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NEW SPECIES OF THE GENUS *ABRINA* (BIVALVIA: SEMELIDAE) FROM THE COMMANDER AND KURIL ISLANDS

Gennady M. Kamenev

The Institute of Marine Biology, Russian Academy of Science, Vladivostok 690041, Russia; kamenev@mail333.com, inmarbio@mail.primorye.ru

ABSTRACT

A new species, *Abrina scarlatoi*, is described from the Commander and Kuril islands. This species has a small (to 11.2 mm), ovate-trigonal, high, almost equilateral shell with a non-polished, gray or light brown periostracum and conspicuous growth lines. The external ligament is attached to a short, wide nymph. The internal ligament is lodged in an ovate-elongate resilifer, which extends obliquely posterior to the beaks. *Abrina scarlatoi* was found in shelf zones of the Commander Islands (depth 3–100 m) and Kuril Islands (intertidal zone to 120 m), on rocky platforms and boulders, covered by a thick layer of lime red algae, brown algae, and sponges, with a population density up to 30 specimens/m^2. The taxonomic status of *Abrina magna* Scarlato, 1965, and *A. hainanensis* Scarlato, 1965, is also discussed.

Key words: *Abrina*, Semelidae, Bivalvia, Commander and Kuril islands.

INTRODUCTION

Previously, four species of the genus *Abrina* – *A. cuneipyga* Scarlato, 1981; *A. sachalinica* Scarlato, 1981; *A. shiashkotanika* Scarlato, 1981; and *A. tatarica* Scarlato, 1981 – have been listed in Russian fauna (Scarlato, 1981). However, examination has shown that they are species of *Macoma* Leach, 1819 (Tellinidae) (Kamenev & Nadtochy, 1999).

Study of the bivalve fauna of the Commander Islands shelf revealed an unknown species tentatively assigned to the genus *Abrina* Habe, 1952 (Kamenev, 1995; Bujanovsky, 1997). Detailed examination of the material from the Commander Islands and additional specimens from the Kurils has led me to regard it as a new species of *Abrina*.

MATERIAL AND METHODS

In this study, I have used the material collected by the IMB intertidal expedition to the Kuril Islands (June–July, 1967), joint IMB-PRIFO expeditions to the Commander Islands (8–28 July 1972, sealer "Krylatka"; 30 August–6 October 1973, R/V "Rakytnoe") and the Kuril Islands (July–November 1987, R/V "Tikhookeansky"), and joint IMB - PIBOC expedition to Sakhalin Island and the Kuril Islands (1 July–4 August 2003, R/V "Akademik Oparin").

For comparison purposes, collections of the following taxa were used: *Abrina lunella* (Gould, 1861) (NSMT); *A. kinoshitai* (Kuroda & Habe, 1958) (NSMT, NSMI); *A. declivis* (Sowerby, 1868) (SBMNH); *A. magna* Scarlato, 1965, and *A. hainanensis* Scarlato, 1965 (both ZIN), and different species of other genera of the Semelidae (UW, CAS, USNM). *Abrina declivis* was stored in 70% ethanol. All other materials were stored dry.

Shell Measurements

Figure 1 shows the position of the shell morphology measurements. Shell length (L), height (H), width of each valve (W) not shown, anterior end length (A), maximal distance from posterior shell margin to top of pallial sinus (L1), and minimal distance from top pallial sinus (L2) to anterior adductor muscle scar (L2) were measured for each valve. The ratios of these parameters to shell length (H/L, W/L, A/L, L1/L, L2/L, respectively) were determined. Shell measurements were made using an ocular micrometer with an accuracy of 0.1 mm. I made measurements of 34 specimens of the new species.

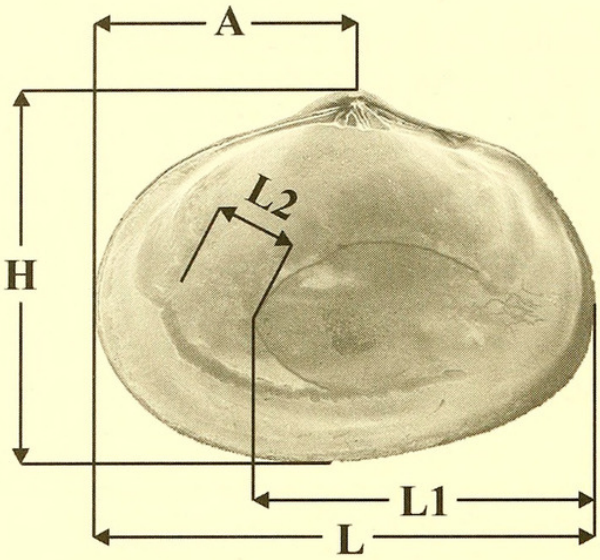


FIG. 1. Placement of shell measurements: L - shell length; H - height; A - anterior end length; L1 - maximal distance from posterior shell margin to top of pallial sinus; L2 - minimal distance from top of pallial sinus to anterior adductor muscle scar.

Abbreviations

The following abbreviations are used in the paper: CAS – California Academy of Sciences, San Francisco; IMB – Institute of Marine Biology, Russian Academy of Sciences, Vladivostok; MIMB – Museum of the Institute of Marine Biology, Vladivostok; NHMI – Natural History Museum and Institute, Chiba; NSMT – National Science Museum, Tokyo; PIBOC – Pacific Institute of Bioorganic Chemistry, Russian Academy of Sciences, Vladivostok; PRIFO – Pacific Research Institute of Fisheries and Oceanography, Vladivostok; SBMNH – Santa Barbara Museum of Natural History, Santa Barbara; USNM – United States National Museum of Natural History, Smithsonian Institute, Washington, D.C.; UW – University of Washington, Seattle; ZIN – Zoological Institute, Russian Academy of Sciences, St. Petersburg.

