varied assemblages from different Mesozoic formations of Germany and Poland. In addition, Corradini & Serpagli (1968) reported on the abundant occurrence of scolecodonts in the Upper Jurassic of the Apennines. Collecting the Mesozoic scolecodonts for last years, the present writer has found that in the deposits of some types they are common and, although not as abundant as in the Lower Palaeo-

zoic, but fairly varied. Unfortunately, complete jaw apparatus of Mesozoic eunicids still remain almost unknown. Only one apparatus has thus far been described (Zawidzka, 1971) from the Middle Triassic of Poland and the present paper gives the description of an incomplete apparatus from the Middle Jurassic of Poland, belonging to the Recent genus *Ophryotrocha* Claparède & Metschnikov.

In addition to scolecodonts, which represent elements of jaw apparatus of the eunicids, the Mesozoic deposits contain abundant jaws of polychaetes of the families Glyceridae Grube and Goniadidae Kinberg, devoid of composite apparatus and having only two or four identical jaws each. These jaws are much more easily comparable with Recent forms than the detached elements of the eunicids.

The assemblage of the Jurassic scolecodonts is more closely related to the jaws of Recent rather than Palaeozoic scolecodonts. Many of them belong even to Recent genera.

This writer's collection comes mostly from calcareous concretions occurring in dark-coloured Bathonian clays near Zawiercie, from similar concretions found in the Callovian clays near Łuków and from dark-gray Volgian marls near Tomaszów Mazowiecki. In addition, the collection includes few specimens from the Cretaceous and Quaternary deposits. Of this collection, in the present paper are described only those forms which, due to their close relationship to Recent ones, were comparable with them and determined within natural taxonomy. The collection under study is housed at the Polish Academy of Sciences, Palaeozoological Institute (abrr. Z. PAL.).

Part of the collection has been made available by Mr. C. Kulicki, to whom the writer's thanks are hereby extended.

THE PRINCIPLES OF COMPARING THE JAWS OF FOSSIL AND RECENT POLYCHAETES

The taxonomy of the scolecondonts has been based from the beginning (Hinde, 1879) on the comparison with the jaws of Recent polychaetes. Such a comparison turned out, however, to be very complex, since the polychaetes of the super-family Eunicea Grube, which includes all the Palaeozoic and most of the Mesozoic scolecodonts known so far, have their jaw apparatus composed of many and various elements and, in addition, homologous elements of quite different apparatus are frequently similar to each other. In fossil state, usually detached scolecodonts are found only. Their identification on the basis of the similarity to particular elements of Recent apparatus caused many errors and, consequently, a chaos arose in the taxonomy of scolecodonts. It was only learning complete fossil apparatus and comparing them with Recent apparatus ini-

tiated by Lange (1949) and Kozłowski (1956) that led to the formation of a natural taxonomy of fossil polychaetes (Kielan-Jaworowska, 1966).

With the present state of knowledge of fossil jaw apparatus, it is possible in certain cases to reconstruct an apparatus having at one's disposal detached elements only. This is possible primarily when in the scolecodont assemblage under study unknown is the origin of only one element of each type, that is, one only morphological form of basal plate, one MI form, one MII form, etc. If each of these elements is represented by many specimens and if these elements fit to each other, forming together an apparatus similar to others already known, we can be certain that they belong to one and the same species. The apparatus of *Atraktoprion eudoxus* Szaniawski 1968 was reconstructed in this way. Using this method, it is possible in certain cases to select of detached scolecodonts missing elements which may fit to an apparatus preserved in an incomplete state. Due to the possibility of errors, it is not advisable to reconstruct apparatus in the case when several morphological forms of elements of an unknown origin occur in a scolecodont assemblage. Statistical studies are also of little help in such a case, since the number of particular elements found depends to a considerable extent on their size and structure.

In a scolecodont assemblage, coming from one and the same sample, one apparatus may be most numerously represented by, e.g., MI and another by MII. Mostly on the basis of a similarity of, detached Triassic scolecodonts to the jaws of the Recent genus *Halla* Costa, 1844 (now considered — Day, 1967 — a synonym of the genus *Oenone* Savigny, 1820), Kozur (1971) reconstructed the apparatus of the Triassic species *Halla tortilis* (Kozur, 1967). In the present writer's opinion, the conspecificity of the elements assigned to *H. tortilis* is uncertain. They occur with many other scolecodonts representing various apparatus, whose, particular elements may be similar to each other. The time interval from the Triassic to the present is so extensive that it is impossible to know for a fact, on the basis of a similarity of some fossil and Recent elements, that complete apparatus of the genus *Halla* have not been subject to evolutionary changes during that period. In addition, basal plates and MI jaws, illustrated by Kozur (1967, 1971) and assigned to *Halla tortilis,* are considerably differentiated. In some of right-hand MI's (Kozur, 1971, Pl. 13, Figs. 6—8), the bight is disproportionally narrow and long in relation to the shape of basal plates. The carriers and MII jaws, assigned to this species, have not, unfortunately, been illustrated.

Among the Mesozoic scolecodonts, there are many forms very similar to the jaws of the Recent polychaetes. This induced Kozur (1970, 1971) to assign many of the Mesozoic scolecodonts to the Recent genera: *Aglaurides* Ehlers, 1868 (according to Day, 1967, a synonym of the genus

Oenone Savigny, 1820); *Arabella* Grube, 1850; *Dorvillea* Parfitt, 1866: *Eunice* Cuvier, 1817; *Notocirrus* Schmarda, 1861; *Onuphis* Audouin & Milne-Edwards, 1833; *Goniada* Audouin & Milne-Edwards, 1833. All the genera, except for the last-named, belong to the superfamily Eunicea Grube. The present writer does not call in question the possibility of the occurrence of Recent genera of polychaetes in the Mesozoic, but considers the identification of detached scolecodonts, which are elements of unknown apparatus, on the basis of their similarity to single elements of known apparatus as to risky. For, in such an identification, it is impossible to avoid errors caused by frequent similarity of homologous elements of various apparatus and by a considerable variability of some elements of apparatus within one and the same genus. Errors in identifying Palaeozoic scolecodonts, resulting precisely from such a procedure, made their systematics extremely difficult. As shown by practice, only complete fossil apparatus, and not their single elements, could be properly compared with the apparatus of the Recent eunicids. Describing detached elements of unknown apparatus must not be of any consequence in the natural systematics of polychaetes.

In addition to scolecondonts coming from the apparatus of eunicids, the Mesozoic deposits also contain the jaws of polychaetes of the Recent families Glyceridae Grube and Goniadidae Kinberg.[1)] The jaws of polychaetes of these families are not connected to form multi-element apparatus and as differentiated as those in the eunicids and, therefore, it is much easier to compare detached fossil and Recent jaws. The present writer succeeded in finding, on the basis of comparisons of the Mesozoic scolecodonts with the Recent material, that the scolecodonts assigned to the genus *Paranereites* (Eisenack, 1939), (Pl. I, Fig. 3) referred by Eisenack (1939) and, after him, by Howell (1962) to the genus *Nereis* Linnaeus, 1758, are in fact the jaws of another Recent genus namely *Glycera* Savigny, 1918 (Pl. III, Fig. 4-7, p. 186). Kozur (1970, 1971) and Zawidzka (1971) placed the genus *Paranereites* within the "Family Unknown". Other genera of scolecodonts, referred to the genus *Nereis*, that is, *Nereidavus* Grinnel, 1877, *Pronereites* Stauffer, 1933 and *Paleonereites* Stauffer, 1933, are exclusively Palaeozoic scolecodonts and, with the present state of knowledge of the fossil polychaetes, it may be easily found that they have nothing in common with the nereids. The genus *Nereidavus* (Pl. I, Fig. 2) represents MI jaws, most likely belonging to the family Paulinitidae Lange, 1947. The scolecodonts of the genus *Paleonereites* Stauffer (Pl. I,

[1)] The two families, along with some others, were included by Dales (1962) in the order Phyllodocina Dales. The division of polychaetes into orders, which he suggested, was accepted, however, not by all zoologists (Day, 1967). Some of them (Fauvel, 1923; Day, 1967), include the Goniadidae in the family Glyceridae. From the viewpoint of the development of the arming of proboscis, which differs fundamentally in these taxons, it is more convenient to adopt the division into two separate families, as it has recently been done by Hartman (1950, 1964).

