JOURNAL OF THE COLLEGE OF SCIENCE, TOKYO IMPERIAL UNIVERSITY.
VOL. XLIV., ART. 7.

# On Some Fossil Shells from the Island of Saishū in the Strait of Tsushima.

By

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*With 1 Plate.*

Several years ago, Prof. Shintaro Nakamura of the Imperial University of Kyoto, then a geologist of the Geological Survey of Korea, sent me some fossil shells for examination, which he had collected on Saishū, an island at the western entrance of the Tsushima Strait, generally known under the name of Quelpart among Westerners.

The fossil locality is a sea-cliff near the brook flowing at the western end of Seikiho,* a small anchorage on the southern coast of the island. According to a note attached to the fossils, the rock-layers composing the cliff seem to be nearly horizontal and three in number which, counted from below, are as follows:

1. Sand. About 100 feet in thickness and containing some argillaceous layers in the upper part and having two shell-layers, one at about 50 feet, the other at about 60 feet above the level of the sea. The lower layer is 3–6 feet thick and entombs Mollusca, while the upper is somewhat less in thickness and rich in Brachiopoda.

2. Volcanic agglomerate. About 20 feet thick.

3. Trachytic lava. About 60 feet thick and occupying the highest part of the cliff.

* 濟州島西歸浦

The fossils which I obtained appear to have been collected from both shell-layers, since though they consist mostly of Mollusks there are also some Brachiopods. Besides these two groups of shells, there are also some remains of Echinoids, Cirripedes, Bryozoans and Tubicolous Annelids.

The Mollusca and Brachiopoda which I have been able to determine are the following:

1. Turritella saishuensis n. sp.
2. Natica sp.
3. Dentalium weinkauffi Dkr.
4. Pholas fragilis Sow.
5. Dosinia sp.
6. Meretrix (Callista) chinensis Chem.
7. Saxidomus purpuratus Sow.
8. Cardium sp.
9. Diplodonta semiaspera Phil.
10. Lucina borealis L.
11. Venericardia cipangoana Yok.
12. Venericardia ferruginea Ad.
13. Venericardia nakamurai n. sp.
14. Myodora fluctuosa Gld.
15. Thracia pubescens Pult.
16. Mytilus sp.
17. Anomia lunula Yok.
18. Pecten laqueatus Sow.
19. Pecten laetus Gld.
20. Pecten tokyoensis Tok.
21. Pecten cosibensis Yok.
22. Pectunculus vestitus Dkr.
23. Nucula insignis Gld.
24. Terebratella coreanica Ad.
25. Terebratella? excelsa n. sp.
26. Terebratella? sp.
27. Endesia? sp.

Putting aside the forms not specifically determined there are 21 species of which 6 are not yet known to be living. Of these

one-half or 3 are quite new, while the other half has already been found in the Musashino formation near Tokyo. The former are *Turritella saishuensis*, *Venericardia nakamurai* and *Terebratella? excelsa*, and the latter *Anomia lunula*, *Pecten tokyoensis* and *Pecten cosibensis*. The remaining 15 are all recent as well as fossil and found in Japan, save one, *Thracia pubescens*, which was hitherto known only from Europe where it is living and also fossil in the English Crag. The formation in which the other 14 are fossil is the *Musashino* found in the region surrounding Tokyo Bay.

From these considerations I deem the shell-layers of Seikiho as of the *Musashino* Age, that is to say, *Upper Pliocene*.

## Description of the Species.

### 1. *Turritella saishuensis* n. sp.

(Pl. I., Fig. 2.).

Shell turrete. Whorls numerous, somewhat convex, weakly angulate a little above the suture, three-ridged. Ridges elevated, more or less sharp on the younger whorls, and flattened on the older; the lowest occupies the angle and is the largest, the middle is nearly as large and in the middle of the whorl, while the upper is the weakest of all and somewhat more distant from the middle one than the middle one is from the lower. There is also a fourth ridge close to the lower suture which, though usually small and inconspicuous, is on the body-whorl nearly as large as the others and forms the angulate periphery. The spaces between the ridges are usually provided with a few unequal spiral striae. Base flattened, with about two spiral ridges near the periphery and diminishing in size toward the caudal end. Spiral striae also present not only between the ridges, but also beyond the last one. Aperture roundly subquadrate. Outer lip thin, sinuous, with a broad and shallow notch below the suture.

