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KRYSTYNA ZAWIDZKA

Polychaete remains and their stratigraphic distribution in the Muschelkalk of southern Poland

ABSTRACT: Various remains of the polychaetes of the families Atraktoprionidae, Glyceridae, Goniadidae, Kalloprionidae (?), Lumbrinereidae, Lysaretidae, Mochtyellidae (?) and Muelleriprionidae have been described from the Muschelkalk of southern Poland. Elements *MI* and *MII* of the genus *Praelumbrinereis* of the family Lumbrinereidae display many characters in common with corresponding jaws of Paleozoic Paulinitidae, thus confirming a direct relationship of the two families. Two new species, *Elleriprion kozuri* sp. n. and *Kielanoprion longidentatus* sp. n. have been described and illustrated.

INTRODUCTION

The presence of many scolecodonts and more or less complete jaw apparatuses of the polychaetes (*cf.* Zawidzka 1971) has been stated during studies on the Muschelkalk stratigraphy of the Silesia-Cracow monocline (Opole Silesia, Upper Silesia, Polish Jura Chain), and the Fore-Sudetic monocline in southern Poland (Figs 1—2). The material collected includes several hundred scolecodonts, some dozen fragmentary and one complete apparatus. In this area, the polychaete remains occur in rocks of various lithological types. Frequently, a considerable number of scolecodonts in a rock is accompanied by an increased amount of other microfossils, in particular conodonts (*cf.* Zawidzka 1975).

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STRATIGRAPHIC DISTRIBUTION

The stratigraphic range of the polychaete remains in the Muschelkalk of the area studied is not uniform; they occur most abundantly in the Lower Muschelkalk.

In this area, the polychaete remains appear in deposits corresponding to the Lower Anisian. The jaws and carriers of the genus *Glycera* have been found in deposits assigned to the Röt (Fig. 3). The youngest Triassic polychaetes belonging to the genera *Glycera*, *?Goniada*, *?Halla* and *?Notocirrus* occur in the Wilkowice and Boruszowice beds, as well as in a series of shales and sandstones also containing floral remains ("Lettenkohle", Fig. 3). The richest scolecodont assemblages, fragmentary and complete apparatus, occur in the Gogolin Beds (the lowermost Pelsonian). Detached apparatus remains have also been found in the Górażdże, *Terebratula* and Karchowice beds, as well as in the lower part of the Middle Muschelkalk (Fig. 3). Most species of the Triassic polychaetes, described so far from other regions (Kozur 1967, 1970, 1971a, b, 1972; Gall & Grauvogel 1967), have also been found in the Muschelkalk of this area (Fig. 4). The species *Arites vulgaris* and *A. keuperianus*, mentioned by Kozur (1967), are not scolecodonts but arm-hooks of cephalopods of the Phragmoteuthida group (*cf.* Kulicki & Szaniawski 1972; Zawidzka 1974).

The presence of the following species of scolecodonts and jaw apparatuses has been stated in the Lower Muschelkalk (Lower Anisian, Pelsonian — Illyrian?) of the area investigated:

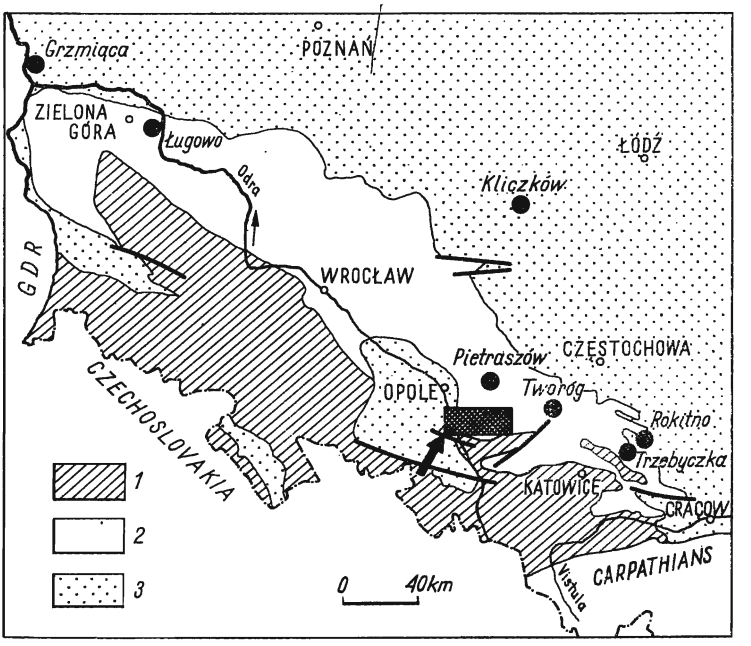


Fig. 1. Location map of investigated exposures and boreholes in the Fore-Sudetic and Silesia-Cracow monoclines; rectangled is the area presented in Text-fig. 2 (*cf.* also Zawidzka 1975, Text-figs 1—2)

1 pre-Triassic formations, *2* Triassic, *3* post-Triassic formations

Atraktoprion anatinus (Stauffer, 1939)
Delosites raridentatus (Kozur, 1967)
Elleriprion kozuri sp. n.
Elleriprion mamilatus (Zawidzka, 1971)
Goniada? cuneata (Kozur, 1967)
Glycera sp.
Kielanoprion longidentatus sp. n.
Kielanoprion oertlii (Kozur, 1972)
Kielanoprion sp.
Praelumbrinereis zawidzkae Kozur, 1972

The Upper Muschelkalk and Lower Keuper of the Opole Silesia (Upper Illyrian through Langobardian) contain the following species of scolecodonts and jaw apparatuses:

Goniada? cuneata (Kozur, 1967)
Glycera sp.
?Halla tortilis Kozur, 1970
?Notocirrus sp.

The ranges of particular taxons occurring in the studied Muschelkalk sequence are similar to those established thus far (Kozur 1972 and Fig. 4).

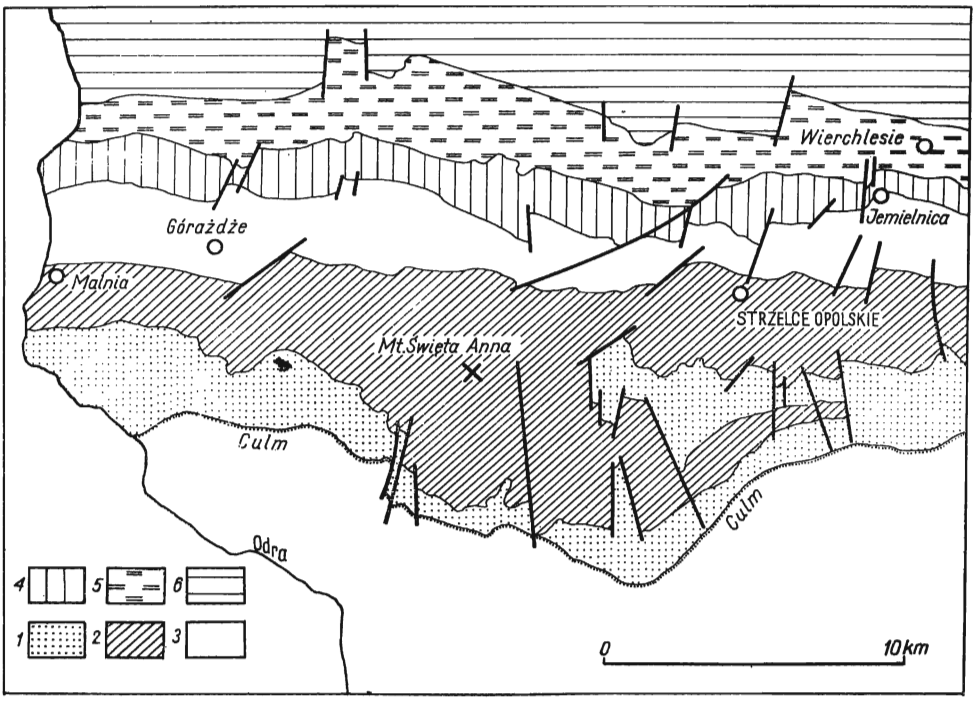
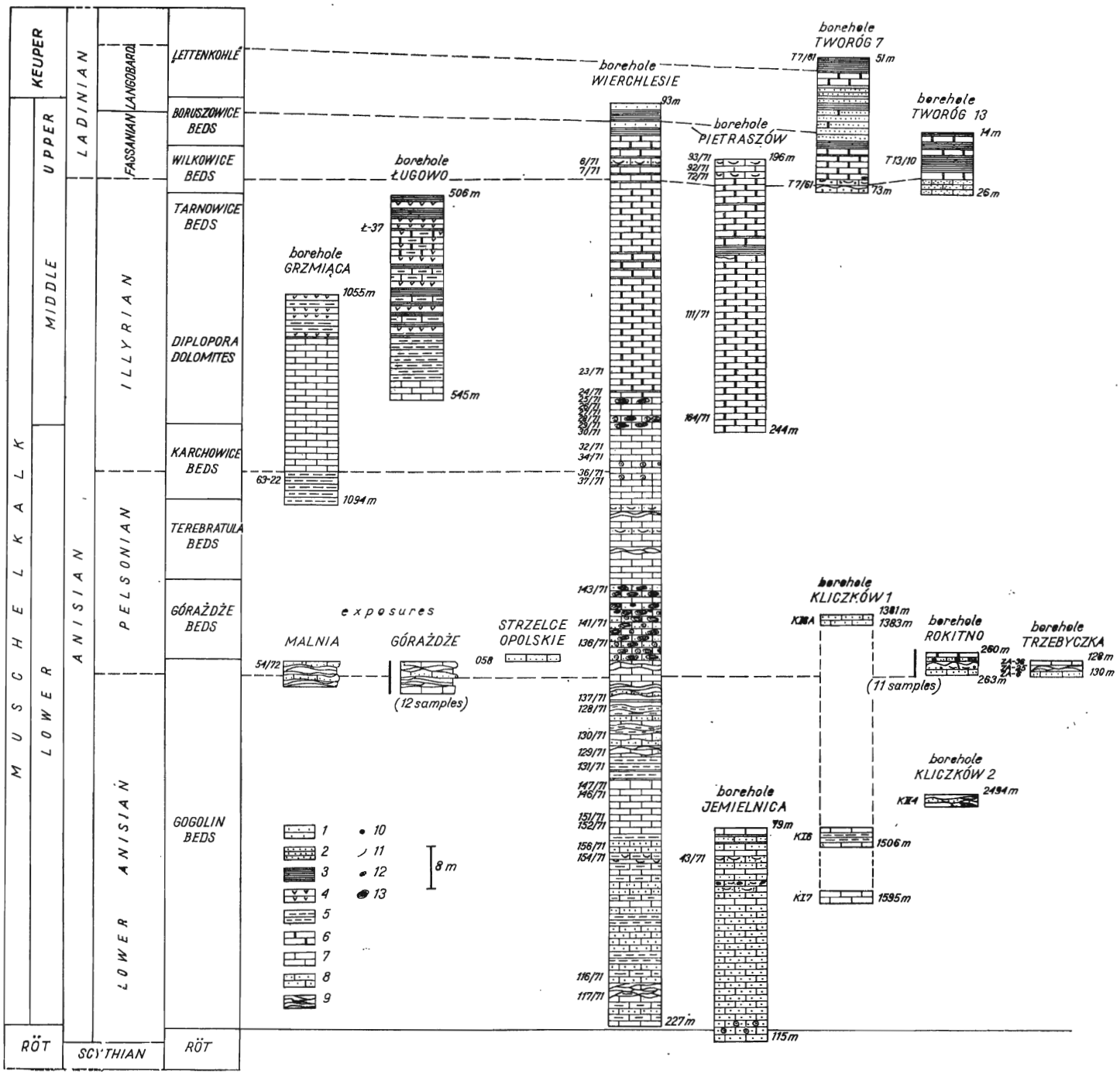


