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A polychaete jaw apparatus and some scolecodonts from the Polish Middle Triassic

ABSTRACT: A polychaete jaw apparatus, composed of joined carriers, two *MI* and two *MII*, 19 isolated elements of other jaw apparatus and a form with an unknown taxonomic position have been described from the Middle Triassic (Muschelkalk) of Southern Poland.

INTRODUCTION

The jaw apparatuses of the polychaetes and their isolated single elements, that is, the scolecodonts have recently aroused a more and more lively interest of various paleontologists. So far, the best known are the jaws of the Paleozoic polychaetes, the credit for which should, to a considerable extent, be given to the Polish authors, Kozłowski (1956), Kielan-Jaworowska (1961, 1962, 1966) and Szaniawski (1968, 1971). Of fundamental importance was Kielan-Jaworowska's work (1966), which contributed to an enormous progress of the knowledge of this group of fossils.

Isolated elements and complete jaw apparatuses have thus far been a rarity in the Mesozoic. Such materials found in deposits younger than the Paleozoic ones have recently become more and more frequent. This is in conformity with Kielan-Jaworowska's (1968) opinion that an insufficient micropaleontological recognition of the Mesozoic rocks is one of the causes of the rarity of the Mesozoic jaw apparatuses.

So far, nobody succeeded in finding a complete and well preserved Mesozoic jaw apparatus. Even when an imprint of the body of a polychaete was preserved, the jaw apparatus was usually more or less damaged (e.g., *Eunicites triassicus* Gall & Grauvogel 1967).

TAXINOMICAL PROBLEMS

In Kielan-Jaworowska's (1966, 1968) opinion, the orthotaxonomic system applied to jaw apparatuses should be separated from the parataxonomic one used for isolated elements of such apparatuses.

An extensive discussion on this subject is conducted by Kozur (1970, 1971), who decidedly rejects, the possibility of using two systems and believes that, according to the provision of the International Code of Zoological Nomenclature (1958), only one taxonomic system should be used for both more or less complete apparatuses and for their isolated elements, with which this author consistently complies conducting a revision of all genera and species known so far in connection with the apparatuses and their parts.

The present writer does not intend to take up a discussion on this subject. The presentation of one's attitude towards the problems of taxonomy and a phylogenetic development of the polychaetes would require an elaboration and comparison of many collections of fossil and Recent polychaetes, which would exceed the framework of the present paper.

Taking example by many authors who are now concerned with scolecodonts (*e.g.*, Taugourdeau 1970, 1971), most isolated elements of jaw apparatuses is here described according to the parataxonomic system. Since the material includes, however, a jaw apparatus and a few isolated elements which have previously been described by A. Kozur according to the combined uniform taxonomic system, to avoid any mistakes the generic names of parataxons are put in quotation-marks. The terminology used in descriptions have been adopted after Kielan-Jaworowska (1966).

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STRATIGRAPHIC REMARKS AND THE MATERIAL

The material under study includes a jaw apparatus, an *MI* connected with carriers, an *MII* and an *MIV* connected with each other and more than 300 isolated elements. Most of them (182) are *MI* and *MII* belonging to the jaw apparatus referred to above.

Many samples coming from the whole of the Muschelkalk were dissolved in acetic acid. The presence of scolecodonts was found in only one lithostratigraphic member, that is, the Gogolin Beds (Lower Muschelkalk). Figure 1 shows only those sectors of profiles in which the occurrence of scolecodonts was found. These are the Trzebyczka and Rokitno boreholes in the Polish Jura Chain and profiles from the Strzelce Opolskie and Górażdże quarries in Lower Silesia. As easily

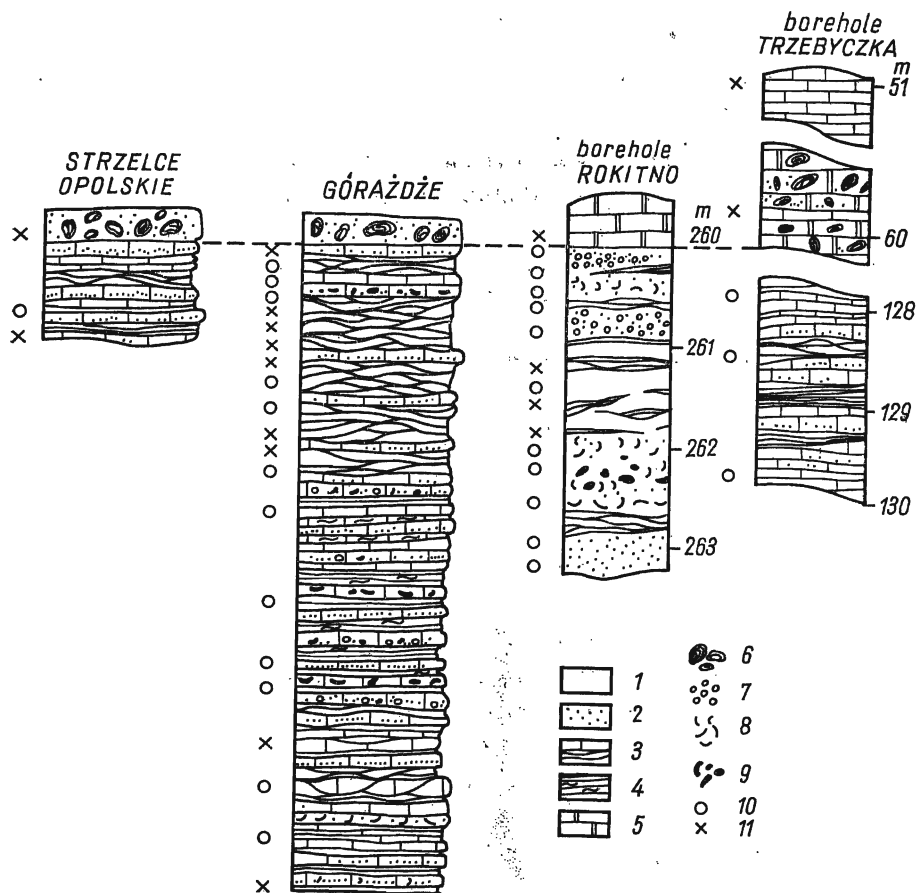


Fig. 1

Investigated profiles of the Lower Muschelkalk in Southern Poland

1 micritic limestones, 2 calcarenites, 3 micritic limestones and wavy-bedded limestones, 4 marly shales, 5 dolomites, 6 onkolites, 7 crinoid ossicles, 8 shell debris, 9 intraclasts, 10 positive samples for scolecodonts, 11 negative samples

noticeable, scolecodonts appear in the facies of marly limestones of the upper part of the Gogolin Beds and do not occur higher up in the facies of *Diplopora* dolomites and onkolitic limestones.

Isolated elements of such an apparatus as found in the Gogolin Beds, were described only from the Lower Muschelkalk of Germany (Kozur 1967, 1970, 1971). In view of this fact they seem to be of a stratigraphic importance as forms characteristic of the Lower Muschelkalk.

PALEONTOLOGICAL DESCRIPTIONS

Higher taxons, including the species previously described by Kozur (1970, 1971), are given after this author.

Order *Phyllodocida* Dales, 1962Family *Goniadidae* Kinberg, 1865Genus *GONIADA* Audouin & Milne-Edwards, 1833*Goniada cuneata* (Kozur, 1967)

(Pl. 3, Fig. 3)

1967. *Allentites cuneatus* n. sp.; H. Kozur, pp. 854—955, Pl. 3, Figs 13, 17—18.1971. *Goniada cuneata* (Kozur); H. Kozur, Pl. 14, Fig. 12; Pl. 15, Fig. 14.*Material.* — A jaw.*Dimensions.* — Length 0.272 mm.

Description. — Form very characteristic owing to its fairly long, clawlike, strongly upturned denticles. Posterior part of jaw bent and forming an oval-triangular spur behind the last denticle. The opening of pulp cavit gaping as far as the base of the first denticle.

Occurrence. — Lower Silesia (Górażdże), Lower Muschelkalk; Germany, Lower Muschelkalk, Keuper.