Fig. 4) are frontal jaws of indeterminate apparatus of the Eunicida. *Pronereites primus* Stauffer (Pl. I, Fig. 5), a type species of the genus *Pronereites*, is an indeterminable fragment of a jaw somewhat resembling the jaws of nereids, but which may come as well from the apparatus of many other genera. *P. naviculiformis* Zebera, another species of this genus, represents an incomplete, right MI of the family Paulinitidae Lange.

The jaws of nereids, at present abundantly represented the same as those of many other families of the Recent polychaetes, have not so far been found in fossil state at all. This might be caused by their different chemical composition, precluding their preservation. Preparing the jaws of Recent polychaetes in a KOH solution, the present writer has found that the jaws known in fossil state, that is, those of the eunicids and glycerids, may be separated from soft parts without any damage, while those of the nereids and nephtids (the family Nephtyidae Grube, 1850), so far never met in fossil state, become dissolved in the same solution. This problem requires special chemical and ultrastructural studies.

A few genera of fossil scolecodonts such as, *Glycerites* Hinde, 1879, *Paraglycerites* Eisenack, 1939, and *Praeglycera* Kozur, 1970 were referred to the Recent genus *Glycera* Savigny, 1818. The comparison of these scolecodonts with the Recent material also allows one to find that they have nothing in common with the jaws of the genus *Glycera*. The scolecodonts of genus *Glycerites* (Pl. I, Fig. 8) are MI jaws of the families Antraktoprionidae Kielan-Jaworowska or Skalenoprionidae Kielan-Jaworowska. The genus *Paraglycerites* Eisenack (Pl. I, Fig. 7) represents cephalopod armhooks (Kulicki & Szaniawski, 1972) and not scolecodonts at all. The Cretaceous scolecodonts of the genus *Praeglycera* Kozur (Pl. I, Fig. 6) differ fundamentally from the jaws of the genus *Glycera*, Pl. III, Fig. 4-7) which in all species of this genus are very similar to each other. Most probably however, these also are not the elements, of apparatus of the eunicids. On the other hand, they resemble jaws fused with ailerons (jaw supports), which are observed in polychaetes of the genera *Hemipodus* Quatrefages (Pl. I, Fig. 9) and *Glycerella* Arwidsson, 1889, also belonging to the family Glyceridae. Perhaps, comparative studies of these scolecodonts and of the Recent material would enable a more precize determination of their systematic position.

Macrognaths of the family Goniadidae from the Triassic and Cretaceous deposits were described by Kozur, who at first (1970) assigned them to the genus *Alienites* Kozur and subsequently (1970, 1971) to the Recent genus *Goniada* Audouin & Milne-Edwards, 1833 (Pl. I, Fig. 13). The assignment of these scolecodonts to the family mentioned above does not arouse any doubt, but their assignment to the genus *Goniada* is not reliable, since all the five genera distinguished at present within the family Goniadidae have similar macrognaths. Detailed comparative studies on the jaws of all Recent genera are likely to enable a better

determination of fossil forms. Unfortunately, the jaws of these genera, much the same as those of most of other Recent genera are rather insufficiently illustrated and described in zoological literature. The comparative studies may be conducted, therefore, only on the basis of an original material (see also page 191—192).

SYSTEMATIC PART

Superfamily **Eunicea** Grube
Family ?**Dorvilleidae** Chamberlin, 1919;
Genus *Ophryotrocha* Claparède & Metschnikov, 1869

Remarks. — The polychaetes of the genus *Ophryotrocha* have a very characteristic jaw apparatus, which radically differs from those of all other eunicids, including the remaining genera of the family Dorvilleidae, that is, *Dorvillea* Parfitt, 1866, and *Protodorvillea* Pettibone, 1961. The entire set of jaws of this apparatus is subject of several transformation and exchanges in the process of the ontogenetic development (Bonnier, 1893). Considering that the development of a jaw apparatus in the superfamily Eunicea is of an essential diagnostic importance, the assignment of the genus *Ophryotrocha* to the family Dorvilleidae arouses considerable doubts.

At the present, this genus is represented only by a few species (Greca & Bacci, 1962), of which the type species *Ophryotrocha puerilis* Claparède & Metschnikov, 1869 (Pl. II, Figs 3—4) is most abundantly represented and best known. The polychaetes of the genus *Ophryotrocha* are algal feeders. *O. puerilis* is usually found among small stones and shells, from whose surface it scrapes off attached diatoms and filamentous algae, using for this purpose its anterior maxillary plates.

The genus *Ophryotrocha* has not so far been described in fossil state. Although an apparatus, belonging for certain to this genus, was found by Corradini & Serpagli (1968) in the Upper Cretaceous deposits of the Apennines, it was not identified and described by them. They only illustrated it and found its similarity to the genus *Ophryotrocha*.

Ophryotrocha lukowensis sp.n.
(Pl. II, Figs 1 and 2)

Holotype: An incomplete apparatus composed of connected MI jaws and carriers; Pl. II, Fig. 1 (Z. PAL No. Sc. III/1).

Type horizon and locality: Jurassic, Middle or Lowermost Upper Callovian; the Łapiguz claypit near Łuków, eastern Poland.

Derivation of the name: *lukowensis* — found near Łuków.

Diagnosis. — MI jaws symmetrical, relatively long, composed of two, distinctly separated parts. The anterior, considerably shorter part (hook), arcuate, terminating in a long, medially directed point. The posterior part considerably wider, nearly quite straight, directed posteromedially. The posterior aperture of pulp cavity triangular, the anterior oval and reaching the base of the anterior part of jaw.

Material. — Six incomplete apparatus, composed of the right and left MI connected with each other and of carriers.

Description. — The length of MI varies from 0.22 to 0.30 mm, with a maximum width amounting to 0.2 of the length. Both MI symmetrical, without accessory denticles, relatively long and not very strongly bent, composed of two parts, distinctly differing from each other. The anterior part (hook) equalling about one-third of the lenght of the entire jaw (the base excluded), narrow, oval in transverse section, bent in the form of an anteromedial arc, terminating in a long, sharp, medially directed tip. The posterior part considerably longer and wider, nearly quite straight, triangular to subtriangular in transverse section, tapering towards the outer margin. The inner margin of the posterior part straight, directed posteriorly, the outer margin anteriorly parallel to it and in the posterior part running posteromedially. The surface of the anterior part lustrous, of the posterior lustreless. The lateral inner side of the posterior part flat, wide, tapering anteriorly. The lateral outer side narrower, slightly convex, with two apertures leading to two separate pulp cavities occurring on it. The posterior aperture triangular, narrowing anteriorly, its length equalling about 0.26 of the length of jaw. The anterior aperture oval, varying in length, with its anterior margin nearly reaching the base of the anterior part of jaw. Both apertures connected on the surface of jaw by a furrow. Dorsally, the connected MI jaws are flat and ventrally somewhat concave. The anterior apertures of pulp cavities are partly visible ventrally. At the base, the MI jaws are fused together and posteriorly turn into carriers.

