

HALSZKA OSMÓLSKA

ON SOME FAMENNIAN PHACOPINAE (TRILOBITA) FROM THE  
HOLY CROSS MOUNTAINS (POLAND)

*Abstract.* — The new Famennian trilobite species *Trimerocephalus dianopsoides* including the meraspid period is described. The mode of moulting in young and adult phacopids and phylogenetic relations of the genera *Cryphops* R. & E. Richter, *Trimerocephalus* M'Coy and *Dianops* R. & E. Richter are discussed.

## INTRODUCTION

The present paper is a continuation of the author's studies (Osmólska, 1958) of the trilobite subfamily Phacopinae. The material here described is from the Famennian beds of Zaremby near Łągów and of Kielce (Kadzielnia quarry), both in the southern part of the Holy Cross Mountains (Góry Świętokrzyskie).

The trilobites from Kadzielnia were collected by Prof. Maria Rózkowska (Palaeozoological Laboratory of the Polish Academy of Sciences, Poznań) and kindly put at the writer's disposal for an investigation; those from Zaremby the writer has collected herself, at the locality kindly shown to her by Dr. Halina Żakowa (Geological Institute, Kielce).

Prof. Zofia Kielan-Jaworowska (Palaeozoological Laboratory of the Polish Academy of Sciences, Warszawa) read the manuscript of the present paper and offered much constructive criticism. Mr. David Bruton (Leicester University, England) kindly corrected the English of the present paper. Miss M. Czarnocka took the photographs, Mrs. E. Gadowska and Mrs. K. Budzyńska made the drawings.

To all these persons the writer wishes to express here sincere thanks and gratitude.

## MATERIAL AND METHODS

The collection of the Famennian Phacopinae described in the present paper consists of more than 300 specimens, which have been deposited at the Institute of Palaeozoology of the Polish Academy of Sciences in Warsaw (Warszawa, Żwirki i Wigury 6) under the catalogue number Tr. D. I.

The greater part of the collection studied comes from Zaremby, and this material has allowed the author a description of *Trimerocephalus*

*dianopsoides* n. sp., and an investigation of its ontogeny in the meraspid and holaspid periods.

In addition to *Tr. dianopsoides* n.sp., there occur in Zaremby *Tr. caecus* (Gürich, 1896) and some specifically unidentifiable representatives of *Cyrtosymbole* (*Cyrtosymbole*) R. Richter, 1913. In the Zaremby assemblage the blind phacopids prevail, ostracods and pelecypods are very common. Less common are the inarticulate brachiopods, while the articulate brachiopods occur but sporadically. Plant remains are very rare, represented only by carbonized, dichotomic fragments.

The Famennian beds in Zaremby represent the mudstones, in which the trilobites are preserved as internal and external moulds. The external moulds, as a rule, show details of the minute ornamentation, so that plasticine casts have been made from them to show the details of the external surface of the test. The trilobites being otherwise satisfactorily preserved, are mostly depressed, and this is why it has been impossible to describe the longitudinal and transverse profiles of the specimens. The comparatively large number of well preserved small specimens has allowed the author to make measurements, and the graphic treatment of the resulting data has given some information concerning the growth in particular developmental stages. The specimens were measured using an eye-piece scale with a binocular microscope. In the graphic elaboration, only the length of the exoskeletons or their parts has been taken into account as the depression of the specimens could not allow one to draw any conclusions concerning the length to width ratio.

The occurrence in the Famennian beds of Zaremby of the representatives of *Cyrtosymbole* (*Cyrtosymbole*) and *Trimerocephalus caecus* allows the beds to be identified as belonging stratigraphically to the Famennian zones II or III.

In the collection from Kadzielnia (marly shales interbedded by limestones) there occurs *Trimerocephalus trifolius* (Osmólska, 1958), discussed in the present paper, accompanied by *Tr. mastophtalmus* (Reinh. Richter, 1856), numerous tetracorals and brachiopods. The age of the Kadzielnia beds in question represents presumably the Famennian zone II.

#### DESCRIPTION

Family **Phacopidae** Hawle & Corda, 1847

Subfamily **Phacopinae** Hawle & Corda, 1847

Genus *Trimerocephalus* M'Coy, 1849

*Trimerocephalus dianopsoides* n. sp.

(pl. I, fig. 1-15; pl. II, fig. 3-6; pl. III, fig. 1-6; pl. IV, fig. 4, 5; text-pl. I)

*Holotype*: The cephalon No. Tr. D. I/223, figured on pl. III, fig. 1.

*Type horizon*: Famennian, zone II or III.

*Type locality*: Zaremby near Łagów, Holy Cross Mountains, Poland.

*Derivation of name*: *dianopsoides* — reminding one, in some characters, of the genus *Dianops* R. & E. Richter, 1926.

*Diagnosis.* — Facial suture cuts the lateral border and runs in the border furrow, but does not trespass onto the cheek. Ocular protuberance on the anterior genal angle. Hypostoma triangular, wide(tr.). Pygidium indistinctly furrowed, short(long.), wide(tr.), trapezoidal, with a posterior margin nearly rectilinear. Exoskeleton minutely granulated, somewhat larger granules on the cephalic doublure, on the hypostoma and on the lateral border near the suture.

*Material.* — 60 entire specimens in meraspid degrees 3 to 10, 28 adult specimens, 160 cephalae, 7 hypostomata, 80 pygidia, and numerous detached thoracic segments. All the specimens are from yellowish-grey Famennian mudstones of Zaremby.

*Description.* — *Cephalon.* The outline of the cephalon is semicircular. Glabella (in all the specimens depressed) widens anteriorly. Occipital ring narrow (long.), convex. Occipital furrow narrow but distinct, in the middle part somewhat bent anteriorly. Intercalating ring at the axial furrows inflated, its width (long.) being equal to two thirds that of the occipital ring. Intercalating furrow not broken medially, somewhat bent anteriorly, deeper at the axial furrows. Middle ( $S_2$ ) and anterior ( $S_3$ ) lateral glabellar furrows lacking. Cheeks fairly convex. No eyes. In the anterior genal angle, near the axial furrow a distinct ocular protuberance. Border convex, comparatively narrow, widening only at the posterior genal angle. Lateral border furrow distinct, shallowing posteriorly. Facial suture in the posterior part very indistinct, cuts the border obliquely, reaches the border furrow at the level of the ocular protuberance and runs along the border furrow where it is distinctly deeper. At the anterior genal angle it bends and returns onto the border but does not cut the cheek.

The cephalic doublure is narrow, its width (long.) being equal to that of the occipital ring (long.). Vincular furrow fairly deep, its width (long.) being more or less equal to that of the intercalating ring. It runs along the anterior margin of the cephalon reaching half of the cheeks length (long.), or somewhat behind. The bottom of the vincular furrow in the part running along the cheek is crenulated with 11 pits.

*Hypostoma* subtriangular, wider than long, flat. Hypostomal border indistinct, present only in the posterior part of the hypostoma. Anterior margin straight, posterior without spines. Anterior wings with prominent processes.

*Thorax* consists of 11 segments. Thoracic rings fairly convex. Pleura with a wide, flat fulcrum, somewhat sharpened; pleural furrow wide, dividing the pleura into two convex bands, equally wide (long.). Posterior margin of the pleura sigmoid, its adaxial part directed slightly posteriorly, abaxial — anteriorly. Pleural doublure wide (tr.) somewhat wider than the pleura (long.). On the distal ends of the pleural doublure there occur the prominent, tubercle-like thickenings which, on the anterior

segments are comparatively faint, but become very distinct on the six posterior segments. Near the anterior margin of the pleural doublure, there occurs a Pander's protuberance in a form of a longitudinal elevation. This is directed obliquely posteriorly, reaching nearly the adaxial margin of the pleural doublure. Tracing the pleural doublures from the first segment backwards, one notices that the protuberances become more prominent and narrower (tr.) and move towards the anterior pleural margins. Similarly the highest point of the protuberance moves towards the interior margin of the pleural doublure. Hence, on the two posterior pleurae the protuberances form distinct tubercles situated close to the interior margin of the doublure (pl. IV, fig. 5).

*Pygidium* is short (long.), twice as wide as long, posterior margin being directed transversely. Anterior margin in the middle part is parallel to the posterior border, beyond the half of the pleural width (tr.) it bends and is directed nearly posteriorly. The axial furrows are shallow, pygidial axis short (long.) and wide (tr.), not separated from the posterior part of the pygidium. The ring furrows are extremely faint, the first one only being somewhat more distinct, deeper at the axial furrows. Articulating half ring as wide (long.) as the first axial ring. Interpleural and pleural furrows are indistinct except the first pleural furrow, which delimitates the convex half rib. Pleural doublure very narrow, in the middle part reaching the axis, widening peripherally. On the distal end of the pygidium near the interior margin of the doublure, there occurs the tubercle situated in the prolongation of the line of Pander's protuberances on the successive thoracic segments.

*Ornamentation.* The whole exoskeleton, including the ocular protuberance, is densely, but minutely granulated. The more coarse granules occur on the cephalic border near the facial suture, on the cephalic doublure and on the hypostoma. The finest granules occur on the pygidium.

*Individual variation.* The variation observed concerns the following characters:

- 1) The depth of the border furrow at the posterior genal angle. In the majority of the examined cephalia the border furrow is distinct, in some specimens it becomes more shallow near the genal angle, and in an extreme case it is hardly visible. The shallowing of the border furrow is usually connected with the widening of the border at the posterior genal angle.

