68. *The Oti Graben in Southern Noto peninsula, Japan. (Part 3)*

By Yanosuke OTUKA,

Earthquake Research Institute.

(Received Sept. 20, 1935.)

8. Description of fossils.

GASTROPODA.

Emarginula LAMARCK, 1801.

Emarginula crassicostata SOWERBY

Plate LIII, Figures 21 a, b.

1863 *Emarginula crassicostata* SOWERBY, Thesaurus Conchyliorum, **3**, p. 214, Pl. 11, figs. 41, 42.

1934 *Emarginula crassicostata*, HIRASE, A collection of Japanese Shells, Pl. 63, fig. 1.

SOWERBY describes this species as follows:

"Shell oval, somewhat narrowed in front, with close, thick, noduliferous radiating ribs, the interstices clathrate; apex posterior; back arched; cicatrix above the suture carinated, foveolate. Oval, arched; with thick, rather close beaded ribs, the apex very posterior."

Three specimens collected.

Geologic age.—Pleistocene-Recent. Geogr. distr.—Central and western Japan. Occurrence.—Hiradoko (3 specimens), Hypotype No. 2076 in Coll. Earthquake Research Institute (height 3·7 mm.)

Puncturella LOWE, 1827.

Puncturella nobilis (A. ADAMS)

Plate LIII, Figures 23 a, b, c, 23′ a, b.

1866 *Cemoria nobilis* A. ADAMS, Ann. Mag. Nat. Hist. p. 422.

1863 *Cemoria nobilis*, SOWERBY, Thes. Conch., **3**, p. 208, Pl. 245, figs. 6~9.

1922 *Puncturella nobilis*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Uuiv. **44**, 1, p. 116, Pl. 6, fig. 4.

Geol. age.—Pliocene-Recent. Geogr. distr.—Matusima Bay; Mutu Bay; Hokkaido. Occurrence.—Simazaki (Himi Beds. 3 specimens) Hypotype No. 2024, Coll. Earthq. Res. Inst. (height 4·2 mm.)

There are two forms in the writer's collection. The description of slender form (Fig. 23 a, b, c, in Plate LIII) is as follows:

"Shell small, conical; vertex acuminate, vertically minutely coiled; radiating ribs strong, equidistant, with weak secondary radiating rib

(sometimes 2 or obsolete) in the interstices; interstices concentrically striated. Number of primary radiating ribs 17 in type specimen.

Measurements.—Height 5 mm, length 6 mm, width 4·8 mm. (with No. 2025, Coll. Earthq. Res. Inst.) Occur.– Simazaki (Himi series).

Sowerby's Fig. 9 of *Puncturella nobilis* in Pl. 245 (SOWERBY's Thesaurus Conch. 3) resembles this form in its outline. This form has a slender and higher shell than the form of Fig. 23′ a, b in Plate LIII."

***Puncturella hirasei* OTUKA n. n.**

Plate LIII, Figures 22 a, b, c.

1934 *Puncturella gigantea*, HIRASE, Coll. Japanese Shells, Pl. 62, fig. 7. (not of SCHEPMAN, 1908.)

Shell moderate, conical; vertex small, acute, vertically minutely coiled; radiating ribs numerous, more than 60, more or less equidistant, sometimes with weak secondary ribs in interstices. Interstices narrow elongated lozenge. Margin crenulated.

Fossil specimen has more or less broader radiating ribs, and narrower interstices than the living specimen.

Geol. age.—Pliocene-Recent. Geogr. distr.—Northern Japan, and Japan Sea. Occur.—Simazaki (Himi beds), Monotype No. 2026, Coll. Earthq. Res. Inst.

Puncturella (*Craniopsis*) *gigantea* SCHEPMAN[29] is closely allied to this new species, but this species is more compressed shell. *Puncturella hirasei* Otuka measures 9·5 mm high; 18·5 mm long diameter; 14·5 mm short diameter.

Puncturella galeata GOULD[30] in another allied shell. But Gould's species is higher shell with rude radiating ribs.

Puncturella major DALL[31] is closely allied to *Puncturella hirasei* Otuka, but the former species has numerous fine ribs.

***Diodora* GRAY, 1821.**

***Diodora sieboldii* (REEVE)**

Plate LIII, Figure 24.

