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FAMENNIAN PHACOPIDAE FROM THE HOLY CROSS MOUNTAINS  
(POLAND)

*Abstract.* — Nine species of the Famennian phacopid trilobites are described from the southern part of the Holy Cross Mts. In addition to forms already recorded from this area the writer describes some species never before found in Poland, as well as two quite new species, namely: *Trimerocephalus polonicus* and *Dianops? trifolius*.

## INTRODUCTION

The described material was collected in 1948 and 1949 by Dr. Zofia Kielan, from Kadzielnia, Psiarnia, Herby (within the precincts of town Kielce), Łagów, Gałęzice, Kowala and Jabłonna near Borków, all lying in the southern part of the Holy Cross Mountains.

The terminology used in descriptions of glabella is partly that proposed by V. Jaanusson (1956), to say: lobes and lateral furrows in glabella have been lettered *L* (lobus) and *S* (sulcus) respectively, and numbered postero-anteriorly. The term “*preoccipital ring*” has been used to designate the posterior glabellar lobe ( $L_1$ ) and that of “*preoccipital furrow*” — to designate lateral glabellar furrow ( $S_1$ ). “Preoccipital ring” is a definition more appropriate with the morphological character of this glabellar element in phacopids than that of “lobe”, since in most cases, similarly to the occipital ring, it is in the form of a uniform segment.

R. & E. Richter (1926) introduced the following terms in their descriptions of phacopid trilobites: “Zwischenring” = “basal lobe” = “preoccipital ring” = *L*, and “Zwischenfurche” = “preoccipital furrow” =  $S_1$ . Instead of Delo’s (1940, s. 15) term “subcranial furrow”, the more correct term “*subcranial furrow*” is used as an equivalent to R. & E. Richter “Verschlussfurche”.

The abbreviations used here are: *tr.* — transversal i. e. perpendicular to the axis of symmetry; *sag.* — sagittal i. e. parallel to the longitudinal axis. Length of glabella has been measured without the occipital ring.

Famennian phacopids have been described from the Holy Cross Mountains by several authors, i. e. by C. F. Roemer (1866), G. Gürich

(1896), D. Sobolev (1911), R. & E. Richter (1926) and also mentioned in papers by the Polish geologists: J. Czarnocki (1948 and elsewhere) and J. Samsonowicz (1917 and elsewhere).

C. F. Roemer (1866) has described species *Dianops typhlops* (Gürich, 1896) under the name of *Phacops cryptoptalmus* (Emmrich).

G. Gürich (1896) gave this species the new name of *Trimerocephalus typhlops*. In the same paper he also described other Famennian phacopids such as *Phacops posidoniae* n. sp. = *Phacops granulatus* (Münster, 1840), *Trimerocephalus* sp. (*incisus?* A. Roemer, 1866) = *Nephranops incisus incisus* (A. Roemer, 1866), *Phacops caecus* n. sp. = *Trimerocephalus caecus* (Gürich, 1896).

D. Sobolev (1911) reports from Famennian beds of the Holy Cross Mts. the occurrence of *Trimerocephalus caecus* (Gürich, 1896) under the name of *Phacops sulcatus?* Drevermann, 1901.

R. & E. Richter (1926), in their work on Upper Devonian trilobites, among others, also describe Famennian phacopids occurring in Poland and elsewhere.

To the list of phacopids hitherto recorded from Poland the present writer adds two new species: *Trimerocephalus polonicus* n. sp. and *Dianops? trifolius* n. sp., as well as some species known from Great Britain, Germany and U. S. S. R., but never up to now found in Poland, to say: *Phacops wedekindi wedekindi* R. & E. Richter, 1926; *Trimerocephalus mastoptalmus* (Reinh. Richter, 1856); *Ductina ductifrons* (R. & E. Richter, 1923). Specimens of *Nephranops incisus incisus* (A. Roem., 1866) were not available to the writer. One damaged cephalon of this form, found by Gürich in Kielce, is referable to lowest Famennian deposits and perhaps even to those of the uppermost Frasnian (*Manticoceras* zone), as surmised by R. & E. Richter.

All the here described specimens are deposited in the Geological Survey Museum in Warsaw (Instytut Geologiczny), referred to by the abbreviated form I. G.

Laboratory work during the preparation of this paper has been carried out by the writer in 1954, at the Institute of Paleozoology of the Polish Academy of Sciences, under the guidance of Prof. Dr. R. Kozłowski whose valuable suggestions were of great assistance. Thanks are also due to the following persons: to Dr. Z. Kielan for the privilege of describing her collection, for helping the author and for reading her manuscript; to Mrs. M. Pajchel for general information on the geology of the studied area; to Mrs. J. Humnicka for the English translation of the present paper; to Miss M. Czarnocka for the pains taken in doing the photographs published in this paper.

## REMARKS ON THE GEOLOGY OF FAMENNIAN BEDS IN THE SOUTHERN PART OF THE HOLY CROSS MTS.

The Famennian phacopids described in the present paper have been collected from the following localities: Kadzielnia, Psiarnia, Herby, Łagów, Gałęzice, Kowala and Jabłonna (see fig. 1). All these sites are situated south of the Holy Cross Mts. range and may be grouped into two regions of different lithological and faunal character: I. Central (or Kielce-Łagów) synclinorium, II. Gałęzice-Daleszyce syncline.

Within the central synclinorium the Famennian is represented by a series of grey-yellowish shale limestone deposits, over 100 m in thickness. The trilobite fauna here is fairly abundant, consisting mainly of blind phacopid forms (see table of distribution on p. 124), such as *Trimerocephalus caecus* (Gürich), *Trim. polonicus* n. sp., *Trim. mastophtalmus* (Reinh. Richter), *Dianops typhlops* (Gürich), *Dianops? trifolius* n. sp., *Ductina ductifrons* R. & E. Richter. Proetid trilobites are very rare. Deposits of this type occur in the following localities:

*Kadzielnia* — In Kadzielnia Famennian beds rest on Frasnian limestones and are made up of marly shales interbedded by limestones. This is a thick series of deposits containing a trilobite and lamellibranch fauna, with fragmentary remains of clymenids in a poor state of preservation. After Czarnocki (1948) *Cheiloceras* and *Clymenia* zones occur here. The following phacopids have been recorded: *Trimerocephalus caecus* (Gürich), *Trim. mastophtalmus* (Reinh. Richter), *Trim. polonicus* n. sp., *Dianops? trifolius* n. sp.

*Psiarnia* — The Famennian is developed as marly shales intercalated by limestones. Phacopid trilobites encountered here are: *Phacops granulatus* (Münster)<sup>1</sup>, *Dianops typhlops* (Gürich), *Ductina ductifrons* (R. & E. Richter).

*Herby* — Black limestones outcrop on the roadway leading to Czarnów, containing *Dianops typhlops* (Gürich).

*Łagów* — The Famennian outcrops occur within its northernmost area, on the valley slopes of the Łagowica stream. They are strongly bituminous shale limestone deposits. The dark-grey *Clymenia* limestones here occasionally yield a profusion of exoskeletons belonging to *Trimerocephalus caecus* (Gürich) (see pl. II, fig. 3), those of *Trim. mastophtalmus* (Reinh. Richter) being very scarce. *Dianops typhlops* (Gürich) is another phacopid form here encountered.

<sup>1</sup> The occurrence in Psiarnia of *Phacops granulatus* (Münster) seems doubtful. Its only record from this locality is that cited by Gürich (1896), but it has never after been found here.

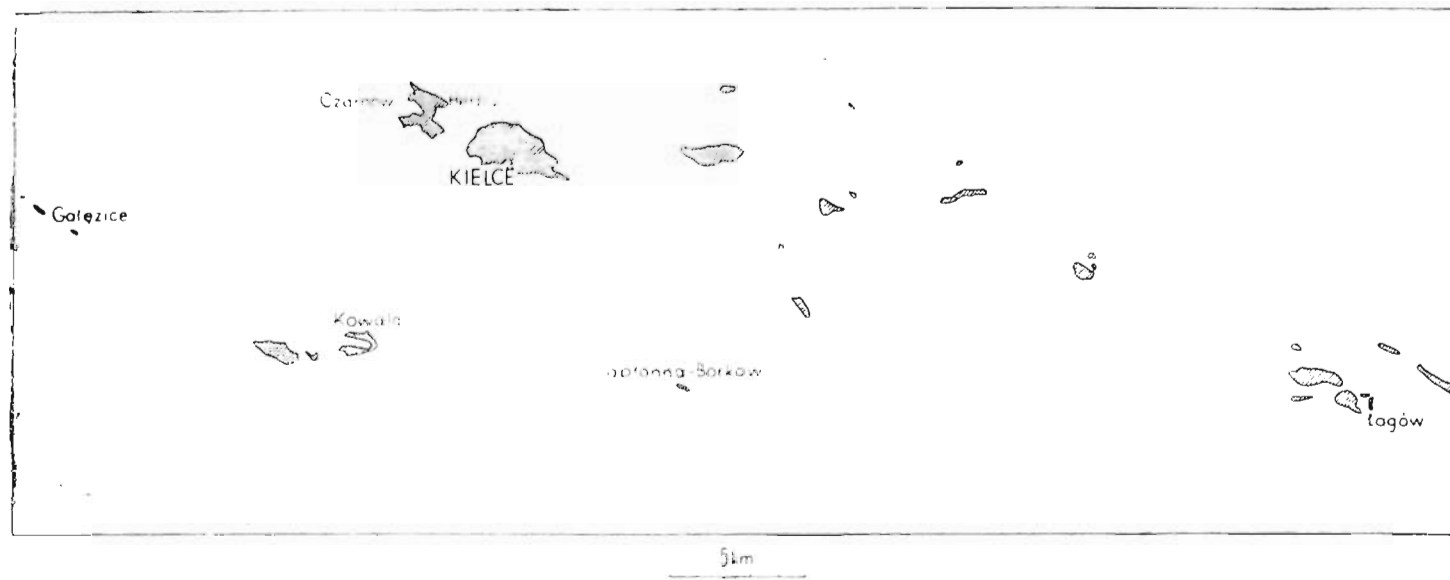


Fig. 1. — Distribution of the Famennian in the southern part of the Holy Cross Mountains.