The carriers make up an extension of lateral inner walls of the MI jaws. They are fused together with their inner planes and form a semi-oval plate. Their length equals about 0.3 of the length of MI.

Anterior jaws — unknown.

Comparisons. — The MI jaws of the new species are similar to MI of the Recent species *Ophryotrocha labronica* Greca & Bacci (Text-fig. 1b), from which they mostly differ, however, in the lack of an accessory denticle and somewhat shorter anterior part. The MI of the new species differ from the type species *O. puerilis* Claparède & Metschnikov (Text-fig. 1c, Pl. II, Figs 3 and 4) in a considerably shorter anterior part and its distinct separation from the posterior part, in a much more anterior situation of the aperture of pulp cavity and in a considerably slighter arcuate curvature of the entire jaws. The apparatus of the genus *Ophryo-*

trocha from the Upper Cretaceous of the Apennines (Corradini & Serpagli, 1968, Pl. I, Figs 1 and 2) seem to be considerably more closely related to the Recent *O. puerilis* than to the newly described species from the Middle Jurassic.

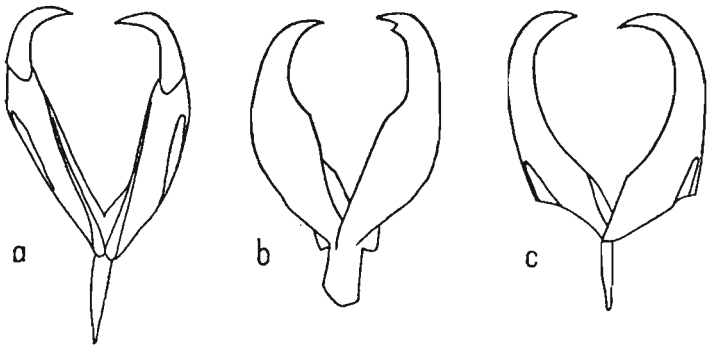

Fig. 1. Diagramatic scetches of joined MI and carriers of a — *Ophryotrocha lukowensis* sp.n. b — *Ophryotrocha labronica* Greca & Bacci (after Greca & Bacci, 1962) c — *Ophryotrocha puerilis* Claparède & Metschnikow.

Superfamily **Glycerea** Grube
Family **Glyceridae** Grube, 1850
Genus *Glycera* Savigny, 1818

Remarks. — The Mesozoic scolecodonts, so far assigned to the genus *Paranereites* Eisenack, 1939, should be included in the Recent genus *Glycera*. Erecting the genus *Paranerites*, Eisenack believed it to be related to the Recent genus *Nereis* Linnaeus, 1758. In fact, however, all the scolecodonts, assigned to the genus *Paranereites* (Pl. I, Fig. 3), differ radically from the jaws of the genus *Nereites* and of other genera of the family Nereidae Johnston, 1865 (Pl. I, Fig. 1), while they are nearly identical with those of the genus *Glycera* (Pl. III, Figs 4 and 5). The jaws of the nereids are usually long and narrow, have only one pulp cavity and are always serrate, while the scolecodonts, assigned to the genus *Paranereites* the same as the jaws of the genus *Glycera*, are falciform, having two pulp cavities and never displaying serration. In addition, the jaws of glycerids usually have thicker walls and mostly a distinct sculpture of surface, while the jaws of nereids usually display growth lines only. The jaws of Recent nereids are easily solvable in a KOH solution and this is probably the reason why they are not preserved in fossil state. The similarity in anatomical details between the fossil and Recent jaws of glycerids is so great that they are hardly distinguishable from each other. A perforation in the ventral wall above the outer pulp cavity, occurring the Recent forms only is the main difference (Pl. III, Fig. 4b). It is not unlikely, however, that this, rather small perforation also

occurred in fossil forms but became obliterated in the process of fossilization.

In the proboscis of polychaetes of the genus *Glycera,* in addition to four jaws (Text-fig. 2), there also occur four jaw supports, due to their

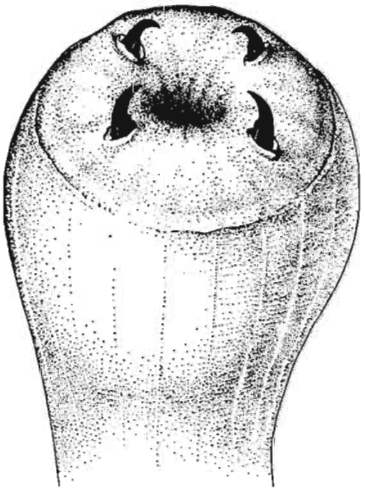

Fig. 2. Extended proboscis of Recent *Glycera* sp.

shape usually called ailerons (Pl. III, Figs 6 and 7), connected by muscles with the jaws. The supports are considerably more differentiated than the jaws and are of a diagnostic importance (Hartman, 1950: Day, 1967). According to Day (1967, p. 354), "the jaws seem to be very constant in shape but the jaw supports vary from species to species and provide useful characters. The basic structure is V-shaped with unequal prongs, but the two prongs may be united in varying degrees or one prong may be reduced to a mere vestige fused to the base of the other". These supports have not far been known in fossil state. They are somewhat smaller and less strongly built than the jaws themselves. Partly damaged, they are not similar to any scolecodonts and probably for this reason they have so far escaped attention. They were found by the present writer only as a results of special search and after his discovering that the *Paranereites* were a synonym of the genus *Glycera.* Other genera of the family Glyceridae, that is, *Hemipodus* Quatrefages, 1866 and *Glycerella* Arwidsson, 1899 have quite different ailerons. Finding that ailerons and jaws concur with each other enables, therefore, an indubitable determination of their generic assignment.

Hartman (1950, p. 51) maintains that "the Glyceridae are known for many species in few genera. *Glycera* Savigny, 1818 is by far the largest genus; its species are widely distributed in all seas and occur in intertidal to abyssal depth". This genus includes about forty important species.

The scolecodonts of the genus *Glycera* are also very common in the Meso- to Cainozoic deposits. All of them described so far (Eisenack, 1939; Kozur, 1967, 1971; Zawidzka, 1971) have been assigned to *Paranereites balticus* Eisenack, 1939 and stratigraphic range determined (Kozur, 1971) as the Triassic through the Cretaceous. In the present writer's opinion, these scolecodonts represent various species which, much the same as Recent forms, only slightly differ from each other. The fact that it was only Zawidzka (1971) who observed that these scolecodonts had two separate pulp cavities, gave ample evidence of the insufficiency of their former studies. In differentiating the jaws of fossil glycerids into species, the ailerons, which, in this writer's opinion, will be found if appropriately looked for, will certainly be more important than the jaws themselves.

In 1970, Kozur erected the genus *Praeglycera* for the Cretaceous scolecodonts, which he considered similar to the jaws of the *Glycera*. These scolecodonts (Pl. I, Fig. 6) differ, however, radically from all fossil and Recent jaws of the genus *Glycera*, but are slightly similar to those of the remaining genera of the family Glyceridae, that is, *Hemipodus* Quatrefages, 1866 (Pl. I, Fig. 9) and *Glycerella* Arwidsson, 1899. These jaws, like the scolecodonts of the genus *Praeglycera*, are devoid (?) of pulp cavities and their aileron is attached to their middle part. However, comparative studies with the use of original material are necessary to find with a certainty the relationship of the scolecodonts of the genus *Praeglycera* to the Recent genera mentioned above.

