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ON THE TRILOBITE FAMILY STAUROCEPHALIDAE

Abstract. — The ventral cephalic sutures of the genus *Staurocephalus* Barrande, 1846, are described and are shown to be eu-ptychopariid type, the rostral plate being extremely large. The origin of this structure in *Staurocephalus* is discussed. The similarities between *Staurocephalus* and *Oedicybele* Whittington, 1938, are pointed out and the two genera are taken to constitute a separate family — the Staurocephalidae. *Staurocephalus clavifrons* Angelin, *Staurocephalus* sp. *a*, *Staurocephalus* sp. *b*, *Staurocephalus* sp. *c*, and *Oedicybele kingi* Whittington are described.

INTRODUCTION

In connection with a study of the Upper Ordovician trilobites of the Holy Cross Mountains (Góry Świętokrzyskie) in Central Poland, the present writer had an opportunity to examine the ventral cephalic sutures of the genus *Staurocephalus* Barrande and the entire exoskeleton of the genus *Oedicybele* Whittington. As publication of the monographic treatment of the whole Upper Ordovician trilobite fauna mentioned above may take some time, it is thought desirable to publish separately the results bearing on the morphology and taxonomy of these genera.

The species here described are chiefly from the Upper Ordovician beds (zone of *Staurocephalus clavifrons)*, from the localities of Brzezinki and Wólka in the Holy Cross Mts. The data concerning the stratigraphy of these beds have been published separately (Kielan, 1956; comp. also Kielan, 1955). The *Staurocephalus clavifrons* beds in the Holy Cross Mts consist of light-coloured mudstones and the state of preservation of the trilobites is mostly good, though many of the specimens are compressed. The trilobites are usually preserved as internal and external moulds, the latter showing as a rule details of the ornamentation, so that plastic or latex casts may be made from them in order to show the details of the external surface of the test. Some Scandinavian and British specimens of *Staurocephalus* and *Oedicybele* have been examined for comparison.

The terminology of the different types of ventral cephalic sutures used in the present paper corresponds to that of Rasetti (1952) and Jaanusson

(1956). The condition where the anterior branches of the facial suture are fused and no median suture is developed, is called the levisellid type, that with a broad rostral plate the eu-ptychopariid, and that with a narrow rostral plate steno-ptychopariid. In the terminology of the lateral glabellar lobes and furrows the present writer follows Jaanusson (1956): the furrows and lobes are numbered from back to front, the lobes being lettered „L" (*lobus*), the furrows „S" (*sulcus*).

Examination of much of the material here described has been carried out during the writer's stay at the Paleontological Institute of Uppsala University in 1956. Professor P. Thorslund has provided the author with the facilities for studying at this Institute. Dr V. Jaanusson (Uppsala University) has given the author continued assistance and made many helpful suggestions.

During the writer's stay in Britain Dr J. T. Temple (London University) has offered very useful criticism. The accompanying photographs have been taken by Mr. Hjorth (Paleontological Institute in Uppsala), Mr. J. M. Brown (British Museum, Natural History in London) and Miss M. Czarnocka (Paleontological Institute in Warsaw). The accompanying drawings have been made by Mr. E. Ståhl (Paleont. Inst. in Uppsala) and Mr. A. Sulimski (Paleont. Inst. in Warsaw). To all these persons the writer wishes to express her gratitude.

The writer is indebted to the authorities of the following Museums, which have provided her with opportunities for examining the specimens in their charge:

Museum of the Geological Institute (Instytut Geologiczny) in Warsaw (IG),

Museum of the Paleontological Institute of Lund University (LM),

Museum of the Paleontological Institute of Uppsala University (UM),

State Museum of Natural History (Naturhistoriska Riksmuseet) in Stockholm (RM),

Museum of the Geological Survey (Sveriges Geologiska Undersköning) in Stockholm (SGU),

Museum of the Paleontological Institute, University of Copenhagen (CM),

British Museum (Natural History) in London (BM),

Sedgwick Museum in Cambridge (SM),

Geological Museum of the University of Oxford (OM),

Paleontological Museum of Oslo University (PMO),

National Museum (Národni Museum) in Prague (NM).

ON THE SYSTEMATIC POSITION OF *STAUROCEPHALUS* AND *OEDICYBELE*

The systematic position of *Staurocephalus* Barrande, 1846, has been discussed by several authors and it has been placed in either the Cheiruridae (Raymond, 1913, placed it in the subfamily Deiphoninae), or the Encrinuridae. The evidence for excluding *Staurocephalus* from the Cheiruridae has been discussed by Reed (1898), King (1920), Warburg (1925), Öpik (1937) and Prantl & Přibyl (1947). The latter authors (1947) have established for *Staurocephalus* a new subfamily, the Staurocephalinae, within the Encrinuridae. Hupé (1953) has put the Staurocephalinae back in the Cheiruridae, but without discussing the problem.

It should be mentioned that King (1920) after studying the hypostoma of *Staurocephalus* stated (p. 534): „It is difficult to find any family with a similar type of hypostome; certain it is that it is far from the Cheirurid type, but it must also be admitted that very little resemblance can be seen between it and the normal encrinurid type, with its peculiar and striking central tongue-like anterior protrusion. A study of the hypostome of *Staurocephalus* therefore confirms the view that it should be removed from the Cheiruridae, but does not seem to indicate that it should be put into the Encrinuridae..."

The present writer agrees with Prantl and Přibyl in excluding *Staurocephalus* from the Cheiruridae, but at the same time supports the opinion of King, that it should also be excluded from the Encrinuridae. In addition to the evidence of the hypostoma given by King, the structure of the pygidium and of the rostral plate of *Staurocephalus* is taken here as a further support for excluding this genus from the Encrinuridae.

The members of the Encrinuridae can be recognized among the other Cheiruracea chiefly by their pygidial structure, characterised by a great number of rhachial segments and comparatively fewer pleural segments. All the characters of the cephalon and thorax of the Encrinuridae as defined by Schmidt (1881), Hupé (1953) and others can be recognized also in some representatives of the Cheiruridae and Pliomeridae and therefore cannot be claimed as *par excellence* encrinurid. The pygidium of *Staurocephalus* is quite different from that of the Encrinuridae: it is small, with only 3 or 4 rhachial rings and with 3 pleurae produced into spines.

The rostral plate of encrinurids is usually very narrow, of steno-ptychopariid type (for example *Encrinurus* and *Encrinuroides* as figured by Schmidt, 1881, pl. 14, fig. 11-12, and Whittington, 1950, fig. 2 respectively). The largest rostral plate of encrinurids described so far is that of *Atractopyge xipheres* Öpik (comp. Öpik, 1937, pl. 21, fig. 3) where it is oblong (*tr.*) regular in shape and may be called eu-ptychopariid. In *Staurocephalus* the rostral plate (see p. 166 and fig. 1 and 3) is extremely large and broad *(long.* and *tr.)* composed of two parts: anterior (topographically), bulbous and coarsely granulated, forming the direct continuation of the bulbous anterior glabellar lobe, and posterior, smaller, minutely granulated, sub-trapezoid in shape. This type of the rostral plate is quite different from any known so far in the Encrinuridae.

Of the genus *Oedicybele* Whittington, 1938, only cranidia have so far been known so that its systematic position was very uncertain. An examination of some complete specimens of this genus from the Upper Ordovician of the Holy Cross Mts. and of Scania has thrown some new light on this question. The similarities between *Staurocephalus* and *Oedicybele* are striking (see fig. 2 and 5). In both of them glabella is divided into a narrow posterior portion with three pairs of lateral glabellar furrows, and an almost spherical anterior portion consisting of the swollen frontal glabellar lobe, although in *Staurocephalus* this lobe is greater and more convex than in *Oedicybele*. The thorax and pygidium are also very similar. There are 10 thoracic segments in *Staurocephalus* and 11 in *Oedicybele*, but the shape of thoracic pleurae produced into long spines — is closely comparable. The pygidia of the two genera are also similar: they are both small with 3 rhachial segments (3 to 4 in *Staurocephalus)* and 3 pleurae produced into spines directed backwards and ending along a straight transverse line. In both cases the outer surface of the exoskeleton is strongly granulated. Comparison of the ventral cephalic sutures is not possible as the ventral plate of *Oedicybele* is not known so far.

It should be mentioned that Thorslund (1940) in describing the cranidium of the new genus *Jemtella* (regarded by the present author as a junior subjective synonym of *Oedicybele)*, remarked (p. 161) on the similarities of the glabella to that of *Staurocephalus.*

In view of similarities between *Oedicybele* and *Staurocephalus* the two genera must be classified together, but they cannot be referred to either the Cheiruridae or the Encrinuridae, and are here separated into an independent family, the Staurocephalidae.

DESCRIPTIONS

Family **Staurocephalidae** (Prantl & Přibyl, 1947)

Diagnosis. — Facial suture proparian. Glabella divided into narrow, parallel-sided posterior portion with 3 pairs of lateral glabellar furrows, and a bulbous, spherical frontal lobe overhanging in front. (In *Staurocephalus* ventral cephalic sutures of eu-ptychopariid type, hypostoma consisting of wings and triangular, raised central portion with two knobs). Thorax of 10-11 segments with pleurae produced into long spines. Pygidium small, rhachis of 3-4 segments, pleurae with 3 segments, produced into spines. Entire body, especially cephalon, strongly granulated.

Occurrence. — Middle Ordovician (zone of *Nemagraptus gracilis)* — Silurian (Lower Ludlow). Bohemia, Poland, Scandinavia, Great Britain, Kazakhstan, North America, Australia.