1850 *Fissurella sieboldii* REEVE, Conch. Icon., sp. 102.

1928 *Fissurella sieboldii*, YOKOYAMA, Imp. Geol. Surv. Japan, Rep. 101, p. 124, Pl. 19, fig. 4.

1934 *Diodora sieboldii*, HIRASE, Coll. Japanese Shells. Pl. 62, fig. 5.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Tiba-pref., Sagami Bay, Wakayama pref., Nagasaki pref., Amami-Osima, Hukui pref. Oc-

29) SCHEPMAN, Siboga Exped. *Prosobranchiata*, Pt. 1, p. 88, (1908). Pl. 7, fig. 4.
30) GOULD, *Proc. Bost. Soc. Nat. Hist.*, 2 (1846), 159.
31) DALL, *Proc. U. S. Nat.* Mus., 14, 186.

currence—Miyainu (1)* (Hypotype No. 2077, Coll. E. R. I. (length 6·5 mm); Tumuki.

Patelloida **QUOY and GAIMARD, 1834.**

Patelloida saccharina **(LINNÉ)**

Pl. LIII. Fig. 25.

1758 *Patella saccharina* LINNÉ, Syst. Nat. ed. 10, p. 781.

1934 *Patelloida saccharina*, HIRASE, A collection of Japanese shells, Pl. 56, f. 1.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Tiba pref., Amami-Osima (KURODA), Toyama Bay (KIKUCHI). Occurrence.—Miyainu (1) Hypotype No. 2078, Coll. E. R. I. (length 23·5 mm)

Patelloida conulus **(DUNKER)**

Pl. LIII, Fig. 26. a, b.

1861 *Patella conulus* DUNKER, Mollusca Japonica, p. 24, Pl. 3, f. 20.

Shell small, conical, slightly convex; aperture nearly elliptical, vertex more or less blunt, smooth, nearly central, but minute; surface ornamented with obsolete radiating ribs (number about 40), decussated with concentric lines of growth; margin entire, polished, thinned; anterior and posterior margin slightly produced; inner surface smooth, with large muscular impression.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Hukui pref., Miyagi pref. Occur.—Miyainu (3) No. 2080; Hiradoko (8) Hypotype No. 2079, Coll. E. R. I. (length 3·8 mm).

Euchelus **PHILIPPI, 1847.**

Euchelus foveolatus **(A. ADAMS)**

Pl. LIII. Fig. 27 a, b, c.

1851 *Monodonta foveolata* A. ADAMS, Proc. Zool. Soc. London, p. 176.

SOWERBY describes this species as follows: "Shell small, globose-conic, solid, white, very minutely perforated; spire short; whorls about 4, convex, encircled by strong spiral ribs, the interstices between them deeply, coarsely pitted by the prominence of strong, regular, longitudinal lamellae, continuous over the spirals. The penultimate and next earlier whorls have 3 spirals (the subsutural one sometimes subobsolete), the outer lip inserted upon the fourth; on the last whorl near the aperture there are 7, but sometimes more, by reason of the interpolation of one or two interstitial riblets on the upper surface; two or three submedian ribs are generally more prominent; suture canaliculate; aperture rounded, columella slightly concave, rather wide, flat, not toothed on base, umbilical perforation minute.

No. 1. height 7·2 mm, diameter 7 mm (Hypotype).

No. 2. " 5 mm, " 5 mm.

* Number of collected specimen.

Geogr. distr.—Philippines. Geol. age.—Pleistocene-Recent. Occurrence.—Hiradoko (5), Hypotype No. 2081, Coll. E. R. I.

***Solariella* S. WOOD, 1842.**

***Solariella* aff. *angulata* (TOKUNAGA)**

1906 *Trochus (Minolia) angulatus* TOKUNAGA, Jour. Coll. Sci. Imp. Univ. Tokyo, **21**, 2, p. 30, Pl 2, f. 5.

1922 *Solariella angulata*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ. **44**, 1, p. 111, Pl. 5, f. 20.

Specimens from Hiradoko very small. Living specimens collected from Japan Sea and Sagami Bay. Measurements of specimens from Sagami Bay: height 14 mm, diameter 14 mm.