SYSTEMATICS

Family Semelidae Stoliczka, 1870
Genus *Abrina* Habe, 1952
Type species: *Abra kanamarui* Kuroda, 1951; = *Macoma lunella* Gould, 1861

Diagnosis

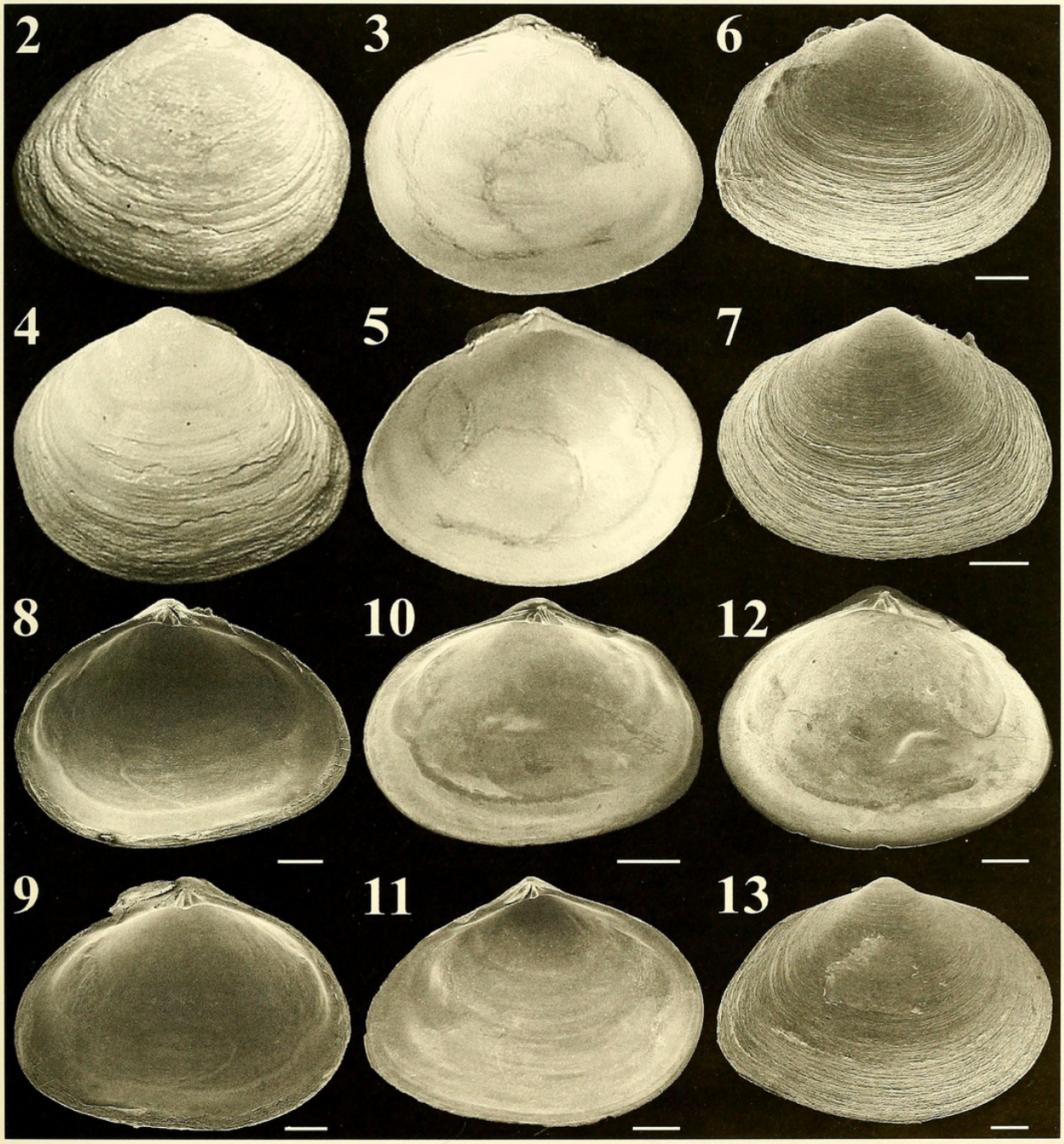
Shell small (< 20 mm), thin to medium in thickness, moderately inflated, subtrigonal, ovate-trigonal or ovate, white, equivalve or with right valve sometimes more inflated, equilateral to longer anteriorly. Posterior end attenuate, with radial ridge along postero-dorsal margin, sometimes flexed to right. Periostracum thin, adherent or dehiscent, silky to dull, colorless, tan, gray, light brown. Surface with faint or conspicuous growth lines. Beaks orthogyrate, central or posterior. Hinge weak, two cardinal teeth in each valve; lateral teeth absent. Ligament opisthodetic, parivincular, both external and internal; external seated on a nymph not projecting above dorsal margin; internal lodged in oblique resilifer posterior to cardinal teeth. Pallial sinus long, sometimes slightly different length and form in each valve, partly confluent with pallial line.

Abrina scarlatoi Kamenev, new species
Figs. 2–19, Table 1

Type Material and Locality

Holotype (MIMB 9529), Polovina Bight, Bering Island, Commander Islands, Bering Sea, 3 m, rocky platform, bottom water temperature of 8.0°C, Coll. V. N. Romanov, 26-VII-1972 (sealer "Krylatka"); paratypes (30): paratypes (2) (MIMB 9530) from the holotype locality; paratypes (5) (MIMB 9531), Tonky Cape, Bering Island, Commander Islands, Bering Sea, 10 m, rocky platform, bottom water temperature of 9.1°C, Coll. S. D. Vavilin, 13-IX-1973 (R/V "Rakitnoye"); paratype (MIMB 9532), Kamni Bobrovye – Kitolovnaya Bed, Medny Island, Commander Islands, Bering Sea (54°58.0'N, 167°21.5'E), 100 m, rocky platform, Coll. V. I. Lukin, 18-IX-1973 (R/V "Rakitnoye"); paratypes (2) (MIMB 9533), Cherny Cape, Medny Island, Commander Islands, Bering Sea, 15 m, rocky platform, bottom water temperature of 9.4°C, Coll. V. I. Lukin, 17-IX-1973 (R/V "Rakitnoye"); paratypes (2) (MIMB 9534), Palata Cape, Medny Island, Commander Islands, Pacific Ocean, 20 m, rocky platform, bottom water temperature of 5.0°C, Coll. V. I. Lukin, 16-VII-1972 (sealer "Krylatka"); paratype (MIMB 9535), Sivuchy Kamen, Medny Island, Bering Sea, 10 m, boulders, bottom water tempera-

ture of 8.6°C, Coll. V. I. Lukin, 2-X-1973 (R/V "Rakytnoe"); paratypes (3) (MIMB 9536), Tonky Cape, Bering Island, Commander Islands, Bering Sea, 20 m, rocky platform, bottom water temperature of 9.0°C, Coll. G. T. Belokonev, 13-IX-1973 (R/V "Rakytnoye"); paratypes (2) (MIMB 9537), Vodopadskogo Cape, Medny Island, Commander Islands, Pacific Ocean



FIGS. 2–13. *Abrina scarlatoi* Kamenev, new species. FIGS. 2–5: Holotype (MIMB 9529), Polovina Bight, Bering Island, Commander Islands, Bering Sea, 3 m, shell length 9.8 mm. FIGS. 6, 7: Paratype (MIMB 9538), Phedoskina Cape, Bering Island, Commander Islands, Pacific Ocean, 5 m, right and left valves of a young specimen. FIGS. 8, 9: Paratype (MIMB 9531), Tonky Cape, Bering Island, Commander Islands, Bering Sea, 10 m, right and left valves with ligament. FIG. 10: Paratype (MIMB 9530), from holotype locality, right valve without ligament. FIG. 11: Paratype (MIMB 9534), Palata Cape, Medny Island, Commander Islands, Pacific Ocean, 20 m, left valve without ligament. FIG. 12: Paratype (MIMB 9533), Cherny Cape, 15 m, Medny Island, Commander Islands, Bering Sea, right valve without ligament. FIG. 13: MIMB 9549, Nadezda Strait (Rashua Island - Matua Island), Kuril Islands, 48°00'N, 153°15'E, 50 m. Bar = 1 mm.