- 2) The occurrence of the middle ( $S_2$ ) lateral glabellar furrow, which usually is lacking (as well as  $S_3$ ). In one specimen however there occur the traces of  $S_2$  in the form of shallow deepening.

- 3) The prominence of interpleural and pleural furrows on the pygidium, may be more or less distinct, but are always shallow.

Table 1  
Dimensions of *Trimerocephalus dianopsoides* n.sp. (in mm)

Cat. No. Tr. D. I.	Number of thoracic segments	Total length of carapace (lt)	Length of cephalon (lc)	Length of pygidium (lp)
1	2	3	4	5
139	3	2.70	1.40	0.81
97	3	2.79	1.49	0.75
232	3	2.53	1.31	0.70
187	3	2.31	1.18	0.66
173	5	3.37	1.76	0.88
301	5	3.47	1.51	0.78
50	5	3.35	1.52	0.76
81	6	3.78	1.65	0.81
82	6	3.96	1.95	0.76
86	6	3.90	1.95	0.79
44	6	3.98	1.95	0.85
61	7	4.55	2.00	0.85
249	7	—	2.29	0.90
400	7	4.63	2.10	0.82
65	7	4.55	2.31	0.83
63	7	4.75	2.13	0.84
210	7	4.58	1.85	0.83
208	7	4.89	2.13	0.91
94a	7	4.62	2.02	0.75
136	8	5.33	2.39	0.84
10	9	6.20	2.64	0.80
234	9	6.60	2.68	0.99
184	9	6.30	2.81	0.84
230	9	6.80	2.74	0.94
212	9	6.50	2.87	0.85
113	9	6.30	2.92	0.94
62	10	7.00	3.15	1.02
51	10	7.80	2.83	1.03
217	10	9.00	3.65	1.28
54	10	7.80	3.04	0.98
202	10	8.10	3.65	1.15
57	10	8.80	3.15	1.26
178	10	9.00	3.58	1.13
66	10	8.00	2.93	1.08
193a	10	7.80	2.96	1.05
121	11	11.77	4.17	1.30
338	11	11.40	3.90	1.30
235	11	11.40	3.90	1.30
337	11	14.40	5.20	1.95
193b	11	14.80	5.20	1.95
25	11	—	—	2.80
240	11	12.03	4.13	1.30
163	11	—	—	1.42
242	11	17.12	5.32	2.09
128	11	14.20	5.20	1.82
219	11	—	—	2.14

Table 1 (continued)

1	2	3	4	5
203	11	—	—	2.82
231	11	10.90	3.90	1.17
94b	11	20.20	7.00	2.20
142	11	40.00	10.50	3.50
196	11	58.00	13.00	3.50
223	11	—	11.00	—
152a	11	—	—	3.20
152b	11	—	—	5.82
Dimensions of <i>Trimerocephalus caecus</i> (Gürich) (in mm)				
11	9	12.00	4.10	1.80
146	9	11.30	4.20	1.90
Dimensions of <i>Trimerocephalus trifolius</i> (Osmólska) (in mm)				
16	?	—	5.20	—
21	11	20.20	6.80	4.50

It is possible that the individual variation concerns also other characters but, on account of the depression of all the specimens, not all the feature could be analysed from this point of view.

*Ontogenetic development.* — In the collection of Zaremby there occur 60 young specimens, representing different degrees of the meraspid period and some young holaspid instars (table 1). The degrees: 1, 2 and 4 are lacking. The degree 8 is represented by one specimen only, the remaining degrees — by several specimens each. As the specimens are somewhat depressed, the measurements (table 1 and 2) do not allow the calculation of the growth index. The graphs (fig. 1-5) show that the growth in the meraspid period is rather regular. The comparison of

Table 2

Average lengths (in mm) of total exoskeleton (lt), cephalon (lc), thorax (lth), pygidium (lp), and cephalic length to total exoskeleton length ratio ( $\% \frac{lc}{lt}$ ), pygidial length to total exoskeleton length ratio ( $\% \frac{lp}{lt}$ )

Meraspid degree	lt	lc	lth	lp	$\% \frac{lc}{lt}$	$\% \frac{lp}{lt}$
3	2.58	1.35	0.49	0.74	52	28
4	—	—	—	—	—	—
5	3.40	1.63	0.98	0.79	46	23
6	3.90	1.87	1.23	0.80	48	20
7	4.65	2.10	1.71	0.84	45	18
8	5.33	2.39	2.12	0.84	44	16
9	6.45	2.78	2.80	0.87	43	14
10	8.20	3.29	3.80	1.11	40	13
11a	11.50	4.0	6.23	1.27	34	11
11f	58.0	13.0	39.70	5.30	22	9

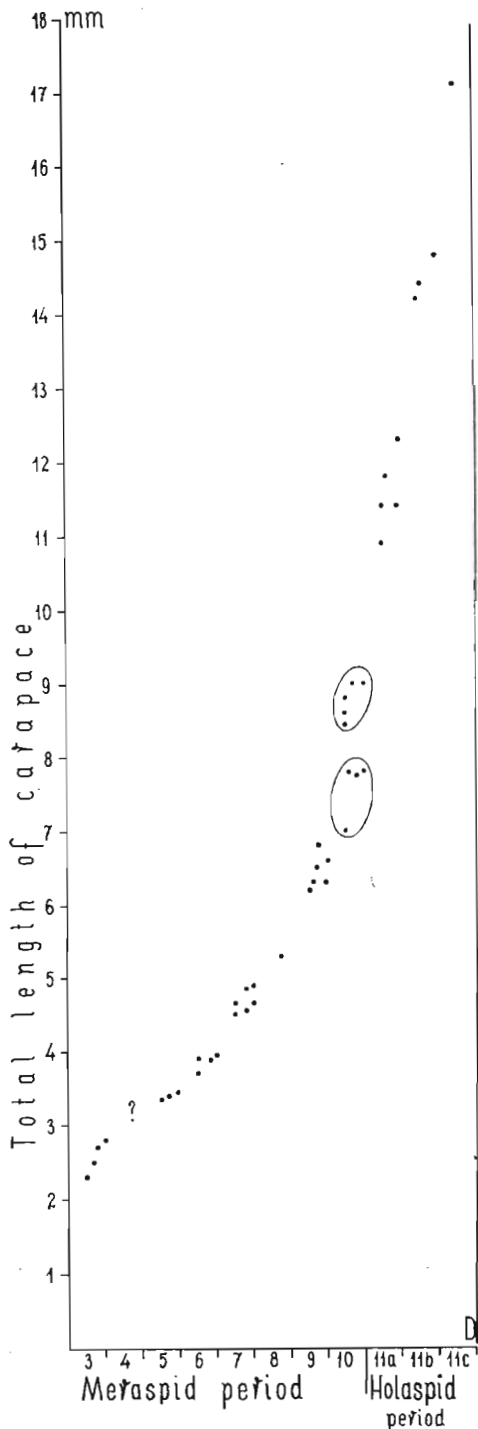


Fig. 1. — Graph of the increase in length of the entire exoskeleton during the meraspis and early holaspis period (11a, 11b, 11c — successive instars of holaspis period).

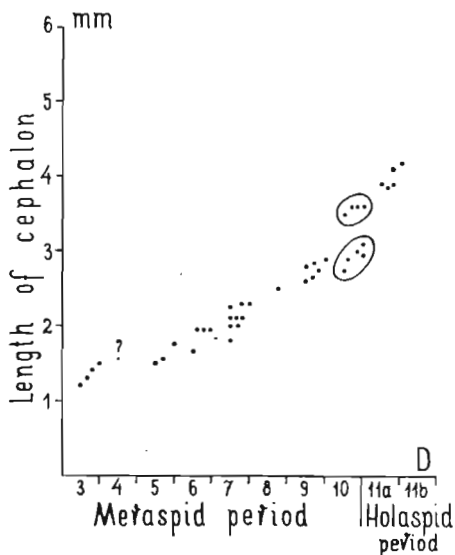


Fig. 2. — Graph of the increase in length of the cephalon during the meraspis and early holaspis period.

