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## Fossil Shells from the Atsumi Peninsula, Mikawa

By

Matajiro YOKOYAMA, *Rigakuhakushi*

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With 1 Plate

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In the spring of the year 1925, Mr. K. Ishii of the Imperial Geological Survey was engaged in surveying for the Survey's Sheet Map of Irako, Mikawa Province, which includes the whole of Atsumi, a peninsula separating the bay of the same name on the north from the Sea of Tōtōmi on the south. The peninsula consists in greater part of layers of loosely cemented sand and gravel, occasionally intercalating those of clay, which, in spite of their very gentle dip to the west, form a plateau sixty to seventy metres above the level of the sea. This plateau on the south ends in a steep cliff directly on the sea. Here near the foot of the cliff, Mr. Ishii collected fossils at two places, Tonami<sup>1)</sup> and Ikobé,<sup>2)</sup> places not quite four kilometres from each other, from two consecutive layers, the upper of which is clay about five metres in thickness, and the lower, loose conglomerate about three metres in thickness. The fossils of Tonami all belong to the upper clay and those of Ikobé all to the lower conglomerate.

These fossils on examination were found to consist of species given in the following table :

- 
- 1) 渥美郡高豊村豊南    2) 同村伊古部

	Ikobé	Tonami	Geological Occurrence
<b>Gastropoda</b>			
1. <i>Ringicula musashinoensis</i> Yok.		+	{ Pliocene, Low. a. Up. Musashino, Recent
2. <i>Mangilia ishiiana</i> n. sp.		+	
3. <i>Hemifusus ternatanus</i> (Gm.).		+	Pliocene, Up. Musashino, Recent
4. <i>Siphonalia cassidaraeformis</i> (Rve.)		+	Pliocene, Up. Musashino, Recent
5. <i>Eburna japonica</i> Rve.		+	Up. Musashino, Coral Bed, Recent
6. <i>Columbella (Atilia) masakadoi</i> Yok.		+	Up. Musashino, Coral Bed, Recent
7. <i>Columbella (Atilia) martensi</i> Lke.		+	Up. Musashino, Recent
8. <i>Columbella (Mitrella) dunkeri</i> Try.		+	{ Low. a. Up. Musashino, Cor. Bed. Recent
9. <i>Columbella (Anachis) fratercula</i> n. sp.		+	
10. <i>Repana bezoar</i> L. var. <i>thomasi</i> Cr.	+		Pliocene, Up. Musashino, Recent
11. <i>Dolium luteostomum</i> Küst.	+		Pliocene, Musashinos, Recent
12. <i>Potamides (Batillaria) zonalis</i> (Brug).		+	Up. Musashino, Recent
13. <i>Cerithiopsis satomii</i> Yok.		+	Coral Bed
14. <i>Natical janthostoma</i> Desh.		+	{ Miocene, Pliocene, Musashino, Recent
15. <i>Eulima (Leiostraca) glabroides</i> Yok.		+	Up. Musashino
16. <i>Turbonilla (Mormula) paucicostulata</i> Tok.		+	Up. Musashino
17. <i>Odostomia (Odostomia) limpida</i> D. et B.		+	Up. Musashino, Recent
18. <i>Odostomia marielloides</i> Yok. var. <i>gracilis</i> Yok.		+	Up. Musashino
19. <i>Chlorostoma rusticum</i> (Gm.)		+	Recent
20. <i>Calliostoma ishiianum</i> n. sp.		+	
21. <i>Euchelus ornatissimus</i> n. sp.		+	
<b>Lamellibranchiata</b>			
22. <i>Panope generosa</i> Gld.		+	Pliocene, Up. Musashino, Recent
23. <i>Corbula venusta</i> Gld.		+	Low. a. Up. Musashino, Recent
24. <i>Basterotia gouldii</i> (Ad.)		+	Low. Musashino, Recent
25. <i>Mya arenaria</i> L.		+	Pliocene, Recent
26. <i>Cryptomya busoensis</i> Yok.		+	Up. Musashino, Recent
27. <i>Mactra ovalina</i> Lam.		+	Up. Musashino, Recent
28. <i>Tresus nuttali</i> (Conr.)		+	Pliocene, Up. Musashino, Recent
29. <i>Psammobia oriens</i> Desh.		+	Recent
30. <i>Tellina jedoensis</i> Lke.		+	Up. Musashino, Recent
31. <i>Tellina ojiensis</i> Tok.		+	Low. a. Up. Musashino, Recent
32. <i>Macoma dissimilis</i> (Mart.)		+	{ Miocene, Pliocene, Musashinos, Recent
33. <i>Dosinia angulosa</i> Phil.		+	Pliocene, Recent
34. <i>Dosinia troscheli</i> Lke.		+	Pliocene, Musashinos, Recent
35. <i>Chioné mindanensis</i> Yok.		+	Up. Musashino, Recent
36. <i>Tapes variegatus</i> Hanl.		+	Pliocene, Musashinos, Recent
37. <i>Cardium muticum</i> Rve.		+	Pliocene, Musashinos, Recent

