acta
geologica
polonica

Vol. 37, No. 3-4 Warszawa 1987

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Free-living crinoids from the Korytnica Clays (Middle Miocene; Holy Cross Mountains, Central Poland)

ABSTRACT: The assemblage of free-living crinoids of the order Comatulida A. H. CLARK, 1908, from littoral facies of the Korytnica Basin (Middle Miocene; Holy Cross Mountains, Central Poland) comprises one new species of the family Comasteridae A. H. CLARK, 1908, and at least one form of the family Himerometridae A. H. CLARK, 1908, represented by numerous, generically indeterminable brachial and cirral ossicles. The new species, *Sievertsia polonica* sp. n., is represented by centrodorsals (one with the radial ring) and isolated radial, brachial and cirral ossicles. A new genus, *Sievertsia* gen. n., is established to include two species: *Sievertsia seranensis* (SIEVERTS, 1933), being the type species, and *Sievertsia polonica* sp. n. The newly established genus is included in the subfamily Comasterinae A. H. CLARK, 1908, the Recent and fossil representatives of which are confined to the Indo-Pacific realm. This recognition indicates Indo-Pacific biogeographic affinities of the Middle Miocene (Badenian) organic communities occurring in the Korytnica Basin.

INTRODUCTION

The free-living crinoids of the order Comatulida A. H. CLARK, 1908, are relatively often represented in some strata or areas of the Tertiary deposits in Europe (*cf.* PHILIPPI 1844, FORBES 1852, MICHELOTTI 1861, SCHLÜTER 1878, FONTANNES 1879a, b, NOELLI 1900, VADÁSZ 1915, GISLÉN 1924, ALBUS 1930, SIEVERTS-DORECK 1960, WIENBERG RASMUSSEN 1972).

In Poland, from the Middle Miocene (Badenian) Leitha Limestone exposed at Pińczów, on the southern slopes of the Holy Cross Mountains (Central Poland) only one centrodorsal with the radial ring of *Discometra* sp. [1] has hitherto been reported (RADWAŃSKI 1977, p. 747 and Fig. 172/8). From the coeval deposits of the Korytnica Basin, north of Piń-

[1] This specimen, along with others possibly of the species *Discometra rhodanica* (FONTANNES, 1879) are the subject of a separate contribution (RADWAŃSKA 1988).

czów on the southern slopes of the Holy Cross Mountains, comatulid crinoids have generally been reported[2] but never illustrated (BAŁUK 1975, p. 17; BAŁUK & RADWAŃSKI 1977, p. 99; RADWAŃSKA 1982, p. 93).

The material investigated herein comes from the littoral facies of the Korytnica Clays, exposed in two localities: at Mt. Lysa in the village Korytnica, and at Karsy (Text-fig. 1). The comatulid-bearing deposits of the Korytnica Basin are developed at Mt. Lysa as clayey, oyster shellbed replete with highly diverse paleontological content (*see* Text-fig. 1*B*). The fauna comprises typical marine mollusks (chitons, bivalved gastropods, cuttlefish), corals, cirripedes, brachiopods, bryozoans, other echinoderms and fish otoliths (*cf.* BAŁUK 1975, 1984; BAŁUK & RADWAŃSKI 1977, 1979, 1984; RADWAŃSKA 1982, 1984; VÁVRA 1984). At Karsy, the organic community is indicative of an area more distant from the shoreline, and hence devoid of oysters and other specialized littoral forms.

THE INVESTIGATED MATERIAL

The obtained material of the comatulid crinoids consists of one centrodorsal with the radial ring, some 30 centrodorsals, several isolated radial ossicles, and numerous isolated brachial and cirral ossicles. A large part of this sifted material comes from locality Mt. Lysa, and in majority is well preserved. The remaining material, containing mostly centrodorsals from locality Karsy (*see* Pl. 2, Figs 1—3), is poorly preserved.

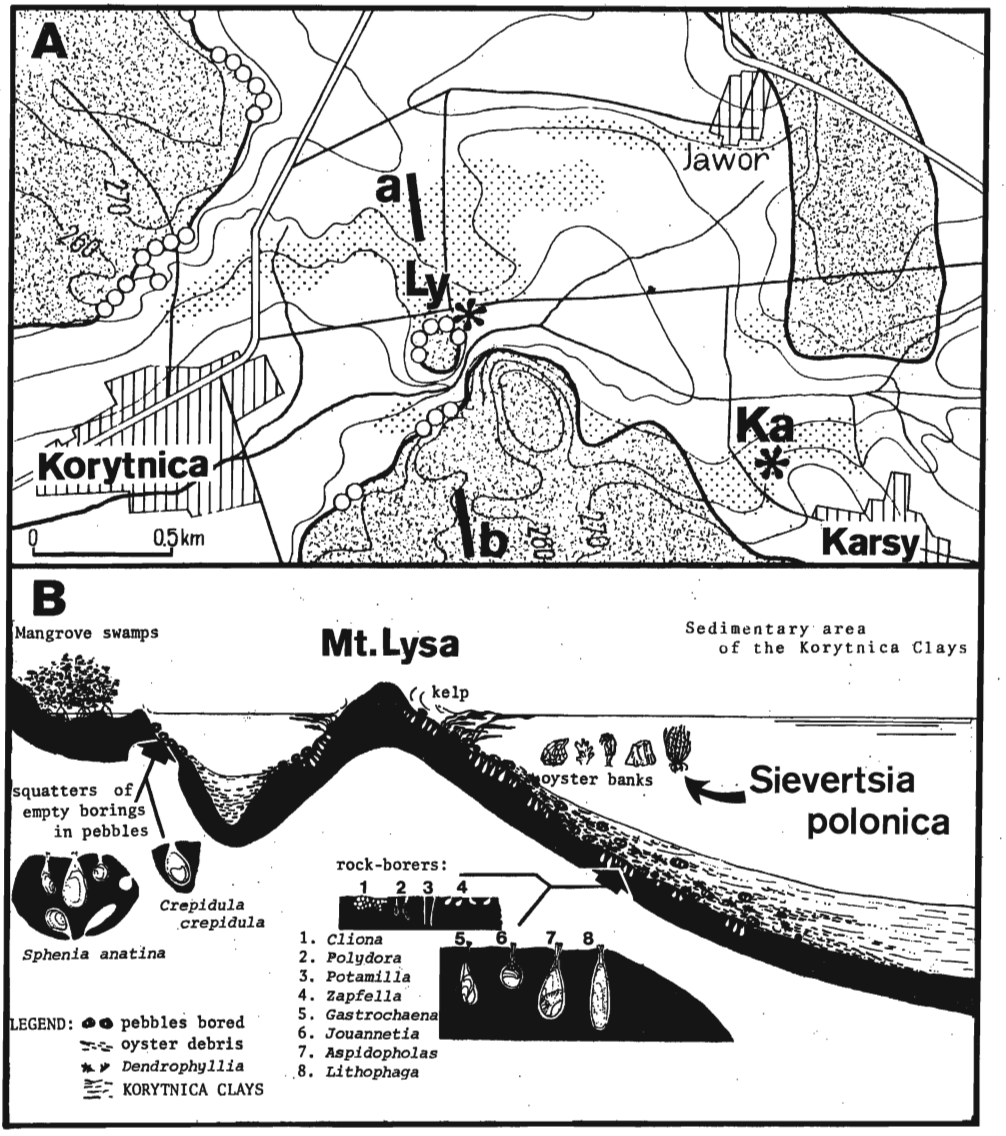
The morphological features of all the investigated specimens, which are indicative of the family Comasteridae, allow to conclude upon their separateness from the hitherto known taxa of both the specific and the generic ranks.

SYSTEMATIC ACCOUNT

Order **Comatulida** A. H. CLARK, 1908
Superfamily **Comasteracea** A. H. CLARK, 1908
Family **Comasteridae** A. H. CLARK, 1908

The family Comasteridae A. H. CLARK, 1908, includes three subfamilies: Comasterinae A. H. CLARK, 1908, Capilasterinae A. H. CLARK, 1909, and Comactininae A. H. CLARK, 1909 (*see* WIENBERG RASMUSSEN 1978). The investigated specimens display morphological features indicative of their attribution to the subfamily Comasterinae A. H. CLARK, 1908.

[2] The forms referred to by BAŁUK (1975, p. 17) and BAŁUK & RADWAŃSKI (1977, p. 99) as *Antedon* sp. are hereafter described in this paper as *Sievertsia polonica* gen. et sp. n., whereas those referred to as *Discometra* sp. are regarded as the Himerometridae, gen. et sp. indet.



A — Paleoenvironmental sketch of the southern part of the Korytnica Basin, to show localities yielding the investigated assemblage of comatulid crinoids: **Ly** — Mt. Lysa, **Ka** — Karsy; asterisked are the sampling sites; leaders (*a*-*b*) denote the line of the section presented in *B*

Within the sketch indicated are: marine area of the basin during the Middle Miocene (Badenian) transgression (*blank*), present-day outcrops of the Korytnica Clays (*stippled*), preserved fragments of littoral structures (*circled*), and land or island areas along the seashore (*hachured*); adopted *from* BAŁUK & RADWAŃSKI (1977, Text-fig. 2)

B — Idealized section of the shorezone at Mt. Lysa, to show the environmental conditions under which the investigated comatulid crinoids have lived: the rocky bottom (Upper Jurassic limestones), damaged by gregarious rock-borers, is covered by clayey, oyster shellbed containing littoral rubble, and overgrown by seagrass meadows, and by kelp at the water surface; adopted *from* BAŁUK & RADWAŃSKI (1977, Text-fig. 5)

Within the oyster bank community indicated are: *Ostrea frondosa* de SERRES, associated with corals *Dendrophyllia*, stalked cirripedes *Scalpellum*, acorn barnacles *Balanus*, and the investigated comatulids *Sievertsia polonica* gen. et sp. n.