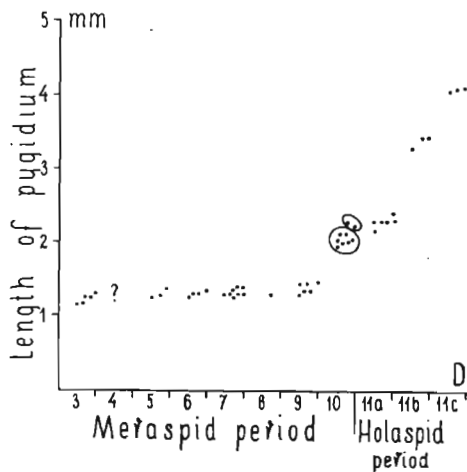


Fig. 3. — Graph of the increase in length of the pygidium during the meraspis and holaspis period.

the graphs of the average lengths: of the entire exoskeleton (*lt*), of the cephalon (*lc*), of the thorax (*lth*) and of the pygidium (*lp*), shows that the curves *lt* and *lth* are subparallel (fig.4). This fact should be expected as the increase of the length of the entire exoskeleton is caused mainly

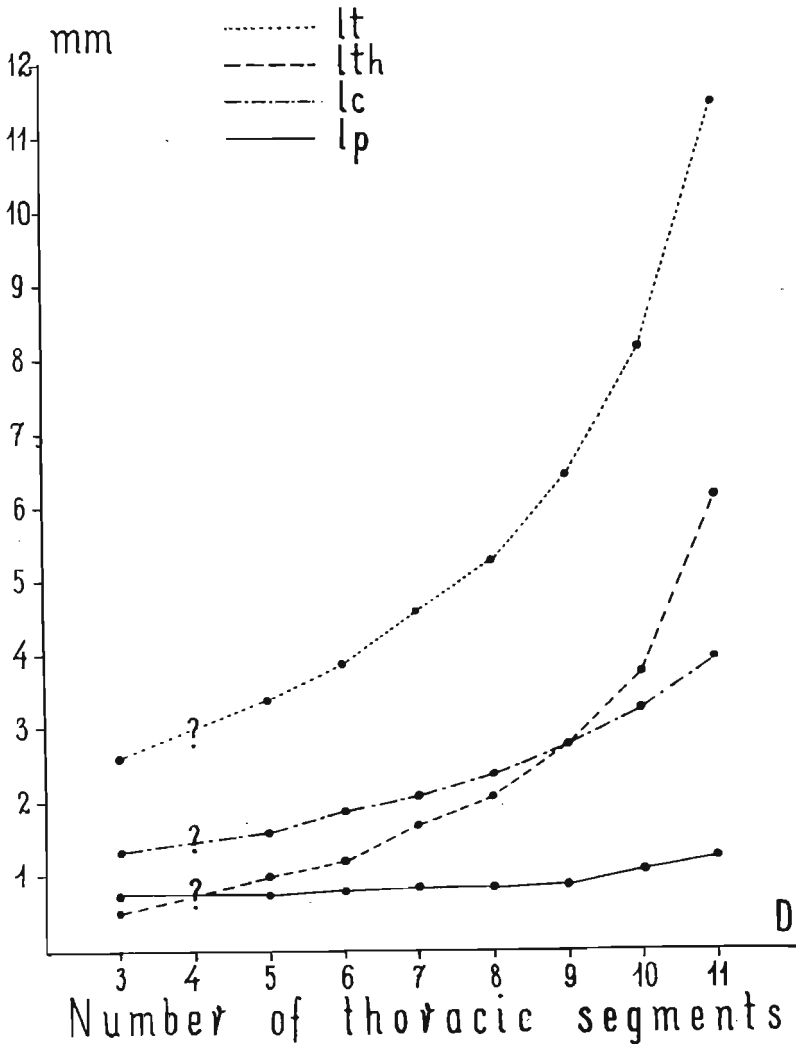


Fig. 4. — Comparison of the changes in average length of particular exoskeletal parts during the meraspid period  
*lc* length of cephalon, *lt* total length of exoskeleton, *lth* length of thorax, *lp* length of pygidium.

by an addition of one thoracic segment in each meraspid degree. The graph of the length increase of the cephalon (*lc*, fig. 2,4) shows that the growth is here slower. The graph of the pygidial length increase (*lp*, fig. 3, 4) shows but a very slight increase in successive meraspid degrees. Until the degree 9, the absolute pygidial length increases only very slightly, whilst a somewhat greater increase is observable during



the holaspid period, and even beginning from the meraspid degree 9. The graphs (fig. 5) of the average percentage changes of the cephalic length to entire exoskeleton length ratio ( $\% \frac{lc}{lt}$ ) and that of the pygidial length to the entire exoskeleton length ratio ( $\% \frac{lp}{lt}$ ), show that in the meraspid period the relative lengths of cephalon and pygidium decrease. It is noticeable that the curve  $\% \frac{lc}{lt}$  is slightly sigmoid which is probably the result of the ununiform growth of the cephalon. In contrast with this,

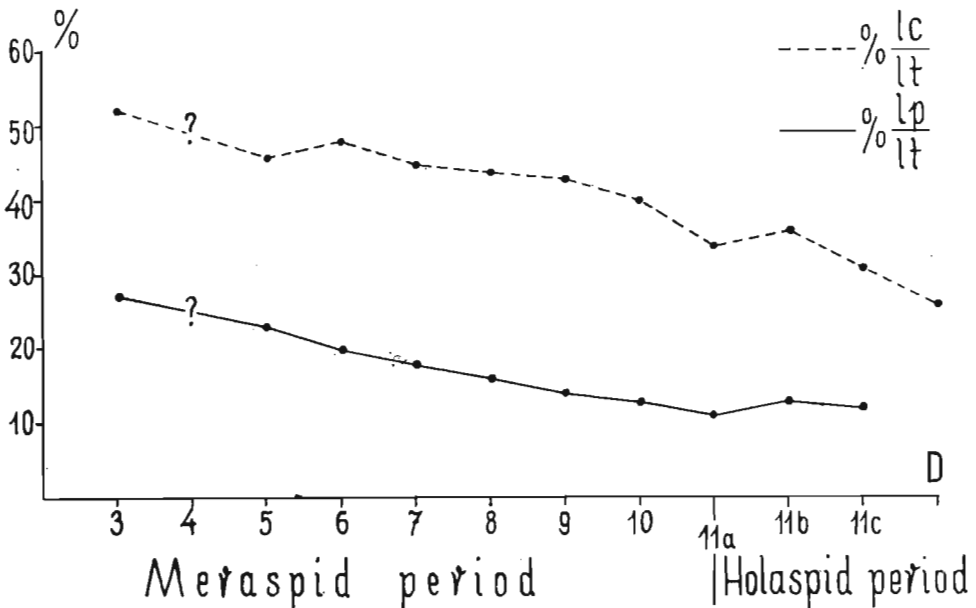


Fig. 5. — Graphs of the average percentage changes of:

$\% \frac{lc}{lt}$  cephalic length to entire exoskeleton length ratio,

$\% \frac{lp}{lt}$  pygidial length to entire exoskeleton length ratio,

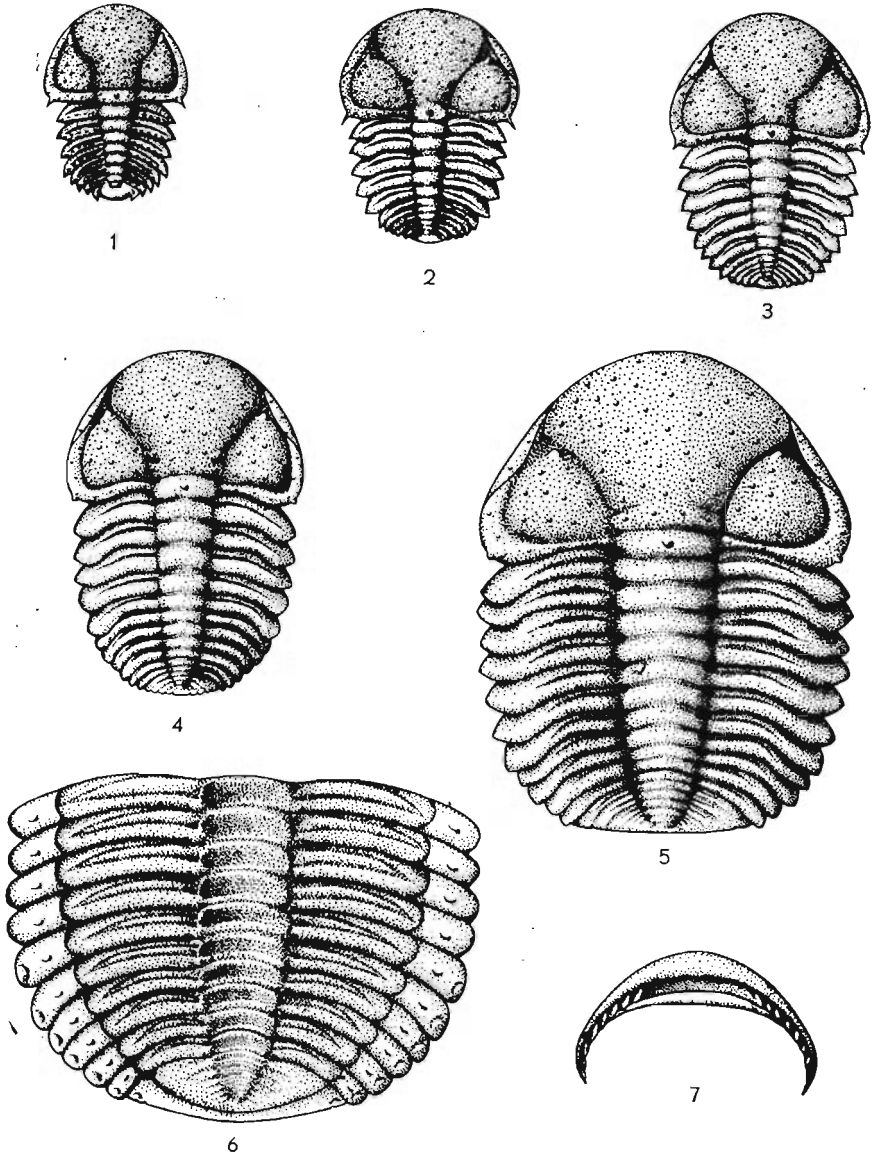
during meraspid and early holaspid period.

the relative lengths of the pygidium (the curve  $\% \frac{lp}{lt}$ ) in the meraspid period decrease uniformly.

The comparison of the dimensions within one growth degree shows that the appearance of each thoracic segment is connected in this species probably with a single moult. Only in the degree 10 the dimensions of the entire exoskeletons, as well as those of the cephalon and pygidia, show that there are two groups of specimens, differing in dimensions. In consequence this indicates that in the degree 10 there are at least two instars.

