acta
geologica
polonica

Vol. 34, No. 3-4 Warszawa 1984

WACŁAW BAŁUK

Additional data on chitons and cuttlefish from the Korytnica Clays (Middle Miocene; Holy Cross Mountains, Central Poland)

ABSTRACT: The new material of chitons and cuttlefish from the Korytnica Clays (Middle Miocene, Badenian; Holy Cross Mountains, Central Poland) is presented to supplement the data on some species, especially those established formerly as new ones (BAŁUK 1971, 1977). In chitons, a special attention is paid to the taxonomical problems resulting from diverse judgements in the literature (LAGHI 1977) upon the relations between some Neogene (Miocene and Pliocene) and present-day species. In cuttlefish, discussed are some morphological details of the fragmented sepions belonging to the formerly established species *Sepia sanctacrucensis* BAŁUK.

INTRODUCTION

The aim of the present paper is to supplement the previous data on the occurrence of chitons and cuttlefish in the Korytnica Clays developed within the Middle Miocene (Badenian) Korytnica Basin on the southern slopes of the Holy Cross Mountains, Central Poland. The extremely fossiliferous Korytnica Clays have formerly yielded 17 species of chitons (BAŁUK 1971), the assemblage of which was the richest one in the Miocene deposits of Europe. The cuttlefish was represented only by one endemic species (BAŁUK 1977).

The new materials, obtained due to the sifting procedure of many samples of the Korytnica Clays, some new localities including, allow to recognize better the specific features and variability of the chiton species, and to acquaint with some new skeletal remains of the cuttlefish. On the other hand, the recently published papers on the taxonomy of chitons, especially that one by LAGHI (1977), involve a revision of some former determinations (*cf.* BAŁUK & RADWAŃSKI 1979, pp. 230—231).

When presenting the former report on the chitons from the Korytnica Clays, the author (BAŁUK 1971) was of the opinion, following that of REUSS (1860) and SULC (1934), that the Miocene species are the ancestors of the present-day forms. Recently, LAGHI (1977) in his monograph of the Miocene and Pliocene chitons of North Italy, stated that a distinction between some ancient and the present-day Mediterranean species is not justifiable. Generally, this view may be acceptable. In some species however it is not so obvious, and it will subject a discussion in the systematic account hereafter. This account comprises also supplementary data, documented usually by the *SEM* micrographs, on morphology of some species and on their variability, especially in regard with the species either established formerly as new ones (BAŁUK 1971), or with those discussed by LAGHI (1977). The revised taxonomy does not influence the wealth of the chiton assemblage from the Korytnica Clays, which is still enriched in one species more, viz. *Acanthochitona sandeciana* BAŁUK, which was established for the specimens coming from the contemporaneous deposits exposed in another locality, outside the Holy Cross area (BAŁUK 1965). The total number of the chitons in the Korytnica assemblage thus attains the value of 18 species, the highest of all the hitherto reported.

NEW OCCURRENCE SITES

The two newly recognized occurrence sites of chitons and cuttlefish in the Korytnica Basin are characterized as follows.

The first one, at slopes of Mt. Lysa (point *4* in Text-fig. 1) appears within the oyster shellbed, being a littoral facies of the Korytnica Clays (*cf.* FRIEDBERG 1928, RADWAŃSKI 1969) and developed upon the bioeroded substrate (Upper Jurassic limestones; *cf.* BAŁUK & RADWAŃSKI 1977, Text-fig. 5). The chitons are here usually more common than within the samples taken from the basinal part of the Korytnica Clays.

The chiton assemblage from this locality contains frequently *Acanthochitona faluniensis, Lepidopleurus cajetanus, Craspedochiton minututus,* and less commonly such species as *Lepidopleurus sulci, L. africanus, Ischnochiton rissoi, Callochiton laevis,* and *Chiton corallinus.* Impressive is the occurrence of the small-sized species *Craspedochiton minutulus* which belongs to the genus whose some present-day representatives are known (SMITH 1960a) to live as the epibionths of sponges. It may be the case also in this very species, established (BAŁUK 1971) upon the Korytnica specimens, which occurs within the community containing such sponge-related epi- and/or endobionths as the cirripede *Acasta* and the gastropod *Tenagodes* (see BAŁUK & RADWAŃSKI 1977). The whole assemblage of chitons from the oyster shellbed is typically littoral, and well comparable to those reported from the eastern coast of the Adriatic (*see* LELOUP & VOLZ 1938).

The second locality, Korytnica-Plebania, situated north of the priest's house at church (point *9* in Text-fig. 1), concerns the area of the occurrence of the Korytnica Clays distant about 200 m to the littoral structures developed along the Middle Miocene (Badenian) shoreline. The clays contain here a specific organic community, much deviated from those recognized in other parts of the Korytnica Basin.

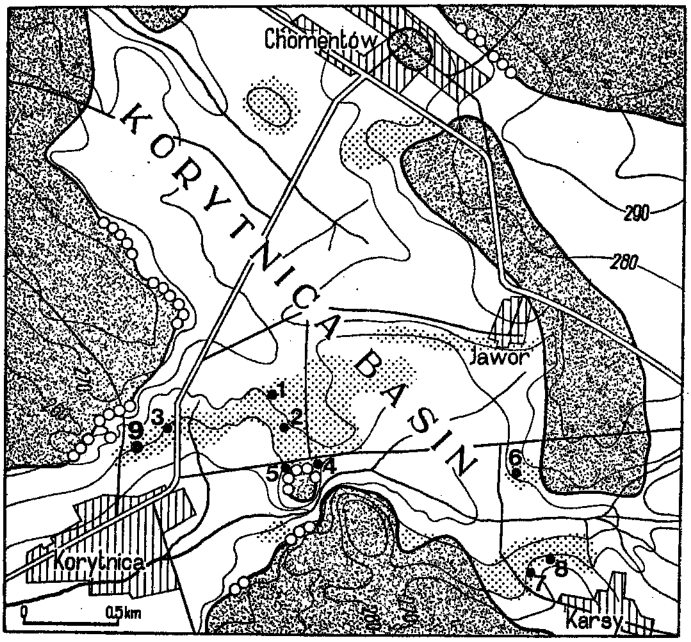


Fig. 1. Paleoenvironmental sketch of the Korytnica Basin (*cf.* BAŁUK 1971, Text-fig. 1; and 1977, Text-fig. 1)

Indicated are: marine area of the Korytnica Basin during the Middle Miocene (Badenian) transgression (*blank*) and present-day outcrops of the Korytnica Clays (*stippled*); preserved fragments of littoral structures (*circled*); land or island areas along the seashores (*hachured*)

Marked are new occurrence sites of chitons (points *4* and *9*; *comp.* BAŁUK 1971) and all of cuttlefish (points *1*—*9*; *comp.* BAŁUK 1977)

The organic community of this locality characterizes by the presence of diverse anthozoans (scleractinians and sea pens; *see* BAŁUK & PISERA 1984), bryozoans (*i.a.*, free-living genera *Cupuladria*, *Reussirella*, and *Lunulites*; *see* BAŁUK & RADWAŃSKI 1984a), cirripedes (*i.a.*, acorn barnacles, and the creusioids domiciled in corals *Tarbellastraea* and *Porites*; *see* BAŁUK & RADWAŃSKI 1984b), echinoderms (starfish ossicles and spines, fragmented crowns of sea urchins), and fish remains (*i.a.*, teleost otoliths; *see* RADWAŃSKA 1984). This community yields also some rare components, such as brachiopods (*see* RADWAŃSKA & RADWAŃSKI 1984), bivalved gastropods *Berthelinia krachi* (hitherto known from other localities of the basin; *see* BAŁUK & JAKUBOWSKI 1968), and the cuttlefish. The latter material, of the cuttlefish, is presented in a further part of this paper.

The chiton assemblage from this locality is a subordinate component of the community. Frequently occurring are *Cryptoplax weinlandi*, *Lepidopleurus cajetanus*, and *Chiton corallinus*, and associated are *Lepidopleurus sulci*, *L. africanus*, *Hanleya multigranosa*, *Lepidochitona lepida*, *Callochiton laevis*, *C. zigzag*, *Acanthochitona fascicularis*, and *A. faluniensis*. A common occurrence of the species *Cryptoplax weinlandi* has certainly been connected here with the presence of scleractinian corals on which the present-day representatives of the genus *Cryptoplax* live (*see* LADD 1966, LELOUP 1980). The whole community from the locality indicates an extremely shallow, near-to-shore environment featured by an almost flat seafloor upon which the clays were deposited.

SYSTEMATIC ACCOUNT

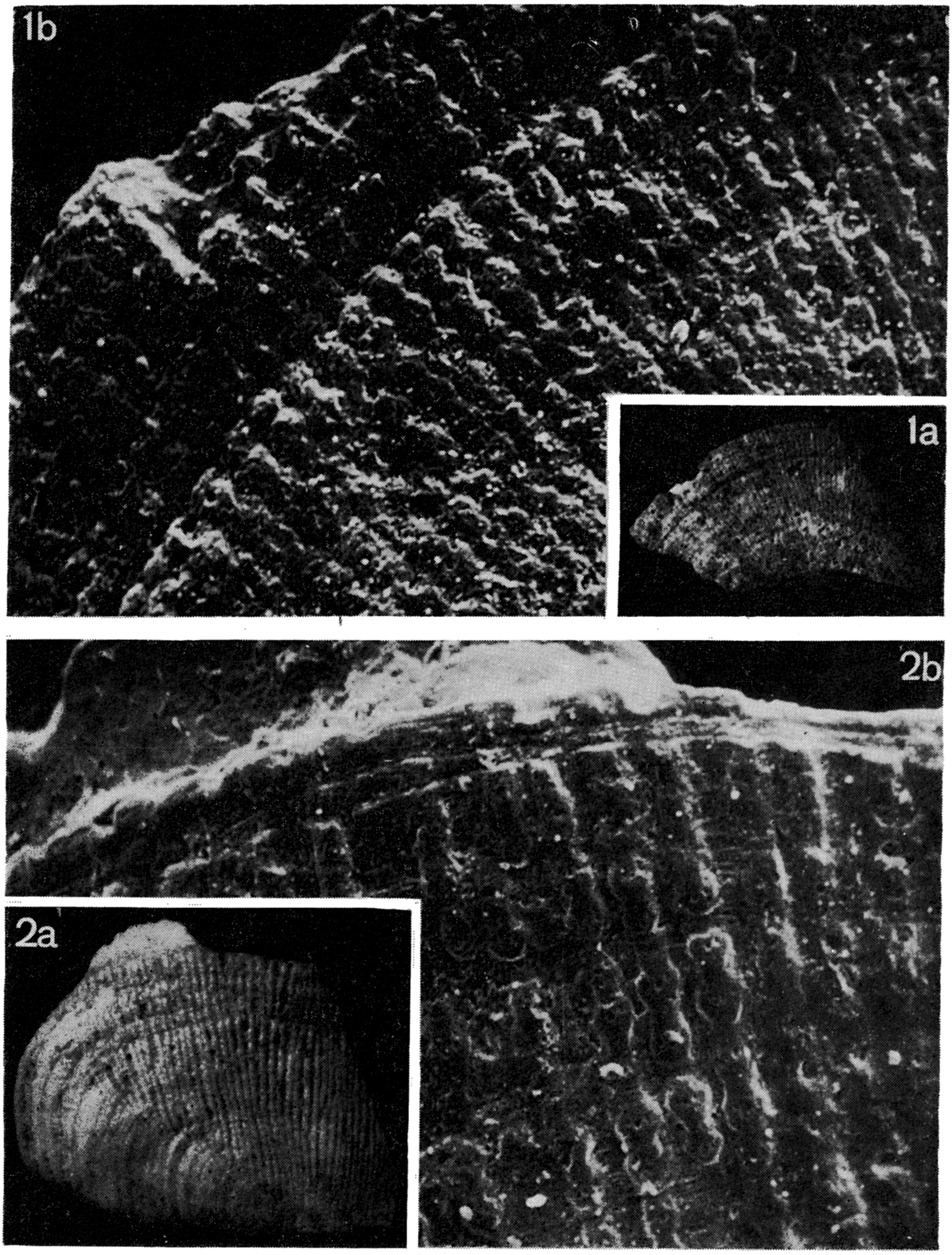
Class **Amphineura** von IHERING, 1876
Subclass **Polyplacophora** de BLAINVILLE, 1816
Order **Neoloricata** BERGENHAYN, 1955
Suborder **Lepidopleurina** THIELE, 1910
Family **Lepidopleuridae** PILSBRY, 1892
Genus *Lepidopleurus* LEACH *in* RISSO, 1826
Lepidopleurus cajetanus (POLI, 1791)
(Pl. 4, Figs 1—2)

1860. *Chiton decoratus* m. n. sp.; A. E. REUSS, p. 257, Pl. 8, Fig. 7.
1934. *Lepidopleurus (Lepidopleurus) decoratus* RSS.; J. SULC, pp. 3—4.
1962. *Lepidopleurus (L) cajetanus* (POLI, 1791); A. MALATESTA, pp. 146—147, Fig. 1.
1964. *Lepidopleurus (L) cajetanus* (POLI); J. MARINESCU, p. 180, Pl. 1, Fig. 1 (*non* Figs 2 and 3).
1965. *Lepidopleurus decoratus* (REUSS); W. BAŁUK, pp. 366—368, Pl. 1, Figs 1—4.
1971. *Lepidopleurus decoratus* (REUSS, 1860); W. BAŁUK, pp. 453—454, Pl. 1, Figs 1—4.
1977. *Lepidopleurus cajetanus* (POLI, 1791); G. F. LAGHI, pp. 95—98, Pl. 1, Figs 13—20, Text-fig. 3a,b.

MATERIAL: Twenty-nine head valves, 160 intermediate, and 65 tail valves.
DIMENSIONS of the largest valves (in *mm*):

	width	length
head valve	3.5	7.5
intermediate valve	3.0	8.5
tail valve	4.5	8.0

SUPPLEMENTARY DESCRIPTION: The newly collected numerous tail valves display a great variability of the shape. It especially concerns their post-mucronal part, which is overlapped to a variable extent, and thus the mucro becomes situated either centrally, or posteriorly.