Fig. 2. Geological sketch-map (*after* Assmann 1944; simplified) of the area near Strzelce Opolskie (for its location — see Text-fig. 1) with the polychaete-bearing profiles

1 Bunter Sandstone, *2* lower part of the Lower Muschelkalk, *3* upper part of the Lower Muschelkalk, *4* Middle Muschelkalk, *5* Upper Muschelkalk, *6* Keuper

Lithological profiles of the investigated Muschelkalk sequence and position of polychaete-bearing samples (numbered)



1 sandstones, *2* shales, *3* sandy shales, *4* gypsum, *5* siltstones, *6* dolomites, *7* micritic limestones, *8* calcarenites, *9* crumpled limestones, *10* crinoid detritus, *11* mollusk and brachiopod shell detritus, *12* intraclasts, *13* onkolites

This makes a basis for recognition *Delosites raridentatus* (*cf.* Kozur 1972) and *Praelumbrinereis zawidzkae* Kozur as index species of the Lower Muschelkalk.

Representatives of the family Muelleriprionidae, abundant in the Triassic of Germany, are absent from the Upper Muschelkalk of the area studied. The occurrence of *Atraktoprion anatinus*, an unusually long-lived and conservative form, along with the *Glycera*, *?Halla*, *?Notocirrus* and *?Goniada* has been stated in the Wilkowice Beds and in the "Lettenkohle". These scolecodonts also occur in the Lower Muschelkalk and, for this reason, much the same as due to an uncertain systematic position of some taxons, the forms mentioned above cannot be considered as indices.

TAXONOMIC PROBLEMS

The taxonomy of the fossil polychaete remains is now in an extremely difficult stage of its development, as several diverging views on this problem are recorded among the investigators.

The isolated fragments of the jaw apparatuses of fossil polychaetes have until now been classified on the basis of binominal nomenclature (e.g. Eller 1934, 1936, 1938, 1940, 1941, 1942, 1945, 1955, 1961, 1964; Taugourdeau 1967, 1969, 1970a, b, 1971, 1972). Consequently, a vast number of taxons was erected. At the same time, more or less complete Paleozoic polychaete jaw apparatuses have been known since the forties (Lange 1949; Kozłowski 1956; Kielan-Jaworowska 1962, 1963, 1966; Szaniawski 1968, 1970; Szaniawski & Wrona 1973). These apparatuses have been described and classified independently of each other and not taking into account the systematics of scolecodonts. Under such circumstances, accepting the law of priority leads to numerous complications (*cf.* Kielan-Jaworowska 1968). In such a situation, Kielan-Jaworowska (1968) suggested to maintain two taxonomic systems: the orthotaxonomic for jaw apparatuses of the polychaetes and the parataxonomic for scolecodonts.

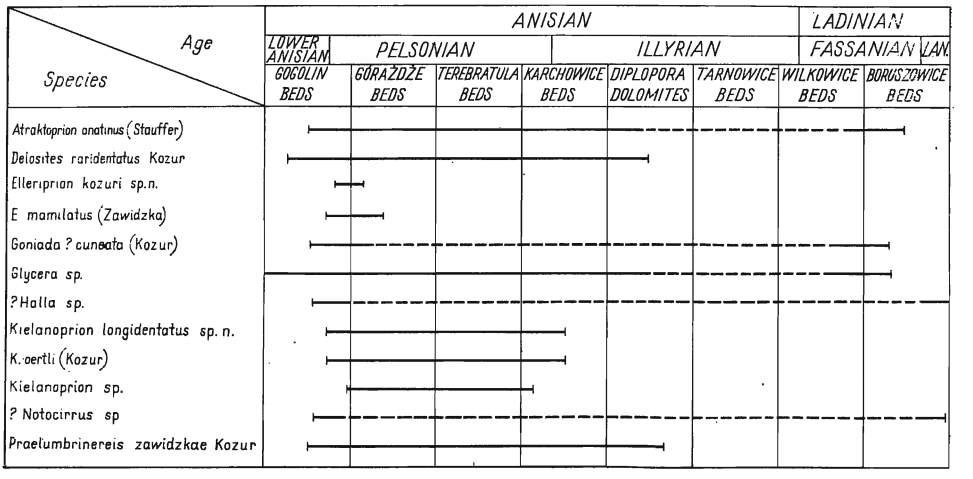


Fig. 4. Stratigraphic distribution of polychaetes in the investigated Muschelkalk sequence

In 1970, H. Kozur sought to combine the two systematics on the basis of original diagnoses and type species. In the course of this procedure, most genera of jaw apparatus of fossil polychaetes was included in the synonymies of older scolecodont genera.

Jansonius & Craig (1971), Szaniawski & Wrona (1973) and Szaniawski (1974) consider such a combination of the two taxonomic systems to be premature and, in many cases, based on insufficiently documented facts. Classifying the polychaetes, they use the two systems separately, extending the parataxonomic system.

The taxonomic system suggested by Kozur contains several errors, which, due to the confusion in the taxonomy of scolecodonts, seem to be inevitable in many cases. The species *Delosites raridentatus* Kozur, 1967, is among the most glaring examples in this respect. Particular jaws of this Mesozoic jaw apparatus of the polychaetes, one of the few known so far, were assigned by Kozur (1967, 1970, 1971a, b) to various taxons up to the rank of family and it was only after finding a complete jaw apparatus that these jaws could be interpreted correctly (Zawidzka 1971).

Now, the degree of complexity of the systematics of fossil polychaetes increases since it is difficult to maintain consistently the two separate taxonomic systems (*cf.* Sylvester 1959; Zawidzka 1971; Szaniawski & Wrona 1973).

Type species of scolecodonts, which make up a starting point of Kozur's (1970, 1971a) taxonomic considerations, are in many cases based on poorly preserved type specimens devoid of appropriate diagnostic characters, which precludes their presentation in the synonymy together with jaw apparatuses. Nevertheless, the overwhelming majority of scolecodonts and jaw apparatuses known so far have been described from the Paleozoic and, therefore, the taxonomic difficulties mostly concern the Paleozoic polychaetes.

Only few finds of scolecodonts, either jaw apparatuses or imprints of complete polychaete bodies, are known from the Mesozoic (Ehlers 1868, 1869; Gall & Grauvogel 1967; Kozur 1967, 1970, 1971a; Zawidzka 1971). In this connection, isolated jaws which display, however, appropriate diagnostic characters may in most cases be related unequivocally with corresponding jaw apparatuses (*cf. Delosites raridentatus* Kozur emend. Zawidzka). Finally, jaws and jaw apparatuses of the Mesozoic polychaetes display far-reaching similarites to those of the Recent polychaetes (Kozur 1970, 1971a, 1972; Szaniawski 1974; Charletta & Boyer 1974), which is a basis for the opinion that many genera (for example, *Halla, Glycera*) changed only to a rather small extent or even did not change at all from the Triassic up to the Recent. The application of the principle of priority to the taxonomy of the Mesozoic polychaetes does not involve, therefore, any significant complications. For this reason, a uniform taxonomic system has here been adopted for the scolecodonts and jaw apparatuses.

SYSTEMATIC DESCRIPTION

Family **Goniadidae** Kinberg, 1886
Genus *GONIADA* Audoin & Milne-Edwards, 1833

Remarks. — The Triassic Goniadidae were described by Kozur (1970, 1971a), who assigned the macrognaths of the representatives of this family to the genus *Goniada*. Szaniawski (1974) believes, however, that the assignment of the Triassic forms to this genus is not certain, mainly due to the fact that the macrognaths of all genera of the family Goniadidae have a similar pattern of structure and do not give sufficient basis for generic identification. The species *G. cuneata* Kozur

(*cf.* Zawidzka 1971), known from Germany and the Mediterranean area and occurring in the sequence studied, should therefore be assigned only tentatively to this genus.

?*Goniada* sp.
(Pl. 6, Fig. 4)

Material. — One macrognath.

Remarks. — The form illustrated differs from the Triassic Goniadidae known so far primarily in its dentition, as it has only one, prominent, clawlike hook.

Occurrence. — Upper Muschelkalk (Fassanian) at Wierchlesie (Opole Silesia).

Superfamily **Glycerea** Grube, 1850
Family **Glyceridae** Grube, 1850
Genus *GLYCERA* Savigny, 1818
(Pl. 6, Figs 2—3 and 6—7; Pl. 8, Figs 2—3)

Remarks. — A new genus, *Paranereites* was erected by Eisenack (1939), who included in it edentate, sickle-like falciform jaws that came from the Jurassic. Having at his disposal more than 100 specimens from the Triassic of Germany, Kozur (1967, 1970, 1971a) assigned them also to the genus *Paranereites*, thus suggesting their relationship to the Recent genus *Nereis*. These two authors did not pay attention to an important morphological detail, that is, the presence of two pulp cavities (*cf.* Zawidzka 1971). As shown subsequently by Szaniawski (1974), who compared fossil and Recent polychaetes, the jaws described as *Paranereites* are attributable to the Recent genus *Glycera*, which only very slightly differs from the Mesozoic forms (*cf.* also Charletta & Boyer 1974).

A fairly differentiated assemblage of jaws, belonging to the genus *Glycera* (Pl. 6, Figs 2—3 and 6—7) and which undoubtedly includes various species, occurs in the material under study.

Carriers of the genus *Glycera* (Pl. 8, Figs 2—3), first described by Szaniawski (1974) from the Middle and Upper Jurassic of Poland have also been recorded in the investigated Muschelkalk.

Occurrence. — Muschelkalk (Lower Anisian through Fassanian) of the Fore-Sudetic and Silesia-Cracow monoclines.

?Family **Mochtyellidae** Kielan-Jaworowska, 1966
(Pl. 8, Fig. 6)

Remarks. — The representatives of this family have so far been known only from the Paleozoic, with the Permian species *Oxyprion compressus* Szaniawski, 1968, as their youngest form. A few *MI*? were described from the *Ceratites* Beds of the German Basin (Ladinian) by Kozur (1967, 1970, 1971a), who assigned them to the genus *Staurocephalites* of the family under study. In the present writer's opinion, these jaws are so poorly preserved that their systematic assignment is uncertain. They display a considerable similarity to *MII* of adult, large individuals of the family Muelleriprionidae.

