

An Occurrence of *Acanthopleura tenuispinosa* (LELOUP, 1939)
(Polyplacophora: Chitonidae) from Amami and Okinawa
Islands in Reference to Taxonomic Evaluation

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Abstract: *Acanthopleura tenuispinosa* (LELOUP, 1939) is recorded from Japanese waters for the first time. This species which was previously considered to be a forma of *Acanthopleura japonica* (LISCHKE, 1873), is here recognized as a distinct species.

Introduction

Many specimens of the genus *Acanthopleura* collected from Amami and Okinawa Islands were identified to be *Liolophura* (= *Acanthopleura*) *japonica* forma *tenuispinosa* LELOUP, 1939, which had originally been described from the Gulf of Thailand and Vietnam. The results of a close examination of these specimens revealed that LELOUP's taxon should be raised to the species level, and not merely a form of *Acanthopleura japonica* (LISCHKE, 1873). The morphological characters are described here in detail.

Taxonomy

Family Chitonidae RAFINESQUE, 1815

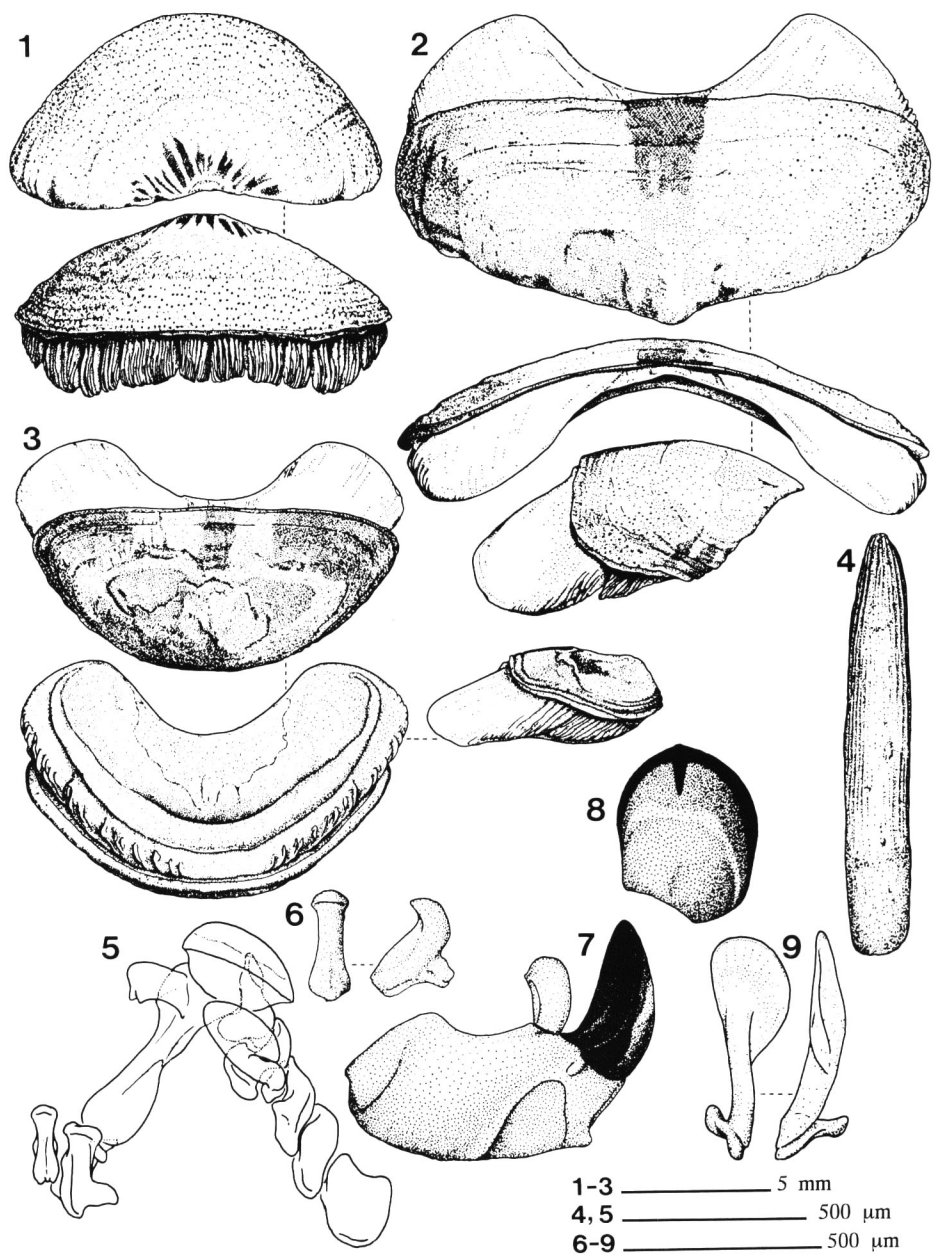
Genus *Acanthopleura* GUILDING, 1829

Acanthopleura tenuispinosa (LELOUP, 1939)