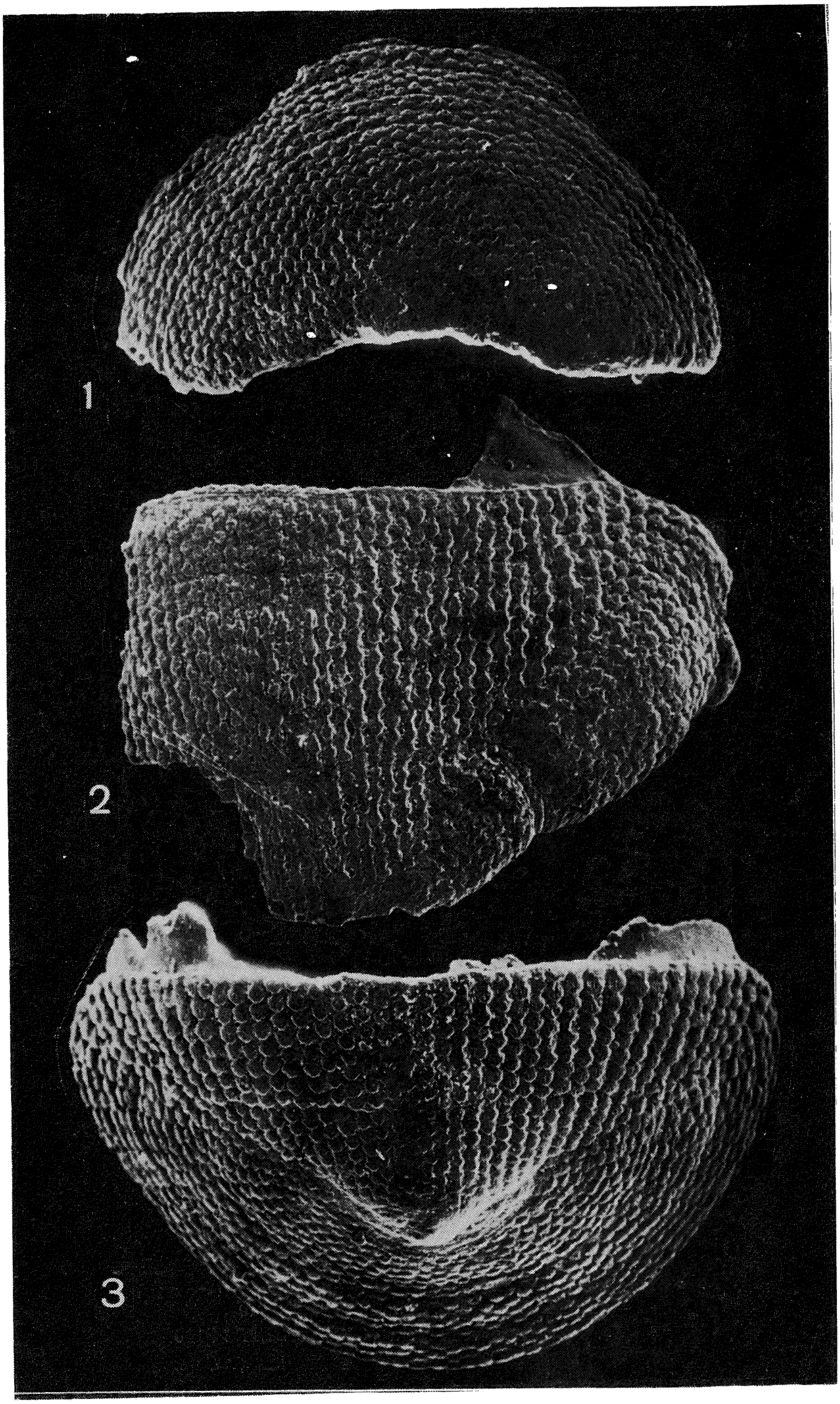


Lepidopleurus africanus NIERSTRASZ, 1906

1 — Head valve; 1a × 15, 1b *SEM* × 110

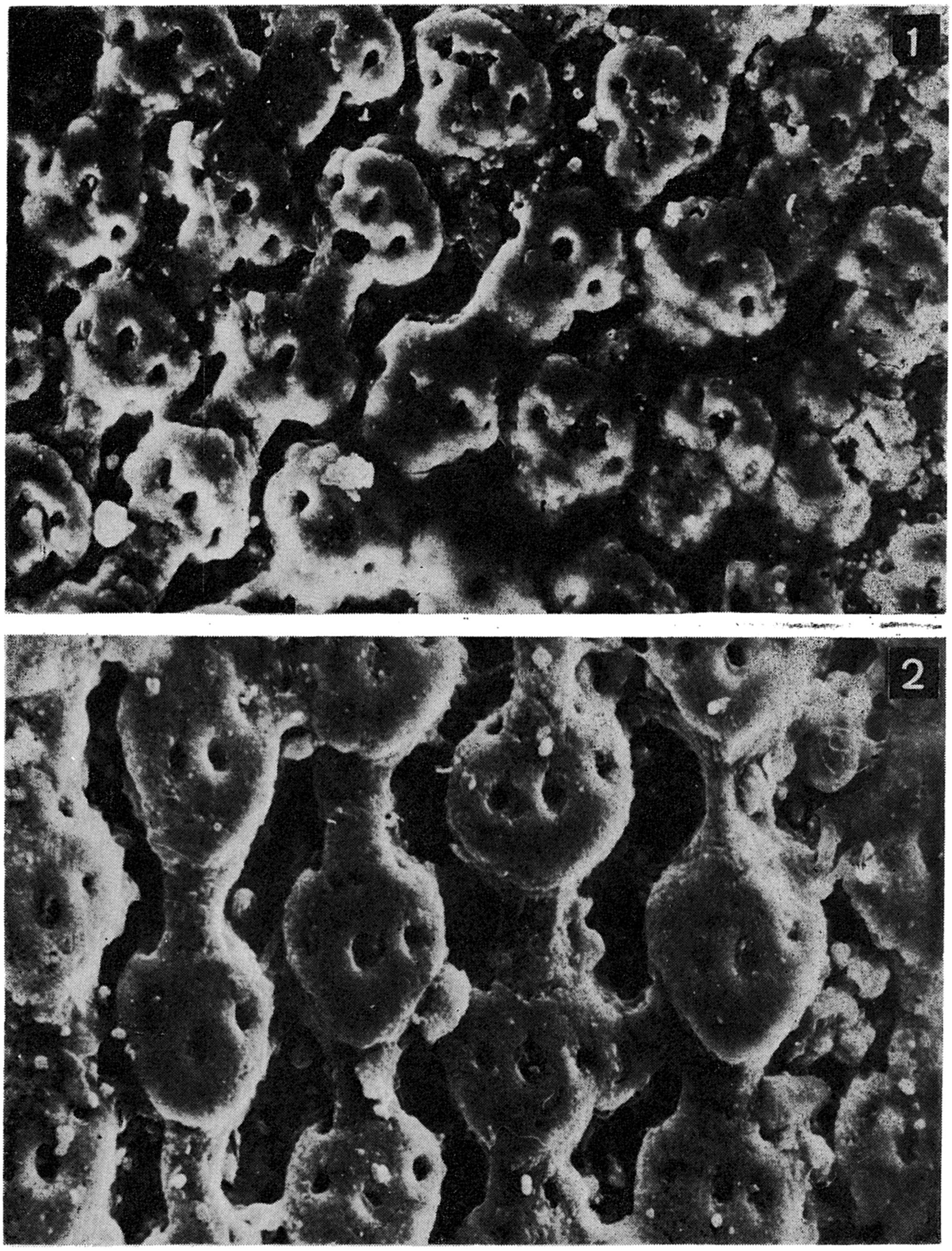
2 — Intermediate valve; 2a × 15, 2b *SEM* × 110

Photos 1a and 2a taken by L. ŁUSZCZEWSKA, M. Sc.



Lepidopleurus sulci BAŁUK, 1971

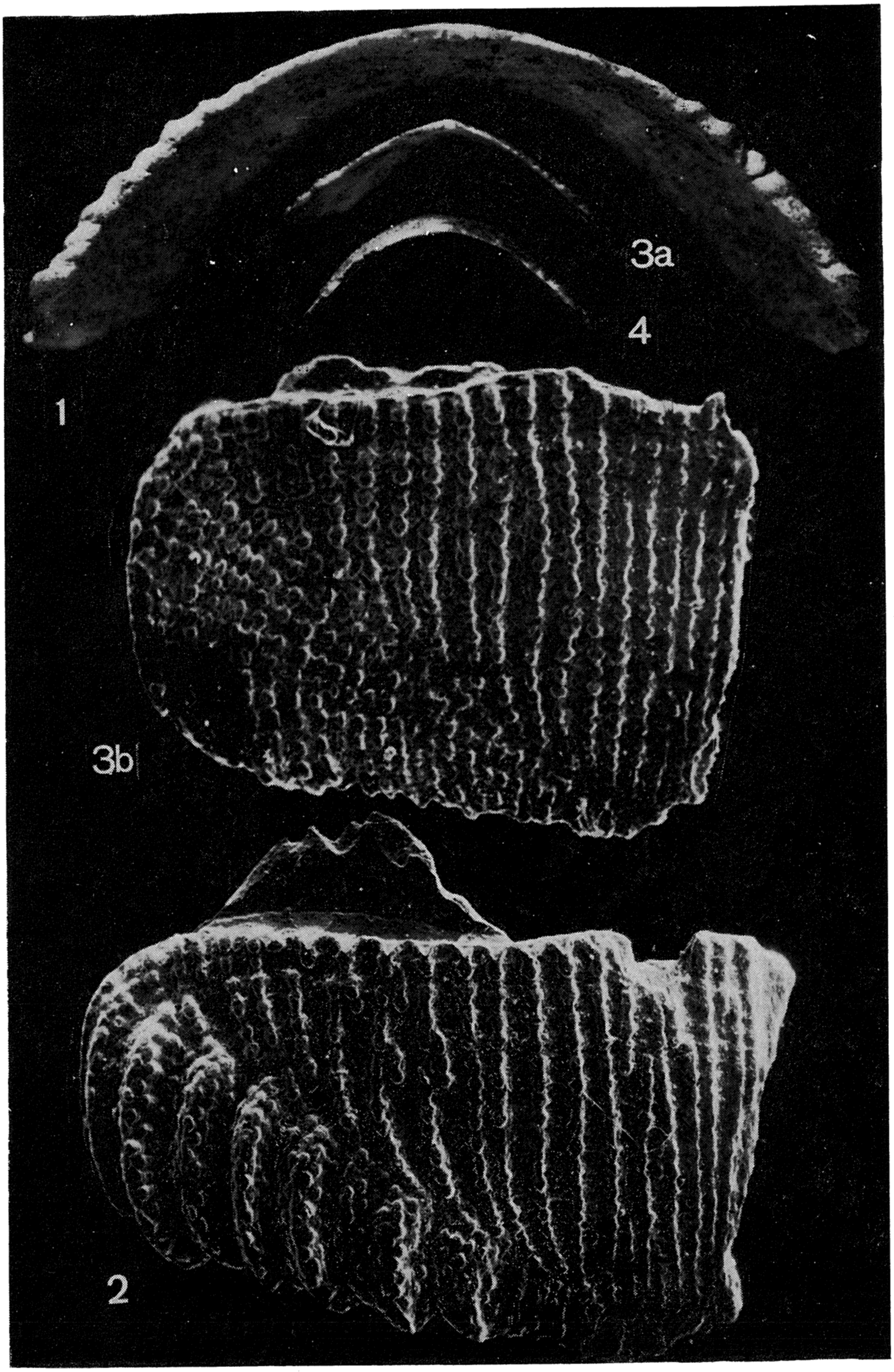
1 — Head valve, **2** — intermediate valve, **3** — tail valve; *SEM* × 48



Lepidopleurus sulci BAŁUK, 1971

1 — Ornamentation of head valve; *SEM* × 600

2 — Ornamentation of the central area of tail valve; the same specimen as in Pl. 2, Fig. 3; *SEM* × 600


3a
4
1
3b
2

REMARKS: Formerly, the author (BAŁUK 1965, 1971) determined this species as *Lepidopleurus decoratus* (REUSS). Recently, LAGHI (1977) postulated that both the Miocene specimens from Poland, and from the contemporaneous deposits of the Vienna Basin are conspecific with the present-day species *Lepidopleurus cajetanus* (POLI). This statement is accepted herein, a this is supported by the above mentioned great variability of tail valves, which in the Vienna Basin specimens was already recognized by SULC (1934), and by MALATESTA (1962). Within the Korytnica material, no specimens were however obtained which by the size and shape of the tail valve were identical with the specimen presented by LAGHI (1977, Pl. 1, Fig. 21) under the name of *Lepidopleurus subcajetanus* (D'ORBIGNY). Some specimens figured by SULC (1934) may belong to the latter species, as their tail valves attain a width of 18 mm, being reasonably greater than that known in ancient or present-day specimens of *Lepidopleurus cajetanus* (POLI).

Lepidopleurus srameki SULC, 1934
(Pl. 4, Figs 3a—3b)

1934. *Lepidopleurus (Lepidopleurus) srameki* n. sp.; SULC, p. 5, Pl. 1, Fig. 3.
1971. *Lepidopleurus srameki* SULC, 1934; BAŁUK, pp. 454—455, Pl. 2, Fig. 5.

REMARKS: No new material has been obtained. To distinguish this species from the others of the genus *Lepidopleurus*, presented are new illustrations of the formerly described specimen (BAŁUK 1971, Pl. 2, Fig. 5). They demonstrate specific features of ornamentation (Pl. 4, Fig. 3b), and the presence of a distinct, carinated jugal part.

Lepidopleurus sulci BAŁUK, 1971
(Pl. 2, Figs 1—3; Pl. 3, Figs 1—2; Pl. 4, Fig. 4)

1934. *Lepidopleurus* cf. *cancellatus* (CAPELLINI); J. SULC, pp. 6—7.
1971. *Lepidopleurus sulci* sp. n.; W. BAŁUK, pp. 455—456, Pl. 2, Figs 1—4.

MATERIAL: Sixteen head valves, 60 intermediate, and 50 tail valves.
DIMENSIONS of the largest valves (*in mm*):

	length	width
head valve	1.1	2.5
intermediate	1.4	3.2
tail valve	1.6	2.5

SUPPLEMENTARY DESCRIPTION: Ornamentation of the valves is very delicate, composed of fine, more or less circular granules, arranged in rows. In each rows the granules are joined by a narrow ridge. The granule interspace is twice lesser than their diameter (*see* Pl. 3, Figs. 1—2). On the head valves (Pl. 2, Fig. 1 and Pl. 3, Fig. 1), the lateral areas of intermediate valves (Pl. 2, Fig. 2), and on the posterior area of tail valves (Pl. 2, Fig. 3) the rows of granules become radial. On the central areas (Pl. 2, Figs. 2—3; Pl. 3, Fig. 2) these rows are longitudinal, and the granules are greater than those in radial rows. A regular quincuncial pattern is displayed by granules of neighboring rows. Each granule usually bears three holes after aesthete.

PLATE 4

1-2 — *Lepidopleurus cajetanus* (POLI, 1791); *1* intermediate valve: posterior view, to show the valve profile, × 15; *2* intermediate valve, to show details of ornamentation, *SEM* × 40

3a-3b — *Lepidopleurus srameki* SULC, 1934; *3a* intermediate valve: posterior view, to show the valve profile, × 15; *3b* intermediate valve, to show details of ornamentation, *SEM* × 110

4 — *Lepidopleurus sulci* BAŁUK, 1971; intermediate valve: posterior view, to show the valve profile, × 15

Photos 1, 3a and 4 taken by L. ŁUSZCZEWSKA, M. Sc.

