

## Description of a new *Leptochiton* from the Azores and of a new *Lepidozona* from Vietnam (Mollusca, Polyplacophora)

by Hermann L. STRACK

**Abstract.** — *Leptochiton pseudogloriosus* n. sp. from the Azores (North East Atlantic) is described and compared with the closely related *L. gloriosus* Kaas from the Iles Glorieuses (western Indian Ocean). The specimen on which the description is based was previously recorded as *Ischnochiton (Stenosemus) albus* (L.), the geographic and bathymetrical range of which is discussed. *Lepidozona vietnamensis* n. sp. from Vung Tau, Vietnam, is described and its taxonomic position is discussed.

**Résumé.** — *Leptochiton pseudogloriosus* n. sp. des Açores (Atlantique orientale) est décrit et comparé avec l'espèce la plus proche, *L. gloriosus* Kaas des îles Glorieuses (océan Indien occidental). L'exemplaire sur lequel la description est fondée, était antérieurement mentionné comme *Ischnochiton (Stenosemus) albus* (L.). La distribution géographique et la répartition bathymétrique de cette espèce sont reconsidérées et établies. *Lepidozona vietnamensis* n. sp. de Vung Tau, Vietnam, est décrit et sa position taxonomique est discutée.

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### INTRODUCTION

While curating the Polyplacophora collection of the Muséum national d'Histoire naturelle (Paris) in 1989, I recognized two undescribed species of chitons. The first species, previously misidentified as *Ischnochiton (Stenosemus) albus* (L., 1767) [KAAS, 1979 : 28], was dredged in 815 m, east of São Miguel, Azores. The second species was found among unidentified material in the old museum collection and originated from Vung Tau, Vietnam.

#### Abbreviations

HLS : private collection of H. L. Strack, Rotterdam.  
MNHN : Muséum national d'Histoire naturelle, Paris.  
MOM : Musée Océanographique, Monaco.  
NMNZ : National Museum of New Zealand, Wellington.

SYSTEMATICS

**Leptochiton pseudogloriosus** n. sp.

(Pl. I, 1-8; Pl. III, 1-3)

**MATERIAL** : Holotype MNHN; Biaisores Expedition St. 197; East of São Miguel, Azores, 37°49'.5" N, 25°01'.5" W; 815 m; bottom consisting of sand, pebbles, stones and corals; 5.XI.1971. A formerly rolled up, alcohol preserved specimen, measuring 4.2 mm in length, 3.6 mm in width (in rolled up position), now disarticulated. Estimated extended length about 8 mm. About half of the radula and girdle preserved in alcohol, the remainder mounted on a stub and coated for SEM photography.

**DIAGNOSIS** : Animal of small size, up to 8 mm long, elongate oval, highly elevated (height/width quotient valve 4 : 0.51), carinated, side slopes slightly convex, almost straight (pl. III, 1). The valves hardly beaked, lateral areas somewhat raised. Mucro of tail valve slightly anterior, postmucronal slope concave. Tegmentum sculptured with relatively large, well separated, highly elevated granules, that are arranged (or at least give that impression) in more or less longitudinal chains on outer ends of central area, and quincincially arranged towards the jugum. Apophyses connected by a delicate jugal plate. Girdle narrow, dorsally covered with subquadrate, longitudinally ridged, scales. Radula with about 125 rows of mature teeth.

DESCRIPTION

Head valve (pl. I, 1) semicircular, anterior slope straight, posterior margin widely V-shaped. Intermediate valves (pl. I, 2) more or less rectangular, anterior margin convex between apophyses in valve II, almost straight in valves III-VIII, side margins evenly rounded, posterior margin directed forward, lateral areas slightly raised. Tail valve (pl. I, 3) almost semicircular, mucro slightly anterior, not pointed, postmucronal slope concave (pl. III, 2).

Tegmentum granulated all over, granules hollow, well separated, roughly hemispherical, relatively large, diameter 50 to 60  $\mu\text{m}$ . Granules highly elevated (30-40  $\mu\text{m}$ ), although less elevated on jugal areas. Posterior margin of lateral areas serrated by large granules. In head valve, lateral and jugal areas of median valves and postmucronal area of tail valve, granules are in quincunx; on outer edges of central areas of median valves, granules seem to be arranged (depending on the lighting) in more or less regular, longitudinal, close set chains, about 15-17 per side. Growthlines not discernible, colour of tegmentum white.