There are only a few specimens, all lacking the apex. The entire number of the whorls may be about eighteen. Apical angle

about 18°. The largest specimen measures some 56 millimetres in height and 15 millim. in diameter.

This species is not unlike *Turritella trisulcata* Lam. (Tryon's Conchology, vol. 8, pl. 63, fig. 75) living in the Red Sea, in which, however, the arrangement of the three upper ridges is somewhat different.

A form close to this species was found in the Tertiary of Gōtsu, Echigo.

### 2. *Natica* sp.

A single imperfect fragment of a young shell resembling that of *Natica janthostoma* Desh. (Yokoyama, Foss. Miura Penin., pl. v, figs. 3, 4.).

### 3. *Dentalium weinkauffi*, Dunker.

*Dentalium weinkauffi.* Yokoyama, Foss. Miura Pen., p. 102, pl. VI, figs. 19–21. Foss. Up. Musashino, p. 118, pl. VI, fig. 6.

Only some fragments.

### 4. *Pholas fragilis*, Sowerby.

*Pholas fragilis.* Yokoyama, Foss. Miura Penin., p. 104, pl. VI, fig. 29. Foss. Up. Musashino, p. 119.

A right valve not quite perfect.

### 5. *Dosinia* sp.

A fragment not quite determinable.

### 6. *Meretrix* (Callista) *chinensis*, (Chemnitz).

*Meretrix* (*Callista*) *chinensis.* Yokoyama, Foss. Miura Penin., p. 120, pl. VIII, figs. 9, 10. Foss. Upper Musashino, p. 146, pl. XI, fig. 6.

A small imperfect right valve.

### 7. *Saxidomus purparatus*, (Sowerby).

*Saxidomus purpuratus.* Yokoyama, Foss. Miura Penin., p. 127, pl. IX, fig. 8. Foss. Up. Musashino, p. 153, pl. IX, figs. 4, 5.

Two large specimens, though merely casts.

### 8. *Cardium* sp.

Two casts of a large *Cardium* showing on its surface about eighteen rather weak and distant radiating ribs.

### 9. *Diplodonta semiaspera*, (PHILIPPI).

*Diplodonta semiaspera.* Yokoyama, Foss. Miura Penin., p. 131, pl. X, figs, 2, 3. Foss. Up. Musashino, p. 160, pl. XIV, fig. 2.

An internal cast of a medium-sized shell.

### 10. *Lucina borealis*, (LINNÉ).

*Lucina borealis.* Yokoyama, Foss. Miura Penin., p. 133, pl. X, fig. 7, Foss. Up. Musashino, p. 160.

Only some fragments.

### 11. *Venericardia cipangoana*, YOKOYAMA.

*Venericardia cipangoana.* Yokoyama, Foss. Miura Penin., p. 137, pl. X, fig. 2. Foss. Up. Musashino, p. 162, pl. XIII, fig. 4.

A tolerably large right valve.

### 12. *Venericardia ferruginea*, (ADAMS).

(Pl. I., Fig. 6.).

*Venericardia ferruginea.* Yokoyama, Foss. Miura Penin., p. 139, pl. XI, figs. 3, 4. Foss. Up. Musashino, p. 162.

Two right valves. The one is small and normal in form, the length somewhat exceeding the height. The other (figured) is large and abnormally high, being 18.2 millim. long and 19.5 millim. high, so that it may be provisionally treated as a variety under the name of var. *orbicularis*.

### 13. *Venericardia nakamurai*, YOKOYAMA.

(Pl. I., Fig. 9.).

A single right valve.