Glycera baltica (Eisenack, 1939)
(Pl. I, Fig. 3; Pl. III, Figs 1—3)

1939. *Paranereites balticus* sp. n.; A. Eisenack, p. 169, Fig. 13.
non 1967. *Paranereites balticus* Eisenack; Kozur, p. 862, Pl. 1 Figs 1, 5, 6,
non 1971. *Paranereites balticus* Eisenack; Kozur, p. 76, Pl. 13, Figs 23, 28.
non 1971. *Paranereites balticus* Eisenack; Zawidzka, p. 364, Pl. 2, Fig. 1.

Emended diagnosis. — Jaw crescent shaped, its width equalling about 0.3 of length. Hook gently curved, equalling about 0.33 of the length of jaw. The aperture of the cardinal pulp cavity, reaching halfway the length of jaw, is nearly three times as wide as the lateral aperture, which extends much further anteriorly. A rib runs parallel to the outer margin on both sides of the jaw and, in addition, a narrow, longitudinal groove and a transverse striation are slightly marked on the ventral side[2)].

[2)] In the description of scolecodonts of the genera *Glycera* and *Goniada*, the same method of orienting jaws has been adopted as in the superfamily Eunicea, that is, the aperture of pulp cavity determining the ventral side. In these genera, in contrast to the eunicids, this orientation of jaws does not correspond, however, to the actual orientation of the entire bodies of polychaetes.

Material. — Fourteen specimens from the Bathonian of the environs of Zawiercie and twenty-five specimens from the Callovian of Łuków.

Description. — Length of jaws varying from 0.28 to 0.85 mm, width equalling about 0.3 of length. Hook relatively slightly bent, turned antero-laterally, equalling about 0.33 of the length of jaw (measuring along the axis of jaw from the anterior end of belt). Outer margin nearly regularly arcuate, slightly more bent anteriorly than posteriorly. A small "step" corresponding to the termination of the wall covering the lateral pulp cavity, is situated somewhat below its middle. Inner margin arcuate and medially bent in the anterior part forming hook, straight, posterolaterally running in the middle part limiting belt and once again medially bent in the posterior part surrounding the cardinal pulp cavity. The transition from the middle into the posterior sector is situated at about 0.42 of the length of jaw from the posterior end, where the jaw is widest. Posterior margin short, straight, running posteromedially. A narrow ridge runs parallel to outer margin on the dorsal side. None other sculpture occurs on the dorsal side. Apertures of two separate pulp cavities are situated on the ventral side of jaw. The aperture of cardinal cavity reaches nearly halfway the length of jaw, its anterior margin gently arcuate. On the outer side, this aperture is partly covered by a long, narrow wall which makes up an extension of the lower wall of lateral cavity. The latter is situated on the outer side of the cardinal cavity, from which it is separated by a wall. The aperture of this cavity is one-third the width of that of the cardinal cavity. It is triangular in outline, more extended anteriorly than the cardinal aperture and usually reaching halfway the length of belt. The length of the latter equals about 0.26 of the length of jaw and its width is uniform over the entire length. The anterior margin of belt runs posterolaterally. The inner margin of jaw before belt is sharp. A very narrow groove runs almost parallel to the outer margin from the end of the aperture of lateral cavity. A very narrow and not very prominent ridge runs parallel to this groove near the middle of jaw and over the wall which bounds externally the lateral aperture. Two such ribs occur in some specimens. A very delicate, close transversal striation, parallel to the anterior aperture of the cardinal pulp cavity is situated between this ridge and the inner margin. A complete sculpture of the ventral surface is visible only on well preserved specimens.

Remarks. — The aperture of lateral pulp cavity is invisible in the illustration depicting the holotype of the species under study (Pl. I, Fig. 3). Its presence is, however, indicated by a steplike bend of the outer margin showing the place where a wall bounding this aperture terminates. Specimens from the Triassic of Germany, assigned to this species by Kozur (1967), differ from it in a considerably shorter hook and longer belt (*l. c.*, Pl. I, Fig. 1). In addition, some of these specimens (*l. c.*, Pl. I, Fig. 5)

are either deformed or are quite different in shape than the species discussed. Specimens described by Zawidzka (1971) from the Triassic of Poland also have a considerably shorter hook, longer belt and, furthermore, a much wider lateral pulp cavity.

Glycera pilicae sp.n.

(Pl. I, Figs 10 and 11; Pl. III, Figs 9—12)

Holotype: Jaw illustrated in Pl. III, Fig. 9; Z. PAL. No. Sc. III/31.
Type horizon: Jurassic, Volgian, the Zaraiskites scythicus Zone.
Type locality: Brzostówka near Tomaszów Mazowiecki.
Derivation of the name: pilicae — found on the Pilica River.

Diagnosis. — Jaw long, hook strongly bent, belt long. The aperture of cardinal pulp cavity reaches nearly halfway the length of jaw and is nearly twice as wide as that of the lateral cavity. A transverse striation is visible on the ventral side in addition to a longitudinal rib and a narrow groove. Jaw support with a shaft twice as long as shank, with which it forms an angle of about 45°.

Material. — About 60 jaws of a dextral and sinistral form and four incomplete ailerons, all of them from the Volgian of Brzostówka near Tomaszów Mazowiecki.

Description. — The length of jaws varying from 0.4 to 1.00 mm, width equalling about 0.34 of length. Hook strongly bent, directed laterally, equalling about 0.28 of the length of jaw. The outer and inner margins run similarly to those of *G. baltica*, except for the posterior part of inner margin, which near the posterior end takes a posteromedial direction and, consequently, the jaw is wide over a longer stretch of its posterior part. On the ventral side, the aperture of the cardinal pulp cavity reaches nearly halfway the lenght of jaw and is anteriorly rounded, while the aperture of the lateral cavity is more than two times narrower, V-shaped and extended considerably more anteriorly. Belt about 0.3 of the length of jaw and slightly extending posteriorly. A rib, running parallel to outer margin over the entire length of jaw, is strongly developed on both sides of jaw. In addition, a narrow, poorly visible groove runs on the ventral side between the rib and the outer margin beginning with the end of the aperture of lateral pulp cavity, while a fine, transverse striation occurs between the rib and the inner margin.

Jaw support (aileron) vary in length from 0.28 to 0.36 mm. Shaft (main prong) thick in transverse section and about twice as long as shank (lateral prong). Shank narrow, tapering posteriorly, running posterolaterally, diverging from shaft at an angle of about 45°. The anterior part of aileron, in which shaft and shank are not yet separated, equals about

0.17 of the length of the whole aileron. The wall connecting shaft and shank, is thin, brittle and not preserved complete in any of the specimens. Its posterior margin runs posteromedially and near shank reaches two-thirds of the length of specimen.

Comparison. — The new species differs from *Glycera baltica* (Eisenack) in a somewhat shorter and more strongly bent hook, longer belt, slightly different course of the posterior part of inner margin and in a better outline sculpture.