The morphological changes occurring in the successive instars concern the following characters (pl. I, pl. II, fig. 3—6; text-pl. I):

## TEXT-PL. I

*Trimerocephalus dianopsoides* n. sp.

- Fig. 1. Reconstruction of meraspid, degree 3.  
 Fig. 2. " " " degree 5.  
 Fig. 3. " " " degree 7.  
 Fig. 4. " " " degree 9.  
 Fig. 5. " " " degree 10.  
 Fig. 6. Reconstruction of the ventral side of thorax and pygidium, in meraspid, degree 10.  
 Fig. 7. Reconstruction of vincular furrow in meraspid, degree 7.

1) Ocular protuberance very prominent at first, becomes lower and lower, reaching at the degree 10 the shape and size characteristic of the young holaspides.

2) The spine on the outer side of the posterior genal angle in degree 3 is very thin and pointed, its length being equal to two thirds of the width (long.) of the occipital ring. In the successive instars, including degree 7, it becomes smaller and smaller in comparison with the cephalic length and in the degree 9 and 10 it changes into a tubercule.

3) The middle lateral glabellar furrow ( $S_2$ ) deep and distinct in younger meraspid instars, becomes indistinct between the degrees 7 to 9, later disappearing.

4) In the young instars the glabella is widened anteriorly at the position of  $S_2$ . However, the widening occurs more posteriorly at each successive instar causing the shallowing and then disappearance of the  $S_2$ -furrow. Consequently in older meraspides the glabella widens anteriorly at the level of  $S_1$  (intercalating furrow) as is characteristic of adult forms.

5) The facial suture in meraspides<sup>1</sup> until the degree 10, is functional. It is disposed in the border furrow, in the same position as in the adult forms, when it becomes non-functionable.

6) The vincular furrow in adult forms is, in the middle part, nearly straight, directed transversely with smooth edges. In the genal part it is directed posteriorly and crenulated. In younger forms the straight part of the furrow is somewhat shorter (tr.) than the width (tr.) of the transitory pygidium. In the crenulated part, the number of pits, fitting in the enrolled ends of the thoracic pleurae, is greater than the number of free thoracic segments. This is connected with the fact that the crenulations correspond to the ends of pleurae of the transitory pygidium. As the lower part of the cephalon is in small specimens poorly preserved, it is impossible to count which number of pits in the vincular furrow corresponds to particular meraspid degrees. It seems however, that during the growth, the number of pits increases.

7) In younger meraspides the thoracic pleurae are wider (long.) with regard to the length, than in the later degrees. In the degree 3, the length (tr.) of the first thoracic pleura is twice as long as width (long.), in degree 5 it is three times longer, in 9 — more than three times, in 10 — four times and in the adult specimens it is six times longer. The absolute width (long.) of the thoracic pleurae increases only very slightly. Pleural ends in younger meraspides are distinctly pointed and become nearly rounded during the growth. The pleural furrows in the degrees 3 to 5 are wide (long.), shallow, running nearly along the entire pleura. During the growth they become narrower (long.) and deeper, occupying in the

---

<sup>1</sup> Facial suture observable first in the degree 5.

degrees 9 and 10, and in the adult forms a little more than a half of the pleural length (tr.). At the same time, the anterior and posterior parts of the pleura become more convex.

8) The changes of the transitory pygidium:

Degree .....	3	4	5	6	7	8	9	10	11
Axial rings .....	5	?	6	7	7	7	7	7	7
Pleural spines .....	5	?	6	5	6	?	6	2	—
Pleural ribs visible ...	5	?	6	5	6	6	5	5	4

It appears from the above table that the adult pygidium consists of 7 segments. This number is already attained in the transitory pygidia degree 6, and this means that in each successive instar, one segment from the anterior pygidial margin becomes released into the thorax and at the same time the new segment is added to the pygidium. During the whole meraspid period the first pygidial segment is distinctly separated from the remainder, and in meraspides 9 and 10 it may appear to belong already to the thorax. In this case the specimen would represent the higher growth degree. In such cases only the detailed examination of the internal mould of the specimen or even its plasticine cast, allows one to recognize where the boundary between the thorax and the transitory pygidium lies (pl. II, fig. 3, 4; pl. IV, fig. 5). During the entire meraspid period the pleurae of the pygidium are developed as spines. In the degree 6 they are elongated and pointed but later they become shorter and rounded. In the transitory pygidium the spines occur on nearly all the segments. In the degree 10, the terminations of first two segments only are distinctly visible, whereas on the remaining part of the pygidium there occur but small incisions along the posterior margin between the particular segments and the posterior pygidial margin is slightly denticulated. The plasticine cast of the internal mould of the pygidium in degree 10 shows, that on the pygidial doublure at the pleural ends, there occur tubercule-like thickenings, similar to those occurring on the distal part of the doublure of thoracic segments (see p. 498; pl. IV, fig. 5).

9) In very young meraspides the ornamentation is more variegated than in older meraspid degrees and in the adult forms. The granules are more scattered in meraspides than in adult specimens being, however, more prominent and pointed. In the degrees 9 and 10 their size decreases. In young meraspides among the granules occur very fine pits which, in degree 10, become shallower and in early holaspid period are hardly visible.

*Remarks.* — The new species here described shows some similarities to *Trimercephalus caecus* (Gürich, 1896) in the course of the facial suture. It is also similar to the most primitive representative of the genus *Tr. mastophtalmus* (Reinh. Richter, 1856) in the presence of the

ocular protuberance on the anterior genal angle and in the type of ornamentation. In the lack of the lateral glabellar furrows  $S_2$  and  $S_3$ , and in the shape of pygidium, which is indistinctly furrowed, the new species is reminiscent of *Dianops aktjubensis* Maksimova, 1955, known from the Upper Famennian of Kazakhstan. It differs, however, from this species in the course of the facial suture which, in *D. aktjubensis* runs, as it is characteristic of the genus *Dianops* R. & E. Richter, 1926, on the lateral border close to the border furrow; in *Tr. dianopsoides* it runs in the border furrow. Further differences concern the presence of the ocular protuberance in our species and the shape of the glabella which, in the new species strongly widens anteriorly and its lateral angles are not truncated. The distinct difference concerns the lateral border which, in *D. aktjubensis*, is bent outside at the lateral glabellar angle.

The course of the facial suture in *Tr. dianopsoides* is intermediate between those characteristic of the genera *Trimerocephalus* and *Dianops*. The indistinctly furrowed subtrapezoid pygidium of the new species is characteristic of the genus *Dianops* (cf. table 3).

*Trimerocephalus trifolius* (Osmólska, 1958)

(pl. IV, fig. 1-3,6)

1958. ?*Dianops trifolius* Osm.; H.Osmólska, *Famennian Phacopidae...*, p. 136, pl. 4, fig. 2,3, text-fig. 6.

*Material.* — 3 entire specimens in Salter's position and 8 cephalae from Famennian marly shales, zone II of Kadzielnia quarry.

*Remarks.* — In 1958 the present author described a new species, recorded tentatively as ? *Dianops trifolius*, stating that it differs in the cephalic structure from the remaining representatives of *Dianops*. Also its stratigraphic occurrence was beyond the stratigraphic range of *Dianops*. The new and better preserved material found in Kadzielnia shows that its assignment to *Trimerocephalus* is more justified:

1) Glabella of *Tr. trifolius* widens anteriorly and its lateral angles are not truncated (as is characteristic of *Dianops*).

2) On well preserved specimens, the lateral glabellar furrow  $S_2$  is visible, consisting of the transverse part and the longitudinal one parallel to the axial furrow (as in some other representatives of *Trimerocephalus*).

3) The presence of the continuous intercalating ring, with the distal ends somewhat inflated.

4) Delimitation of the lateral border from the cheek by the distinct border furrow which, at the posterior genal angle, is deeply incised.

5) The structure of the vincular furrow characteristic of the genus *Trimerocephalus* is, in spite of some specialization, expressed by the distinct elongation of its anterior, transverse part, and by its widening

(long.). The latter features are connected with the transverse elongation of the pygidium which in the enrolled position fitted to the part of the vincular furrow running below the glabella.

This transverse elongation of the pygidium is in fact relative, being caused by the depression of the transverse profile of the pygidium. It is this which, in the remaining species of *Trimerocephalus* is somewhat vaulted. In these forms the vincular furrow is also arcuate. This straight course of the contra-pygidal part of the vincular furrow has caused some

Table 3

Comparison of specific characters of *Dianops aktjubensis* Maksimova with the representatives of *Trimerocephalus* M'Coy

Species	Lateral glabellar furrows (S <sub>2</sub> , S <sub>3</sub> )	Ocular protuberance on anterior genal angle	Facial suture	Shape of pygidium	Stratigraphical range	Geographical range
<i>Trimerocephalus dianopsoides</i> .	—	+	in marginal furrow	trapezoidal	II or III	P
<i>Tr. steinachensis</i> .	—	+	on cheek	?	II	N
<i>Tr. mastophtalmus</i>	+	+	on cheek	lenticular	II, III (?)	A, N, P, U,
<i>Tr. cryptophtalmoides</i> . . .	+	+	on cheek	lenticular	II	U
<i>Tr. lacunosus</i> . .	+	—	on cheek	?	II	N
<i>Tr. polonicus</i> . .	—	—	on cheek	lenticular	III	P
<i>Tr. vodorezovi</i> .	+	—	on cheek	trapezoidal	II	U
<i>Tr. lentiginosus</i> .	+	—	near marginal furrow	?	V	U
<i>Tr. caecus</i> . . .	+	—	in marginal furrow	lenticular	II, III	P, N, U
<i>Tr. trifolius</i> . .	+	—	on cheek	lenticular	II, III (?)	P
<i>Dianops aktjubensis</i>	—	—	on border	trapezoidal	V	U

Legend: + present  
— absent

A England  
N Germany

P Poland  
U Ural Mts.

changes in the structure of the cephalic border which, in connection with this, widens distally at the anterior lateral angles of the glabella.