Discussion. — The monotypic subfamily Staurocephalinae erected by Prantl and Přibyl (1947) as a member of the Encrinuridae, is here regarded as a separate family. The family Staurocephalidae is to include the genera *Staurocephalus* Barrande, 1846 and *Oedicybele* Whittington, 1938; *Jemtella* Thorslund, 1940, being regarded as a junior subjective synonym of *Oedicybele.*

Genus *Staurocephalus* Barrande, 1846

Diagnosis. — Glabella with narrow, parallel-sided posterior portion and extremely bulbous, spherical frontal lobe, protruding over and concealing anterior margin of cephalon. S_1 and S_2 short and circular, S_3 extending across entire width (*tr.*) of glabella and forming sharp posterior boundary of frontal lobe. Free cheecks convex, genal spines present. Rostral plate large, long (*sag.*) divided into two parts: anterior (topographically), forming the direct continuation of frontal glabellar lobe and posterior sub-trapezoidal. Hypostoma imperfectly known, consisting of flattish margin with wings and sharply rising blunt triangular raised central portion with two knobs behind centre.

Occurrence. — Middle Ordovician (zone of *Dicranograptus clingani)* — Silurian (Lower Ludlow). Bohemia, Poland, Scandinavia, Great Britain, Kazakhstan, North America, Australia.

Discussion. — The type species of *Staurocephalus* is *S. murchisoni* Barrande, described by that author (1846 and 1852) from the Silurian (Wenlock) of Bohemia. Angelin (1878) has described *Staurocephalus clavifrons* from the Upper Ordovician („*Staurocephalus* shales") of Vestergötland in Sweden. The latter species is redescribed in the present paper. In addition to *S. murchisoni* and *S. clavifrons* several species identified as *Staurocephalus* have been described from the different parts of the world, but it appears that several of them do not in fact belong to the genus.

Among the species recorded by Salter (1864 and 1865) as *Staurocephalus, S. unicus* Salter has been referred by Schmidt (1881) and later by Reed (1906) to *Sphaerocoryphe. Staurocephalus globiceps* Portlock although confirmed by Reed (1906, p. 152) as belonging to *Staurocephalus* has a differently shaped pygidium, and Begg (1940, p. 298) suggests that: „The affinities of this genus are with *Sphaerocoryphe* and not with *Staurocephalus*". *Staurocephalus murchisoni* Barrande described by Salter from the Wenlock Limestone (1864, p. 1, pl. 5, fig. 1-4; 1865, p. 84, pl. 7, fig. 13-18) is according to Begg (1940, p. 289) probably not conspecific with Barrande's species. Salter's original specimens examined by the present author, housed in the British Museum (Natural History) and in the Geological Museum, Oxford University, are well preserved (comp. pl. I and II). An examination by the present writer of Barrande's type specimens in the National Museum in Prague has led to the conclusion that British specimens are not conspecific with Czech specimens. British specimens differ from Czech in having coarser granulation and shorter *(long.)* cephalon. In *Staurocephalus murchisoni* the posterior part of the glabella (lateral view) is situated much lower than the anterior bulbous part, whereas in British specimens (see pl. I, fig. 1 *b*, and pl. II, fig. 2 *a*) the posterior part is only slightly lower than the anterior one. Therefore, British Wenlock specimens of *Staurocephalus,* evidently belonging to a new species, are here provisionally called *Staurocephalus* cf. *murchisoni* Barrande.

An examination by the present writer of some of the Upper Ordovician specimens from Rhiwlas, Bala, N. Wales, housed in the Sedgwick Museum in Cambridge, figured by McCoy (1854, pl. 1 F, fig. 15, 15a) and by Salter (1864, pl. 5, fig. 5; 1865, pl. 7, fig. 19-20) as *Staurocephalus murchisoni,* indicates that they are conspecific with *S. clavifrons* Angelin.

Staurocephalus near *S. murchisoni* Barrande, described from Australia by Ratte (1888, p. 100, pl. 2, fig. 5-9) and later by Etheridge and Mitchell (1917, p. 495, pl. 27, fig. 6-11 and 13) does not seem to be conspecific with *S. murchisoni* Barrande.

Staurocephalus murchisoni Barrande (one cranidium) has been recorded also by Weber (1951, p. 39, pl. 5, fig. 10) from the Silurian of Kazakhstan.

Staurocephalus clarkei de Koninck (1898, p. 36, pl. 1 fig. 13, 13a) from the Silurian of Australia does not belong to this genus.

Staurocephalus clarkei Weller (1907, p. 207, pl. 24, fig. 15) from the Niagaran Limestone of the Chicago Area, is known from one cephalon only. The figure given by Weller does not show the details of its structure, but shows that it belongs to *Staurocephalus.*

Weber (1948) has described several poorly preserved cranidia of *Staurocephalus* sp. from Kazakhstan (Mamontovo), from beds evidently corresponding to a part of Ashgillian.

Some imperfectly known staurocephalid species from the Middle and Upper Ordovician beds of Norway and Sweden are described in the present paper as *Staurocephalus* sp. *a*, *Staurocephalus* sp. *b* and *Staurocephalus* sp. *c*.

The oldest known staurocephalid species is so far *Staurocephalus* sp. *a*, from the Middle Ordovician beds, *Dicranograptus clingani* zone from Norway (see p. 167). In the lowermost part of the Upper Ordovician in Dalarna, Sweden, one specimen has been found and is described here as *Staurocephalus* sp. *b*. In the Red *Tretaspis* mudstones of Vestergötland (Sweden), which correspond presumably to the zone of *Dicellograptus complanatus*, some rare staurocephalid specimens have been found by the present writer and are described here as *Staurocephalus* sp. *c*. In the middle part of the Ashgillian — zone of *Staurocephalus clavifrons*, regarded usually as an equivalent of the *Dicellograptus anceps* zone, *Staurocephalus* is widely spread over Europe, occurring in Great Britain, Sweden, Bornholm, Poland and Kazakhstan. In the Silurian (Wenlock) beds staurocephalid species have been recorded from Bohemia, Great Britain, Kazakhstan, North America and Australia.

As there are almost no data on the Middle Ordovician staurocephalids (one poorly preserved cranidium has been found so far) — no reasonable conclusions concerning the phylogeny of this genus can be drawn. It is, however, worth to mention that the oldest known *Staurocephalus*, viz. *Staurocephalus* sp. *a* differs from all the other staurocephalids to a very great extent. The Upper Ordovician and Silurian species of *Staurocephalus* are similar in general cephalic pattern and differ only in proportions, but it is not the case with *Staurocephalus* sp. *a*. The cranidium of *Staurocephalus* sp. *a* (see fig. 4 and pl. IV, fig. 3) is much less convex than those of all the other staurocephalids. The frontal lobe of the glabella is less bulbous, and not uniformly elevated, the greatest elevation being on the anterior part. The cheeks form cone-like elevations, situated far from the frontal glabellar lobe. The cephalic surface is here much less granulated and the lateral glabellar pits at S_3 show quite a different pattern. In *S. murchisoni* and *S. clavifrons* the lateral pits on S_3 are large, deep and round. In *Staurocephalus* sp. *a* on the same place there are 4 small shallow pits, situated close to each other (see fig. 4). The pair of pits at S_3 has been described by Öpik (1937, fig. 36) in *Cybelella grenwingki* (Schmidt). Öpik has interpreted these closely situated pits, lying in one furrow, as corresponding to the muscular attachment of the mandible (*Md*) and antennae (A_{II}), while the anteriorly situated, comparatively large pits at dorsal furrows (anterior pits) as corresponding to antennuale (A_I). When comparing the four small pits in *Staurocephalus* sp. *a* with the large pits on the same place in *S. clavifrons* or *S. murchisoni*, it appears possible to homologize them. It seems more reasonable to refer the four small pits to four small branches of one muscle, corresponding to one cephalic appendage, than to treat them as muscular apodemes of different cephalic appendages. The muscle divided into four branches in *Staurocephalus* sp. *a* is in the other staurocephalids developed as one single, strong muscle with a large apodeme.

Among all the above mentioned staurocephalid species the ventral side of the cephalon is known only in *S. clavifrons* from Poland (see p. 166, fig 3) and in *S.* cf. *murchisoni* from the Wenlock Limestone of Malvern and Dudley, Great Britain (see fig. 1; pl. I and pl. II). The British specimens have been figured by Salter (1864, pl. 5, fig. 1-4; 1865, pl. 7,

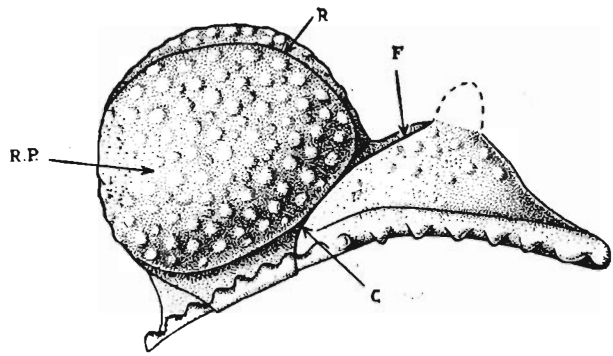

Fig. 1. — *Staurocephalus* cf. *murchisoni* Barrande — cephalon in antero-lateral view, slightly diagrammatical; *R.P.* rostral plate, *R* rostral suture, *F* facial suture, *C* connective suture (O.M.—C. 306); × 5.

fig. 13-17) but the course of the ventral cephalic sutures has not been indicated on these figures. An examination of Salter's type specimens, as well as other conspecific specimens housed in the British Museum (Natural History) has shown that the general shape of the rostral plate and the course of ventral cephalic sutures is similar to those of *S. clavifrons*. In *S. clavifrons* the rostral suture runs (comp. fig. 3) across the bulbous part of cephalon, quite close to the cephalic margin on the ventrally overturned part of the cephalon, whereas in *Staurocephalus* cf. *murchisoni* it runs close to the cephalic margin but more dorsally. On account of this the convex portion of the rostral plate in *S.* cf. *murchisoni* is still larger *(long.)* than in *S. clavifrons*. The connective sutures run in *S.* cf. *murchisoni* more obliquely than in *S. clavifrons*, therefore the posterior part of the rostral plate is in *S.* cf. *murchisoni* narrower (*tr.*) than in *S. clavifrons*. There are 4-5 marginal spines on the rostral plate of *S.* cf. *murchisoni*, whereas 6-7 in *S. clavifrons*.