Family — unknown

Genus *PARANEREITES* Eisenack, 1939*Paranereites balticus* Eisenack, 1939

(Pl. 2, Fig. 1)

1939. *Paranereites balticus* n. sp.; A. Eisenack, pp. 168—169, Rys. 13.1967. *Paranereites balticus* Eisenack; H. Kozur, p. 862, Pl. 1, Figs 1, 5—6.1971. *Paranereites balticus* Eisenack; H. Kozur, p. 76, Pl. 13, Figs 23, 28.*Material.* — Nineteen right and seventeen left jaws.

Dimensions. — Length 0.480 to 0.720 mm; width 0.120 to 0.240 mm. The specimen illustrated: length 0.720, width 0.240 mm.

Description. — An elongated form, resembling a bent and flattened cone, whose anteriorly bent hook extends and gradually passes into the rest of the jaw. Inner and outer margin converge more or less halfway the jaw, so that the posterior part of jaw elongates and, frequently, tapers. Inner margin of the anterior part provided with a thin sharp-edged, fairly wide list situated in the plane of jaw. Ridges stretching posteriorly of the hook and nearer the outer margin of jaw are clearly visible on both the ventral and dorsal side. They make up attachment places of the inner septum to the wall of jaw. This septum divides the wall into two parts, the outer one having, therefore, the form of a long, conical tooth. Part of jaw situated between the outer margin and that mentioned above is ventrally convex and provided with semicircular rollers and grooves.

Remarks. — Almost all features of the specimens described above accurately correspond to characteristics of the holotype. Since only two specimens were available to Eisenack, it seems very likely that the presence of inner septum escaped his attention. In the sight of this supposition, the absence of any mention of this, complication in structure from Kozur's works (1967, 1971), based on a abundant material, is incomprehensible.

Occurrence. — Lower Silesia (Górażdże), Polish Jura Chain (Rokitno), Lower Muschelkalk; Baltic-sea region, Jurassic; Germany, Upper Muschelkalk and Upper Cretaceous.

Order Eunicida Dales, 1962
Family Lysaretidae Kinberg, 1865, emend. Kozur, 1970
Genus *DELOSITES* Kozur, 1967

Delosites raridentatus Kozur, 1967, emend. author
(Pl. 1, Figs 1—3)

1967. *Delosites raridentatus* n. sp.; H. Kozur, p. 857, Pl. 2, Fig. 10.

1967. *Palurites separatus* n. sp.; H. Kozur, pp. 861—862, Pl. 3, Figs 19—20.

1971. *Delosites raridentatus* Kozur; H. Kozur, p. 83, Pl. 14, Fig. 14.

1971. *Palurites separatus* Kozur; H. Kozur, p. 77, Pl. 13, Figs 22, 27.

New diagnosis. — Length of carriers, about 0.6 of the length of *MI*. *MI* shaped like an elongated triangle. Hook long, slender. All other denticles much smaller and widely spaced. Outer-posterior corner provided with a large process. Oval opening of pulp cavity occupying 0.4 of the length of jaw. *MII* seems to be identical as or somewhat shorter than *MI*. Teeth widely spaced. Opening of pulp cavity gaping.

Denticle formula:	<i>MI</i>	4—5	4—6
	<i>MII</i>	6—7	6—9

Material. — An apparatus composed of 6 elements, joined carriers, two *MI* and two *MII*, as well as 6l *MI* and 12l *MII*.

Description. — Carriers strongly deformed, their shape difficult to discern, except in lateral view which allows one to see that these are two plates strongly fused with *MI* and *MII* (?). In Fig. 2, the carriers are shown hypothetically on the basis of the fact that the same type of morphology was observed in all samples in which the carriers occurred, along with *MI* and *MII*. Anterior margin sublinear, inner margins slightly concave, outer forming — in the anterior part of carriers — a distinct bight subsequently running posteromedially. Length of *MI* varying from 0.200 to 0.700 mm, of *MII* 0.200 to 0.600 mm. Dimensions of the apparatus illustrated: length of carriers, 0.120 mm, of *MI* 0.192 mm, of *MII* 0.190 mm. *MI* has a very long, slender hook, running in the posterior part anterolaterally; its anterior terminal part is nearly always arranged laterally and only rarely slightly posterolaterally. Inner margin straight or, in the part occupied by the denticles, somewhat convex. Denticles usually directed laterally; sometimes, the first and second denticle behind the hook display a slight anterolateral deviation. Denticles are long, needle-shaped and gradually diminishing posteriorly. Beginning with the last tooth, which in many cases is very indistinctly outlined, inner margin changes its direction. Outer margin running posterolaterally and at a distance of 2/5 of its length from the posterior margin of jaw passes in to a large, spatulate process. Further on, this margin runs posteromedially, subsequently turning transversally. The anterior margin of pulp cavity is falcate in outline, the posterior one provided with a collar-shaped convexity.

The right and left jaws are mirror-like reflections of each other. *MII* is elongated. Except for the anterior part with the first denticle, the entire jaw is lanceolate in outline. Outer margin of a wide, foliaceous tooth passes posteriorly into a short, posteriorly directed shank. Anterior parts of the outer margin of the left slope of the right jaw and of the right slope of the left jaw form a fairly wide, oval, posterolaterally facing convexity. Inner, narrow parts of this slope are subvertical, outer wider and situated at a certain angle to the inner. Margins of these slopes are usually provided with a remainder of the attachment lamella. Denticles widely spaced, foliaceous or triangular, sometimes nodular. Opening of pulp cavity occupying the entire length of jaw. On the side of the right margin of the right jaw and left margin of the left jaw, the margin of pulp cavity is swollen. *MIIr* is a mirror-like reflection of *MIIl*.

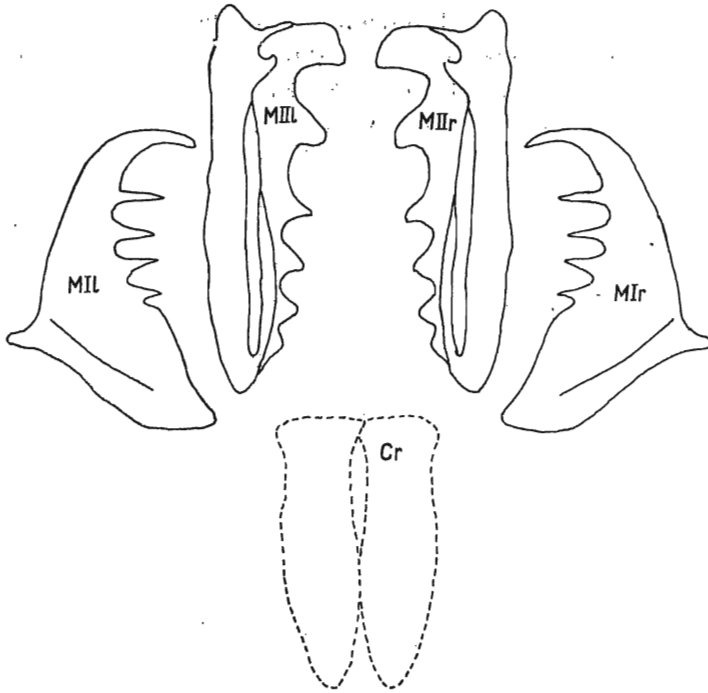


Fig. 2

Diagram of the jaw apparatus *Delosites raridentatus* Kozur, emend. Zawidzka

Variability. — A general variability is shown in Fig. 3. In the case of *MI*, it is mostly expressed in the outline of the inner margin and the shape and situation of teeth, while in *MII* a differentiation is observed in the shape and size of teeth. Dimensions of jaws vary within wide limits.

Remarks. — In 1967, two genera and two species for *MI* and *MII* of the apparatus described have been erected by Kozur who treated them as separate parataxons. Then, in 1970, he placed them in the classification, he corrected, on the following positions: *MI* = „*Delosites*” *raridentatus* Kozur within the family Lysaretidae, Kinberg, 1865, emend. Kozur, 1970 and *MII* = „*Palurites*” *separatus* within the family Dorvilleidae Chamberlin, 1919, emend. Kozur, 1970. At the same time, this author is not quite certain of the systematic position of the last-named genus (*Palurites*).