The facial development of the Famennian beds in Łagów slightly differs from the type shale limestone facies on account of the predominance of limestones over shales. The faunal assemblage here is different too. In addition to phacopids, very copious here, trilobites of the Proetidae family are also represented.

Within the Gałęzice-Daleszyce syncline Famennian beds are of a limestone facies, frequently red coloured and characterized by small thickness, never exceeding 30 m. The fauna here is very rich and in an excellent state of preservation. Of phacopid trilobites only two species occur: *Phacops granulatus* (Münster) and *Ph. wedekindi wedekindi* R. & E. Richter, both provided with eyes, while proetids, nearly altogether absent from the central synclinorium, are here very numerous. Famennian deposits of the limestone type occur in the following localities:

*Gałęzice* — Beds of Frasnian age absent. The Famennian deposits rest directly on *Amphipora* Givetian limestones and consist of hard limestones displaying black, grey, pink and greenish colouration. After Czarnocki (1928) the *Cheiloceras* horizon is missing here, while the Upper Famennian contains all the *Clymenia* horizons, those of *Wocklumeria* and *Gattendorfia* included. The fauna is a markedly rich one, with goniatites, clymenids, orthoceratids, brachiopods, lamellibranchs, trilobites and fish remains. Of the phacopids we note here *Phacops granulatus* (Münster). Higher up are deposits of Lower Carboniferous age (the Culm and Carboniferous limestone lenses). Due to the tapering of some of the beds, thickness of outcrops ranges from 3 to 10 m.

*Kowala* — The Famennian beds are represented here by nodulous limestones, often with a reddish hue, overlying Frasnian limestones. After Czarnocki (1957) all the *Clymenia* horizons are here present. Of the phacopids there occurred: *Phacops wedekindi wedekindi* R. & Richter, and *Dianops typhlops* (Gürich). Culm shales occur higher up.

*Jabłonna near Borków* — The Famennian has been here discovered by the late J. Czarnocki, after World War II. His field work on the geology of the district was carried on through 1949, but the information thus obtained has never been published. Famennian beds overlay here the Frasnian limestones. Similarly as in Kowala, a complete Famennian succession is exposed, beginning with *Cheiloceras* beds and probably including all the *Clymenia* horizons. The deposits consist of limestones with red or grey colouration, while the beds interpreted by Czarnocki as of *Wocklumeria* horizon are of green colour. The fauna is very rich. Thickness about 30 m. Of phacopid trilobites the only form occurring here is *Phacops granulatus* (Münster). Representatives of this species occurring within lower *Clymenia* horizons consist of forms having cephalons of the size

of a few millimeters only, while the same species from the green *Wock-lumeria* limestones are with cephalons up to 18 mm in size. Culm shales overlie the Famennian deposits.

The geology of the Famennian beds within the Holy Cross Mts. has not, thus far, been described in full detail. Hence the writer has experienced difficulties in establishing the horizons which have yielded the studied trilobites. The only differentiation which it has been possible to make is that between the older, i. e. *Cheiloceras* beds, and the younger, i. e. *Clymenia* beds. Most of the known species here described are also recorded from the same beds in other countries. The only exception is *Ductina ductifrons* R. & E. Richter. This species has been reported by its authors (1926) from the *Manticoceras* and *Cheiloceras* horizons, i. e. from Upper Frasnian and lowest Famennian beds, while in the Holy Cross Mts. it has been yielded by the *Clymenia* beds (Upper Famennian) of Psiarnia.

Distribution of the considered phacopid species in outcrops of the southern part of the Holy Cross Mountains

Species	Localities	Gałęźce	Kowala	Jabłonna	Kadzielnia	Psiarnia	Herby	Łagów
1. <i>Phacops granulatus</i> (Münster)		+		+		(+)*		
2. <i>Phacops wedekindi wedekindi</i> R. & E. Richter			+					
3. <i>Trimerocephalus caecus</i> (Gürich)					+			+
4. <i>Trimerocephalus mastophthalmus</i> (Reinh. Richter)					+			+
5. <i>Trimerocephalus polonicus</i> n. sp.					+			
6. <i>Dianops typhlops</i> (Gürich)			(+)			(+)	+	(+)
7. <i>Dianops? trifolius</i> n. sp.					+			
8. <i>Ductina ductifrons</i> R. & E. Richter						+		
9. <i>Phacops</i> sp.					+			

\*The bracketed + sign indicates that this particular species has been recorded from that site by other authors, but that the present writer has not encountered it in that respective outcrop.

## SYSTEMATIC DESCRIPTIONS

Family **Phacopidae** Hawle & Corda, 1847 (emend. Delo, 1935)Subfamily **Phacopinæ** Reed, 1905Genus *Phacops* Emmrich, 1839*Phacops granulatus* (Münster 1840)

(fig. 2; pl. I, fig. 1)

1896. *Phacops posidoniae* Gürich; G. Gürich, Das Paläozoicum..., p. 363, pl. 15, fig. 5 a-d.
1926. *Phacops (Phacops) granulatus* (Münster); R. & E. Richter, Die Trilobiten..., p. 137, pl. 8, fig. 34-39 (with previous synonymy).
1955. *Phacops (Phacops) granulatus* (Münster); Z. A. Maksimova, Trilobity..., p. 136, pl. 10, fig. 3-11.

*Material.* — 4 fragments and one complete cephalon with exoskeleton, 1 pygidium with exoskeleton, 1 pygidium without exoskeleton — all from the grey limestone *Clymenia* beds of Gałęzice; 4 fragments of cephalon and 1 pygidium with exoskeleton from the red limestone *Clymenia* beds of Jabłonna; 2 damaged cephalons with exoskeleton from the light-green limestone *Wocklumeria* beds of Jabłonna.

*Dimensions* of 5 specimens (in mm) — see table below.

Specimens	I. G.	I. G.	I. G.	I. G.	I. G.*
	169.II.2	169.II.1	169.II.4	169.II.3	169.II.5
Length of cephalon	5.0	7.0	12.7	18.5	—
Width of cephalon	8.0	11.2	—	—	—
Length of glabella	4.0	5.2	11.0	16.0	—
Width of glabella	4.8	7.0	13.0	19.0	—
Width of preoccipital ring L <sub>1</sub> (sag.)	0.6	0.5	—	2.0	—
Length of eye	1.8	2.9	5.1	7.8	—
Distance of eye from posterior furrow	0.8	0.9	0.8	2.1	—
Angle of dorsal furrows	72 <sup>0</sup>	75 <sup>0</sup>	65 <sup>0</sup>	—	—
Length of pygidium	—	—	—	—	3.5
Width of pygidium	—	—	—	—	7.5
Length of rhachis	—	—	—	—	3.1
Width of rhachis	—	—	—	—	1.7

\* Museum Catalogue Numbers of the Geological Institute (I. G.) in Warsaw.

*Description.* — Outline of cephalon semicircular. In longitudinal section occipital ring as high as glabella; anterior portion of glabella overhanging the border. In transverse section glabella strongly vaulted, eye lobe nearly vertical to palpebral lobe. Greatest width of glabella be-

fore its mid-length, at level of anterior end of the eye; length/width ratio of glabella 0.8; dorsal furrows at first straight, diverging at the level of the anterior end of eye; angle of dorsal furrows  $65^{\circ}$  to  $75^{\circ}$ ; three fourths of cheek area occupied by eyes, their anterior margin directly touching

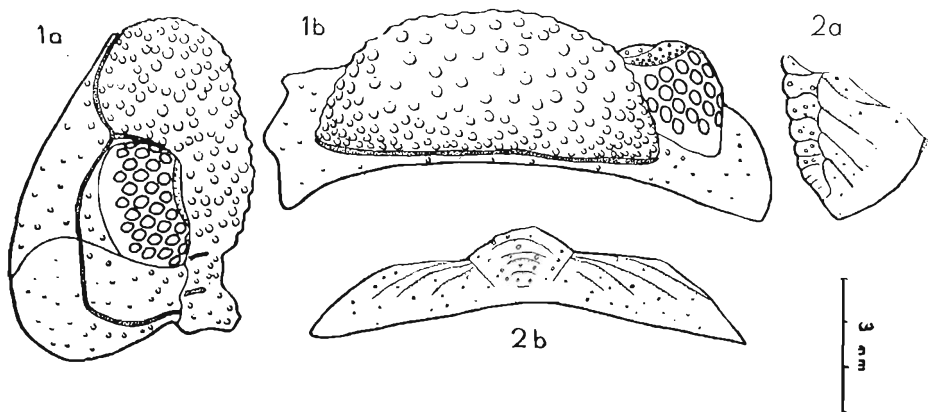


Fig. 2. — *Phacops granulatus* (Münster): 1a cephalon, lateral view; 1b same specimen, anterior view (I. G. 169 II. 1); 2a pygidium, lateral view; 2b same specimen, posterior view (I. G. 169. II. 23).

the glabella; the ratio of the eye length to its distance from posterior border furrow strongly variable. In the 7 specimens that have been measured it is: 2.2, 3.2, 3.6, 3.7, 4.8, 5.8 and 6.4, i. e. an average of 4.2. Lenses on eye lobe round, hardly contacting one another. In an individual 7 mm long and 11.2 mm wide the lenses are arranged in 13 vertical rows, 3 lenses of 0.4 mm in each row; there are also some irregularly arranged lenses along the posterior eye end. In other cephalons the number of vertical rows is the same with 4 lenses in each row, in an alternate arrangement. Total number of lenses ranges from 39 to 52. Pygidium short and stout, the length/width ratio being 0.39.