A study of the ventral cephalic sutures of *S. clavifrons* and *S.* cf. *murchisoni* permits one to visualize the course of the ventral cephalic sutures in their probable ancestors. In the ancestral form the denticulated margin of the cephalon probably formed the real cephalic outline, the frontal glabellar lobe being much less bulbous, the rostral plate smaller and the rostral suture running parallel or sub-parallel to the outline. On account of the enormous increase in size of the frontal glabellar lobe, the denticulated cephalic margin has moved ventrally under the bulbous lobe. The rostral suture has had to migrate across the ventrally overturned part of the bulbous lobe, towards its margin, since otherwise it could not function during ecdysis. The rostral plate thus formed is composed of two different parts: the original rostral plate topographically posterior and the anterior part formerly of the glabella.

There is one nomenclatural question connected with this problem. As usually defined the glabella forms part of the cranidium; as the latter is limited by the facial and rostral sutures, the rostral plate can neither belong to the cranidium, nor consequently to the glabella. On the other hand, the glabella may be defined as the convex, central portion of the cephalon, delimited in front by the preglabellar furrow, which seems to be more reasonable. But in *Staurocephalus* the preglabellar furrow runs across the rostral plate, topographically in front of the denticulated margin, dividing the rostral plate into two parts. If one accepts the latter definition, the anterior part of the rostral plate would belong to the glabella, but not the posterior part. This may give rise to some misunderstandings. Therefore in the present paper the first definition is accepted. The convex middle part of the cephalon, formerly the glabella, is secondarily divided by the rostral suture into the glabella and the rostral plate.

Staurocephalus clavifrons Angelin, 1878

(text-fig. 2, 3; pl. III, fig. 2, 3; pl. IV, fig. 1, 2)

1854. *Staurocephalus Murchisoni* Barrande; F. McCoy, Description of the British Paleozoic fossils..., p. 153, pl. 1 F, fig. 16, 15a.

1864. *Staurocephalus Murchisoni* Barrande; J. W. Salter, British organic remains, Dec. 11, Tril., p. 1-partim, pl. 5, fig. 5.

1865. *Staurocephalus Murchisoni* Barrande; J. W. Salter, A monograph of British trilobites, p. 85-partim, pl. 7, fig. 19-20.

1878. *Staurocephalus clavifrons* n. sp.; N. P. Angelin, Palaeontologia Scandinavica, p. 67, pl. 24, fig. 8.

1906. *Staurocephalus clavifrons* Angelin; E. Olin, Om de Chasmopskalken och Trinucleusskiffern..., p. 48, pl. 1, fig. 15-17.

1956. *Staurocephalus clavifrons* Angelin; Z. Kielan, On the stratigraphy of the Upper Ordovician..., pl. 3, fig. 3-4.

Diagnosis. — Frontal lobe projecting for less than half its length beyond cheek margin. Dorsal furrows on the posterior part of glabella slightly converging anteriorly. Cheeks very convex, as high as frontal glabellar lobe. In lateral view of the cephalon posterior part of glabella entirely concealed by cheeks; 13-14 denticles on free cheek, 3 on fixed cheek, 6-7 on rostral plate. The whole exoskeleton strongly granulated.

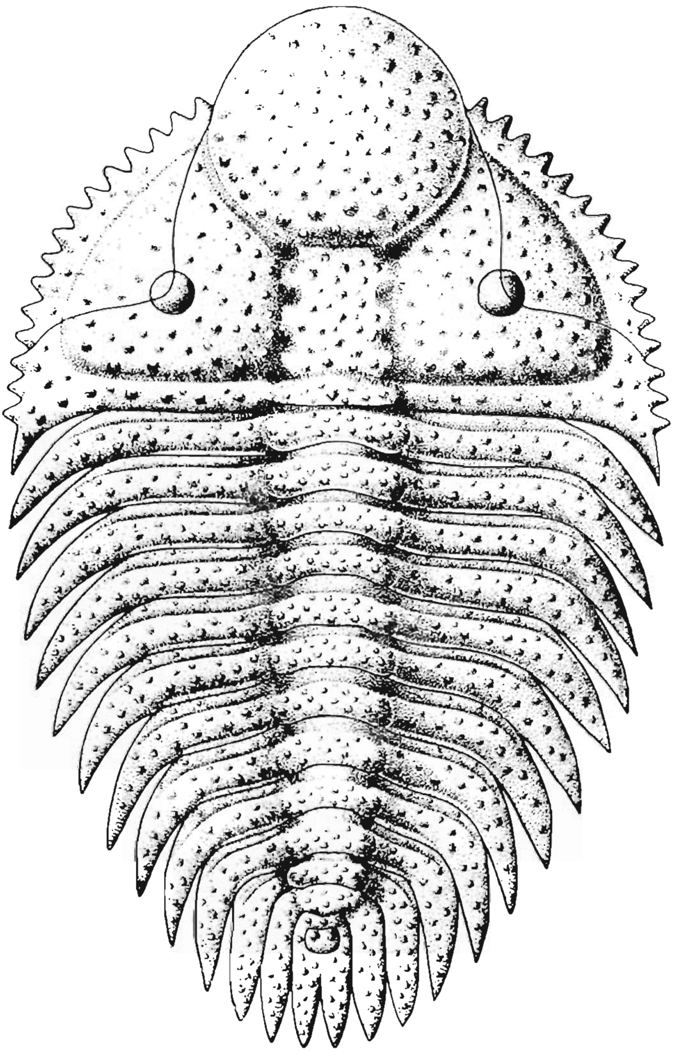

Fig. 2. — *Staurocephalus clavifrons* Angelin — reconstruction; × 8.

Pygidium with 4 rhachial rings, the fourth rhachial ring is comparatively large, shaped as triangular shield with two pits.

Material. — About 130 more or less fragmentary specimens, a few of which are complete, from Brzezinki and Wólka in the Holy Cross Mts., zone of *Staurocephalus clavifrons.* Several cranidia and pygidia from the *Staurocephalus* beds of Scania and Vestergötland (Sweden).

Measurements of two specimens from Brzezinki (in mm):

	1	*2*
Length of the entire individual	3.9	17.2
Length of the cephalon	1.6	7.5
Width of the cephalon	2.7	—
Length of the frontal lobe	1.0	4.5
Length of the pygidium (with spines)	0.55	3.0
Width of the pygidium	0.7	3.8

Description. — The outline of the cephalon is semicircular, invaded by the frontal lobe, which projects for less than half its length beyond the cheek margin. The frontal lobe is spherical and very strongly, uniformly convex, its length being more than half that of the cephalon. The dorsal furrows are broad and very deep; on the posterior part of glabella they run sub-parallel, sligthly converging anteriorly. In the anterior part of the glabella they curve round the frontal lobe to the cephalic margin. The posterior part of the glabella is convex (*tr*). The occipital ring is convex (*sag.*) and in the middle part twice as broad (*sag.*) as at the dorsal furrows, with a sharply pointed occipital node. The occipital furrow is broad and comparatively shallow in the middle part, with very deep, round pits at the dorsal furrows. There are three lateral glabellar furrows: S_1 and S_2 form large, deep pits at the dorsal furrows; S_3 extends across the entire width of glabella and is very broad and deep, with deep, large, round pits at the dorsal furrows in the corners. The cheek is very strongly convex, more elevated than the posterior portion of the glabella. At the highest point of the cheek there is a high cylindrical eye, surrounded by a shallow furrow. The visual surface occupies the greater part of the eye lobe, and consists of about sixty small hexagonal facets. In lateral view the cephalon consists of two equal circles (frontal lobe and cheek), the latter with the eye at its highest point. Lateral border is broad, comparatively flat, with 14 marginal spines on the free cheek and 3 on the fixed cheek. Lateral border furrow is broad and distinct. Posterior border is convex, narrow at the dorsal furrow and becoming flatter peripherally. The genal angle is produced into a short postero-laterally directed spine. Posterior branch of the facial suture cuts the cephalic margin a short distance in front of the genal angle and runs antero-medially through the lateral border, then transversely through the cheek to the eye, round which it curves. The anterior border of the facial suture runs from the eye almost directly forward to the cephalic margin, quite close to the dorsal furrow.