Geologic. age.—Lower Pleistocene-Recent. Geographic distribution.—Sagami Bay, Kisyû Nada, and Hukui pref. Southerm Kwanto (Tiba pref.) Occurrence.—Hiradoko (2) No. 2082, Coll. Earthq. Research Institute. (diameter 1·8 mm)

***Tegula* LESSON, 1832.**

***Tegula* (*Chlorostoma*) *rustica* (GMELIN)**

Pl. LIII. Fig. 28, a, b.

Trochus rustica CHEMNITZ, Conch. Cab. **5**, p. 89, f. 1645, 1646.

1821—0 *Trochus rustica* GMELIN, Syst. Nat. ed. 13, p. 3572.

1934 *Tegula (Chlorostoma) rustica*, HIRASE, Coll. Jap. Shell, Pl. 67, f. 7.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Honsyu, Sikoku, and Kyusyu. Occurrence. - Tumuki (1) Hypotype No. 2086, Coll. E. R. I., (height 28 mm; diameter 29 mm).

***Umbonium* LINK, 1807.**

***Umbonium* (*Suchium*) *akitanum* SUZUKI**

Pl. LIV, Fig. 62, 63.

1934 *Umbonium akitanum* SUZUKI, Jour. Geol. Soc. Tokyo, **41**, p. 63, f. 1.

Shell depressed-conical; whorls about 5~6, of which first two or three embryonal and smooth, the remainder slightly convex; surface spirally sculptured, the sculpture consisting of many spiral threads whose interspaces are narrower than threads. Number of spiral threads about 10 or 9 on penultimate whorl; upper part of spiral threads *moniliferum* type; base slightly convex with fine spiral lines.

Although this species has a striking resemblance to *Umbonium (Suchium) moniliferum costatum* (KIENER)[32] in its sculpture, the former has a depressed shell with more weak spiral threads and weak basal spiral lines.

Prof. M. YOKOYAMA[33] reported this species from the Pliocene formation of the Akita Oil-fields as *Umbonium suchiense*, but *Umbo-*

32) KIENER, *Species General Iconographie Coquilles Vivantes, Roulette*, (1838~9) p. 10, Pl. 2, fig. 5.

33) M. YOKOYAMA, *Jour. Fac. Sci. Imp. Univ. Tokyo* (2), **1**, 9 (1926), p. 380.

nium suchiense YOKOYAMA[34] has a subsutural tubercle band and many sharp spiral ridges.

Although the specimen from Simazaki is fragmental, the writer is confident that it is the very species noted by K. SUZUKI.

Geol. age.—Pliocene of Northwestern Japan. Occour.—Simazaki (Himi series) Hypotype No. 2028, Coll. E. R. I. (diameter 11·5 mm. Pl. LIV, fig. 52).

***Skenea* FLEMING, 1824.**

***Skenea nipponica*? YOKOYAMA**

Plate LIV, Figures 93 a, b, c.

1920 *Skenea nipponica* YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ. **39**, art. 6, p. 75, Pl. 5, fig. 1.

1922 *Skenea nipponica*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ. **44**, art. 1, p. 81, Pl. 4, fig. 7.

Geol. age.—Lower Pleistocene-Recent. Geogr. distr.—Central Japan. Occur.—Tumuki (2) Hypotype No. 2384, Akasaki (2).

***Homalopoma* CARPENTER, 1864.**

***Homalopoma amussitata* (GOULD)**

Pl. LIV, Fig. 61.

1861 *Turbo amussitata* GOULD, Proc. Boston Soc. Nat. Hist., **8**, 14.

1820 *Leptothyra amussitata*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **39**, p. 85, Pl. 5, fig. 21.

Geol. age.—Hokkaido, Sanriku coast, Matusima Bay. Geogr. distr. —Pliocene-recent. Occur.—Simazaki, (Himi series), Hypotype No. 2043, Coll. E. R. I. (diameter 7 mm).

***Turbo* LINNÉ, 1758.**

***Turbo* (*Lunella*) *coronatus coreensis* RÉCLUZ**

1853 *Turbo coreenisis* RÉCLUZ, Jour. de Conch. p. 1245, Pl. 8, f. 2.