Shell small, rather thick, compressed, subequilateral. Anterior and posterior margins rounded, both passing without

any angle into the broadly arcuate ventral margin; anterior dorsal nearly straight, posterior somewhat excavated. Surface ornamented with ten coarse, flatly rounded, radiating ribs separated by very narrow valleys. Beak pointed. Lunula present, though not very distinct, short. Hinge with an anterior lateral tooth. Height 5.4 millim. Breadth 5 millim. Depth 1.5 millim.

The specimen is worn, but very characteristic in form. It is somewhat like *Venericardia toneana* Yok. (Foss. Up. Musashino, p. 163, pl. XIII, figs. 6, 7.), but it is higher and more pointed, with a less number of ribs.

### 14. *Myodora fluctuosa*, GOULD.

*Myodora fluctuosa.* Yokoyama, Foss. Up. Musashino, p. 170, pl. XIV, figs. 6, 7.

A single right valve.

### 15. *Thracia pubescens*, PULTENY.

(Pl. I., Fig. 1.).

*Thracia pubescens.* Wood, Crag Mollusca, Bivalves III, p. 259, pl. XXVI, fig. 1.

A specimen with both valves preserved, though the left valve is much broken. It is 60 millim. long, 42 millim. high, and about 25 millim. thick, and is almost exactly like that figured by Wood in his Crag Mollusca above cited. Hanley and Forbes describes the ventral margin as somewhat retuse on the posterior side (British Moll,, I. p. 226). But it is uniformly convex as in the Crag specimen. The posterior end of ours is a little fractured.

This species is still living in the British seas as well as in the Mediterranean, but up to this time, it has never been found living in the seas around Japan.

### 16. *Mytilus* sp.

A cast of a right valve looking somewhat like that of *Mytilus grayanus* Dkr. living in our seas.

### 17. *Anomia lunula*, YOKOYAMA.

*Anomia lunula.* Yokoyama, Foss. Up. Musashino. p. 177, pl. XIV, figs. 22, 23.

A single flat valve.

### 18. *Pecten laqueatus*, SOWERBY.

*Pecten laqueatus.* Yokoyama, Foss. Miura Penin., p. 160, pl. XIV, figs. 9, 10. Foss, Up. Musashino, p. 183.

A single flat or left valve.

### 19. *Pecten lætus*, GOULDS.

*Pecten laetus.* Yokoyama, Foss. Miura Penin., p. 152, pl. XIV, figs. 1, 2. Foss. Up. Musashino, p. 180, pl. XIV, fig. 26.

Some fragments.

### 20. *Pecten tokyoensis*, TOKUNAGA.

*Pecten tokyoensis.* Yokoyama, Foss. Miura Penin., p. 158, pl. XIV, figs. 7, 8. Foss. Up. Musashino, p. 182.

Two right and three left valves,

### 21. *Pecten cosibensis*, YOKOYAMA.

(Pl. I., Fig. 5.).

*Pecten cosibensis.* Yokoyama, Foss. Miura Penin., p. 156, pl. XIII, figs. 7, 8.

A right valve 50 millim. high. The ribs are four in number, if we except the last one on each side of the shell which is indistinct. The two middle ones consist of three and the two lateral ones of two unequal riblets. The interspaces are narrow, and radiately and unequally costellated.

### 22. *Pectunculus vestitus*, DUNKER.

*Pectunculus vestitus.* Yokoyama, Foss. Miura Penin., p. 167, pl. XVII, figs. 10, 11. Foss. Up. Musashino, p. 189, pl. XVI, figs. 1–3.

A right and a left valve.

### 23. *Nucula insignis*, GOULD.

*Nucula insignis.* Yokoyama, Foss. Miura Penin., p. 179, pl. XIX, figs. 7, 8. Foss. Up. Musashino, p. 198.

A single right valve.

### 24. *Terebratella coreanica*, Adams et Reeve.

*Terebratella coreanica.* Yokoyama, Foss. Miura Penin., p. 184, pl. XIX, figs. 25, 28. Foss. Up. Musashino, p. 198.

A single large specimen with both valves preserved, though a little broken.