The ventral cephalic sutures are of eu-ptychopariid type. The rostral suture runs as a direct continuation of the facial suture across the bulbous part of the cephalon on its ventral side close to the border of the cephalon, and divides the bulbous part of the cephalon into frontal lobe and rostral plate. The connective sutures run obliquely inwards across the doublure and curve in a slight curve outward, before reaching the distal margin (comp. fig. 3), so that the minimum width (*tr.*) of the rostral plate is topografically anterior to its distal margin. Rostral plate

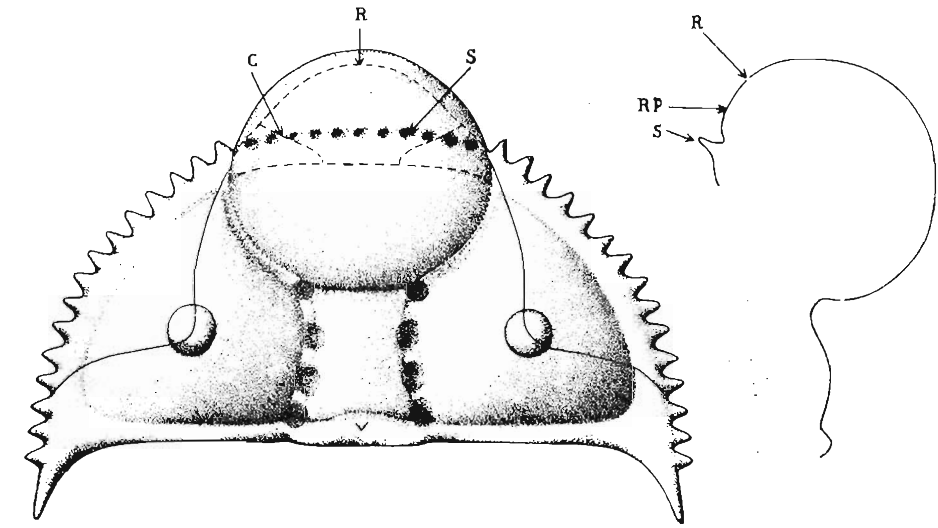

Fig. 3. — *Staurocephalus clavifrons* Angelin — reconstruction of the cephalon; *A* dorsal view (broken lines indicate the sutures and cephalic margin, and the black spots *(S)* — the marginal spines, both on the ventral side of the cephalon), *B* outline of the profile, *R* rostral suture, *C* connective suture, *R.P.* rostral plate, *S* spine; × 8.

is very large, wide (*sag.*), consisting of two parts: an anterior and a posterior, divided by a transverse furrow. The topographically anterior part of the rostral plate is a direct continuation of the frontal lobe, on the lower part of the anterior bulbous portion of the cephalon, and forms a convex, granulated semicircle. On the posterior border of this part of the rostral plate there is a shallow, transverse furrow, and posteriorly to it a transverse row of 6-7 short spines, forming a direct continuation of a row of spines on the cheek margin. The posterior part of the rostral plate is sub-trapezoidal, minutely granulated and much smaller than the anterior portion. One incompletely preserved specimen of a hypostoma shows its triangular shape, similar to that figured by Salter (1865, pl. 7, fig. 17). But on account of the bad state of preservation of this hypostoma details of its structure cannot be observed.

The thorax is composed of 10 segments. The rhachis is convex *(tr.)* tapering gently to the posterior segment. Ratio of rhachial width *(tr.)* to that of pleura with spine is 1:1.25. Pleurae are horizontal for the 1/2 of its length, then curve at sharp angle backwards, and run postero-laterally extending into spines. On the inner (horizontal) part of the pleura there is a shallow furrow *(tr.)* dividing the pleura into a narrow *(long.)* flat anterior portion and a strongly convex, much broader posterior one. Spines of the last thoracic segments are directed entirely backwards.

Pygidium. Ratio of pygidial length (with spines) to width is 1:1.2. Dorsal furrows are very shallow. The rhachis consists of 4 rings, the 3 anterior forming annulations, the 4th a triangular plate with two large pits in one transverse line. The 3 pleurae correspond to 3 anterior rhachial rings. The first pleura is wide *(long.)*, directed transversely and divided by a narrow pleural furrow into a triangular anterior portion and more convex, wider *(long.)* posterior portion. Second and third pleurae widen peripherally and are convex; 3 pairs of pleural spines are directed entirely backwards, those of the first pair are the longest, so that the ends of all three pairs are situated along one transverse line.

Ornamentation. Small and large, sharply pointed tubercles cover the whole cephalic surface, except the rhachial furrows. The posterior portion of the rostral plate and the marginal spines of the cephalon are minutely granulated. On the rhachial rings of thorax, there are two transverse, irregular rows of tubercles. Three irregular transverse rows of tubercles are on the thoracic pleurae. Different sized tubercles are scattered on the thoracic spines and the whole pygidial surface.

Staurocephalus sp. *a*

(text-fig. 4; pl. IV, fig. 3)

Material. — One cranidium from the Middle Ordovician (Upper Chasmops Limestone = 4bδ of the Norwegian division, corresponding to the zone of *Dicranograptus clingani*, from Terneholmen, Askar, Oslo region). The specimen was found by Dr. V. Jaanusson (Uppsala University) whilst examining the rock for ostracods.

Measurements (in mm):

Length of the cranidium	2.5
Length of the frontal lobe	1.45
Width of the frontal lobe	1.4
Width of the cranidium	3.6

Description. — The dorsal furrows are broad and comparatively shallow, running parallel to each other between the occipital ring and the third lateral glabellar furrow (S_3). The posterior portion of the glabella is narrow and convex (*tr.*), occipital ring being broad and imperfectly preserved. Occipital furrow is narrow and shallow in the middle part, slightly convex anteriorly, with round, deep pits at dorsal furrows. The first and second lateral glabellar furrows (S_1 and S_2) form round, shallow pits at dorsal furrows. S_1 is a little larger than S_2; S_3 is very wide (*sag.*) and shallow, extending across the entire width of the glabella. On the posterior border of S_3, at the dorsal furrows, there are on each side two very shallow, well defined, small round pits called

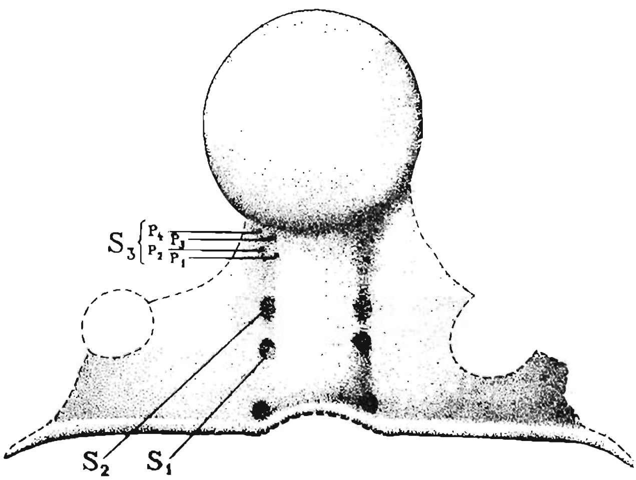

Fig. 4. — *Staurocephalus* sp. *a* — S_1, S_2 and S_3 the first, second and third lateral glabellar furrows; the third composed of 4 small pits (p_1-p_4) (P.M.O.-67044); × 24.

here p_1 and p_2 (comp. fig. 4). They are smaller than S_1 and S_2, situated very closely to each other. External pit p_2 is situated more anteriorly than the internal p_1. Two similar shallow pits (p_3 and p_4) although badly preserved are situated on the anterior border of S_3, more peripherally than p_1 and p_2; p_4 (external) is situated more posteriorly than p_3. Frontal lobe of glabella is well defined, spherical, with greatest elevation in its anterior part. Posterior border is narrow (*exsag.*), convex, directed outwards at dorsal furrows, bending at 1/2 of its length (*tr.*), directed outwards and backwards, and produced into the genal spine. Posterior border furrow is very narrow and thread-like. Cheeks are comparatively flat at the dorsal furrows and are set off distally in the form of cone-like elevations, with the eye on its highest point. This elevated portion of the cheek is situated far from the frontal glabellar lobe, and delimited from it by the wide, concave anterior portion of the fixed cheek. Facial suture cuts the anterior cephalic border close to the dorsal furrow, runs backwards and inwards, then bends in a sharp curve and runs backwards and outwards, cutting the lateral border a short distance in front of the genal angle.

Ornamentation. — Frontal lobe of glabella is minutely granulated. The cheeks have small scattered tubercles. Posterior portion of the glabella is smooth with two small scarcely visible tubercles along its mid-line, the posterior on L_1 and anterior on L_2. (For discussion see p. 161).

Staurocephalus sp. *b*

(pl. III, fig. 1 *a-c*)

Material. — One cephalon from the beds 1 m below the Red *Tretaspis* mudstone, of Skålberget, Dalarna, Sweden; the specimen has been found by Dr. V. Jaanusson and kindly placed by him at the author's disposal.

Measurements (in mm):

Length of the cephalon	5.3
Length of the frontal lobe	3.0
Width of the frontal lobe	3.5

Description. — The outline of the cephalon is half elliptic, the length to width ratio of the cephalon being 1:1.2. The bulbous frontal glabellar lobe projects for one third its length beyond the cheek margin. The frontal lobe is spherical and very strongly, uniformly convex, its length being more than half that of the cephalon. The occipital ring is wide (*long.*), narrowing at the dorsal furrows and convex (*long.* and *tr.*). The dorsal furrow is comparatively shallow and becomes deeper at the dorsal furrows. The dorsal furrows are deep; on the posterior part of the glabella they run sub-parallel, slightly converging anteriorly; in the anterior part of the glabella they curve round the frontal lobe to the cephalic margin. S_1 and S_2 are scarcely visible (due in part to the state of preservation), S_3 extends across the entire width of the glabella and is deep and wide. The cheeks are convex, situated lower than the frontal glabellar lobe. In the lateral view the posterior portion of the glabella is visible. The posterior border is narrow and convex. The lateral border is comparatively wide and flat, with 14 marginal spines on the free cheek and three on the fixed cheek. The genal angle is produced into an incompletely preserved spine. The course of the facial sutures cannot be observed with any certainty.

The whole cephalic surface except the furrows is covered by smaller and larger rounded tubercles.

Discussion. — The specimen here described differs from *Staurocephalus clavifrons* in having the narrower cephalon, the larger frontal glabellar lobe, the wider (*tr.*) occipital ring, and more closely situated tubercles. In *S. clavifrons* the tubercles are sharply pointed, whereas here they are rather rounded, but this may be due to the state of preservation. The difference in the development of the lateral glabellar furrows may be also caused by the state of preservation.

Staurocephalus sp. c

pl. IV, fig. 4, 5)

Material. — One incompletely preserved cranidium and one pygidium from Red *Tretaspis* beds of Skogastorp and Skultorp in Vestergötland, Sweden.