	Ikobé	Tonami	Geological Occurrence
38. <i>Cardium nuttallii</i> Conr.	+		{ Miocene, Pliocene, U. Musashino, Recent
39. <i>Lucina pisidium</i> Dkr.		+	{ L. a. U. Musashino, Coral Bed, Recent
40. <i>Cardita cumingiana</i> Dkr.		+	Pliocene, Up. Musashino, Recent
41. <i>Lithophaga zitteliana</i> Dkr.		+	Up. Musashino, Recent
42. <i>Anomia lischkei</i> D. et F.		+	Pliocene, Musashino, Recent
43. <i>Placunanomia macroschisma</i> (Desh).		+	Up. Musashino, Recent
44. <i>Pecten laetus</i> Gld.		+	Pliocene, Musashinos, Recent
45. <i>Pecten atsumiensis</i> n. sp.		+	
46. <i>Ostrea denselamellosa</i> Lke.	+	+	L. a. U. Musashino, Recent
47. <i>Ostrea cucullata</i> Born.		+	Pliocene, Coral Bed, Recent
48. <i>Arca symmetrica</i> Rve.		+	L. a. U. Musashino, Recent

The above fauna consists of the following elements:

1. Species hitherto found only living . . . . .	2
2. Species hitherto found only fossil . . . . .	9
3. Species found living as well as fossil . . . . .	37
	<hr/> 48

Of the nine species hitherto found only fossil, one occurs in the Coral Bed of Awa (*Youngest Pleistocene*) and three in the Upper Musashino (*Youngest Pliocene* or *Lower Pleistocene*), while the remaining five are new. If these nine are really extinct, the percentage of extinct forms to the whole becomes about 16.

Of the thirty-seven living as well as fossil species, twenty-three go up into the *Pliocene* and eleven into the *Upper Musashino*, while only three go up into the *Miocene*. Thus the greatest weight falls on the *Pliocene*. It is probable from the low percentage of the extinct forms that the fauna is younger than that of the *Satsuka Beds* (*Middle Pliocene* with about 33 % of extinct forms) of the neighbouring province of Tōtōmi, and is approximately contemporaneous with that of the *Hijikata Beds* of the same region, which I regard as an equivalent of the *Lower Musashino* of the district south of Yokohama.

## Description of New or Rare Species

1. *Mangilia ishiiana*, nov. sp.

Pl. XLIII. Fig. 2.

Shell small, broad-fusiform, with body-whorl higher than spire. Whorls five, of which two are nuclear, smooth and rounded; postnuclear whorls convex, longitudinally plicate and spirally corded. Plicae fourteen on penultimate and ultimate whorls, rounded, straight or slightly sinuous, with the upper end curved forward, somewhat oblique, with lower end more forward than upper; interspaces equal in breadth to plicae or broader. Spiral cords three in a whorl, one in its middle and two below, the distance between the upper and the middle one being somewhat greater than that between the middle and the lower, distinct in interspaces, though indistinct on plicae. On the body-whorl there is one more cord below the third, beyond which on the base there are about ten cords down to the caudal end. Aperture narrow, elongated, with sinus immediately below the suture and rounded. Canal short, bent. Height 3 millim. Diameter 1.2 millim.