The form illustrated (Pl. 8, Fig. 6) probably represents lateral denticles (long, triangular, flattened, pointed and having an oval aperture of the pulp cavity), belonging to an apparatus of the placognatha type (*cf.* Kielan-Jaworowska 1966; Szaniawski & Wrona 1973).

Occurrence. — Muschelkalk (Lower Anisian through Pelsonian) at Rokitno (Polish Jura Chain).

Family **Atraktoprionidae** Kielan-Jaworowska, 1966
Genus *ATRAKTOPRION* Kielan-Jaworowska, 1962
Type species: *Atraktoprion cornutus* Kielan-Jaworowska, 1962
Atraktoprion anatinus (Stauffer, 1939)
(Pl. 3, Figs 3—6; Pl. 8, Figs 4—5 and 8)

1939. *Arabellites anatinus* n. sp.; C. R. Stauffer, p. 501, Pl. 58, Figs 40-42, 50.
1939. *Arabellites magnificus* n. sp.; C. R. Stauffer, p. 503, Pl. 57, Fig. 7; Pl. 58, Figs 1, 14.
1945. *Ildraites camurus* n. sp.; E. R. Eller, p. 142, Pl. 2, Figs 30-37.
1966. *Ildraites anatinus* (Stauffer); P. Tasch & J. R. Stude, p. 21, Pl. 2, Figs 12-16.
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 1-5.
1971. *Ildraites gallica* n. sp.; P. Taugourdeau, p. 87, Pl. 2, Figs 29-31.
1971a. *Arabellites anatinus* Stauffer; H. Kozur, p. 80. Pl. 14, Figs 1, 11.
1971. *"Ildraites" anatinus* (Stauffer); K. Zawidzka, p. 370, Pl. 1, Fig. 5.
1971. *"Leodicites" magnificus* (Stauffer); K. Zawidzka, p. 374, Pl. 4, Fig. 2.

Remarks. — The *MI* jaws of this species are similar to those of other species of this genus known from the Paleozoic and Triassic (*cf.* Zawidzka 1971). Minor differences in the morphology of the jaws of this apparatus may certainly be included in the range of specific variability, the more so as the intraspecific variability of the forms assigned to the family Atraktoprionidae is very extensive (*cf.* Kielan-Jaworowska 1966).

On the basis of the material collected the writer succeeded in supplementing the schema of the apparatus of *Atraktoprion anatinus* (Fig. 5).

The *MII* jaws are of the *"Arabellites" magnificus* Stauffer type. Upper jaws are most likely identical with the scolecodont *Paleoenonites pecten* Taugourdeau,

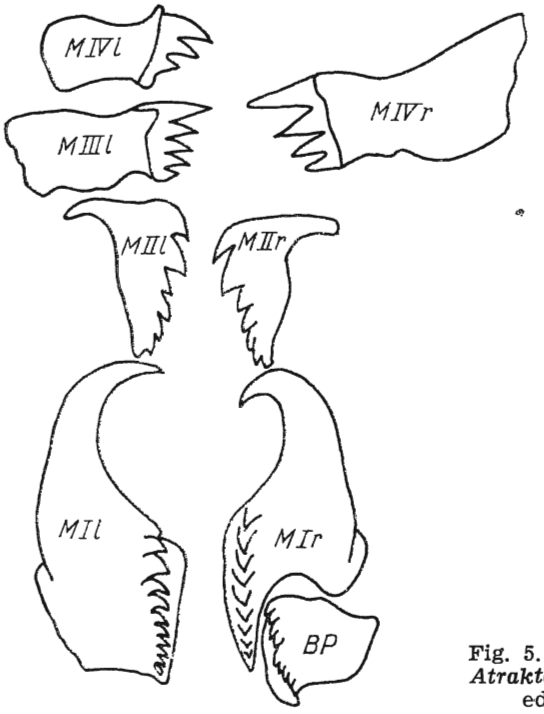


Fig. 5. Schema of the jaw apparatus of *Atraktoprion anatinus* (Stauffer), compiled from the investigated material

1968, which make up *MIII*? and *MIV* of *Atraktoprion anatinus*, since all jaws occur in one and the same sample, in which no scolecodonts have been found except for *MIl, MIr, MIIr, MIIl, MIII*? and *MIV*. The attachment lamella of these elements displays a characteristic granular structure (*cf.* Taugourdeau 1972).

Occurrence. — Muschelkalk (Anisian through Lower Fassanian) of Opole Silesia and Polish Jura Chain; Middle Devonian of U.S.A. (Stauffer 1939); Permian of U.S.A. (Tasch & Stude 1966); Upper Devonian of France (Taugourdeau 1971); Upper Muschelkalk of Germany (Kozur 1967, 1970, 1971a).

Superfamily **Paulinitaceae** Lange, 1947
Family **Lysaretidae** Kinberg, 1865, emend. Kozur, 1970
Genus *DELOSITES* Kozur, 1967, emend. Zawidzka, 1971
Type species: *Delosites falcatus* (Seidel, 1959)
Delosites raridentatus Kozur, 1967, emend. Zawidzka, 1971
(Pl. 4, Figs 1, 3—4, 6—7 and 9—12)

Remarks. — The representatives of the genus *Delosites* are numerically predominant among the elements of jaw apparatuses of the Triassic polychaetes. They belong, however, to one species only, *Delosites raridentatus* Kozur. In addition to isolated jaws, a jaw apparatus has also been found in the Gogolin Beds (Zawidzka 1971).

A considerable variability in morphological characters of *MI* and *MII* jaws is recorded within the range of this species. The curvature of the hook in *MI*, the position of the basal part in relation to the dentated anterior part and the number of denticles are considerably variable characters. The *MII* is also variable within a fairly extensive limits (*cf.* Pl. 4 and Zawidzka 1971).

Two subspecies distinguished by Kozur (1972), that is, *D. raridentatus raridentatus* and *D. raridentatus reiflingensis*, the latter absent from the German part of Triassic epicontinental basin, occur in the Lower Muschelkalk of the area studied.

Family **Muelleriprionidae** Kozur, 1967

Remarks. — A considerable number of mostly Permian species, displaying only slight interspecific differences which perhaps are contained within limits of the intraspecific variability, are recorded within the family Muelleriprionidae. The curvature of the hook or the twist of particular parts of jaw in relation to each other may be caused by secondary factors. These are characters which, considering the elasticity of the jaws, also change dynamically during the functioning of the apparatus. Closed maxillae, in which hooks and further denticles interlace each other, are visible in the specimen examined (*cf.* Fig. 6). Such an orientation of the jaws corresponds to the position of seizing and holding up the prey (*cf.* Hartmann-Schröder 1967), much the same as in the Recent species *Eunice (Palola) siciliensis* Grube, in which a lock is formed besides in the lower part of the jaw.

It seems that the posterior, inner elements of the basal parts of *MI* jaws closely adhered to each other during appropriate life functions.

Genus *ELLERIPRION* Kozur, 1970
Type species: *Elleriprion demissicus* (Eller, 1963)
Elleriprion kozuri sp. n.
(Pl. 7, Fig. 1a—b)

Holotype: the specimen of *MII* presented in Pl. 7, Fig. 1; kept in the writer's collection (numbered 0165/57).

Type horizon: the uppermost part of the Gogolin Beds, Lower Muschelkalk (Pelsonian).

Type locality: Górażdże, Opole Silesia.

Derivation of the name: after the name of Dr. Heinz Kozur of Meiningen, German Democratic Republic.

Material. — One *MII*.

Diagnosis. — An elongate *MII*, provided with straight hook and five needlelike denticles; minor sector of posterior part straight. Outer margin shaped with a small process.

Description. — Jaw elongate, with a well developed hook directed anteriorly and gradually turning into a relatively narrow basal part. Outer outline of anterior part moderately convex. A concavity, turning into a not very large, but distinct process, is outlined in the posterior part. Inner margin concave anteriorly and provided with five denticles almost uniform in size and facing anteriorly, the last of them small, triangular. Posterior part bipartite: its straight inner part turns, through the convexity of base, into an outer sector running obliquely anteriorly.

Remarks. — The species *Elleriprion kozuri* sp. n. is similar to *E. mamilatus* (Zawidzka), from which it differs only in dentition, that is, the number of denticles in *E. mamilatus* is much larger. Besides, they are needlelike and always perpendicular to the outer margin of the jaw.

Occurrence. — Lower Muschelkalk (Pelsonian) at Górażdże (Opole Silesia).

?*Elleriprion* sp.
(Pl. 5, Fig. 10)

Material. — A damaged *MIr*.

Description. — Hook robust, relatively long, directed anteriorly and upwards. Farther denticles pointed and, except for the first, directed posteriorly.

Occurrence. — Upper Muschelkalk (Illyrian) at Wierchlesie (Opole Silesia).

Genus *KIELANOPRION* Szaniawski, 1968
Type species: *Kielanoprion pomeranensis* Szaniawski, 1968
Kielanoprion longidentatus sp. n.
(Pl. 3, Fig. 1; Pl. 4, Fig. 5)

1971. "*Arabellites*" *magnidentatus* Seidel; K. Zawidzka, p. 369, Pl. 2, Figs 5 and 7.

Holotype: the specimen presented in Pl. 3, Fig. 1; kept in the writer's collection (numbered 32/71).

Type horizon: Lower Muschelkalk (Pelsonian).

Type locality: Wierchlesie, Opole Silesia.

Derivation of the name: after conspicuously long hooks.

Material. — *MI, MII, MIII* and *MI* connected together, as well as three *MI* and one *MIII*.

Diagnosis. — Jaw elongate, both margins convex. The anterior part of inner margin denticulate, with hook long and upturned. Outer margin turning posteriorly into a small process. Posterior margin bipartite. Pulp cavity open.

Description. — Hook long, upturned. Outer margin undulate, with a depression appearing just behind the base of hook and another near the posterior end of margin, where it turns into a small process. Inner margin convex, its posterior sector edentate. The second denticle long, situated near hook facing anteriorly and

bent upwards. The successive denticles, also long, are bent and gradually diminishing posteriorly. Posterior margin bipartite: its outer, longer sector running obliquely anteriorly, its inner sector straight. The *MII* and *MIII* are similar to other Triassic species of the genus *Kielanoprion* (*cf.* Zawidzka 1971: *"Leodicites"*, *Eunicites* sp., and "gen. et spec. indet. *A*").

Occurrence. — Lower Muschelkalk (Pelsonian) at Wierchlesie (Opole Silesia).

Kielanoprion oertlii (Kozur, 1972)
(Fig. 6 and Pl. 2, Figs 3—4; Pl. 3, Fig. 2; Pl. 4, Fig. 8)

1972. *Eunicites oertlii* Kozur; H. Kozur, pp. 769—770, Figs 2—4.