### 25. *Terebratella*(?) *excelsa*, Yokoyama.

(Pl. I., Fig. 3, 4.).

Shell tolerably large, either suborbicular or elongate-oval, broadest near the middle, moderately inflated. Ventral valve somewhat deeper than the dorsal one. Mesial fold hardly developed, the ventral valve being rather uniformly convex and the place where the dorsal sinus should be being simply flattened, or at utmost only very slightly concave. Beak moderately produced, incurved and truncated by a large round foramen almost reaching the hinge-line and separated from it by a deltidium in two small separate pieces. Beak-ridges sharp. Surface with numerous sharp roof-like ridges which increase in number toward the front by the interpolation of new ones, especially in the front-half of the shell, the size of the new ones near the margin being weaker. Lines of growth distinct, crossing the ridges and occasionally forming constrictions. Shell-structure punctate.

There are two examples. The one is perfect with both valves preserved and larger. It is 43.8 millim. high, 38.2 millim, broad and 25.3 millim. thick. The other is a ventral valve nearly as broad as high, being 32.6 millim. high, 32.4 millim. broad, and 11.3 millim. deep.

The generic determination is at present impossible, but the surface-sculpture shows some resemblance to that of *Terebratella dorsata* (Gmelin), described and figured in Davidson's „Monograph of Recent Brachiopoda" (p. 75, pl. XIV, figs. 9–19).

### 26. *Terebratella*(?) sp.

(Pl. I., Fig. 10.).

Two specimens. The shell is elongate-oval in shape, inflat-

ed, smooth on surface, punctate in structure and with the dorsal valve only a little shallower than the ventral. The beak is produced, incurved and truncated by a small round foramen separated from the hinge-line by a deltidium consisting of two pieces. Height 25.5 millim. Breadth 19 millim. Thickness 5.3 millim.

This shell looks like an elongated form of *Terebratella coreanica* (Davidson's Monograph, pl. XIII, fig. 8), though thicker with the beak more pointed and the foramen smaller. It is also not unlike a fossil which I described from the Lower Musashino of Koshiba (Foss. Miura Penin., pl. XIX, fig. 27) under the name of *T. nipponensis*, though the foramen is smaller.

On account of the extreme difficulty in determining this class of shells from a few examples, especially when we are not able to disclose the internal characters, I leave the shell unnamed. And so also the next one.

### 27. *Endesia*(*?*) sp.

(Pl. I., Figs. 7, 8.).

This is a more roundish form than the preceding, although in itself it is somewhat longer than broad. There are three specimens, two of which have been figured. These seem to belong to the same species in spite of the smaller one being more pointed behind. The surface is perfectly smooth, the magnifying-glass, however, revealing its punctate structure. Mesial fold hardly developed. The beak is much produced, incurved and provided with a small foramen at the summit. Deltidium consisting of two pieces.

The larger of the figured specimens measures 27.6 millim. in height 24.7 millim. in breadth and 16 millim. in thickness, while the smaller is 23 millim. high, 20.5 millim. broad and 11 millim. thick.

The shell shows some distant resemblance to *Eudesia lenticularis* (Deshayes) living and fossil (Pleistocene) in New Zealand (Davidson's Monograph, p. 52, pl. IX, figs. 2–13).