A single example.

Fossil occurrence.—Upper clay, Tonami.

2. *Hemifusus ternatanus*, (GMELIN)

Pl. XLIII. Fig. 1.

*Hemifusus ternatanus*. Yokoyama, Tert. Moll. South. Tôtômi, p. 336.

The single specimen of this species hitherto found was a mere fragment. From Atsumi, however, we have a nearly perfect one, of which I here give a photograph.

This species is still living in Central and Western Japan and also in the south down to the equator.

Fossil occurrence.—Upper clay, Tonami Satsuka Beds. Upper Musashino of Shinagawa.

3. *Columbella (Atilia) martensi*, LISCHKE

*Columbella martensi*. Lischke, Japan, Meeresconch., vol. II, p. 47, pl. V, figs. 1, 1a. 2-9. Pilsbry, Catal., p. 38.

*Columbella (Atilia) praecursor*. Yokoyama, Foss. Up. Musash., p. 61, pl. II, fig. 24.

A species of *Columbella*, described by me under the new specific name of *praecursor* in my work on the fossils of the Upper Musashino, is, as I am now convinced, identical with *Columbella martensi* of Lischke. That *Columbella praecursor* is a living species was already stated in the work cited. But this identification has widened its range of distribution from Central Japan to include Northern as well as Western Japan.

Only one specimen.

Fossil occurrence.—Upper Clay, Tonami.

#### 4. *Columbella* (*Anachis*) *fratercula*, nov. sp.

Pl. XLIII. Fig. 3.

Shell small, low-turrete. Whorls six or seven, only slightly convex, shouldered, longitudinally costate. Costae fourteen on penultimate whorl, obsolete on the last part of body-whorl, straight, somewhat oblique, broad, rounded, with interspaces narrower. Base abruptly narrowed, smooth or with several spiral sulci. Aperture elongated, narrow, with posterior corner pointed. Outer lip thin, straight or even concave. Canal very short, bent.

Two specimens, one of which is short and the other long. The former measures 2.5 millim. in height and 1 millim. in diameter, while the latter measures 3.1 millim. in height and 1.2 millim. in diameter.

Fossil occurrence.—Upper clay, Tonami.

#### 5. *Chlorostoma rusticum*, (GMELIN)

Pl. XLIII. Fig. 10.

*Chlorostoma rusticum*. Pilsbry, Catalogue, p. 94.

*Trochus rusticus*. Lischke, Jap. Meeresconch., I, p. 97. Schrenck, Moll. Amurl. u. d. nordjap. Meeres, p. 347.

A single example, readily recognized by its longitudinally rudely ribbed and spirally striated shell with umbilicus open.

This shell is still living in Northern and Western Japan.

Fossil occurrence.—Upper clay, Tonami.

#### 6. *Calliostoma ishiianum*, nov. sp.

Pl. XLIII. Fig. 9.

Shell very small, thick, conical. Whorls four, of which the first is embryonal, smooth and rounded; the succeeding ones slightly convex, ornamented with three strong, rounded, spiral cords, which are equally

distributed and separated by narrower interspaces. Body-whorl with one more cord below the normal ones on the periphery making the latter angulate. Base flat, with six strong spiral cords. Aperture subquadrate with rounded corners. A single example measuring 2.5 millim. in height and 2 millim. in diameter.

This shell resembles *Calliostoma occidentalis* Mighels and Adams (Tryon, Man. Conch., XI, pl. 301, fig. 23) of the North Atlantic which, however, has more whorls and beaded cords.

Fossil occurrence.—Upper clay, Tonami.

#### 7. *Euchelus ornatissimus*, nov. sp.

Pl. XLIII. Figs. 7, 8.