In 1971, after classification changes, introduced by Kozur, *Delosites* has finally been assigned to the family Lysaretidae Kinberg, 1865, emend. Kozur, 1970 and *Palurites* in the family Dorvilleidae Chamberlin, 1919, emend. Kozur, 1970.

The fact described above may constitute a contribution to further considerations of the advisability of using one taxonomic system for both isolated elements and complete jaw apparatus of fossil polychaetes.

The carriers, here tentatively assigned to *Delosites raridentatus*, are very similar to those of the jaw apparatus of *Kielanoprion pomeranensis* Szaniawski, 1968, as well as *Marphysaites pistullus* Taugourdeau, 1968, *M. paranaensis* Lange, 1949 (cf. Taugourdeau 1970, 1971), *Mülleriprion?* Kozur, 1967 and *Marphysaites junctus* Eller, 1964.

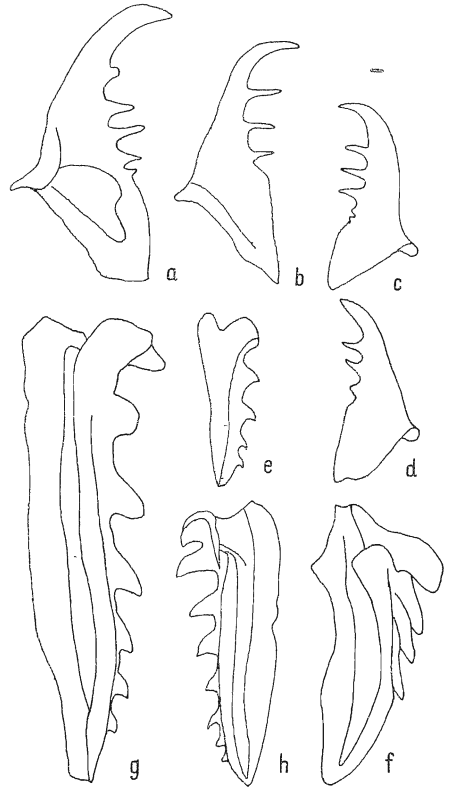


Fig. 3

Delosites raridentatus Kozur, emend. Zawidzka; several jaws illustrating the specific variability

a *Mlr* from ventral side, b *Mll* from dorsal side, c *Mlr* from dorsal side, d *Mlr* from dorsal side, e *Mlll* from ventral side, f *Mlll* (?pathological form) from left lateral side, g *Mlll* from left lateral side, h *Mllr* from right lateral side

It should be added that the fact that, in the process of studies on this material, „*D.*” *raridentatus* and „*P.*” *separatus* occurred in samples in equal amounts, predominating over other scolecodonts, enabled the conclusion that they belonged to one and the same apparatus. This conclusion was subsequently confirmed by finding such an apparatus.

Occurrence. — The apparatus was found in the Gogolin Beds at Górażdże, Lower Silesia. Isolated elements of this apparatus occurred in predominant amounts in all profiles (Fig. 1). In Germany, such elements also occur in the Lower Muschelkalk.

Eunicites thuringensis? (Kozur, 1967)
(Pl. 3, Figs 6—7)

1967. *Mülleriprion?* *thuringensis* n. sp.; H. Kozur, p. 847, Pl. 2, Fig. 6.

1967. *Mülleriprion?* cf. *thuringensis* Kozur; H. Kozur, p. 847, Pl. 2, Fig. 5.

1967. *Mülleriprion?* sp. B Kozur; H. Kozur, pp. 851, 854, Pl. 2, Fig. 3.

1971. *Eunicites thuringensis* (Kozur); H. Kozur, p. 85, Pl. 15, Figs 1—2.

Material. — Two right and one left jaw.

Dimensions. — Length of the order of 0.380 mm, width 0.096 mm; dimensions of the specimens illustrated: in Pl. 3, Fig. 7 — length 0.378; in Pl. 3, Fig. 6 — length 0.364 mm.

Description. — Elongate, narrow jaws with a large number of triangular, posteriorly deflected denticles on outer margin. Not very long, transverse branchings occur in the anterior part. In dorsal view, some of the specimens are bent and S-shaped. Opening of pulp cavity gaping.

Remarks. — The undulations of the jaw, differing in intensity in various planes, do not seem to be a permanent character within one species.

Occurrence. — Lower Silesia (Góraźdze), Lower Muschelkalk; Germany, Upper Muschelkalk.

?Eunicites sp. A

(Pl. 3, Fig. 4)

Material. — Probably *MIIIr* and *MIVr* connected with each other.

Dimensions. — Each of the jaws is about 0.240 mm long.

Remarks. — The jaws illustrated are very similar to *MIII* and *MIV* of the jaw apparatus of *Kielanoprion pomeranensis* Szaniawski, described from the Permian of Poland, and to anterior jaw of *Paulinites paranaensis* Lange, 1949. Similar, isolated jaws were described by various authors as *Paleoenonites*, *Eunicites*, etc. (cf. Szaniawski 1968, pp. 271—273).

In new classification suggestions of Kozur (1970, 1971), the genus *Kielanoprion* has been treated as a younger synonym of *Eunicites* Ehlers, 1968, emend. Kozur, 1970.

Occurrence. — Lower Silesia (Góraźdze), Lower Muschelkalk.

„*Arabellites*” *mamilatus* sp. n.

(Pl. 3, Fig. 12)

Holotype: MII 0175 (21—22), Pl. 3, Fig. 12.

Type horizon: upper part of the Gogolin Beds, Lower Muschelkalk.

Type locality: Góraźdze, Lower Silesia.

Derivation of name: after mamillary denticles.

Material. — Six right and nine left jaws.

Dimensions. — All jaws, both right and left, are similar in dimensions, length 0.450, width 0.120 mm; holotype 0.432 mm long and 0.160 mm wide.

Description. — Jaw triangular, elongate, with denticulated inner margin. Hook slender, short, deflected posteriorly. The denticles mamillary in shape, rarely tapering distally; they may be longer or shorter in particular jaws. Their number reaching 16, they are almost uniform in size, closely and uniformly spaced, directed laterally and slightly bent dorsally. Inner margin straight, with an only small concavity below the center of jaw. Denticles occupy 3/5 of the length of inner margin. Outer margin, anteriorly straight, further running posterolaterally and forming in this corner a distinct, pointed process. Outer part of posterior margin first running posteromedially and then transversally. Anterior margin of pulp cavity semicircular, posterior limited by a convex belt extending towards the inner margin of jaw. Both right and left jaws are symmetrical.

Remarks. — *A. mamilatus* sp. n. is similar to *A. plesiocomis* Tasch & Stude, 1966, from which it differs, however, in the number and shape of teeth.

Occurrence. — Lower Silesia (Góraźdze), Polish Jura Chain (Rokitno, Trzebyczka), Lower Muschelkalk.

„*Arabellites*” *magnidentatus* Seidel, 1959

(Pl. 2, Figs 5 and 7)

1959. *Arabellites?* *magnidentatus* n. sp.; S. Seidel, pp. 22—23, Pl. 1, Figs 16—18; Pl. 2, Fig. 19.

Material. — Three right and four left jaws along with a carriers connected with *MIII*.

Dimensions. — Length varying from 0.5 to 1.0 mm. Length of the specimens illustrated: Pl. 2, Fig. 5 — 0.528 mm, Fig. 7 — 0.848 mm.

Description. — Jaw triangular in outline, with inner margin having 9 to 11 teeth, the first of them most conspicuous and directed laterally, the remaining ones decreasing and gradually more and more sloping posteriorly. Outer margin forming, near the posterolateral corner, a distinct bight and a triangular or rounded process. Posterior margin straight in its inner part and directed posteromedially. Its inner sector, marking up $1/5$ of the entire margin, changes its direction more transversally. A furrow, separating the distal part of jaw from the rest of it, runs on the dorsal side parallel to the outer sector of posterior margin. This furrow does not reach the posterior margin. The anterior margin of pulp cavity semicircular, posteriorly labiate convex.