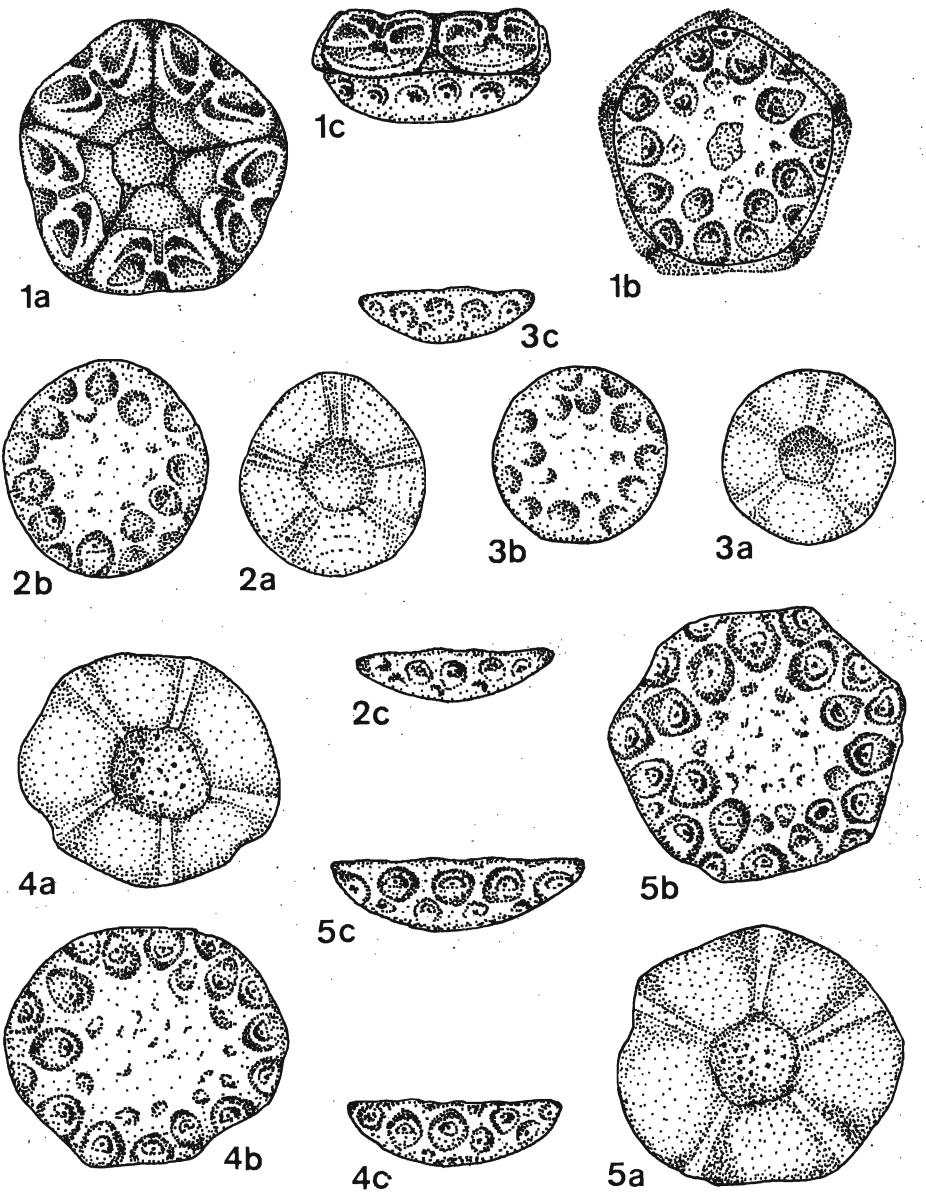
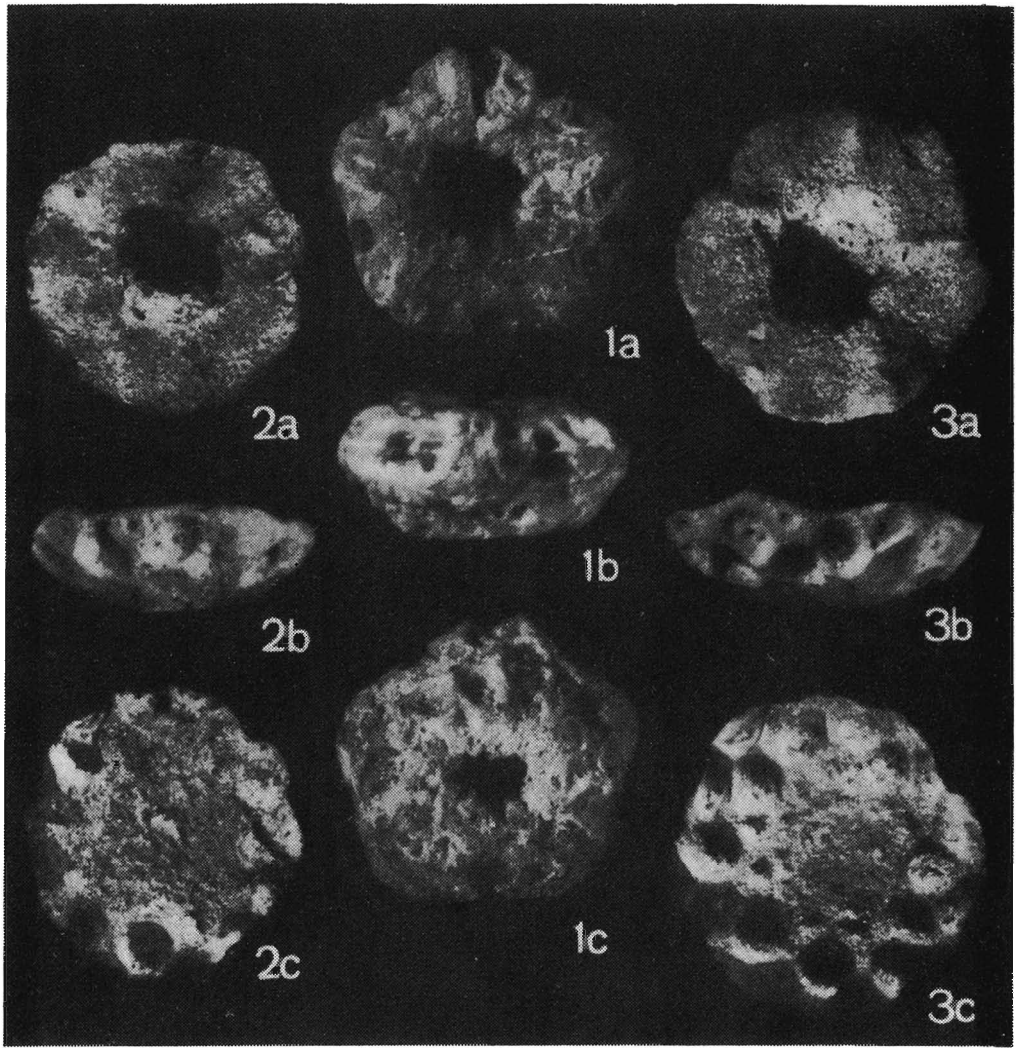


Fig. 2. *Sievertsia polonica* gen. et sp. n.; magn. × 20

1 — Holotype, centrodorsal with radial ring (*1a* ventral view, *1b* dorsal view, *1c* lateral view); **2—5 — paratypes**, centrodorsals (*a* ventral views, *b* dorsal views, *c* lateral views)

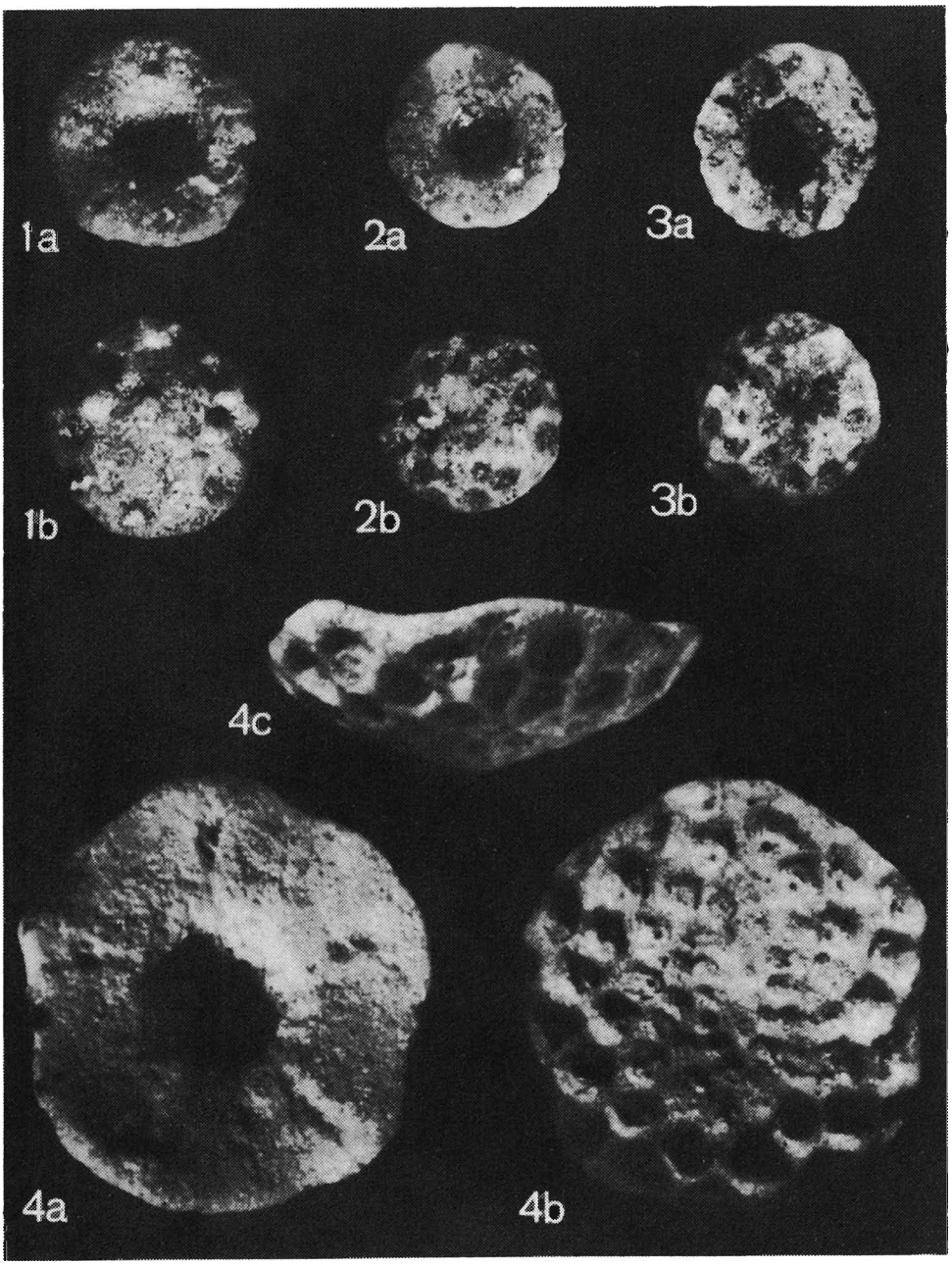


Sievertsia polonica gen. et sp. n.