The pygidium of *Tr. trifolius*, found for the first time, is poorly preserved, but allows the recognition of its lens like shape, characteristic of *Trimerocephalus*.

*Tr. trifolius* in some features is very similar to *Dianops aktjubensis* Maksimova, 1955, described from the Upper Famennian of Kazakhstan. The similarities concern here the peculiar structures of the vincular furrow and lateral cephalic border.

#### THE MOULT IN BLIND PHACOPINAE

The ontogeny of *Trimerocephalus dianopsoides* n. sp. studied in the present paper support the earlier observations of Maksimova (1955), who stated, that young forms of some Phacopiniae moult in a different manner from that of adult forms. In *Tr. dianopsoides* in the meraspid degrees 3 to 10, the cephalon of the majority of specimens was broken off along the line of the functional facial suture, the detached doublure being moved backwards — as is the case in adult forms of *Ductina* R. & E. Richter, 1931 (Phacopidellinae Delo, 1935). In youngest holaspid instars there occur the Salter's position representing the phacopid mode of moulting. The *Ductina* mode of moulting has been observed by Maksimova in young specimens of the following species: *Trimerocephalus mastophtalmus* (Reinh. Richter, 1856), *Tr. cryptophtalmoides* Maksimova, 1955, *Dianops griffithides mugodjaricus* Maksimova, 1955, *D. aktjubensis* Maksimova, 1955. By "young specimens" Maksimova means the forms with eleven thoracic segments, representing thus the holaspid.

Here recorded data concerning the development of *Tr. dianopsoides* are in some disagreement with those recorded by Maksimova. According to her, the length of the smallest known specimens at eleven thoracic segments is, in *Tr. mastophtalmus* 5.7 mm, in *Tr. cryptophtalmoides* 8.0 mm, in *D. griffithides mugodjaricus* (5 mm?) 6.8 mm and in *D. aktjubensis* 8.3 mm. The length of *Tr. mastophtalmus* corresponds to the length of meraspides degree 9 of *Tr. dianopsoides*, the length of three remaining specimens corresponds to the meraspides degree 10 in our species. It has been already mentioned that only a keen observation of the internal mould and of the surface of the exoskeleton has allowed the present author to ascertain that the oldest specimens of *Tr. dianopsoides* with a *Ductina* mode of moulting represent in fact the meraspides degree 10. There arises therefore the question whether or not the forms described by Maksimova do represent in fact the young instars of the holaspid period. One should be aware, however, that the coincidence in dimensions here discussed of the young forms described by Maksimova (1955) with meraspides of *Tr. dianopsoides* degree 10,

should be regarded only tentatively, as in some young specimens of *Tr. caecus* (Gürich) found at Zaremby and representing the *Ductina* mode of moulting (pl. II, fig. 1, 2), the length of the entire exoskeleton with 9 thoracic segments corresponds to the smallest holaspides.

The *Ductina* mode of moulting has been also observed by R. and E. Richter in *Dianops griffithides griffithides* (1926, pl. 11, fig. 8), *Dianops* sp. (1955, pl. 2, fig. 14), *Cryphops pulvinifer* Matern, 1927 (1955, pl. 1, fig. 3) and in *Cr. schlosseri* R. & E. Richter, 1955 (1955, pl. 1, fig. 2). In all these specimens the lengths of the cephala range between 4.0 and 4.5 mm, thus corresponding to the cephala of *Tr. dianopsoides* in young holaspides. The German specimens here mentioned (R. & E. Richter, 1926, 1955) are preserved as isolated cephala or as the fragmentary exoskeletons with the unknown number of thoracic segments, and this makes it impossible to recognize whether they represent the meraspides, young holaspides or more adult stages.

As the moults of entire exoskeletons in Salter's position (phacopid mode of moulting) have been described in *Cryphops* R. & E. Richter, 1926, and *Dianops*, and as it has been stated by Maksimova and confirmed in the present paper, that in the ontogeny of Phacopiniae there occurs the change in the mode of moulting, it seems reasonable to the present author to presume that in the cases mentioned by R. and E. Richter we are dealing with a similar phenomenon. The lack of the entire moults in the *Ductina* mode of moulting or in Salter's position is surely caused by the fact, that they could be preserved only in particular sedimentary conditions.

In accordance with the recapitulation theory it seems to be the fact that, within the secondarily blind forms, or the forms with reduced eyes and the facial suture moved towards the lateral border, the larval forms may have the facial suture functional. With regard to the above discussed investigations, the present author cannot agree with the opinion of Maksimova (1955, p. 108-109, fig. 39-2), that in young Phacopiniae characterized by the regression of the facial suture, the marginal suture comparable with that occurring in the Mesonacidae was present.

As in the blind Phacopiniae here discussed, the facial suture in young stages is functional in spite of the fact that it is situated on the dorsal side and not marginally, the present author presumes that the similar hypothesis could be adopted to the Phacopiniae with the eyes well developed. In these forms the facial suture is not functional in adult forms, it is however highly probable that it was functional in young ontogenetic stages (meraspid period). The verification of this hypothesis in paleontological material is however hardly possible, as the Phacopiniae with the well developed eyes, living in the shallow parts of the sea basin could hardly be preserved as the entire undistorted moults. On the



contrary, the blind Phacopinae found in the deposits which were laid down in a deep sea zone (cf. Rábien, 1956; Osmólska, 1958, 1962), are often preserved as the entire undetached moults of the young and adult individuals.

#### PHYLOGENETIC RELATIONS OF *CRYPTHOPS*, *TRIMEROCEPHALUS* AND *DIANOPS*

In the genealogical tree of the last blind Phacopinae it would be very difficult to indicate the species, which could be regarded as direct ancestors of particular genera. However, there occur in some genera the groups of species within which, or within the forms similar to them, one should search for the missing links between the above mentioned genera.

The present author agrees with R. and E. Richter's opinion (1955) that the ancestral forms of *Trimerocephalus* should be found in the "*cryptophtalmus*" group of *Cryphops* R. & E. Richter, 1926. This opinion has been also confirmed by the studies of Maksimova (1955), who described ? *Cryphops latilimbatus* with the eyes developed, but with the shape of cephalon and glabella characteristic of primitive representatives of *Trimerocephalus* similar to *Tr. steinachensis* R. & E. Richter, 1926. On the other hand, within the genus *Trimerocephalus* the same author described *Tr. cryptophtalmoides* Maksimova, 1955, which lacks the eyes, but has the cephalon resembling the forms of the "*cryptophtalmus*" group. *Tr. trifolius* (Osmólska, 1958), described from Poland is closely related to the latter species. Its trapezoidal cephalon, differing from that characteristic of the genus *Trimerocephalus*, represents the further step in the specialization of the vincular furrow marked already in the "*cryptophtalmus*" group.

The above mentioned observations of R. and E. Richter (1955) concerning the fact that the facial suture in some representatives of *Cryphops* ("*schlosseri*" group) and *Dianops* was functional, did or may have influenced these authors' hypothesis on the phylogenetic relationship of these genera. According to R. and E. Richter's diagram (1955, fig. 1), *Dianops* developed directly from *Cryphops*, through the forms recorded as "*schlosseri*" group. *Trimerocephalus* was regarded as a lateral branch of *Cryphops*. Maksimova (1955) and Pfeiffer (1959, tab. 1) regarding *Cryphops* as an ancestral form of these Phacopinae, assumed that *Dianops* is an offshoot of *Trimerocephalus*. The latter view seem to the present author to be entirely convincing, especially in the light of the following facts (unknown to R. and E. Richter in 1955):

1) The functional facial suture is characteristic not only of the genera *Cryphops* and *Dianops*, but occurs as well in *Trimerocephalus*.

2) The following species: *Tr. lentiginosus* Maksimova, 1955, *D. aktjubensis* Maksimova, 1955, *Tr. lacunosus* Pfeiffer, 1959, and *Tr. dianopso-*

Table 4

Stratigraphic range of the genera *Cryphops*, *Trimerocephalus* and *Dianops*

STRATIGRAPHIC RANGE OF CRYPHOPS, TRIMEROCEPHALUS, DIANOPS	griffithides mugodjaricus		griffithides griffithides		Dianops	
	anophthalmus		limbatus			
	pernai		lyphlops vicarius			
	lyphlops		lyphlops			
	aktjubensis					
	lentiginosus					
			dianopsoides			Trimerocephalus
		caecus				
		lacunosus				
		polonicus				
		vodořezovi				
		cryptophthalmoides				
		mastophthalmus				
		trifolius				
		steinachensis				
		?latilimbatus				
STRATIGRAPHIC RANGE OF CRYPHOPS, TRIMEROCEPHALUS, DIANOPS	tripartitus		schlosseri		Cryphops	
	wocklumeriae		pulvinifer			
	ensae		cryptophthalmus			
			acuticeps			
			inseřensis			
STAGE ZONE	VI	V	IV	III	II	I
STAGE	FAMENNIAN				FRASNIAN	

*ides* n. sp. are in some ways intermediate between the genera *Trimerocephalus* and *Dianops*.