Carriers reaching in length about a half of that of jaw (Pl. 2, Fig. 5) and seem to be shifted so that their anterior margin is situated underneath. Both lateral margins of carriers are concave, the anterior substraight, posterior rounded.

Occurrence. — Lower Silesia (Górażdże), Lower Muschelkalk; Thuringia, Zechstein.

„*Arabellites*” *oblongus* Seidel, 1959
(Pl. 2, Fig. 6)

1959. *Arabellites? oblongus* n. sp.; S. Seidel, p. 24, Pl. 2, Fig. 23.

Material. — One Mlr.

Dimensions. — Length 0.928, width 0.387 mm.

Description. — Jaw elongate with five robust, triangular teeth, fairly widely spaced on inner margin. Hook substraight, not very long, anterolateral. The size of the remaining denticles slightly decreasing posteriorly, their direction changing into more lateral. Anteriorly, outer margin substraight, further on arcuate, forming near the posterolateral corner a shallow bight and a small process. Outer sector of posterior margin substraight, inner forming a bight and changing its direction transversally. An opening of pulp cavity, occupying one-third of the length of jaw, is visible on the ventral side. Its anterior margin is semicircular, posteriorly labiate.

Remarks. — *A. oblongus* differs from other isolated elements primarily in length, number and situation of denticles on inner margin.

Occurrence. — Lower Silesia (Górażdże), Lower Muschelkalk; Thuringia, Zechstein.

„*Arabellites*” sp.
(Pl. 3, Fig. 11)

Material. — One Mlr.

Dimensions. — Length 0.768, width 0.208 mm.

Description. — Jaw elongate, with a long, slender, pointed hook, directed laterally. Seven denticles occur on the outer, twisted margin. Inner margin of hook is not situated in the plane of this twisted margin but extends further posteriorly into a distinct ridge and, consequently, a deep, longitudinal depression is formed on the dorsal side outside the denticulated margin. The second denticle having an identical habitus as that of hook, is smaller. The remaining denticles triangular, pointed, sloping posteriorly, their size decreasing and slope increasing also posteriorly. Outer margin, running posterolaterally, forms a small bight. Outer

sector of posterior margin running obliquely from the posterolateral corner, inner transversally. Opening of pulp cavity small.

Remarks. — The jaw under study is relatively well preserved and does not display any flattening, which seems to preclude diagenetic changes in its structure and be an evidence of primary complications in structure.

Occurrence. — Lower Silesia (Górażdże), Lower Muschelkalk.

„*Nereidavus*” *nudus* Taugourdeau, 1971

(Pl. 2, Figs 2—3)

1968. *Nereidavus nudus* n. sp.; P. Taugourdeau, pp. 1, 242, Fig. 111.

Material. — Thirteen right and thirteen left jaws.

Dimensions. — All jaws approximately the same in size. Length of the specimen illustrated in Pl. 2, Fig. 2 — 0.576, width 0.256 mm and of that illustrated in Pl. 2, Fig. 3 — resp. 0.426 and 0.208 mm.

Description. — An elongate, slender form with a prominent hook directed posteriorly. Inner margin smooth and medially convex, outer bending from the base of hook posterolaterally and passing in a small but well outlined process. Outer part of posterior margin running posteromedially, inner changing its direction in a more transversal one. Opening of pulp cavity small, its anterior margin semicircular. Inner wing well developed, separated from the posterior part of inner margin by a narrow depression. A small groove occurs between this margin and a more dorsally situated small ridge. Such a system of depressions and elevations may be observed on both right and left jaw which are symmetrical.

Occurrence. — Lower Silesia (Górażdże), Polish Jura Chain (Rokitno, Trzebyczka), Lower Muschelkalk; Sahara Desert, Middle Devonian.

„*Paleoenonites*” sp.

(Pl. 3, Fig. 4)

Material. — One right and three left jaws.

Dimensions. — Length of the order of 0.400, width 0.270 mm; length of the specimen illustrated 0.400 mm.

Description. — Jaw shaped like an elongate triangle. Inner margin straight, denticulated. Number of denticles constant, amounting to 7. The first tooth always more conspicuous than other ones, the second the smallest. Denticles triangular, frequently with truncate tips, only slightly sloping posteriorly and occupying about two-thirds of the inner margin. Anterior part, together with anterior teeth deflected transversally. Opening of pulp cavity gaping. Ventral part of the outer margin always with a superstructure formed by a variously-sized attachment lamella.

Remarks. — The form described displays a considerable similarity to the previously known jaws of *Oenonites aequibrachiatus* Eller, 1945, *Paleoenonites henryi* Eller, 1945 and *Staurocephalites* sp. Kozur, 1967.

Occurrence. — Lower Silesia (Górażdże), Polish Jura Chain (Rokitno), Lower Muschelkalk.

„*Ildrattes*” *anatinus* (Stauffer, 1939)

(Pl. 5, Fig. 5)

1939. *Arabellites anatinus* n. sp.; C. R. Stauffer, p. 501, Pl. 58, Figs 40—42, 50.

1945. *Ildrattes camurus* n. sp.; E. R. Eller, p. 142, Pl. 2, Figs 30—37.

1966. *Ildraites anatinus* (Stauffer); P. Tasch & I. R. Stude, p. 21, Pl. 2, Figs 12—13.
 1967. *Arabellites anatinus* Stauffer; H. Kozur, p. 855, Pl. 1, Fig. 2.
 1967. *Arabellites moeanus* n. sp.; M. Wilczewski, pp. 54—55, Pl. 5, Figs 1, 2—5.
 1971. *Ildraites gallica* n. sp.; P. Taugourdeau, p. 87, Pl. 2, Figs 29—31.
 1971. *Arabellites anatinus* Stauffer; H. Kozur (partim), p. 80, Pl. 14, Fig. 1 (non cet.).

Material. — Four right jaws.

Dimensions. — Length of the specimen illustrated 0.364, width 0.160 mm.

Description. — A form with a prominent hook. Outer and inner margins slightly convex, subparallel to each other, inner having seven conical, almost equally sized, posteriorly sloping denticles. The last tooth is always the smallest. Posterior margin forming a deep bight, oval or subrectangular in outline.

Remarks. — *I. anatinus* has many characters in common with *MIR* of jaw apparatus described under the generic name of *Atraktoprion* (*A. major*, *A. robustus* Kielan-Jaworowska, 1966, *A. eudoxus* Szaniawski, 1968).

Occurrence. — Lower Silesia (Strzelce Opolskie), Polish Jura Chain (Rokitno), Lower Muschelkalk; U.S.A., Middle Devonian; Germany, Upper Muschelkalk; France, Upper Devonian.

„*Ildraites*” cf. *serratus* Kozur, 1967
 (Pl. 4, Fig. 6)

1962. *Ildraites* cf. *serratus* n. sp.; H. Kozur, pp. 860—861, Pl. 3, Fig. 9.

Material. — A left jaw.

Dimensions. — Length 0.336, width 0.240 mm.

Description. — A fairly short, flattened form with eight teeth gradually diminishing posteriorly. Hook not distinguished. Anterior margin straight; margin of the right slope medially extends to form a pointed process. Opening of pulp cavity occupying the outer part of jaw.

Occurrence. — Lower Silesia (Góraźdże), Lower Muschelkalk; Germany Upper Muschelkalk.

„*Ildraites*” sp.
 (Pl. 3, Fig. 5)

Material. — A left jaw.

Dimensions. — Length 0.320, width 0.176 mm.

Remarks. — The scolecodont described is similar to many forms of the genus „*Ildraites*”, e.g.: *I. decorus* Eller, 1961, *I. bifurcatus*, *I. eldoradus*, *I. spiculatus* Tasch & Stude, 1966.

Most of the characters of its morphology are in common with those of *MIII* of *Kalloprion* sp. a Kielan-Jaworowska, 1966 and *MIII* of *Halla tortilis* (Kozur, 1967 (cf. remarks on *Lumbriconereites* sp. A).

Occurrence. — Polish Jura Chain (Rokitno), Lower Muschelkalk.