REMARKS: The newly collected specimens (primarily from the ocurrence site 4 in Text-fig. 1) are identical with those formerly assigned (BAŁUK 1971) to *Lepidopleurus sulci* BAŁUK, a Miocene species regarded as an ancestor of the present-day *Lepidopleurus cancellatus* (SOWERBY). Recently, LAGHI (1977) suggested that the Korytnica specimens may be conspecific with those from the Pliocene deposits exposed at Tagliata near Modena (LAGHI 1977, Pl. 1, Figs 1—3), and with the present-day specimens of *Lepidopleurus cancellatus* (SOWERBY). This statement is not accepted herein, because the range of variability in ornamentation of *L. cancellatus* is so great (*see* MALATESTA 1962, Fig. 3; LAGHI 1977; KAAS 1981, Fig. 10*F* and Table 2) that the specific limits are thought to have not yet been precisely established.

Lepidopleurus africanus NIERSTRASZ, 1906
(Pl. 1, Figs 1—2)

1934. *Lepidopleurus (Parachiton) thielei* n. sp.; J. SULC, pp. 7—8, Pl. 1, Figs 4—5.
1971. *Lepidopleurus thielei* SULC; W. BAŁUK, pp. 454—455, Pl. 1, Fig. 8.
1977. *Leptochiton (Parachiton) africanus* (NIERSTRASZ); P. KAAS, Figs 1—6.
1980. *Lepidopleurus (Parachiton) africanus* NIERSTRASZ; G. F. LAGHI, F. RUSSO & B. DELL'ANGELO, pp. 1—7, Figs 3—9.

MATERIAL: Two head valves formerly unknown, 20 intermediate, and 12 tail valves; all incomplete.
DIMENSIONS of the largest valves (in *mm*):

	length	width
head valve	*c.* 2.0	*c.* 5.0
intermediate valve	*c.* 3.0	7.0
tail valve	3.8	*c.* 5.0

SUPPLEMENTARY DESCRIPTION: Head valves ornamented with thin, densely spaced radial ribs. The ribs are composed of delicate granules, almost contacting each other (Pl. 1, Fig. 1b). One of the fragmentary specimen (Pl. 1, Fig. 1a) bears 46 ribs (counted along the anterior margin; the total number may be estimated as *c.* 150). Concentric ridges are absent on the head valves, but they appear on the lateral areas of intermediate valves, being always weakly pronounced and usually with inconstant interspaces.

REMARKS: The discussed specimens were assigned formerly (BAŁUK 1971) to the species *Lepidopleurus thielei* SULC. Recently, KAAS (1977) followed by LAGHI, RUSSO & DELL'ANGELO (1980) confirmed the occurrence of a very rare species *Lepidopleurus africanus* NIERSTRASZ, which was established upon one specimen from Oran, Algeria. Because there have been no further reports, the specimen illustrated by NIERSTRASZ (1906) was even regarded as a mistake in labelling. KAAS (1977) indicated that the specimens of *L. thielei* SULC from the Vienna Basin (SULC 1934) and from Korytnica (BAŁUK 1971) are supposedly conspecific with this present-day species, *L. africanus* NIERSTRASZ. A similar opinion was offered by LAGHI, RUSSO & DELL'ANGELO (1980), who presented some present-day specimens and one head valve from the Pliocene deposits of Valle Andona (Piemonte). This opinion is to be accepted herein, because the similarity of these specimens is really remarkable, and the differences concern only greater dimensions and an absence of regular interspaces between the concentric ridges on lateral areas of intermediate valves in *L. thielei* SULC.

KAAS (1977) includes the species into *Leptochiton (Parachiton)*. The present author follows the taxonomical frames for the genus *Lepidopleurus* LEACH *in* RISSO, 1826, those as established by SMITH (1960a,b).

Family **Hanleyidae** BERGENHAYN, 1955
Genus *Hanleya* GRAY, 1857
Hanleya multigranosa (REUSS, 1860)
(Pl. 5, Figs 1a—1b)

1860. *Chiton multigranosus* m. n. sp.; A. E. REUSS, p. 259, Pl. 8, Fig. 8 (*non* Fig. 9).
1934. *Hanleya multigranosa* (RSS.); J. SULC, pp. 9—10, Pl. 1, Figs 7—12.
1971. *Hanleya? multigranosa* (REUSS, 1860); W. BAŁUK, pp. 456—457, Pl. 1, Figs. 5—7.
1977. *Hanleya hanleyi* (BEAN, 1844); G. F. LAGHI, pp. 99—102, Figs 5—9.

MATERIAL: Six head valves, 38 intermediate, and 12 tail valves.

DIMENSIONS of the largest valves (in *mm*):

	length	width
head valve	1.2	2.6
intermediate valve	2.0	c. 4.2
tail valve	1.8	2.7

SUPPLEMENTARY DESCRIPTION: Granules featuring the ornamentation of the valves are of variable shape. Usually, they are elongated longitudinally, tapering anteriorly; sometimes (Pl. 5, Fig. 1b) they are more or less rounded. Their surface, especially at the margin contains numerous (up to 14) holes after aesthete. Similar holes appear locally also on the surface of tegmentum, amongst the granules (Pl. 5, Fig. 1b, *bottom right*).

REMARKS: Following REUSS (1860) and SULC (1934), the Korytnica specimens are included into *Hanleya multigranosa* (REUSS), the species established upon the Miocene specimens from Rudoltice in the Moravian part of the Vienna Basin. SULC (1934, p. 9), indicating a phyletic relationship of this species to the present-day *Hanleya hanleyi* (BEAN, 1844), stated the presence of circular granules in the latter one (not elongated, as in *H. multigranosa* (REUSS). The same is displayed by the specimen illustrated by MALATESTA (1962, Fig. 9). Both SULC (1934), the present author (BAŁUK 1971, Text-fig. 2), and recently LAGHI (1977, Pl. 3, Fig. 8b) noted the presence of insertion plates on all valves, whereas in *Hanleya hanleyi* (BEAN) they occur only on the head valve (MALATESTA 1962, p. 153). It is consequently thought that the opinion of LAGHI (1977) to synonymize *Hanleya multigranosa* (REUSS) with *H. hanleyi* (BEAN) is not acceptable, and the Pliocene specimens from Tagliata in North Italy are identical with *Hanleya multigranosa* (REUSS).

Suborder **Ischnochitonina** BERGENHAYN, 1930
Family **Ischnochitonidae** DALL, 1889
Genus *Ischnochiton* GRAY, 1847
Ischnochiton rissoi (PAYRADEAU, 1826)
(Pl. 6, Figs 2a—2b)

1934. *Ischnochiton rudolticensis* n. sp.; J. SULC, pp. 23—24, Pl. 2, Figs 41—43.
1962. *Ischnochiton rissoi* (PAYRADEAU, 1826); A. MALATESTA, pp. 160—161, Fig. 10.
1971. *Ischnochiton rudolticensis* SULC; W. BAŁUK, p. 458, Pl. 3, Figs 5—8.
1977. *Ischnochiton rissoi* (PAYRADEAU); G. F. LAGHI, p. 104, Pl. 1, Figs 4—8, 9(?).

MATERIAL: Ten head valves, 70 intermediate, and 21 tail valves.

DIMENSIONS of the largest valves (in *mm*):

	length	width
head valve	c. 2.5	c. 5.0
intermediate valve	2.5	5.5
tail valve	4.0	6.0

REMARKS: The newly collected specimens, some of which are of the size greater than formerly reported in this species, being determined (BAŁUK 1971) as *Ischnochiton rudolticensis* SULC. Recently, LAGHI (1977) recognized the latter as conspecific with the present-day species *Ischnochiton rissoi* (PAYRADEAU). This statement is accepted herein, and it was already SULC (1934) who indicated a great similarity of those two species.

Ischnochiton korytnicensis BAŁUK, 1971
(Pl. 6, Figs 1a—1b)

1965. *Ischnochiton rudolticensis* SULC; W. BAŁUK, pp. 369—370, Pl. 1, Fig. 7.
1971. *Ischnochiton korytnicensis* sp. n.; W. BAŁUK, pp. 458—459, Pl. 3, Figs 1—4.
?1977. *Ischnochiton rissoi* (PAYRADEAU); G. F. LAGHI, p. 104, Pl. 1, Fig. 9 (*non* Figs 4—8).

MATERIAL: Four head valves, 56 intermediate, and 7 tail valves.

REMARKS: The newly collected specimens are identical with those formerly reported. The species *Ischnochiton korytnicensis* BAŁUK differs from *I. rissoi* (PAYRADEAU) in ornamentation, especially of head valves and of the lateral areas of intermediate valves. To demonstrate the differences illustrated are (Pl. 6, Figs 1a—b and 2a—b) head valves of the both species. Formerly (BAŁUK 1971, Pl. 3, Figs 1 and 5), the same specimens were illustrated unsatisfactorily.

The specimen from the Tortonian deposits of Montegibbio, North tIaly, presented by LAGHI (1977, Pl. 1, Fig. 9) may belong to this species; unfortunately, it has the lateral area seriously demaged.

Genus *Lepidochitona* GRAY, 1821
Lepidochitona lepida (REUSS, 1860)
(Pl. 7, Figs 1—3)

1971. *Lepidochitona lepida* (REUSS); W. BAŁUK, pp. 459—460, Pl. 4, Figs 6—12 (*with synonymy*).

MATERIAL: Nine head valves, 27 intermediate, and 4 tail valves.

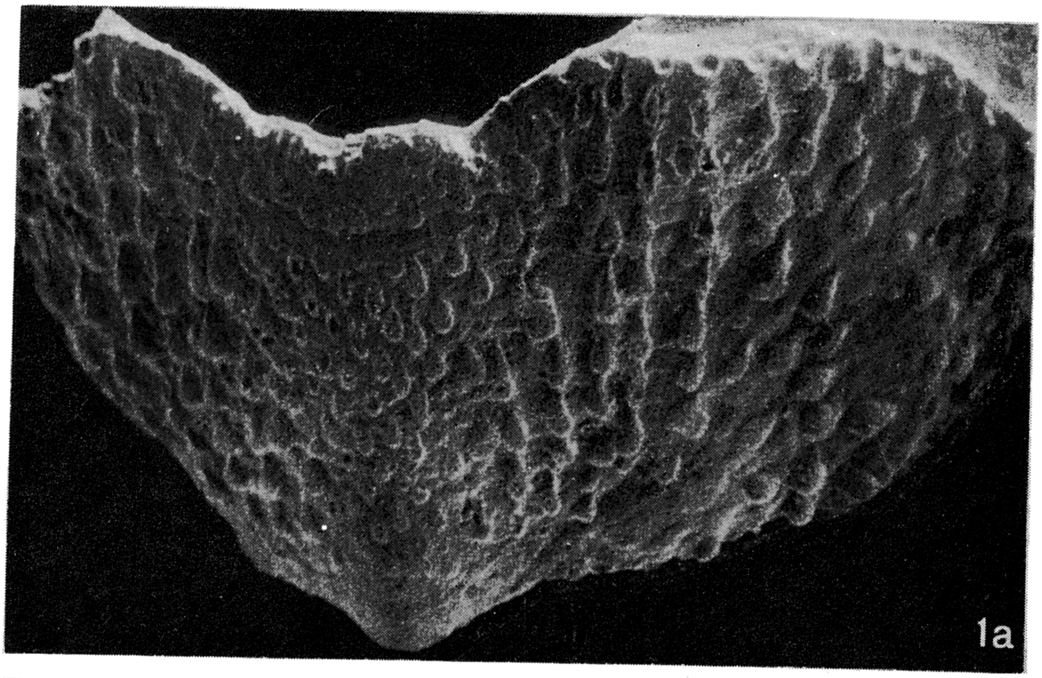
DIMENSIONS of the largest valves (in *mm*):

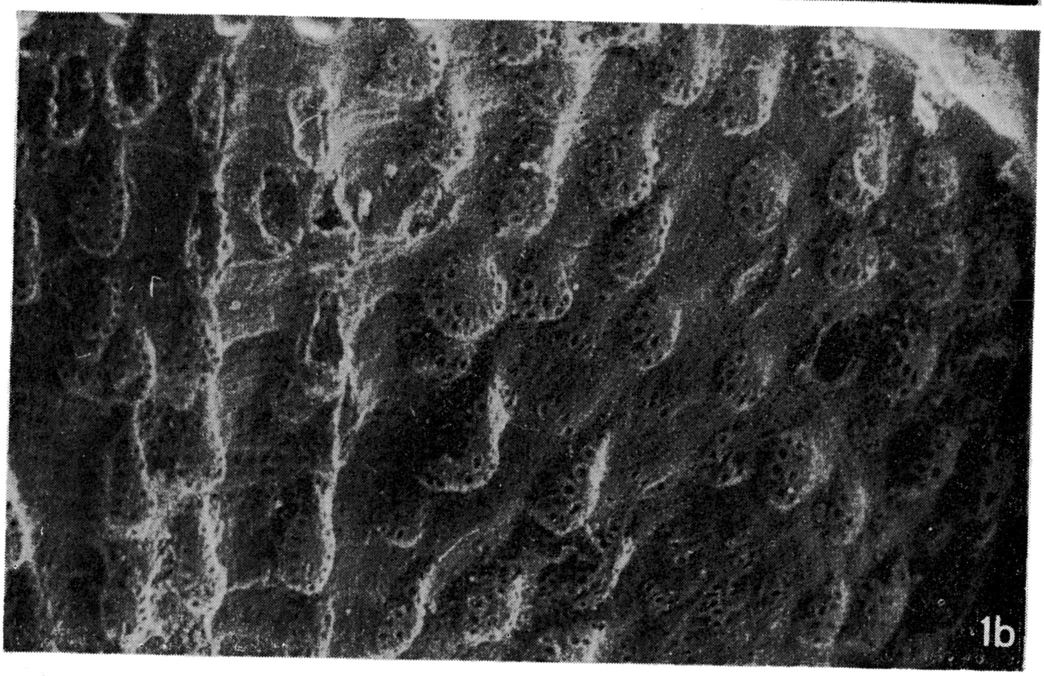
	length	width
head valve	c. 2.0	c. 4.0
intermediate valve	2.3	5.0
tail valve	1.8	2.8