1 — Holotype, centrodorsal with radial ring (1*a* ventral, 1*b* lateral, 1*c* dorsal view); outlined as item 1 in Text-fig. 2

2-3 — Paratypes, centrodorsals (*a* ventral, *b* lateral, *c* dorsal views); outlined as items 4-5 in Text-fig. 2

All figures ×20; taken by L. ŁUSZCZEWSKA, M. Sc.



Sievertsia polonica gen. et sp. n.

1-3 — Juvenile centrodorsals (*a* ventral, *b* dorsal views); Figs 1 and 2 are outlined as items 2 and 3 in Text-fig. 2

4 — Large centrodorsal (*4a* ventral, *4b* dorsal, *4c* lateral view)

All figures ×20; taken by L. ŁUSZCZEWSKA, M. Sc.

Subfamily **Comasterinae** A. H. CLARK, 1908

The investigated specimens bear taxonomically significant features so different from those of the hitherto known taxa in the subfamily Comasterinae A. H. CLARK, 1908, that they are regarded as representing a new genus, *Sievertsia* gen. n.

Genus *Sievertsia* gen. n.

Type species: *Palaeocomaster seranensis* SIEVERTS, 1933

DERIVATION OF THE NAME: In honor of Dr. Hertha SIEVERTS-DORECK, an outstanding student of fossil crinoids, who first contributed (SIEVERTS 1933) on the comatulids assigned herein to the newly established genus.

DIAGNOSIS: Centrodorsal low, subpentagonal, with a large cirrus-free dorsal area. Dorsal side slightly convex or flat, with cirrus sockets in two or three irregular circles. Cirrus sockets moderately large, deep, with a slightly elevated margin around the nerve lumen. Cirri may be provided with a spine in the distal part of cirrals. Ventral side of the centrodorsal with a rather deep, moderately large Cd-cavity, less than 0.3 of the centrodorsal diameter. Basals present, exposed in interradial points. Radials trapezoidal with a low free surface. Radial ring slightly higher than, or equel to the centrodorsal, slightly overhanging. Articular face of the radials moderately high, with dorsal ligament fossae vertical, and interarticular and muscular fossae moderately sloping. Interarticular ligament fossae subtriangular, slightly higher than the dorsal ligament fossa, rather deep. Ventral muscular fossae deep, forming narrow triangular bands along the horizontal or oblique ventral edge of radials. Interarticular and muscular fossae separated by a narrow mid-radial furrow, which may continue into a moderately deep notch. Radial cavity large, at first shallow, then passing into a round, steep central depression. Arms divided at the *2nd* primibrachials, and possibly also onwards.

REMARKS: The subfamily Comasterinae A. H. CLARK, 1908, has hitherto been represented by four genera[3]: *Comaster* AGASSIZ, 1836, *Comantheria* A. H. CLARK, 1909, *Comanthina* A. H. CLARK, 1909, and *Comanthus* A. H. CLARK, 1908 (*see* WIENBERG RASMUSSEN 1978, pp. *T*882—*T*885); of these genera, *Comaster* AGASSIZ, 1836, alone comprises species known as fossils from the Upper Tertiary (Miocene and Pliocene).

The newly established genus *Sievertsia* gen. n. resembles most closely the extant genus *Comaster* AGASSIZ, 1836, from which it differs primarily in development of its radial ossicles. In representatives of the genus *Sievertsia* gen. n. the radial ossicles are more trapezoidal in outline; moreover, their articular faces are generally gently sloping, the interarticular ligament fossae are triangular and a little wider than high, the mid-radial furrow is narrower and continues into a more or less deep notch in the ventral edge of radials; the interarticular ligament fossae and ventral muscular fossae are rather deep.

The newly established genus *Sievertsia* gen. n. includes two species: *Sievertsia seranensis* (SIEVERTS, 1933) and *S. polonica* sp. n., the former being designated herein as the type. The species *Sievertsia seranensis* (SIEVERTS, 1933) has hitherto been included in the genus *Comaster* AGASSIZ, 1836, but it evidently differs

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[3] The genus *Palaeocomaster* GISLÉN, 1924, to which the type species of the herein established genus *Sievertsia* gen. n. had originally been ascribed by SIEVERTS (1933), was excluded from this subfamily (family and superfamily as well) by WIENBERG RASMUSSEN (1978), who interpreted it as containing solely Jurassic forms, and placed it within the superfamily Solanocrinitacea JAEKEL, 1918 (*see* WIENBERG RASMUSSEN 1978, p. *T*877).

from the remaining species of this genus (*see* WIENBERG RASMUSSEN 1978, p. T883).

Sievertsia polonica sp. n.
(Text-figs 2—6 and Plates 1—4)

HOLOTYPE: Centrodorsal joined with radial ossicles, presented in Text-fig. 2 (*item* 1) and Pl. 1, Fig. 1a—1c.

PARATYPES: Centrodorsals presented in Text-fig. 2 (*items* 2—5) and Pl. 1, Figs 2—3 and Pl. 2, Figs 1—4.

TYPE LOCALITY: Mt. Lysa at Korytnica, 24 km SSW of Kielce, southern slopes of the Holy Cross Mountains, Central Poland.

TYPE HORIZON: Middle Miocene (Badenian).

DERIVATION OF THE NAME: Latin *polonicus* — after the country of the finding.

MATERIAL: 1 centrodorsal with radial ossicles (the holotype), 28 centrodorsals, 10 isolated radial ossicles, and numerous isolated brachial and cirral ossicles from locality Mt. Lysa; 5 centrodorsals and isolated brachial and cirral ossicles from Karsy.

DIMENSIONS (*in* mm):

Specimens	Figured in	Dimensions (in mm)				
		ØCd	ØCdC	HCd	HRR	ØRC
Holotype	Pl.1, Fig.1 and Text-fig.2: 1	1.8	-	0.5	0.6	1.0
Paratypes	Pl.1, Fig.2 and Text-fig.2: 4	1.8	0.6	0.4	-	-
	Pl.1, Fig.3 and Text-fig.2: 5	2.0	0.7	0.4	-	-
Others	Pl.2, Fig.1 and Text-fig.2: 2	1.5	0.5	0.3	-	-
	Pl.2, Fig.2 and Text-fig.2: 3	1.2	0.4	0.3	-	-
	Pl.2, Fig.3	1.2	0.5	0.3	-	-
	Pl.2, Fig.4	3.0	1.0	1.0	-	-

Abbreviations: Cd - centrodorsal, CdC - centrodorsal cavity, RR - radial ring, RC - radial cavity; Ø - diameter, H - height

DIAGNOSIS: Centrodorsal low, subpentagonal with a large cirrus-free dorsal area. Dorsal side slightly convex, with cirrus sockets in two or three irregular circles, approximately 22 in the holotype, and 32 in the largest specimen. Cirrus sockets moderately large, with a slightly elevated margin around the nerve lumen. Ventral side of the centrodorsal with a deep cavity about 0.3 of the centrodorsal diameter. Basals exposed in interradial points. Radial ring slightly higher than the centrodorsal, slightly overhanging. Radials trapezoidal, with a very low free dorsal surface. Articular face of the radials moderately high, with a dorsal ligament fossa vertical and a moderately sloping proximal surface sculptured by interarticular and muscular fossae. Interarticular ligament fossae triangular, separated by a shallow and narrow mid-radial furrow. Ventral muscular fossae smaller and lower than the interarticular fossae, forming narrow triangular bands along the oblique ventral edge of radials. Radial cavity large.

DESCRIPTION: Centrodorsals are low, subpentagonal, more or less convex, with a large dorsal cirrus-free area. Cirrus sockets are moderately large and closely spaced in two or three irregular circles (*see* 1b, 2b, 3b, 4b, 5b *in* Text-fig. 2 and Pl. 1, Figs 1c, 2c, 3c and Pl. 2, Figs 1b, 2b, 3b, 4b). Their number approximates 32 in the largest specimen (*see* Pl. 2, fig. 4b), 22 in average-sized specimens, and it attains only 17 in the smaller centrodorsals. Centrodorsal cavity is rather deep, the ratio of Cd-diameter to Cd-cavity diameter being invariably 1:3 (*see* table of dimensions). The only specimen with preserved radial ring has its basals

exposed in interradial points (*see* 1c *in* Text-fig. 2 and Pl. 1, Fig. 1b). Radial ring is slightly higher than the centrodorsal and slightly overhanging. Articular faces of the radials (*see* 1—2 *in* Text-fig. 3 and Pl. 3, Figs 1a, 2, 3, 4) are moderately high, with a dorsal ligament fossa vertical and with a moderately sloping proximal surface sculptured by interarticular and ventral muscular fossae. All these fossae are rather deep. Interarticular ligament fossae are subtriangular, slightly higher than the dorsal ligament fossa and separated by a shallow and narrow mid-radial furrrow. Ventral muscular fossae are low, triangular, forming narrow bands along the oblique ventral edge of radials and slightly curved downwards along the narrow mid-radial furrow. Ventral surface of the radials is at first gently sloping and then vertical. Radial cavity is large, at first very shallow and then passing into the steep central depression (*see* 1a *in* Text-fig. 1 and Pl. 1, Fig. 1a).

Reconstruction of arm ramification

The collected material contains also numerous isolated brachial and cirral ossicles which are herein tentatively all attributed to the investigated species, although not included into its diagnosis. The analysis of articular faces of the brachial ossicles allows for a reconstruction of the arm ramification as in the following formula (*see also* Text-figs 5—6):

$$\mathrm{I}\ 1\text{—}2 \begin{cases} \mathrm{II}\ 1\text{—}2\ 3+4 \begin{cases} \mathrm{Br}\ 1+2\ 3456+7\ldots \\ \mathrm{Br}\ 1+2\ 3456+7\ldots \end{cases} \\ \mathrm{II}\ 1\text{—}2\ 3+4 \begin{cases} \mathrm{Br}\ 1+2\ 3456+7\ldots \\ \mathrm{Br}\ 1+2\ 3456+7\ldots \end{cases} \end{cases}$$

Abbreviations used: + syzygy, — synarthry, 34... muscular articulation.

The IBr series is composed of two ossicles per ray, united by a synarthry. The 1*st* primibrachial (IBr_1) has, on its proximal side, a perfectly straight muscular articulation and, on its distal side, a synarthry, subrhomboidal in outline (*see* 3—4 *in* Text-fig. 3; Text-fig. 5 *and* Pl. 3, Fig. 5). The 2*nd* primibrachial (IBr_2), being the axillary, has a subrhomboidal synarthry on its proximal side and an oblique muscular articulation on the distal side (*see* 11—12 *in* Text-fig. 3; Text-fig. 5 *and* Pl. 3, Fig. 11).