1920 *Turbo* (*Marmorostoma*) *coreensis*, YOKOYAMA, Jour. Coll. Sci. Tokyo, Imp. Univ., **39**, 6, p. 84~85, Pl. 5, f. 19, 20.

1934 *Turbo* (*Lunella*) *coreensis*, HIRASE, Coll. Japanese Shell, Pl. 74, f. 1.

Geol. age.—Pleistocene-Recent. Geogr. distr.—South Tyosen, Honsyu, Sikoku, Kyusyu. Occur.—Tumuki (5) No. 2084; Akasaki (2) No. 2053; Miyainu (1) No. 2085, Coll. E. R. I.

***Astraea* (BOLTEN) RÖDING, 1798.**

***Astraea* (*Calcar*) *haematraga* (MENKE)**

Pl. LIII, Fig. 40, a, b.

1829 *Trochus haematragus* MENKE, Catal. Coll. Malsb. Pyrmonti, p. 18.

1924 *Astralium* (*Cyclocantha*) *haematragus*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **45**, 1, p. 32, Pl. 2, f. 7.

1934 *Astraea* (*Calcar*) *haematraga*, HIRASE, Coll. Jap. Shell, Pl. 74, f. 4.

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34) M. YOKOYAMA, *Jour. Coll. Sci. Tokyo Imp. Univ.*, **45**, 2 (1923), p. 13, Pl. 2, fig. 1.

Geol. age. — Pleistocene-Recent. Geogr. distr.—Tiba prefecture, Wakayama pref., Kagosima pref., Toyama Bay, Hukui pref. Occur.—Miyainu (13) Hypotype No. 2088 (diameter 18·5 mm); Hiradoko (3) No. 2087.

***Iravadia* BLANFORD, 1867.**

***Iravadia annulata* (DUNKER)**

Pl. LIII, Fig. 34; text fig. (Fig. 220).

1860 *Rissoina annulata* DUNKER, in Malakoz. Bl. 6, p. 235.

1861 *Rissoina annulata* DUNKER, Moll. Jap. p. 12, Pl. 2, f. 12.

Fig. 220

Shell small, elongate ovate; whorls about 7, first two embryonal and smooth, remainder distinctly spirally keeled; number of keel two or three on upper three whorls, and three or four on last two whorls; interspaces between these keels ornamented with two or three keels; aperture with varice, on which keels are extended; inner surface of aperture smooth; inner lip slightly arcuated. Measurements on Hiradoko specimens are.

	Height	Diameter	Apical angles.	
No. 1.	4·3 mm	2·1 mm	50°~55°	(Hypotype)
No. 2.	4·1 mm	1·8 mm	〃	
No. 3.	4·0 mm	2·0 mm	〃	

Iravadia ornata Blanford[35] resembles this species, but the latter has a higher spire and finer regular keels.

The former species has two broad spiral keels on the penultimate whorl.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Japan (DUNKER), Hukui pref. Occur.—Miyainu (3), No. 2090; Hiradoko (3) Hypotype No. 2089, Coll. E. R. I.

***Cingula* (FLEMING 1828) H. & A. ADAMS 1854.**

***Cingula* (*Pseudosetia*) *paludinoides* (YOKOYAMA)**

1927 *Rissoa* (*Cingula*) *paludinoides* YOKOYAMA, Jour. Fac. Sci. Imp. Univ. Tokyo, (2), 1, 10, p. 415, Pl. 46, f. 23.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Tokyo. Occurrence.—Hiradoko (5) No. 2156, Coll. E. R. I.

***Amphithalamus* CARPENTER 1865.**

Amphithalamus yendoi* (YOKOYAMA)

Plate LIV, Figure 86 a, b.

1927 *Rissoina yendoi* YOKOYAMA, Jour. Fac. Sci. Imp. Univ. Tokyo, (2), 1, 10, p. 415, Pl. 46, f. 27.

1927 *Turbonilla* (*Careliopsis*) *filiola* YOKOYAMA, Jour. Fac. Sci. Imp. Univ. To-

35) Blanford in Küster, Conch Cab., Pl. 15, b. fig. 1.

* *Rissoina* (*Zebinella*) *yendoi* YOKOYAMA in Table I, Part I.

kyo, (2), **1**, 10, pp. 453, 454, Pl. 51, f. 26.