(54°38.6'N, 167°43.5'E), 40 m, rocky platform, Coll. V. I. Lukin, 3-X-1973 (R/V "Rakytnoe"); paratypes (3) (MIMB 9538), Phedoskina Cape, Bering Island, Commander Islands, Pacific Ocean, 5–15 m, rocky platform, bottom water temperature of 9.8–10.0°C, Coll. V. I. Lukin, 23-IX-1973 (R/V "Rakytnoe"); paratypes (3) (MIMB 9539), Peregrebnogo Cape, Bering Island, Commander Islands, Bering Sea, 15–20 m, rocky platform, bottom water temperature of 10.0°C, Coll. B.I. Sirenko, 5-IX-1973 (R/V "Rakytnoe"); paratype (MIMB 9540), Bujan Bight, Bering Island, Commander Islands, Bering Sea, 5 m, rocky platform, bottom water temperature of 7.6°C, Coll. V. I. Lukin, 28-VII-1972 (sealer "Krylatka"); paratype (MIMB 9541), Poloviny Bay, Bering Island, Commander Islands, Bering Sea, 10 m, rocky platform, bottom water temperature of 9.8°C, Coll. V. I. Lukin, 27-IX-1973 (R/V "Rakytnoe"); paratypes (4) (MIMB 9542) Ushishir Islands, Kuril Islands (42°30.2'N, 152°51.0'E), 87–120 m, boulders covered by Spongia, Coll. G. M. Kamenev, 19-VII-2003 (R/V "Akademik Oparin").