The IIBr series is composed of four ossicles united according to the formula: **II 1—2 3+4**. The primipostaxillary ($IIBr_1$) is the hyparthral (*see* 5—6 *in* Text-fig. 3; Text-fig. 5 *and* Pl. 3, Figs 6—7) with an almost straight muscular articulation; it has one of the interarticular ligament fossae, *viz.* the one situated on the inner side of the arm, developed in the form of two pits. The epiarthral ($IIBr_2$) displays an oblique muscular articulation distally and a large pinnula socket (*see* 7—8 *in* Text-fig. 3; Text-fig. 5 *and* Pl. 3, Figs 8—9). Higher in the arm there appears a syzygial pair ($IIBr_3$ and $IIBr_4$). The hypozygal (*see* 9 *in* Text-fig. 3, *and* Text-fig. 5) has an almost straight muscular articulation proximally and cryptosyzygy dorsally. The epizygal (*see* 10 *in* Text-fig. 3; Text-fig. 5 *and* Pl. 3, Fig. 10), being the axillary, has a cryptosyzygy on its proximal side, and an oblique muscular articulation dorsally. This ossicle gives the second arm-division. The cryptosyzygies (*see* 9—10 *in* Text-fig. 3) in this syzygial pair are featured by tubercles forming one regular circle around the nerve lumen and an irregular pattern outwards.

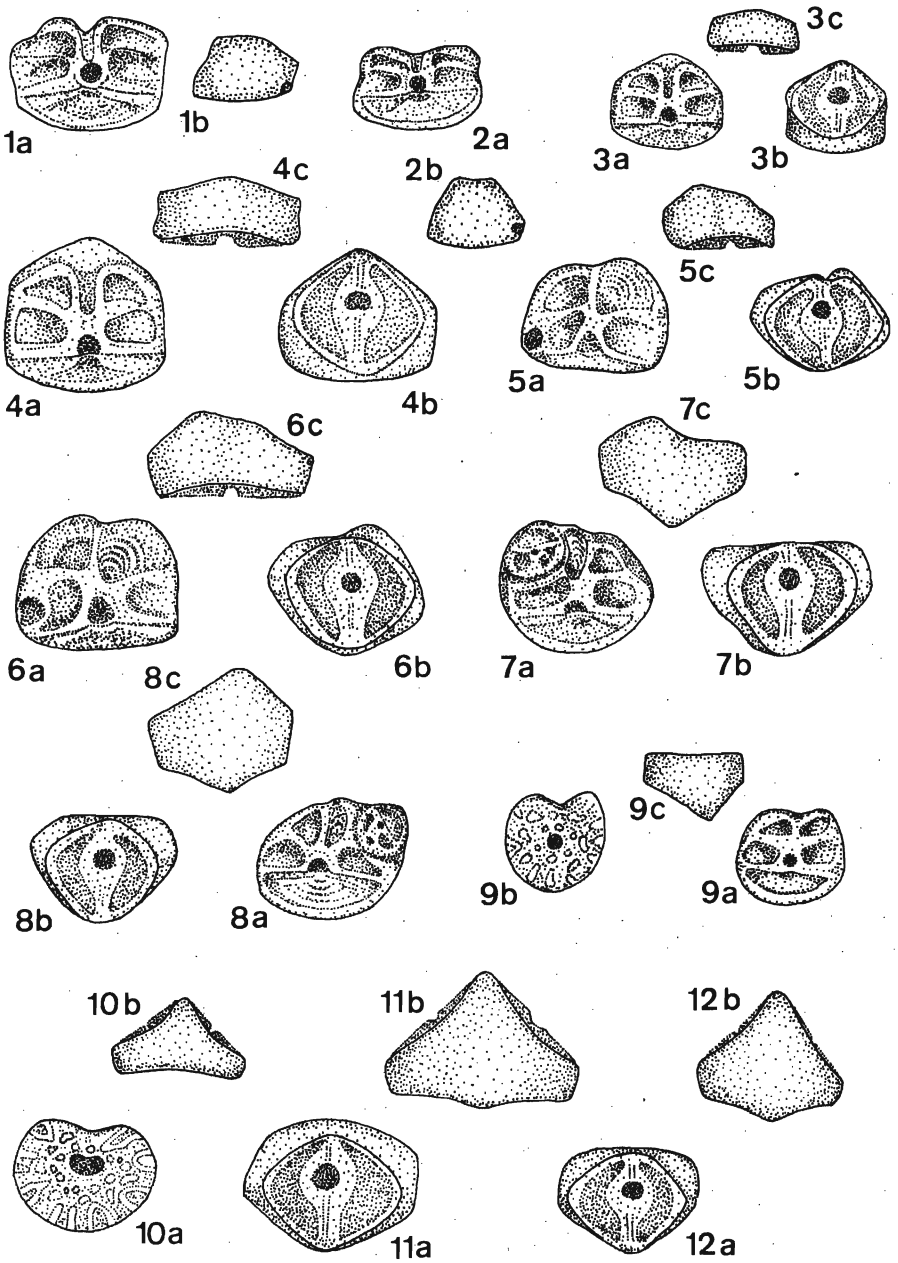
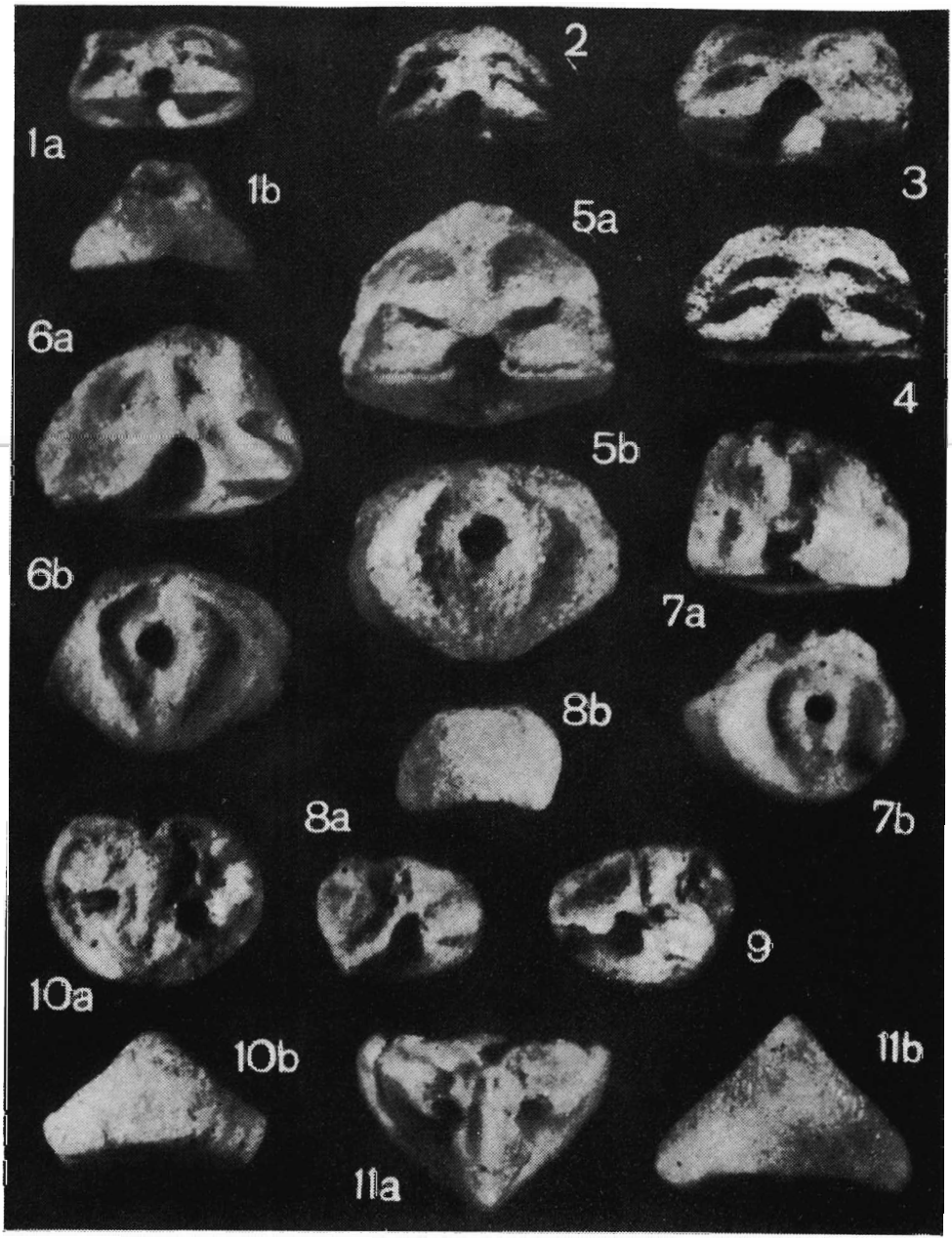


Fig. 3. *Sievertsia polonica* gen. et sp. n.; magn. × 15

1-2 — Radials (*a* distal facets; *b* lateral views); **3-4** — 1*st* primibrachials = IBr_1 (*a* proximal facets; *b* distal facets; *c* dorsal views); **5-6** — hyparthrals (*a* proximal facets; *b* distal facets; *c* dorsal views); **7** — epiarthral with left pinnula socket (*7a* distal facet, *7b* proximal facet, *7c* dorsal view); **8** — epiarthral with right pinnula socket (*8a* distal facet, *8b* proximal facet, *8c* dorsal view); **9** — hypozygal with cryptosyzygy (*9a* proximal facet, *9b* distal facet, *9c* dorsal view); **10** — secundiaxillary (*10a* proximal facet, *10b* dorsal view); **11-12** — primiaxillaries (*a* proximal facets; *b* dorsal views)