This species is closely allied to *Rissoina* (*Amphithalamus*) *alphesiboei* MELVILL.[36] But the latter species has a narrower shell.

Rissoina (*Amphithalamus*) *aristoei* MELVILL[37] is another allied shell, but this species is shorter than the Yokoyama's species.

Turbonilla (*Careliopsis*) *filiola* YOKOYAMA may be identical with this species.

Geol. age.—Pleistocene-?. Occur.—Miyainu (3) Hypotype No. 2094, Coll. Earthq. Res. Inst.

Amphithalamus*? *tumukiensis* OTUKA n. sp.

Fig. 221 (text figure.)

Shell small, elongate ovate; nuclear whorls about 2 1/2 well rounded, smooth; spirals of nuclear whorls more or less compressed; post-nuclear whorls about 3 1/2, inflated, well rounded, marked by fine incised, equally spaced spiral grooves, of which about 37 on penultimate whorl, and fine unequally spaced axial incremental lines; suture strongly constricted; periphery of last whorl well rounded. Aperture large, semi-circle, slightly expanded, its margin not attached to preceeding whorls; its basal part broadly canaliculated. Base marked by fine incised grooves and fine axial incremental lines as on preceeding whorls; umbilical chink very narrow.

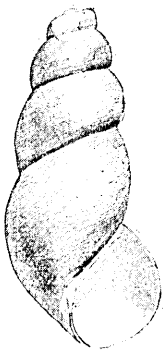

Fig. 221

Measurement: Height 2·8 mm, diameter 1·1 mm.

The present writer could not assign this species to any genus. *Cingula* H. and A. ADAMS, 1854, is a genus with characteritics similar to this species, but *Cingula* has no canaliculate aperture. Genus *Amphithalamus* CARPENTER, 1865, does not represent this species.

Cingula aleutica DALL[38] in an allied form of this new species, but the former has more rounded aperture and more inflated whorls.

Geol. age.—Pleistocene. Geogr. distr.—Tumuki, Isikawa prefecture. Occurence.—Tumuki, Noto (1), Monotype No. 2096, Coll. E. R. I.

Alvania RISSO, 1826.

Alvania concinna A. ADAMS

1861 *Alvania concinna* A. ADAMS, Ann. Mag. Nat. p. 138.

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36) MELVILL, *Proc. Mal. Soc.* **10**, (1912~3), p. 244, Pl. 11, fig. 5 (5 mm high, 2 mm diameter.)

37) MELVILL, *Proc. Mal. Soc.* **10**, (1912~3), p. 245, Pl. 11, fig. 6. (3·5 mm high, 1 mm diameter.)

38) DALL, *Proc. U. S. Nat. Mus.*, **9**, 307 (1886), Pl. 3, fig. 11.

* *Amphithalamus* sp. in Table I, Part I.

1924 *Rissoa (Alvania) concinna*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ. **45**, 1, p. 25, Pl. 5, f. 11.

1928 *Rissoa (Alvania) sadoensis* YOKOYAMA, Jour. Fac. Sci. Imp. Univ. Tokyo, (2), **1**, 8, p. 272, Pl. 33, f. 12.

Shell small, ovate conic, imperforate, solid; whorls about 6, of which 2 or $2\,^1/_2$ embryonal and smooth, remainder convex, longitudinally costate and spirally striated; longitudinal costae strong on upper whorls, but obsolete on later whorls. Costae rounded, slightly oblique, somewhat curved with concave side towards front, about 16 on upper whorl and about 12 or 11 on penultimate whorl, close together, distinct near lower suture. Periphery rounded; base abruptly narrowed, with about 10 spiral threads; aperture oval, pointed behind, sharply rounded in front, with periostome obsoleted behind inner margin of aperture.

Geol. age.—Pliocene-Recent. Geogr. distr.—Northern and western Japan (Matusima Bay, Hukui prefecture, and Tusima.) Occ.—Miyainu (8) No. 2092; Tumuki (2) No. 2091, Collection of the Earthquake Research Institute.