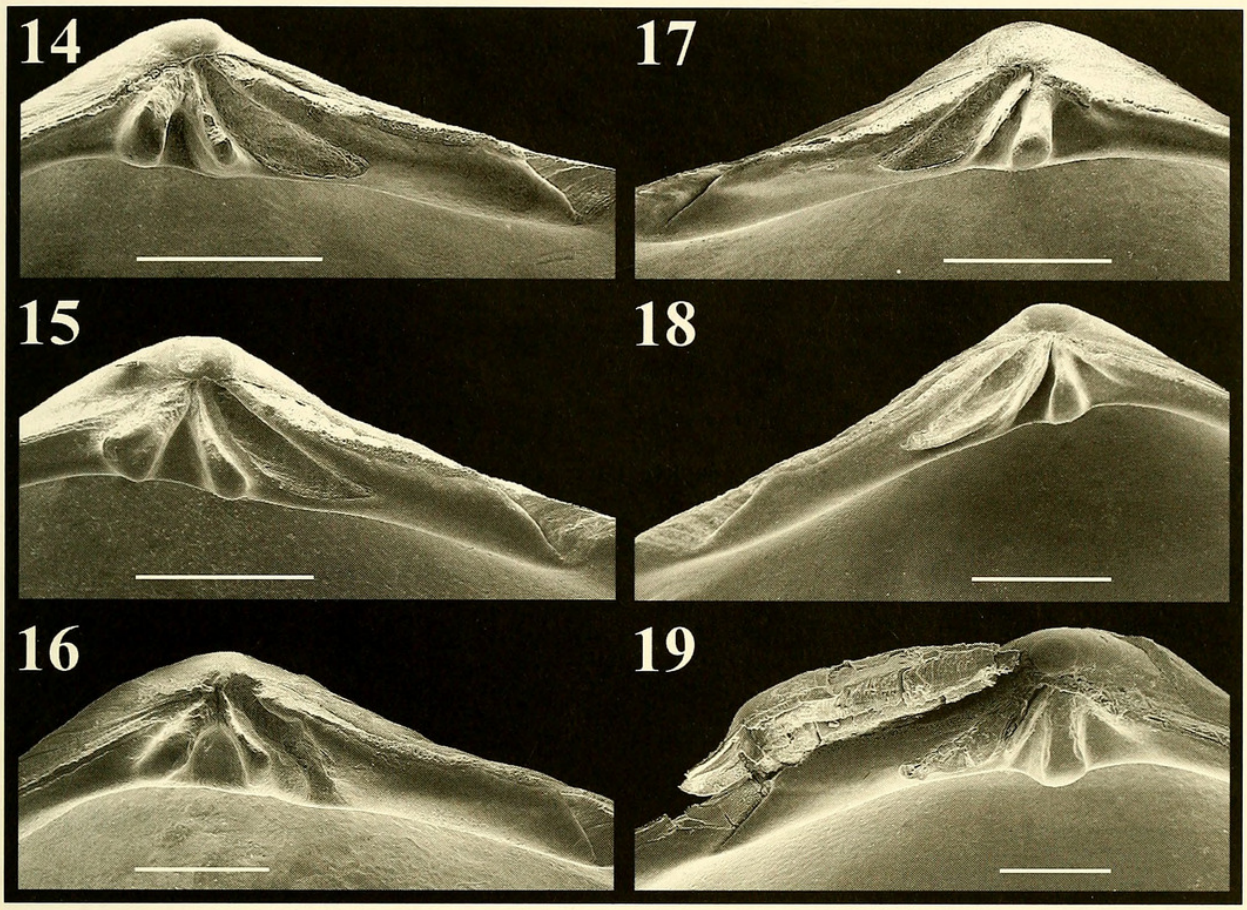
Other Material Examined

One slightly damaged specimen (MIMB 9543), Korabelnaya Bight, Medny Island, Commander Islands, Bering Sea, 5 m, rocky platform, bottom water temperature of 6.8°C, Coll. V. I. Lukin, 14-VII-1972 (sealer "Krylatka"); one slightly damaged specimen (MIMB 9544), Kamny Bobrovye, Medny Island, Commander Island, Bering Sea, 5 m, bottom water temperature of 5.6°C, Coll. V. I. Lukin, 13-VII-1972 (sealer "Krylatka"); one left valve (MIMB 9545), Palata Cape, Medny Island, Commander Islands, Pacific Ocean, 15 m, rocky platform, bottom water temperature of 5.2°C, Coll. V. I. Lukin, 16-VII-1972 (sealer "Krylatka"); one left valve (MIMB 9546), Phedoskina Cape, Bering Island, Commander Islands, 20 m, rocky platform, bottom water temperature of 9.9°C, Coll. V. I. Lukin, 23-IX-1973 (R/V "Rakitnoye"); one slightly damaged specimen (MIMB 9547), Utesnaya Bight, Second Kuril Strait, Paramushir Island, Kuril Islands, intertidal zone, boulders with brown algae of the genera *Fucus* and *Alaria*, Coll. M. B. Ivanova, 7-VII-1967; one specimen (MIMB 9548), Burevestnik Village, Iturup Island, Kuril Islands, Sea of Okhotsk, intertidal zone, boulders with brown algae of the genus *Alaria*, Coll. O. G. Kusakin, 24-VII-1967; one specimen (MIMB 9549), Nadezda Strait (Rashua Island - Matua Island), Kuril Islands (48°00'N, 153°15'E), 50 m, rocky platform, Coll. V. I. Lukin, 19-VIII-1987 (R/V "Tikhookeansky"). Total of 5 specimens and 2 left valves.

Description

Exterior: Shell small (to 11.2 mm), ovate-trigonal, high (H/L = 0.740–0.827), equivalve, moderately inflated (W/L = 0.181–0.235), almost equilateral (slightly longer anteriorly, sometimes equilateral or longer posteriorly), thin, solid, white under periostracum. Surface with conspicuous growth lines. Periostracum non-polished, gray, sometimes light brown, dehiscent, easily peeled off near beaks, extending into inner surface, thrown into small wrinkles, more conspicuous at shell margins. Beaks orthogyrate, small, slightly rounded, moderately projecting above dorsal margin, slightly posterior or anterior to midline, sometimes central (A/L = 0.474–0.583). Anterior end rounded. Posterior end narrow, obliquely subtruncate, with faint radial ridge from beaks to ventral limit of posterior end. Anterodorsal margin slightly convex, gently descending ventrally, smoothly transiting to rounded anterior end. Ventral margin slightly curved. Posterodorsal margin short, straight, gently descending ventrally, forming noticeable angle at transition to posterior margin. Posterior margin straight, rather steeply descending ventrally, forming rounded angle at transition to ventral margin. External ligament short (1/2 posterodorsal margin length), attached to short, wide nymph not projecting above dorsal margin.

Interior: Hinge plate wide, sometimes projecting into shell cavity in area of cardinal teeth. Hinge weak, with two cardinal teeth in each valve. In left valve, anterior tooth wide, long, reaching edge of hinge plate; posterior tooth very narrow, lamellate, shorter, not reaching edge of hinge plate, almost parallel to anterior tooth. In right valve, anterior and posterior teeth almost same length and width (anterior tooth slightly shorter and wider). Internal ligament well developed, reaching edge of hinge plate, lodged in ovate-trigonal or ovate-elongate resilifer, which extends obliquely posterior to beaks. Anterior adductor muscle scar large, ovate, vertically extended; posterior adductor scar large, rounded, shorter and wider than anterior scar. Pallial sinus distinct, moderate, reaching past midline (L1/L = 0.603–0.698), broad, rounded anteriorly, of



FIGS. 14–19. The hinge of the different age specimens of *Abrina scarlatoi* Kamenev, new species. FIGS. 14–16. Hinge of right valve. FIG. 14: Paratype (MIMB 9538), Phedoskina Cape, Bering Island, Commander Islands, Pacific Ocean, 10 m, shell length 6.2 mm. FIG. 15: Paratype (MIMB 9536), Tonky Cape, Medny Island, Commander Islands, Bering Sea, 20 m, shell length 6.8 mm. FIG. 16: Paratype (MIMB 9533), Cherny Cape, Medny Island, Commander Islands, Bering Sea, shell length 7.6 mm. FIGS. 17–19. Hinge of left valve. FIG. 17: Paratype (MIMB 9530), from holotype locality, shell length 6.2 mm. FIG. 18: Paratype (MIMB 9534), Palata Cape, Medny Island, Commander Islands, Pacific Ocean, 20 m, shell length 7.5 mm. FIG. 19: Paratype (MIMB 9531), Tonky Cape, Bering Island, Commander Islands, Bering Sea, 10 m, shell length 8.5 mm. Bar = 500 μm.

same shape and size in both valves (L1/L and L2/L of left valve 0.655 and 0.184; L1/L and L2/L of right valve 0.654 and 0.187), substantially detached, confluent with pallial line for more than 1/2 of its length. Shell interior often with faint radial striae.

Variability

Shell shape and proportions change with age. In young specimens (< 4 mm), in contrast to adults, the shell is more elongate and angular; the posterodorsal margin at the transition to the posterior margin forms a distinct angle; the posterior margin more steeply descends ventrally, forming a pointed acute angle at the transition to ventral margin; the ventral margin is almost straight; the beaks are placed more posteriorly (A/L = 0.54–0.583). The periostracum of young specimens has very fine, short, discontinuous radial lines in the area of the beaks. In young and adult specimens, the relative length, shape, and degree of confluence of the pallial sinus with the pallial line vary slightly. Sometimes, the length and shape of pallial sinus of right and left valves are slightly different (Table 1).

Distribution and Habitat (Fig. 20)

Commander Islands: Bering Island and Medny Island; Kuril Islands: Paramushir Island; Nadezda Strait (Rashua Island - Matua Island) (48°00'N, 153°15'E); Ushishir Islands (42°30.2'N, 152°51.0'E); Iturup Island.

Near the Commander Islands, this species was found at depths from 3 m (Polovina Bight, Bering Island) to 100 m (Kamni Bobrovye - Kitolovnaya Bed, Medny Island, 54°58'N, 167°21'5E) on a rocky platform and boulders covered by a thick layer of lime red algae, with a population density up to 30 specimens/m^2; near the Kuril Islands – from the intertidal zone (Paramushir Island, Iturup Island) to 120 m (Ushishir Islands) on boulders covered by brown algae of the genera *Fucus* and *Alaria* or sponges.