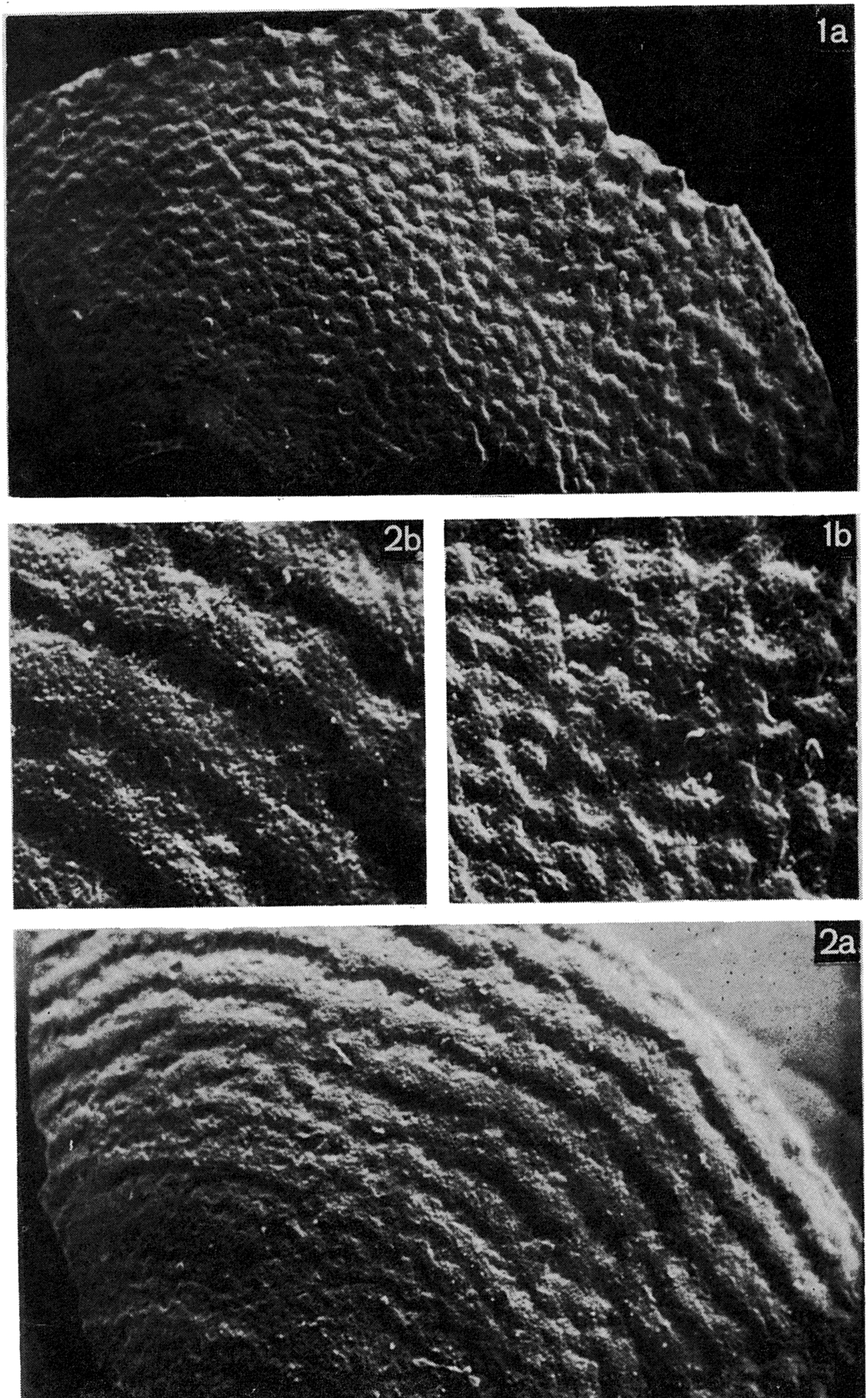
PLATE 5

Hanleya multigranosa (REUSS, 1860)

1a — Intermediate valve, *SEM* × 48
2a — Fragment of the same specimen, to show details of ornamentation, *SEM* × 110


1a


1b


1a
2b
1b
2a

SUPPLEMENTARY DESCRIPTION: Insertion plate of head valve with 8 slits, and that of tail valve with 11 slits.

REMARKS: Of the newly collected specimens, important is a completely preserved tail valve (Pl. 7, Fig. 3) which displays ornamentation more pronounced than that formerly reported (BAŁUK 1971, Pl. 4, Figs 11 and 12).

The recognition of the species within the genus *Lepidochitona* is a highly troublesome task in the research of the Miocene Polyplacophora. The assignation of the Korytnica specimens to the fossil species *Lepidochitona lepida* (REUSS) is doubtless, but not clearly indicatable is its relation to some of the present-day species. MALATESTA (1962) identifies this fossil species with *Middendorffia caprearum* (SCACCHI) *. The same does LAGHI (1977), who indicates the presence of 8 radial ribs on the head valves. The latter feature is however known also in another present-day species, *Lepidochitona (L.) monterosatoi* KAAS & VAN BELLE. The Korytnica specimens display ornamentation more similar to the latter species than to *Lepidochitona corrugata* (REEVE). When having only isolated valves, often incomplete, the calcareous corpuscules from girdle and teeth of the radula being absent, it is almost impossible to take a further approach to this taxonomical discussion. Until a better recognition of this stock of species, the Korytnica specimens are included into the fossil species established by REUSS.

Lepidochitona subgranosa BAŁUK, 1971
(Pl. 7, Fig. 4)

1971. *Lepidochitona subgranosa* sp. n.; W. BAŁUK, p. 460, Pl. 4, Figs 1—5.

MATERIAL: Seven head valves, 38 intermediate, and 9 tail valves.

DIMENSIONS of the largest valves (in *mm*):

	length	width
head valve	1.4	2.0
intermediate valve	1.8	c. 4.5
tail valve	1.0	3.3

REMARKS: The newly collected specimens are identical with those formerly reported. Recently, LAGHI (1977) postulated that the species is presumably conspecific with the present-day species *Lepidochitona cinerea* (LINNAEUS). Similarly, as in the case of *Lepidochitona lepida* (REUSS) this cannot be evidenced when having only isolated valves. As it may be judged by the illustrations presented by KAAS & VAN BELLE (1981), ornamentation in *Lepidochitona subgranosa* BAŁUK is the closer to that in *Lepidochitona canariensis* (THIELE) rather than in the species indicates by LAGHI (*see* KAAS & VAN BELLE 1981, Figs 18—20 and 2—3).

PLATE 6

1a-1b — *Ischnochiton korytnicensis* BAŁUK, 1971; *1a* head valve, *SEM* × 55; *1b* fragment of the same specimen, to show details of ornamentation, *SEM* × 100

2a-2b — *Ischnochiton rissoi* (PAYRADEAU, 1826); *2a* head valve, *SEM* × 55; *2b* fragment of the same specimen, to show details of ornamentation, *SEM* × 100

* According to KAAS & VAN BELLE (1981), the correct name of the species is *Lepidochitona corrugata* (REEVE).

Family **Callochitonidae** PLATE, 1899

Genus *Callochiton* GRAY, 1847

Callochiton zigzag SULC, 1934

1934. *Callochiton zig-zag* n. sp.; J. SULC, p. 12, Pl. 1, Figs 17—19.
1971. *Callochiton zigzag* SULC; W. BAŁUK, p. 461, Pl. 3, Figs 6—8.

MATERIAL: Two head valves, 7 intermediate, and 2 tail valves; all incomplete.

DIMENSIONS of the largest valves (in *mm*):

	length	width
head valve	1.2	3.0
intermediate valve	2.7	c. 6.5
tail valve	c. 4.0	c. 6.0

REMARKS: The newly collected specimens are identical with those formerly reported, excepted the size being slightly greater. The species *Callochiton zigzag* SULC has no relatives in the present-day European species, and its synonymizing (*cf.* MALATESTA 1962, pp. 158—159) with the species *Callochiton achatinus* (BROWN), which also is known as *C. laevis* (MONTAGU), cannot be accepted.

Callochiton laevis (MONTAGU, 1803)

1860. *Chiton rariplicatus* m. n. sp.; A. E. REUSS, pp. 258—259, Pl. 8, Figs 9—11.
1934. "*Chiton*" *rariplicatus* RSS.; J. SULC, pp. 27—28, Pl. 2, Fig. 5.
1971. *Callochiton rariplicatus* (REUSS); W. BAŁUK, pp. 461—462, Pl. 5, Figs 1—5.

MATERIAL: Twenty head valves, 88 intermediate, and 70 tail valves.

DIMENSIONS of the largest valves (in *mm*):

	length	width
head valve	1.6	3.4
intermediate valve	1.7	3.8
tail valve	1.9	2.8

REMARKS: The newly collected, numerous specimens are identical with those formerly reported (BAŁUK 1971) under the name of *Callochiton rariplicatus* (REUSS). Recently, LAGHI (1977) recognized both the Korytnica specimens, and those illustrated by REUSS (1860) and by SULC (1934) from the Vienna Basin as conspecific with the present-day species *Callochiton laevis* (MONTAGU), the only European species of this genus. This statement is accepted herein, insofar a great variability is known in the species (LELOUP & VOLZ 1938, MALATESTA 1962, KAAS 1978), and it was the reason of a taxonomical mess. The most commonly used name is that of *C. laevis* (MONTAGU), but according to KAAS (1978), available is also the name *C. septemvalvis* (MONTAGU, 1803).

Family **Chitonidae** RAFINESQUE, 1815

Genus *Chiton* LINNAEUS, 1758

Chiton corallinus (RISSO, 1826)

1962. *Chiton (Chiton) corallinus* (RISSO); A. MALATESTA, pp. 163—164, Fig. 20.
1971. *Chiton denudatus* REUSS; W. BAŁUK, pp. 462—463, Pl. 5, Figs 9—11 (*with synonymy*).
1977. *Chiton corallinus* (RISSO); G. F. LAGHI, p. 109, Pl. 2, Figs 9—12.

MATERIAL: Thirty-five head valves, 310 intermediate, and 55 tail valves.

DIMENSIONS of the largest valves (in *mm*):

	length	width
head valve	c. 2.3	c. 5.0
intermediate valve	3.1	6.6
tail valve	3.0	4.5

REMARKS: Formerly (BAŁUK 1971), this species was regarded as *Chiton denudatus* REUSS, a Miocene ancestor of the present-day species *Chiton corallinus* (RISSO). Recently, LAGHI (1977) recognized a conspecifity of these two species, and this statement is accepted herein. The only difference, indicated already by SULC (1934), *viz.* a slightly different shape of the tail valve, is really of no taxonomical importance.

Suborder **Acanthochitonina** BERGENHAYN, 1930
Family **Acanthochitonidae** PILSBRY, 1893
Genus *Acanthochitona* GRAY, 1821
Acanthochitona fascicularis (LINNAEUS, 1766)
(Pl. 9, Fig. 2)

1934. *Acanthochiton* aff. *fascicularis* (L.); J. SULC, p. 19.
1962. *Acanthochitona fascicularis* (LINNE); A. MALATESTA, pp. 164—165, Fig. 22.
1971. *Acanthochitona lacrimulifera* sp. n.; W. BAŁUK, p. 464, Pl. 2, Figs 6—9.
1977. *Acanthochitona fascicularis* (LINNEO); G. F. LAGHI, p. 111, Pl. 3, Figs 20—21.

MATERIAL: Seven head, and 45 intermediate valves.

REMARKS: The newly collected specimens are identical with those formerly reported (BAŁUK 1971) under the name of *Acanthochitona lacrimulifera* BAŁUK. Recently, LAGHI (1977) recognized the latter as conspecific with the present-day species *Acanthochitona fascicularis* (LINNAEUS), and this statement is accepted herein. When the species *A. lacrimulifera* was established, it was regarded (BAŁUK 1971) as a Miocene ancestor of the species indicated by LAGHI (1977).

Acanthochitona faluniensis (ROCHEBRUNE, 1883)
(Pl. 8, Figs 1—5)

1971. *Acanthochitona faluniensis* (ROCHEBRUNE); W. BAŁUK, pp. 463—464, Pl. 2, Figs 10—15 (*with synonymy*).

MATERIAL: Twenty head valves, 90 intermediate, and 30 tail valves.

DIMENSIONS of the largest valves (in *mm*):

	length	width
head valve	2.0	4.5
intermediate valve	3.5	c. 8.0
tail valve	2.2	4.2

SUPPLEMENTARY DESCRIPTION: Lateral margin of the tegmentum is much variable; usually it is rounded (Pl. 8, Fig. 3), rarely falciforme in the posterior part. Ornamentation of the tegmentum (jugal areas excepted) consists of the granules, circular in outline.

REMARKS: Following SULC (1934), the discussed specimens are included into the species *Acanthochitona faluniensis* (ROCHEBRUNE). Recently, LAGHI (1977) postulated that both the Korytnica specimens and those from the Vienna Basin

(SULC 1934) are conspecific with the present-day species *Acanthochitona communis* (RISSO). This statement must be rejected, because neither the Korytnica specimens, nor those figured by REUSS (1860) and by SULC (1934) display their lateral margin of tegmentum of the shape typical of the present-day species (*see* MALATESTA 1962). The latter species, according to MALATESTA (1962), is not a descendant of *A. faluniensis*.

The specimens from the Miocene and Pliocene deposits of Italy, figured recently by LAGHI (1977, Pl. 3, Figs 13—19) are very close to those from Korytnica, and they may be suggested as conspecific.

Associated with *A. communis* in the same localities (Tagliata and Solignano) in North Italy are specimens distinguished by LAGHI (1977) as separate species, *Craspedochiton (Pseudoacanthochitona) ambiguus* LAGHI. This distinction does not seem justifiable, because both the head and the intermediate valves are practically identical. Additional slits on the insertion plate of tail valves appear also in some of the Korytnica specimens, and according to the present author, they results from a rippling of a part of the insertion plate, in between the main slits. Established by SULC (1934) the subgenus *Pseudoacanthochiton* SULC, has been synonymized by SMITH (1960a) with *Acanthochitona* GRAY.

Acanthochitona sandeciana BAŁUK, 1965
(Pl. 9, Figs 1a—1b)

1934. *Acanthochiton* sp. *III*; J. SULC, p. 20, Text-fig. 4.
1965. *Acanthochitona sandeciana* n. sp.; W. BAŁUK, pp. 371—372 and 374, Pl. 1, Figs 9—11.

MATERIAL: One head valve.

DIMENSIONS (in *mm*): length 2.0, width 3.8.

DESCRIPTION: Head valve highly convex, with its anterior margin hemicircular. Ornamentation of the tegmentum consists of the densely spaced granules, almost circular in the outline, flat or slightly concave at the top.

REMARKS: The only specimen of this species differs from specimens of *Acanthochitona faluniensis* (ROCHEBRUNE) in their smaller and more densely spaced granules of the tegmentum, as it is well evidenced when specimens of the same size are compared (Pl. 9, Fig. 1a—b and Pl. 8, Fig. 1a—b). The same ornamentation is displayed (*see* BAŁUK 1965) in *Acanthochitona sandeciana* BAŁUK from the contemporaneous deposits exposed at Niskowa in the Carpathians.