According to KURODA, there are many intermediate forms between *Alvania concinna* A. ADAMS and *Alvania sadoensis* YOKOYAMA. He thinks that these two species are one and the same, although *Alvania concinna* A. ADAMS has 2 or $2\,^1/_2$ nuclear whorls, whereas *Alvania sadoensis* YOKOYAMA has only 2 or $1\,^1/_2$, Although the longitudinal costae of the former is obsolete on the last whorl, the latter has a strong costae on it.

Rissoina D'ORBIGNY, 1840.

Rissoina (Phosinella) media SCHWARTZ

1860 *Rissoina media* SCHWARTZ, Fam. Rissoiden, p. 92, fig 56.

1924 *Rissoina (Phosinella) cancellata*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **45**, 1, p. 26. Pl. 5, fig. 10.

Tryon gives the following descripetton of this species:

"Solid, white or yellowish, semipellucid, shining, with 18~20 longitudinal crossed by spiral ridges. Whorls 8, subconvex, with distinct but narrow suture, the base with a funiculum of three spiral riblets, lip sinuous, produced below, varix crenulated."

Geol. age.—Pleistocene-Recent. Geogr. distr.—Hukui prefecture, Ceylon, Java, Nicobar Is. Occurrence.—Miyainu (1) No. 2092, Collection of the Earthq. Res. Inst.

Rissoina (Rissoina) laevicostulata PILSBRY

Plate LIII, Fig. 29, a, b.

1904 *Rissoina (Rissolina) laevicostulata* PILSBRY, Proc. Acad. Nat. Sci. Philadelhia, **56**, p. 27, Pl. 5, fig. 54, 54 a.

PILSBRY described this species in detail as follows:

"Shell narrowly ovate acuminate, regularly tapering from the last

whorl, white, with a red-brown bluish on the back of the last whorl, moderately solid. Sculpture of about 20 rounded, obliquely longitudinal slightly sinuous ribs about as wide as the intervals, both ribs and intervals smooth. Whorls about 8, moderately convex, the last with a very strong, heavy varix behind the outer lip, and with a convex siphonal fasciole at the base, bounded above by a groove and regularly plicate, the ribs passing over it. Aperture semioval, the outer lip thick and sinuous, columella margin but slightly concave. A shallow but distinct channel at its base in the basal margin."

This form is related to *Rissoina costulata* (DUNKER)[39], but differs from it in its more numerous ribs. *Rissoina plicatula* (GOULD)[40], an unfigured species, also seems to be related to it.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Sagami Bay, Hukui prefecture. Occurrence.—Tumuki (40) No. 2321; Miyainu (2), Hypotype No. 2322; Hiradoko (13) No. 2323; Akasaki (3) No. 2324.

Pseudoliotia **TATE, 1898.**

Pseudoliotia micans **(A. ADAMS)**

1850 *Cyclostrema micans* A. ADAMS, Proc. Zool. Soc. London, p. 43.

1861 *Cyclostrema pulchellum* DUNKER, Moll. Jap. p. 20, Pl. 3, fig. 5.

The following description of this species is by M. YOKOYAMA:

"Shell very small, thick, subglassy, shining, depressed. Whorls about four, rapidly growing, first two nuclear, smooth and rounded; third (penultimate) shouldered, with the surface between the shoulder and the upper suture somewhat sunken, below very steep or almost vertical and flattish, longitudinally ribbed, with ribs about sixteen in number, elevated though rounded on top, separated by broader interstices which are finely longitudinally striate. Body-whorl double shouldered with the upper shoulder weaker, angulate at periphery, the angle being elevated with top rounded, so that the surface above the angle is somewhat concave; ribs about twenty in number with interstices striate as on the preceeding whorl. Shoulders and angle tubercular at the points of intersection with the ribs. Base three-angled, the angles becoming weaker as they go downward, the third one surrounding the large and deep imblicus within which there is still a weaker one. These angles are all crossed by longitudinal ribs, with the crossing points tubercular. Aperture subcircular with a thickened continuous peristome."

Geol. age.—Pliocene ?-Pleistocene-Recent. Geogr. distr.—Central and western Japan. Occurrence.—Miyainu (2) No. 2097, Collection of

39) DUNKER, *Moll. Jap.* (1861). p. 12, Pl. 2, fig. 11.

40) GOULD, *Proc. Boston. Soc. N. H.* 7, (1861), p. 401.

the Earthquake Research Institute.