Comparisons

In contrast to other species of *Abrina*, *A. scarlatoi* has the shell with rough, conspicuous growth lines, gray, a non-polished, dehiscent periostracum, wide hinge plate, and a short, wide nymph (Table 2). Moreover, *A. scarlatoi* differs from *A. lunella* (Figs. 21–28) in its smaller, higher shell with less posteriorly placed beaks and in having the hinge with non-bifid cardinal teeth and a very narrow, lamellate posterior cardinal tooth in the left valve (Gould, 1861; Kuroda, 1951; Habe, 1952, 1977, 1981; Kuroda et al., 1971; Ito et al., 1986; Kamenev & Nadtochy, 1999; Okutani, 2000); from *A. kinoshitai*, in a smaller, higher, more inflated, ovate-trigonal shell without a flexure of the posterior end, with less posteriorly placed beaks, a shorter pallial sinus of the same shape and size in both valves, and in having the hinge with non-bifid cardinal teeth and a very narrow, lamellate posterior cardinal tooth in the left valve (Ito, 1967, 1989; Kuroda et al., 1971; Habe, 1977; Tsuchida & Kurozumi, 1995; Kamenev & Nadtochy, 1999); from *A. declivis*, in the more elongate shell with a much less attenuate posterior end and in having the hinge with non-bifid cardinal teeth and a very narrow, lamellate posterior cardinal tooth in the left valve (Scott, 1994); from *A. sibogai* (Prashad, 1932), *A. inanis* (Prashad, 1932), and *A. weberi* (Prashad, 1932), in the shell with less posteriorly placed beaks and lacking lunule and a escutcheon (Prashard, 1932).

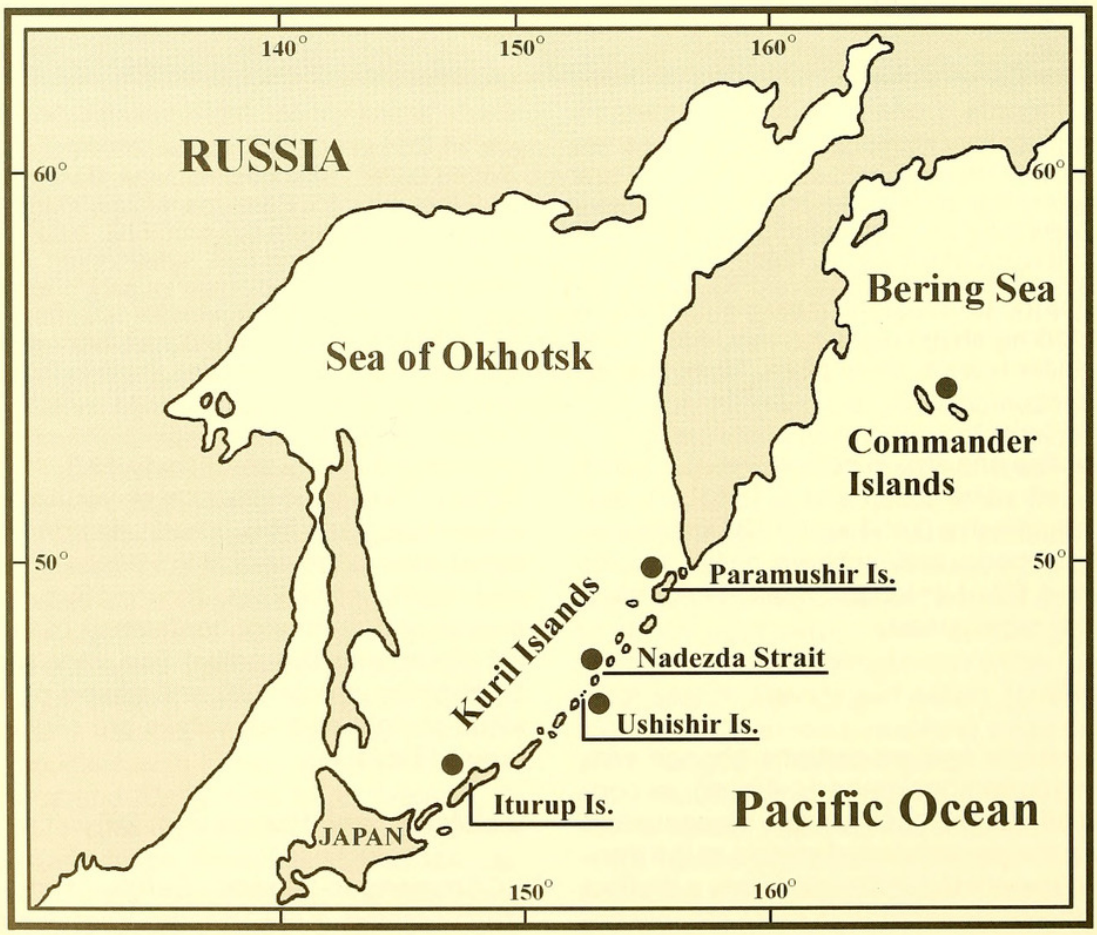


FIG. 20. Distribution of *Abrina scarlatoi*.

TABLE 1. *Abrina scarlatoi* Kamenev, new species. Shell measurements (mm), indices and summary statistics of all characteristics: L - shell length; H - height; W - width; A - anterior end length; L1 - maximal distance from the posterior shell margin to the top of pallial sinus; L2 - minimal distance from the top of pallial sinus to the anterior adductor muscle scar. Numerator indicates shell measurements and indices for the left valve, denominator - for the right valve.