Articulamentum white, somewhat transparent, apophyses well developed for the genus, broadly triangular, evenly rounded in tail valve. Thin, delicate jugal plate present in valves II-VII, absent in valve VIII. Jugal plate not dentated, but dorsally roughened.

Girdle narrow, dorsally covered with subquadrate, convex scales (pl. I, 4), up to 62  $\times$  58  $\mu\text{m}$ , ornamented with 8-10 riblets. Girdle scales interspersed with few, slender, cylindrical, straight, finely striated needles, up to 400  $\mu\text{m}$  long. Ventrally girdle paved with rows of flat, round-tipped scales, distally ornamented with 4-7 longitudinal sulci (pl. I, 5). This ornamentation is strongest near outer margin of girdle. Scales measure 50-70  $\times$  18-22  $\mu\text{m}$ , largest near outer margin of girdle. Marginal spicules (pl. I, 6) somewhat flattened, 95-120  $\mu\text{m}$  long, 30  $\mu\text{m}$  wide, torpedo-shaped, with 3-5 riblets.

Radula (pl. I, 7) 3.1 mm in length, with about 125 rows of mature teeth. Central tooth

(pl. I, 8) elongate, slender, distally tapering and strongly curved. Major lateral tooth (pl. III, 3) with single, slender, curved and sharply pointed head, 60-70  $\mu\text{m}$  long.

The gills could not be studied because the unique specimen was completely rolled up.

#### OBSERVATIONS

*Leptochiton pseudogloriosus* n. sp. has little in common with all known northeastern Atlantic species of *Leptochiton*. From other deep water *Leptochiton* species living in adjacent areas, such as *L. alveolus* (Lovén), *L. leloupi* Kaas, *L. tenuis* Kaas, *L. gascognensis* Kaas & Van Belle and *L. thalattius* Kaas & Van Belle, it can be easily differentiated by the tegmental sculpture, the girdle armature and in some instances the radula. On the other hand *L. pseudogloriosus* bears a strong superficial similarity to *L. gloriosus* Kaas, 1985, from the Iles Glorieuses (North West of Madagascar, western Indian Ocean). *L. gloriosus* and *L. pseudogloriosus* are so similar that it is highly likely that they had a close common ancestry. The characters discriminating the two species are shown on table I.

TABLE I. — Characters discriminating *Leptochiton pseudogloriosus* n. sp. from *Leptochiton gloriosus* Kaas, 1985.

<i>Leptochiton gloriosus</i> (holotype ca. 7 mm)	<i>Leptochiton pseudogloriosus</i> (holotype ca. 8 mm)
Back roundly arched	Back carinated
Dorsal girdle scales elongate	Dorsal scales almost square
Bases of dorsal girdle scales broadened	Bases of dorsal girdle scales not broadened
Dorsal girdle scales with 6-8 riblets	Dorsal girdle scales with 8-10 riblets
Tip of ventral girdle scales pointed	Tip of ventral girdle scales rounded
Ventral girdle scales smooth	Ventral girdle scales distally with 4-7 sulci
40 rows of mature radular teeth	Ca. 125 rows of mature radular teeth
Length head major lateral tooth 80-85 $\mu\text{m}$	Length head major lateral tooth 60-70 $\mu\text{m}$
Head major lateral tooth broad at the base	Head major lateral tooth slender at the base

In the discussion of his record of *Ischnochiton (Stenosemus) albus* (L., 1767), KAAS (1979 : 28) referred to another sample from the Azores (38°33'.21" N, 29°08'.39" W, 1300 m depth), originally recorded by DAUTZENBERG (1927 : 231). DAUTZENBERG also recorded *L. albus* from off the Canary Islands near Tenerife, 1530-1340 m depth), and from the Bay of Biscay (63 m depth). KAAS overlooked the fact that BERGENHAYN (1931 : 9-10 & 14) had reexamined the material recorded by DAUTZENBERG (in colln. MOM), and found that none of the specimens recorded were correctly identified. In fact they proved to belong to four distinct species, none of which was *I. albus*. BERGENHAYN's conclusions were largely confirmed during the present study, although his identifications of *Lepidopleurus scabridus* (Jeffreys) and *Ischnochiton rissoi* (Payraudeau) (the specimen recorded from the Azores), both based on single valves, represent respectively a probably yet undescribed species of *Leptochiton* and *Ischnochiton (Stenosemus) exaratus* (G. O. Sars). Present collections and data indicate that *I. albus* is an arctic and circum-boreal species that does not occur south of 50° N. It is most common between low

water level and 100 m depth, records from deeper water are rather exceptional and in many cases due to misidentification.