***Tachyrhynchus* MÖRCH, 1868.**

***Tachyrhynchus venustellus* (YOKOYAMA)**

1927 *Bittium venustellnm* YOKOYAMA, Jour. Fac. Sci. Imp. Univ. Tokyo, (2), 2, 4, p. 175, Pl. 47, fig. 7.

Geol. age.—Pliocene. Occ.—Simazaki (Himi series), No. 2045, Coll. E. R. I.

***Tachyrhynchus*? sp.**

Pl. LIV, Fig. 87.

Occur.—Simazaki (Himi series).

***Turritella* LAMARCK, 1799.**

***Turritella fascialis* MENKE**

Pl. LIII, Fig. 51.

1828 *Turritella fascialis* C. T. MENKE, Syn. Teth. Moll., 83.

1849 *Turritella fascialis*, REEVE, Conch. Icon., **13**, Pl. 10, fig. 47.

1886 *Turritella fascialis*, TRYON,s Man. Conch., **8**, p. 197, Pl. 59, fig. 36, 37.

1634 *Turritella fascialis*, HIRASE, Col. Jap. Shells, Pl, 86, fig. 2.

Shell small, high-turreted; whorls numerous, nearly flat, spirally sculptured, slightly angulated little above suture on apical part. Ribs normally more than 10 on later whorl, one of which is suprasutural, being usually not prominent. Of the two upper, one middle and one lower rib stronger than others. These strong ribs finely noded, but weaker ones smooth; below lower strong ribs, three fine ribs present. Between lower and middle strong ribs two or three fine ribs present; and between upper two strong and middle, one or two fine ones present. Interspaces between these ribs smooth or longitudinally striated with fine growth lines; nuclear whorls about 2, smooth; following 2 whorls ornamented with one strong rib.

This species is closely allied to *Turritella fortililrata nipponica* YOKOYAMA[41], but the latter has a larger shell, and equally arranged ribs.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Nagasaki pref., Kisyu-nada, Sagami Bay, Hukui pref. Occurrence.—Miyainu (20), Hypotype No. 2098 (length 11·5mm and 10·5 mm); Hiradoko (5) No. 2099.

***Turritella fortilirata saishuensis* YOKOYAMA**

1923 *Turritella saishuensis* YAKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **44**, 7, Pl. 1, fig. 2.

1934 *Turritella fortilirata saishuensis*, OTUKA, Bull. Earthq. Res. Inst. Tokyo Imp. Univ., **12**, 3, p. 622, Pl. 51, fig. 103.

Geol. age.—Middle neogene-Pliocene. Geogr. distr.—Saisyuto (Plio-

41) M. YOKOYAMA, *Jour. Coll. Sci. Tokyo Imp. Univ.* **39**. 6 (1920), pp. 71~72, 7, Pl. 4, figs. 16~19.

cene), Isikawa pref. (Pliocene). Occur.—Hukazawa (Nozaki beds).

***Turritella fortilirata motidukii* OTUKA**

Pl. LIV, Fig. 53.

1935 *Turritella fortilirata motidukii* OTUKA, Jour. Geol. Soc. Japan, **42**, 503, p. 508.

MOCHIZUKI collected from Nozaki beds a new form of *Turritella fortilirata* Sowerby, habing only three distinct spiral threads, without intersticial lines. Fig. 53 in Pl. LIV show this new form of *Turritella fortilirata*. The present writer has named this new form *Turritella fortilirata motidukii* OTUKA (Jour. Geol. Soc. Jap. **42**, 503, p. 508.)

Occur.—Kozima and Tobeiyati.

***Lemintina* RISSO, 1826.**

***Lemintina imbricata* (DUNKER)**

1860 *Vermetus imbricatus* DUNKER, Malakoz. Bl. p. 204.

1861 *Vermetus imbricatus*, DUNKER, Moll. Jap. p. 17, Pl. 2, fig. 18.

1920 *Thylacodes medusae*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **39**, p. 61, Pl. 4, fig. 7.

1930 *Thylacodes imbricatus*, YAMAKAWA, Kairui-zuhu, Pl. 8, fig. 1.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Miyagi-pref, Kyusyu, Hukui-pref., Toyama bay. Occur.—Tumuki (2) No. 2109; Miyainu (1) No. 2110; Akasaki (2) Coll. E. R. I.