Depository	L	H	W	A	L1	L2	H/L	W/L	A/L	L1/L	L2/L
Holotype MIMB 9529	9.8	8.1	2.2	4.7	6.4	2.1	0.827	0.224	0.480	0.653	0.214
	9.8	8.1	2.2	4.7	6.4	2.1	0.827	0.224	0.480	0.653	0.214
Paratype MIMB 9530	7.6	6.0	1.6	3.9	5.0	1.4	0.789	0.211	0.513	0.658	0.184
	7.6	6.0	1.6	3.9	5.0	1.4	0.789	0.211	0.513	0.658	0.184
Paratype MIMB 9530	6.2	4.7	1.2	3.4	4.1	1.2	0.758	0.194	0.548	0.661	0.194
	6.2	4.7	1.2	3.4	4.1	1.2	0.758	0.194	0.548	0.661	0.194
Paratype MIMB 9531	8.5	6.6	1.9	4.3	5.7	1.7	0.776	0.224	0.506	0.671	0.200
	8.5	6.6	1.9	4.3	5.7	1.7	0.776	0.224	0.506	0.671	0.200
Paratype MIMB 9531	8.0	6.4	1.8	4.0	5.3	1.6	0.800	0.225	0.500	0.663	0.200
	8.0	6.4	1.8	4.0	5.3	1.6	0.800	0.225	0.500	0.663	0.200
Paratype MIMB 9531	7.6	6.0	1.7	3.9	5.1	1.3	0.789	0.224	0.513	0.671	0.171
	7.6	6.0	1.7	3.9	5.1	1.3	0.789	0.224	0.513	0.671	0.171
Paratype MIMB 9531	6.8	5.4	1.6	3.4	4.7	1.0	0.794	0.235	0.5	0.691	0.147
	6.8	5.4	1.6	3.4	4.5	1.2	0.794	0.235	0.5	0.662	0.176
Paratype MIMB 9531	5.6	4.3	1.1	3.0	3.6	0.9	0.768	0.196	0.536	0.643	0.161
	5.6	4.3	1.1	3.0	3.6	0.9	0.768	0.196	0.536	0.643	0.161
Paratype MIMB 9532	7.7	5.7	1.4	3.9	4.8	1.6	0.740	0.182	0.506	0.623	0.208
	7.7	5.7	1.4	3.9	5.0	1.5	0.740	0.182	0.506	0.649	0.195
Paratype MIMB 9533	7.6	6.1	1.6	3.6	5.1	1.2	0.803	0.211	0.474	0.671	0.158
	7.6	6.1	1.6	3.6	5.0	1.2	0.803	0.211	0.474	0.658	0.158
Paratype MIMB 9533	6.6	5.0	1.4	3.2	4.4	1.2	0.758	0.212	0.485	0.667	0.182
	6.6	5.0	1.4	3.2	4.3	1.3	0.758	0.212	0.485	0.652	0.197
Paratype MIMB 9534	7.5	5.9	1.5	3.9	5.2	1.5	0.787	0.200	0.520	0.693	0.200
	7.5	5.9	1.5	3.9	5.0	1.7	0.787	0.200	0.520	0.667	0.227
Paratype MIMB 9534	5.4	4.0	1.1	2.7	3.5	1.0	0.741	0.204	0.500	0.648	0.185
	5.4	4.0	1.1	2.7	3.5	1.0	0.741	0.204	0.500	0.648	0.185
Paratype MIMB 9535	7.3	5.5	1.6	3.7	4.7	1.3	0.753	0.219	0.507	0.644	0.178
	7.3	5.5	1.6	3.5	4.5	1.4	0.753	0.219	0.479	0.616	0.192
Paratype MIMB 9536	7.2	5.6	1.4	3.6	4.9	1.5	0.778	0.194	0.500	0.681	0.208
	7.2	5.6	1.4	3.6	4.8	1.5	0.778	0.194	0.500	0.667	0.208
Paratype MIMB 9536	6.8	5.1	1.4	3.6	4.3	1.6	0.750	0.206	0.529	0.632	0.235
	6.8	5.1	1.4	3.6	4.4	1.4	0.750	0.206	0.529	0.647	0.206
Paratype MIMB 9536	4.5	3.5	0.9	2.4	3.0	0.9	0.778	0.200	0.533	0.667	0.200
	4.5	3.5	0.9	2.4	3.0	0.9	0.778	0.200	0.533	0.667	0.200
Paratype MIMB 9537	7.2	5.4	1.4	3.5	4.6	1.5	0.750	0.194	0.486	0.639	0.208
	7.2	5.4	1.4	3.5	4.6	1.5	0.750	0.194	0.486	0.639	0.208
Paratype MIMB 9537	5.9	4.5	1.2	3.0	3.7	1.2	0.763	0.203	0.508	0.627	0.203
	5.9	4.5	1.2	3.0	3.7	1.2	0.763	0.203	0.508	0.627	0.203
Paratype MIMB 9538	3.7	2.8	0.7	2.0	2.3	0.7	0.757	0.189	0.541	0.627	0.189
	3.7	2.8	0.7	2.0	2.3	0.7	0.757	0.189	0.541	0.622	0.189
Paratype MIMB 9538	6.5	4.9	1.4	3.3	4.2	1.2	0.754	0.215	0.508	0.646	0.185
	6.5	4.9	1.4	3.3	4.2	1.2	0.754	0.215	0.508	0.646	0.185
Paratype MIMB 9538	6.2	4.8	1.3	3.1	3.8	1.3	0.774	0.210	0.500	0.613	0.210
	6.2	4.8	1.3	3.1	3.9	1.3	0.774	0.210	0.500	0.629	0.210
Paratype MIMB 9539	5.7	4.4	1.2	3.0	3.6	0.8	0.772	0.211	0.526	0.632	0.140
	5.7	4.4	1.2	3.0	3.8	0.8	0.772	0.211	0.526	0.667	0.140
Paratype MIMB 9539	3.7	2.8	0.7	2.0	2.4	0.6	0.757	0.189	0.541	0.649	0.162
	3.7	2.8	0.7	2.0	2.4	0.6	0.757	0.189	0.541	0.649	0.162
Paratype MIMB 9539	2.4	1.9	0.5	1.4	1.6	0.4	0.792	0.208	0.583	0.667	0.167
	2.4	1.9	0.5	1.4	1.6	0.4	0.792	0.208	0.583	0.667	0.167
Paratype MIMB9540	5.3	4.3	1.1	2.8	3.7	0.8	0.811	0.208	0.528	0.698	0.151
	5.3	4.3	1.1	2.8	3.6	0.9	0.811	0.208	0.528	0.679	0.170

(*continues*)

(*continued*)

Depository	L	H	W	A	L1	L2	H/L	W/L	A/L	L1/L	L2/L
Paratype MIMB 9541	3.9	3.1	0.8	2.2	2.5	0.6	0.795	0.205	0.564	0.641	0.154
	3.9	3.1	0.8	2.2	2.5	0.6	0.795	0.205	0.564	0.641	0.154
Paratype MIMB 9542	11.2	9.0	2.4	5.5	7.2	1.7	0.782	0.214	0.491	0.643	0.152
	11.2	9.0	2.4	5.5	7.2	1.8	0.782	0.214	0.491	0.643	0.160
Paratype MIMB 9542	10.5	8.5	2.3	5.3	7.0	2.2	0.804	0.219	0.505	0.667	0.210
	10.5	8.5	2.3	5.3	7.0	2.2	0.804	0.219	0.505	0.667	0.210
Paratype MIMB 9542	11.2	9.1	2.4	5.1	7.8	1.7	0.813	0.214	0.455	0.696	0.152
	11.2	9.1	2.4	5.1	7.8	1.8	0.813	0.214	0.455	0.696	0.161
Paratype MIMB 9542	4.1	3.3	1.0	2.2	2.7	0.8	0.791	0.244	0.537	0.659	0.195
	4.1	3.3	1.0	2.2	2.7	0.8	0.791	0.244	0.537	0.659	0.195
MIMB 9547	6.0	4.8	1.3	3.3	4.0	1.1	0.800	0.217	0.550	0.667	0.183
	6.0	4.8	1.3	3.3	4.0	1.1	0.800	0.217	0.550	0.667	0.183
MIMB 9548	7.8	6.1	1.6	4.0	4.7	1.3	0.782	0.205	0.513	0.603	0.167
	7.8	6.1	1.6	4.0	4.7	1.3	0.782	0.205	0.513	0.603	0.167
MIMB 9549	9.4	7.1	1.7	4.7	6.3	1.9	0.755	0.181	0.500	0.670	0.202
	9.4	7.1	1.7	4.7	6.3	2.0	0.755	0.181	0.500	0.670	0.213
Statistics	**L**	**H**	**W**	**A**	**L1**	**L2**	**H/L**	**W/L**	**A/L**	**L1/L**	**L2/L**
Mean	6.81	5.31	1.42	3.46	4.47	1.26	0.778	0.208	0.514	0.655	0.184
	6.81	5.31	1.42	3.45	4.46	1.28	0.778	0.208	0.514	0.654	0.187
SD	2.10	1.72	0.48	0.96	1.43	0.43	0.023	0.014	0.026	0.024	0.024
	2.10	1.72	0.48	0.96	1.42	0.44	0.021	0.014	0.027	0.019	0.021
SE	0.36	0.30	0.08	0.16	0.24	0.07	0.004	0.002	0.005	0.003	0.004
	0.36	0.30	0.08	0.16	0.24	0.07	0.004	0.002	0.005	0.003	0.004
Min	2.4	1.9	0.5	1.4	1.6	0.4	0.740	0.181	0.455	0.603	0.140
	2.4	1.9	0.5	1.4	1.6	0.4	0.740	0.181	0.455	0.603	0.140
Max	11.2	9.1	2.4	5.5	7.8	2.2	0.827	0.244	0.583	0.698	0.235
	11.2	9.1	2.4	5.5	7.8	2.2	0.827	0.244	0.583	0.696	0.227
N	34	34	34	34	34	34	34	34	34	34	34
	34	34	34	34	34	34	34	34	34	34	34