Family **Goniadidae** Kinberg, 1866
Genus ?*Goniada* Audouin & Milne-Edwards, 1833

Remarks. — The assignment of macrognaths of the species described below to the genus *Goniada* is not absolutely reliable. In the present writer's opinion, also uncertain is the assignment to this genus of all other scolecodonts so far included in it. For, at present five genera are distinguished within the family Goniadidae and all of them have macrognaths identical in the type of structure. In the literature on the Recent polychaetes, they are described rather superfically and it is not unlikely that accurate comparative studies would enable finding essential differences between them. The number of teeth in macrognaths was frequently used for the purposes of specific diagnosis, but it is rather doubtful if an identical number of teeth, with small differences, might actually be essential diagnostically. Of the elements, which may be preserved in fossil state, the proboscis of the goniadids has, in addition to macrognaths, two arcs of micrognaths and what is known as chevrons (Text-fig. 3). The micrognaths are X- or Y-shaped denticles which, together with macrognaths, form a complete circle around the open end of the proboscis. The chevrons form a series of dark, V-shaped, chitinous elements which occur on either side of the base of the proboscis. According to Hartman (1950,

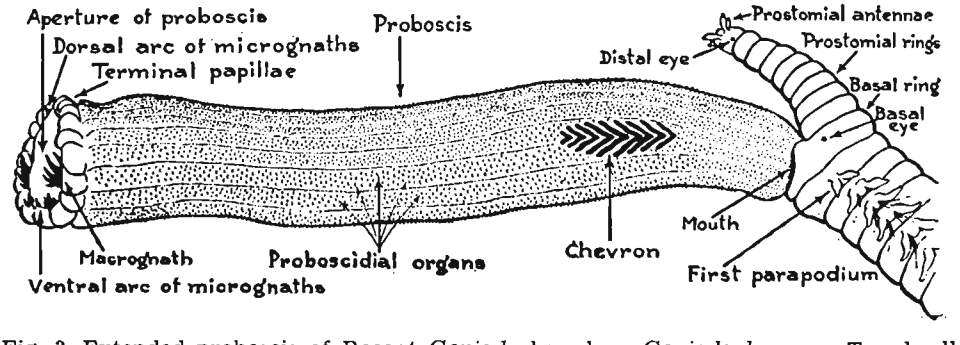

Fig. 3. Extended proboscis of Recent *Goniada* based on *Goniada brunnea* Treadwell (after Hartman, 1950).

p. 10), "it is possible that they function for the stabilization of the long body or also to maintain traction during progression". Both micrognaths and chevrons have not so far been known in fossil state, but finding them in the future is quite likely. The micrognaths can easily escape attention due to their small size and the chevrons due to their shape different from all scolecodonts. Judging by the illustrations of the Recent forms, chevrons are much more strongly differentiated than macrognaths and, moreover, they occur in three genera of the goniadids only. Finding a concurrence of macrognaths and chevrons in fossil state would enable, therefore, a more accurate determination of their taxonomic position. On the basis of a comparison with Ehlers's (1868) illustrations of the macrognaths of Recent polychaetes, Kozur (1970, 1971) assigned the fossil species of macrognaths, he described, to the genus *Goniada*. When Ehlers's monograph of polychaetes was published only one genus, *Goniada*, was distinguished within the family Goniadidae. Some of the species described by Kozur are, however, very similar also to the macrognaths of Recent polychaetes of other genera, for example, *Goniada szaniawskii* Kozur nom. n. (Pl. I, Figs 13, 14) only slightly differs from the macrognaths of *Ophioglycera eximia* (Ehlers) (Pl. I, Fig. 12).

?*Goniada szaniawskii* Kozur, nom.n.
(Pl. I, Figs 13 and 14)

1971. *Goniada multidentata* sp. n.; Kozur, p. 74, Pl. 17, Figs 7 and 8

The reason of the change in name. — The name given this species by Kozur (1971) is a younger homonym of that used by Arwidsson (1899, p. 49) and, on the basis of clause 53 of I. R. Z. N. should be changed. The new name was suggested by Dr. H. Kozur (in personal letter).

Material. — Four incomplete specimens from the Callovian near Łuków and six specimens from the Volgian near Tomaszów Mazowiecki, including only one complete.

Description. — Jaws 0.26 to 0.35 mm long. Their width, including teeth, is nearly one and a half of the length. Shaft short, tapering posteriorly, slightly bent towards the largest tooth. Outer margin concave, inner convex. Transverse section subtriangular, narrowing towards inner margin. Laterally, a shallow and wide furrow runs externally over the whole length of shaft. Teeth large, robust, strongly deflected, posteriorly, subround in transverse section. One or two of the first teeth are usually considerably larger than the rest of them, which gradually decrease. The length of the first tooth nearly equals that of shank. The only complete specimen in the collection displays five teeth. A wide, lingulate or oval process, directed posterolaterally, occurs behind the last

tooth. Viewed ventrally, the first tooth gradually turns into shank, making up together with it a convex, semilunar form. A small, oval aperture, leading to a very narrow pulp cavity, occurs in the place in which the tooth turns into shank.

Remarks. — Describing the species under study, Kozur (1971) did not mention the presence of the aperture of pulp cavity and the lateral process. On the basis of his illustrations one can find, however, that these morphological elements did occur in the specimens from the Upper Cretaceous of Germany and that they were similarly developed as in those of the Jurassic of Poland.

Goniada diversidentata sp.n.

(Pl. I, Fig. 15; Pl. III, Fig. 8)

Holotype: A macrognath, probably with a broken-off tooth, illustrated in Pl. I, Fig. 15 and Pl. III, Fig. 8 (Z. PAl. No. III/116).

Type horizon and locality: Jurassic, Bathonian, Morrisiceras morrisi Zone; Blanowice near Zawiercie.

Derivation of the name: Lat. *diversus* = diverse, varied; *dentis* = tooth, after a strongly differentiated size of teeth in one and the same specimen.

Diagnosis. — Shaft very long, narrow, tapering, with longitudinal furrows running along lateral margins. Aperture of pulp cavity situated under the largest tooth, relatively large, oval, connected with furrow. Teeth narrow, sligthly deflected, strongly varying in size in one and the same specimen.

Material. — The holotype and an incomplete specimen from the Callovian deposits of Łuków.

Description. — Shaft very long and narrow, wedgelike, dorsally nearly quite flat, ventrally strongly convex, with furrows running bilaterally along the margin over the entire lenght. The furrow running along inner margin, is wider, extending anteriorly and leading to the aperture of pulp cavity occurring under the largest tooth. This aperture is relatively large and oval. Anteriorly, shaft strongly widens, forming a distinctly separated anterior part of jaw more than twice as wide as shaft. A row of seven (?) long, narrow teeth, round in transverse section, slightly curved and nearly perpendicular to shank, runs along its rounded anterior margin. The length of teeth decreases regularly and quickly. The first teeth are very long and pointing dorsally, while the last ones are very small and directed laterally. The teeth are relatively widely-spaced.

Remarks. — The new species radically differs from all so far known fossil jaws of this genus primarily in its very long shaft. The jaws of

most species of Recent polychaetes of this genus are not yet accurately known. With such an extensive time interval, the existence of jaws identical with the newly described Jurassic ones is, however, rather unlikely.

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SZCZĘKI WIELOSZCZETÓW MEZOZOICZNYCH NALEŻĄCE DO WSPÓŁCZESNYCH RODZAJÓW

Streszczenie

W utworach batonu pod Zawierciem, keloweju pod Łukowem i wołgu pod Tomaszowem Mazowieckim znaleziono liczne skolekodonty. W pracy opisano jeden aparat szczękowy oraz cztery gatunki izolowanych szczęk, należące do rodzajów znanych do dziś. Pozwoliło to na przeprowadzenie dokładnych studiów porównawczych materiału kopalnego ze współczesnym. W celu lepszego porównania drobnych

elementów morfologicznych w badaniach tych posługiwano się refleksyjnym mikroskopem elektronowym. Aparat jurajski *Ophryotrocha lukowensis* sp. n. porównano z aparatem współczesnym gatunku typowego *Ophryotrocha puerilis* Claparède & Metschnikow i stwierdzono, że aparaty te różnią się jedynie cechami szczebla gatunkowego. Kopalne aparaty z rodzaju *Ophryotrocha* ani ich izolowane szczęki nie były dotychczas opisywane.