The origin of *Dianops* from *Trimerocephalus* through the above mentioned species or the forms related to them, is also in accordance with their stratigraphic occurrence (see table 4).

Palaeozoological Laboratory  
of the Polish Academy of Sciences  
Warszawa, April 1963

## REFERENCES

- MAKSIMOVA, Z. A. 1955. Trilobity srednego devona Urala i severnykh Mugo-dzar. — *VSEGEI*, N. S., 3, 3-262, Moskva.
- OSMÓLSKA, H. 1958. Famennian Phacopidae from the Holy Cross Mountains, Poland (Phacopidae fameńskie z Gór Świętokrzyskich). — *Acta Palaeont. Pol.*, 3, 2, 119-148, Warszawa.
- 1962. Famennian and Lower Carboniferous Cyrtosymbolinae (Trilobita) from the Holy Cross Mountains, Poland (Cyrtosymbolinae (Trilobita) famenu i dolnego karbonu Gór Świętokrzyskich). — *Ibidem*, 7, 1/2, 53-204.
- PFEIFFER, H. 1959. Neue Beobachtungen und Funde aus dem Saalfelder Oberdevon. — *Geologie*, 3, 262-279, Berlin.
- RABIEN, A. 1956. Zur Stratigraphie und Facies des Oberdevons in der Waldecker Hauptmulde. — *Abh. Hess. L.-Amt. Bodenforsch.*, 16, Wiesbaden.
- RICHTER, R. & E. 1926. Die Trilobiten des Oberdevons. — *Abh. preuss. geol. Landesanst.*, N. F., 99, 1-314, Berlin.
- & — 1931. Unterlagen zum Fossilium Catalogus, Trilobitae 5. — *Senckenbergiana*, 13, 2, Frankfurt a. M.
- & — 1955. Oberdevonische Trilobiten, Nachträge. 1. Trilobiten aus der Prolobites Stufe III. — *Ibidem*, 36, 1/2, 49-56.

---

HALSZKA OSMÓLSKA

NIEKTÓRE FAMEŃSKIE PHACOPINAE (TRILOBITA) Z GÓR  
ŚWIĘTOKRZYSKICH

*Streszczenie*

WSTĘP

W pracy niniejszej opisano fameńskie trylobity z podrodziny Phacopinae Hawle & Corda, 1847, pochodzące z Zaremb koło Łagowa (poziom II lub III) i z kamieniołomu Kadzielnia w Kielcach (poziom II).

W Zarembach znaleziono dorosłe osobniki oraz larwy w stadium meraspis. Należą one do licznie tu występującego gatunku *Trimerocephalus dianopsoides* n. sp.

i do *T. caecus* (Gürich, 1896). Ponadto występują tu nielicznie, nie oznaczalne gatunkowo okazy, należące do podrodzaju *Cyrtosymbole* (*Cyrtosymbole*) R. Richter, 1913. Poza trylobitami i małżoraczkami (*Richterina?*), występującymi licznie, pozostała fauna jest uboga i składa się z form bardzo drobnych. Znalezione także trochę zwęglonych szczątków roślinnych.

Materiał z Kadzielni pozwolił autorce na uzupełnienie jej poprzednich badań, dotyczących *Trimerocephalus trifolius* (Osmólska, 1958) dzięki znalezieniu kilkunastu dobrze zachowanych okazów tego gatunku.

#### DIAGNOZA NOWEGO GATUNKU

*Trimerocephalus dianopsoides* n. sp.

(pl. I, fig. 1-15; II, fig. 3-6; III, fig. 1-6; IV, fig. 4, 5; text-pl. I)

*Diagnoza.* — Szew twarzowy po przecięciu limbusa bocznego biegnie w bruzdzie brzeżnej nie wkraczając na policzek. Modzel na przednim kącie policzkowym. Hypostom szeroki (tr.), trójkątny. Pygidium krótkie (long.), szerokie (tr.), o kształcie trapezoidalnym i słabo zaznaczonej segmentacji. Powierzchnia pancerza drobno granulowana; guzki na duplikaturze cefalonu i powierzchni hypostomu oraz na limbusie bocznym w okolicach szwu twarzowego — większe.

#### ROZWÓJ ONTOGENETYCZNY

W posiadanym materiale z Zaremb znajduje się około 60 całych osobników w stadium meraspis, z segmentami toraksu od 3 do 10. Dokonane pomiary poszczególnych stopni wzrostowych (tabele 1 i 2) pozwoliły na opracowanie wykresów (fig. 1-5) obrazujących zmiany, zachodzące we wzajemnych stosunkach długości poszczególnych części pancerza.

Zmiany morfologiczne, jakie zachodzą w kolejnych stopniach stadium meraspis, dotyczą podanych poniżej cech (pl. I, pl. II, fig. 3-6; text-pl. I):

- 1) modzele oczne zmniejszają się;
- 2) kolce na tylnych kątach policzkowych zanikają;
- 3) bruzdy boczne glabelli  $S_2$  zanikają;
- 4) w młodszych stopniach meraspis glabella rozszerza się poczynając od bruzd bocznych  $S_2$ ; później, w związku z zanikiem  $S_2$ , rozszerzanie glabelli zaczyna się na wysokości międzybruzdy;
- 5) szew twarzowy w stadium meraspis funkcjonalny i w tym samym położeniu, co u osobników dorosłych, kiedy to traci funkcjonalność;
- 6) ilość zagłębień w bocznych częściach bruzdy subkranialnej zwiększa się w miarę dodawania segmentów toraksu;
- 7) pleury toraksu stają się węższe (long.) i dłuższe (tr.);
- 8) pleury pygidium przejściowego we wszystkich stopniach meraspis zakończone kolcami (por. 506);
- 9) ornamentacja larw bardziej urozmaicona, niż u form dorosłych; składa się ze spiczastych guzków i gęstych, drobnych nakłuc.

## LINIENIE ŚLEPYCH PHACOPINAE

Ontogeneza *Trimerocephalus dianopsoides* n. sp. potwierdza wcześniejsze obserwacje Maksimowej (1955), że larwy ślepych Phacopinae linały w inny sposób, niż formy dorosłe. Pierwsze wydostawały się przez szczelinę między cefalonem i jego duplikaturą (typ duktinowy), drugie — przez szczelinę między cefalonem i toraksem (typ fakopidowy). Duktinowy typ linienia obserwowała Maksimowa na młodych wylinkach o 11 segmentach toraksu, a więc należących już do stadium holaspis, gdy natomiast u *Tr. dianopsoides* n. sp. już najmłodsze wylinki holaspis odznaczają się fakopidowym typem linienia. W wymienionym gatunku we wszystkich stopniach meraspis szew twarzowy jest funkcjonalny, mimo że nie zajmuje położenia zdecydowanie marginalnego, lecz przebiega w bruzdzie brzeżnej. Fakt ten, zdaniem autorki niniejszej pracy, jest zapewne powszechny u wszystkich ślepych Phacopinae, i jest w zgodzie z teorią rekapitulacji.

ZWIĄZKI FILOGENETYCZNE RODZAJÓW *CRYPHOPS*, *TRIMEROCEPHALUS* I *DIANOPS*

Autorka uznaje za słuszny pogląd wypowiedziany przez Maksimową (1955) i Pfeiffera (1959), że rodzaj *Dianops* stoi w bezpośrednim związku z rodzajem *Trimerocephalus*, z którego się wyodrębnił. W obu rodzajach istnieją gatunki świadczące o ich bliskim pokrewieństwie (tab. 4). Odmienny pogląd, przyjmujący powstanie rodzaju *Dianops* z rodzaju *Cryphops*, wypowiedziany przez R. i E. Richterów (1955), oparty został w dużej mierze na przekonaniu autorów, że tylko u *Cryphops* i *Dianops* występuje funkcjonalny szew twarzowy. Stwierdzenie przez Maksimową (1955) funkcjonalności szwu twarzowego, w pewnym okresie życia, także u przedstawicieli rodzaju *Trimerocephalus* wykazało, że hipoteza R. i E. Richterów jest błędna.

## OBJAŚNIENIA DO ILUSTRACJI

Fig. 1 (p. 501)

Wykres zmian długości całego pancerza podczas stadium meraspis i wczesnego holaspis (11a, 11b, 11c — kolejne wylinki stadium holaspis).

Fig. 2 (p. 501)

Wykres zmian długości cefalonu podczas stadium meraspis i wczesnego holaspis.

Fig. 3 (p. 501)

Wykres zmian długości pygidium podczas stadium meraspis i wczesnego holaspis.

Fig. 4 (p. 502)

Zestawienie wykresów zmian średnich długości: całego pancerza (lt), toraksu (lth), cefalonu (lc) i pygidium (lp) podczas stadium meraspis.

Fig. 5 (p. 503)

Wykres procentowych zmian średnich długości cefalonu (lc) w stosunku do długości całych pancerzy (lt) oraz długości pygidium (lp) w stosunku do długości całych pancerzy podczas stadium meraspis i wczesnego holaspis.

## Text-Pl. I (p. 504)

*Trimerocephalus dianopsoides* n. sp.

Fig. 1. Rekonstrukcja młodego okazu z 3 segmentami toraksu.