„*Lumbriconereites*” sp. A
 (Pl. 3, Fig. 10)

Material. — A right jaw.

Dimensions. — Length 0.560 mm.

Description. — An elongate form with a substraight inner margin provided with 12—13 long, triangular, pointed, posteriorly sloping denticles. The first

tooth is slightly longer than the remaining ones. Anterior margin rounded, posteriorly passing in a fairly long shank with a more or less deep bight. Opening of pulp cavity occupying almost an entire length of jaw, except for the hook.

Remarks. — The genus *Lumbriconereites* Ehlers, 1868 has been considered by Kozur (1970) as a synonym of *Eunicites* Ehlers, 1868 since the erection of these two genera by Ehlers was based, according to Kozur, on an insufficiently well preserved and erroneously interpreted material. The scolecodonts described as *Lumbriconereites* are the jaws of apparatus belonging to the Polychaetaspidae, Ramphoprionidae, Polychaeturidae, and Kalloprionidae. The discussed form seems to correspond in Kozur's classification to *MIIr* of the species *Notocirrus? pulcher* Kozur, 1971 (entitling the second part of diagnosis as *MIIIr* in Kozur, 1971, p. 79 should perhaps be considered as a printing mistake?). On the other hand, this form is very similar to *MIIr* of *Halla tortilis* (Kozur, 1967).

Occurrence. — Lower Silesia (Góraźdże), Lower Muschelkalk.

„*Lumbriconereites*” sp. B
(Pl. 3, Fig. 9)

Material. — Two right jaws.

Dimensions. — Length 0.364 mm.

Description. — An elongate form with 15 teeth and a distinct, posterolaterally directed shank. Inner wing conspicuous, triangular, its anterior margin concave. The first, posteriorly deflected, tooth is the largest. Opening of pulp cavity gaping as far as the base of the first 2 to 3 teeth.

Remarks. — „*Lumbriconereites*” sp. B displays a certain similarity to *L. latifrons* Eller, 1964. It also has many character in common with *MIIr* of *Halla tortilis* (Kozur, 1967).

Occurrence. — Lower Silesia (Góraźdże), Polish Jura Chain (Trzebyczka), Lower Muschelkalk.

„*Leodicites*” *falciformis* (Stauffer, 1939)
(Pl. 4, Fig. 1)

1939. *Arabellites falciformis* n. sp.; C. B. Stauffer, p. 502, Pl. 58, Figs 13, 15–16.

1939. *Arabellites cultriformis* n. sp.; C. B. Stauffer, p. 502, Pl. 58, Figs 9–10.

1959. *Arabellites falciformis* Stauffer; R. K. Sylvester, p. 40, Pl. 5, Figs 5–6.

1959. *Arabellites cultriformis* Stauffer; R. K. Sylvester, p. 40, Pl. 5, Figs 7–8.

1968. *Leodicites falciformis* (Stauffer); P. Taugourdeau, pp. 1236–1237, Pl. 1, Figs 21–26; Pl. 3, Figs 59, 61, 64, 69; Pl. 4, Figs 131–136, 139.

1971. *Leodicites falciformis* (Stauffer); P. Taugourdeau, p. 88, Pl. 2, Figs 43–44.

Material. — Five right and six left jaws.

Dimensions. — Length varying from 0.270 to 0.440, width from 0.130 to 0.230 mm. Length of the specimen illustrated 0.432, width 0.256 mm.

Description. — An elongate jaw with a straight, denticulated inner margin and fairly long, transversal branch, arranged at a varying, but always acute angle to the longitudinal branch of jaw. Transversal branch sharply terminating and only slightly upturned, similarly as a row of denticles whose number fluctuates between 11 and 13. The first tooth is always the largest. All denticles sloping posteriorly. Opening of pulp cavity occupying the outer part of jaw.

Remarks. — It should be stated, in conformity with Lange's opinion, that some MII (dental plate) of the jaw apparatus of *Paulinites paranaensis* Lange (cf. Lange 1949) are similar to *L. falciformis*. A considerable similarity to the species under study is also displayed by the type species of the genus *Leodicites*, that is, *L. variedentatus* Eller, 1940 and by *L. irregularidentatus* Taugourdeau, 1968. Their similarity to *L. falciformis* has already been emphasized by the authors of the species referred to above. In addition, certain characters in common with *L. falciformis* are displayed by *L. heteropsis* Eller, 1964.

According to Kozur's suggestions, the paragenus *Leodicites* makes up an MII of the jaw apparatus of *Kettnerites* Žebera, 1935. The jaws described as *Leodicites* also occur in the jaw apparatus of *Eunicites* sp. undet. Tasch & Stude, 1964.

Kozur (1970, 1971) believes in turn that *Kielanoprion* Szaniawski, 1968 and *Mülleriprion* Kozur, 1967 are younger synonyms of *Eunicites* Ehlers, 1968, emend. Kozur, 1970. In view of this fact and according to this author's conception, *Leodicites* Eller, 1940 = *Kettnerites* Žebera, 1935 (MII) = *Eunicites* Ehlers, 1968 (MII).

Occurrence. — Lower Silesia (Strzelce Opolskie, Górażdże), Polish Jura Chain (Rokitno), Lower Muschelkalk; U.S.A., Middle Devonian; Sahara Desert, Devonian; France, Devonian.

„*Leodicites*” *angiformis* Eller, 1955
(Pl. 1, Fig. 7; Pl. 3, Figs 1—2)

1955. *Leodicites angiformis* n. sp.; E. R. Eller, p. 349, Pl. 22, Figs 5—6.

1959. *Leodicites? hamatus* n. sp.; S. Seidel, pp. 25—27, Pl. 2, Figs 26—33; Pl. 4, Figs 26a, 31a.

1966. *Arabellites falciformis* Stauffer; Tasch & Stude, pp. 12—13, Pl. 1, Figs 1—3, 8.

Material. — Three right jaws.

Dimensions. — Lengths and widths of the specimens illustrated: in Pl. 1, Fig. 7 — resp. 0.794 and 0.208 mm, in Pl. 3, Fig. 1 — 0.512 and 0.224 mm, in Pl. 3, Fig. 2 — 0.640 and 0.192 mm.

Remarks. — Within the genus „*Leodicites*” there are many species very similar to each other. *L. angiformis* in principle differs from *L. crassimarginatus* only in the lack of a process in the anterior part of the margin of the right slope of the right jaw and of the left slope of the left jaw and, consequently, in a different shape of the opening of pulp cavity. All other characteristics are mostly similar in both species. Characteristics of many of these species are contained within the variability of the features of the second pair of jaws of the apparatus in *Kielanoprion pomeranensis* Szaniawski, 1968 (cf. remarks on *L. falciformis*).

Occurrence. — Lower Silesia (Górażdże), Lower Muschelkalk.

„*Leodicites*” *crassimarginatus* Eller, 1961
(Pl. 1, Fig. 6)

1961. *Leodicites crassimarginatus* n. sp.; E. R. Eller, p. 39, Pl. 2, Figs 27—29.

1964. *Leodicites finitimus* n. sp.; E. R. Eller, pp. 240—241, Pl. 2, Figs 18—19.

Material. — Two right and five left jaws.

Dimensions. — Length and width of the specimen illustrated resp. 0.864 and 0.320 mm.

Remarks. — *L. crassimarginatus* is very similar to *L. angiformis* (cf. remarks on *L. angiformis*).

Occurrence. — Lower Silesia (Górażdże), Lower Muschelkalk.

„*Leodicites*” *magnificus* (Stauffer, 1939)
(Pl. 4, Fig. 2)

1939. *Arabellites magnificus* n. sp.; C. R. Stauffer, p. 503, Pl. 57, Fig. 7; Pl. 58, Figs 1, 14.
1971. *Arabellites anatinus* Stauffer; H. Kozur (partim), p. 80, Pl. 14, Fig. 11 (non cet.).

Material. — Two jaws, the right with seven and left with five teeth.

Dimensions. — Length and width of the specimen illustrated, resp. 0.384 and 0.308 mm.