Shell small, rather thick, turbate. Whorls four, the first smooth and rounded, the succeeding convex, spirally ribbed and longitudinally threaded. Spiral ribs three except on body-whorl, on which there is a fourth on the periphery, strong, equally distributed, rounded, with the uppermost the strongest and the lowest the weakest; interspaces about equal in breadth to ribs. Longitudinal threads numerous, over thirty on body-whorl, straight, somewhat oblique, with upper end more anterior than lower end. Points of intersection of ribs and threads tubercular. Base convex, with three spiral ribs similar to those of the whorls, crossed by longitudinal threads which, however, are indistinct on the ribs, being visible mostly in the interspaces. Aperture roundish, with outer lip crenate, caused by the spiral ribs of the outside.

Two specimens, one of which is imperfect. The one measures 2.5 millim. in height and 3 millim. in diameter, while the other measures over 5 millim. in height and 4 millim. in diameter.

Fossil occurrence.—Upper clay, Tonami.

#### 8. *Psammobia oriens*, DESHAYES

Pl. LXIII. Fig. 6.

*Psammobia oriens*. Deshayes, Proc. Zool. Soc., 1854, p. 318. Reeve, Conch. Icon., *Psammobia*, pl. I, fig. 1.

Only a left valve, rather thin, squarish and more equilateral than the other species of the genus found in Japan. Reeve speaks of the shell as rather solid, but in outline our examples agree quite well with Deshayes' species.

Reeve gives its habitat simply as Japan. It is not found in

Iwakawa's catalogue of Japanese shells found in the Tokyo Imperial Museum, from which it may be conjectured that the living shell is rare.

Fossil occurrence.—Lower conglomerate, Ikobé.

9. *Pecten atsumiensis*, nov. sp.

Pl. XLIII. Figs. 4, 5.

Shell rather small, moderately thick. Right valve compressed, almost as high as long, equilateral, anterior extremity roundly angulate, posterior markedly angulate, though the angle is blunt, radiately ribbed. Ribs sixteen or seventeen, straight, more or less elevated, broad, flattish on top with edges blunt and flanks very steep, separated by flat, usually somewhat narrower, valleys. Ears comparatively large, anterior and posterior different in shape; anterior ear somewhat longer and narrower, with anterior border somewhat curved, radiately ribbed with ribs seven to ten, scaly; byssal notch very deep, pointed; posterior ear triangular with posterior border almost straight and somewhat oblique, gradually receding below, only with concentric lines of growth.

Three right valves, the largest measuring 46 millim. in height and length, and 8.3 in depth.

This species has a close resemblance to *Pecten* (*Equipecten*) *palmeri* Dall (Arnold, Tert. a. Quatern. Pectens California, p. 136, pl. L. fig. 2) living in the Gulf of California, although there are some slight differences. The latter has the posterior extremity rounded and not angulate, and the posterior ear radiately costulated. Even if these differences are only variations, in the absence of the left valve it seems to be not at all prudent to treat the Japanese fossil under Dall's name.

Fossil occurrence.—Upper Clay, Tonami.

10. *Ostrea denselamellosa*, LISCHKE

Pl. XLIII. Fig. 11.