*Ornamentation* of glabella consists of large, densely arranged tubercula, smaller above the anterior border furrow and in the cheek area; lateral border on the fixed cheeks with minute granulation; pygidial rhachis covered by small and rather sparse tubercles, pleurae smooth.

*Remarks* — *Phacops granulatus* (Münster) was first recorded in Poland by G. Gürich (1896) from the green limestones of Psiarnia containing a fauna with *Posidonia venusta*, under the name of *Phacops posidoniae* Gürich. That author placed it in the zone of *Clymenia humboldti* (*Prolobites* beds).



R. & E. Richter (1926) have described *Phacops granulatus* from Germany, assigning them to horizons with *Manticoceras*, *Prolobites* and *Gonioclymenia* (*Clymenia laevigata* and *Wocklumeria*).

Polish specimens do not display any cardinal differences as compared with those described by R. & E. Richter. The only difference is that in the ratio of the eye length to its distance from posterior furrow: in specimens described by R. & E. Richter this is below 3.6, while in those of the present writer it is up to 6.4, averaging 4.2. Thus, while in German specimens this distance is approximately half the eye length, in Polish specimens it ranges from one third to one sixth of the eye length. This may suggest that Polish forms represent an earlier stage of the eye migration towards the anterior margin of the shield. This migration is observable in the *Phacops granulatus* group consisting of three species: *Phacops circumspectans* Paeckelmann, *Ph. granulatus* (Münster) and *Ph. wedekindi* R. & E. Richter (R. & E. Richter, 1926). In the Polish specimens of *Phacops granulatus* the eye is placed as in *Ph. circumspectans* — near the posterior furrow — with the remaining features typical of *Ph. granulatus*.

Z. A. Maksimova (1953) when describing *Phacops granulatus* from the Ural has observed that these specimens have larger dimensions than the German forms. The latter have the cephalon 8 to 8.5 mm long, those from the Ural 14 to 17 mm, the angle of dorsal furrows being 66-70° and 67-75° respectively. In Polish specimens these dimensions vary strongly, the cephalon length being from 5.0 to 18.5 mm with the dorsal furrow angle at 65-75°.

*Phacops wedekindi wedekindi* R. & E. Richter, 1926

(pl. I, fig. 2 a-b)

1926. *Phacops* (*Phacops*) *wedekindi* R. & E. Richter; R. & E. Richter, Die Trilobiten..., p. 145, pl. 8 fig. 40-43.

*Material.* — 1 incomplete cephalon from Kowala limestones.

*Dimensions* (in mm):

	I. G.
	169.II.6
Length of cephalon	8.0
1/2 of cephalic width	8.5
Length of glabella	7.0
1/2 of glabellar width	5.0
Width of preoccipital ring (L <sub>1</sub> ) (sag.)	1.0
Length of eye	2.0
Distance of eye from posterior border furrow	2.0

*Remarks.* — Comparing with specimens described by R. & E. Richter (1926) the Polish representatives of this species displays the following differences:

<i>Phacops wedekindi wedekindi</i>	from Hönne (Germany)	from Kowala (Poland)
Length of eye (mm)	2.8	2.0
Distance of eye from posterior border furrow (mm)	2.0	2.0
Ratio of eye length to eye distance from posterior border furrow	1.4	1.0
Number of lenses	31	21
Granulation	(2, 3, 5, 6, 6, 6, 3) conspicuous	(2, 3, 4, 4, 4, 3, 1) missing

A new subspecies *Phacops wedekindi uralicus* Maks. has been described from the Ural by Maksimova (1955). The Kowala specimen differs from it in considerably larger eyes and absence of granulation. This latter feature may, however, be due to unsatisfactory state of preservation.

Genus *Trimerocephalus* McCoy, 1849  
*Trimerocephalus caecus* (Gürich, 1896)  
 (fig. 3; pl. II, fig. 1 a-c, 2 a-b, 3)

1896. *Phacops caecus* Gürich; G. Gürich, *Das Paläozoicum...*, p. 362, pl. 15, fig. 4 a-c.  
 1926. *Phacops (Trimerocephalus) caecus* (Gürich); R. & E. Richter, *Die Trilobiten...*, p. 180, pl. 10, fig. 80-86 (with previous synonymy).

*Material.* — 29 cephalons with exoskeletons, 4 moulds of cephalons, 4 pygidia with exoskeletons, 6 thoraces with exoskeletons — from the *Cheiloceras* beds of Kadzielnia (in Kielce); 1 cephalon with exoskeleton, 2 complete specimens enrolled, with exoskeletons, 6 moulds of complete specimens — from the *Clymenia* beds of Kadzielnia. All the Kadzielnia specimens have been yielded by yellowish calcareous-clay shale, with exoskeletons preserved in most cases, but strongly deformed. 14 moulds of cephalons, 1 pygidium with exoskeleton from *Clymenia* beds of Łagów, all from dark-grey limestone. About 20 complete specimens, enrolled, come from the *Cheiloceras* beds in the brickyard at Kielce. These specimens are a part of J. Czarnocki's collections. During the Warsaw insurrec-

tion they have been damaged by fire and are thus not fit to be worked out in detail.

*Dimensions* of 3 specimens (in mm):

Specimens →	I. G. 169.II.10	I. G. 169.II.8	I. G. 169.II.9
Length of cephalon	2.4	5.5	9.0
Width of cephalon	4.4	8.8	15.6
Length of glabella	2.1	4.0	8.0
Width of glabella	3.0	5.9	9.0
Width of preoccipital ring (L <sub>1</sub> ) (sag.)	0.2	0.3	1.0
Width of border at the post- erior cheek angle	0.3	1.0	2.0
Dorsal furrow angle	68°	68°	68°
Length of pygidium	—	2.0	—
Width of pygidium	—	6.1	—
Length of rhachis	—	1.8	—
Width of rhachis	—	1.8	—

*Description.* — Outline of cephalon sub-semicircular. Length/width ratio 0.56. In longitudinal section occipital ring high, occipital furrow conspicuous, preoccipital ring (L<sub>1</sub>) discernible as a small ridge between occipital ring and glabella. Glabella flat, overhanging anteriorly, in transverse section forming a flattened arch. At inner genal angle dorsal furrows parallel, diverging anteriorly at an angle from 70° to 80°; occipital ring wide (sag.), abruptly narrowing at dorsal furrows; occipital furrow strongly curving anteriorly in middle part, and forming a shallow depression at the dorsal furrow; preoccipital ring (L<sub>1</sub>) at dorsal furrows not much broader than medially, flattened out, often with two tubercles symmetrically placed on either side of the midline; preoccipital furrow (S<sub>1</sub>) distinct, also curving forward; second (S<sub>2</sub>) and third (S<sub>3</sub>) lateral glabellar furrows reduced to two short depressions, S<sub>3</sub> however sometimes missing; cheeks strongly vaulted; lateral border broadest at the posterior genal angle, narrowing; anterior border situated under the glabella is crescent-like, occasionally with a shallow concavity, sub-parallel to the outline of the cephalon; subcranial furrow deep and moderately wide; facial suture detectable from mid-length of lateral border follows a course typical of this species without crossing the cheek. In the mould the cheek is modified at its anterior angle, due to the course of the facial suture which, along a certain length, touches here the cheek, truncating it squarely or semicircularly along the border furrow. Width of

rhachis/width of thorax pleurae ratio 0.52. In transverse section rhachis is high, pleurae strongly curving downward. Pygidium short and stout, with length/width ratio 0.33. In transverse section rhachis lower than on thorax, dorsal furrows more shallow, pleurae slightly vaulted. Rhachis, bluntly terminated, does not reach posterior margin of pygidium.

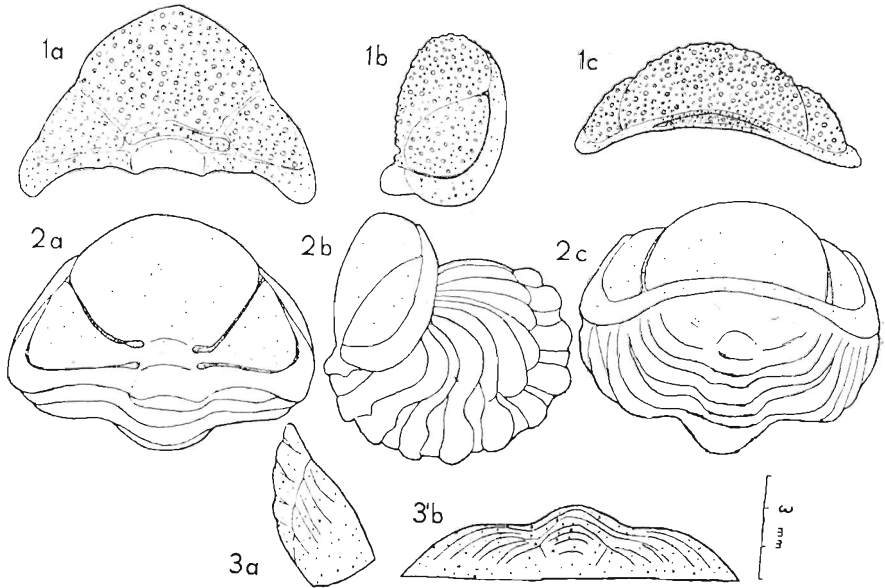


Fig. 3. — *Trimerocephalus caecus* (Gürich): 1a cephalon, dorsal view; 1b same specimen, lateral view; 1c same specimen, anterior view (I. G. 169. II. 3); 2a internal mould of enrolled specimen, dorsal view; 2b same specimen, lateral view; 2c same specimen, anterior view (I. G. 169. II. 24); 3a pygidium, lateral view; 3b same specimen, posterior view (I. G. 169. II. 25).