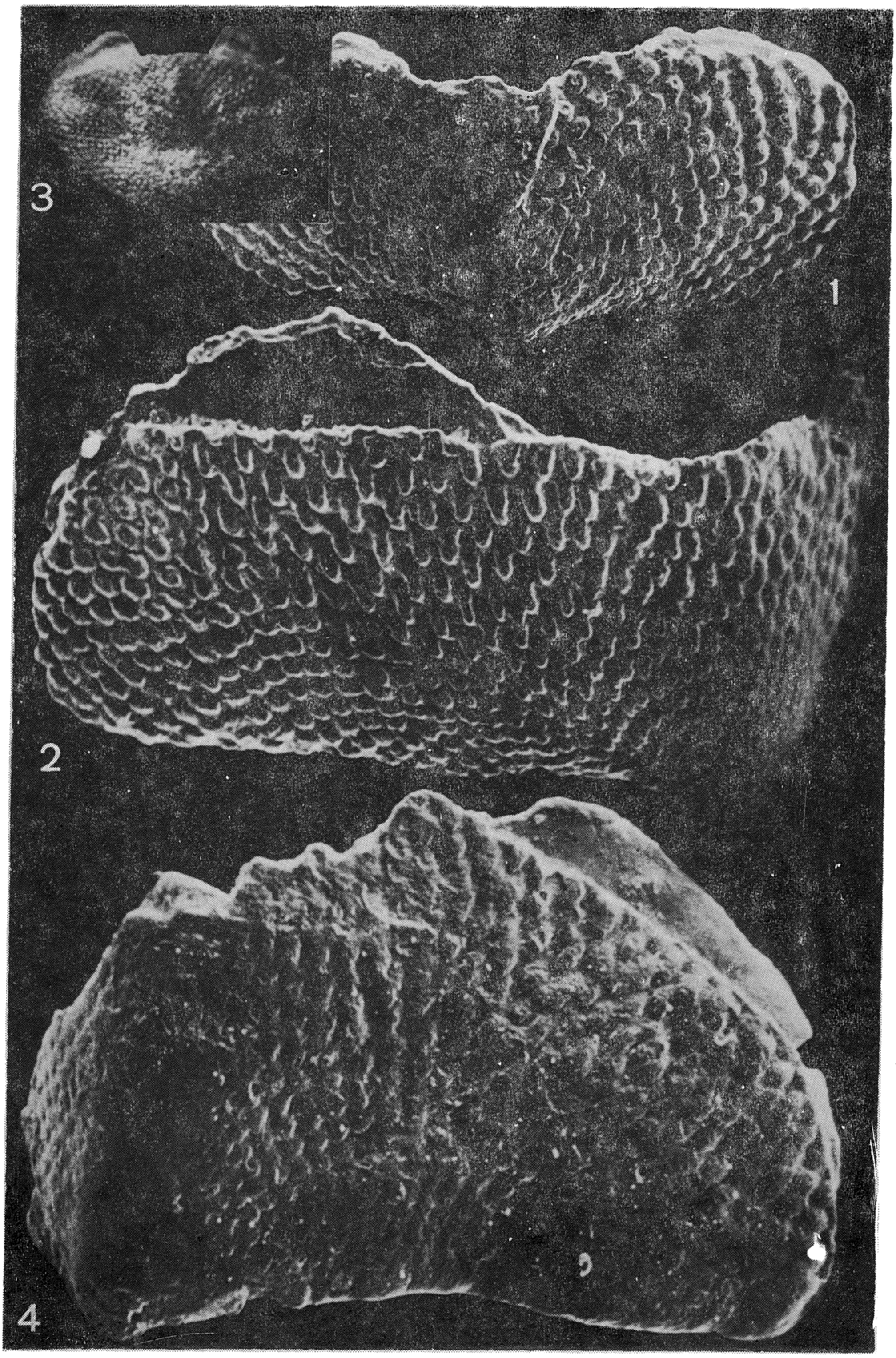
Genus *Craspedochiton* SHUTTLEWORTH, 1853
Craspedochiton profascicularis (BOETTGER, 1907)
(Pl. 12, Figs 1—2)

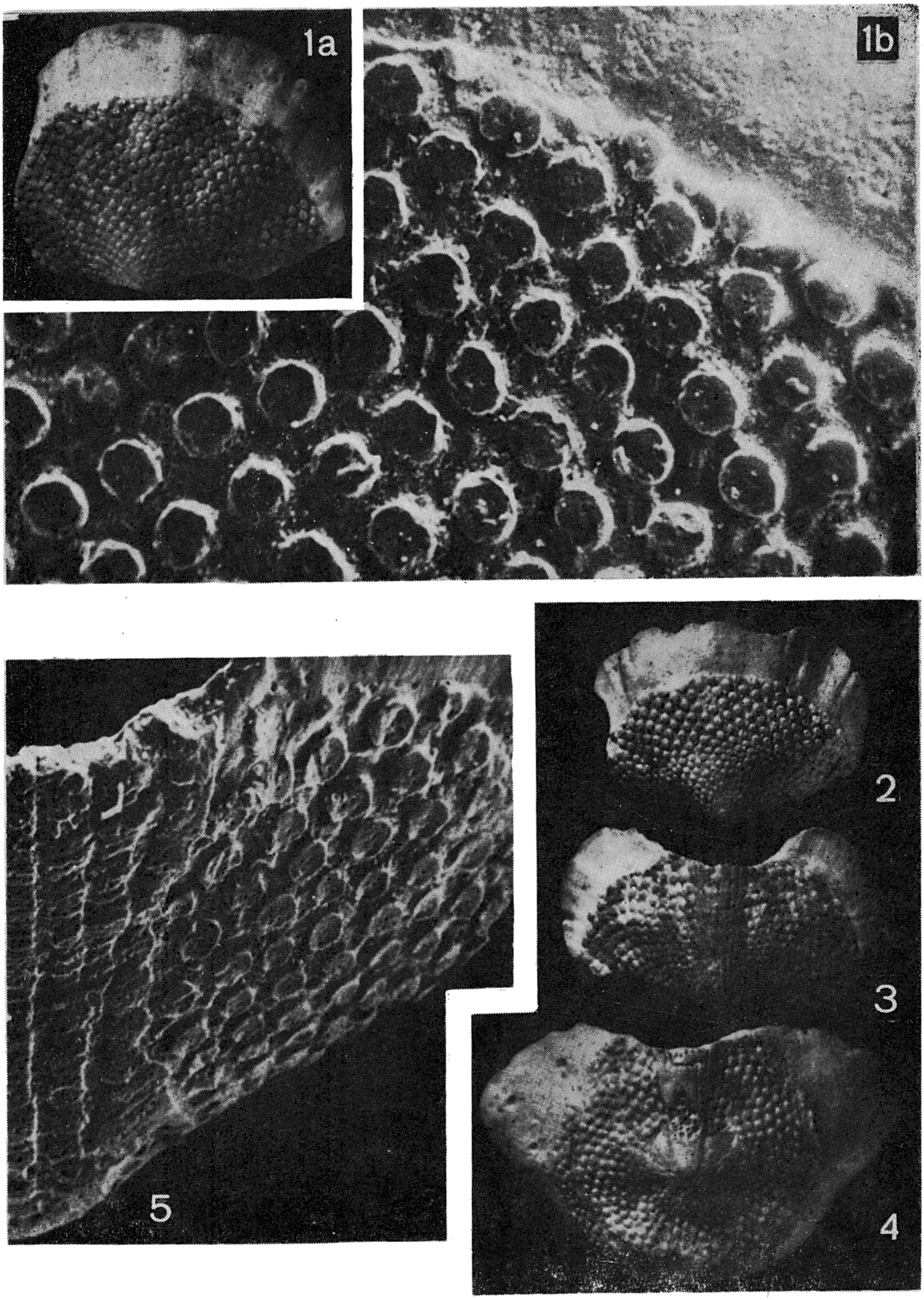
1907. *Acanthochites profascicularis* n. sp.; O. BOETTGER, p. 208.
1934. *Cryptoconchus (Craspedoplax) profascicularis* (BOETTGER); J. SULC, p. 13.
1934. *Cryptoconchus (Craspedoplax) profascicularis* (BOETTGER); A. ZILCH, pp. 199—200, Pl. 1, Fig. 17.

PLATE 7

1-3 — *Lepidochitona lepida* (REUSS, 1860); *1* intermediate valve, *SEM* × 40; *2* another intermediate valve, *SEM* × 45; *3* tail valve, × 15
4 — *Lepidochitona subgranosa* BAŁUK, 1971; intermediate valve, *SEM* × 45

Photo 3 taken by L. ŁUSZCZEWSKA, M. Sc.


3
1
2
4


1a
1b
2
3
4
5

1971. *Craspedochiton schafferi* SULC; W. BAŁUK, p. 465, Pl. 2, Figs 13—14.

MATERIAL: One head, and 5 intermediate valves.

DIMENSIONS of the largest valves (in *mm*):

	length	width
head valve	1.3	2.3
intermediate valve	1.8	c. 4.0

SUPPLEMENTARY DESCRIPTION: Insertion plate of the head valve split into parts by five, rather broad slits. Each slit is bordered from both sides by narrow ridges. Ornamentation of the tegmentum of the head valve consists of numerous oval nodes, variable in size, and the largest ones situated at the prolongation of the slits.

REMARKS: Formerly, the author (BAŁUK 1971) having only two fragmented intermediate valves, assigned them erronously to *Craspedochiton schafferi* SULC. The newly collected specimens, although also scarce but containing a head valve, allow to attribute them to *Craspedochiton profascicularis* (BOETTGER), the species known from Kostej, Rumania. BOETTGER (1907), when established the species, had only one specimen of the head valve. The herein reported intermediate valves are therefore a new contribution to the recognition of the species, the tail valves of which still remain unknown. SULC (1934) and ZILCH (1934) were of the opinion that with the species established by BOETTGER conspecific are also specimens described by SACCO (1897) as *Acanthochiton costatus* (ROV.). Recently, LAGHI (1977) presented the same specimens from North Italy as *Craspedochiton costatus* (SACCO). Although LAGHI (1977, p. 112) also included the BOETTGER'S species into the synonymy, his own illustrations (LAGHI 1977, Pl. 4, Figs 1—3), and an illustration of the holotype of the BOETTGER'S species given by ZILCH (1934, Pl. 1, Fig. 17) clearly indicate that *Craspedochiton costatus* (SACCO) and *C. profascicularis* (BOETTGER) are separate species which differ distinctly in their size, ornamentation, and relation of the surface of the tegmentum to that of the whole head valve.

Craspedochiton minutulus BAŁUK, 1971
(Pl. 10, Figs 1—5; Pl. 11, Figs 1—7)

1971. *Craspedochiton minutulus* sp. n.; W. BAŁUK, pp. 465—466, Pl. 6, Figs 9—13.
1977. *Craspedochiton minutulus* BALUK; G. F. LAGHI, p. 113, Pl. 4, Figs 13—16.

MATERIAL: Twenty-two head valves, 125 intermediate, and 33 tail valves.

PLATE 8

Acanthochitona faluniensis (ROCHEBRUNE, 1883)

1a — Head valve, × 15; **1b** — fragment of the same specimen, to show details of ornamentation, *SEM* × 110

2 — Another head valve, × 15; **3** — intermediate valve, × 15; **4** — tail valve, × 15

5 — Fragment of intermediate valve, to show details of ornamentation, *SEM* × 100

Photos 1a, 2—4 taken by L. ŁUSZCZEWSKA, M. Sc.

DIMENSIONS of the largest valves (in *mm*):

	length	width
head valve	0.8	1.4
intermediate valve	1.0	1.9
tail valve	1.0	1.6

SUPPLEMENTARY DESCRIPTION: Head valve hemicircular, insertion plate narrow and 5-slitted. Tegmentum featured with fine and densely spaced granules. Each granule bears several (usually 6—10) holes after aesthete, the central one being slightly larger. Insertion plate of the tail valve has 6 to 10 slits.

REMARKS: Formerly, the author (BAŁUK 1971) had a very scarce material at this disposal (20 intermediate, and one tail valve). The newly collected specimens (primarily at occurrence site *4* in Text-fig. 1) contain numerous, formerly unknown head valves, which supplement the features of this species.

The specimens illustrated recently by LAGHI (1977) from the Miocene deposits of Montegibbio, North Italy, are evidently conspecific with those from Korytnica, although their ornamentation, especially in the jugal part of intermediate valves is less distinct.

Genus *Cryptoplax* de BLAINVILLE, 1818
Cryptoplax weinlandi SULC, 1934

1971. *Cryptoplax weinlandi* SULC; W. BAŁUK, p. 466, Pl. 6, Figs 1—8 (*with synonymy*).
1977. *Criptoplax weinlandi* SULC; G. F. LAGHI, p. 114.

MATERIAL: Seventeen head valves, 92 intermediate, and 18 tail valves.

DIMENSIONS of the largest valves (in *mm*):

	length	width
head valve	3.0	2.6
intermediate valve	5.5	2.4
tail valve	5.4	2.0

REMARKS: The newly collected, numerous specimens (primarily in the occurrence site *9* in Text-fig. 1) are identical with those formerly reported, except of the size being larger. This Miocene species, common also in the Vienna Basin (SULC 1934) is recently reported from the contemporaneous deposits exposed near Modena, Italy (LAGHI 1977).

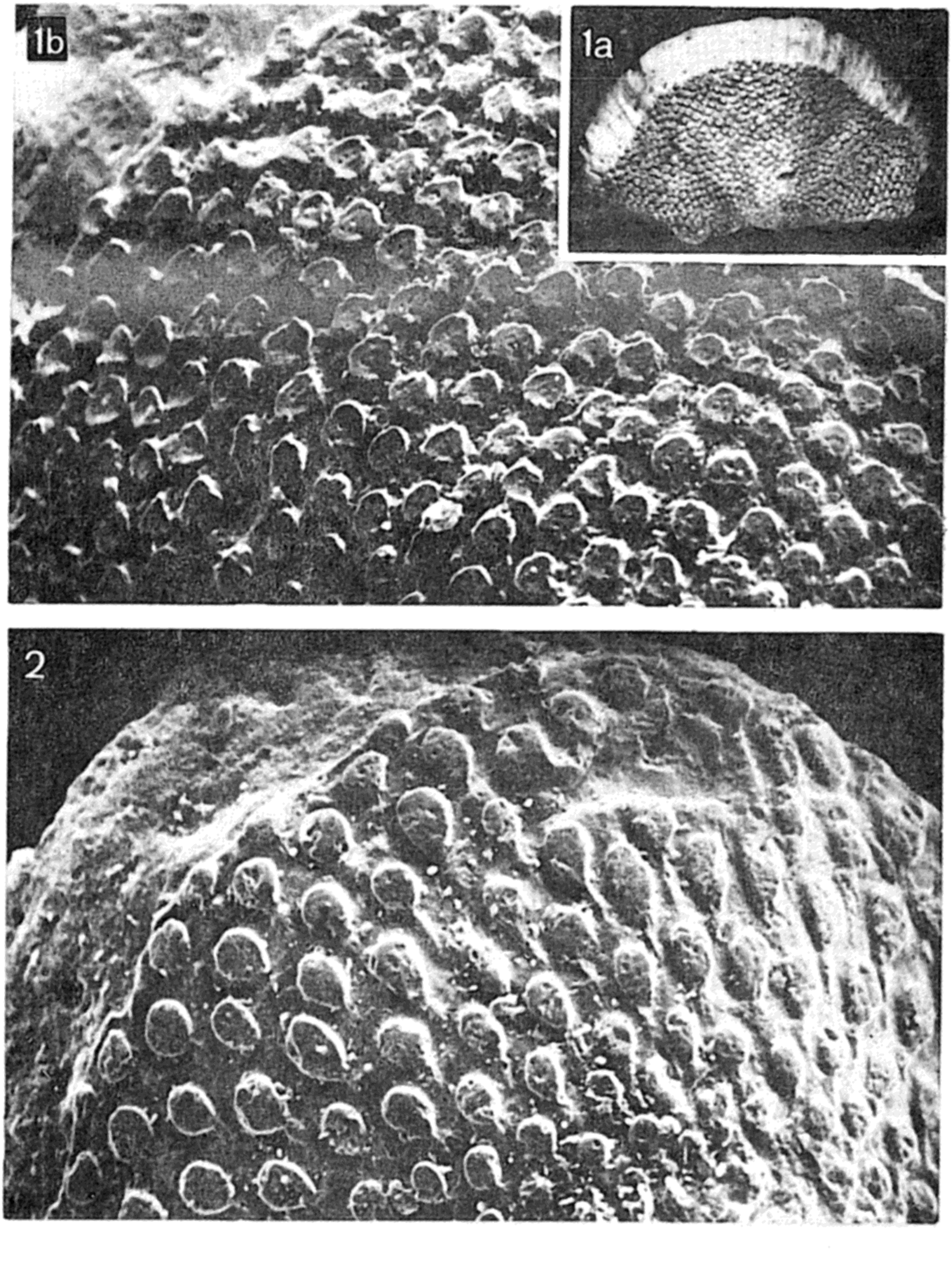
As formerly indicated (BAŁUK 1971) the genus, unknown in present-day European seas, is regarded as typical of the Indo-Pacific regions. Quite recently however, LELOUP (1980) described from the Red Sea the species *Cryptoplax enigmaticus* LELOUP, which differs from the discussed Miocene species in a smaller size, and in the granulated ribs on the lateral areas.