Measurements (in mm):

Length of the cranidium	2.0
Length of the frontal lobe	1.0
Length of the pygidium	1.7
Width of the pygidium	1.5

Description. — The dorsal furrows are broad and run parallel to each other between the occipital ring and the third lateral glabellar furrow (S_3). The posterior portion of the glabella is convex, the occipital ring is broad (*sag.*) and convex (*sag.*) with an occipital node; S_1 and S_2 form small, shallow pits, S_3 is very deep, broad (*sag.*) and extends across the whole width of the glabella, forming a very sharp posterior boundary of the frontal lobe. The frontal lobe is convex and round. The cheeks are moderately convex, much lower than the frontal lobe, but higher than the posterior portion of the glabella, which in the lateral view is not visible. The whole surface of the cranidium is uniformly granulated with small tubercles and minute pits among them.

Pygidium is incompletely preserved. The rhachis seems to be rather narrow (*tr.*) and long (*sag.*). The spines which are well preserved, are narrow (*tr.*), directed backwards and gently bent inwards.

Genus *Oedicybele* Whittington, 1938

Synonym: *Jemtella* Thorslund, 1940.

Diagnosis. — Eyes small, free cheek narrow. (Ventral cephalic sutures incompletely known, hypostoma unknown). Glabella divided into parallel-sided posterior portion with three pairs of lateral glabellar furrows, and a bulbous frontal lobe, overhanging in front. A pair of oblique furrows on posterior part of frontal lobe. Thorax of 11 segments with pleurae produced into spines. Pygidium small with 3 rhachial rings and 3 pleurae produced into posteriorly directed spines. Cephalon with several strong tubercles, the rest of exoskeleton granulated.

Occurrence. — Middle Ordovician (zone of *Nemagraptus gracilis*) — Upper Ordovician (zone of *Staurocephalus clavifrons*). Central Poland, Bornholm, Sweden, Great Britain.

Type species. — *Oedicybele kingi* Whittington, 1938.

Discussion. — Thorslund (1940) described a new monotypic genus *Jemtella* from the Middle Ordovician, zone of *Nemagraptus gracilis*, Jemtland, Sweden. In discussing the systematic position of *Jemtella*, Thorslund stated (p. 161): „In many features (*viz.* outline, general shape and furrows of glabella), *Jemtella clava* seems to agree with *Oedicybele kingi* Whittington (1938, p. 446, pl. XXXVIII, fig. 4, 5)". It differed from the latter species (according to Thorslund) in lacking a preglabellar field and an eye ridge. An examination of British, Polish and Scandinavian specimens of *Oedicybele kingi*, including the type specimens, has shown that contrary to Whittington's statement there is no preglabellar field in this species and thus the differences between *Oedicybele* and *Jemtella* are fairly small and cannot be regarded as of generic rank. *Jemtella* is therefore regarded as a junior subjective synonym of *Oedicybele*.

Oedicybele kingi Whittington, 1938

(text-fig. 5; pl. V and VI)

1938. *Oedicybele kingi* n. sp.; H. B. Whittington, The geology of the district around Llansantffraid..., p. 446, pl. 38, fig. 4-5.

Diagnosis. — Eyes small, tubercular, similar in shape and size to other tubercles on cheeks surface. Transverse, indistinct eye-ridge between eye and glabella. Posterior portion of glabella comparatively broad, frontal lobe sharply differentiated.

Occurrence. — Upper Ordovician, zone of *Staurocephalus clavifrons*. Central Poland, Bornholm, Scania, Vestergötland, Great Britain.

Material. — Whittington's original specimens, one nearly complete specimen from Röstanga, Scania; one cephalon from Bornholm; two cephala from Vestergötland; several nearly complete specimens, for the most part deformed, from Brzezinki in the Holy Cross Mountains.

Measurements of one specimen from Brzezinki (in mm):

Length of the entire individual	13.0
Length of the cephalon	5.0
Length of the pygidium	2.0
Width of the pygidium	2.8

Description. — The outline of the cephalon is sub-semicircular, slightly wider than a semicircle. Dorsal furrows are deep, sub-parallel on the posterior portion of glabella, and strongly widening in front, around the bulbous frontal lobe. The greatest width of the glabella is more than twice that at the base. The occipital ring is narrow *(sag).* and convex. Occipital furrow is very shallow in the middle part, so that the junction between the occipital ring and glabella is difficult to distinguish here. At the dorsal furrows the occipital ring becomes narrower and deeper. There are three distinct, short *(tr.)*, deep, lateral glabellar furrows; S_1 is transverse at the dorsal furrows, crosses less than 1/4 of the glabellar width and then bends sharply backwards and reaches the occipital furrow as a narrow, faint, very shallow furrow. The small basal lobes (L_1) thus cut off are very convex. S_2 and S_3 are short, deep and directed postero-medially. The bulbous frontal glabellar lobe is very large, strongly convex, slightly overhanging in front and much longer than the posterior portion of the glabella. In its posterior part there is a pair of very faint, short *(long.)* oblique furrows, parallel to the dorsal furrows and visible only on well preserved specimens. Cheeks are large, triangular and strongly convex. The posterior border is very convex and comparatively narrow at the dorsal furrow, becoming broader *(long.)* and less convex peripherally, where it joins the lateral border. Posterior border furrow is deep at dorsal furrow and shallower distally. Lateral border is convex and broader than the posterior border. Lateral border furrow is shallow and wide. The genal angle is produced into the genal spine — which is more than a third of the cephalic length, directed postero-laterally and gently convex outwards. The facial suture cuts the lateral border obliquely in front of the genal angle, runs along the lateral border furrow, then bends inwards and runs antero-medially to the small pustule-like eye. Anterior branch of the facial suture runs forward to the lateral border furrow and is then concealed under the overhanged frontal lobe. The course of the ventral cephalic sutures in unknown. The eye is very small, tubercular, similar in size and shape to the other tubercles on the cheek surface and is connected with the glabella by the indistinct, transversely directed eye-ridge. On account of the state of preservation of the eye, no traces of lenses are seen. Free cheeks are very small, comprising the lateral border and a very small part of the cheek inside the lateral border furrow. Hypostoma is unknown.

The thorax is composed of 11 segments. Rhachial rings are strongly convex (*long.* and *tr.*) curving slightly forwards at the dorsal furrows, and forming there small lobes, which are slightly separated from the rest of the rhachial ring. Pleurae are moderately convex, transverse at the dorsal furrows and divided by a transverse furrow into narrow *(long.)*

anterior part, and a broader, more convex, posterior part. Both parts are peripherally bent backwards, and produced into narrow postero-laterally directed long spines.

The pygidium is very small, wider than long. The width of the rhachis is less than a third of the pygidial width. Rhachis tapers strongly

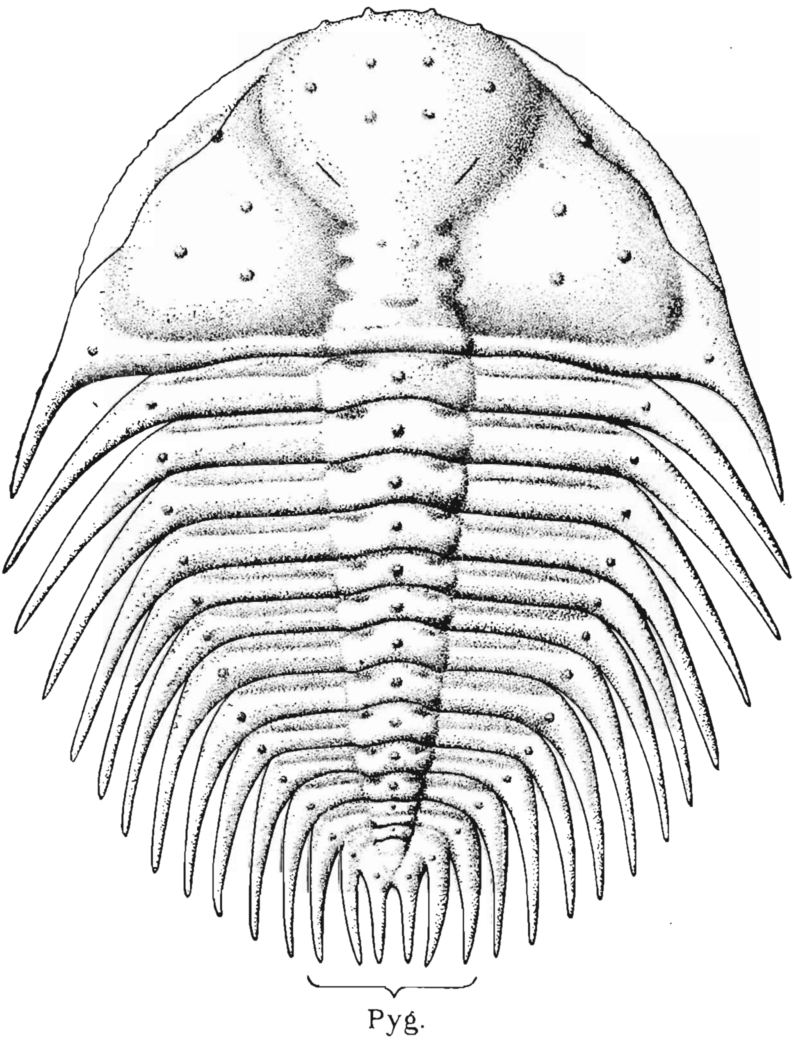

Fig. 5. — *Oedicybele kingi* Whittington — reconstruction (slightly diagrammatical); × 8.

posteriorly, and is divided by two transverse furrows into three rings, the last of which is very small and indistinct. There are three comparatively flat pleurae, corresponding to three rhachial rings. They are produced into wide (*tr.*) posteriorly directed spines. The first pleura is the widest, with a pleural furrow dividing it into anterior and posterior portions but this furrow does not continue onto the spine.