Material. — This species is represented by a dozen or so detached or connected (mostly in pairs, e.g., *MI* and *MII*, *MII* and *MIII*, etc.) jaws and by a single nearly complete apparatus, lacking only a few anterior jaws. This is the best preserved apparatus of the Mesozoic polychaetes.

Description. — The *MI* subtriangular, inner margin denticulate and convex, posterior bipartite, with inner part straight and outer facing obliquely anteriorly A small, triangular process develops at the contact of the outer and posterior mar-

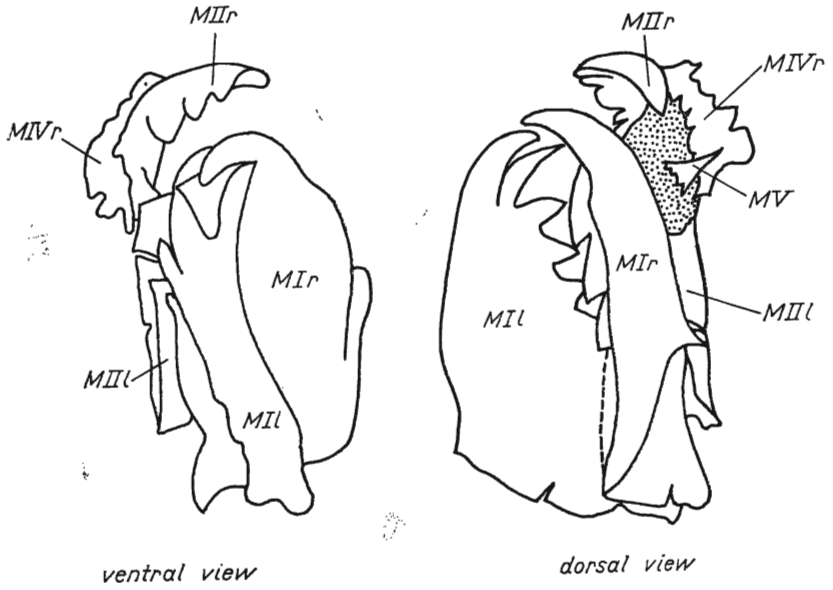


Fig. 6. Jaw apparatus of *Kielanoprion oertlii* (Kozur)

gins. Hook larger than the rest of denticles, upturned. The next denticles, near the hook, directed anteriorly and also upturned. The remaining denticles distinctly separated from the two preceding ones, deflected posteriorly, triangular. The *MII* of the *Eunicites thuringensis?* and *"Leodicites" angiformis* type, *MIII* shaped like an irregular, elongate triangle with small denticles (7—9), rounded at tips and sloping posteriorly. Attachment lamella sizable.

Occurrence. — Lower Muschelkalk (Lower Anisian through Lower Illyrian) of the Silesia-Cracow and Fore-Sudetic monoclines.

Kielanoprion sp.
(Pl. 2, Figs 1 and 5)

Material. — Ten *MI*.

Description. — A triangular jaw with denticles nearly uniform in size. Hook upturned, the second denticle facing anteriorly. Further, triangular denticles (7—10) inclined posteriorly. Outer margin convex, terminating in a distinct, triangular process. Inner part of posterior margin straight over a short sector, outer part running obliquely anteriorly.

Occurrence. — Lower Muschelkalk (Pelsonian — Illyrian) of the Fore-Sudetic monocline and Polish Jura Chain.

Family **Lumbrinereidae** Malmgren, 1867, emend. Kozur, 1970

Genus *PRAELUMBRINEREIS* Kozur, 1972

Type species: *Praelumbrinereis zawidzkae* Kozur, 1972

Praelumbrinereis zawidzkae Kozur, 1972
(Figs 7—8 and Pl. 7, Figs 2—7)

1971. *"Nereidavus" nudus Taugourdeau;* K. Zawidzka, p. 370, Pl. 2, Figs 2-3.
1972. *Praelumbrinereis zawidzkae* Kozur; H. Kozur, pp. 763-765, Fig. 1.

New diagnosis. — The *MI* jaw edentate or with one to three small denticles. Hook large, distinctly separated from the basal part. Aperture of pulp cavity small. Posterior part of outer margin stretched out to form a pointed process.

The *MII* of the *Paulinites* type (*cf.* Zawidzka 1971, p. 372: *"Leodicites" falciformis*).

The *MIV?r* makes up a small jaw with seven wide, rounded denticles, only slightly sloping posteriorly. Pulp cavity open over the whole length of jaw. Attachment lamella relatively large. Similar jaws occur in fossil apparatuses of various types, as well as in the Recent Lumbrinereidae (*cf.* Ushakov 1955: *Lumbriconereis cervicalis* Treadwell).

Remarks. — On the basis of the results of a statistical analysis, Kozur (1972) believed that *MII* of *Praelumbrinereis* is of the *Delosites* type.

During the analysis of the material collected, it was found that the stratigraphic ranges of *Delosites raridentatus* and *Praelumbrinereis zawidzkae* are not in a complete conformity with each other. The species *P. zawidzkae* and *Delosites raridentatus* appear almost simultaneously in the Gogolin Beds (Lower Anisian, Figs 3—4), where, next to the *Glycera*, they are among the oldest Muschelkalk polychaetes. The two species also occur in the onkolitic limestones of the lower part of the Middle Muschelkalk (Illyrian), but *P. zawidzkae* reaches somewhat higher up than *D. raridentatus*.

Finding connected *MI* and *MII* in the Górażdże Beds enables an extension and correction of the diagnosis of the type species and, since the genus is monotypic, also of the diagnosis of the genus.

Occurrence. — Lower Muschelkalk (Lower Anisian through Illyrian) of Opole Silesia and Polish Jura Chain; Reifling Limestones (Illyrian) in Austria and Pelsonian of Hungary (Kozur 1972); Lower Muschelkalk (Lower Anisian-Pelsonian) of Germany (Kozur 1972).

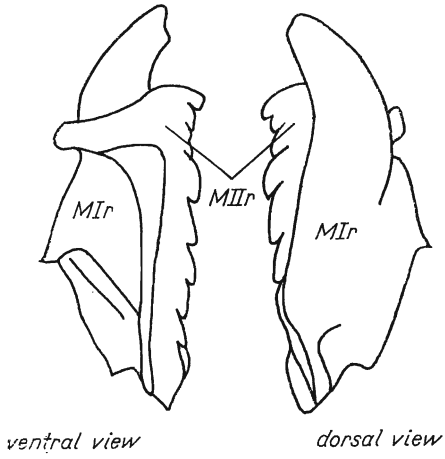


Fig. 7. Schema of united *MIr* and *MIIr* of *Praelumbrinereis zawidzkae* Kozur

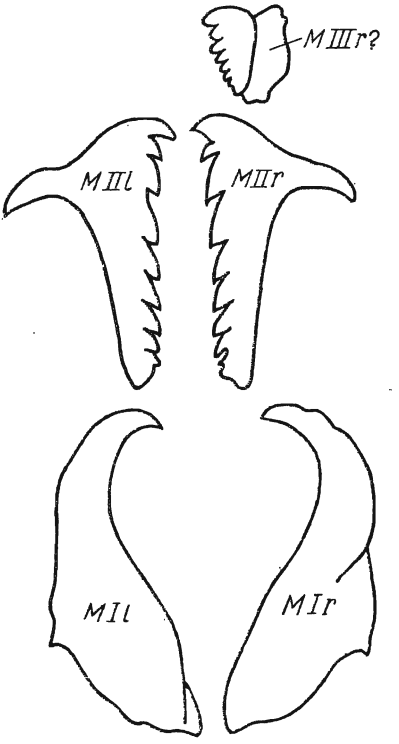


Fig. 8. Schema of the jaw apparatus of *Praelumbrinereis zawidzkae* Kozur

?Family **Kalloprionidae** Kielan-Jaworowska, 1966
(Pl. 5, Fig. 5)

Remarks. — Only *MI* from the Lower Anisian of Germany (Kozur 1971a) has so far been known in the Triassic.

The form illustrated is a basal plate. It was not unlikely to be part of a jaw apparatus of the family Atraktoprionidae, e.g., of the genus *Halla.*

Superfamily **Arabellacea** Hartmann, 1944

Remarks. — Several forms representing various elements of jaw apparatuses of the polychaetes of the superfamily Arabellacea (Pl. 5, Figs 1—5 and 8—9) were found in the studied Muschelkalk sequence. Some of them may be compared with the following species described from the German Triassic:

Pl. 5, Figs 3, 9 — *Halla tortilis* Kozur, 1970 (Atraktoprionidae), viz.: Fig. 3 — *MIr,* and Fig. 9 — *MIVr;*

Pl. 5, Figs 1—2, 4, 7—8 — *Notocirrus* Schmarda, 1861 (Arabellidae). viz.: Fig. 1 — *Notocirrus triassicus, MIl,* Fig. 2 — *Notocirrus, MIl,* Fig. 4 — *Notocirrus, MIIIr?,* Figs 7—8 — *Notocirrus, MIIr.*

In the case of such a taxonomy, the stratigraphic ranges of the two genera (*Halla* and *Notocirrus*) would include nearly the entire Muschelkalk (*cf.* Fig. 4). In Germany, these genera are known only from the Upper Muschelkalk.

A vast differentiation within the range of particular species of the Recent Arabellacea (compare *Aglaurides fulgida* Savigny and *Arabella irricolor* (Montagu) as presented by Kielan-Jaworowska, 1966) demands that we should be cautious in establishing the taxonomic position of detached elements of apparatuses of the fossil polychaetes. It is only by finding more or less complete apparatuses and by comparing them carefully with the Recent ones that may enable establishing an unquestionable systematic position of the forms presented above.

Family unknown
Genus *HINDEOPRION* Szaniawski & Wrona, 1973
Type species: *Hindeoprion basalaris* Szaniawski & Wrona, 1973
?*Hindeoprion* sp.
(Pl. 5, Fig. 6)

Material. — Two *MI.*

Description. — Hook long, curved; further three denticles pointed, directed laterally. Outer margin convex, inner concave in the denticulate part and convex in the lower part. Posterior margin bipartite: inner sector straight, outer running obliquely anteriorly. Inner wing relatively large. Basal part twisted to the inside in relation to the anterior part of the jaw. Pulp cavity open, reaching far anteriorly and occupying the whole width of the jaw.

Remarks. — The genus *Hindeoprion* was erected on the basis of connected *MIr* and *MIl* coming from the Upper Devonian of Poland. The form described above differs from *Hindeoprion* Szaniawski & Wrona in a smaller number of denticles.

Occurrence. — Lower Muschelkalk (Pelsonian) at Strzelce Opolskie (Opole Silesia).