Remarks. — The jaws described are almost identical with *MIIr* of the jaw apparatus of *Atraktoprion eudoaxus* Szaniawski, 1968, which has already been emphasized earlier by the author of the latter species (Szaniawski 1968). Kozur (1971) considers *L. magnificus* as the second pair of jaws of the apparatus he described as *Arabellites anatinus*.

Occurrence. — Lower Silesia (Góraźdże), Polish Jura Chain (Trzebyczka), Lower Muschelkalk.

Gen. et spec. indet. A
(Pl. 3, Fig. 8)

Material. — One basal plate?

Dimensions. — Length 0.208, width 0.128 mm.

Remarks. — The form here presented is similar to the scolecodonts described as *Paleoenonites* Eller, 1942 (cf. Eller 1955) and *Eunicites* Ehlers, 1968 (cf. Sylvester 1959; Taugourdeau 1968, 1970, 1971). Considerably similar to it are some elements (bp and small anterior jaws) of jaw apparatus in *Paulinites* Lange, *Atraktoprion* Kielan-Jaworowska and *Polychaetaspis* Kielan-Jaworowska.

Occurrence. — Lower Silesia (Góraźdże), Lower Muschelkalk.

Gen. et spec. indet. B
(Pl. 4, Fig. 5)

Material. — One specimen.

Dimensions. — Length 0.352, width 0.116 mm.

Description. — A small, triangular form with six conical, pointed and straight denticles on inner margin, their size gradually decreasing posteriorly. Anterior part of the right slope provided with a very long attachment lamella. Opening of pulp cavity gaping over the entire length.

Remarks. — Similarly as in the previous form (gen. et spec. indet. A), most characters are similar or sometimes even identical with those of the scolecodonts so far described as *Paleoenonites* and *Anisocerasites*. A particular similarity is displayed by *Paleoenonites pekten* Taugourdeau, 1968.

Occurrence. — Polish Jura Chain (Rokitno), Lower Muschelkalk.

Gen. et spec. indet. C
(Pl. 4, Fig. 4)

Material. — A mandible.

Dimensions. — Length 0.352, width 0.112 mm.

Description. — Anterior part oval, elongate, with its surface covered with concentric lines upturning near the inner margin and with a slightly outlined ridge running through its center. A bent posterior part forms a distinct margin. Basal part shaped like a dorsally convex angleplate.

Remarks. — The mandible here presented is most similar to those belonging to the jaw apparatus of *Oxyprion compressus* Szaniawski, 1968.

Occurrence. — Lower Silesia (Górażdże), Lower Muschelkalk.

Gen. et spec. indet. D

(Pl. 4, Fig. 8)

Material. — One left, broken-off carriers.

Dimensions. — Length 0.308, width 0.208 mm.

Description. — A carriers probably belonging to an apparatus of the prionognathic type. Anterior margin arcuate, inner slightly and outer strongly concave. A section transverse to the plane of carriers is shaped like a narrow wedge which is caused by a posteroventral swelling of carriers. Dorsal side flat.

Remarks. — Similar carriers were described as *Orthopelta mucronata* Eisenack, 1939. The greatest similarities may be found in the supports of the jaw apparatus in *Atraktoprion eudoxus* Szaniawski, 1968.

Occurrence. — Polish Jura Chain (Rokitno), Lower Muschelkalk.

Incertae sedis

(Pl. 4, Fig. 10)

Material. — A few fragments of thin plates.

Dimensions. — Length of the specimen illustrated, 0.730 mm.

Description. — Thin, uniformly thick, smooth, transparent and light-brown fragments of plates, frequently coiled irregularly. Some of their margins display the presence of hooklike, regular teeth, uniform in size and direction of sloping.

Occurrence. — Lower Silesia (Górażdże) Lower Muschelkalk.

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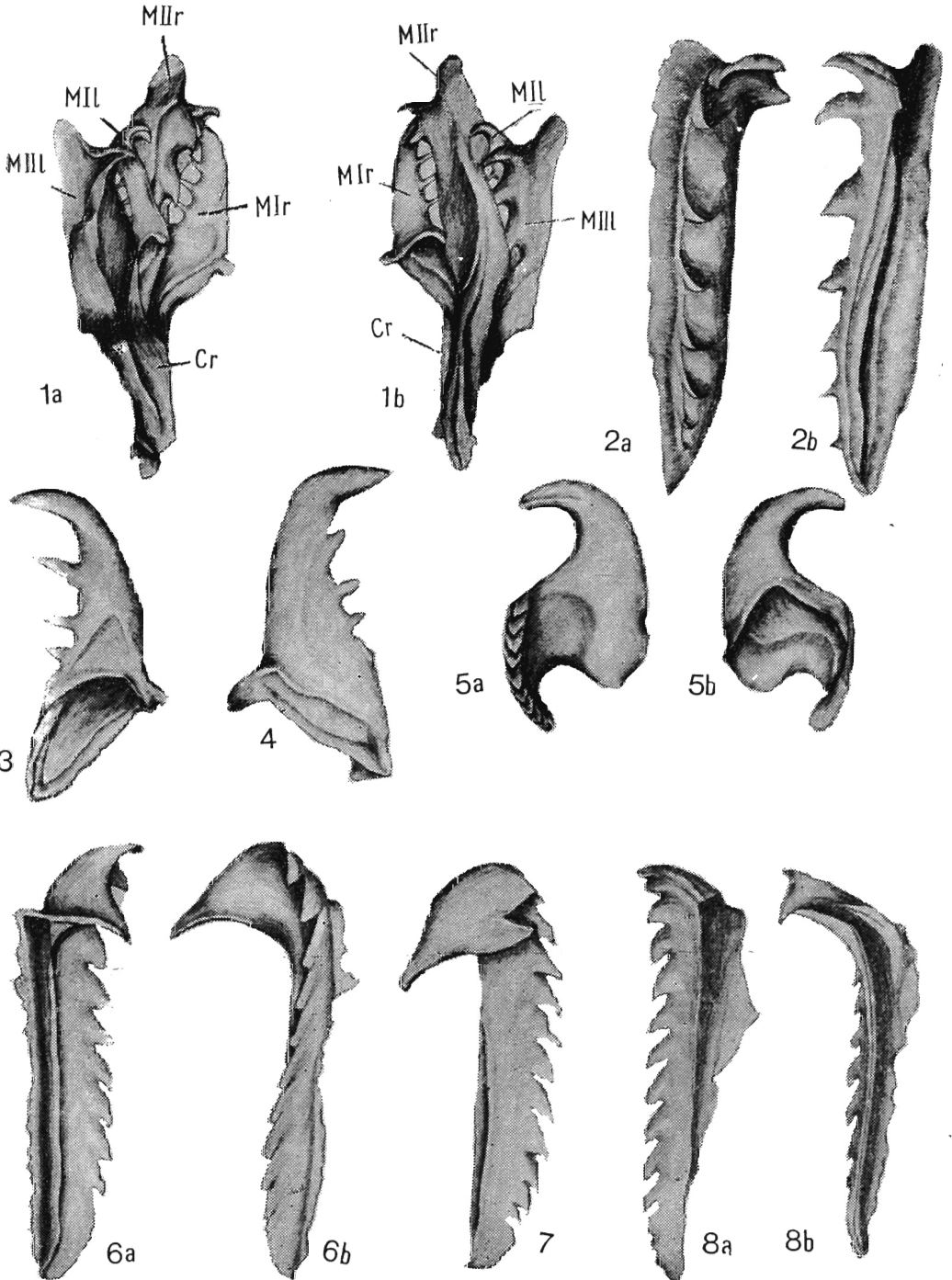
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Warsaw, April 1971