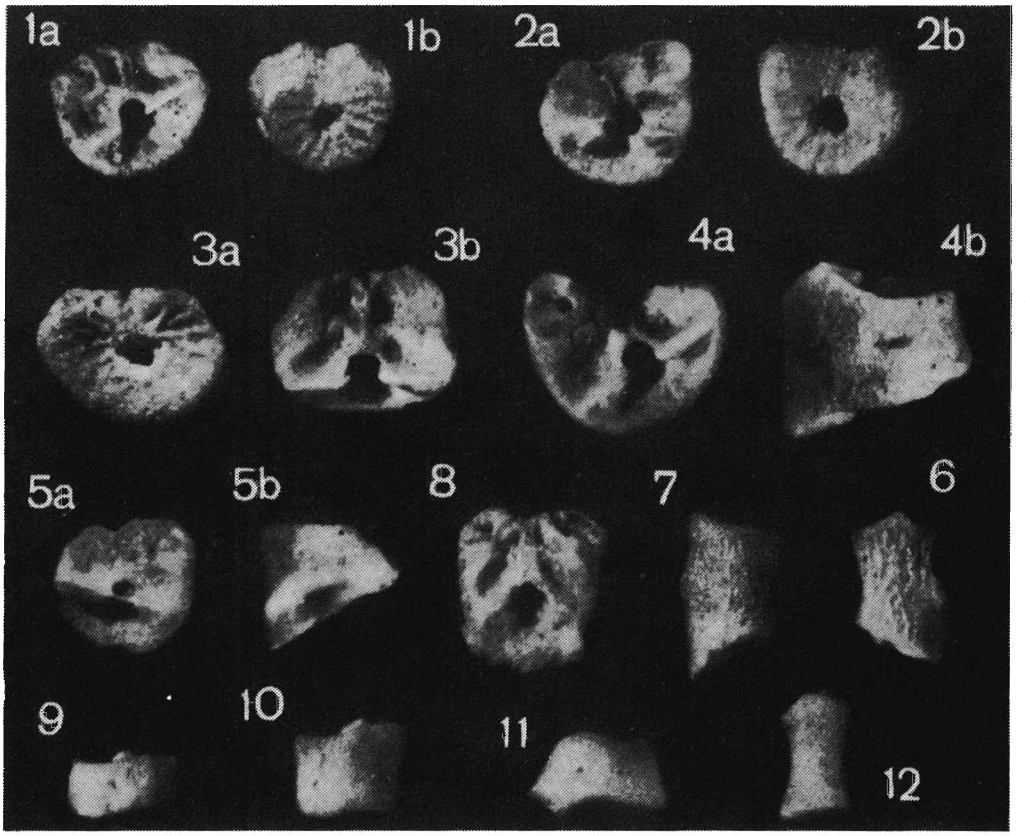


Sievertsia polonica gen. et sp. n.

1-4 — Radials (1*a*, *2*, *3*, *4* distal facets; 1*b* proximal facet); **5** — 1*st* primibrachial (*5a* proximal, *5b* distal facet); **6-7** — hyparthrals (*a* proximal, *b* distal facets); **8-9** — epiarthrals (*8a*, *9* distal facets, *8b* lateral view); **10** — secundiaxillary (*10a* distal facet, *10b* dorsal view); **11** — primiaxillary (*11a* distal facet, *11b* dorsal view)

Figs 1 and 2 are outlined in Text-fig. 3 as items 1 and 2; Fig. 5 as item 4; and Figs 10 and 11 as items 10 and 11

All figures ×20; taken by L. ŁUSZCZEWSKA, M. Sc.



Sievertsia polonica gen. et sp. n.

1-2 — Epizygals (*a* distal, *b* proximal facets); **3** — hypozygal (*3a* distal, *3b* proximal facet); **4-5** — brachials from the proximal part of the arm (*a* distal facets, *b* dorsal views); **6-7** — brachials from the distal part of the arm, dorsal views; **8** — brachial with two pinnula sockets, distal facet; **9-12** — cirrals, lateral views

Fig. 9 is outlined in Text-fig. 4 as item 15, whereas Figs 10-11 as items 17 and 21

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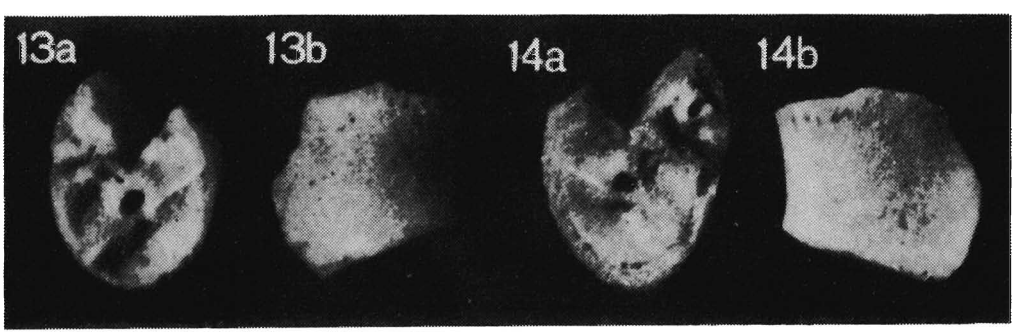

Himerometridae, gen. et sp. indet.

13-14 — Brachials from the distal part of the arm (*a* distal facets, *b* dorsal views)

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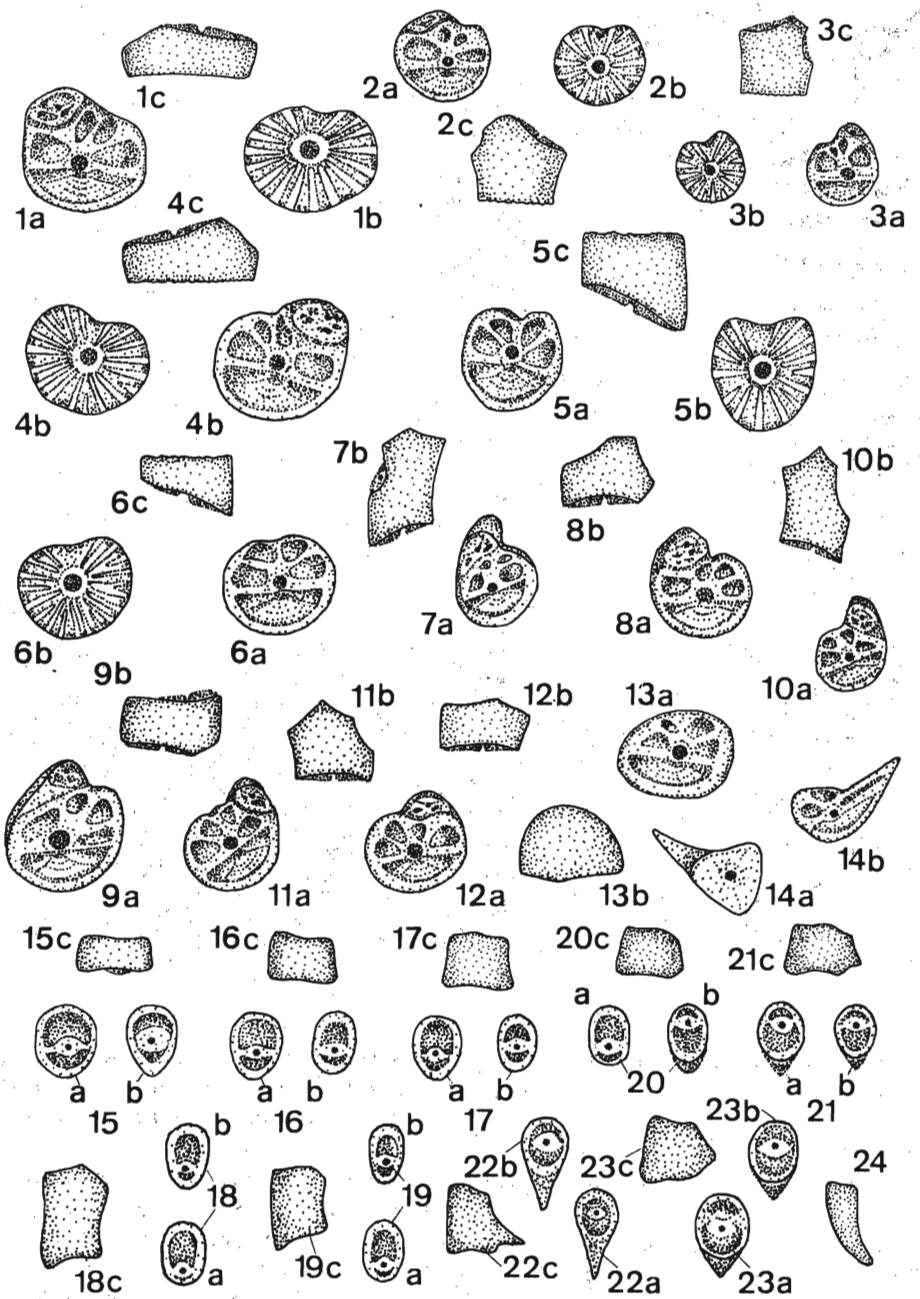


Fig. 4. *Sievertsia polonica* gen. et sp. n.; magn. × 15

1-2 — Epizygals with left pinnula socket (*a* distal facets; *b* proximal facets; *c* dorsal views); **3-4** — epizygals with right pinnula socket (*a* distal facets; *b* proximal facets; *c* dorsal views); **5-6** — hypozygals (*a* proximal facets; *b* distal facets; *c* dorsal views); **7-9** — brachials with left pinnula sockets (*a* distal facets; *b* dorsal views); **10-12** — brachials with right pinnula sockets (*a* distal facets, *b* dorsal views); **13** — last distal brachial (*13a* proximal facet, *13b* dorsal view); **14** — pinnular (*14a*, *14b* articular facets); **15-19** — cirrals (*a* proximal facets, *b* distal facets, *c* dorsal views); **20-21** — cirrals with tubercle (*a* proximal facets; *b* distal facets; *c* lateral views); **22-23** — cirrals with spine (*a* proximal facets; *b* distal facets; *c* lateral views); **24** — claw, lateral view

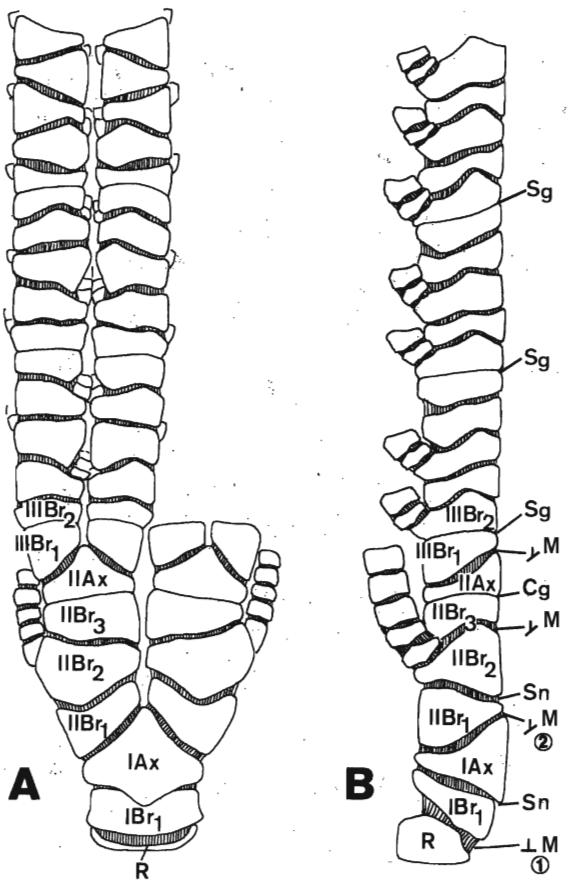


Fig. 5. Reconstruction of proximal arm-part in *Sievertsia polonica* gen. et sp. n. **A** — dorsal view, **B** — lateral view; magn. ca × 10