Ornamentation consists of two kinds of tubercles: some are larger, flattened out and punctured, others smaller, dispersed among the larger.

*Remarks.* — *Trimerocephalus caecus* (Gürich) was for the first time described in Poland by Gürich (1896), from Kadzielnia, on specimens from lower *Clymenia* beds (zone of *Cl. humboldti*). In 1901 F. Drevermann described this species from Langenaubach (Rhine Province) and in 1919 — R. & E. Richter from Gattendorf. The specimens of Drevermann and R. & E. Richter were found in lower *Cheiloceras* beds, but according to the last mentioned authors, this form may also be encountered within *Prolobites* beds.

Our specimens perfectly agree with Gürich's description. The only ascertained difference consists in the absence of tubercle on the occipital ring.

German specimens from Langenaubach (R. & E. Richter, 1926, pl. 10, fig. 83) differ from those found in the Holy Cross Mts. not only in the presence of tubercle on the occipital segment, but also in a broader, semicircular outline of cephalon.

*Trimerocephalus mastophtalmus* (Reinh. Richter, 1856)  
emend. R. & E. Richter, 1926  
(fig. 4; pl. I, fig. 3 a-b)

1926. *Phacops* (*Trimerocephalus*) *mastophtalmus* (Reinh. Richter); R. & E. Richter, *Die Trilobiten...*, p. 172, pl. 9, fig. 68-74; pl. 10, fig. 75 (with previous synonymy).  
1955. *Phacops* (*Trimerocephalus*) *mastophtalmus* (Reinh. Richter); Z. A. Maksimova, *Trilobity...*, p. 155, pl. 14 fig. 1-9.

*Material.* — 4 fragments of cephalons with exoskeletons from *Clymenia* beds of Kadzielnia, 2 cephalons from *Clymenia* beds of Łagów, one of them as a mould.

*Dimensions* (in mm):

	I. G.
	169.II.7
Length of cephalon	10.5
Width of cephalon	19.0
Length of glabella	8.4
Width of glabella	10.4
Width of preoccipital ring ( $L_1$ ) (sag.)	0.9
Width of border at posterior genal angle	2.0
Angle of dorsal furrows	68°

*Description.* — Outline of cephalon semicircular. Glabella slightly overhanging the anterior border; its transverse section is slightly arched, cheeks strongly vaulted, border flat. Maximum width of glabella before its mid-length; at this point glabella nearly twice as broad as at the base; dorsal furrows straight, diverging at an angle of 68°; occipital ring broad, strongly narrowing at dorsal furrows; occipital furrow curving forward, deeper at dorsal furrows; preoccipital ring ( $L_1$ ) broad mesially, narrowing at sides and then becoming inflated at the dorsal furrows; preoccipital furrow ( $S_1$ ) curving forward; border broadest at posterior genal angle, running as a uniform band as far as anterior glabellar angle; subcranial furrow deep and narrow; doublure semicircular; hypostome not preserved. Facial suture only partly discernible: it cuts the lateral border in half of its length, slightly obliquely forward, being deeper incised when running on the anterior part of the border; cuts the border furrow and runs along the cheek in a concave arch, reaching the dorsal furrow near the anterior glabellar angle.

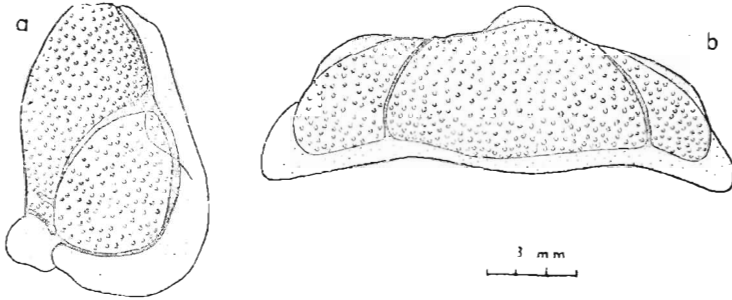


Fig. 4. — *Trimerocephalus mastophtalmus* (Reinh. Richter): a cephalon, lateral view; b same specimen, anterior view (I. G. 169. II. 7).

*Ornamentation* of cephalon consists of minute granulation uniformly and fairly densely covering the glabella and cheeks. The granules are 0.3 mm in diameter with cephalon 10 mm in length. There are about 36 granules over 1 square mm.

*Remarks.* — The here described specimens differ from those of Germany in the following characters:

<i>Trimerocephalus mastophtalmus</i>	from Germany	from Poland
Central ( $S_2$ ) and anterior ( $S_3$ ) lateral glabellar furrow	discernible	absent
Preoccipital furrow ( $S_1$ )	distinct	faintly indicated
Preoccipital ring ( $L_1$ )	as an uniform ridge	narrowing at sides and inflated at the dorsal furrows
Subcranial furrow	broad	narrow
Course of facial suture	discernible throughout the lateral border	discernible from mid-width (tr.) of lateral border, deeply incised at border furrow

Specimens described by Maksimova from Kazakhstan (USSR), according to that author, agree with those from Germany.

Salter (1864-1883, p. 16, pl. 1, fig. 5-7) has figured *Trimerocephalus laevis* (Münster) with characteristic glabella, strongly widening anteriorly

and missing second ( $S_2$ ) and third ( $S_3$ ) lateral glabellar furrows; preoccipital ring ( $L_1$ ) having large tubercles, the cheeks being triangular, the border narrow.

R. & E. Richter (1926, p. 172, pl. 9, fig. 68-74) have accepted the name of *Trimerocephalus laevis* as a synonym of *Trim. mastophtalmus* (Münster). Nevertheless some differences exist between these two forms, namely *Trim. mastophtalmus* has very distinct second ( $S_2$ ) and third ( $S_3$ ) lateral glabellar furrows, distinct facial suture crossing the cheek (Salter did not mention the suture in his description and did not figure it), while the granulation on the preoccipital ring ( $L_1$ ) is very faint. Salter was not able to detect the extremely fine granulation, characteristic of *Trim. mastophtalmus*, probably owing to lack of adequate magnifications. These differences, however, seem to be small and to show that we are dealing here with intraspecific variation only.

Specimens of *Trimerocephalus mastophtalmus* from Poland, described in this paper, come closest to those from Britain.

*Trimerocephalus polonicus* n. sp.

(fig. 5; pl. III, fig. 1, 2 a-c)

*Holotypus*: I. G. 169.II.12, cephalon, fig. 5 and pl. III, fig. 2 a-c.

*Stratum typicum*: Famennian *Clymenia* beds.

*Locus typicus*: Kadzielnia within the Holy Cross Mts. area, Poland.

*Derivatio nominis*: *polonicus* — described from Poland.

*Material*. — 6 cephalons with exoskeletons preserved, two damaged, all from the *Clymenia* beds of Kadzielnia.

*Dimensions* of 2 specimens (in mm):

Specimens →	I.G. 169.II.12	I. G. 169.II.13
Length of cephalon	4.9	4.0
Width of cephalon	7.0	6.0
Length of glabella	3.6	3.0
Width of glabella	4.5	4.0
Width of preoccipital ring ( $L_1$ ) (sag.)	0.9	1.0
Width of border at posterior genal angle	1.0	0.5
Angle of dorsal furrows	65°	59°

*Diagnosis*. — Outline of cephalon sub-semicircular, strongly pointed anteriorly. Dorsal furrows slightly concave outside, their angle varies

markedly, ranging from  $51^\circ$  to  $80^\circ$ . Elongated depression on the crescent-shaped anterior border. Facial suture crosses the cheek near its anterior angle. Ornamentation of cephalon consists of tubercles, rather large in relation to cephalic dimensions, scarcely dispersed. Two tubercles on sides of preoccipital ring. Thorax and pygidium unknown.

*Description.* — Outline of cephalon sub-semicircular, strongly pointed anteriorly. Length/width ratio 0.64. In longitudinal section occipital ring high; occipital furrow moderately deep; preoccipital ring ( $L_1$ ) slightly convex; preoccipital furrow ( $S_1$ ) more shallow than the occipital; glabella somewhat overhanging the anterior border; border under glabella broad, centrally depressed. In transverse section glabella and cheeks strongly vaulted, border narrow and convex. Outline of glabella strongly pointed anteriorly, hyperbolic; maximum glabellar width at mid-length of glabella

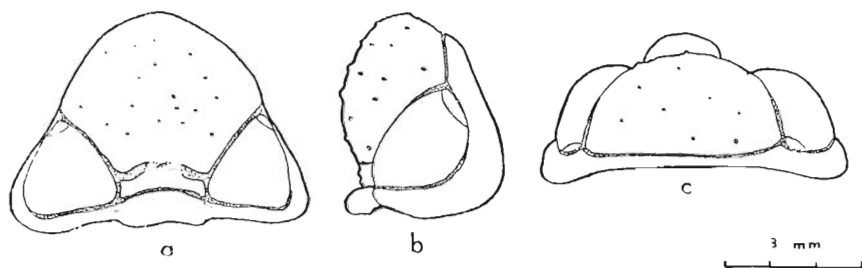


Fig. 5. — *Trimerocephalus polonicus* n. sp.: a holotype, cephalon, dorsal view; b same specimen, lateral view; c same specimen, anterior view (I. G. 169. II. 12).

or very near to it, at that point glabellar width more than twice that at the base; length/width ratio 0.8; dorsal furrows convex inside, angle at which they meet varies strongly, ranging from  $51^\circ$  to  $80^\circ$ ; occipital ring broad, narrowing at dorsal furrows; occipital furrow moderately deep, deeper near dorsal furrows, its median part curving forward; preoccipital segment ( $L_1$ ) gently convex, with uniform width throughout and with ends directed posteriorly; preoccipital furrow ( $S_1$ ) medially shallow but distinct, mesially strongly curving forward, near dorsal furrows incised more deeply and thus producing pits directed obliquely anteriorly; second ( $S_2$ ) and third ( $S_3$ ) lateral furrows missing; cheeks directed more or less vertically downward and thus imparting a characteristically conical appearance to the whole cephalon. Posterior border narrow and convex, broadening and flattening out when passing into lateral border which here attains its maximum width. Viewed from above the border is discernible nearly as far as the lateral angle of glabella; it then passes under the glabella



where it is broad and crescent-shaped; here an elongate, wide depression occurs separating the anterior border into two convex lists; subcranial furrow deep and wide; border furrow deep, highly arched under the glabella. Eyes missing. Facial suture very faint, discernible on the cheek only where it is shaped like a small arch and enters the dorsal furrow in front of the genal angle.