(Figures 1–17)

Liolophura japonica forma *tenuispinosa* LELOUP, 1939: 1–3, figs. 1, 3, 4, 1961: 38, Fig. 5AII.

Materials Examined: NSMT-Mo 69851, 4 specimens, 16–32 mm, Gishifu-jima, Onna-son, Okinawa Island, 8–9 April 1989; NSMT-Mo 69846, 11 specimens, ca. 40–60 mm, Sesoko-jima, Okinawa Islands, 24 April 1982; NSMT-Mo 69849, 3 specimens, ca. 50–55 mm, Bise-zaki, Okinawa Island, 22 September 1988; NSMT-Mo 69850, 6 specimens, ca. 25–40 mm, Saneku, Kakeroma Island, 27 September 1988;



NSMT-Mo 69847, 16 specimens, 13-ca. 50 mm, Sokaru, Amami-Oshima Island, 21 March 1988; NSMT-Mo 69848, 5 specimens, ca. 55–65 mm, Adange, Amami-Oshima Island, 22 March 1988; NSMT-Mo 69852, 2 specimens, ca. 40 mm, Itton, Amami-Oshima Island, 30–31 March 1990; NSMT-Mo 69853, 3 specimens, ca. 25–70 mm, Amami-Oshima Island; NSMT-Mo 69854, 3 specimens, ca. 30–40 mm, Kho Sichang, the Gulf of Thailand, 25 September 1988.

Description: The animal is large, attaining to 70 mm in body length and elongate oval in outline. Valves are moderately elevated, round backed and beaked. The girdle is densely spiculate (Fig. 10). The color of the tegmentum is greyish white with blackish brown bands along midline, and dark brown on both sides. The color of the girdle is tessellated with light and dark brown.

The valve I is semicircular and thick, with convex anterior slope (Fig. 1). The valve V is widest in intermediate valves. The valve IV is oblong, almost straight at the anterior margin and beaked, although usually eroded at the posterior margin (Fig. 2). Lateral areas are slightly raised and weakly demarcated. The valve VIII is less than semicircular with nearly straight anterior margin (Fig. 3). Tegmental width of the valve VIII is slightly shorter than that of the valve I and more than twice as tegmental length of the valve VIII. The mucro is weakly raised and situated slightly anterior to the posterior margin (Fig. 11). Both ante- and postmucronal slopes are slightly convex.