Fig. 2. „ „ „ z 5 „ „

Fig. 3. „ „ „ z 7 „ „

Fig. 4. „ „ „ z 9 „ „

Fig. 5. „ „ „ z 10 „ „

Fig. 6. Rekonstrukcja brzusznej strony toraksu i pygidium młodego okazu z 10 segmentami toraksu.

Fig. 7. Rekonstrukcja bruzdy subkranidialnej młodego okazu z 7 segmentami toraksu.

## Pl. I

*Trimerocephalus dianopsoides* n. sp.

(p. także pl. II-IV)

Fig. 1. Ośródkka młodego okazu z 3 segmentami toraksu (Tr. D. I/232).

Fig. 2. Odcisk plastelinowy młodego okazu z 3 segmentami toraksu (Tr. D. I/151).

Fig. 3. Ośródkka młodego okazu z 3 segmentami toraksu i odciskiem duplikatury (Tr. D. I/243).

Fig. 4. Ośródkka młodego okazu z 5 segmentami toraksu i odciskiem duplikatury (Tr. D. I/215).

Fig. 5. Ośródkka młodego okazu z 5 segmentami toraksu i odciskiem duplikatury (Tr. D. I/50).

Fig. 6. Odcisk plastelinowy tego samego okazu.

Fig. 7. Odcisk plastelinowy młodego okazu z 5 segmentami toraksu (Tr. D. I/92).

Fig. 8. Odcisk plastelinowy młodego okazu z 6 segmentami toraksu (Tr. D. I/86).

Fig. 9. Ośródkka młodego okazu z 6 segmentami toraksu i odciskiem duplikatury (Tr. D. I/1).

Fig. 10. Ośródkka młodego okazu z 7 segmentami toraksu i odciskiem duplikatury (Tr. D. I/63).

Fig. 11. Odcisk plastelinowy młodego okazu z 7 segmentami toraksu (Tr. D. I/400).

Fig. 12. Odcisk młodego okazu z 7(?) segmentami toraksu i odciskiem duplikatury (Tr. D. I/249).

Fig. 13. Ośródkka młodego okazu z 8 segmentami toraksu i odciskiem duplikatury (Tr. D. I/136).

Fig. 14. Ośródkka młodego okazu z 9 segmentami toraksu i odciskiem duplikatury (Tr. D. I/212).

Fig. 15. Odcisk plastelinowy tego samego okazu.

Wszystkie okazy z poziomu II lub III famenu w Zarembach; × 6.

## Pl. II

*Trimerocephalus caecus* (Gürich, 1896)

Fig. 1. Odcisk plastelinowy młodego okazu z 9 segmentami toraksu (Tr. D. I/11); × 3.

Fig. 2. Ośródkka młodego okazu z 9 segmentami toraksu i odciskiem duplikatury (Tr. D. I/146); × 3.

*Trimerocephalus dianopsoides* n. sp.

(p. także pl. I, III, IV)

Fig. 3. Ośródkka młodego okazu z 10 segmentami toraksu i odciskiem duplikatury (Tr. D. I/66); × 6.

Fig. 4. Odcisk plastelinowy młodego okazu z 10 segmentami toraksu (Tr. D. I/62); × 6.

Fig. 5. Odcisk plastelinowy młodego okazu z 10 segmentami toraksu (Tr. D. I/217); × 6.

Fig. 6. Ośródką młodego okazu z 10 segmentami toraksu i odciskiem duplikatury (Tr. D. I/178);  $\times 6$ .

Wszystkie okazy z poziomu II lub III famenu w Zarembach.

Pl. III

*Trimerocephalus dianopsoides* n. sp.

(p. także pl. I, II, IV)

Fig. 1. Odcisk plastelinowy cefalonu dorosłego osobnika, holotyp (Tr. D. I/223);  $\times 3$ .

Fig. 2. Odcisk plastelinowy pygidium dorosłego osobnika (Tr. D. I/152a);  $\times 6$ .

Fig. 3. Odcisk plastelinowy pygidium dorosłego osobnika (Tr. D. I/152b);  $\times 6$ .

Fig. 4. Odcisk plastelinowy hypostomu (Tr. D. I/46);  $\times 3$ .

Fig. 5. Ośródką dorosłego okazu w położeniu Saltera (Tr. D. I/338);  $\times 3$ .

Fig. 6. Odcisk plastelinowy dorosłego okazu w położeniu Saltera (Tr. D. I/337);  $\times 3$ .

Wszystkie okazy z poziomu II lub III famenu w Zarembach.

Pl. IV

*Trimerocephalus trifolius* (Osmólska, 1958)

Fig. 1. Cefalon, profil podłużny (Tr. D. I/16);  $\times 6$ .

Fig. 2. Fragment cefalonu od strony brzusznej, widoczna bruzda subkranidialna (Tr. D. I/39);  $\times 6$ .

Fig. 3. Cefalon, widok z góry (Tr. D. I/16);  $\times 6$ .

Fig. 6. Cały okaz w położeniu Saltera (Tr. D. I/21);  $\times 3$ .

*Trimerocephalus dianopsoides* n. sp.

(p. także pl. I-III)

Fig. 4. Odcisk dorosłego okazu w położeniu Saltera (Tr. D. I/196); wielk. nat.

Fig. 5. Odcisk plastelinowy brzusznej strony toraksu i pygidium młodego okazu z 10 segmentami toraksu; widoczne położenie duplikatury, organów Pandera i zgrubienia na dystalnych krańcach pleur (Tr. D. I/66);  $\times 6$ .

Fig. 1-3 i 6 — z poziomu II famenu w Kadzielni;

fig. 4 i 5 — z poziomu II lub III famenu w Zarembach.

ГАЛЬШКА ОСМУЛЬСКА

НЕКОТОРЫЕ ФАМЕНСКИЕ РНАСОРИНАЕ (ТРИЛОБИТА)  
ИЗ СВЕНТОКРЖИСКИХ ГОР (ПОЛЬША)

Резюме

ВСТУПЛЕНИЕ

В настоящей работе дано описание фаменских трилобитов из подсемейства Phacopinae Hawle & Corda, 1847, происходящих из местности Зарэмбы около Лагова (горизонт II или III) и из камнеломни Кадзельня в Кельцах (горизонт II).

В Зарэмбах найдено так взрослые особи, как и их личинки в стадии мерасписа. Принадлежат они обильно тут выступающим видам *Trimerocephalus dia-*

*nopsoides* n.sp. и *Trimerocephalus caecus* (Gürich, 1896). Кроме того находятся тут тоже немногочисленные, неопределимые в видовом отношении образцы, принадлежащие подроду *Cyrtosymbole* (*Cyrtosymbole*) R. Richter, 1913. За исключением многочисленных трилобитов и остракод (*Richterina?*), остальная фауна скудна и состоит из очень мелких форм. Найдено тоже несколько обуглевших растительных остатков.

Материал из Кадзельни позволил автору дополнить прежние исследования, касающиеся *Trimerocephalus trifolius* (Osmólska, 1958) благодаря находке больше десяти образцов этого вида, хорошей сохранности.

#### ДИАГНОЗ НОВОГО ВИДА

*Trimerocephalus dianopsoides* n.sp.

(пл. I, фиг. 1—15; пл. II, фиг. 3—6; пл. III, фиг. 1—6; пл. IV, фиг. 4, 5;  
текст-пл. I)

*Диагноз.* — Лицевой шов после хода в поперёк бокового лимбуса проходит в краевой борозде не входя на щеку. Мозоль на переднем углу щеки. Гипостома широкая (tr.), треугольная. Хвостовой щит короткий (long.), широкий (tr.), трапециевидной формы, со слабо намеченной сегментацией. Поверхность панцыря покрыта мелкой грануляцией; бугорки на дубликатуре головного щита, поверхности гипостомы и на боковом лимбусе в окрестности лицевого шва более крупные.

#### ОНТОГЕНЕТИЧЕСКОЕ РАЗВИТИЕ

В имеющемся материале из Зарэмб находится около 60 цельных особей на стадии мерасписа с 3 до 10 туловищными членками. Промеры отдельных возрастных ступеней (табл. 1, 2) позволили вычертить графики (фиг. 1-5) изображающие изменения происходящие во взаимных соотношениях длины отдельных частей панцыря.

Морфологические изменения происходящие на последовательных ступенях стадии мерасписа касаются ниже приведенных признаков (пл. I, II; текст-пл. 1):

- 1) глазные мозоли подвергаются изменению;
- 2) исчезают шипы на задних углах щек;
- 3) исчезают боковые борозды глабеллы  $S_2$ ;
- 4) на младших ступенях мерасписа глабелла расширяется начиная с боковых борозд  $S_2$ ; позже, в связи с исчезновением  $S_2$  расширение глабеллы происходит на уровне межборозды;
- 5) лицевой шов на стадии мерасписа функциональный и также расположенный как у взрослых особей, у которых теряет функциональность;
- 6) количество углублений в боковых частях субкранидиальной борозды увеличивается параллельно прибавлению туловищных членков;
- 7) плевры туловищного щита становятся более узкими (long.) и длинными (tr.);
- 8) плевры транзиторного хвостового щита на всех ступенях мерасписа снабжены на концах шипами (см. стр. 506);



9) скульптура личинок более разнообразна чем у взрослых форм; состоит из заостренных бугорков и многочисленных тесно расположенных мелких „уколов“.