*Ornamentation* of cephalon very characteristic: glabella and cheeks with tubercles from 0.07 to 0.1 mm in diameter (the cephalic length being 4.4 mm, its width 6.5 mm). The tuberculation is distinctly sparse, there being about 16 granules on each mm. On the preoccipital ring (L<sub>1</sub>) two tubercles are placed symmetrically on either side of the centre, not larger than the tubercles on the glabella and cheeks. Occipital ring and border smooth. In frontal part of glabella and on border under the glabella, tuberculation more dense.

*Remarks.* — This species doubtlessly belongs to genus *Trimerocephalus*, as is suggested by such characters as: falcate shape of border below glabella, facial suture crossing the cheek, preoccipital furrow unbroken in the middle part and curving forward. On the whole this species most approaches *Trimerocephalus caecus*, its glabella, however, is more sharply pointed and the course of its facial suture differs in that it not only touches the cheek basally but even crosses it. A diagnostic feature here is the difference of ornamentation. In *Trimerocephalus polonicus* n. sp. it consists of fairly large tubercles sparsely dispersed on the glabella and cheeks.

In *Trimerocephalus mastophtalmus* (Reinh. Richter), described by R. & E. Richter (1926, p. 172, pl. 9, fig. 68-74), similarly as in *Trim. polonicus*, the cheek is transected by the facial suture, while the dorsal furrows curve outside. In the former, however, the outline of cephalon is semi-circular, glabella slightly rounded anteriorly with discernible anterior and central lateral furrows absent from the here described species. Ornamentation of cephalon in *Trim. mastophtalmus* consists of fine, dense granulation, the length of cephalon ranging from 5.2 to 16.5 mm, while the largest cephalons in *Trim. polonicus* never exceed 4.4 mm in length and their ornamentation consists of markedly sparsely dispersed granules.

#### Genus *Dianops* R. & E. Richter, 1923

##### *Dianops typhlops* (Gürich, 1896)

(pl. IV, fig. 1, 4)

1896. *Trimerocephalus typhlops* Gürich; G. Gürich, Das Paläozoicum..., p. 359, pl. 15, fig. 7 a b.
1926. *Phacops (Trimerocephalus) typhlops* (Gürich); R. & E. Richter, Die Trilobiten..., p. 192, pl. 10, fig. 90-94 (with previous synonymy).

*Material.* — 4 cephalons, 2 fragments of pygidia, with exoskeleton partly preserved, from dark-grey *Clymenia* limestones of Herby.

*Dimensions* of 2 specimens (in mm):

Specimens →	I. G. 169.II.14	I. G. 169.II.15
Length of cephalon	8.0	—
Width of cephalon	16.0	—
Length of glabella	7.0	—
Width of glabella	8.6	—
Length of pygidium	—	2.3
Width of pygidium	—	5.0
Length of rhachis	—	2.1
Width of rhachis	—	1.2

*Remarks.* — *Dianops typhlops* (Gürich) has been described from Poland i. a. also by Gürich (1896) and R. & E. Richter (1926). Upon comparison with the lectotype (R. & E. Richter, 1926) the here described specimens display some slight difference. In the longitudinal section, namely, the cephalon is less vaulted, while the lateral border is relatively narrower.

*Dianops? trifolius* n. sp.

(fig. 6; pl. IV, fig. 2, 3)

*Holotypus:* I. G. 169.II.16, cephalon, fig. 6 and pl. IV, fig. 2.

*Stratum typicum:* Famennian *Cheiloceras* beds.

*Locus typicus:* Kadzielnia within the Holy Cross Mts. area, Poland.

*Derivatio nominis:* *trifolius* — with shape resembling a trilobate leaf of clover (*Trifolium*).

*Material.* — 5 cephalons, with exoskeletons preserved, from the *Cheiloceras* beds; 2 damaged cephalons, with exoskeletons, from the *Clymenia* beds of Kadzielnia. Nearly all the specimens slightly damaged.

*Dimensions* of 3 specimens (in mm) — see p. 137.

*Diagnosis.* — Outline of cephalon trilobate. Glabella flattened anteriorly, twice as broad as at the base, lateral angles gently truncated. At posterior genal angle the border twice as broad as at the anterior angle, bent inside the dorsal furrows. Thorax and pygidium unknown.

*Description.* — Outline of cephalon that of a semicircle strongly bent inside the dorsal furrows. Length/width ratio 0.5. In longitudinal section occipital ring lower or even as high as glabella; preoccipital segment ( $L_1$ )

Specimens →	I. G.	I. G.	I. G.
	169.II.16	169.II.18	169.II.17
Length of cephalon	4.5	6.0	6.0
1/2 of cephalon width	5.0	5.1	6.5
Length of glabella	3.2	5.0	5.0
Width of glabella	5.1	6.2	---
Width of preoccipital ring ( $L_1$ ) (sag.)	---	0.4	0.5
Width of border at posterior genal angle	0.9	---	1.5
Width of border at anterior genal angle	0.5	0.8	0.8
Angle of dorsal furrows	70°	70°	68°

only occasionally prominently vaulted; preoccipital furrow ( $S_1$ ) faintly indicated; glabella is raised, gently arched, not overhanging the border, with a small frontal edge; border weakly vaulted. In transverse section glabella and cheeks gently arcuate, border wide, moderately convex. Glabella broadly rounded anteriorly, attaining its maximum width in front of mid-length; length/width ratio of glabella 0.7; its shape resembling a trapeze with base half the length of the upper edge; lateral angles of

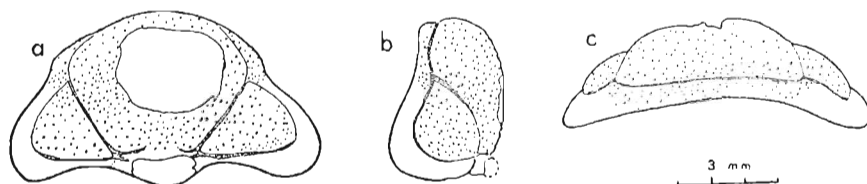


Fig. 6. — *Dianops? trifolius* n. sp.: a holotype, cephalon, dorsal view; b same specimen, lateral view; c same specimen, anterior view (I. G. 169. II. 16).

glabella somewhat truncated; dorsal furrows straight, diverging at an angle of 70°; occipital ring moderately wide, occipital furrow straight; preoccipital ring ( $L_1$ ) narrow, preoccipital furrow ( $S_1$ ) straight, usually interrupted mesially; pits in preoccipital and occipital furrow very shallow, elongate; two anterior lateral glabellar ( $S_2, S_3$ ) furrows not discernible; cheeks in the shape of an almost equilateral triangle; posterior border narrowing at mid-length (tr.), then widening and attaining maximum width where it meets the border; the border wide posteriorly, narrows anteriorly so that it is there nearly 2 times narrower than at the posterior genal angle; at contact with dorsal furrows the border strongly bent inside, viewed dorsally it is seen along 1/3 of the length of the anterior

margin of glabella and farther being concealed beneath it; under glabella, limb broadly flat and running as a uniform band; subcranial furrow deep and broad, with hind edge somewhat lower than the frontal; border furrow deep and fairly wide, bent inside at the dorsal furrows; under glabella subcranial and border furrows running parallel. Facial suture not discernible. Eyes missing.

*Ornamentation* of cephalon: Glabella, cheeks and border near the dorsal furrow covered by minute granules 0.03 mm in diameter, with cephalon length 6.0 mm. Under  $\times 30$  magnification occipital ring shows delicate granulation. In badly preserved specimens, particularly on glabella, granulation not visible.

*Remarks.* — This species displays following features suggesting its assignment to genus *Dianops*: before glabella limb broadly flat, under glabella subcranial and border furrows parallel; second ( $S_2$ ) and third ( $S_3$ ) lateral furrows missing; preoccipital furrow ( $S_1$ ) straight, broken in the middle part.

Other features of this species, however, do not agree with the diagnosis of genus *Dianops*, as given by R. & E. Richter (1926). They are, namely, different shape of glabella which expands uniformly forward, and anterior angles of glabella only quite insignificantly truncated. Moreover, in our species, the border is throughout its length distinctly delimited from the cheek by a deep border furrow.

Bending of the border at the dorsal furrow, characteristic of *Dianops? trifolius* n. sp., may have been caused by the exoskeleton being broken off here along the facial suture, which has a similar course in genus *Dianops*. This, however, is rather doubtful, since in blind trilobites the suture was not, in all probability, functional.

In comparison with other species of genus *Dianops*, *Dianops? trifolius* shows the following differences: outline of its cephalon is semicircular, bent near the dorsal furrow (this is a character not encountered in any one of the described species of genus *Dianops*); lateral angles of glabella only slightly truncated (in *Dianops typhlops*, *D. anophtalmus*, *D. griffithides* glabellar angles are conspicuously truncated); the entire glabella and cheeks, as well as border near the dorsal furrows are finely granulated. Granulation also occurs in *D. typhlops*, *D. anophtalmus* and *D. griffithides*, but in some parts of the cephalon only.