Discussion. — In the Upper Ordovician beds, zone of *Staurocephalus clavifrons* of Central Poland and Sweden, there are several fairly well preserved specimens of *Oedicybele*. After an examination of Whittington's type specimens of *Oedicybele kingi* from Geological Dept. Birmingham University, the present author has regarded the Polish and Scandinavian specimens as conspecific with the latter species. From *Oedicybele clava* (Thorslund) of which only the cranidia are known, *O. kingi* differs in having very small, tubercular eyes. In *O. clava* the visual lobes are unknown, but there are quite distinct, elongated palpebral lobes, which indicated the presence of eyes, rather larger than in *O. kingi*. Further differences are in proportions of the glabella, which in *O. kingi* has a comparatively broader posterior portion than in *O. clava,* while in the latter species L_3 is more strongly differentiated and the genal spines are longer.

Paleozoological Laboratory
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ZOFIA KIELAN

O RODZINIE TRYLOBITÓW STAUROCEPHALIDAE

Streszczenie

Stanowisko systematyczne rodzaju *Staurocephalus* Barrande, 1846, było wielokrotnie dyskutowane i rodzaj ten był zaliczany bądź do rodziny Cheiruridae, bądź do Encrinuridae. Dowody przemawiające za wydzieleniem tego rodzaju z Cheiruiridae były omawiane m. in. przez Reeda (1898), Kinga (1920), Warburg (1925), Öpika (1937) oraz Prantla i Přibyla (1947), przy czym ci ostatni autorzy utworzyli dla niego podrodzinę Staurocephalinae w obrębie Encrinuridae.

Należy podkreślić, że King (1920), na podstawie studiów nad budową hypostomu staurocefalusa, wypowiedział pogląd, że trudno jest znaleźć rodzinę o podobnej budowie hypostomu. Hypostom staurocefalusa jest odległy zarówno od typu cheiruridowego, jak i enkrinuridowego. Budowa hypostomu staurocefalusa potwierdza, zdaniem Kinga, pogląd, że rodzaj ten powinien być wydzielony z Cheiruridae, lecz, z drugiej strony, nie przemawia za włączeniem go do Encrinuridae.

Przeprowadzając studia nad fauną trylobitów górno-ordowickich (głównie z poziomu ze *Staurocephalus clavifrons*) z Gór Świętokrzyskich — miejscowości Wólka i Brzezinki (Kielan, 1955 i 1956) oraz porównując tę faunę z trylobitami górno-ordowickimi Skandynawii i Wielkiej Brytanii, miałam do dyspozycji wiele dość dobrze zachowanych okazów rodzaju *Staurocephalus*. Zapoznanie się z jego morfologią doprowadziło mnie do wniosku potwierdzającego pogląd Kinga, że *Staurocephalus* winien być wykluczony również z rodziny Encrinuridae. Dowodów na to, poza budową hypostomu, dostarcza morfologia pygidium oraz przebieg wentralnych szwów twarzowych i kształt rostrum u tego rodzaju.

Cechą diagnostyczną rodziny Encrinuridae jest budowa pygidium. Wszystkie inne cechy charakteryzujące tę rodzinę, podawane przez Schmidta (1881), Hupé (1953) i inny autorów, występują również u pewnych przedstawicieli Pliomeridae i Cheiruridae i dlatego nie mogą być traktowane jako *par excellence* charakterystyczne dla Encrinuridae. Pygidium Encrinuridae charakteryzuje się dużą liczbą segmentów rachialnych i stosunkowo znacznie mniejszą liczbą segmentów pleuralnych. Małe pygidium staurocefalusa, z 3 pierścieniami na rachis i 3 pleurami wydłużonymi w kolce, jest zupełnie odmienne od pygidium charakterystycznego dla Encrinuridae. Zbadanie dobrze zachowanych cefalonów *S. clavifrons* z Gór Świętokrzyskich oraz *S.* cf. *murchisoni* z Anglii wykazało, że rostrum staurocefalusa jest niezmiernie duże, złożone z dwóch części. Jego część przednia jest wypukła i stanowi bezpośrednie przedłużenie wzdętego przedniego płata glabelli; część tylna jest mniejsza, drobno granulowana i ma kształt trapezoidalny (fig. 1 i 3). Ten typ rostrum jest zupełnie odmienny od rostrów u przedstawicieli Encrinuridae, gdzie jest ono małe, jednolite i zazwyczaj bardzo wąskie, i stanowi dalszy fakt przemawiający za wydzieleniem staurocefalusa z tej rodziny.

W górnym ordowiku i w sylurze rodzaj *Staurocephalus* wykazuje szerokie rozprzestrzenienie geograficzne. Ze środkowego ordowiku nie był on dotychczas wzmiankowany. W pracy niniejszej opisany jest najstarszy znany *Staurocephalus*, oznaczony jako *Staurocephalus* sp. *a*, pochodzący z warstw środkowego ordowiku, poziom z *Dicranograptus clingani*, z Norwegii. Gatunek ten różni się od górno-ordowickich i sylurskich przedstawicieli rodzaju *Staurocephalus* głównie mniej wzdętym przednim płatem glabelli i odmiennym wykształceniem trzeciej bruzdy bocznej (fig. 4; pl. IV, fig. 3). Wentralne szwy twarzowe i spodnia strona cefalonu nie zachowały się u tego gatunku. Studia nad budową rostrum i przebiegiem wentralnych szwów twarzowych u *S. clavifrons* i *S.* cf. *murchisoni* pozwalają wyobrazić sobie jak wyglądało wykształcenie tych elementów u przypuszczalnego przodka staurocefalusa. Wydaje się prawdopodobne, że w związku z wzdęciem przedniego płata glabelli, w toku ewolucji rodzaju *Staurocephalus*, pierwotny, otoczony ząbkami brzeg cefalonu został przesunięty pod spód wzdętego płata. W takiej pozycji znajduje się on u *S. clavifrons* i *S.* cf. *murchisoni* (fig. 1 i 3; pl. I, fig. 1 *c*; pl. II, fig. 2 *b*). Szew rostralny natomiast przesunął się z pierwotnego brzegu cefalonu — na obecny jego brzeg, gdyż tylko w tym położeniu może on być funkcjonalny w czasie linienia. W związku z tym płytka rostralna znacznie się powiększyła i składa się z dwóch części: pierwotnego rostrum, stanowiącego obecnie tylną, subtrapezoidalną część rostrum u *S. clavifrons* i *S.* cf. *murchisoni*, oraz z części przedniej, stanowiącej bezpośrednie przedłużenie wzdętego przedniego płata, należącej pierwotnie do glabelli.

Rodzaj *Oedicybele* Whittington, 1938, znany był dotychczas tylko z kranidiów, w związku z czym jego stanowisko systematyczne było niejasne. (Rodzaj *Jemtella* Thorslund, 1940, traktowany jest tutaj jako synonim *Oedicybele*). Miałam do dyspozycji szereg całych okazów *Oedicybele kingi* Whittington z górnego ordowiku Gór Swiętokrzyskich i Szwecji (fig. 5; pl. V i VI). Porównanie całych pancerzy rodzajów *Oedicybele* i *Staurocephalus* wykazało (fig. 2 i 5), że podobieństwa między tymi rodzajami są znaczne. U obu rodzajów glabella składa się z wąskiej, tylnej części z 3 parami bruzd bocznych i bardzo wypukłego płata przedniego. Toraks u *Staurocephalus* ma 10 segmentów, a u *Oedicybele* — 11, lecz kształt pleur jest u obu rodzajów podobny. Wreszcie oba rodzaje charakteryzują uderzająco podobne małe pygidia, o 3 segmentach rachialnych (niekiedy 4 u *Staurocephalus*) i 3 pleurach, wyciągniętych w skierowane ku tyłowi kolce. Przebieg wentralnych szwów twarzowych i kształt rostrum jest u *Oedicybele* niekompletnie znany, istnieje jednak pewne prawdopodobieństwo, że rodzaj ten ma również duże i szerokie rostrum.

Opierając się na wyżej podanych faktach, rodzaje *Staurocephalus* i *Oedicybele* zostały w niniejszej pracy wydzielone zarówno z Cheiruridae, jak i z Encrinuridae, i umieszczone razem w odrębnej rodzinie Staurocephalidae.

OBJAŚNIENIA DO ILUSTRACJI

Fig. 1 (p. 162)

Staurocephalus cf. *murchisoni* Barrande — nieco schematyczny rysunek cefalonu od strony przednio-bocznej; *R. P.* płytka rostralna, *R* szew rostralny, *F* szew twarzowy, *C* szew konektywny (O. M. — C. 306); × 5.

Fig. 2 (p. 164)

Staurocephalus clavifrons Angelin — rekonstrukcja; × 8.

Fig. 3 (p. 166)

Staurocephalus clavifrons Angelin — rekonstrukcja cefalonu; A widok od strony grzbietowej (linia przerywana wskazuje przebieg szwów i brzeg cefalonu, a ciemne plamki *(S)* — kolce marginalne, na spodniej stronie płata czołowego glabelli), *B* zarys profilu, *R* szew rostralny, *C* szew konektywny, *R.P.* płytka rostralna, *S* kolec; × 8

Fig. 4 (p. 168)

Staurocephalus sp *a.* — S_1, S_2 i S_3 pierwsza, druga i trzecia bruzdy boczne glabelli; trzecia bruzda składa się z 4 małych wgłębień (p_1-p_4) (P.M.O.—67044); × 24.

Fig. 5 (p. 173)

Oedicybele kingi Whittington — rekonstrukcja (nieco schematyczna); × 8.

Pl. I

Staurocephalus cf. *murchisoni* Barrande

Fig. 1. Fragment cefalonu i toraksu: *a* od strony grzbietowej, *b* z boku, *c* od strony brzusznej. Na fig. 1*b* i 1*c* widoczna jest płytka rostralna, przesunięta ze swego pierwotnego położenia. Sylur, wapień wenlocki; Wielka Brytania, Dudley (B.M.— J. 7960); × 5.