Anterior maxillae, mandibles and carriers
(Pl. 8, Figs 1, 7 and 9)

The taxonomic position of these forms, occurring as detached elements of various apparatuses, is difficult to establish. Single denticles, *MV* (*cf.* Pl. 8, Fig. 7), occur in many groups of fossil polychaetes (*cf.* Kielan-Jaworowska 1966). The same applies to the mandibles (*cf.* Pl. 8, Fig. 9 and Zawidzka 1971). All carriers found so far in the Muschelkalk studied, are parts of apparatus of the labidognatha type, except for those of the genus *Glycera.*

PHYLOGENY OF THE LUMBRINEREIDAE

The representatives of the family Lumbrinereidae Malmgren, 1867, have been known so far only from the Recent. Scolecodonts, determined in the parataxonomic system as "*Nereidavus nudus*", were described by the writer (Zawidzka 1971) from the Muschelkalk of Poland. They were considered by Kozur (1972) as the oldest representatives of the Lumbrinereidae and were assigned to his new genus, *Praelumbrinereis*.

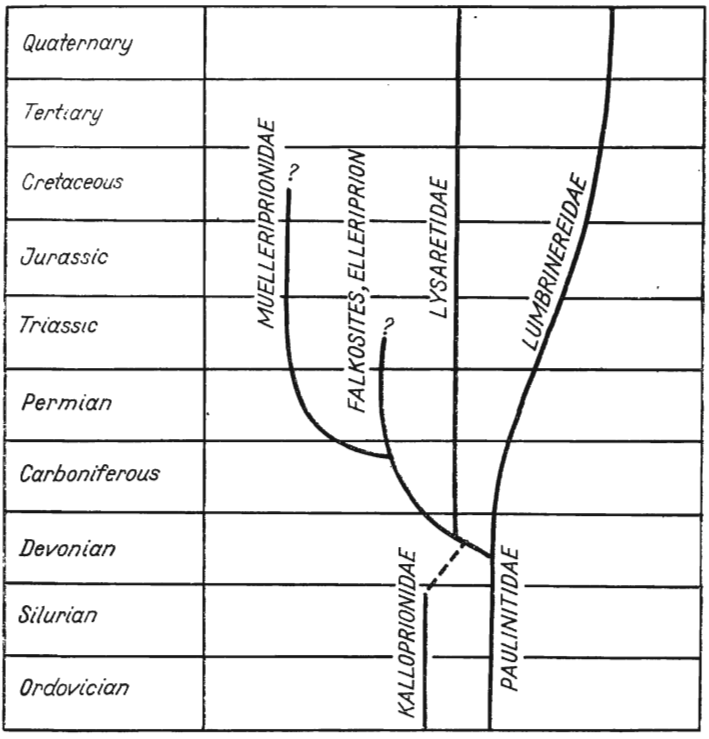


Fig. 9. Suggested phylogeny schema of some Eunicida (Muelleriprionidae, Lysaretidae and Lumbrinereidae)

The origin of the Lumbrinereidae, the same as that of the Onuphidae and Eunicidae, has so far been related with the Paleozoic Paulinitidae, from which they evolved by a reduction in the *MI* dentition, narrowing of the aperture of pulp cavity, a decrease or a disappearance of the basal plate and straightening of the posterior margin of the jaw (*cf.* Kielan-Jaworowska 1966). According to Kozur (1972), *Praelumbrinereis* displays many characters in common with the genus *Delosites*, which induces this author to derive the Lumbrinereidae directly from the Lysaretidae. Kozur's (1972) phylogenetic diagram determines the Eunicea (Eunicidae, Onuphidae and Lumbrinereidae) as a polyphyletic group. Thus, the Pau-

linitidae would be direct ancestors of the Eunicidae (*Langeites*) and Onuphidae (*Paulinites*), while the Lumbrinereidae would come from the Lysaretidae (*Delosites*).

In Kozur's (1972) opinion, the Lysaretidae and Muelleriprionidae would descend from the forms belonging to the group of the *Elleriprion* and *Falkosites*, which in turn would be related to the Paulinitidae.

The Kozur's schema may be corrected (*cf.* Fig. 9) in some respect on the basis of polychaete remains found in the Muschelkalk of the area investigated, which shake the view that the Lumbrinereidae are direct descendants of the Lysaretidae. As mentioned above, the interpretation of the genus *Praelumbrinereis* plays an important role in Kozur's phylogenetic considerations. On the basis of a statistical analysis of about 100 samples from the Muschelkalk, this author supposed that the genus *Praelumbrinereis* Kozur had the jaws of the second pair identical with the *MII* of *Delosites* ("*Palurites*"). The specimens described in this paper indicate, however, that the *MII* of *Praelumbrinereis* are very similar to those of the Paulinitidae (*cf.* Figs 7—8). The genus *Praelumbrinereis* differs from typical representatives of the Paulinitidae in its symmetry (*MIl* identical with *MIr*), in the smaller size of the aperture of pulp cavity and in the reduction in dentition, leading to its complete disappearance. In addition, the jaws of the first pair in the Paleozoic Paulinitidae, described mostly as various "*Nereidavus*" (for example, "*Nereidavus giganteus*" Sylvester, 1959; *Langeites lublinensis* Szaniawski & Wrona, 1973; and "*Nereidavus wolfcampis*" Tasch & Stude, 1965), display, in the present writer's opinion, considerably more characters in common with *Praelumbrinereis rather* than with *Delosites*. The Permian forms of "*Nereidavus*" are already strikingly similar to *Praelumbrinereis* (*cf.* Pl. 1).

The Lumbrinereidae probably evolved from the Paleozoic Paulinitidae in a continuous developmental sequence (Pl. 1 and Fig. 9). The evolution of the Lysaretidae (*Delosites*) was presumbly independent of that of the Lumbrinereidae.

The Triassic Lumbrinereidae are more closely related to the Recent forms, consituting for them a transitional link derived from the Paleozoic Paulinitidae.

Institute of Geology
of the Warsaw University
Al. Żwirki i Wigury 93, 02-089 Warszawa, Poland
Warsaw, November 1974

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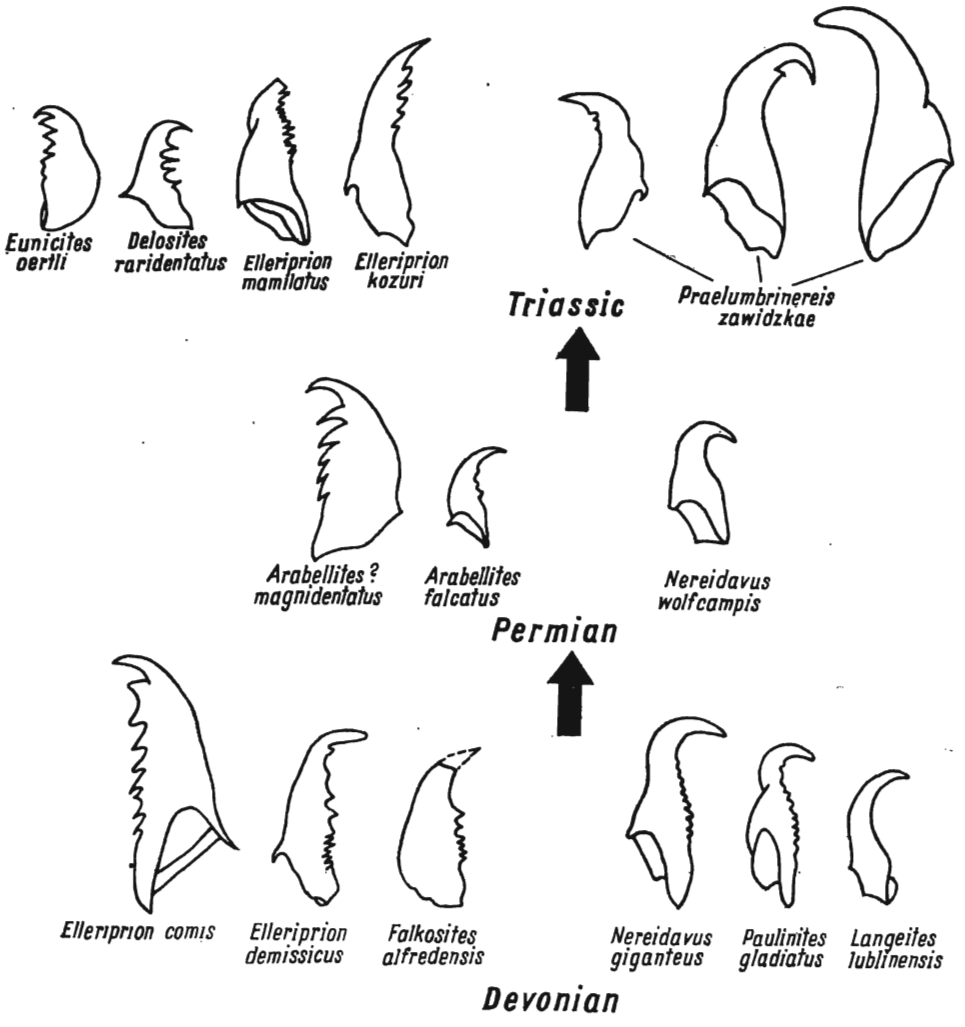
K. ZAWIDZKA