*Phacops* sp.

(fig. 7; pl. III, fig. 4)

*Material.* — 1 pygidium with exoskeleton found in *Clymenia* beds of Kadzielnia.

*Dimensions (in mm):*

	I. G. 169.II.19
Length of pygidium	5.2
Width of pygidium	10.2
Length of rhachis	5.2
Width of rhachis	3.1

*Description.* — Width of pygidium more than twice the length; outline of posterior margin gently arcuate, slightly concave where rhachis reaches the margin. In longitudinal section, rhachis considerably elevated over pleurae, this elevation equalling 2/3 of pleurae height; three distinct segments and conspicuous rhachial rings, three further segments not read-

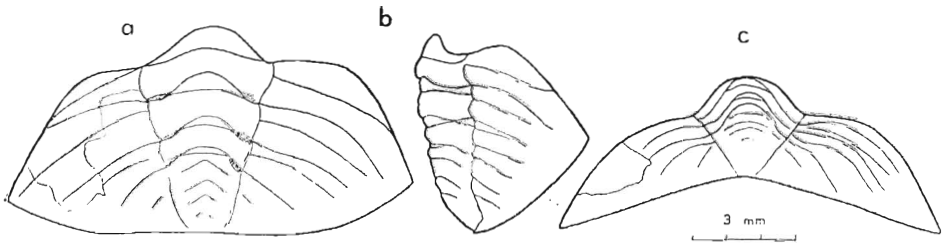


Fig. 7. — *Phacops* sp.: a pygidium, dorsal view; b same specimen, lateral view; c same specimen, posterior view (I. G. 169. II. 19).

ily discernible; rhachis bent rather sharply where it meets posterior margin of shield, reaching to end of shield. In transverse section rhachis strongly vaulted. Dorsal furrows converging V-shaped at posterior margin of shield; pleurae horizontal from dorsal furrows to approximately 1/3 of their width (tr.), farther strongly curved downward; posterior margin raised where meeting the rhachis; 6 furrows between rhachial rings, the frontal ones semicircular and conspicuous, deeper along dorsal furrows, beginning with the 4th barely discernible and mesially angularly bent; 4 ribs present on pleurae, gently arcuate distally. Pleural grooves moderately deep, intersegmental furrows more shallow but likewise distinct; not one of them reaches to margin of shield; anterior and posterior portions of rib distinctly delimited, convex; segments of rhachis with very faint ornamentation consisting of low tubercles 0.07 mm in diameter.

*Remarks.* — The above described pygidium differs considerably from pygidia of all species of *Phacops* so far described. It may possibly be referred to one of the two new species described in the present paper found in the same beds and presenting a similar fine granulation.

Subfamily **Phacopidellinae** Delo, 1935  
 Genus *Ductina* (R. & E. Richter, 1931)  
*Ductina ductifrons* R. & E. Richter, 1923  
 (pl. III, fig. 3)

1926. *Phacopidella ductifrons* R. & E. Richter; R. & E. Richter, Die Trilobiten..., p. 207, pl. 11, fig. 16-22 (with previous synonymy).  
 1931. *Phacopidella (Ductina) ductifrons* R. & E. Richter; R. & E. Richter, Unterlagen zum Fossilium Catalogus.  
 1955. *Phacopidella (Ductina) ductifrons* R. & E. Richter; Z. A. Maksimova, Trilobity..., p. 186, pl. 16, fig. 1-6.

*Material.* — 4 cephalons from *Clymenia* beds of Psiarnia. These specimens, with exoskeletons, have been preserved in shales, in a deformed and flattened condition.

*Dimensions* of 3 specimens (in mm):

Specimens →	I. G. 169.II.20	I. G. 169.II.21	I. G. 169.II.22
Length of cephalon	4.0	—	5.0
Width of cephalon	—	7.1	—
Length of glabella	3.1	—	4.1
Width of glabella	—	4.1	—
Angle of dorsal furrows	—	60°	60°

*Description.* — Outline of cephalon semicircular, length/width ratio 0.5; dorsal furrows divergent at an angle of 58° to 60°, frontally curving to the outside and passing uninterrupted into border furrow; glabella widening out anteriorly, with lateral angles passing outside into the border; length/width ratio 0.8; occipital ring moderately narrow, preoccipital ring (L<sub>1</sub>) broadly flat, occipital and preoccipital furrows (S<sub>1</sub>) delimiting it straight; preoccipital furrow (S<sub>1</sub>) medially very faintly indicated; eyes absent.

*Remarks.* — *Phacopidella ductifrons* (1926), described by R. & E. Richter, is without subcranial furrow, which is a generic character, while the facial suture runs along the outer margin of border. Exoskeleton with delicate granulation. The here mentioned features are not discernible in Polish forms owing to extremely bad state of preservation. *Ductina ductifrons* has not thus far been described from Poland. In Europe it has been recorded from the Rhine Province and from Eastern Thuringia, as well as from Great Britain. After R. & E. Richter (1926) it is encountered within *Manticoceras* and *Cheiloceras* beds.

*Paleozoological Laboratory*  
*of the Polish Academy of Sciences*  
 Warszawa, January 1958

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HALSZKA OSMÓLSKA

## PHACOPIDAE FAMEŃSKIE Z GÓR ŚWIĘTOKRZYSKICH

*Streszczenie*

Phacopidae fameńskie, opisane w niniejszej pracy, zostały zebrane przez Dr Z. Kielan w następujących miejscowościach: Kadzielnia, Psiarnia, Herby (dzielnice Kielc), oraz Łągów, Gałęzice, Kowala i Jabłonna koło Borkowa (fig. 1) i prze-

kazane autorce do opracowania. Wszystkie te punkty położone są na południe od nasunięcia Świętokrzyskiego i zgrupowane w dwóch odrębnych faunistycznie i litologicznie regionach: I. synklinorium centralne (kielecko-łagowskie), II. synklina gałęzicko-daleszycka.

Famen w synklinorium centralnym wykształcony jest w postaci ponad 100-metrowej serii osadów łupkowo-wapiennych o szaro-żółtawym zabarwieniu. Fauna trylobitowa jest dość obfita; są to wyłącznie trylobity ślepe z rodziny Phacopidae: *Trimerocephalus caecus* (Gürich), *Trim. mastophtalmus* (Reinh. Richter), *Trim. polonicus* n. sp., *Dianops typhlops* (Gürich), *Dianops? trifolius* n. sp., *Ductina ductifrons* R. & E. Richter. Charakterystyczny tu jest zupełny brak trylobitów z rodziny Proetidae. Osady tego typu wykształcone są w następujących punktach:

**Kadzelnia** — Famen spoczywa tu na wapieniach franu; są to łupki margliste przewarstwiane wapieniami. Tworzą one gruby kompleks z fauną trylobitów i małżów oraz żle zachowanych klimenii. Według J. Czarnockiego (1948) są tu reprezentowane warstwy cheilocerasowe i klimeniowe. Spośród Phacopidae występują: *Trimerocephalus caecus* (Gürich), *Trim. mastophtalmus* (Reinh. Richter), *Trim. polonicus* n. sp., *Dianops? trifolius* n. sp.

**Psiarnia** — Famen jest tu wykształcony również w postaci łupków marglistych przewarstwionych wapieniami. Phacopidae reprezentowane są przez: *Phacops granulatus* (Münster), *Dianops typhlops* (Gürich), *Ductina ductifrons* (R. & E. Richter).

**Herby** — W drodze prowadzącej do Czarnowa odsłaniają się czarne wapienie, w których spotyka się *Dianops typhlops* (Gürich).

**Łagów** — Odsłonięcia famenu występują na północnym krańcu miasteczka, w zboczu doliny rzeczki Łagowicy. Są to silnie bitumiczne osady łupkowo-wapienne. W ciemnoszarych wapieniach klimeniowych znajduje się niekiedy wielkie nagromadzenie pancerzy *Trimerocephalus caecus* (Gürich) i nieliczne *Trim. mastophtalmus* (Reinh. Richter). Z innych Phacopidae cytowano tu *Dianops typhlops* (Gürich). Wykształcenie famenu w Łagowie odbiega nieco od typowego łupkowo-wapiennego, gdyż przeważają tu wapienie, łupków zaś jest mniej. Zespół faunistyczny jest tu także odmienny: oprócz bardzo licznych Phacopidae, są tu trylobity z rodziny Proetidae.

Famen w synklinie gałęzicko-daleszyckiej wykształcony jest w facji wapiennej. Są to wapienie szare, często o zabarwieniu czerwonym, o miąższości nie przekraczającej 30 m. Fauna ich jest bardzo bogata i dobrze zachowana. Spośród Phacopidae występują tu tylko dwa gatunki; są to formy mające oczy: *Phacops granulatus* (Münster) i *Ph. wedekindi wedekindi* R. & E. Richter; natomiast Proetidae, których niemal zupełnie brak w synklinorium centralnym, są tu bardzo liczne. Osady fameńskie typu wapiennego występują w następujących punktach:

**Gałęzice** — Brak tu franu, famen zaś spoczywa bezpośrednio i prawie zgodnie na wapieniach amfiporowych żywetu. Jest on wykształcony w postaci twardych wapieni o zabarwieniu ciemnoszarym, różowym, czekoladowym i zielonkawym. We-



dług Czarnockiego (1928) brak tu poziomu cheilocerasowego, a górny famen obejmuje wszystkie poziomy klimeniowe, łącznie z woklumeriowym oraz gattendorfiowym, należącym już do dolnego karbonu. Fauna jest bardzo bogata i doskonale zachowana; zawiera ona goniatyty, klimenie, ortocerasy, brachiopody, małże, trylobity, szczątki ryb. Spośród Phacopidae występuje *Phacops granulatus* (Münster). Wskutek wyklinowania się pewnych warstw miąższość w poszczególnych odkrywkach w samych Gałęzicach waha się od 3 do 7 m.