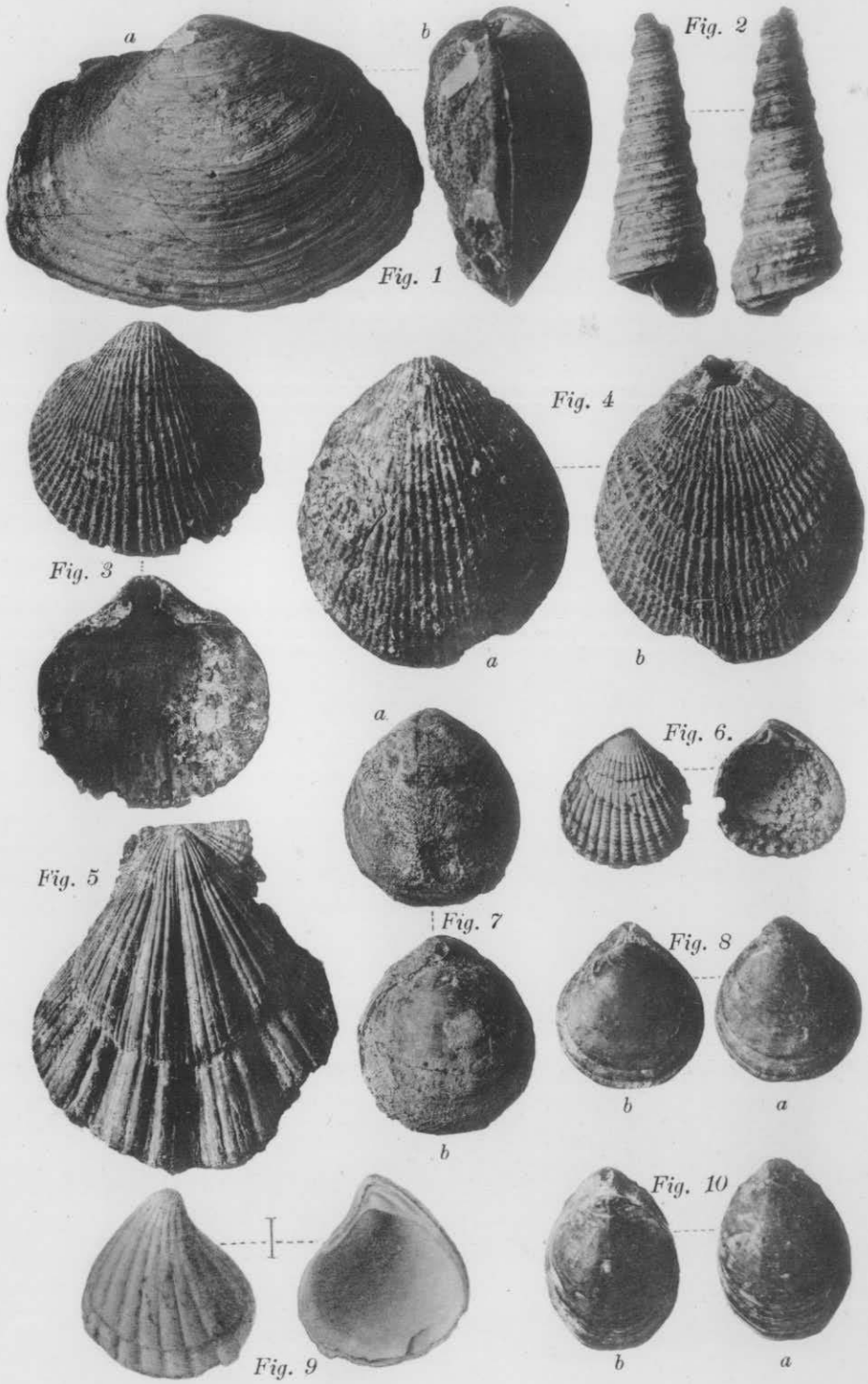
Published January 24th, 1923.

# PLATE I.

# Plate I.

## Fossils from Quelpart.

Fig. 1. Thracia pubescens Pult. a. View from right side. b. View from behind.
Fig. 2. Turritella saishuensis Yok.
Figs. 3, 4. Terebratella ? excelsa Yok. 3. Ventral valve seen from outside and inside. 4 a. Ventral view. 4 b. Dorsal view.
Fig. 5. Pecten cosibensis Yok. Right valve.
Fig. 6. Venericardia ferruginea var. orbicularis Yok. Right valve.
Figs. 7, 8. Eudesia ? sp. a. Ventral views. b. Dorsal views.
Fig. 9. Venericardia nakamurai Yok. Right valve, much enlarged.
Fig. 10. Terebratella ? sp. a. Ventral view. b. Dorsal view.




M. YOKOYAMA: Fossil Shells from Saishu.