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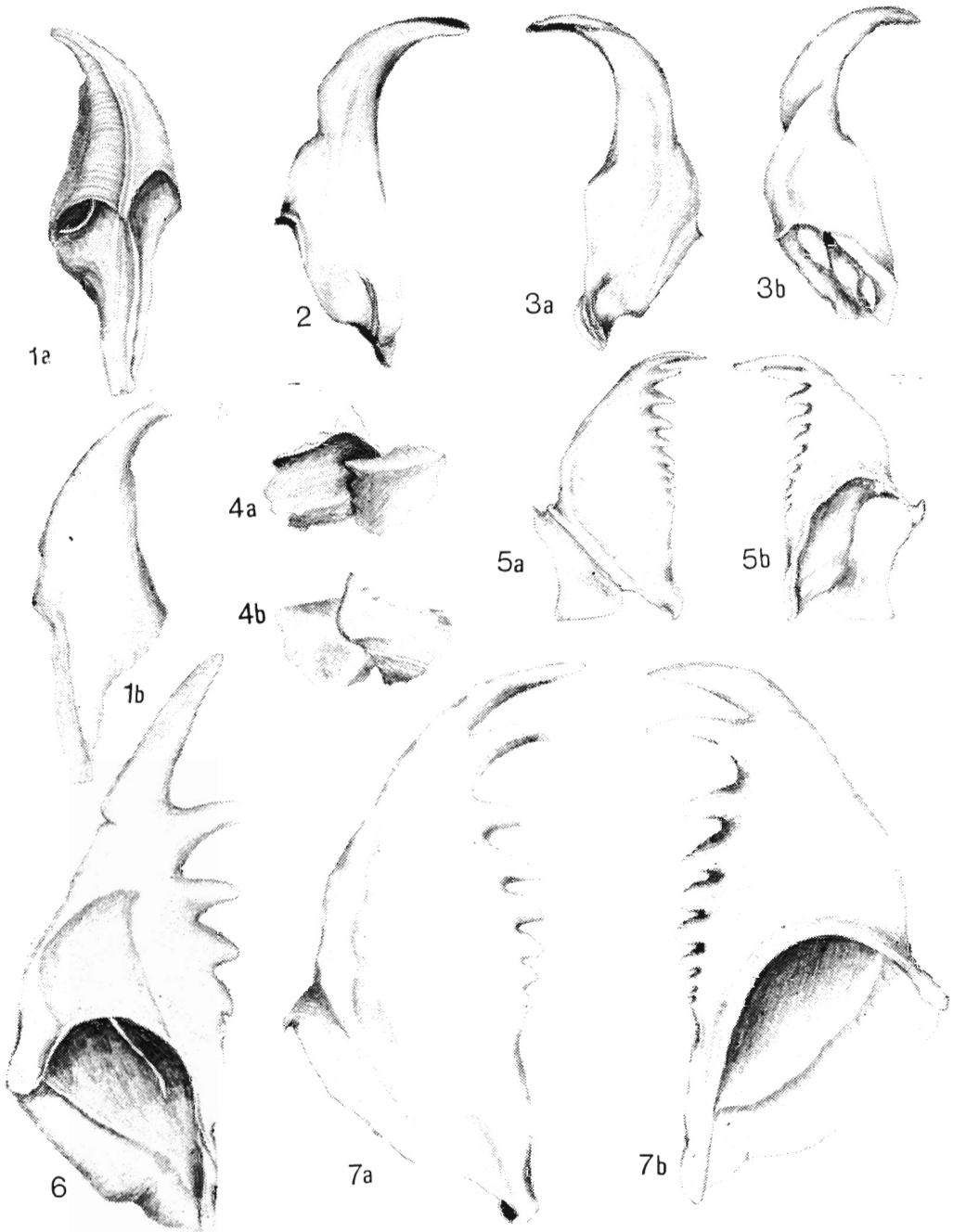


1-4 — Jaw apparatus *Delosites raridentatus* Kozur emend. Zawidzka; 1a dorsal, 1b ventral side, 2 MIr dorsal (a) and right lateral side (b), 3 MIL from ventral side, 4 MIL from dorsal side; Górażdże.

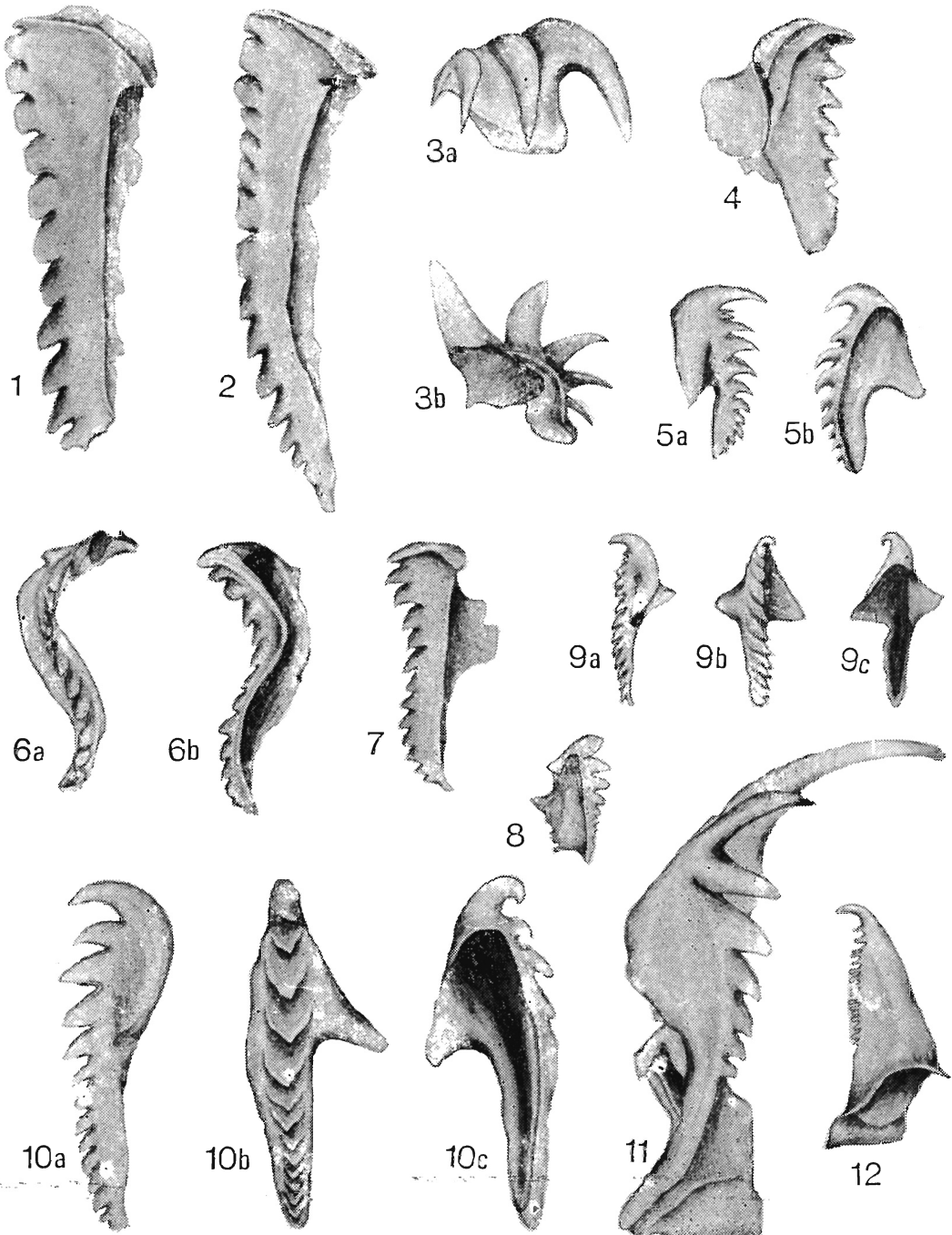
5 — "*Ildraites*" *anatinus* (Stauffer); right jaw from dorsal (a) and ventral (b) side; Strzelce Opolskie.

6 — "*Leodicites*" *crassimarginatus* Eller; left jaw from ventral (a) and dorsal (b) side; Górażdże.