OSSICLES: **R** — radial, **IBr$_1$** — 1*st* primibrachial, **IAx** — primiaxillary (= 2*nd* primibrachial), **IIBr$_1$** — 1*st* secundibrachial, **IIBr$_2$** — 2*nd* secundibrachial, **IIBr$_3$** — 3*rd* secundibrachial, **IIAx** — secundiaxillary (= 4*th* secundibrachial), **IIIBr$_1$** — 1*st* tertibrachial

ARTICULATIONS: **M** — muscular articulations (1 — straight, 2 — oblique), **Sn** — synarthry, **Sg** — syzygy, **Cg** — cryptosyzygy

The analysis of the axillary and primipostaxillary ossicles indicates the presence of only two arm-divisions. Beyond the second axillary, further succession of the brachial ossicles remains unrecognizable. It may only be suggested to agree with the formula: **Br 1+2 3456+7...**

The second primipostaxillary (IIIBr$_1$) is a hypozygal (*see* 5—6 *in* Text-fig. 4; Text-fig. 5 *and* Pl. 4, Fig. 3) with an oblique muscular articulation proximally and a syzygy distally. The epizygal (IIIBr$_2$) has an oblique muscular articulation dorsally and a pinnula socket emplaced either on the left or on the right side (*see* 1—4 *in* Text-fig. 4; Text-fig. 5 *and* Pl. 4, Figs 1—2). The syzygies (*see* 1b, 2b, 3b, 4b *in* Text-fig. 4 *and* Pl. 4, Figs 1b, 2b) in these syzygial pairs have 15—18 well developed septa, a part of which (6—8) are complete.

The position of the next syzygial pair is unclear. Taking into account the number of hypozygal and epizygal ossicles, it is assumed that they may have often appeared in the arms, similarly as stated in the present-day representatives of the subfamily Comasterinae A. H. CLARK, 1908 (*see* GISLÉN 1924, p. 84). The brachial ossicles with oblique muscular articulation on the both sides, and with a pinnula socket either on the left or on the right side (*see* 7—12 *in* Text-fig. 4;

Text-fig. 5 *and* Pl. 4, Figs 4—7), are thus interpreted as situated between the syzygial pairs. Double-pinnulation was recognized in one specimen only; the brachial ossicle displays there a syzygy on the proximal side and a straight muscular articulation on the distal side (*see* Pl. 4, Fig. 8). The arm was terminated by a distal ossicle which had only one muscular articulation proximally (*see* 13a—13b *in* Text-fig. 4).

In the investigated material, pinnula ossicles are represented by one specimen (*see* 14a—14b *in* Text-fig. 4) with a smooth surface on one side and a muscular articulation on the other side.

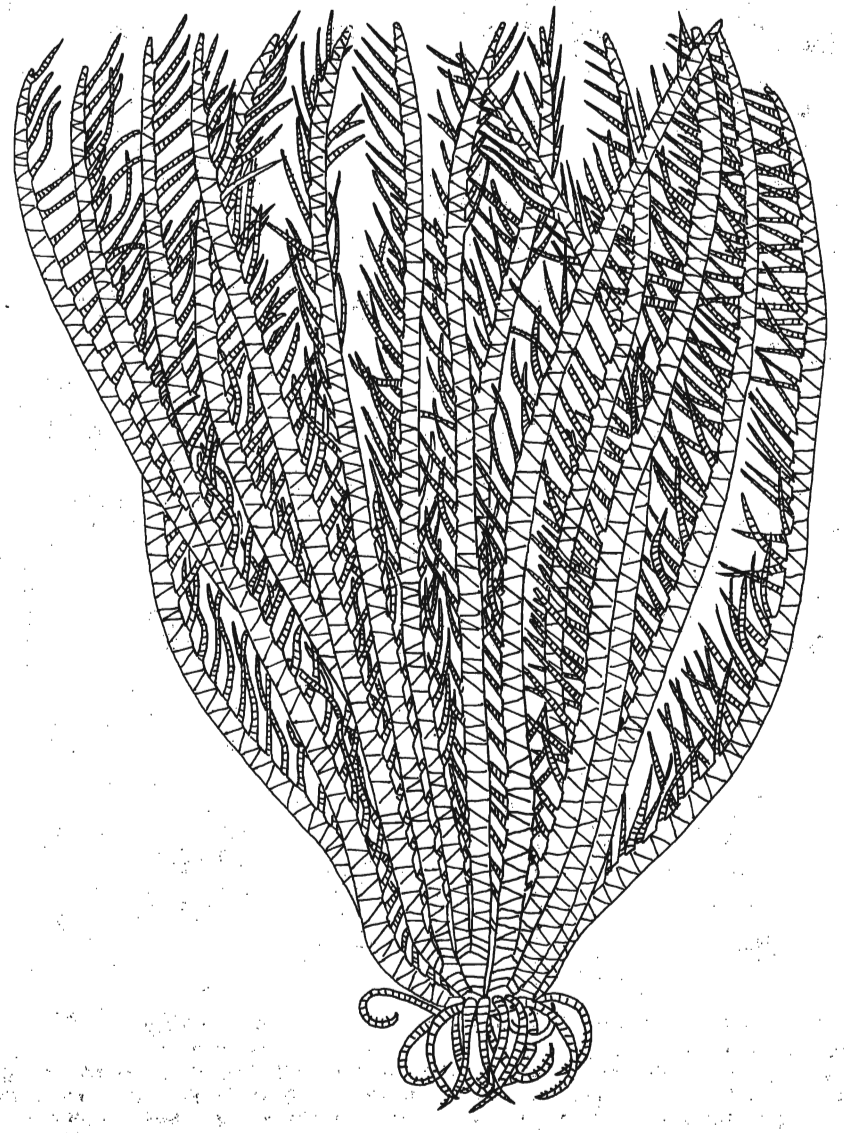


Fig. 6. Reconstruction of a complete specimen of *Sievertsia polonica* gen. et sp. n.; magn. *ca* × 4 of actual size

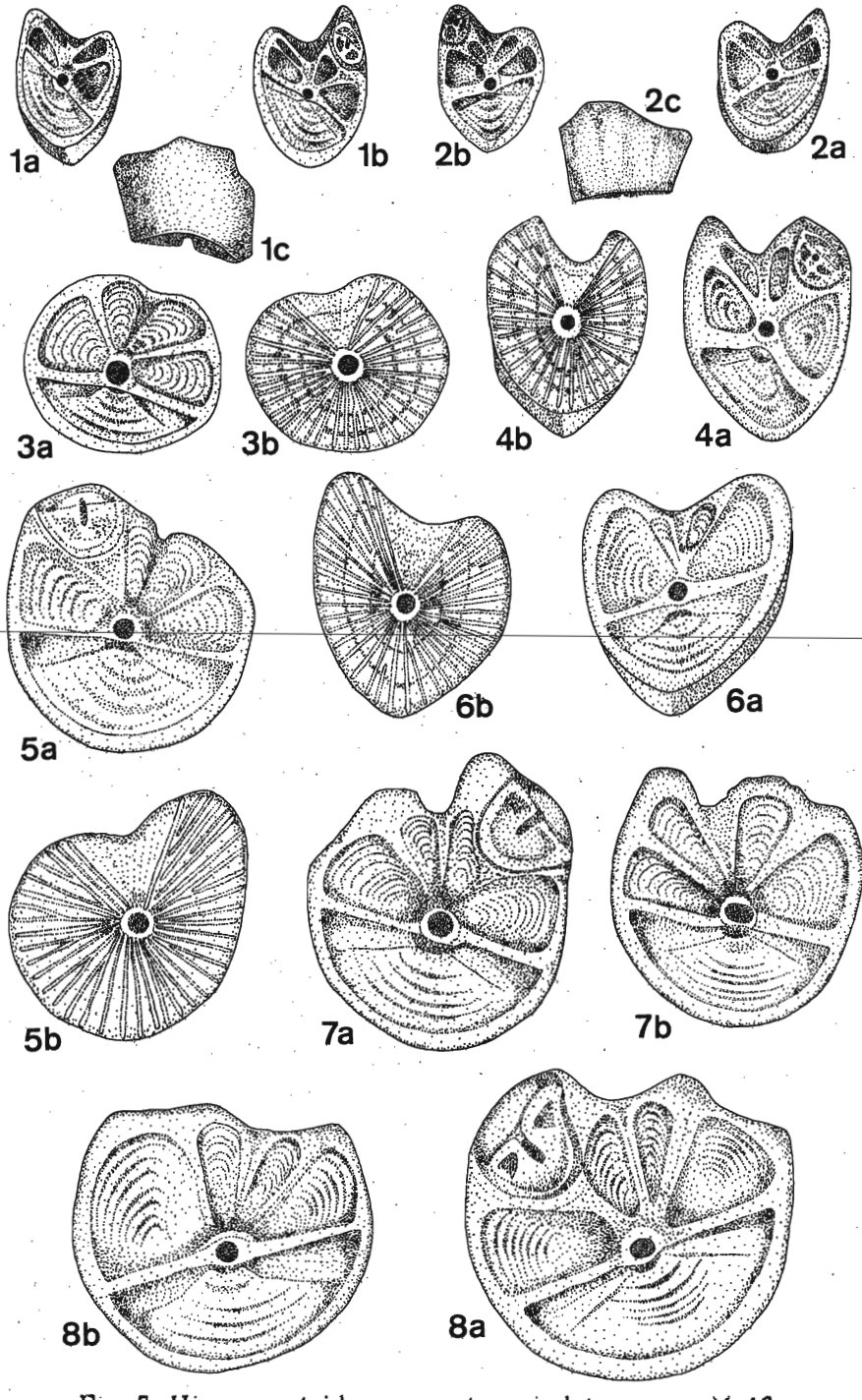
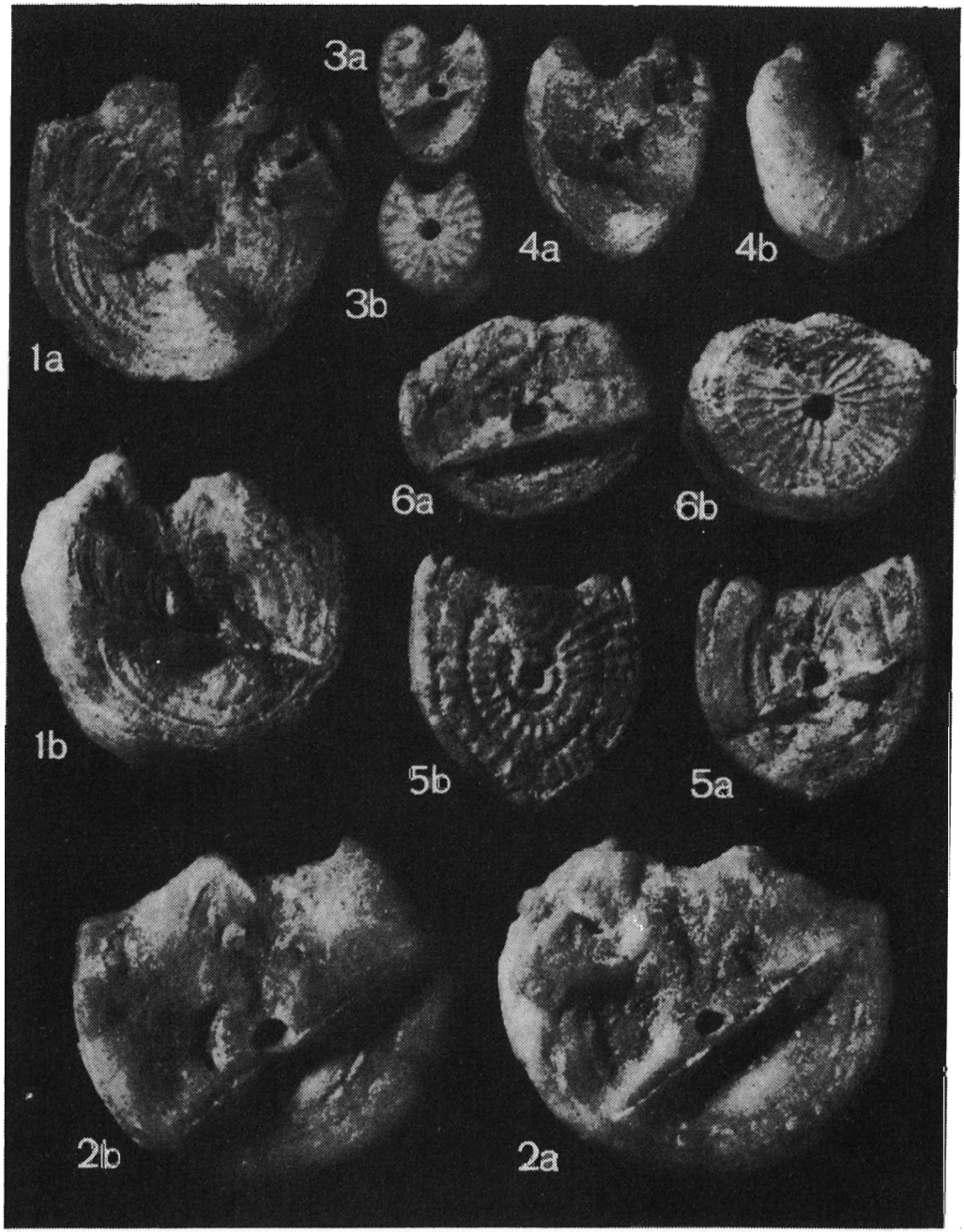