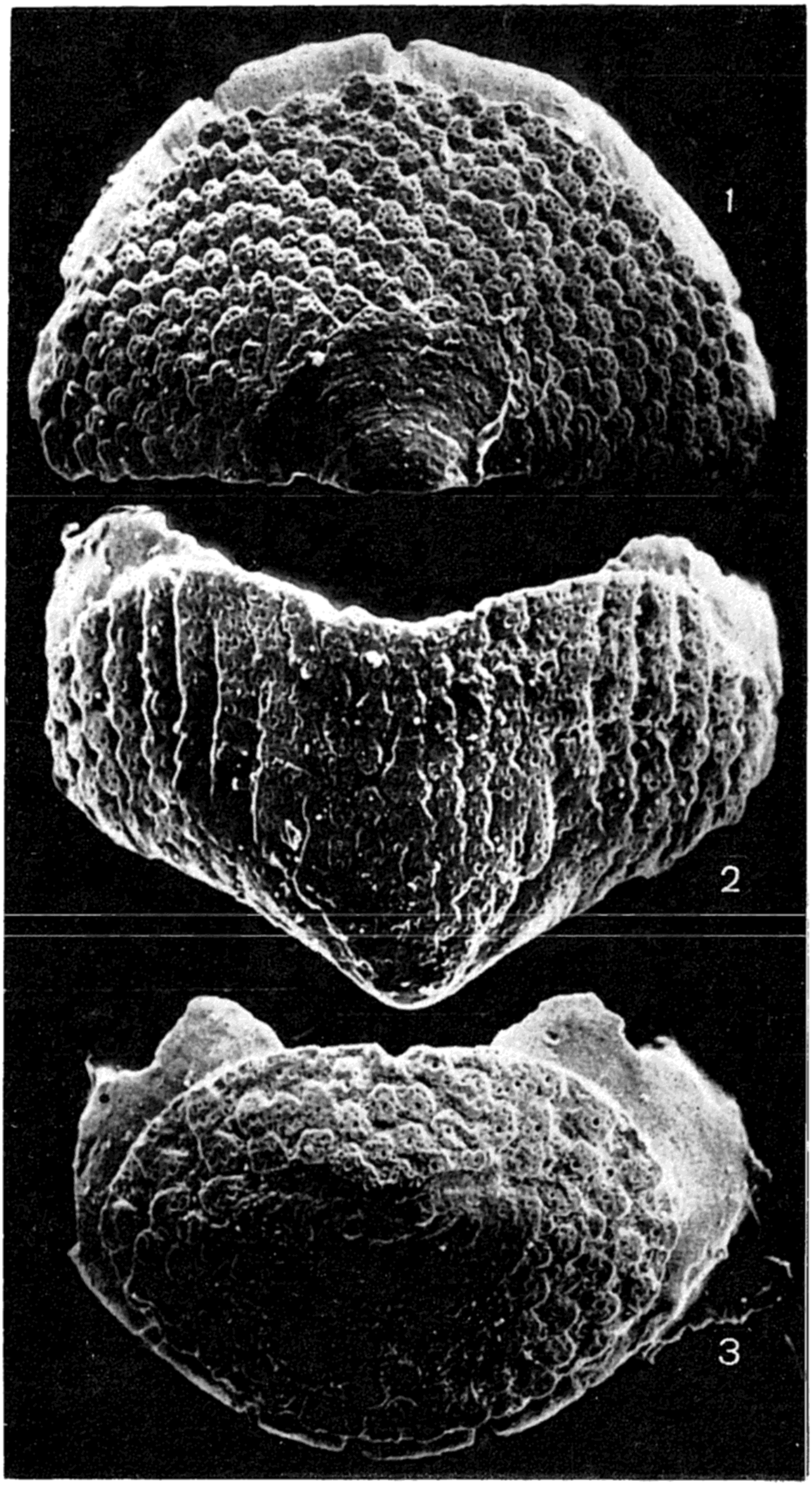
PLATE 9

1a-1b — *Acanthochitona sandeciana* BAŁUK, 1965; *1a* head valve, × 15; *1b* fragment of the same specimen, to show details of ornamentation, *SEM* × 110

2 — *Acanthochitona fascicularis* (LINNAEUS, 1766); fragment of head valve, to show details of ornamentation, *SEM* × 110

Photo 1a taken by L. ŁUSZCZEWSKA, M. Sc.


1b
1a
2


1
2
3

Class Cephalopoda CUVIER, 1794
Subclass Coleoidea BATHER, 1888 [=Dibranchiata OWEN, 1832]
Order Sepiida ZITTEL, 1895
Family Sepiidae KEFERSTEIN, 1866
Genus *Sepia* LINNAEUS, 1758
Sepia sanctacrucensis BAŁUK, 1977
(Pl. 13, Figs 1—2; Pl. 14, Figs 2—7; Pl. 15. Figs 2—7 and Pl. 16)

1977. *Sepia sanctacrucensis* sp. n.; W. BAŁUK, pp. 170—172, Pl. 1, Figs 1—4 and Pl. 2, Figs 1—6.

FORMER MATERIAL: When establishing the species (BAŁUK 1977), only 26 small fragments of the rostral part of sepions were available (from occurrence sites *1—8* in Text-fig. 1).

NEW MATERIAL and its DESCRIPTION: From one of the gastropod shells being a peculiar preservation trap during sedimentation of the Korytnica Clays (*see* BAŁUK & RADWAŃSKI 1977, p. 104), a fragment of the phragmocone has been obtained. This fragment is composed (*see* Pl. 16, Figs 1a—1c) of partly damaged five septa (it thus comprises fragments of 4 camerae) with folded intracameral walls. When compared with a fragment of the phragmocone of a present-day specimen of *Sepia officinalis* LINNAEUS, it does not display greater differences, except of an obvious lack of organic lamellae parallelling the septa (*compare* Pl. 16, Fig. 1c and Pl. 17, Fig. 1a). A mode of rippling of the intracameral walls, due to which a labyrinth pattern of the wall attachments to a given septum is acquired, appears remarkably similar in these two specimens (*compare* Pl. 16, Figs 1a—1b and Pl. 17, Fig. 1b). The interseptal distances cannot be compared because of an unknown position of the fragment within the sepion in the case of the Korytnica specimen. In present-day *Sepia officinalis* LINNAEUS, the interseptal distances are variable not only in different parts of the sepions, but sometimes also in the identical fragments (*see* HEWITT & PEDLEY 1978, Pl. 1, Fig. A), being dependant on diverse factors, the food supply including (BOLETZKY & WIEDMANN 1978).

The second finding consists of a group of 20 small fragments of the dorsal wall, belonging supposedly to one sepion, and coming from a very small sample of the clays from locality Korytnica-Plebania (occurrence site *9* in Text-fig. 1). All these fragments (*see* Pl. 13, Figs 1—2; Pl. 14, Figs 2—7; Pl. 15, Figs 2—7) are attributable to a sepion part distant from the rostrum. The largest one (Pl. 14, Fig. 7 and Pl. 15, Fig. 7) attains dimensions 5.5 by 4.0 mm. Remarkably well preserved, all are composed of the two layers (*see* Pl. 15, Fig. 3), the outer being the guardlike sheath, and the inner the conothecal wall. The guardlike sheath (regarded as homologous to the belemnite guard; *see* JELETZKY 1966), built of the calcareous substance covering the conothecal wall, is about 2 or 3 times thicker than the latter; the total thickness of the fragments amounts up to *ca.* 0.6 mm. Ornamentation on the outer surface of the guardlike sheath is expressed (*see* Pl. 13, Fig. 2 and Pl. 14, Figs. 2—7) by numerous, boss-like to vermicular protuberances of variable size, always narrow and parallelling each other. On the inner surface of

---

PLATE 10

Craspedochiton minutulus BAŁUK, 1971

1 — Head valve, 2 — intermediate valve, 3 — tail valve, *SEM* × 110

the specimens visible is the inner surface of the conothecal wall provided which the septa (in the number of 5 in the largest specimen; *see* Pl. 15, Fig. 7), damaged almost totally. On the inner surface of the conothecal wall visible are also, between the septal attachments, very delicate traces of the attachment of intracameral walls (*see* Pl. 15, Figs. 2—7; magnified in Pl. 13, Fig. 1) and moreover, in some specimens (*see* Pl. 15, Figs 2 and 6—7), distinct ridges running divergently anteriorly (two of them are well visible in Pl. 15, Fig. 2). When compared with fragments of the sepion of *Sepia officinalis* LINNAEUS (the same as in the former case; *see* Pl. 14, Fig. 1 and Pl. 15, Fig. 1), the Korytnica specimens differ distinctly in the more pronounced ornamentation of the guardlike sheath (especially by the presence of vermicular protuberances), and in having been sculptured by the ridges on the inner surface of the conothecal wall.

REMARKS: Both the herein presented specimens and those of the rostral part of sepions reported formerly (BAŁUK 1977) do not match any ancient species of *Sepia* (reviewed *in* BAŁUK 1977, pp. 172—174; the same concerns the Maltese forms described by HEWITT & PEDLEY 1978). All the specimens illustrated by BELLARDI (1873) display a different, and usually more pronounced ornamentation of the guardlike sheath. Any comparable data on the structure of the septa, intracameral walls, and the inner surface of the conothecal wall remain still not available.

The newly investigated specimens are attributed to the formerly established species, *Sepia sanctacrucensis* BAŁUK, 1971, although such a treatment cannot be proved until the more complete sepions are found.

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

REFERENCES

BAŁUK, W. 1965. Chitons from the Tortonian of the Nowy Sącz Depression, Poland. *Acta Palaeont. Polon.*, 10 (3), 365—378. Warszawa.

— 1971. Lower Tortonian chitons from the Korytnica Clays, southern slopes of the Holy Cross Mts. *Acta Geol. Polon.*, 21 (3), 449—452. Warszawa.

— 1977. A new species of the cuttlefish from the Korytnica Clays (Middle Miocene; Holy Cross Mountains, Poland). *Acta Geol. Polon.*, 27 (2), 169—176. Warszawa.

BAŁUK, W. & JAKUBOWSKI, G. 1968. *Berthelinia krachi* n. sp., a new bivalved gastropod from the Miocene of Poland. *Acta Palaeont. Polon.*, 13 (2), 291—302. Warszawa.

BAŁUK, W. & PISERA, A. 1984. A new species of sea pens, *Graphularia transaedina* sp. n., from the Korytnica Clays (Middle Miocene; Holy Cross Mountains, Central Poland). *Acta Geol. Polon.*, 34 (3—4) [*this issue*]. Warszawa.

BAŁUK, W. & RADWAŃSKI, A. 1977. Organic communities and facies development of the Korytnica Basin (Middle Miocene; Holy Cross Mountains, Central Poland). *Acta Geol. Polon.*, 27 (2), 85—123. Warszawa.

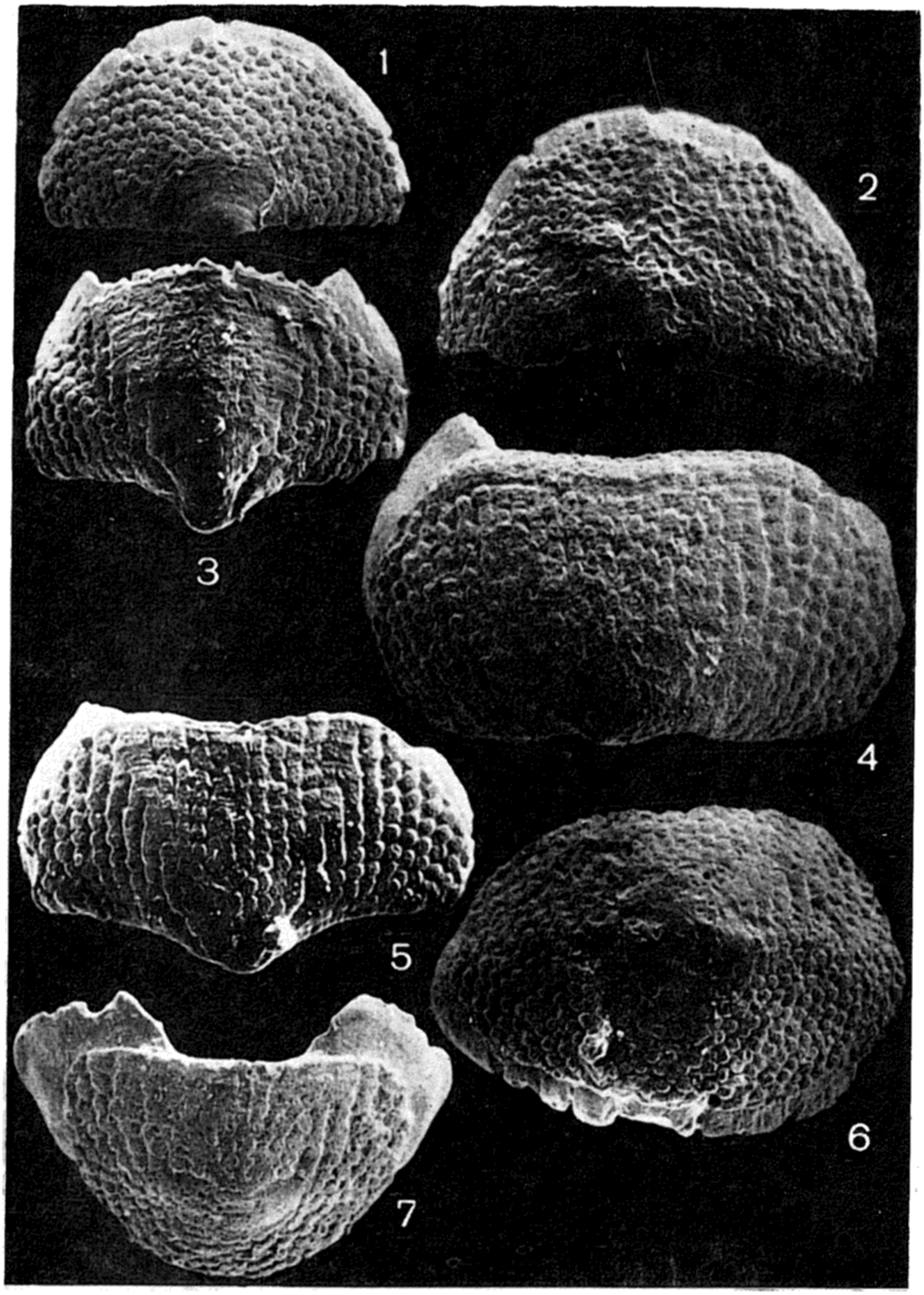
— & — 1979. Additional data on the organic communities and facies development of the Korytnica Basin (Middle Miocene; Holy Cross Mountains, Central Poland). *Acta Geol. Polon.*, 29 (3), 225—238. Warszawa.