Etymology

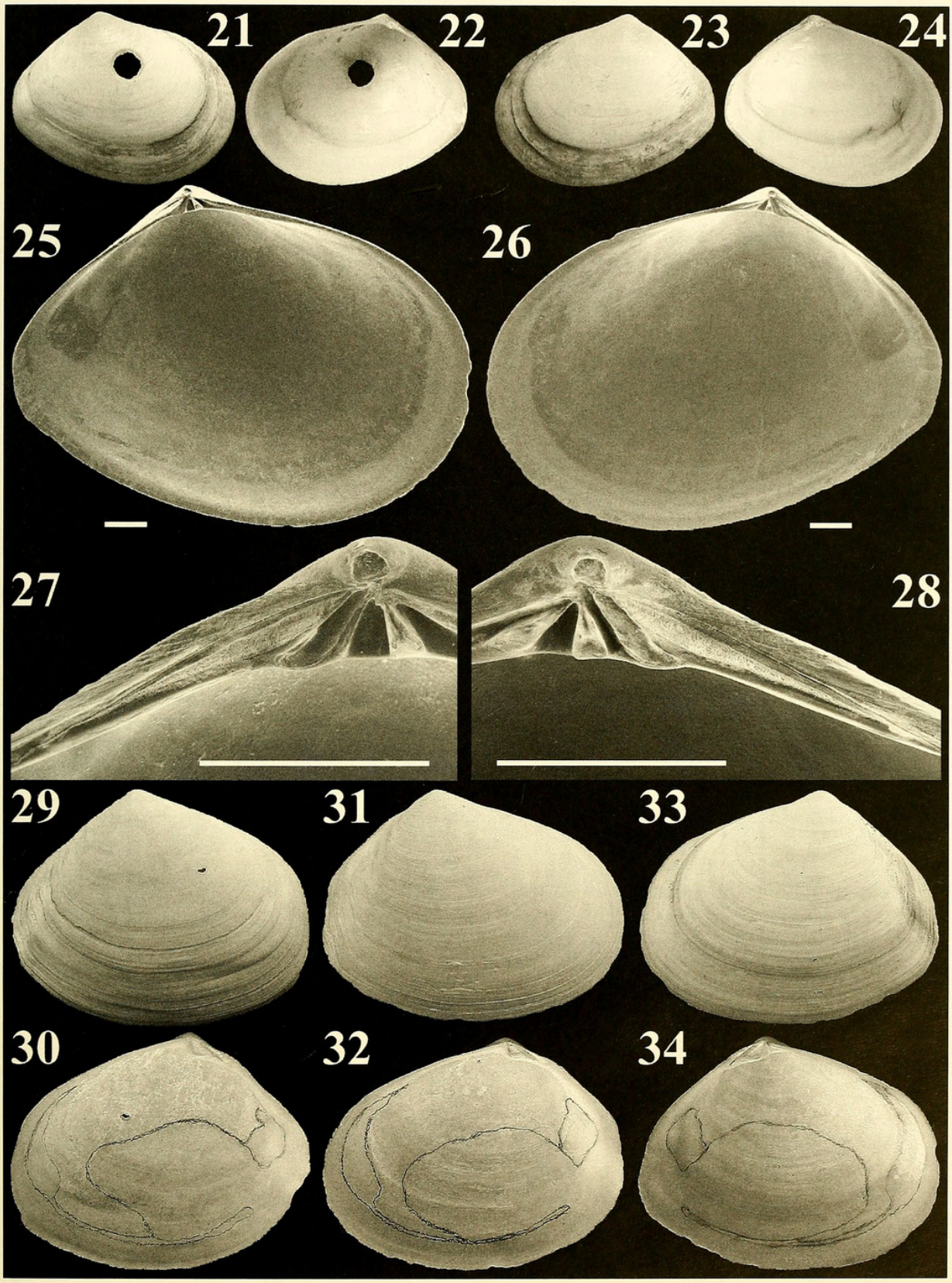
The specific name honors Orest A. Scarlato, Academician of the Russian Academy of Sciences, a famous Russian researcher of the marine bivalve fauna of Russia.

Remarks

The genus *Abrina* also includes species *A. magna* Scarlato, 1965, and *A. hainanensis* Scarlato, 1965, described by Scarlato (1965) from Hainan Island, South China Sea, China. All the material of *A. magna* (4 specimens and 103 shells) was collected from assemblages of empty shells on sandy beaches of Hainan Island and northern Vietnam. The material of *A. hainanensis* (the holotype and 10 additional specimens) is much smaller, but with the exception of the holotype, was also sampled from assemblages of empty shells on sandy shores Hainan Island and the Gulf of Thailand (Bangkok). The holotype was collected in the intertidal zone of Hainan Island in the estuary of river, on silty sand among the mangroves.