SZCZĄTKI WIELOSZCZETÓW Z WAPIENIA MUSZLOWEGO POŁUDNIOWEJ POLSKI I ICH ROZPRZESTRZENIENIE STRATYGRAFICZNE

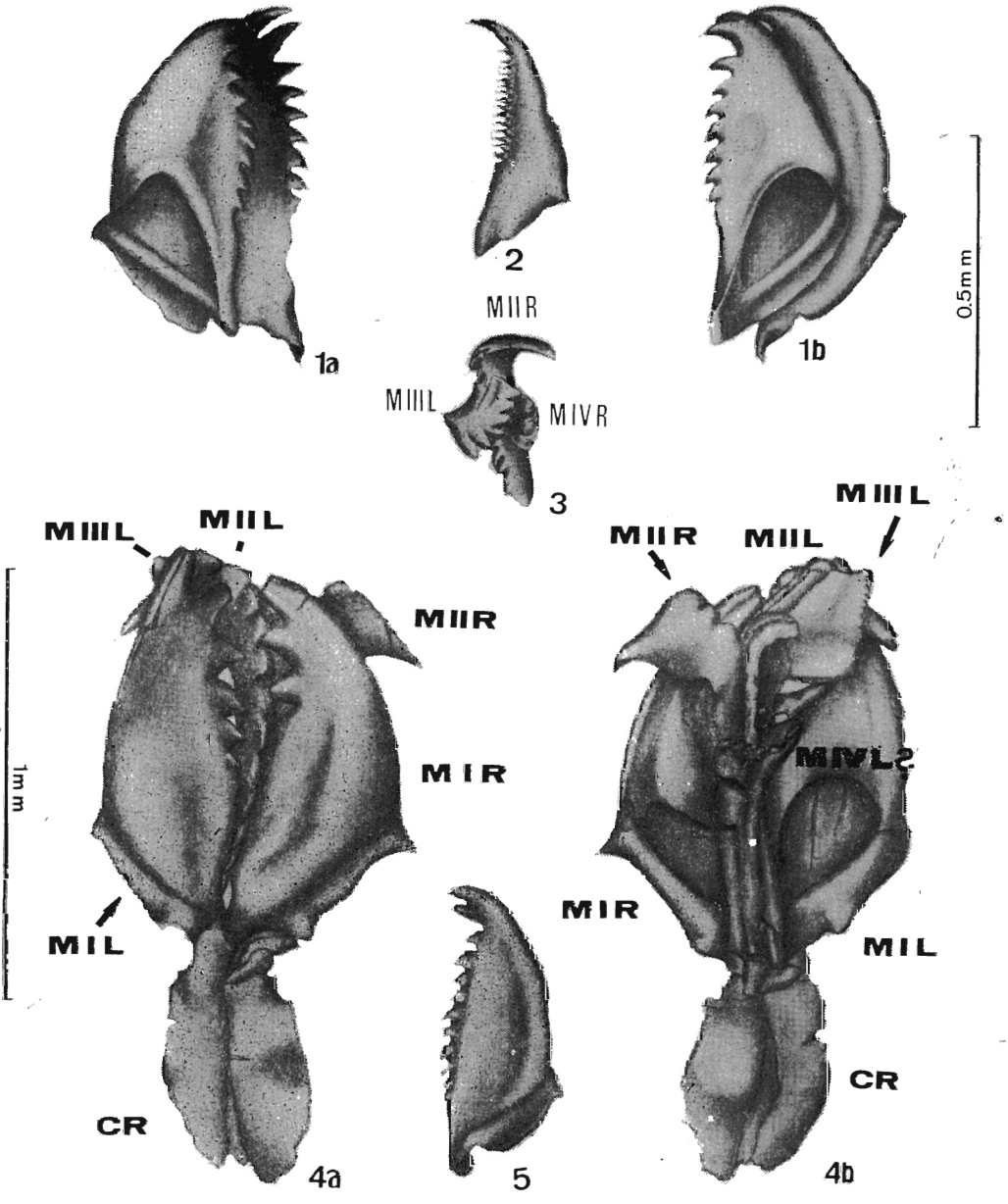
(Streszczenie)

W szeregu profilach wapienia muszlowego na obszarze monokliny śląsko-krakowskiej i przedsudeckiej (fig. 1—2) stwierdzono obecność skolekodontów oraz aparatów szczękowych wieloszczetów należących do rodzin Atraktoprionidae, Glyceridae, Goniadidae, Kalloprionidae?, Lumbrinereidae, Lysaretidae, Mochtyellidae? i Muelleriprionidae (*por.* pl. 2—7). Przyjmując jednolity system taksonomiczny dla skolekodontów i całych aparatów szczękowych opisano jako gatunki nowe *Elleriprion kozuri* sp. n. oraz *Kielanoprion longidentatus* sp. n. Wyodrębniono także dwa zespoły form mogące mieć znaczenie stratygraficzne: (1) *Delosites raridentatus* Kozur i *Praelumbrinereis zawidzkae* Kozur, występujący w dolnym i niższej części środkowego wapienia muszlowego, oraz (2) *Goniada, Glycera, Halla* i *Notocirrus* (bez gatunków charakterystycznych dla starszego zespołu), występujący w górnym wapieniu muszlowym (*por.* fig. 3—4).

Zebrany materiał zezwala na wypowiedzenie poglądu, iż triasowi przedstawiciele Lumbrinereidae wywodzą się bezpośrednio z paleozoicznych Paulinitidae (*por.* fig. 9), przy czym formy triasowe posiadają maksille pierwszej pary zbliżone do odpowiednich elementów aparatów form współczesnych, podczas gdy maksille drugiej pary wykazują daleko idące analogie do odpowiednich elementów u Paulinitidae (patrz pl. 1 oraz fig. 7—8).



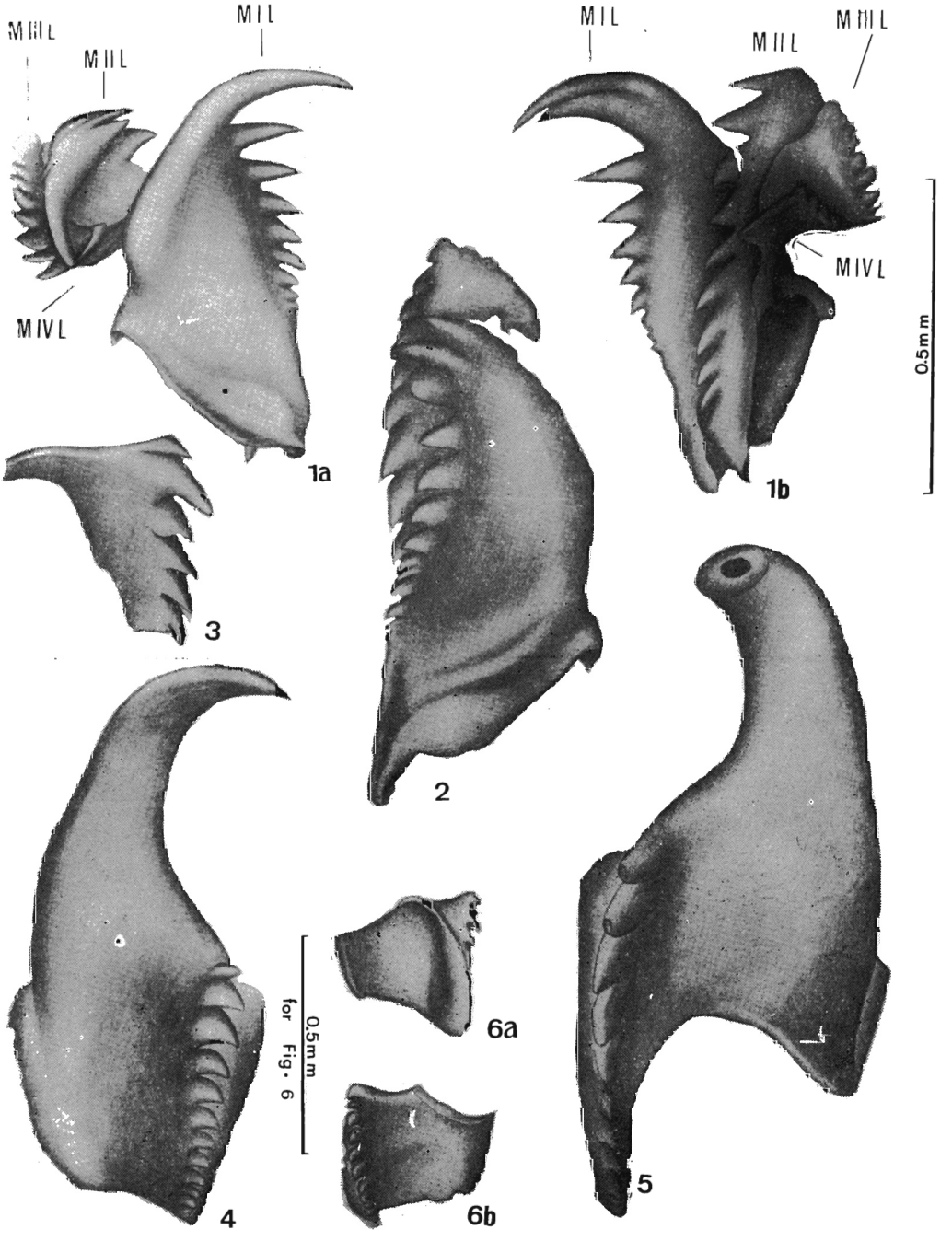
Successive developmental stages in the polychaete families Paulinitidae, Muelleriprionidae, Lysaretidae and Lumbrinereidae



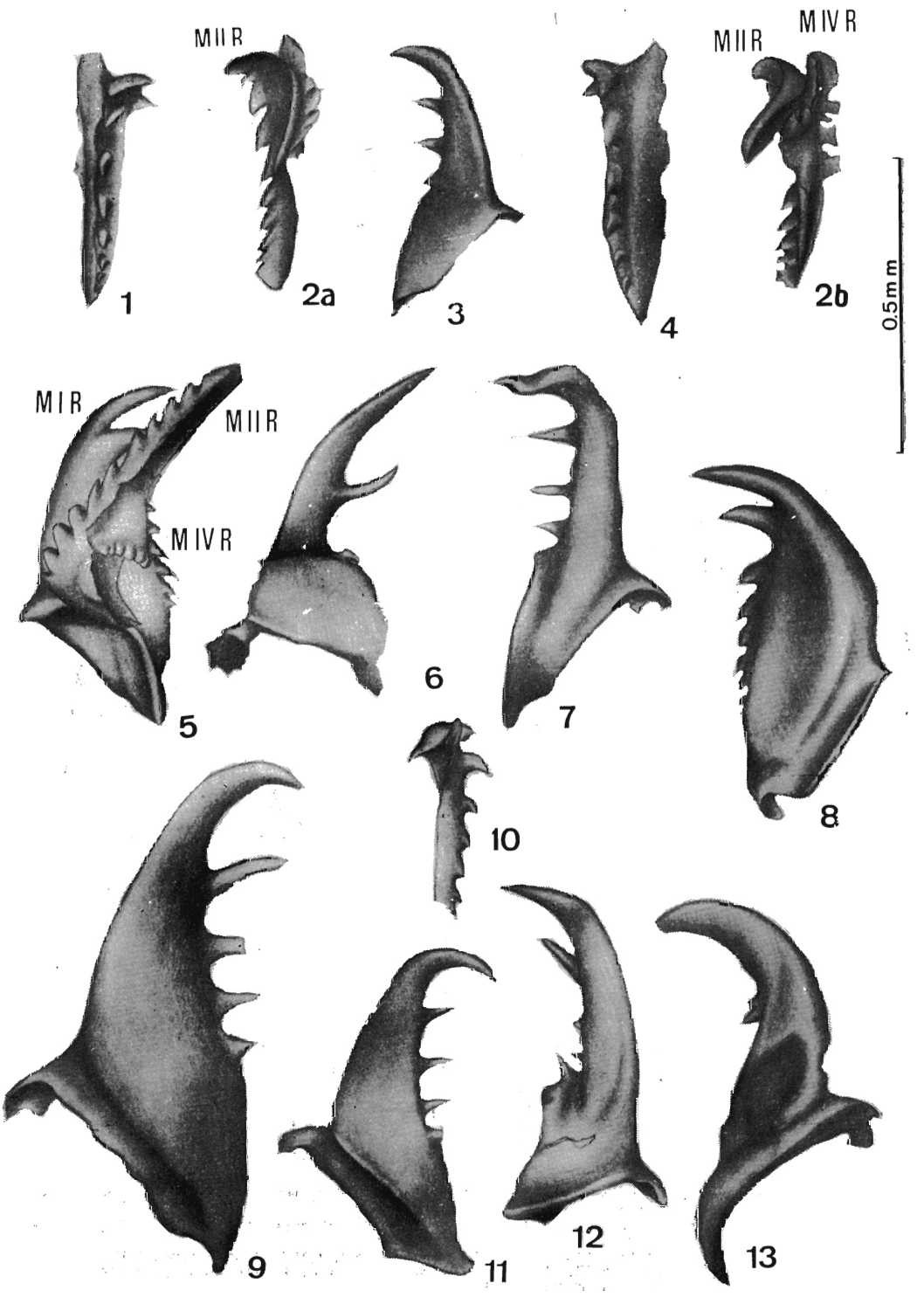
1, 5 — *Kielanoprion* sp.: *1* united *MIl* and *MIr* (sample 26/71, Wierchlesie, Middle Muschelkalk), *5* *MIr* (dorsal view; 0165, Górażdże, Gogolin Beds).