**Lepidozona vietnamensis** n. sp.

(Pl. II, 1-8 ; Pl. III, 4-5)

**MATERIAL** : Holotype MNHN ; Cap St. Jacques (= Vung Tau), Vietnam ; 1908 ; Mr. MODEST leg. A well flattened, dry preserved specimen, length 14 mm, width 8 mm, colour cream, tegmentum with some grey spots. Paratypes : same locality, four specimens (of which one is disarticulated) MNHN Paris ; same locality, one disarticulated specimen, colln. HLS no. 1860.

**DIAGNOSIS** : Animal of medium size, up to 17 mm long, oval, moderately elevated (height/width quotient valve 4 : 0.29 up to 0.4 in older specimens), carinated, side slopes convex. Valves not beaked, lateral areas separated from central areas by thick, highly elevated ribs. Head and tail valves with few prominent ribs. Mucro of tail valve about median, postmucronal slope straight in juvenile and subadult specimens. Tegmentum sculptured with strong radial ribs on head valve, tail valve and lateral areas, ribs with one or two rows of highly elevated pustules. Central areas with longitudinal granulose ribs, latticed in between. Girdle moderately wide, dorsally covered with ribbed, nipple crowned scales.

**DESCRIPTION**

Head valve (pl. II, 1) semicircular, anterior slope straight in younger specimens, convex in largest specimen, posterior margin widely V-shaped, medially notched, tegmentum sculptured with 11-12 strong radial ribs (see table II), which are pitted in between (more conspicuous in small specimens), each rib ornamented with one, sometimes two rows of well separated, highly elevated, cylindrical pustules (pl. II, 5) that measure 90-100  $\mu$ m in diameter, about 5-8 pustules per row. Intermediate valves (pl. II, 2-3) broadly rectangular, anterior margin of tegmentum straight or slightly convex, side margins rounded ; lateral areas with two strong radial ribs sculptured like head valve, central area with 9-16 narrow, longitudinal, granulose ribs on each side (the number of ribs increases with age, see table II), the interspaces densely transversely grooved (pl. II, 6). Tail valve (pl. II, 4) less than semicircular, narrower than head valve, with 8-11 strong radial ribs (see table II) sculptured like head valve, mucro slightly anterior or central, somewhat pointed, postmucronal slope straight, postmucronal slope of largest specimen makes a steep, straight second drop. Colour of tegmentum cream with grey spots, one specimen pale green with cream jugal band.

TABLE II. — Data of type series of *Lepidozona vietnamensis* n. sp.

	SL	RHV	RTV	RPA	NG
Paratype 1	9.5	12	11	9	24/24
Paratype 2	10.5	11	9	9	23/24
Paratype 3	11.5	12	9	10	26/26
Holotype	14	11	8	10	25/25
Paratype 4	14.5	11	11	14	24/24
Paratype 5	17	11	10	16	25/26

SL = specimen length, including girdle (mm) ; RHV = number of ribs on head valve ; RTV = number of ribs on tail valve ; RPA = number of ribs on each side of pleural area of valve IV ; NG = number of gills on each side of the pallial groove.

Articulamentum white with a faint brown streak on both sides of latero-pleural areas, apophyses wide and short, connected by a jugal plate, slit formula of insertion plates 9-10/1/9, teeth short, rather blunt.

Girdle moderately wide, cream-coloured throughout, dorsally covered with imbricating, curved scales (pl. II, 7),  $120-200 \times 90-130 \mu\text{m}$ , ornamented with 8-11 vertical riblets and crowned with a short, broad, striated nipple. Girdle ventrally paved with rows of elongate, slender, unsculptured rectangular scales, measuring  $70-100 \times 12-15 \mu\text{m}$ . Marginal spicules (pl. II, 8) conical, pointed, strongly and irregularly longitudinally ribbed,  $70-80 \times 10-18 \mu\text{m}$ .