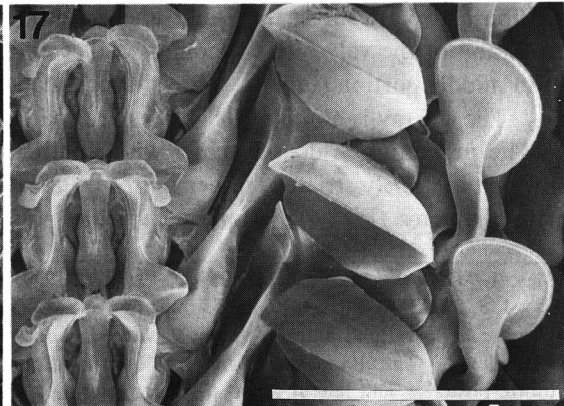
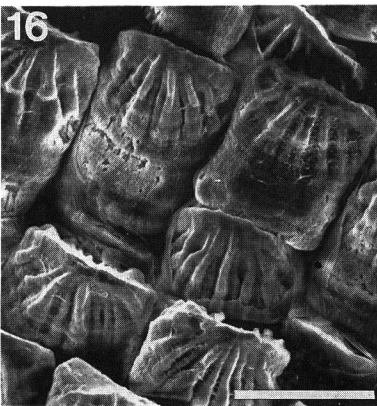
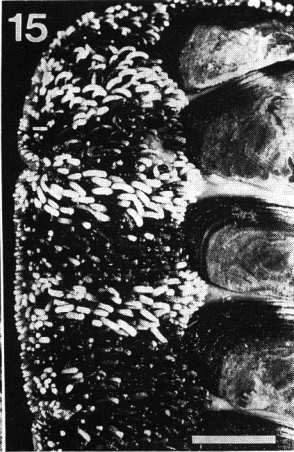
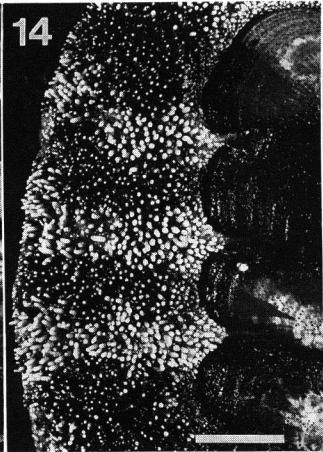
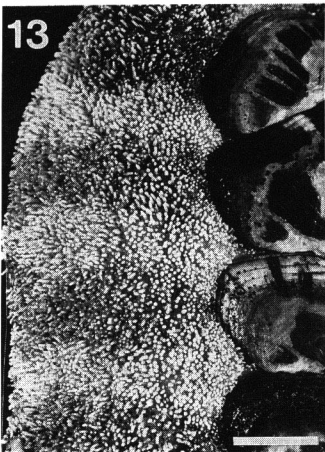
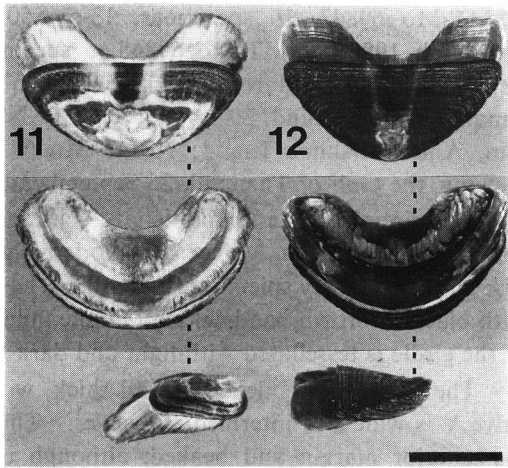
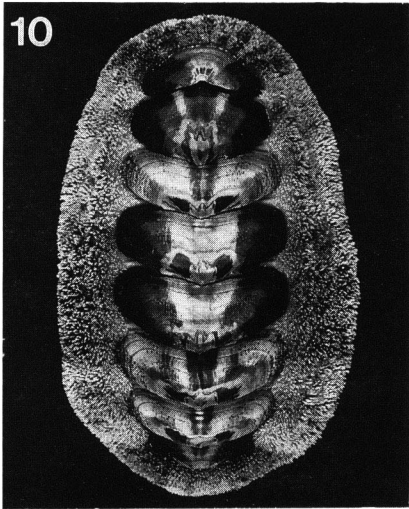
The tegmentum is microgranulose. Granules are slightly coarser and irregularly arranged on the valve I, lateral areas of intermediate valves, and the postmucronal area of the valve VIII. Ocelli are randomly or somewhat concentrically distributed throughout the valve I, lateral areas of intermediate valves, and the postmucronal area of the valve VIII, sparsely and narrowly distributed on both sides of central area of intermediate valves and the antemucronal area of the valve VIII.

The articulamentum is grey to brown in color. Sutural laminae are strongly projected anteriorly, deeply and roundly incised by the jugal sinus and narrowly connected each other. Lateral surfaces of sutural laminae are finely pectinated. Insertion plates are short, thick and finely pectinated on outer surface (Fig. 2). The pectination of the valve VIII becomes weaker and coarser toward posterior end, and lost in middle portion (Fig. 3). The slit formula is 11–12/1/0 or obsolete one on each side. The slit ray is absent. The eaves are solid.

The perinotum is densely beset with small and slender calcareous spicules (Fig. 13) which are finely striated, rather uniform in size, up to 1700 μm in length and 180 μm in diameter (Fig. 4). Marginal spicules are slender, smooth, hyaline, pointed

Figs. 1–9. *Acanthopleura tenuispinosa* (LELOUP, 1939) 1–3, NSMT-Mo 69846, ca. 45 mm; 4, 5, 9, NSMT-Mo 69849, ca. 55 mm; 6–8, NSMT-Mo 69848, ca. 65 mm.