Fig. 7. Himerometridae, gen. et sp. indet.; magn. × 10

1-2 — Brachials with oblique muscular articulation on both sides (*1a*, *2a* proximal facets; *1b* distal facet with right pinnula socket; *2b* distal facet with left pinnula socket; *1c*, *2c* lateral views); 3 and 6 — hypozygals (*3a*, *6a* proximal facets; *3b*, *6b* distal facets); 4-5 — epizygals (*4a*, *5a* distal facets; *4b*, *5b* proximal facets); 7-8 — brachials with oblique muscular articulation on both sides (*7a* distal facet with right pinnula socket; *8a* distal facet with left pinnula socket; *7b*, *8b* proximal facets)

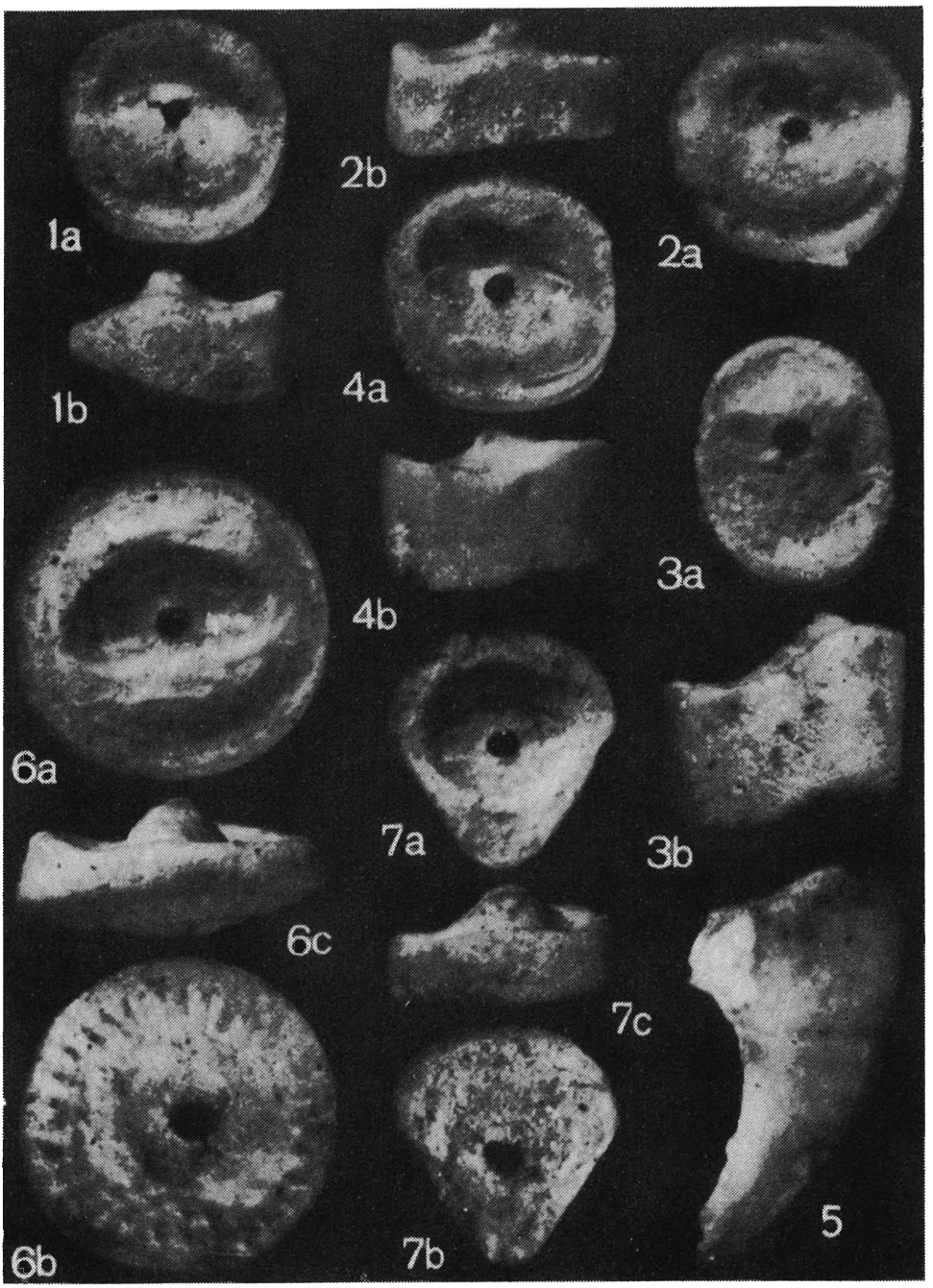


Himerometridae, gen. et sp. indet.

1-2 — Brachials from the proximal part of the arm, with muscular articulation on both sides (*a* distal, *b* proximal facets); **3-4** — epizygals (*a* distal, *b* proximal facets); **5-6** — hypozygals (*a* proximal, *b* distal facets)

Figs 1-2 are outlined in Text-fig. 7 as items 7-8; Figs 3-4 as items 2 and 4; and Figs 5-6 as items 6 and 3

All figures ×12; taken by L. ŁUSZCZEWSKA, M. Sc.



Himerometridae, gen. et sp. indet.

1-4 — Cirrals (*a* distal facets, *b* lateral views); **5** — claw with the preceding cirral (lateral view); all outlined as items 1-5 in Text-fig. 8

? Comatulida indet.

6-7 — Cirrals (*a* distal facets, *b* proximal facets, *c* lateral views); outlined as items 6-7 in Text-fig. 8

All figures ×20; taken by L. Łuszczewska, M. Sc.