2 — *Elieriprion mamilatus* (Zawidzka): *MIr* (dorsal view; 137/71, Wierchlesie, Górażdże Beds).

3-4 — *Kielanoprion oertlii* (Kozur): *3* united *MIIIr*, *MIIIl* and *MIVr* (26/71, Wierchlesie, Middle Muschelkalk); *4* apparatus composed of carriers, two *MI*, two *MII*, *MIIIl* and *MIV*? (*a* dorsal view, *b* ventral view; 137/71, Wierchlesie, Górażdże Beds).



1 — *Kielanoprion longidentatus* sp. n.: united *MIl*, *MIIl*, *MIIIl*, *MIVl* (*a* dorsal view, *b* ventral view; sample 32/71, Wierchlesie, Karchowice Beds).
2 — *Kielanoprion oertli* Kozur: united *MIr* and *MIIr* (dorsal view; 26/71, Wierchlesie, Middle Muschelkalk).
3-6 — *Atraktoprion anatinus* (Stauffer): *3 MIIl* (dorsal view), *4 MIl* (dorsal view), *5 MIr* (dorsal view) (3-5 from sample 92/71, Pietraszów, Wilkowice Beds); *6* basal plate (*a* ventral view, *b* dorsal view; 92/71, Pietraszów, Wilkowice Beds).

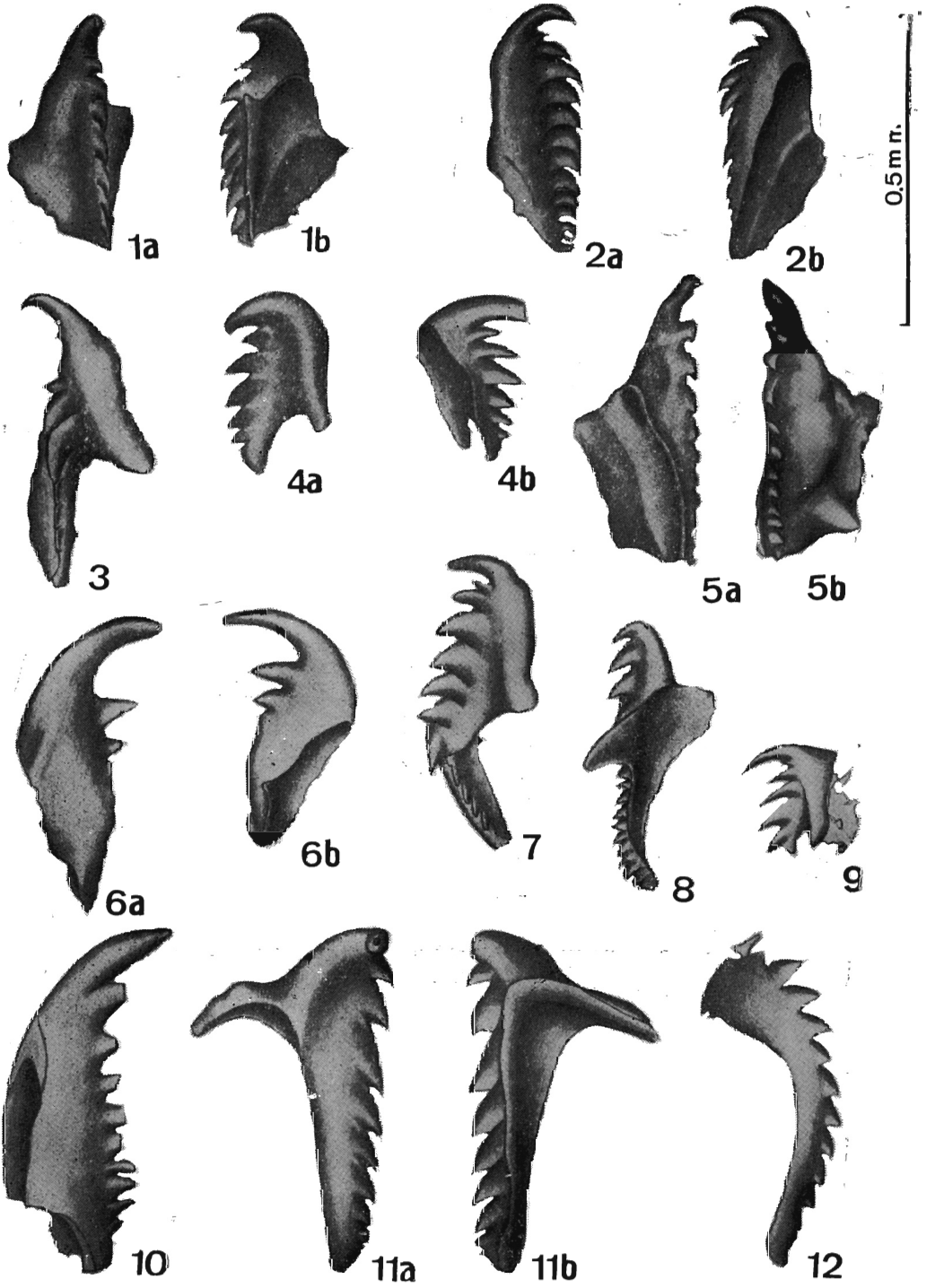


1, 3-4, 6-7, 9-13 — *Delosites raridentatus* Kozur: *1 MIIr* (sample 0174, Górażdże, Gogolin Beds), *3 MIr* (137/71, Wierchlesie, Górażdże Beds), *4 MIIl* (137/71, Wierchlesie, Górażdże Beds), *6 MIl* (43/71, Jemielnica, Gogolin Beds), *7 MIr* (37/71, Wierchlesie, Karchowice Beds), *9 MIl* (146/71, Wierchlesie, Gogolin Beds), *10 MIIr* (0165, Górażdże, Gogolin Beds), *11 MIl* 167/71, Wierchlesie, Górażdże Beds), *12-13 MIr* (43/71, Jemielnica, Gogolin Beds).

2 — *Praelumbrinereis zawidzkae* Kozur: united *MIIr* and *MIVr* (0165, Górażdże, Gogolin Beds).

5 — *Kielanoprion longidentatus* sp. n.: united *MIr*, *MIIr*, *MIVr* (26/71, Wierchlesie, Middle Muschelkalk).

8 — *Kielanoprion oertlii* Kozur: *MIr* (0165, Górażdże, Gogolin Beds).



1-2, 4, 7-8 — ?*Notocirrus* sp.: *1 MII* (sample 137/71, Wierchlesie, Górażdże Beds), *2 MII* (43/71, Jemielnica, Gogolin Beds), *4 MIII?r* (92/71, Pietraszów, Wilkowice Beds), *7 MIIr* (146/71, Wierchlesie, Gogolin Beds), *8 MIIr* (TN-13, Rokitno, Muschelkalk).

3, 9 — ?*Halla tortilis* Kozur: *3 MIr* (T7/61, Tworóg, Lettenkohle), *9 MIVr* (129/71, Wierchlesie, Gogolin Beds).

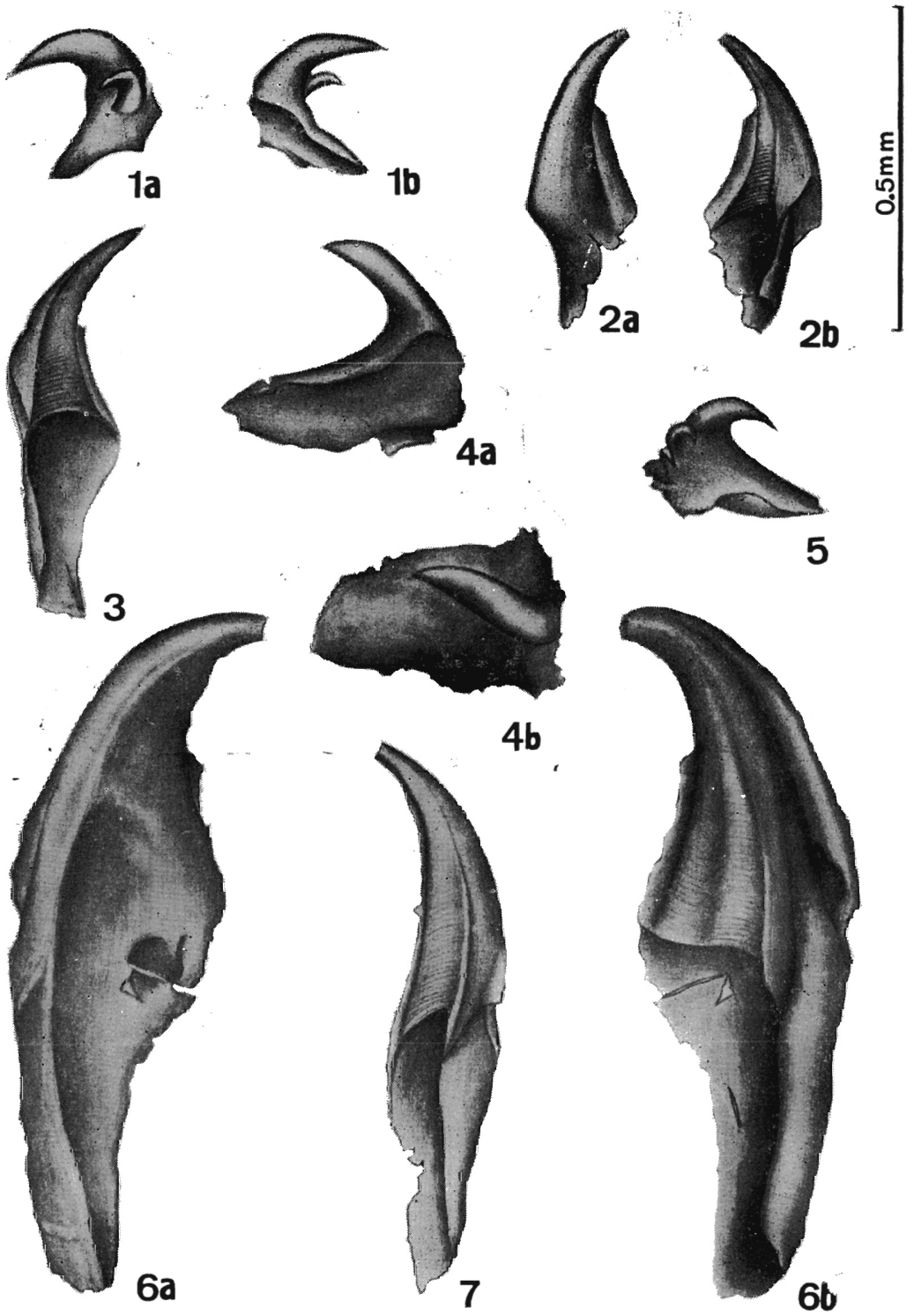
5 — ?ex fam. Kalloprionidae: basal plate (93/71, Pietraszów, Wilkowice Beds).