Radulae of 9.5 and 14.5 mm long paratypes respectively 3.1 and 4.6 mm in length, with about 26-29 rows of mature teeth. Median tooth (pl. III, 5) wide in front (about  $90-100 \mu\text{m}$ ), gradually narrowing towards the base. Head of major lateral tooth (pl. III, 4)  $130-150 \mu\text{m}$  long, strongly curved, with a strong denticle and a second, smaller denticle on the side. The smaller denticle wears off in older teeth, and is more obvious in radula of 9.5 mm long paratype, than in radula of longer (14.5 mm) paratype were it is almost obsolete.

Gills holobranchial and adanal with interspace, originating at posterior margin of valve II extending to the anterior margin of valve VIII, numbering 23-26 on each side (table II).

#### OBSERVATIONS

The genus *Lepidozona* has its greatest speciation in the Eastern Pacific and was hitherto unknown from Vietnam. LELOUP (1952) does not mention any chiton referable to this genus from Vietnam, and a literature search revealed that very few records of *Lepidozona* species exist from the South China Sea, of which the chiton fauna is virtually unknown. The nearest relatives recorded from adjacent areas are *Lepidozona luzonica* (Sowerby, 1842), *L. craticulata* (Gould, 1859), *L. christiaensi* Van Belle, 1982, *L. coreanica* (Reeve, 1847), *L. sorsogonensis* Kaas & Van Belle, 1987, *L. ferreirai* Kaas & Van Belle, 1987 and *L. bisculpta* (Carpenter in Pilsbry, 1892). *Lepidozona vietnamensis* n. sp. differs from these species (and all other known *Lepidozona* species) in having few, very prominent ribs on head and tail valve and on the lateral areas of intermediate valves. This is a striking characteristic of most members of the genus *Callistochiton* (to which *Lepidozona* seems to be closely related), consequently *L. vietnamensis* can easily be mistaken for a *Callistochiton*. On the other hand, such characters as the presence of rows of well separated, cylindrical, highly elevated pustules on the ribs of head valve, tail valve and lateral areas and the mammilated dorsal girdle scales are typical of the genus *Lepidozona* and are not found in *Callistochiton*. In my opinion the new species here described has more affinities with *Lepidozona* than with *Callistochiton*, and it is accordingly placed in the genus *Lepidozona*.

Of the species listed above *L. vietnamensis* most closely resembles *L. bisculpta*, a species distributed from the northern part of the South China Sea (Hong Kong) to the western part of Korea. As mentioned above *L. bisculpta* lacks the strong, elevated ribs on head valve, tail valve and lateral areas of intermediate valves, which are present in all specimens from the type series of *L. vietnamensis*. Apart from very few supplementary minor differences such as the size of the girdle scales, which are slightly larger in *L. bisculpta*, both species are remarkably similar.

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### PLATE I

- 1-8. — *Leptochiton pseudogloriosus* n. sp., East of São Miguel, Azores, holotype MNHN Paris : (1) head valve, 19 × ; (2) valve II, 16 × ; (3) tail valve, 23 × ; (4) dorsal scales, 270 × ; (5) ventral scales (outer margin girdle), 435 × ; (6) marginal spicules, 270 × ; (7) radula (heads of major lateral teeth missing), 125 × ; (8) idem, 270 ×.