#### ЛИНЬКА СЛЕПЫХ PHACOPINAE

Онтогенез *Trimerocephalus dianopsoides* n.sp. подтверждает прежние наблюдения Максимовой (1955), что личинки слепых Phacopinae линяли другим образом, чем взрослые формы. Первые освобождались через щель между головным щитом и его дубликатурой (дуктиновый тип), другие через щель между головным и туловищным щитами (факопидовый тип). Дуктиновый тип линьки наблюдала Максимова на молодых вылиньках с 11 туловищными члениками, т.е. принадлежащих уже стадии голасписа, тогда как у *Tr. dianopsoides* n. sp. уже самые младшие линьки голасписа обнаруживают факопидовый тип линьки. У упомянутого вида на всех ступенях стадии мерасписа лицевой шов является функциональным, хотя не занимал определенно маргинального расположения, но проходил в краевой борозде. Этот факт, по мнению автора настоящей работы, является повидимому всеобщим для всех слепых Phacopinae и находится в согласии с теорией рекапитуляции.

#### ФИЛОГЕНЕТИЧЕСКИЕ СВЯЗИ РОДОВ *CRYPHOPS*, *TRIMEROCEPHALUS* И *DIANOPS*

Автор считает верным мнение высказанное Максимовой (1955) и Пфеиффером (Pfeiffer, 1959), согласно которому род *Dianops* непосредственно связан с родом *Trimerocephalus*, из которого выделился. Оба рода содержат виды свидетельствующие о их близком родстве (таб. 4). Другое мнение, принимающее возникновение рода *Dianops* из рода *Cryphops*, высказанное Р. и Е. Рихтерами (R. & E. Richter, 1955), основано в большой степени на убеждении авторов в том, что только у *Cryphops* и *Dianops* имеется функциональный лицевой шов. Констатирование Максимовой (1955) функциональности лицевого шва, в определенном периоде жизни, также у представителей рода *Trimerocephalus* показало ошибочность гипотезы Р. и Е. Рихтеров.

---

Pl. I

*Trimerocephalus dianopsoides* n. sp.

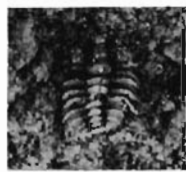
(see also pl. II, III, IV)

- Fig. 1. Internal mould of meraspis, degree 3 (Tr. I. 232).  
Fig. 2. Plasticine cast of meraspis, degree 3 (Tr. I. 151).  
Fig. 3. Internal mould of meraspis, degree 3, with imprint of doublure (Tr. I. 243).  
Fig. 4. Internal mould of meraspis, degree 5, with imprint of doublure (Tr. I. 215).  
Fig. 5. Internal mould of meraspis, degree 5, with imprint of doublure (Tr. I. 50a).  
Fig. 6. Plasticine cast of same specimen.  
Fig. 7. Plasticine cast of meraspis, degree 5, (Tr. I. 92).  
Fig. 8. Plasticine cast of meraspis, degree 6, with imprint of doublure (Tr. I. 86).  
Fig. 9. Internal mould of meraspis, degree 6, with imprint of doublure (Tr. I. 1).  
Fig. 10. Internal mould of meraspis, degree 7, with imprint of doublure (Tr. I. 63).  
Fig. 11. Plasticine cast of meraspis, degree 7 (Tr. I. 400).  
Fig. 12. Imprint of meraspis, degree 7(?), with imprint of doublure (Tr. I. 249).  
Fig. 13. Internal mould of meraspis, degree 8, with imprint of doublure (Tr. I. 136).  
Fig. 14. Internal mould of meraspis, degree 9, with imprint of doublure (Tr. I. 212).  
Fig. 15. Plasticine cast of same specimen.

All specimens from Famennian zones II or III of Zaremby;  $\times$  6.



1



2



3



4



5



6



7



8



9



10



11



12



13



14



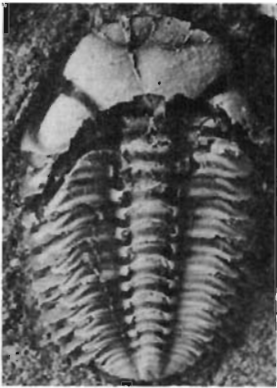
15



1



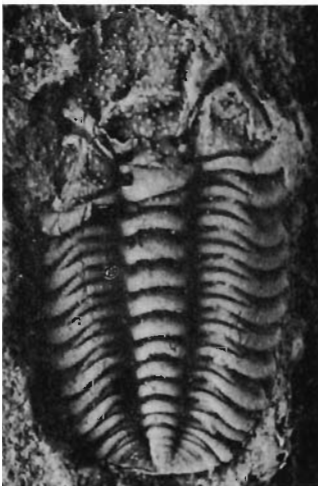
2



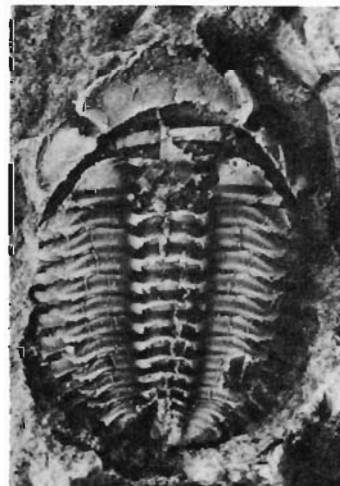
3



4



5



6

Pl. II

*Trimerocephalus caecus* (Gürich, 1896)

- Fig. 1. Plasticine cast of meraspis, degree 9 (Tr. I. 11); × 3.  
Fig. 2. Internal mould of meraspis, degree 9, with imprint of doublure (Tr. I. 146); × 3.

*Trimerocephalus dianopsoides* n. sp.  
(see also pl. I, III, IV)

- Fig. 3. Internal mould of meraspis, degree 10, with imprint of doublure (Tr. I. 66); × 6.  
Fig. 4. Plasticine cast of meraspis, degree 10 (Tr. I. 62); × 6.  
Fig. 5. Plasticine cast of meraspis, degree 10 (Tr. I. 217); × 6.  
Fig. 6. Internal mould of meraspis, degree 10, with imprint of doublure (Tr. I. 178); × 6.

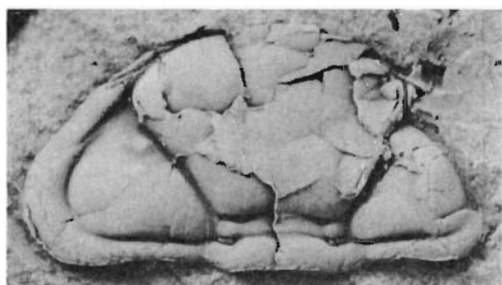
All specimens from Famennian zones II or III of Zaremby.

Pl. III

*Trimerocephalus dianopsoides* n. sp.  
(see also pl. I, II, IV)

- Fig. 1. Plasticine cast of adult cranidium, holotype (Tr. I. 223);  $\times 3$ .  
Fig. 2. Plasticine cast of adult pygidium (Tr. I. 152a);  $\times 6$ .  
Fig. 3. Plasticine cast of adult pygidium (Tr. I. 152b);  $\times 6$ .  
Fig. 4. Plasticine cast of hypostoma (Tr. I. 46);  $\times 3$ .  
Fig. 5. Internal mould of adult specimen showing phacopid mode of moulting (Tr. I. 338);  $\times 3$ .  
Fig. 6. Plasticine cast of adult specimen showing phacopid mode of moulting (Tr. I. 337);  $\times 3$ .

All specimens from Famennian zones II or III of Zaremby.



1



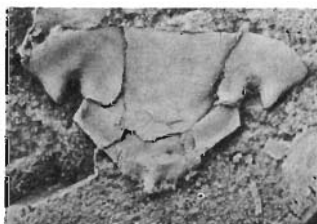
2



3



5



4



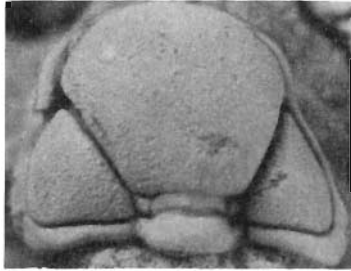
6



1



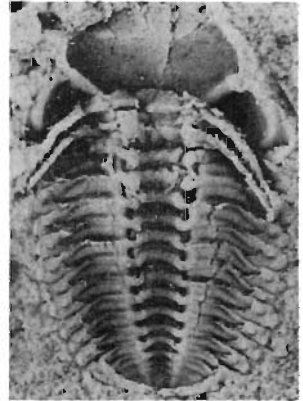
2



3



4



5



6



Pl. IV

*Trimerocephalus trifolius* (Osmólska, 1958)

- Fig. 1. Cephalon, lateral view (Tr. D. I/16);  $\times 6$ .  
Fig. 2. Fragmentary cephalon, ventral view showing vincular furrow (Tr. D. I/39);  $\times 6$ .  
Fig. 3. Cephalon, dorsal view (Tr. D. I/16);  $\times 6$ .  
Fig. 6. Entire specimen in Salter's position (Tr. D. I/21);  $\times 3$ .

*Trimerocephalus dianopsoides* n. sp.

(see also pl. I, II, III)

- Fig. 4. Entire specimen in Salter's position (Tr. D. I/196); nat. size.  
Fig. 5. Plasticine cast of meraspis, degree 10, ventral view showing position of doublure, Panderian protuberances and thickenings on distal ends of pleurae (Tr. D. I/66);  $\times 6$ .

Fig. 1-3, 6 — from Famennian zone II of Kadzielnia;  
fig. 4, 5 — from Famennian zones II or III of Zaremby.