6 — ?*Hindeoprion: MII* (58/72, Strzelce Opolskie, *Terebratula* Beds).

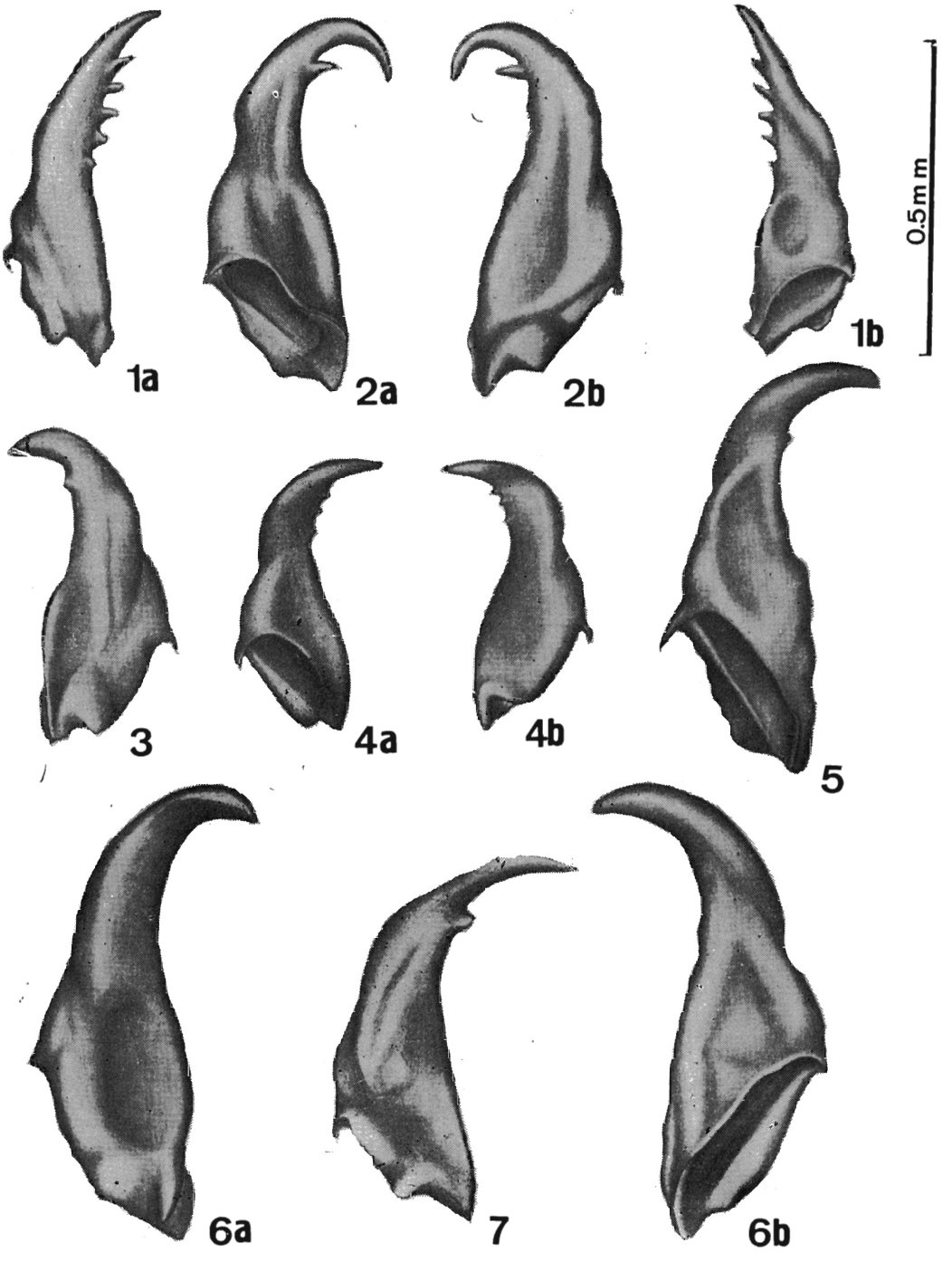
10 — ?*Elleriprion: MIr* (72/71, Pietraszów, Wilkowice Beds).

11 — *Praelumbrinereis zawidzkae* Kozur: *MIII* (25/71, Wierchlesie, Middle Muschelkalk).

12 — ex fam. Muelleriprionidae: *MIIr* (137/71, Wierchlesie, Górażdże Beds).

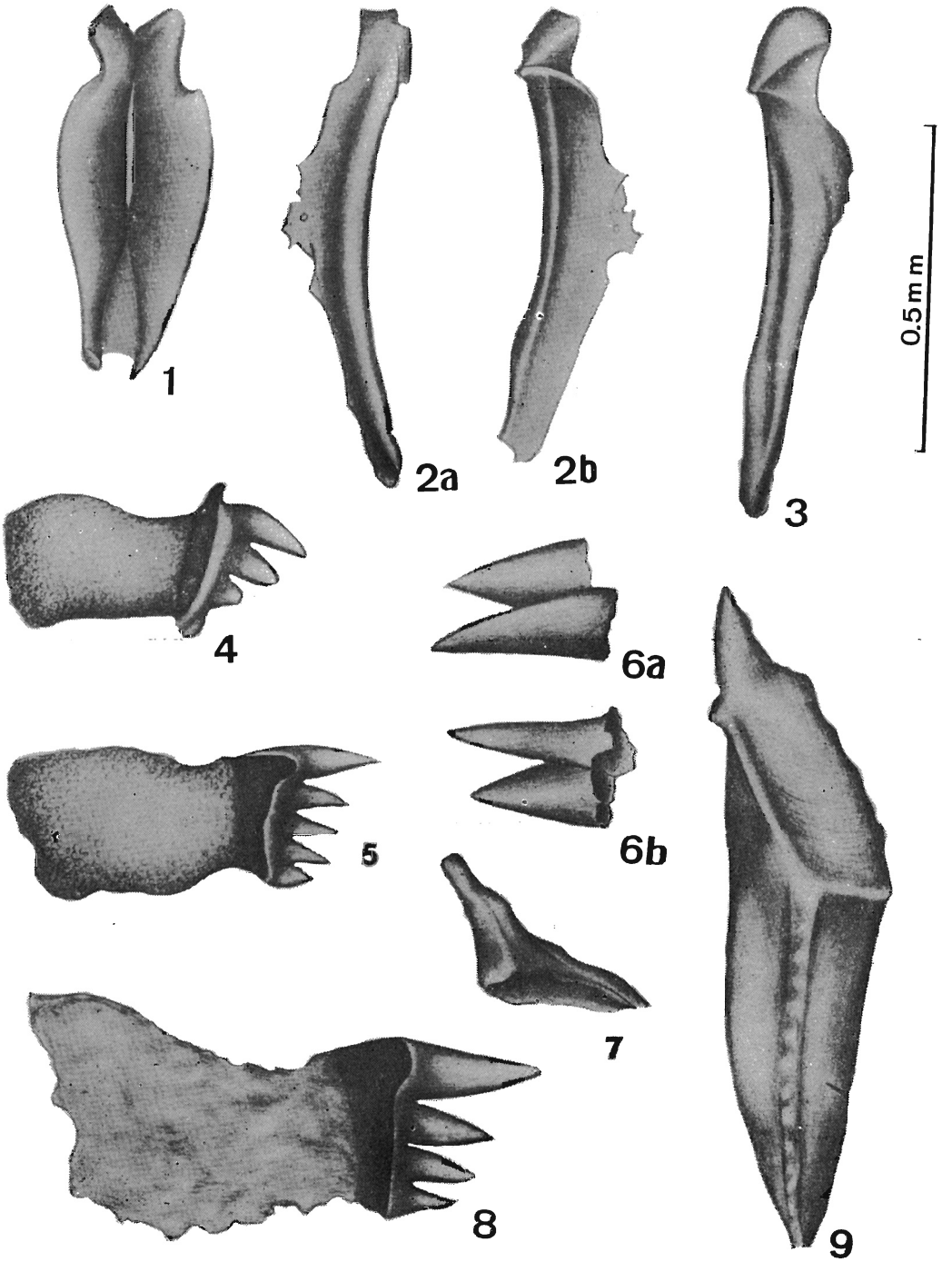


1, 5 — *Goniada? cuneata* Kozur: *1* macrognath (sample 7/71, Wierchlesie, Wilkowice Beds), *5* macrognath (130/71, Wierchlesie, Gogolin Beds).
2-3, 6-7 — *Glycera* sp.: *2* (57/71, Jemielnica, Röt), *3* (0256, Szymiszów, *Terebratula* Beds), *6* (93/71, Pietraszów, Wilkowice Beds), *7* (143/71, Wierchlesie, Röt).
4 — *Goniada* sp. (6/71, Wierchlesie, Wilkowice Beds).



1 — *Elleriprion kazuri* sp. n.: *MIl* (*a* dorsal view, *b* ventral view; sample 0165, Górażdże, Gogolin Beds).

2-7 — *Praelumbrinereis zawidzkae* Kozur: *2 MIr* (*a* ventral view, *b* dorsal view), *7 MIl* (dorsal view) [*2* and *7* from sample 0165, Górażdże, Gogolin Beds]; *3 MIr* (dorsal view), *4 MIr* (*a* ventral view), *b* dorsal view), *5 MIr* (ventral view), *6 MIl* (*a* dorsal view, *b* ventral view) [*3-6* from sample 137/71, Wierchlesie, Górażdże Beds].



1 — Undetermined, united carriers (ventral view; sample 27/71, Wierchlesie, Middle Muschelkalk).
2-3 — Carriers *Glycera* sp.: *2* (56/71, Jemielnica, Röt), *3* (131/71, Wierchlesie, Gogolin Beds).
4-5, 8 — *Atraktoprion anatinus* (Stauffer): *4 MIVl*, *5 MIIIl*, (both from sample 58/71, Jemielnica, Gogolin Beds), *8 MIIIl* (92/71, Pietraszów, Wilkowice Beds).
6 — ex fam. Mochtyellidae(?): two united lateral teeth (TN/13, Rokitno, Wilkowice Beds).
7 — undetermined *MV?* (164/71, Pietraszów, Middle Muschelkalk).