Okaz pokrywany chlorkiem amonu.

Pl. II

Staurocephalus cf. *murchisoni* Barrande

Fig. 1. Cefalon — widok z boku: widoczny przebieg szwu twarzowego i rostralnego. Szwy konektywne, biegnące w zacienionej części, nie widoczne na fotografii. Poziom i miejscowość — jak dla okazu na pl. I (B. M. — 9. 1579); × 5.

Fig. 2. Okaz zwinięty, widoczny z boku i od strony brzusznej. Na fig. 2*a* widoczny przebieg szwu twarzowego i rostralnego, na fig. 2*b* — przebieg szwów konektywnych oraz płytka rostralna. Poziom i miejscowość — jak dla okazu na pl. I (O. M. — C.306); × 7.

Okazy pokrywane chlorkiem amonu.

Pl. III

Staurocephalus sp. *b*

Fig. 1. Cefalon widoczny od strony grzbietowej, z przodu i z boku. Górny ordowik, 1 m poniżej czerwonych mułowców tretapisowych; Szwecja, Dalarna, Skålberget, północny profil (U.M.—D.543); × 6.

Staurocephalus clavifrons Angelin

Fig. 2. Prawie cały osobnik — odlew z lateksu. Górny ordowik, poziom ze *Staurocephalus clavifrons;* Polska, Góry Świętokrzyskie, Brzezinki (I.G. — 2.II.1); × 5.

Fig. 3. Pygidium — odlew z lateksu. Górny ordowik, poziom ze *S. clavifrons;* Polska, Góry Świętokrzyskie, Wólka (I.G.—2.II.2); × 12.

Okazy pokrywane chlorkiem amonu.

Pl. IV

Staurocephalus clavifrons Angelin

Fig. 1. Kranidium — okaz przedstawiony przez Angelina (1878, pl. 34, fig. 8) Górny ordowik, warstwy staurocefalusowe; Szwecja, Vestergötland, Ålleberg (R.M.—Ar.8271); × 6.

Fig. 2. Prawie cały osobnik — odlew z lateksu. Górny ordowik, poziom ze *Staurocephalus clavifrons;* Polska, Góry Świętokrzyskie, Brzezinki (I.G.—2.II.3); × 5.

Staurocephalus sp. *a*

Fig. 3. Kranidium. Środkowy ordowik, poziom z *Dicranograptus clingani,* Norwegia, okolice Oslo, Terneholmen (P.M.O. — 67044); × 12.

Staurocephalus sp. *c*

Fig. 4. Kranidium. Górny ordowik, czerwone mułowce tretaspisowe; Szwecja, Vestergötland, Skogastorp (U.M.—Vg.711); × 12.

Fig. 5. Pygidium. Górny ordowik, czerwone mułowce tretaspisowe; Szwecja Vestergötland, Skultorp (U.M.—Vg.710); × 12.

Okazy pokrywane chlorkiem amonu.

Pl. V

Oedicybele kingi Whittington

Prawie cały osobnik — odlew z lateksu. Górny ordowik, prawdopodobnie poziom ze *Staurocephalus clavifrons;* Szwecja, Scania, Röstånga (L.M.—LO 3874 t); × 12.

Okaz pokrywany chlorkiem amonu.

Pl. VI

Oedicybele kingi Whittington

Fig. 1. Kranidium. Górny ordowik, warstwy tretaspisowe; Bornholm, Vasagaard (C.M.—1917.188); × 6.

Fig. 2. Cefalon. Górny ordowik, poziom ze *Staurocephalus clavifrons;* Polska, Góry Swiętokrzyskie, Brzezinki (I. G. — 2.II.4); × 6.

Fig. 3. Cefalon i fragment toraksu. Górny ordowik, poziom ze *S. clavifrons;* Polska, Góry Świętokrzyskie, Wólka (I. G. — 2.II.5); × 6.

Fig. 4. Cefalon, z widocznym odciskiem brzusznej strony płata czołowego. Górny ordowik, poziom ze *S. clavifrons;* Polska, Góry Świętokrzyskie, Brzezinki (I.G.—2.II 6); × 10.

Okazy pokrywane chlorkiem amonu.

ЗОФИЯ КЕЛЯН

О СЕМЕЙСТВЕ ТРИЛОБИТОВ STAUROCEPHALIDAE

Резюме

В статье описаны вентральные лицевые швы у рода *Staurocephalus* Barrande, 1846, и доказано, что они принадлежат эвптихопаридовому типу, причем ростр очень больших размеров. Обсуждается вопрос, как образовался такого типа ростр в течение эволюции рода *Staurocephalus*.

Установление расположения вентральных лицевых швов рода *Staurocephalus* а также строение гипостома и хзостового щита свидетельствуют о том, что этот род не может быть зачислен к семейству Cheiruridae или Encrinuridae, как это производилось.

Род *Oedicybele* Whittington, 1938, был известен только на основании сохранившихся кранидиев, а в связи с этим его систематическая позиция оставалась неясной. В данной статье описаны два полные экземпляры *Oedicybele kingi* Whittington из верхнего ордовиция Свентокржиских Гор и Швеции. Сравнение целых панцырей родов *Staurocephalus* и *Oedicybele* показало, что сходство между этими родами значительно и касается как строения головного щита, так туловищного и хзостового щитов.

Опираясь на вышеприведенных фактах автор выделила в своей статье роды *Oedicybele* и *Staurocephalus* из семейств Cheiruridae и Encrinuridae и поместила их вместе в отдельном семействе Staurocephalidae.

EXPLANATIONS OF PLATES

Pl. I

Staurocephalus cf. *murchisoni* Barrande

Fig. 1. Fragment of the cephalon and thorax in dorsal (*a*), lateral (*b*) and ventral (*c*) views. Fig. 1*b* and 1*c* show the rostral plate removed from original position. Silurian, Wenlock limestone; Great Britain, Dudley (B.M. —J. 7960); × 5

The specimens coated with ammonium chloride.

Pl. II

Staurocephalus cf. *murchisoni Barrande*

Fig 1. Cephalon in lateral view, showing the course of the facial and rostral sutures. Connective sutures running in shadowed part not visible on the photograph. Horizon and locality — as for pl. I (B.M.—9.1579); × 5.

Fig. 2. Enrolled specimen in lateral and ventral views. Fig. 2*a* shows the course of the facial and rostral sutures; fig. 2*b* shows the course of the connective sutures and the rostral plate. Horizon and locality — as for pl. I (O.M.—C.306); × 7.

The specimens coated with ammonium chloride.

Pl. III

Staurocephalus sp. *b*

Fig. 1. Cephalon in dorsal, frontal and lateral views. Upper Ordovician, 1 m below the Red *Tretaspis* beds; Sweden, Dalarna,. Skålberget, northern section (U.M.—D.543); × 6.

Staurocephalus clavifrons Angelin

Fig. 2. Latex cast of a nearly entire individual. Uppe Ordovician, zone of *Staurocephalus clavifrons;* Poland, Holy Cross Mts., Brzezinki (I.G.—2.II.1); × 5

Fig. 3. Latex cast of the pygidium. Upper Ordovician, zone of *S. clavifrons;* Poland, Holy Cross Mts., Wólka (I.G.—2.II.2); × 12.

The specimens coated with ammonium chloride.

Pl. IV

Staurocephalus clavifrons Angelin

Fig. 1. Cranidium — the specimen figured by Angelin (1878, pl. 34, fig. 8). Upper Ordovician, *Staurocephalus* beds; Sweden, Vestergötland, Ålleberg (R.M.—Ar. 8271); × 6.

Fig. 2. Latex cast of a nearly entire individual. Upper Ordovician, zone of *S. clavifrons;* Poland, Holy Cross Mts., Brzezinki (I.G.—2.II.3); × 5.

Staurocephalus sp. *a*

Fig. 3. Cranidium. Middle Ordovician, zone of *Dicranograptus clingani;* Norway Oslo region, Terneholmen (P.M.O.—67044); × 12.

Staurocephalus sp. *c*

Fig. 4. Cranidium. Upper Ordovician, Red *Tretaspis* beds; Sweden, Vestergötland. Skogastorp (U.M.—Vg. 711); × 12.

Fig. 5. Pygidium. Upper Ordovician, Red *Tretaspis* beds; Sweden, Vestergötland. Skultorp (U.M.—Vg. 710); × 12.

The specimens coated with ammonium chloride.

Pl. V

Oedicybele kingi Whittington

Latex cast of a nearly entire individual. Upper Ordovician, probably zone of *Staurocephalus clavifrons;* Sweden, Scania, Röstånga (L.M.—LO 3874 t); × 12.

The specimens coated with ammonium chloride.

Pl. VI

Oedicybele kingi Whittington

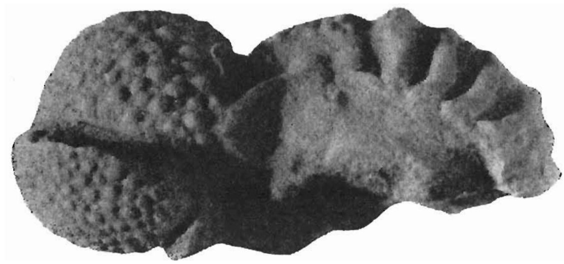
Fig. 1. Cranidium. Upper Ordovician, *Tretaspis* beds; Bornholm, Vasagaard (C.M.—1917. 188); × 6.

Fig. 2. Cephalon. Upper Ordovician, zone of *Staurocephalus clavifrons;* Poland. Holy Cross Mts., Brzezinki (I.G.—2.II.4); × 6.