Omówiono zasady porównywania szczęk wieloszczetów kopalnych ze współczesnymi i stwierdzono, że z aparatami współczesnych wieloszczetów z nadrodziny Eunicea Grube porównywać można tylko kopalne aparaty a nie, jak niejednokrotnie czyniono, pojedyncze ich elementy, ponieważ bardzo podobne elementy występować mogą w zupełnie różnych aparatach. W utworach mezozoiku poza szczękami eunicidów znajdują się również szczęki wieloszczetów z rodzin Glyceridae Grube i Goniadidae Kinberg. Wieloszczety z tych rodzin nie posiadają złożonych aparatów szczękowych tylko po dwie lub cztery, jednakowe szczęki. Można więc znacznie łatwiej porównywać ich izolowane szczęki kopalne i współczesne. Z wieloszczetów tej grupy opisano w pracy skolekodonty: *Glycera baltica* Eisenack, *G. pilicae sp.n.*, ?*Goniada szaniawskii* Kozur nom.n., ?*G. diversidentata* sp.n. Szczęki z rodzaju *Glycera* Savigny są w utworach mezozoiku bardzo powszechne lecz zaliczano je dotychczas do rodzaju *Paranereites* Eisenack wiążąc je omyłkowo ze współczesnym rodzajem *Nereis* Linnaeus. Podobieństwo szczegółów anatomicznych kopalnych i współczesnych szczęk z rodzaju *Glycera* jest jednak tak duże, że niejednokrotnie trudno je od siebie odróżnić. Inne skolekodonty kopalne wiązane ze współczesnymi rodzajami *Nereis* i *Glycera* (*Nereidavus* Grinnel *Pronereites* Stauffer, *Paleonereites* Stauffer, *Glycerites* Hinde, *Paraglycerites* Eisenack, *Praeglycera* Kozur) są do szczęk tych rozdajów podobne tylko powierzchownie i nie łączy ich z nimi żadne bliższe pokrewieństwo. Kopalne szczęki nereidów nie są dotychczas znane. Jest to spowodowane prawdopodobnie ich odmiennym składem chemicznym.

Przynależność rodzajowa skolekodontów kopalnych zaliczanych zwykle do rodzaju *Goniada* Audouin & Milne-Edwards nie jest pewna ponieważ wszystkie 5 rodzajów wieloszczetów współczesnych należących do rodziny Goniadidae Kinberg ma szczęki bardzo podobne. Być może dokładne studia porównawcze szczęk wszystkich rodzajów współczesnych pozwoliłyby na pewniejsze oznaczenie form kopalnych.

Stwierdzono, że zespół skolekodontów jurajskich jest bardziej zbliżony do szczęk wieloszczetów współczesnych niż paleozoicznych.

ХУБЕРТ ШАНЯВСКИ

МЕЗОЗОЙСКИЕ СКОЛЕКОДОНТЫ, ПРИНАДЛЕЖАЩИЕ К СОВРЕМЕННЫМ РОДАМ МНОГОЩЕТИНКОВЫХ ЧЕРВЕЙ

Резюме

В отложениях батского яруса района Заверце, келловейского яруса в районе г. Лукув и волжского яруса в районе г. Томашув-Мазовецки были найдены многочисленные сколекодонты. В работе дано описание одного челюстного аппарата и четырех видов отдельных челюстей многощетинковых червей, относящихся к родам, которые существуют и в настоящее время. Благодаря этому можно было осуществить сопоставление ископаемого материала с ныне живущими формами. Сравнения мелких морфологических элементов строения проводились с помощью отражательного электронного микроскопа. Челюстной аппарат юрского вида *Ophryotrocha lukowensis* sp. n. сопоставлялся с аппаратом современного вида *Ophryotrocha puerilis* Claparede & Metschnikov. Констатировано, что они отличаются единственно видовыми признаками. До сих пор ни челюстные аппараты рода *Ophryotrocha*, ни их изолированные челюсти не описывались.

Описаны принципы сопоставления челюстей ископаемых и современных многощетинковых. Доказано, что с челюстными аппаратами современных многощетинковых надсемейства Eunicea Grube можно сравнивать лишь ископаемые аппараты, а не их отдельные составные части, как это неоднократно осуществлялось, так как совершенно разные аппараты включают иногда весьма сходные элементы строения. В мезозойских отложениях, кроме челюстей Eunicea, встречаются челюсти многощетинковых семейств Glyceridae Grube и Goniadidae Kinberg. Представители этих семейств обладают несложным челюстным аппаратом, состоящим лишь из двух или четырех одинаковых челюстей. В связи с этим сравнение челюстей ископаемых и современных представителей этих семейств не вызывает особенных затруднений. В работе описаны сколекодонты следующих видов этой группы: *Glycera baltica* Eisenack, *G. pilicae* sp.n., ?*Goniada szaniawskii* Kozur nom.n., ?*G. diversidentata* sp.n. Челюсти рода *Glycera* Savigny распространены в мезозойских отложениях в большом количестве, но до сих пор они относились к роду *Paranereites* Eisenack и ошибочно сопоставлялись с современным родом *Nereis* Linnaeus. Однако, сходство анатомических признаков ископаемых и современных челюстей рода *Glycera* настолько велико, что весьма часто их нельзя отличить. Другие ископаемые сколекодонты, сопоставляемые с нынешними родами *Nereis* и *Glycera* (*Nereidavus* Grinnel, *Pronereites* Stauffer, *Paleonereites* Stauffer, *Glycerites* Hinde, *Paraglycerites* Eisenack, *Praeglycera* Kozur), проявляют лишь внешнее сходство с представителями этих родов и не связаны с ними близкими родственными признаками. Ископаемые челюсти нереид до сих пор не встречались. Вероятно, это обусловлено особенностями их химического состава.

Родовая принадлежность ископаемых сколекодонтов, относимых, как правило, к роду *Goniada* Audouin et Milne-Edwards, недостоверна, так как челюсти всех пяти родов современных многощетинковых семейства Goniadidae Kinberg проявляют большое сходство. Возможно более детальное изучение челюстей всех современных родов позволит более достоверно определить ископаемые формы.

Доказывается, что комплекс юрских сколекодонтов характеризуется большим сходством с челюстями современных многощетинковых, чем палеозойских.

EXPLANATION OF PLATES

Plate I

Fig. 1. *Nereis* sp.; left jaw; a — dorsal view, b — ventral view; Recent, Baltic sea (Z. PAL. No. V. V/200), ×30.

Fig. 2. *Nereidavus varians* Grinnel; Upper Ordovician, North America, (after Grinnel, 1877), ×9.

Fig. 3. *Glycera baltica* (Eisenack); ventral view, Callovian, Baltic region, (after Eisenack, 1939), ×80.

Fig. 4. *Paleonereites cervicornis* Stauffer; Middle Ordovician, North America, (after Stauffer, 1930), ×60.

Fig. 5. *Pronereites primus* Stauffer; Middle Ordovician, North America, (after Stauffer), ×60.

Fig. 6. *Praeglycera troegeri* Kozur; Lower Campanian, Germany, (after Kozur, 1970), ca. ×115.

Fig. 7. *Paraglycerites necans* Eisenack; Cephalopod arm hook Callovian, Baltic region, (after Eisenack, 1939), ×45.

Fig. 8. *Glycerites sulcatus Hinde*; left jaw in ventral view Ordovician, North America, (after Hinde, 1879), ×18.

Fig. 9. *Hemipodus armatus* Hartman; jaw with attached aileron (jaw support), Recent, Western Mexico (after Hartman, 1950), ca. ×700.

Figs 10-11. *Glycera pilicae* sp.n. Jurassic, Volgian, Brzostówka near Tomaszów Mazowiecki in Poland; 10a, b — left jaw in dorsal and ventral view, 11 — paratype left jaw in ventral view (Z. PAL. No. Sc III/35-36), ×65.