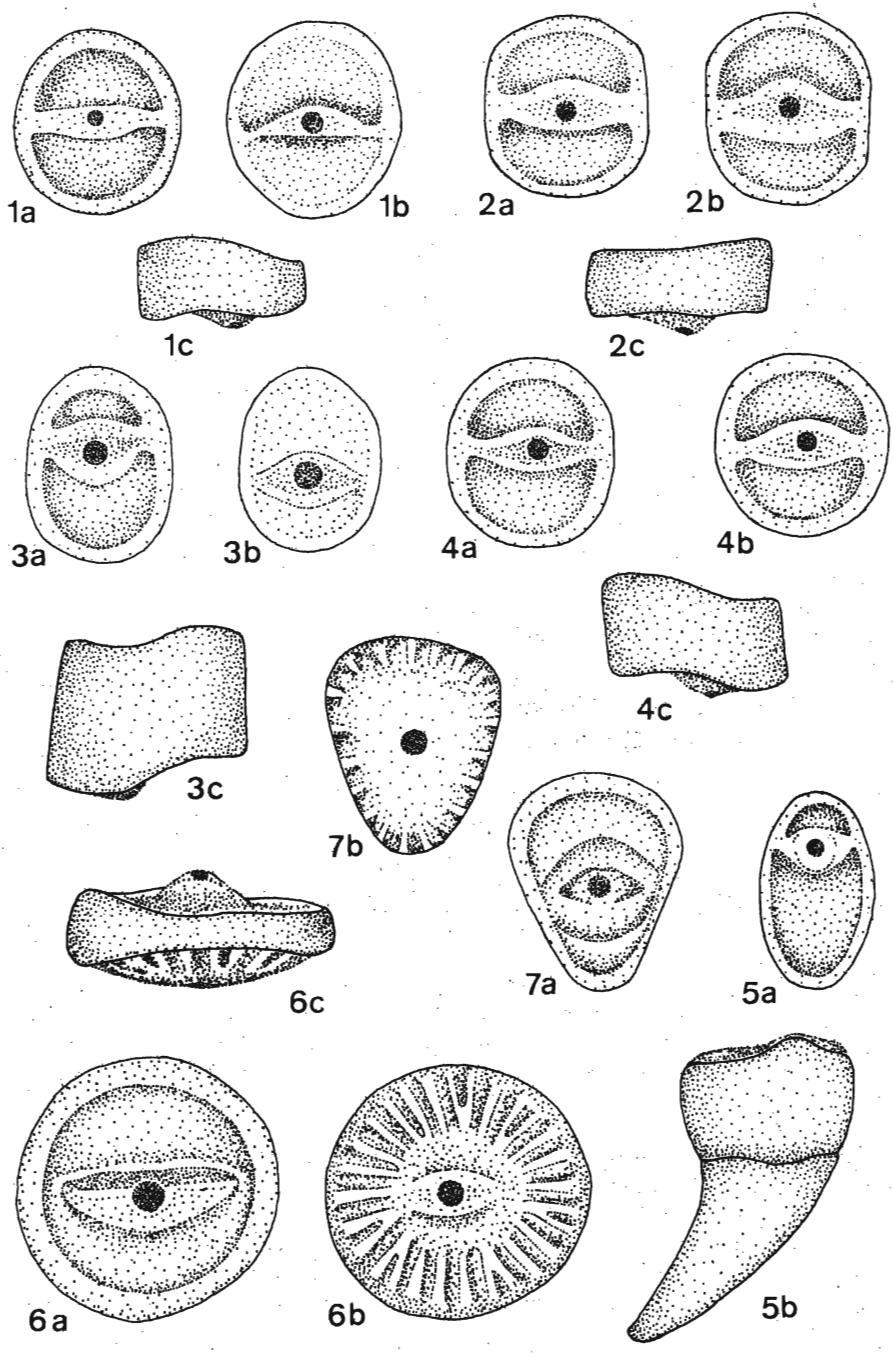


Fig. 8. Himerometridae, gen. et sp. indet.; magn. × 17

1-4 — Cirrals (*a* distal facets; *b* proximal facets; *c* lateral views); 5 — claw with preceding cirral (*5a* proximal facet, *5b* lateral view)

? Comatulida indet.; magn. × 17

6-7 — Cirrals (*6a*, *7a* distal facets; *6b*, *7b* proximal facets; *6c* lateral view)

The remaining part of the investigated material consists of cirral ossicles. Among them distinguished are: (*i*) proximal short cirrals (*see* 15—16 *in* Text-fig. 4 *and* Pl. 4, Fig. 9), oval or subtriangular in cross-section; (*ii*) medium-length cirrals (*see* 17 *in* Text-fig. 4 *and* Pl. 4, Fig. 10), oval in cross-section; (*iii*) long cirrals (*see* 18—19 *in* Text-fig. 4 *and* Pl. 4, Fig. 12), oval in cross-section, slightly compressed laterally and so constricted at the centre; (*iv*) medium-length cirrals with a tubercle or a distinct dorsal spine (*see* 20—23 *in* Text-fig. 4 *and* Pl. 4, fig. 11); and (*v*) a terminal claw (*see* 24 *in* Text-fig. 4).

The proximal short cirrals are united with the centrodorsal. The medium-length cirrals are situated between the short proximal and the long cirrals. Beyond the long cirrals, there again appear medium-length cirrals, at first with an indistinct tubercle, then with a distinct dorsal spine. The end of the cirrus is furnished with a claw.

REMARKS: The newly established species *Sievertsia polonica* sp. n. is close to the type species, *S. seranensis* (SIEVERTS, 1933), established for one centrodorsal with the radial ring and on loose centrodorsal, and known from the Pliocene deposits of the Isle of Ceram [*Seran* in German] in the Moluccas, Indonesia (SIEVERTS 1933, pp. 148—151 and Fig. 1), but it differs in the appearance of basals in interradial points, the more oblique position of the ventral edge of radials, the smooth ventral surface of radials, and the greater depth of its centrodorsal cavity. The remaining morphological features of centrodorsals and radials are very similar, almost identical, in both the species.

Superfamily **Mariametracea** A. H. CLARK, 1909
Family **Himerometridae** A. H. CLARK, 1908

Himerometridae, gen. et sp. indet.
(Text-fig. 7 and items 1—5 *in* Text-fig. 8; Pl. 4, Figs 13—14, Pl. 5, Figs 1—6 and Pl. 6, Figs 1—5)

MATERIAL: Numerous brachial (the largest are corroded) and cirral ossicles (generally well preserved); all the material comes from locality Mt. Lysa.

DESCRIPTION: The brachial ossicles are of two different types: the first is that with an oblique muscular articulation on both sides, and with a pinnula socket on the distal side (*see* 1—2 *and* 7—8 *in* Text-fig. 7, *and* Pl. 4, Figs 13—14 *and* Pl. 5, Figs 1—2); the second is that with a syzygy (with 17—30 ridges). Within this second type there are both hypozygals (*see* 3 *and* 6 *in* Text-fig. 7, *and* Pl. 5, Figs 5—6), and epizygals, the latter bearing a pinnula socket (*see* 4—5 *in* Text-fig. 7, *and* Pl. 5, Figs 3—4). The cirral ossicles are of three different types. These of the first type are rather long, and oval in their outline on the articular face (*see* 3 *in* Text-fig. 8, *and* Pl. 6, Fig. 3); these of the second type are rather short, and round to almost square in their outline (*see* 1—2 *and* 4 *in* Text-fig. 8, *and* Pl. 6, Figs 1, 2, 4); these of the third type are hook-shaped and they are thus recognized as the last ossicle in the cirrus (*see* 5 *in* Text-fig. 8, *and* Pl. 6, Fig. 5).

REMARKS: The investigated brachial and cirral ossicles, in regard with their much greater size, cannot belong to the newly established species, *Sievertsia polonica* sp. n.

These ossicles display many features (outline, size and sculpture) in common with analogous ossicles known in representatives of the family Himerometridae,

for instance, in the Eocene species *Himerometra bassleri* GISLÉN, reported by GISLÉN (1934, Text-figs 15—36), and in the Lower Miocene *Discometra* sp. presented by SIEVERTS-DORECK (1960, Pl. 3, Figs 14—20). On these similarities, the investigated ossicles are herein assigned generally to the family Himerometridae A. H. CLARK, 1908.

? Comatulida indet.
Superfamily and family unrecognizable
(Text-fig. 8, items 6—7; and Pl. 6, Figs 6—7)

MATERIAL: 4 cirral ossicles (2 of them poorly preserved) from licality Mt. Lysa.

DESCRIPTION: The investigated material also contains cirral ossicles of two other different types. The first is represented by two very flat, subtriangular ossicles, bearing on one side a synarthry with a conspicuous articular ridge, and on the other side a cryptosyzygy, with very short ridges at the margin of the ossicle (*see* 7 *in* Text-fig. 8, *and* Pl. 6, Fig. 7). The second type is represented by two very flat, round-outlined ossicles, bearing a synarthry with a conspicuous articular ridge on one side, and a syzygy with ± 30 ridges on the convex side (*see* 6 *in* Text-fig. 8, *and* Pl. 6, Fig. 6).

REMARKS: Both these types of cirral ossicles are in their morphology so distant to anyone which have hitherto been described that their taxonomic recognition is impossible. It may only be suggested that they generally represent the basal part of a cirrus.

ENVIRONMENTAL AND BIOGEOGRAPHIC REMARKS

All the Recent genera of the subfamily Comasterinae A. H. CLARK, 1908, are regarded as subtropical and tropical (*see* CLARK 1931, p. 405). The newly established genus *Sievertsia* gen. n., included into this very subfamily, contains the species *S. seranensis* (SIEVERTS, 1933) reported only from the Pliocene deposits of the Isle of Ceram in the Moluccas. Thus, both the Recent (*see* CLARK 1931, p. 405) and fossil representatives of this subfamily are confined to the Indo-Pacific realm. This general statement matches well to the hitherto recognized tropical and/or subtropical conditions prevailing during the Middle Miocene (Badenian) development and sedimentary history of the Korytnica Basin (*see* BAŁUK & RADWAŃSKI 1967, 1977, 1979; BAŁUK 1975; RADWAŃSKA & RADWAŃSKI 1984).

The Recent representatives of the family Himerometridae A. H. CLARK, 1908, also are confined to the Indo-Pacific bioprovince where they preferentially inhabit diverse littoral environments (*see* WIENBERG RASMUSSEN 1978, p. *T*888). The investigated Middle Miocene (Badenian) specimens of the Himerometridae (gen. et sp. indet.) are thus regarded to supplement the typically littoral community recognized (*see*

Text-fig. 1*B*) at the highly fossiliferous locality Mt. Lysa in the Korytnica Basin.

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WOLNOŻYJĄCE LILIOWCE Z IŁÓW KORYTNICKICH

(Streszczenie)

W zespole wolnożyjących liliowców należących do rzędu Comatulida A. H. CLARK, 1908, a pochodzących z facji litoralnej iłów w Basenie Korytnicy rozpoznano obecność (*patrz* fig. 1—6 oraz pl. 1—4) jednego gatunku nowego dla nauki, zaliczonego do nowego rodzaju w obrębie rodziny Comasteridae A. H. CLARK, 1908. Znaleziono ponadto (*patrz* fig. 7—8 oraz pl. 5—6) liczne płytki ramieniowe oraz cirralne, które zaliczono do rodziny Himerometridae A. H. CLARK, 1908, a także płytki cirralne, których przynależność taksonomiczna nie została ustalona.

Nowy gatunek, *Sievertsia polonica* sp. n., reprezentowany jest przez centrodorsalia (holotyp: centrodorsale z zachowanym okółkiem płytek radialnych) oraz izolowane płytki radialne, ramieniowe i cirralne. Nowy rodzaj, *Sievertsia* gen. n., obejmuje dwa gatunki: *Sievertsia seranensis* (SIEVERTS, 1933), będący gatunkiem typowym, oraz *Sievertsia polonica* sp. n. Ustanowiony rodzaj *Sievertsia* gen. n. zaliczony został do podrodziny Comasterinae A. H. CLARK, 1908, której zarówno dzisiejsi jak i kopalni przedstawiciele znani są tylko z obszaru indo-pacyficznego. Taki sam obszar występowania dotyczy również dzisiejszych przedstawicieli rodziny Himerometridae A. H. CLARK, 1908. Fakt ten wskazuje na powiązania mioceńskich zespołów faunistycznych Basenu Korytnicy z bioprowincją indo-pacyficzną.