— & — 1984a. Free-living bryozoans from the Korytnica Clays (Middle Miocene; Holy Cross Mountains, Central Poland). *Acta Geol. Polon.*, 34 (3—4 [*this issue*]. Warszawa.

— & 1984b. Creusioid cirripedes from the Korytnica Clays (Middle Miocene; Holy Cross Mountains, Central Poland). *Acta Geol. Polon.*, 34 (3—4) [*this issue*]. Warszawa.

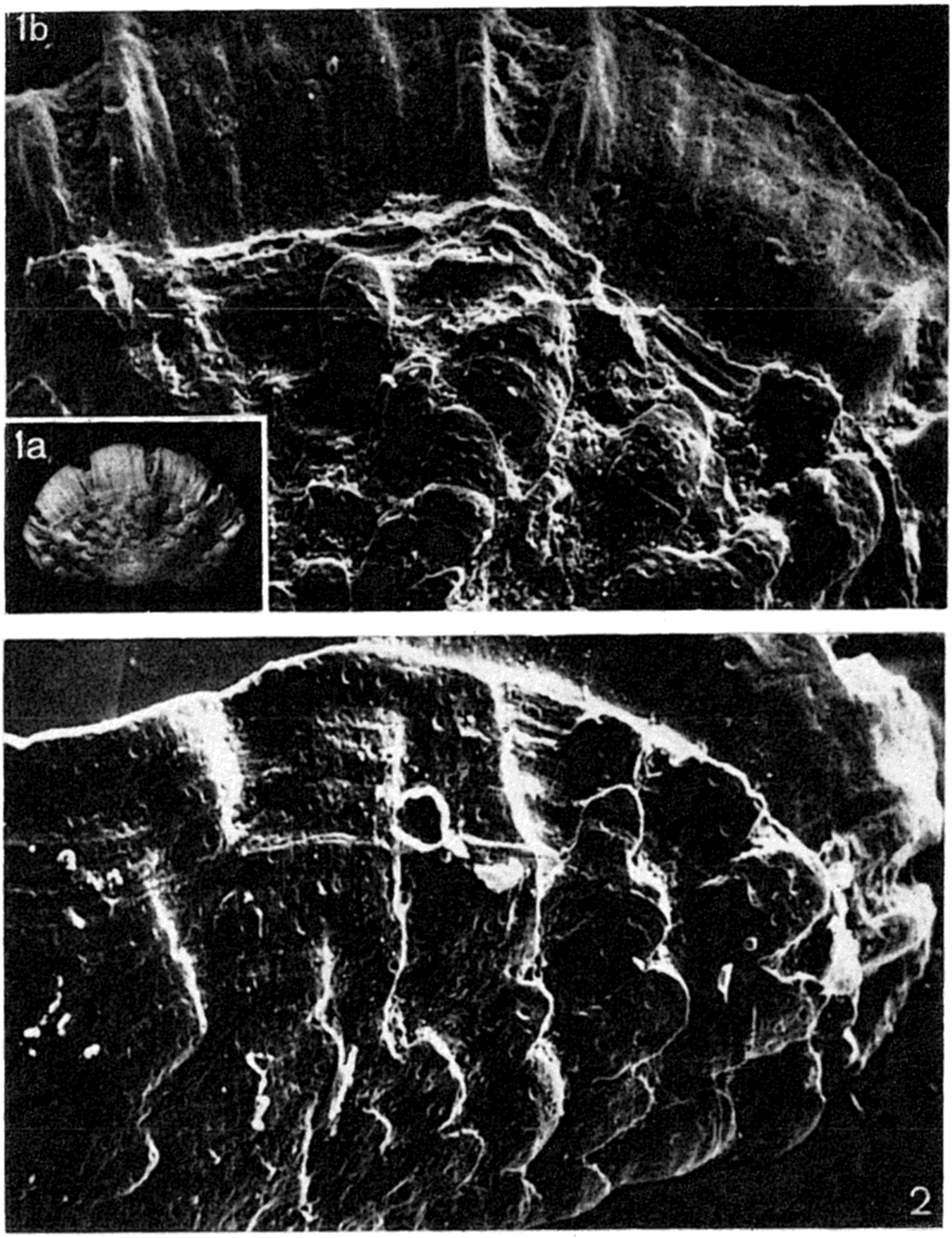
BOETTGER, O. 1907. Zur Kenntnis der Fauna der mittelmiocänen Schichten von Kostej im Krassó-Szörenyer Komitat, 3. *Verh. u. Mitteil. Siebenburg. Ver. Naturwiss.*, 55, 102—217. Harmannstadt.

BOLETZKY, S. & WIEDMANN, J. 1978. Schulp-Wachstum bei *Sepia officinalis* in Abhängigkeit von ökologischen Parametern. *N. Jb. Geol. Paläont. Abh.*, **157** (1—2), 103—106. Stuttgart.
FRIEDBERG, W. 1928. Études sur la Miocène de la Pologne, partie *IV*. *Kosmos, A*, **53** (2—3), 313—325. Lwów.
HEWITT, R. A. & PEDLEY, H. M. 1978. The preservation of the shell of *Sepia* in the Middle Miocene of Malta. *Proc. Geol. Ass.*, **89** (3), 227—237. London.
JELETZKY, J. A. 1966. Comparative morphology, phylogeny, and classification of fossil Coleoidea. *Paleont. Contr. Univ. Kansas*, **7**, 1—162. Lawrence, Kansas.
KAAS, P. 1977. Notes on Loricata, *9*. On the rediscovery of *Lepidopleurus africanus* NIERSTRASZ, 1906 and the systematic position of the taxon *Parachiton* THIELE, 1909. *Basteria*, **41**, 81—86. Leiden.
— 1978. Notes on Loricata, *10*. On the European *Callochiton* species. *Basteria*, **42**, 73—75. Leiden.
— 1981. Scandinavian species of *Leptochiton* GRAY, 1847 (Mollusca, Polyplacophora). *Sarsia*, **66**, 217—229. Bergen.
KAAS, P. & VAN BELLE, R. A. 1981. The genus *Lepidochitona* GRAY, 1821 (Mollusca: Polyplacophora) in the Northeastern Atlantic Ocean, the Mediterranean Sea and the Black Sea. *Zool. Verhandelingen*, **185**, 1—43. Leiden.
LAGHI, G. F., RUSSO, F. & DELL'ANGELO, B. 1980. Recenti ritrovamenti di *Lepidopleurus (Parachiton) africanus* NIERSTRASZ, 1906 (Polyplacophora, Mollusca). *Atti Soc. Nat. Mat. Modena*, **111**, 1—7. Modena.
LELOUP, E. 1980. Chitons de la Mer Rouge, du Golfe de Suez et de la Méditerranée. *Bull. Inst. R. Sci. Nat. Belg., Biologie*, **52** (5), 1—14. Bruxelles.
LELOUP, E. & VOLZ, P. 1938. Die Chitonen (Polyplacophoren) der Adria. *Thalassia*, **2** (10), 1—63. Jena.
MALATESTA, A. 1962. Mediterranean Polyplacophora Cenozoic and Recent. *Geol. Romana*, **1**, 145—171. Roma.
MARINESCU, J. 1964. Reprezentanti ai clasei Amphineura in Miocenul din Oltenia. *Dari de Seama ale Sedintelor*, **50** (1), 179—185. Bucuresti.
RADWAŃSKA, U. 1984. Some new fish otoliths from the Korytnica Clays (Middle Miocene; Holy Cross Mountains, Central Poland). *Acta Geol. Polon.*, **34** (3—4) [*this issue*]. Warszawa.
RADWAŃSKA, U. & RADWAŃSKI, A. 1984. A new species of inarticulate brachiopods, *Discinisca polonica* sp. n., from the Korytnica Clays (Middle Miocene; Holy Cross Mountains, Central Poland). *Acta Geol. Polon.*, **34** (3—4) [*this issue*]. Warszawa.
RADWAŃSKI, A. 1969. Lower Tortonian transgression onto the southern slopes of the Holy Cross Mts. *Acta Geol. Polon.*, **19** (1), 1—164.
REUSS, A. E. 1860. Die marinen Tertiärschichten Bohmens und ihre Versteinerungen. *S. B. Akad. Wiss. Wien*, **39**, 250—270. Wien.
SMITH, A. G. 1960a. Amphineura. *In*: R. C. MOORE (*Ed.*), Treatise on Invertebrate Paleontology, Part I (Mollusca *1*), *I*41—*I*76. Lawrence, Kansas.
— 1960b. The type species of *Lepidopleurus* LEACH *in* RISSO, 1826. *Veliger*, **2** (4), 75—77. Berkeley.
SULC, J. 1934 (1936). Studien über die fossilen Chitonen, *I*. Die fossilen Chitonen im Neogen des Wiener Beckens und angrenzenden Gebiete. *Ann. Naturhist. Mus. Wien*, **47**, 1—31. Wien.
ZILCH, A. 1934. Zur Fauna des Mittel-Miocäns von Kostej (Banat). *Senckenbergiana*, **16** (1—6), 193—302. Frankfurt a. M.



Craspedochiton minutulus BAŁUK, 1971

1-2 — Head valves, **3-5** — intermediate valves, **6-7** — tail valves, SEM × 50 (*1* presents the same specimen as in Pl. 10, Fig. 1)

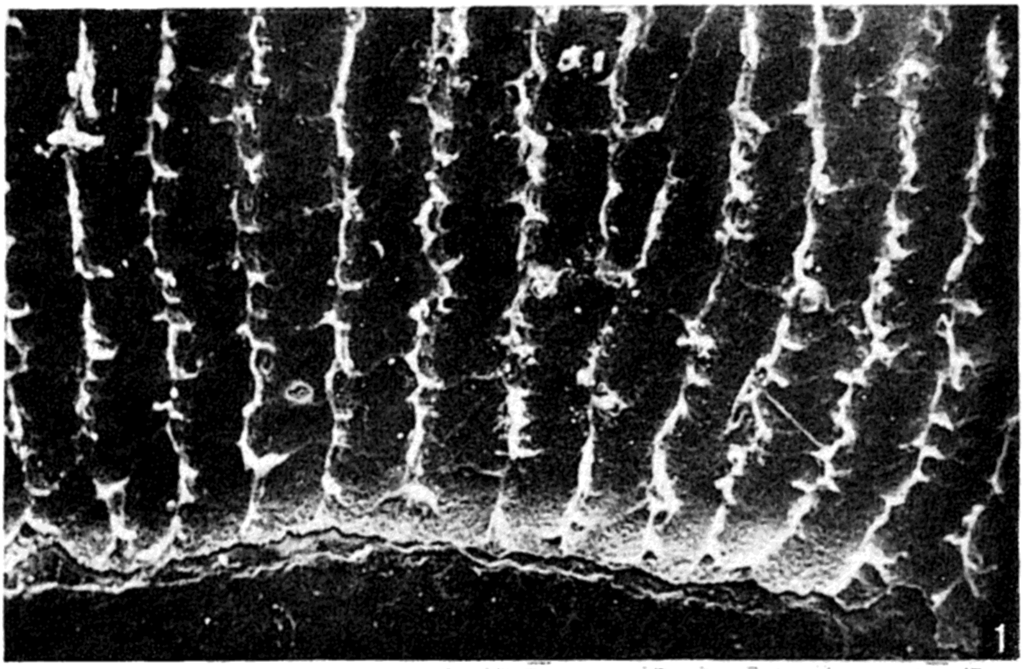


Craspedochiton profascicularis (BOETTGER, 1907)

1a-1b — Head valve: *1a* × 15; *1b* fragment of the same specimen, to show the slits and the associated ridges, as well as details of ornamentation of the tegmentum, *SEM* × 120

2 — Fragment of intermediate valve, to show details of ornamentation, *SEM* × 120

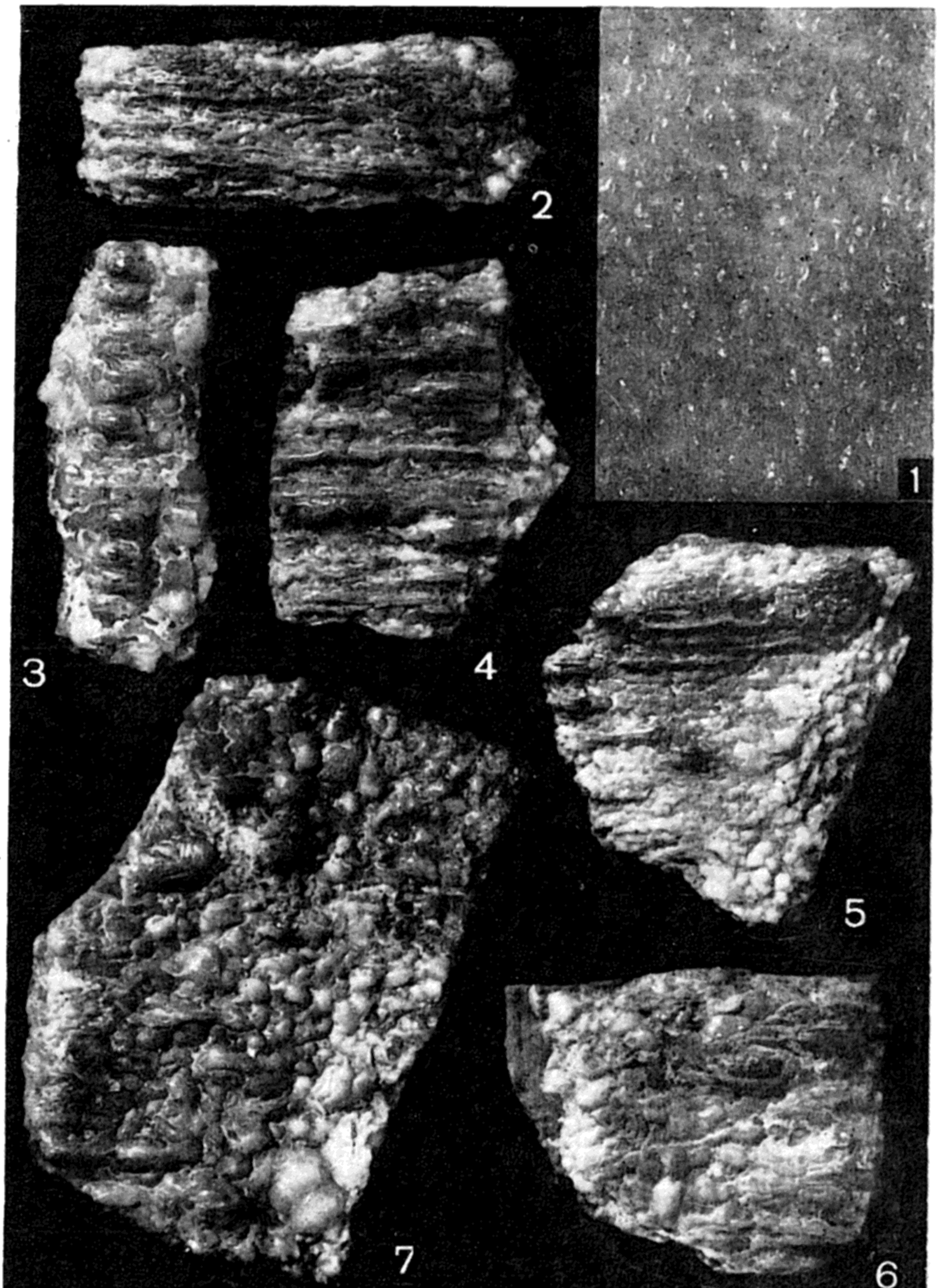
Photo 1a taken by L. ŁUSZCZEWSKA, M. Sc.