Fig. 12. *Ophioglycera eximia* (Ehlers); macrognath (jaw) and micrognaths (paragnaths) from distal end of proboscis, Recent, Antarctica, (after Hartman, 1964), ×18.

Figs 13-14. *Goniada szaniawskii* Kozur, nom.n.; 13 — macrognath in dorsal view, Lower Campanian, Germany, (after Kozur, 1971), 14a, b — macrognath in dorsal and ventral views, Jurrasic, Volgian, Brzostówka near Tomaszów Mazowiecki, Poland, (Z. PAL. No. Sc. III/111), ca. ×100.

Fig. 15. *Goniada diversidentata* sp.n.; holotype, macrognath in ventral view, posterior part of shaft broken off during the study, one tooth probably missing, Bathonian the Morrisiceras morrisi Zone, Blanowice near Zawiercie, Poland (Z. PAL. No. Sc. III/116), ×100, see also Plate III.

Plate II
All figures are stereoscan photographs

Figs 1-2. *Ophryotrocha lukowensis* sp.n.; incomplete apparatus composed of joined left and right MI and carriers, Middle or Upper Callovian, Łuków, Poland; 1 — holotype, a — ventral view, b — ventral-left lateral view, c — anterior half of right MI in ventral view showing the border between anterior and posterior part of jaw, 2 — paratype, dorsal view; (Z. PAL. No. Sc. III/1-2), Figs 1a, b and 2×180, Fig. 1c ×360.

Figs 3-4. *Ophryotrocha puerilis* Claparède & Metschnikow; Recent, Mediteranean sea, joined MI and carriers of different specimens in ventral and dorsal views; (Z. PAL. No. Sc. III/11-12), ×240.

Figs 5-8. *Ophryotrocha* sp.; Recent, Mediteranean sea; 5-6 — joined MI and carriers in dorsal-right lateral and left lateral views, 7 — complete jaw apparatus with out mandibles, a — whole apparatus, b — anterior jaws, c — fragment of anterior jaws, 8 — right mandible, (Z. PAL. No. Sc. III/13-16), Figs 5, 7a and 8×300, Fig. 7*b*×750, Fig. 7*c*×2000.

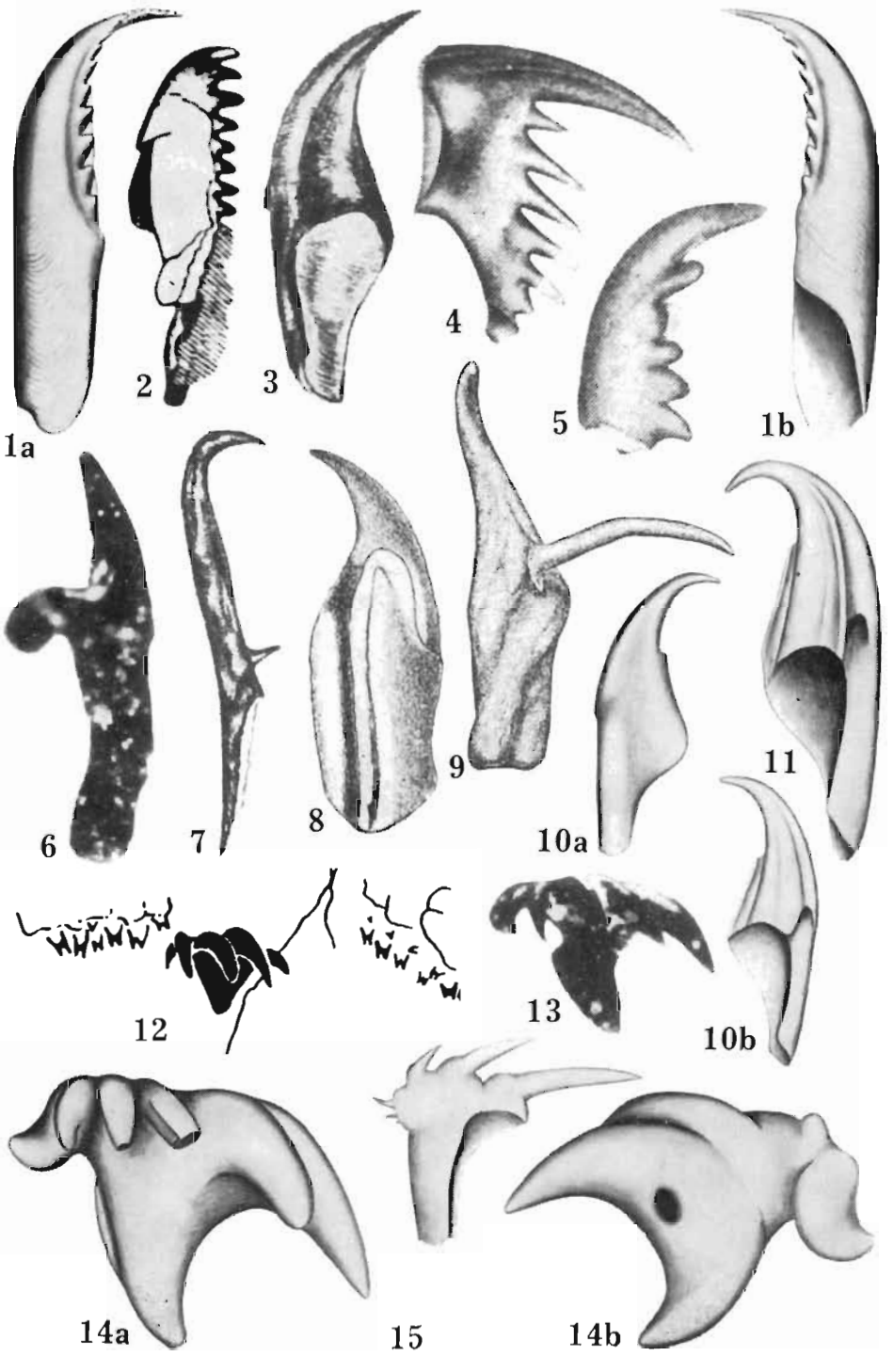
Plate III
All figures are stereoscan photographs

Figs 1-3. *Glycera baltica* (Eisenack); Upper Jurassic, Volgian Blanowice near Zawiercie in Poland; 1 — right jaw in "dorsal" view, 2 — right jaw in "ventral" view, 3 — middle part of left jaw in "ventral" view, (Z. PAL. No. Sc. III/21-23), Figs 1-2×120, Fig. 3×300.

Figs 4-7. *Glycera* sp.; Recent, Mediterenean sea, 4a — right jaw in "ventral" view, b — middle part of this same jaw, 5 — right jaw in "dorsal" view, 6 — aileron (jaw support) in "ventral" view, 7 — aileron in "dorsal" view, (Z. PAL. No. Sc. III/101-104), Fig. 4a×60, Fig. 4b×180, Fig. 5×40, Figs 6-7×100.

Fig. 8. *Goniada diversidentata* sp.n.; holotype in "dorsal view, posterior part of shaft broken off during the study, one tooth probably missing, Jurassic, Bathonian, the Morrisiceras morissi Zone, Blanowice near Zawiercie, Poland, (Z. PAL. No. Sc. III/116), ×180. (see also Pl. I).