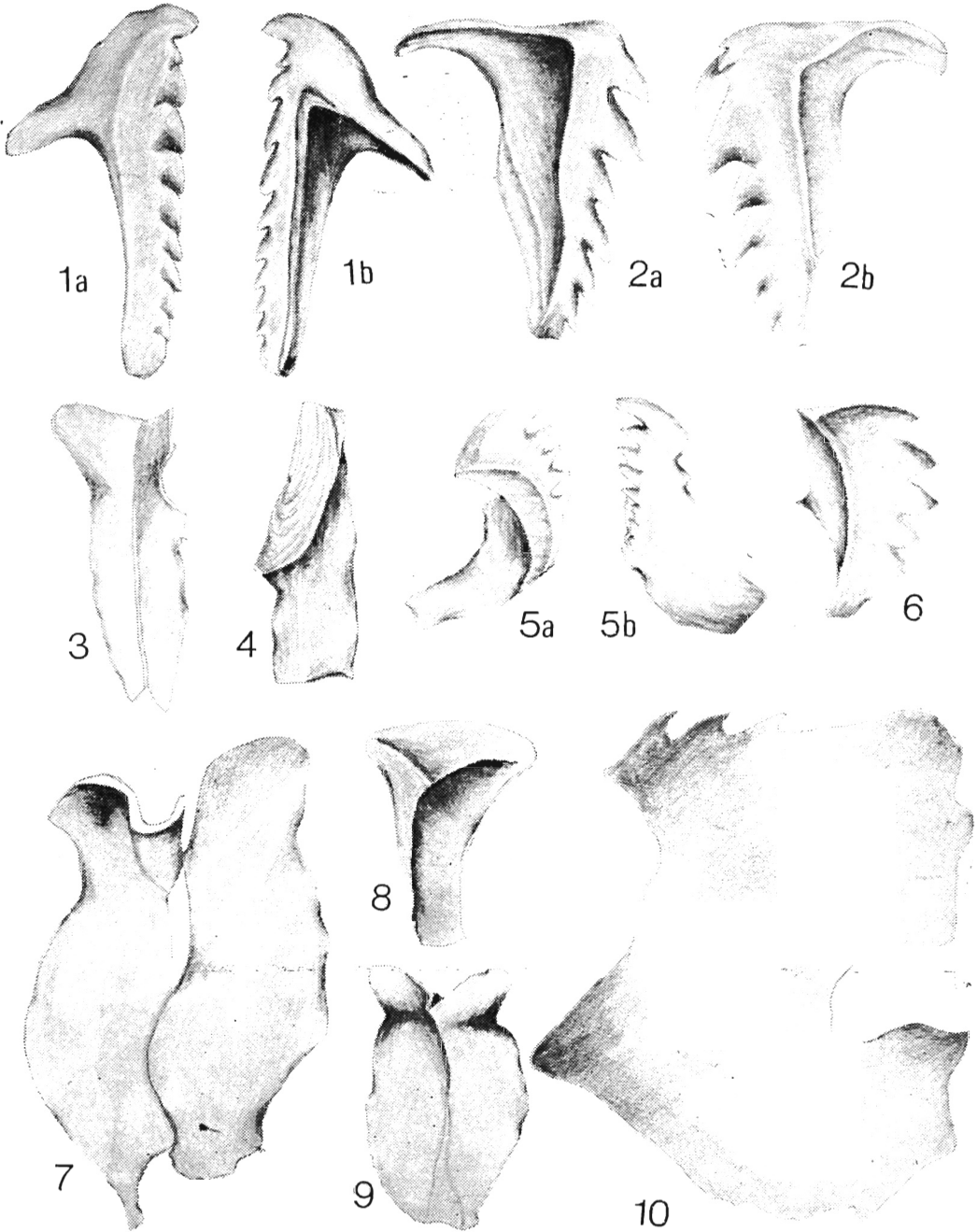
7-8 — "*Leodicites*" *angiformis* Eller; 7 left jaw from left lateral side, 8 right jaw from right lateral (a) and ventral (b) side; Górażdże.



1 — *Paranereites balticus* Eisenack; left jaw from ventral (a) and dorsal (b) side; Rokitno.
 2 — "*Nereidavus*" *nudus* Taugourdeau; left jaw from dorsal side; Górażdże.
 3 — "*Nereidavus*" *nudus* Taugourdeau; right jaw from dorsal (a) and ventral (b) side; Górażdże.
 4 — *Eunicites* sp.; right lateral (a) and left (?) lateral (b) side; Górażdże.
 5 — "*Arabellites*" *magnidentatus* Seidel; left jaw from dorsal (a) and ventral (b) side; Górażdże.
 6 — "*Arabellites*" *oblongus* Seidel; right jaw from ventral side; Górażdże.
 7 — "*Arabellites*" *magnidentatus* Seidel; left jaw from dorsal (a) and ventral (b) side; Górażdże.



1-2 — "*Leodictes*" *angiformis* Eller; right jaws from right lateral side; Górażdże.
 3 — *Goniada cuneata* (Kozur); dorsal (a) and ventral (b) side; Górażdże.
 4 — "*Paleoenonites*" sp.; left jaw from left lateral side; Górażdże.
 5 — "*Ildraites*" sp.; left jaw from left lateral (a), and ventral (b) side; Rokitno.
 6-7 — *Eunicites thuringensis*? (Kozur); right jaws from dorsal (6a) and right lateral (6b and 7) side; Górażdże.
 8 — Gen. et spec. indet. A; ventral side; Górażdże.
 9 — "*Lumbriconeretes*" sp. B; right jaw from right lateral (a), dorsal (b) and ventral (c) side; Górażdże.
 10 — "*Lumbriconeretes*" sp. C; right jaw from right lateral (a), dorsal (b) and ventral (c) side; Górażdże.
 11 — "*Arabellites*" sp.; right jaw from ventral side; Górażdże.
 12 — "*Arabellites*" *mamilatus* sp. n.; holotype — No. 0175 (21-22) — left jaw from ventral side; Górażdże.



1 — "*Leodicites*" *falciformis* (Stauffer); left jaw from dorsal (a) and ventral (b) side; Górażdże.
 2 — "*Leodicites*" *magnificus* (Stauffer); right jaw from ventral (a) and dorsal (b) side, Górażdże.
 3, 7, 9 — *Delosites raridentatus*? Kozur emend. Zawidzka; 3 joined carriers from dorsal side, Rokitno; 7 joined carriers from ventral side, Górażdże; 9 joined carriers from ventral side (Strzelce Opolskie).
 4 — Gen. et spec. indet. C; right mandible from dorsal side, Górażdże.
 5 — Gen. et spec. indet. B; from left lateral (a) and right lateral (b) side; Rokitno.
 6 — "*Ilدراتes*" cf. *serratus* Kozur; from left lateral side, Górażdże.
 8 — Gen. et spec. indet. D; left carriers from ventral side, Rokitno.
 10 — Incertae sedis, Górażdże.

K. ZAWIDZKA

**APARAT SZCZĘKOWY WIELOSZCZETA I SKOLEKODONTY
ZE ŚRODKOWEGO TRIASU POŁUDNIOWEJ POLSKI**

(Streszczenie)

W wapieniach marglistych stanowiących górną część warstw gogolińskich (dolny wapień muszłowy), w próbkach pobranych z odsłoneń (Strzelce Opolskie i Góraźdże na Dolnym Śląsku) oraz z wierceń (Rokitno i Trzebyczka na Jurze Polskiej) stwierdzono obecność licznych szczątków wieloszczetów. W profilu Góraźdże (por. fig. 1) znaleziono aparat szczękowy składający się z 6 elementów, a mianowicie — połączonych podpór, dwóch szczęk pierwszej pary oraz dwóch szczęk drugiej pary (fig. 2 oraz pl. 1, fig. 1). Różne szczęki takiego aparatu były dotychczas traktowane pod względem taksonomicznym niejednolicie (Kozur 1967, 1970, 1971). Nie podejmując szczegółowej dyskusji w sprawie taksonomii, autorka oznacza znaleziony aparat jako *Delosites raridentatus* Kozur emend. Zawidzka. Aparat ten wydaje się być formą charakterystyczną dla dolnego wapienia muszłowego, gdyż jego izolowane szczęki znane są dotychczas tylko z osadów tego wieku (por. Kozur 1967, 1970, 1971).

Zebrany materiał zawiera ponadto około 180 izolowanych szczęk opisywanego aparatu (fig. 3; pl. 1, fig. 2—4) oraz około 120 innych skolekodontów (por. pl. 1—4).

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