Sepia sanctacrucensis BAŁUK, 1977

1 — Fragment of the inner surface of conothecal wall; visible are a broken-out septum (*at base*) and intracameral walls (*above*), *SEM* × 60

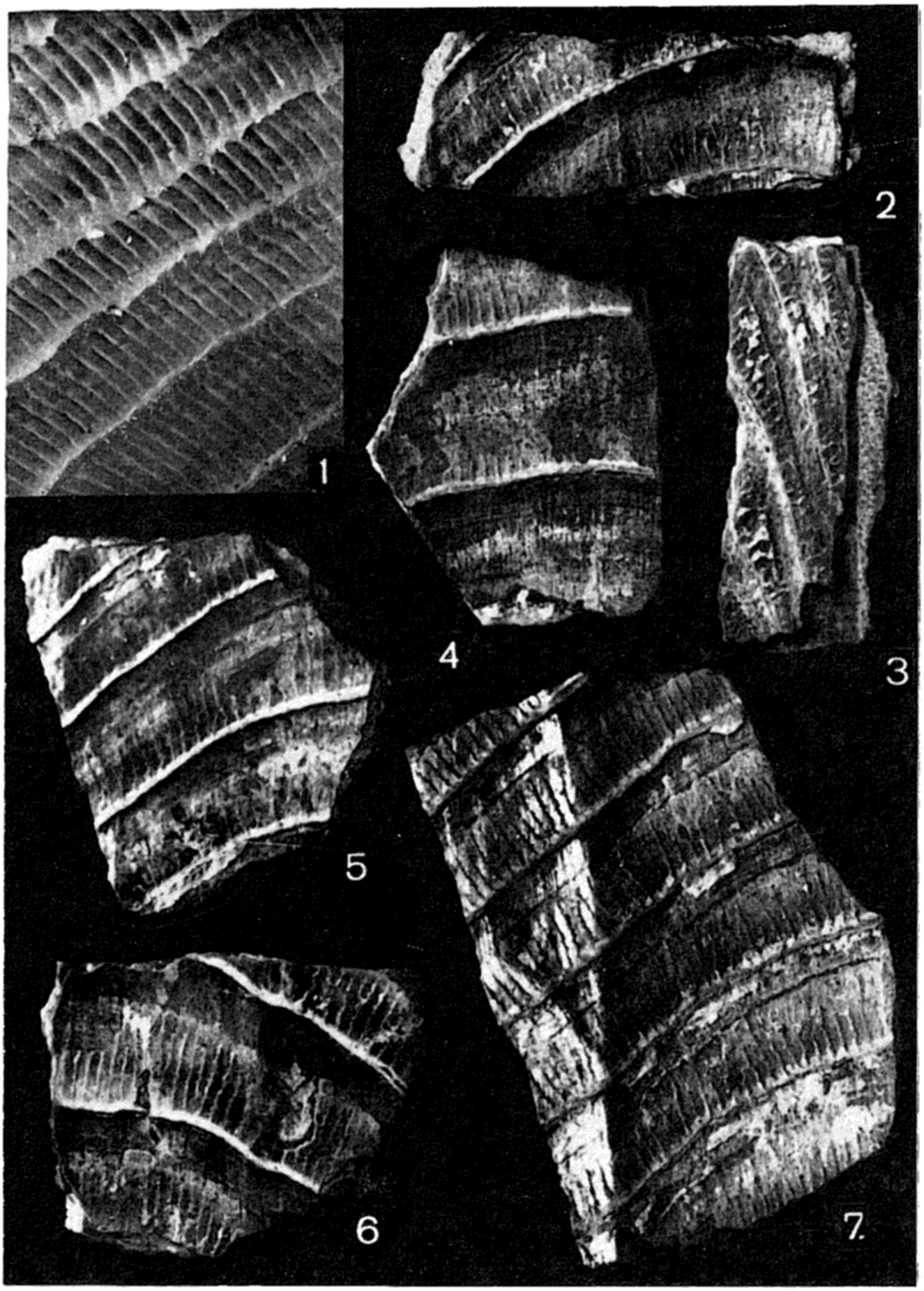
2 — Fragment of the outer surface of guardlike sheath: boss-like ornamentation developed as protuberances, *SEM* × 120



1 — *Sepia officinalis* LINNAEUS: fragment of the outer surface of guardlike sheath (*cf.* Pl. 15, Fig. 1); present-day specimen from Africa

2-7 — *Sepia sanctacrucensis* BAŁUK: fragments of the outer surface of guardlike sheath with ornamentation as boss-like and vermicular protuberances (*cf.* Pl. 15, Figs 2—7)

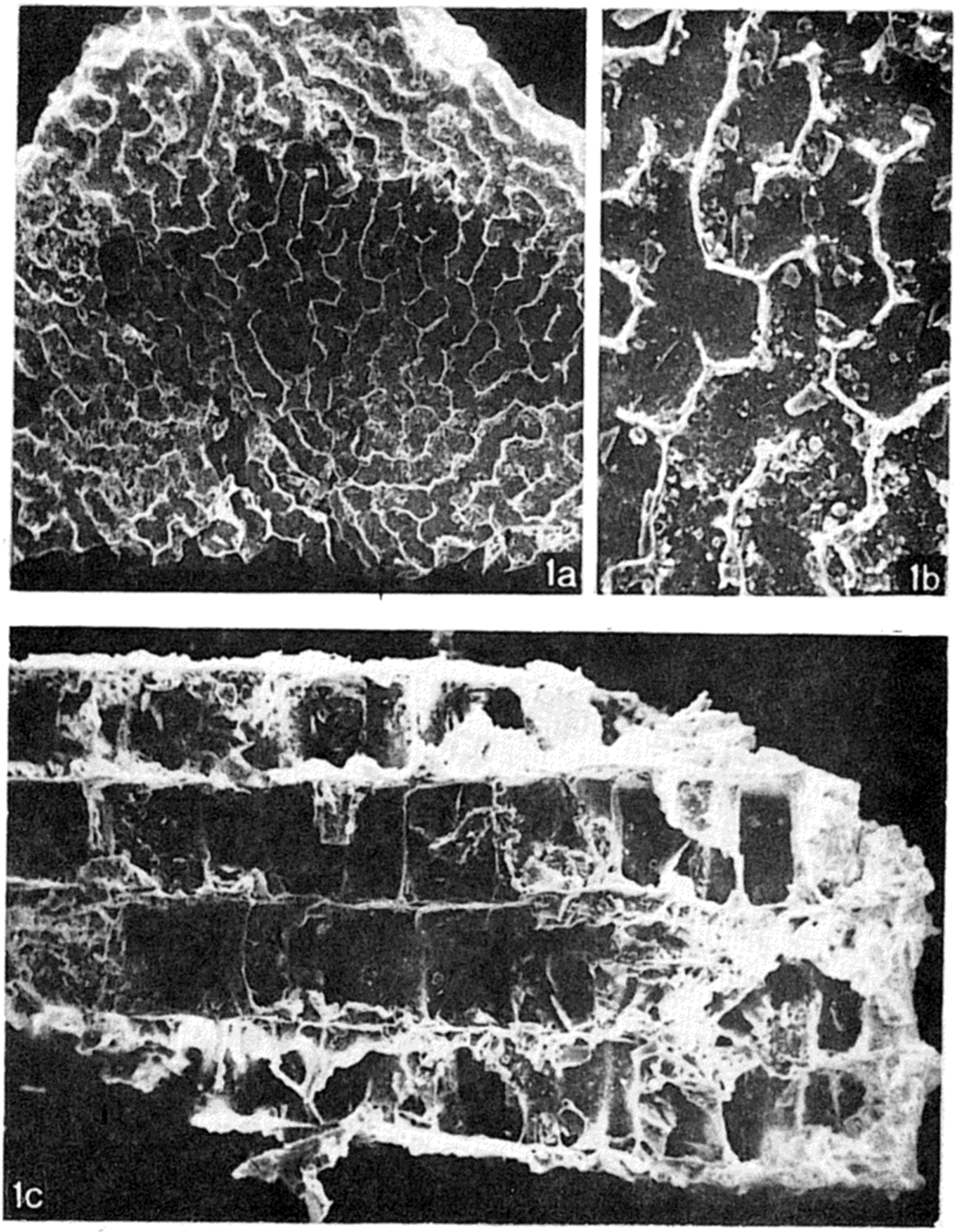
All photos × 15; taken by L. ŁUSZCZEWSKA, M. Sc.



1 — *Sepia officinalis* LINNAEUS: fragment of the inner surface of conothecal wall with broken-out septa and intracameral walls (*cf.* Pl. 14, Fig. 1)

2-7 — *Sepia sanctacrucensis* BAŁUK: fragments of the inner surface of conothecal wall with broken-out septa and intracameral walls (in Figs 2 and 7 visible are longitudinal ridges; in Fig. 3 inner surface of guardlike sheath below the conothecal wall partly broken-off)

All photos × 15; taken by L. ŁUSZCZEWSKA, M. Sc.

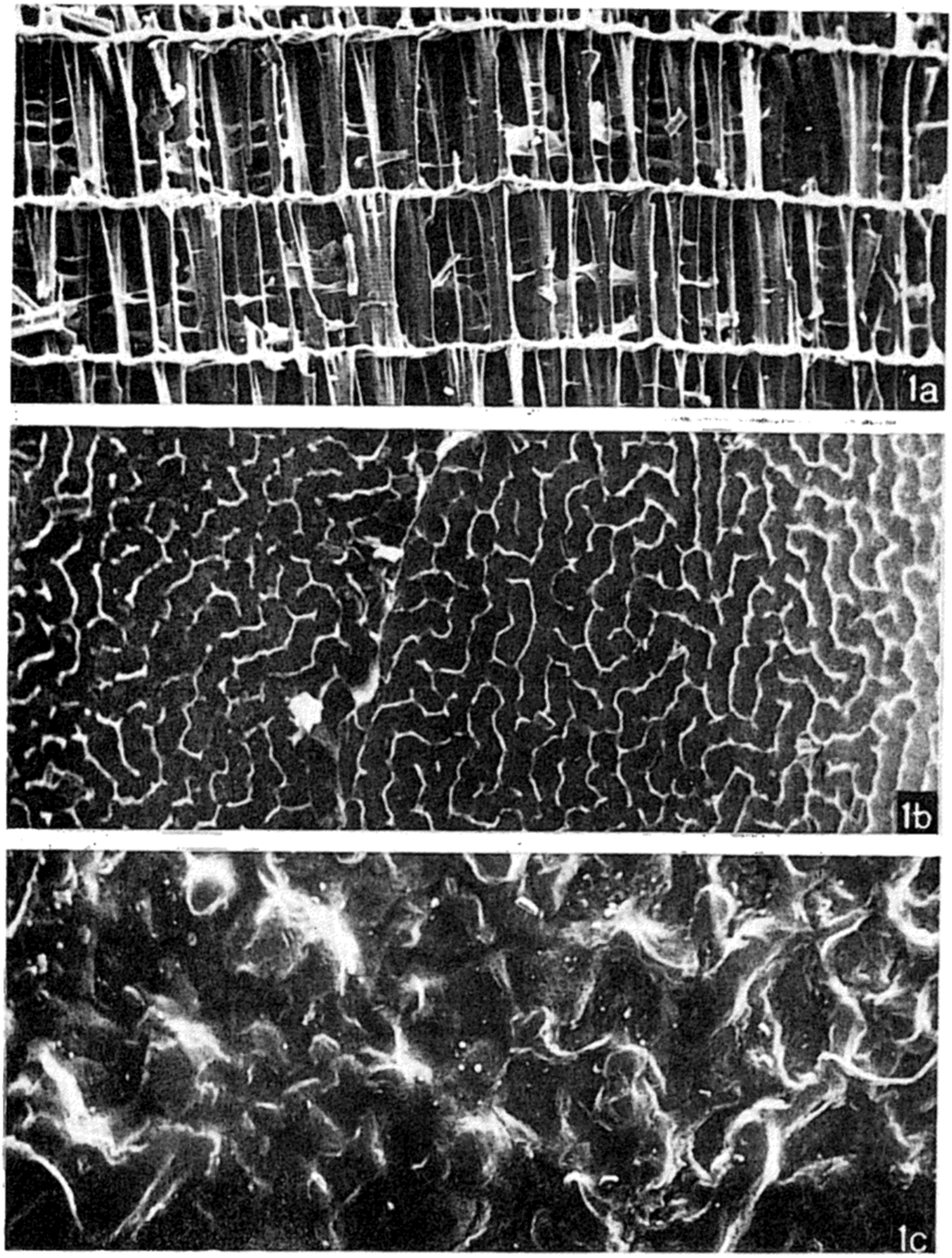


Sepia sanctacrucensis BAŁUK, 1977

1a — Surface of septum, with a labyrinth pattern visible after breakage of folded intracameral walls, *SEM* × 60

1b — Fragment of the same surface, *SEM* × 120

1c — Fragment of phragmocone: visible are 5 septa and intracameral walls, *SEM* × 120



Sepia officinalis LINNAEUS; present-day specimen from Africa

1a — Fragment of phragmocone: visible are 3 septa and intracameral walls with perpendicular organic lamellae, *SEM* × 60

2a — Surface of 2 septa: visible is a labyrinth pattern after breakage of intracameral walls, *SEM* × 60

3a — Fragment of the outer surface of guardlike sheath, to show its ornamentation, *SEM* × 60