*Kowala* — Famen wykształcony tu jest także w postaci wapieni, często czerwono zabarwionych, gruzłowatych, leżących na wapieniach franu. Według Czarnockiego (1957) występują tu wszystkie poziomy klimeniowe. Spośród Phacopidae występują: *Dianops typhlops* (Gürich) i *Ph. wedekindi wedekindi* R. & E. Richter. Wyżej leżą łupki dolnego karbonu.

*Jabłonna k. Borkowa* — Famen został tu odkryty przez Czarnockiego po II wojnie światowej. W roku 1949 prowadził on tu prace geologiczne, których wyniki nie zostały jednak opublikowane. Famen zalega tu na wapieniach franu; jest to, podobnie jak i w Kowali, kompletna seria, zaczynająca się od warstw cheilocerasowych i prawdopodobnie ze wszystkimi poziomami klimeniowymi. Są to wapienie o czerwonym, szarym — a w warstwach interpretowanych przez Czarnockiego jako woklumeriowe — seledynowym zabarwieniu. Fauna bardzo bogata. Miąższość około 30 m. Spośród Phacopidae występuje tylko *Phacops granulatus* (Münster). Przedstawiciele tego gatunku, występujący w niższych poziomach klimeniowych, to osobniki o małych, kilkumilimetrowych cefalonach. Ten sam gatunek z seledynowych wapieni woklumeriowych osiąga rozmiary cefalonu dochodzące do 18 mm. Nad osadami famenu leżą łupki dolnego karbonu.

Wśród opisanych przez autorkę Phacopidae fameńskich w wymienionych wyżej punktach występują trzy gatunki, znane już przedtem z Gór Świętokrzyskich:

*Phacops granulatus* (Münster)

*Trimerocephalus caecus* (Gürich)

*Dianops typhlops* (Gürich)

a także dotychczas w Polsce nie znajdowane:

*Phacops wedekindi wedekindi* R. & E. Richter

*Trimerocephalus mastophtalmus* (Reinh. Richter)

*Ductina ductifrons* (R. & E. Richter).

Do tego dochodzą dwa nowe gatunki:

*Trimerocephalus polonicus* n. sp.

*Dianops? trifolius* n. sp.

Poniżej przytoczone są krótkie diagnozy gatunków nowych.

*Trimerocephalus polonicus* n. sp.

(fig. 5; pl. III, fig. 1, 2 a-c)

*Holotypus*: I. G. 169. II. 12, cefalon, fig. 5 i pl. III, fig. 2 a-c.

*Stratum typicum*: famen, warstwy klimeniowe.

*Locus typicus:* Kadzelnia, Góry Świętokrzyskie, Polska.

*Derivatio nominis:* *polonicus* — opisany z Polski.

*Diagnoza.* — Zarys cefalonu węższy niż półkole; glabella z przodu silnie zastrzona; bruzdy grzbietowe lekko wygięte, wklęsłe na zewnątrz, kąt ich bardzo zmienny (51-80°); na półksiężycowatym limbusie przednim podłużne wgłębienie; szew twarzowy przecina policzek przy przednim jego kącie; ornamentacja cefalonu w postaci dość dużych w stosunku do wymiarów cefalonu guzków, rzadko rozmieszczonych: po bokach międzypierścienia dwa guzki. Toraks i pygidium nie znane.

*Dianops? trifolius* n. sp.

(fig. 6; pl. IV, fig. 2, 3)

*Holotypus:* I. G. 169. II. 16, cefalon, fig. 6 i pl. IV, fig. 2.

*Stratum typicum:* famen, warstwy cheilocerasowe.

*Locus typicus:* Kadzelnia, Góry Świętokrzyskie, Polska.

*Derivatio nominis:* *trifolius* — cefalon ma kształt liścia koniczyny (*Trifolium*).

*Diagnoza.* — Zarys cefalonu przypominający trójpłatowy liść koniczyny; glabella z przodu spłaszczona, dwa razy szersza niż u podstawy, jej boczne kąty lekko ścięte; limbus przy tylnym kącie policzkowym przeszedł dwa razy szerszy niż przy przednim, przy ujściu bruzd grzbietowych wgięty do wnętrza. Toraks i pygidium nie znane.

#### OBJAŚNIENIA DO ILUSTRACJI

Fig. 1 (p. 122)

Mapka występowania famenu w południowej części Gór Świętokrzyskich.

Fig. 2 (p. 126)

*Phacops granulatus* (Münster): 1a cefalon, profil podłużny; 1b ten sam okaz, profil poprzeczny (I. G. 169. II. 1); 2a pygidium, profil podłużny; 2b ten sam okaz, profil poprzeczny (I. G. 169. II. 23).

Fig. 3 (p. 130)

*Trimerocephalus caecus* (Gürich): 1a cefalon, z góry; 1b ten sam okaz, profil podłużny; 1c ten sam okaz, profil poprzeczny (I. G. 169. II. 8); 2a okaz zwinięty, ośrodek wewnętrzna, z góry; 2b ten sam okaz, profil podłużny; 2c ten sam okaz, profil poprzeczny (I. G. 169. II. 24); 3a pygidium, profil podłużny; 3b ten sam okaz, profil poprzeczny (I. G. 169. II. 25).

Fig. 4 (p. 132)

*Trimerocephalus mastophthalmus* (Reinh. Richter): a cefalon, profil podłużny; b ten sam okaz, profil poprzeczny (I. G. 169. II. 7).

Fig. 5 (p. 134)

*Trimerocephalus polonicus* n. sp.: a holotyp, cefalon, z góry; b ten sam okaz, profil podłużny; c ten sam okaz, profil poprzeczny: (I. G. 169. II. 12).

## Fig. 6 (p. 137)

*Dianops? trifolius* n. sp.: a holotyp, cefalon, z góry; b ten sam okaz, profil podłużny; c ten sam okaz, profil poprzeczny (I. G. 169. II. 16).

## Fig. 7 (p. 139)

*Phacops* sp.: a pygidium, z góry; b ten sam okaz, profil podłużny; c ten sam okaz, profil poprzeczny (I. G. 169. II. 19).

## Pl. I

*Phacops granulatus* (Münster)

Fig. 1. Cefalon, z góry (I. G. 169. II. 1);  $\times 5$ .

*Phacops wedekindi wedekindi* R. & E. Richter

Fig. 2. a Fragment cefalonu, z góry; b ten sam okaz, profil podłużny (I. G. 169. II. 6);  $\times 4$ .

*Trimerocephalus mastophtalmus* (Reinh. Richter)

Fig. 3. a Cefalon, z góry; b ten sam okaz, profil poprzeczny; c ten sam okaz, profil podłużny (I. G. 169. II. 7);  $\times 3,1$ .

## Pl. II

*Trimerocephalus caecus* (Gürich)

Fig. 1. a Okaz zwinięty, z góry; b ten sam okaz, profil poprzeczny; c ten sam okaz, profil podłużny (I. G. 169. II. 8);  $\times 4,7$ .

Fig. 2. a Cały okaz, ośrodkowa wewnętrzna, z góry; b ten sam okaz, pygidium (I. G. 169. II. 11);  $\times 2,7$ .

Fig. 3. Wapień z łagowa, szlif mikroskopowy; widoczne przekroje pancerzy *Trimerocephalus caecus*;  $\times 3$ .

## Pl. III

*Trimerocephalus polonicus* n. sp.

Fig. 1. Paratyp, spłaszczony cefalon, z góry (I. G. 169. II. 26);  $\times 6,4$ .

Fig. 2. a Holotyp, cefalon, z góry; b ten sam okaz, profil poprzeczny; c ten sam okaz, profil podłużny (I. G. 169. II. 12);  $\times 8,7$ .

*Ductina ductifrons* (R. & E. Richter)

Fig. 3. Fragment cefalonu, z góry (I. G. 169. II. 20);  $\times 9,5$ .

*Phacops* sp.

Fig. 4. Pygidium, z góry (I. G. 69. II. 19);  $\times 4,8$ .

## Pl. IV

*Dianops typhlops* (Gürich)

Fig. 1. Cefalon, z góry (I. G. 169. II. 14);  $\times 4,7$ .

Fig. 4. Pygidium, z góry (I. G. 169. II. 15);  $\times 8,7$ .

*Dianops? trifolius* n. sp.

Fig. 2. Holotyp, cefalon, z góry (I. G. 169. II. 16);  $\times 8,4$ .

Fig. 3. Paratyp, cefalon, z góry (I. G. 169. II. 17);  $\times 5,6$ .

## ГАЛЬШКА ОСМУЛЬСКА

## ФАМЕНСКИЕ PHACOPIDAE ИЗ СВЕНТОКРЖИСКИХ ГОР (ПОЛЬША)

## Резюме

Описанные в этой статье фаменские Phacopidae собраны Др. З. Келян в следующих местностях: Кадзельня, Псярня и Гербы (пригороды Кельц), Лагув, Галензице, Ковалья, Яблонна около Боркова (см. фиг. 1) и переданы автору для описания. Все эти пункты расположены к югу от свентокржиского надвига и пруплируются в двух различных в литологическом и фаунистическом отношении районах: I. Центральный (келецко-лаговский) синклиниорий, II. Галензицко-далешицкая синклинали.