Figs 9-12. *Glycera pilicae* sp.n.; Jurassic, Volgian the Zaraiskites scythicus Zone, Brzostówka near Tomaszów Mazowiecki in Poland; 9 — holotype right jaw in dorsal view, 10 — compressed and cracked right jaw in ventral view, 11 — slightly deformed left aileron (jaw support) in ventral view, 12 — partly damaged right aileron in dorsal view. (Z. PAL. No. Sc. III/37-40), Figs 9-10×120, Fig. 11×170, Fig. 12×210.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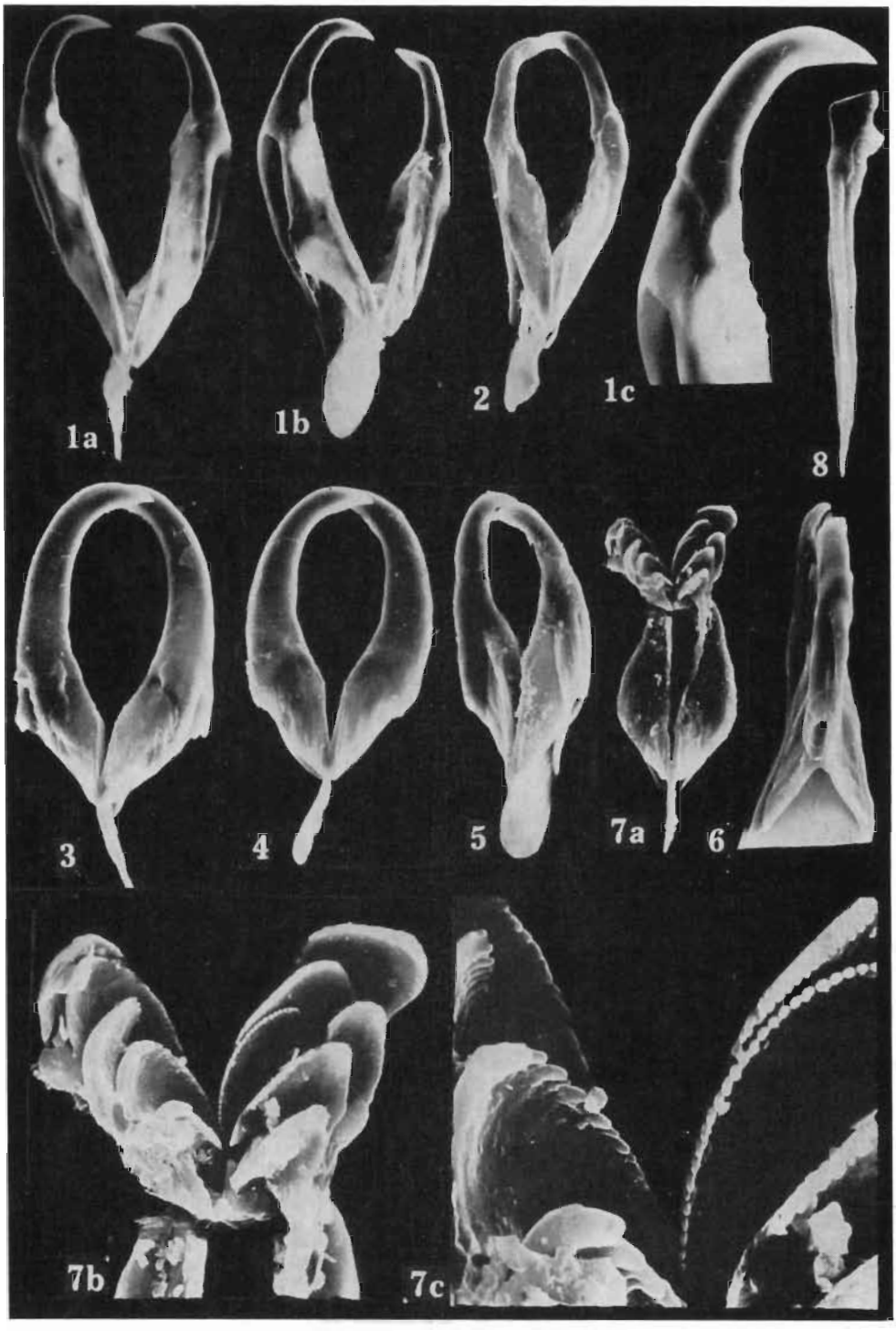
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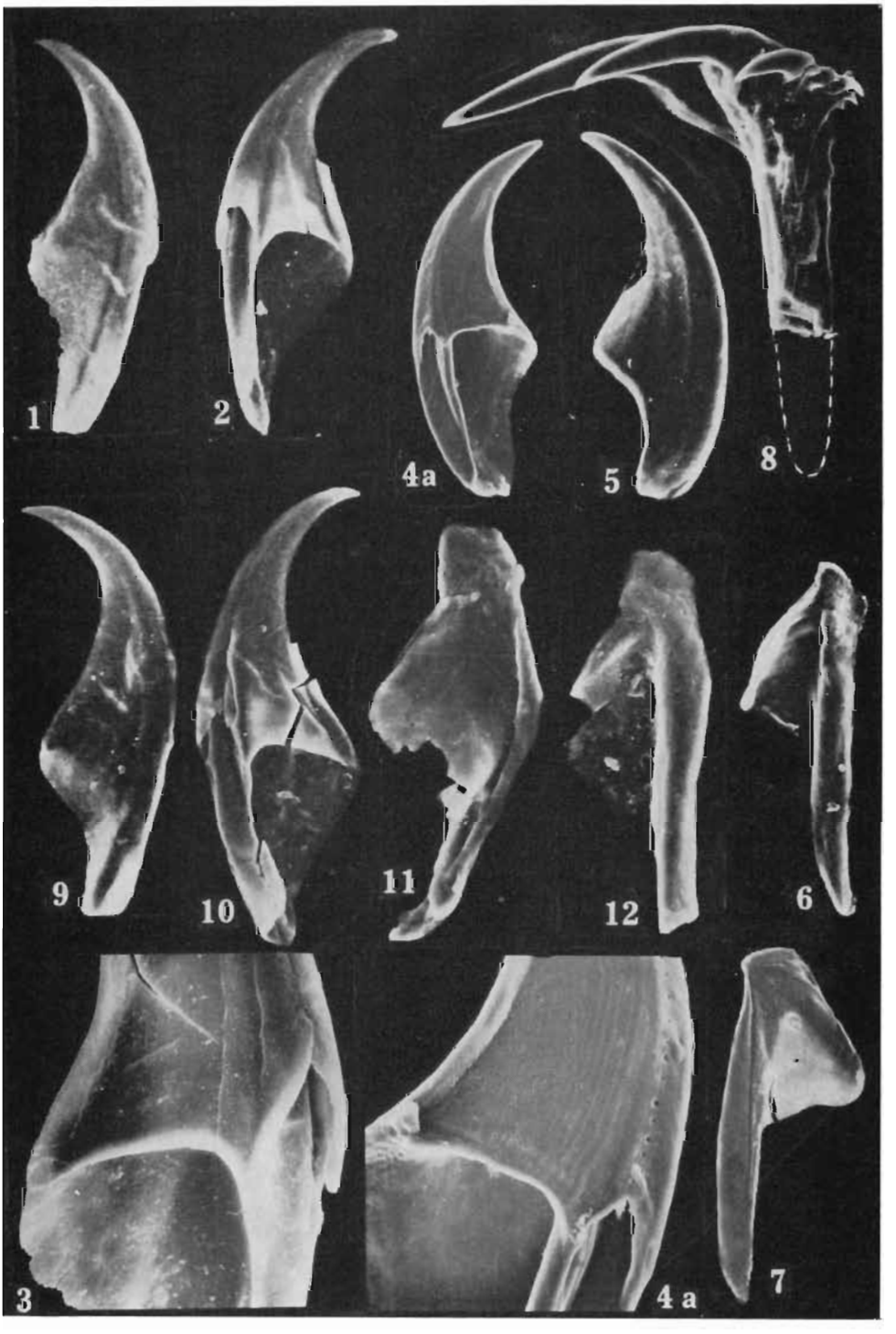
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