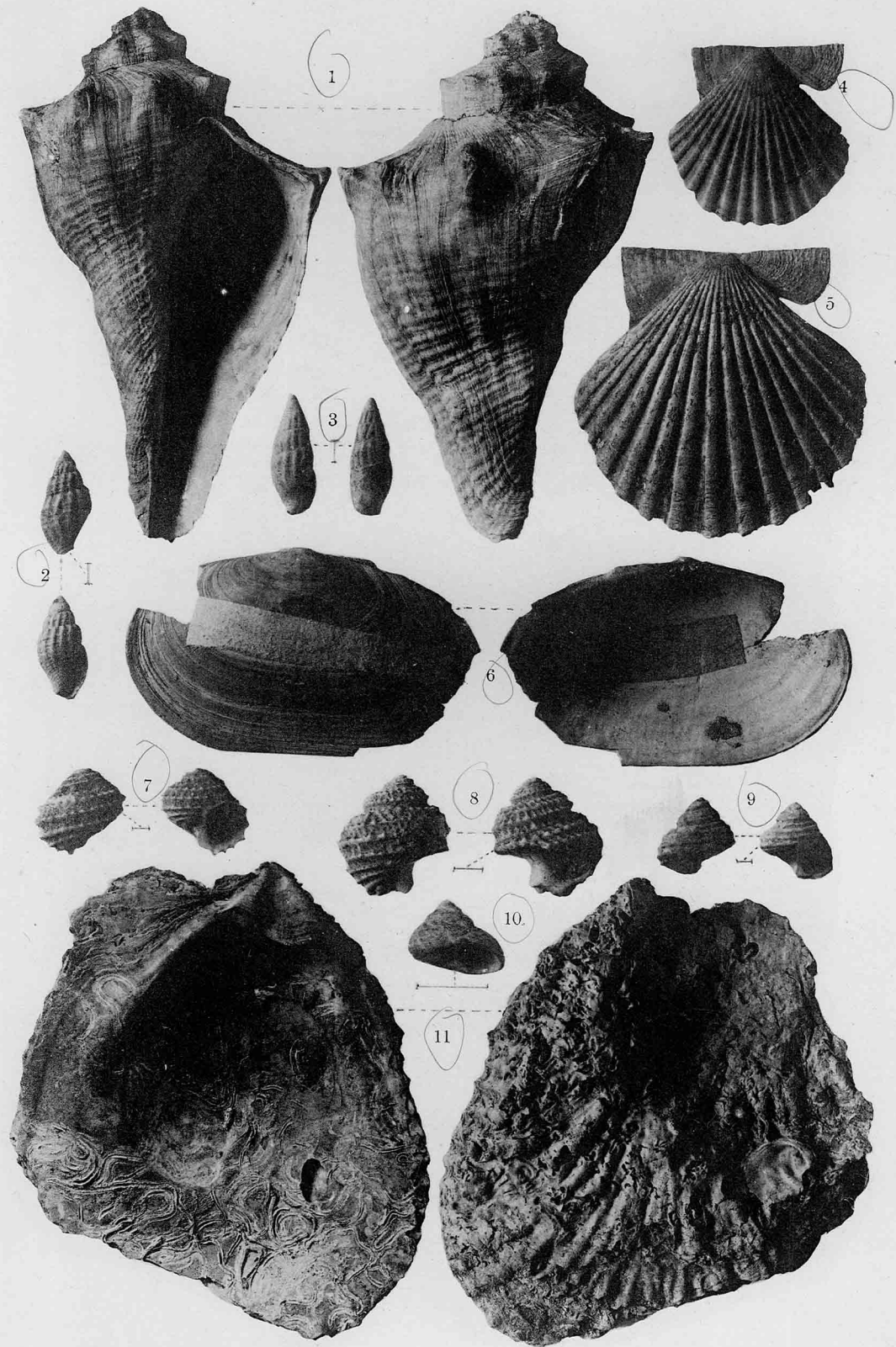
*Ostrea denselamellosa*. Yokoyama, Foss. Miura Penin., p. 162, pl. XVI, fig. 6.

The figure of this species given in my work above cited does not adequately represent the densely lamellar character of the surface. The present one shows it better.

Fossil occurrence.—Upper Clay, Tonami.

Plate XLIII

- Fig. 1. *Hemifusus ternatanus* (Gmelin).  $\frac{2}{3}$  nat. size. P. 372  
Fig. 2. *Mangilia ishiiana* Yok. P. 372  
Fig. 3. *Columbella* (*Anachis*) *fratercula* Yok. (Unfortunately the aperture is not shown in its full breadth). P. 373  
Figs. 4, 5. *Pecten atsumiensis* Yok. Right valves. P. 375  
Fig. 6. *Psammobia oriens* Desh. P. 374  
Figs. 7, 8. *Euchelus ornatissimus* Yok. P. 374  
Fig. 9. *Calliostoma ishiianum* Yok. P. 373  
Fig. 10. *Chlorostoma rusticum* (Gm.). P. 373  
Fig. 11. *Ostrea denselamellosa* Lke.  $\frac{2}{3}$  nat. size. P. 375



M. YOKOYAMA: Fossil Shells from the Atsumi Peninsula.

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