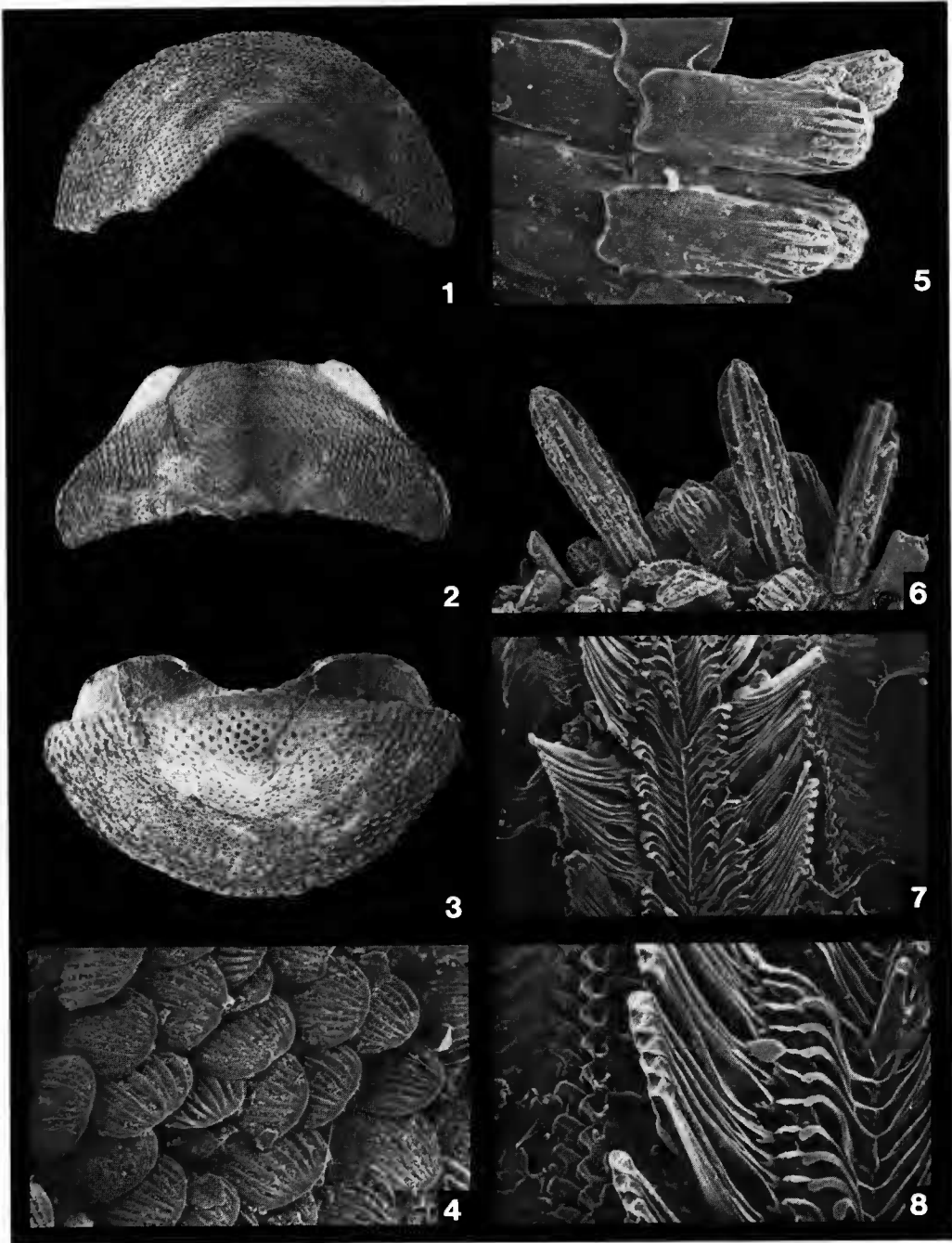


PLATE I

PLATE II

- 1-8. — *Lepidozona vietnamensis* n. sp., Vung Tau, Vietnam, 9.5 mm long paratype MNHN Paris : (1) head valve, 13,5× ; (2) valve II, 11× ; (3) valve IV, 11× ; (4) tail valve, 11× ; (5) head valve (detail), 80× ; (6) valve IV (detail), 80× ; (7) dorsal scales, 162× ; (8) marginal spicules, 162×.