Фамен в центральном синклинории представлен свитой сланцевато-известняковых серо-желтых осадков мощностью свыше 100 м. Трилобитовая фауна относительно многочисленна, причем выражена исключительно слепыми формами семейства Phacopidae (Hawle & Corda): *Trimerocephalus caecus* (Gürich), *Trim. mastophtalmus* (Reinh. Richter), *Trim. polonicus* n. sp., *Dianops typhlops* (Gürich), *Dianops? trifolius* n. sp., *Ductina ductifrons* R. & E. Richter. Характеристическим фактом является здесь полное отсутствие трилобитов из семейства Proetidae. Осадки упомянутого типа развиты в следующих пунктах:

**Кадзельня** — Фаменский ярус залегает здесь на фральских известняках, а точнее на мергелистых сланцах переслаивающихся с известняками. Они образуют мощный комплекс осадков с фауной трилобитов и пластинчатожабренных рядом с фрагментами климений плохой сохранности. По Я. Чарноцким (1948) в этом пункте представлены хейлоцеровые и климениевые слои. Из числа Phacopidae определены: *Trimerocephalus caecus* (Gürich), *Trim. mastophtalmus* (Reinh. Richter), *Trim. polonicus* n. sp., *Dianops? trifolius* n. sp.

**Псярня** — Фамен выражен здесь также в виде мергелистых сланцев с прослоями известняков. Phacopidae представлены следующими видами: *Phacops granulatus* (Münster), *Dianops typhlops* (Gürich), *Ductina ductifrons* (R. & E. Richter).

**Гербы** — В дороге ведущей в Чарнов обнаруживаются черные известняки, в которых встречается *Dianops typhlops* (Gürich).

**Лагов** — Обнажения фаменского яруса прилегают на северном конце местечка, на склонах долины речки Лаговицы. Это сильно битуминозные сланцево-известняковые осадки. В темно-серых климениевых известняках находятся иногда большие скопления панцирей *Trimerocephalus caecus* (Gürich) и немногочисленные *Trim. mastophtalmus* (Reinh. Richter). Из других Phacopidae приводились отсюда *Dianops typhlops* (Gürich).

Развитие фамена в Лагове несколько различается от типичного сланцево-известнякового, так как здесь преобладают известняки, а сланцев меньше. Фаунистическая ассоциация также отличается от предыдущих: кроме очень многочисленных Phacopidae входят также трилобиты из семейства Proetidae.

В синклинали Галензице-Далтешице фамен развит в известняковой фации. Это серые, часто с красноватым оттенком известняки небольшой мощности, до 30 м. Фауна очень обильная и великолепной сохранности. Из числа Phacopidae встречены только два вида, притом формы с глазами: *Phacops granulatus* (Münster) и *Ph. wedekindi wedekindi* R. & E. Richter. В противоположность этому Proetidae, которые отсутствуют в центральной синклинали, здесь весьма многочисленны. Фаменские осадки известнякового типа развиты в следующих пунктах:

**Галензице** — Франский ярус отсутствует и фаменские осадки залегают непосредственно и почти согласно на живецких амфиловых известняках. Они выражены твердыми известняками темно-серой, розовой, шоколадной и зеленоватой окраски. По Чарноцкому (1928) хейлоцеровый горизонт здесь отсутствует, а верхний фамен вмещает все климениевые горизонты с воклюмериевым включительно, а также с гаттендорфиевым, принадлежащим уже нижнему карбону. Фауна очень богата и прекрасной сохранности. Она содержит гониатиты, климении, ортоцеры, брахиоподы, пластинчатожабрные, трилобиты и остатки рыб. Из Phacopidae обнаружен *Phacops granulatus* (Münster). В результате выклинивания некоторых слоев в отдельных обнажениях мощность фамена в Галензицах колеблется в границах от 3 до 7 м.

**Ковалья** — Фамен выражен здесь также известняками, часто окрашенными в красный цвет, неоднородной структуры, которые залегают на известняках франа. По Чарноцкому (1957) в нем представлены все климениевые горизонты. Из числа Phacopidae были встречены: *Dianops typhlops* (Gürich) и *Pr. wedekindi wedekindi* R. & E. Richter. Выше залегают сланцы нижнего карбона.

**Яблонна около Боркова** — Фамен здесь был обнаружен впервые Чарноцким после второй мировой войны. В 1949 г. он производил здесь геологические исследования, но их результаты не опубликованы. Фамен залегают на известняках франа. Это так же, как и в Ковали, полная серия фамена, начинающаяся хейлоцеровыми слоями и содержащая повидимому все климениевые горизонты. Она представлена известняками мощности около 30 м, красными и серыми, а в горизонтах приписываемых Чарноцким воклюмериевым слоям — светло-зелеными. Фауна очень обильна. Из числа Phacopidae найден только *Phacops granulatus* (Münster). Представители этого вида, встречающиеся в нижних климениевых горизонтах, выражены особями характеризующимися маленькими, несколько-миллиметровыми кефалонами. Тот-же вид из светло-зеленых воклюмериевых известняков имеет кефалоны, достигающие размера 18 мм. Над фаменскими осадками лежат сланцы нижнего карбона.

Среди описанных автором фаменских Phacopidae в выше перечисленных пунктах содержатся три вида известные уже раньше из Свентокржиских Гор:

- Phacops granulatus* (Münster).
- Trimercephalus caecus* (Gürich)
- Dianops typhlops* (Gürich),

а также виды до сих пор не обнаруженные в Польше:

*Phacops wedekindi wedekindi* R. & E. Richter  
*Trimerocephalus mastophtalmus* (Reinh. Richter)  
*Ductina ductifrons* (R. & E. Richter).

Кроме того установлены два новых вида:

*Trimerocephalus polonicus* n. sp.  
*Dianops? trifolius* n. sp.

Ниже приведены диагнозы новых видов.

*Trimerocephalus polonicus* n. sp.  
 (фиг. 5; пл. III, фиг. 1, 2 a-c)

*Holotypus*: I. G. 169.II.12, кефалон, фиг. 5 и пл. III, фиг. 2 a-c.  
*Stratum typicum*: фамен, климешевые слои.  
*Locus typicus*: Кадзельня, Свентокржиские Горы, Польша.  
*Derivatio nominis*: *polonicus* — описанный из Польши.

**Диагноз.** — Контур кефалона уже полукруга; глабелла спереди сильно заостренная; спинные борозды легко выгнутые, волнующие наружу, угол их очень изменчивый (51—80°); на полумесячном переднем лимбусе продолговатое углубление; лицевой шов пересекает щеку при ее переднем угле; орнаментация кефалона в виде бугорков довольно больших в соотношении с размерами кефалона, редко размещенных; по бокам промежуточного кольца два бугорка. Торакс и пigidий не известны.

*Dianops? trifolius* n. sp.  
 (фиг. 6; пл. IV, фиг. 2, 3)

*Holotypus*: I. G. 169.II.16, кефалон, фиг. 6 и пл. IV, фиг. 2, 3.  
*Stratum typicum*: фамен, хейлоцеровые слои.  
*Locus typicus*: Кадзельня, Свентокржиские Горы, Польша.  
*Derivatio nominis*: *trifolius* — кефалон имеет вид листа клевера (*Trifolium*).

**Диагноз.** — Контур кефалона напоминающий наружностью трехлопастный лист клевера; глабелла спереди сплюснутая, дважды шире чем у основания, ее боковые углы легко срезанные; лимбус при заднем щечном угле дважды шире чем при переднем, при устьях спинных борозд вогнутый внутрь. Торакс и пigidий не известны.

P L A T E S

## EXPLANATIONS OF PLATES

### Pl. I

#### *Phacops granulatus* (Münster)

Fig. 1. Cephalon, dorsal view (I. G. 169. II. 1);  $\times 5$ .

#### *Phacops wedekindi wedekindi* R. & E. Richter

Fig. 2. *a* Fragment of cephalon, dorsal view; *b* same specimen, lateral view (I. G. 169. II. 6);  $\times 4$ .

#### *Trimerocephalus mastophthalmus* (Reinh. Richter)

Fig. 3. *a* Cephalon, dorsal view; *b* same specimen, anterior view; *c* same specimen, lateral view (I. G. 169. II. 7);  $\times 3.1$ .

### Pl. II

#### *Trimerocephalus caecus* (Gürich)

Fig. 1. *a* Enrolled specimen, dorsal view; *b* same specimen, anterior view; *c* same specimen, lateral view (I. G. 169. II. 8);  $\times 4.7$ .

Fig. 2. *a* Internal mould of whole specimen, dorsal view; *b* same specimen, pygidium (I. G. 169. II. 11);  $\times 2.7$ .

Fig. 3. Thin section of limestone from Łagów showing exoskeletons of *Trimerocephalus caecus*;  $\times 3$ .

### Pl. III

#### *Trimerocephalus polonicus* n. sp.

Fig. 1. Paratype, cephalon flattened, dorsal view (I. G. 169. II. 26);  $\times 6.4$ .

Fig. 2. *a* Holotype, cephalon, dorsal view; *b* same specimen, anterior view; *c* same specimen, lateral view (I. G. 169. II. 12);  $\times 8.7$ .

#### *Ductina ductifrons* R. & E. Richter

Fig. 3. Fragment of cephalon, dorsal view (I. G. 169. II. 20);  $\times 9.5$ .

#### *Phacops* sp.

Fig. 4. Pygidium, dorsal view (I. G. 169. II. 19);  $\times 4.8$ .

### Pl. IV

#### *Dianops typhlops* (Gürich)

Fig. 1. Cephalon, dorsal view (I. G. 169. II. 14);  $\times 4.7$ .

Fig. 4. Pygidium, dorsal view (I. G. 169. II. 15);  $\times 8.7$ .

#### *Dianops? trifolius* n. sp.

Fig. 2. Holotype, cephalon, dorsal view (I. G. 169. II. 16);  $\times 8.4$ .

Fig. 3. Paratype, cephalon, dorsal view (I. G. 169. II. 17);  $\times 5.6$ .