Fig. 3. Cephalon and the fragment of thorax. Upper Ordovician, zone of *S. clavifrons;* Poland, Holy Cross Mts., Wólka (I.G.—2.II.5); × 6.

Fig. 4. Cephalon showing the imprint of the ventral side of the frontal lobe. Upper Ordovician, zone of *S. clavifrons;* Poland, Holy Cross Mts., Brzezinki (I.G.—2.II.6); × 10.

The specimens coated with ammonium chloride.



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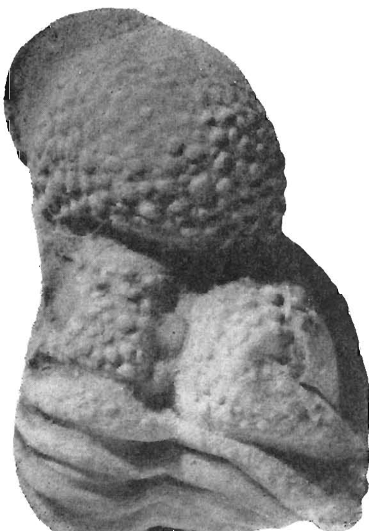

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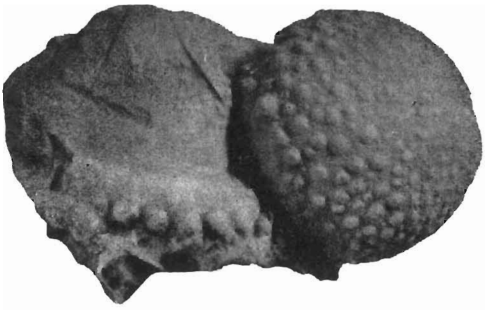

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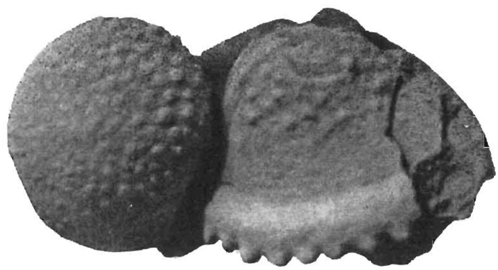

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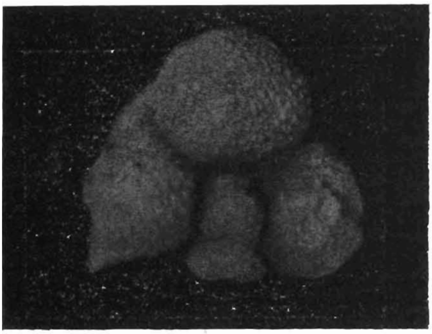

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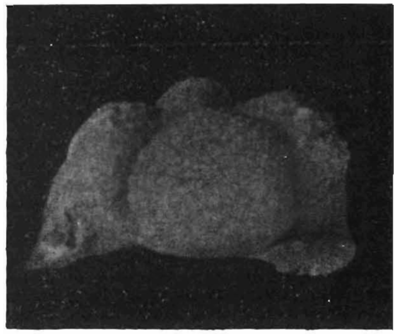

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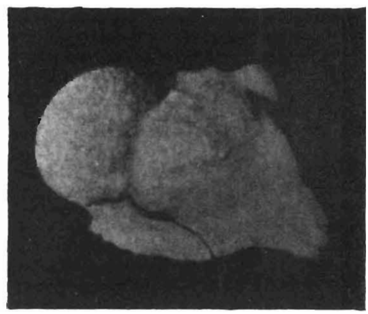

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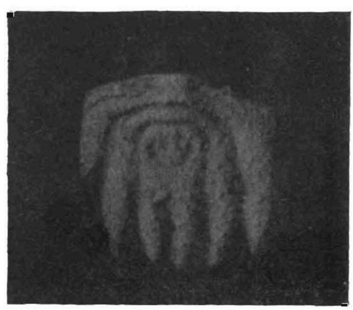

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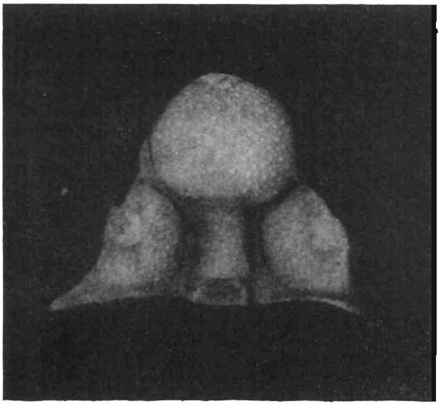

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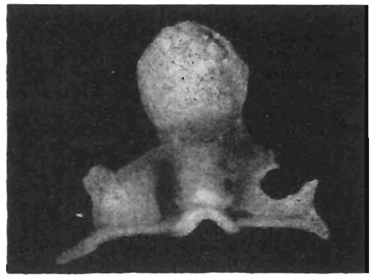

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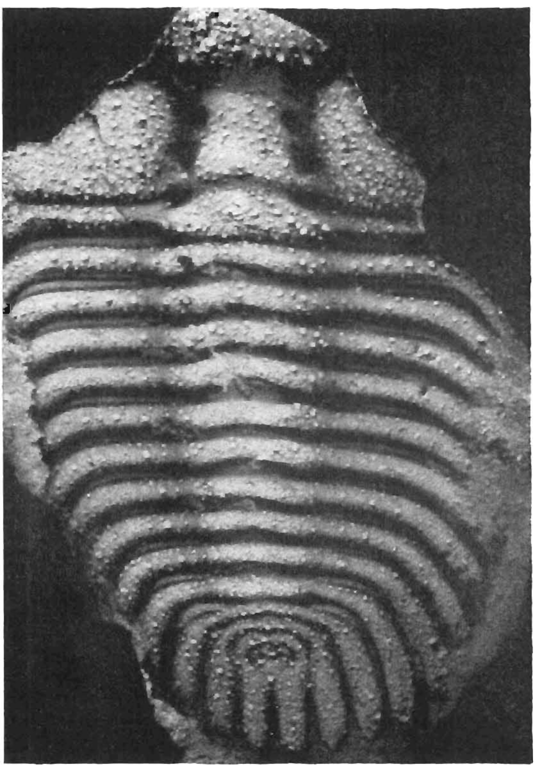

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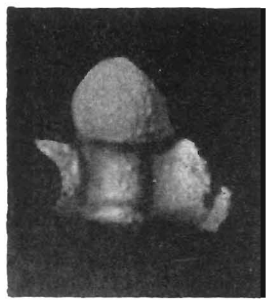

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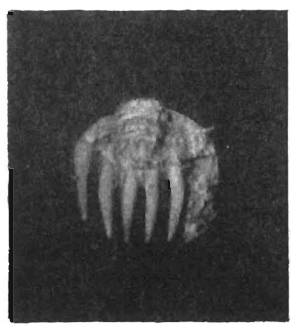

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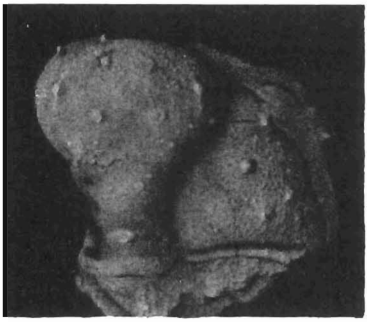

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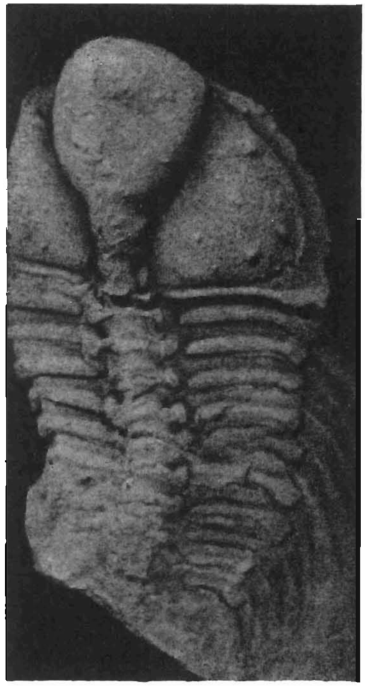

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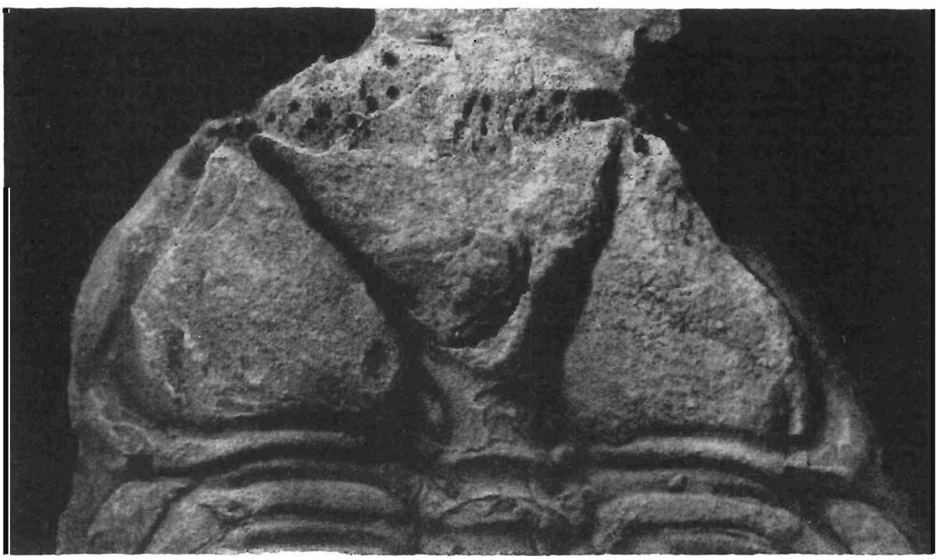

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