Having studied all materials relating to these species in the ZIN collection, I think that Scarlato (1965) erroneously assigned these species to *Abrina*. The hinge plate in these species is very wide, projects into the shell cavity in the area of resilifer. The hinge is weak, with two cardinal teeth in the right valve and two cardinal teeth in the left valve of *A. hainanensis*, and one cardinal tooth in the left valve of *A. magna* (Figs. 29–34). External and internal ligaments are very large. The external ligament is deeply sunken, almost internal, separated from the resilium by a slight ridge. The resilium is lodged in a large, trigonal resilifer behind the cardinal teeth. Lateral teeth are absent.

Thus, the hinge of both species is identical to the hinge of the genus *Psammotreta* (Tellinidae) (Keen, 1969), except that the left valve of *A. magna* bears one cardinal tooth instead of two. To all appearances, the posterior cardinal tooth on the left valve of *A. magna* is partly or com-



FIGS. 21–34. Shells of *Abrina* species. FIGS. 21–28. *Abrina lunella* (Gould, 1861), NSMT (Mo 73503), Shiroko, Suzuka-shi, Mie Prefecture, Japan. FIGS. 21–24: Shell length 12.8 mm. FIGS. 25, 26: Shell length 10.2 mm. FIGS. 27, 28: Hinge of left and right valves. Bar = 1 mm. FIGS. 29–34. *Abrina magna* Scarlato, 1965. FIGS. 29, 30: ZIN (17), Tonkin Bay, North Vietnam, South China Sea, right valve, length 63.0 mm. FIGS. 31–34. ZIN (20), North Vietnam, South China Sea. FIGS. 31, 32: Right valve, length 49.6 mm. FIGS. 33, 34: Left valve, length 45.5 mm.

TABLE 2. Differentiating characters of *Abrina* spp. L - shell length; H - height; W - valve width; A - anterior end length.

Characters	*A. lunella*	*A. kinoshitai*	*A. scarlatoi*	*A. declivis*	*A. sibogai*	*A. inanis*	*A. weberi*
Shell shape (H/L)	ovate-trigonal, high (0.737)	ovate-elongate, low (0.625)	ovate-trigonal, high (0.778)	subtrigonal	ovate-elongate, high (0.836)	ovate-trigonal, low (0.450)	ovate-trigonal, high (0.714)
Shell max. length, mm	16.3	14.8	11.2	10.0	13.4	20.0	14
Valve (W/L)	moderately inflated (0.226)	moderately inflated (0.160)	moderately inflated (0.208)	inflated	moderately inflated (0.198)	moderately inflated (0.06)	inflated (0.243)
Beaks (A/L)	high, posterior to midline (0.624)	low, posterior to midline (0.643)	low, almost central (0.514)	high, almost central	low, posterior to midline	high, posterior to midline	high, posterior to midline
Periostracum	polished, colorless	polished, colorless or grayish	non-polished, gray or light brown	polished to dull, light brown	polished, whitish	polished, whitish	polished
Shell surface	with faint growth lines	with faint growth lines	with conspicuous, rough growth lines	with faint growth lines	with faint growth lines	with faint growth lines	with faint growth lines
Lunule and escutcheon	absent	absent	absent	absent	present	present	present
Nymph	long, narrow	long, narrow	short, wide	long, narrow	long, narrow	long, narrow	long, narrow
Hinge plate	narrow	narrow	wide	narrow	narrow	narrow	narrow

pletely reduced with age. Unlike *A. hainanensis*, all valves of *A. magna* were very large, 42 to 73 mm long (valves of *A. hainanensis* are 9.5 to 22.3 mm in length). Moreover, since all material on this species was collected in assemblages of empty shells, almost on all left and right valves the cardinal teeth were partly or completely destroyed, and the ligament and periostracum were lacking. Therefore, it is not inconceivable that the thin and weak posterior cardinal tooth was broken in all left valves.

Examination of the descriptions and figures of members of the genus *Psammotreta* (Keen, 1969, 1971; Habe, 1977; Lamprell & Whitehead, 1992; Okutani, 2000) shows that *A. magna* is most likely a synonym of *Psammotreta (Tellinimactra) edentula* (Spengler, 1798), inhabiting the intertidal and upper subtidal zones of Japan, South China, North Vietnam and Australia. *Abrina magna* is identical to *P. (T.) edentula* in hinge structure and morphology of the external and internal ligaments. Moreover, it has similar shape, proportions and size of the shell, a very deep pallial sinus in both valves, and scars of the anterior and posterior adductors differing in shape and size (Figs. 29–34). It is possible that the material of *A. hainanensis* comprises young specimens of *P. (T.) edentula*. However, it is not unlikely that *A. hainanensis* is a separate species of the same subgenus. A more thorough study of specimens of different species of *Psammotreta* is needed to make a correct identification of *A. magna* and *A. hainanensis*.

DISCUSSION

Scarlato (1981) described new species of *Abrina* on the basis of a study of young specimens of *Macoma* (Kamenev & Nadtochy, 1999). The main morphological characteristic on the basis of which these species were previously included in *Abrina*, was the presence of an internal ligament in an oblique resilifer posterior to the cardinal teeth. The genera *Abrina* and *Macoma* are similar in most morphological characteristics. The main distinguishing characteristic of *Abrina* is the presence of a well-developed internal ligament in the resilifer, a narrow groove posterior to the cardinal teeth. In *Macoma*, an internal ligament is absent. However, studies of the common northwestern Pacific *Macoma* species – *M. loveni* (Jensen, 1905), *M. calcarea* (Gmelin, 1791), *M. balthica* (Linne, 1758), *M. crassula* (Deshayes, 1855), *M. lama* Bartsch, 1921, *M. incongrua* (Martens, 1865) – show the presence of an internal ligament in young specimens (Kamenev & Nadtochy, 1999). Thus, a well-developed internal ligament lodged in oblique resilifer in representatives of the genus *Macoma* is a juvenile characteristic that is preserved in *Abrina* during its entire life.

Morphological similarity of the genera *Abrina* and *Macoma*, and the presence of an internal ligament in young specimens of species of *Macoma*, at first leads one to suggest that the present species is a juvenile of species of *Macoma*. In *Macoma*, a well-developed resilium is found only in individuals up to 5–6 mm in shell length, whereas in specimens with a shell length more than 10 mm, it is lacking (Kamenev & Nadtochy, 1999). A study of *A. scarlatoi* of different ages showed that both young and adult specimens of this species have a well-developed resilium, lodged in the oblique resilifer posterior to the cardinal teeth. The shape of the resilifer changes with age, but its position and relative size remain unchanged. Furthermore, *A. scarlatoi* differs from most species of *Macoma* (Scarlato, 1981; Coan et al., 2000) in the lack of a flexure to the right of the posterior shell margin and by having pallial sinuses of similar shape and size in both valves. Therefore, I think that the species described herein belongs to the genus *Abrina*, not to *Macoma*.

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