1, valve I, dorsal and anterior views; 2, valve IV, dorsal, anterior and lateral views; 3, valve VIII, dorsal, ventral and lateral views; 4, spicule of perinotum; 5, half radula row; 6, central tooth, posterior and lateral views; 7, major lateral tooth, lateral view; 8, mineralized head of right major lateral tooth, anterior view; 9, major uncinus tooth, posterior and lateral views.



at the tip and up to 200 μm in length. Scales of the hyponotum are squarish, coarsely striated at the distal half, up to 80 μm in length, 60 μm in width (Fig. 16) and much elongated near the girdle margin.

The central tooth of the radula is slender with a round cusp at the distal end, dilated at the base and keeled along midline of the posterior surface (Fig. 6). The centro-lateral tooth has a round edge and a small squarish process at the distal end (Fig. 5, 17). The major lateral tooth is keeled dorsally with a discoid mineralized head and a petaloid process at the antero-dorsal portion (Fig. 7, 8). The major uncinus tooth is spoon-shaped with a footlike basal plate (Fig. 9).

Gills are holobranchial and adanal with interspace type. Number of gills are gradually increasing with growth. There are 60–70 gills on each side in adult stage. The gonopore is situated in front of either of gill between posterior 14th and 17th. The nephridiopore is situated two gills behind the gonopore.

The heart has two pairs of auriculo-ventricular ostia. The anterior end of the pericardium extends between valves V and VI.

Distribution: The Gulf of Thailand and Vietnam (LELOUP), Hong Kong (fide VAN BELLE, 1981) and Amami and Okinawa Islands.

Remarks: LELOUP (1939, 1961) considered this taxon as a forma of *Liolophura* (= *Acanthopleura japonica* (LISCHKE, 1873)). He used only perinotal spicules as a morphological character to separate this one from the typical *A. japonica*. In this character, he found no specimen with intermediate state. He also noticed a difference of the pectination of the valve VIII and listed it in comparative table (LELOUP, 1961: 38), but he still regarded it as an infraspecific variation. This conclusion was, however, drawn from an observation of rather limited number of specimens as he stated such (LELOUP, 1961: 46). In the present study, 50 specimens from Japanese waters and 3 specimens from the Gulf of Thailand were examined. The result was that both taxa are distinguishable from each other by some morphological characters, (Table 1) which warrant the difference on species level.

The distribution range of both species are overlapping to some extent with each other. Both species are distributed in Amami-Oshima Island, though they have never been observed to be in microhabitat.

The examinations on more specimens from the localities between Japan and Thailand are needed for better understanding on the taxonomic and zoogeographical states of this chiton taxon.

Figs. 10, 11, 13, 16 and 17. *Acanthopleura tenuispinosa* (LELOUP, 1939) 10, NSMT-Mo 69848, ca. 55 mm; 11, NSMT-Mo 69846, ca. 45 mm; 13, NSMT-Mo 69848, ca. 65 mm; 16, 17, NSMT-Mo 69849, ca. 55 mm.

Figs. 12, 14, and 15. *Acanthopleura japonica* (LISCHKE, 1873). 12, NSMT-Mo 69857, ca. 45 mm; 14, NSMT-Mo 69855, ca. 60 mm; 15, NSMT-Mo 69856, ca. 50 mm.

10, dorsal view of animal; 11, 12, valve VIII, dorsal, ventral and lateral views, scale bar: 5 mm; 13–15, perinotum, scale bar: 5 mm; 16, scales of hyponotum, scale bar: 50 μm ; 17, half row of radula, petaloid processes of major lateral teeth were lost during the preparation, scale bar: 500 μm .

Table 1. Morphological comparison between *A. tenuispinosa* and *A. japonica*.

	<i>A. tenuispinosa</i>	<i>A. japonica</i>
Valve VIII		
Mucro	Raised and situated at slightly anterior to posterior margin (Fig. 11)	Strongly projected posteriorly beyond posterior margin (Fig. 12)
Callus	Pectinated except for middle portion (Fig. 11)	Smooth or pectinated at only lateral small portion (Fig. 12)
Color of interior	Light brown to greyish brown	Dark brown to dark purplish brown
Girdle		
Perinotal spicules	Small, slender and cylindrical (Fig. 13)	Large, thick, cylindrical or flattened (Figs. 14, 15)
Distribution	From the Gulf of Thailand, Vietnam, Hong Kong to Amami-Oshima Island	From Amami-Oshima Island to southern part of Hokkaido and Korea

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