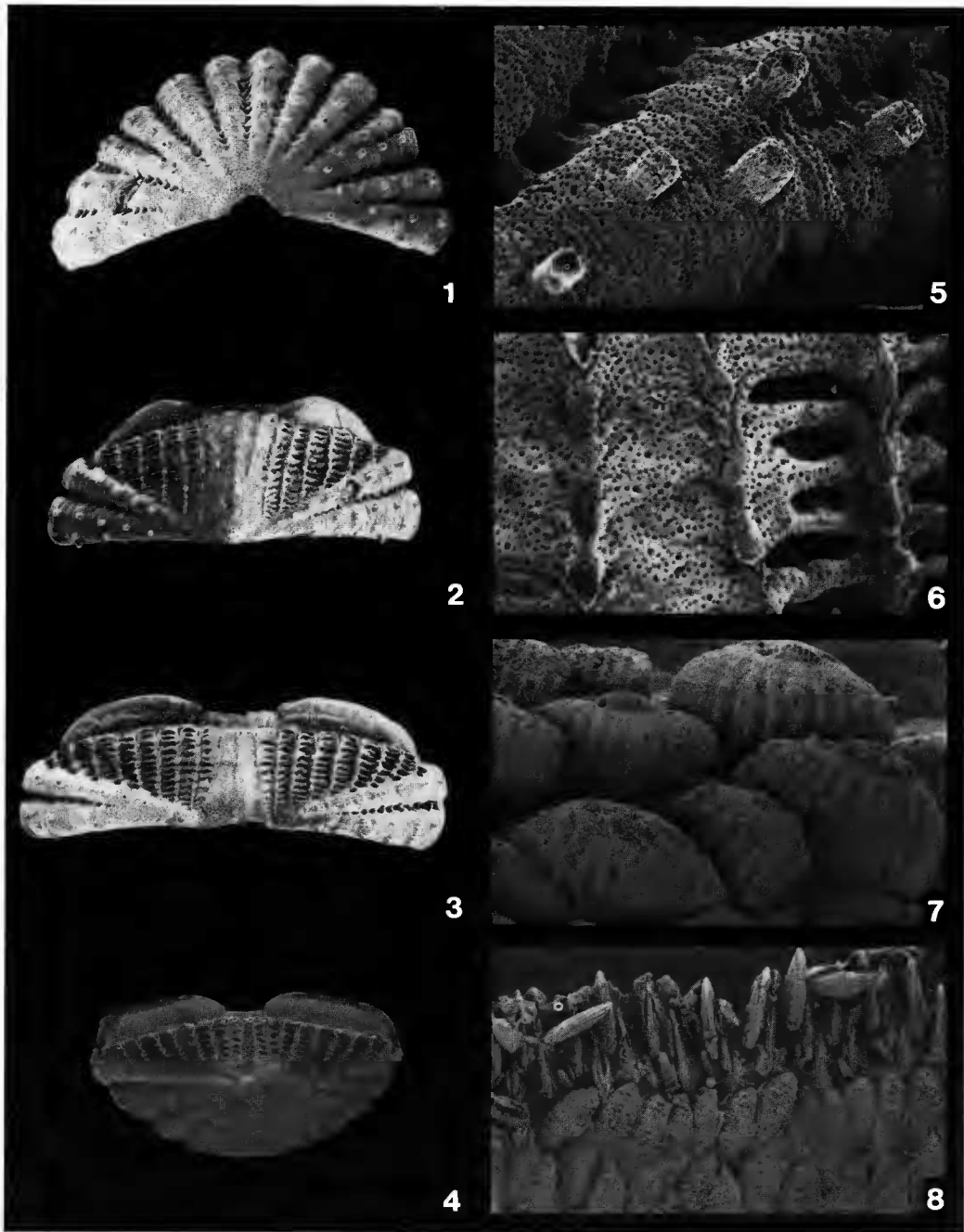
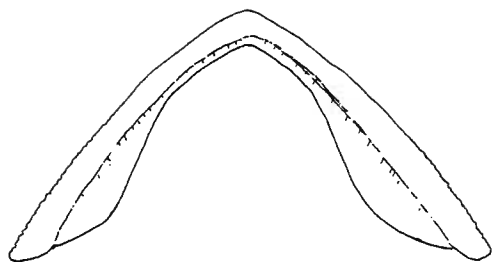


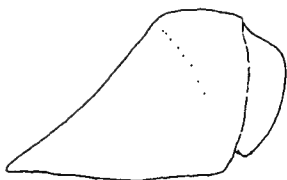
PLATE II

PLATE III

- 1-3. — *Leptochiton pseudogloriosus* n. sp., East of São Miguel, Azores, holotype MNHN Paris : (1) valve IV, 20× ; (2) tail valve, 17× ; (3) head of major lateral radula tooth, 750×.
- 4-5. — *Lepidozonia vietnamensis* n. sp., Vung Tau, Vietnam, 9.5 mm long paratype MNHN Paris : (4) head of major lateral radula tooth, 565× ; (5) central radula tooth, 565×.



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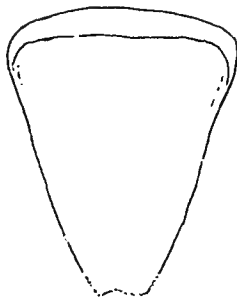
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*PLATE III*