***Siliquaria* LAMARCK, 1799.**

***Siliquaria cumingii* (MÖRCH)**

Pl. LIII, Fig. 49.

1860 *Tenagodus (Siliquarius) cumingii*, MÖRCH, Proc. Zool. Soc., p. 404.

1934 *Siliquaria cumingii*, HIRASE, Coll. Jap. Shell, Pl. 85, fig. 12.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Sagami Bay, Kyusyu, Amami-osima. Kisyu-nada, Hukui-pref. Toyama-Bay. Occurrence. Hiradoko (1), Hypotype No. 2111, Coll. E. R. I.

***Batillaria* BENSON, 1842.**

***Batillaria multiformis* (LISCHKE)**

Pl. LIV. Fig. 79.

1862 *Lampania multiformis* LISCHKE, Jap. Meeresconch., **1**, p. 74, Pl. 7, fig. 1~10.

1920 *Potamides (Batillaria) multiformis*, YOKOYAMA, Jour. Coll. Sci. Tokyo, Imp. Univ., **39**, 6, p. 69, Pl. 4, fig. 9.

1934 *Batillaria multiformis*, HIRASE, Coll. Jap. Shells, Pl. 84, fig. 15.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Honsyu, Kyusyu. Ryukiu, Taiwan. Occur.—Tumuki (1), Hypotype No. 2112, Coll. E. R. I.

***Obtortio* HEDLEY, 1899.**

***Obtortio septentrionalis* (TOKUNAGA)**

1906 *Rissoa septentrionalis* TOKUNAGA, Jour, Coll. Sci. Tokyo Imp. Univ. **21**, 2, p. 26, Pl. 1, fig. 55.

1922 *Fenella septentrionalis*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **44**,

1, p. 80, Pl. 4, fig. 5, 6.

Geol. age.—Upper Pliocene-Pleistocene-Recent. Geogr. distr.—Tokyo bay. Oc.—Tumuki (40), No. 2119; Akasaki (10) C. E. R. I.

Obtortio orientalis **(YOKOYAMA)**

Pl. LIV, Fig. 91 a, b.

1920 *Fenella orientalis* YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **39**, 6, p. 74, Pl. 4, fig. 12.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Tokyo bay. Occurrence.—Tumuki (20), No. 2113; Miyainu (40), Hypotype No. 2114; Hiradoko (30) No. 2115; Akasaki (2), Coll. Earthq. Res. Inst.

Obtortio perpupoides **(YOKOYAMA)**

Pl. LIII, Fig. 31.

1927 *Fenella perpupoides* YOKOYAMA, Jour. Fac. Sci. Imp. Univ., **39**, 6, p. 74, Pl. 4, fig. 12.

Geol. age.—Pleistocene-Recent. Geogr. dist.—Tokyo bay. Occur.—Tumuki (6), No. 2118; Miyainu (1), No. 2117; Hiradoko (40), Hypotype No. 2116; Akasaki (3), Coll. E. R. I.

Scaliola **A. ADAMS, 1860.**

Scaliola bella **A. ADAMS**

1860 *Scaliola bella* A. ADAMS, Ann. Mag. Nat. Hist., p. 120.

1887 *Scaliola bella*, TRYON, Man. Conch., **9**, p. 85, Pl. 17, fig. 39.

1932 *"Rissoa"* (?) sp., OTUKA, Venus., **3**, 2, pp. 110~111. fig. 2, c.

Shell small, turreted, umbilicated, white. Whorls about $7\sim8\,^1/_2$, rounded, simple, argillaceous. Later whorls free; suture greatly impressed; aperture circular; periostome continuous; margin acute. Measurements based on specimens from Hiradoko are:

Height. 3·5 mm; Diameter. 1·3 mm (No. 2120, Coll. E. R. I).

Geol. age.—Lower Pleistocene (Gobantyo shell beds, Tokyo city)-Recent. Geogr. distr.—Japan Sea. Occure.—Tumuki (2), No. 2121; Miyainu (2) No. 2120; Hiradoko (16), No. 2123, Coll. E. R. I.

"Rissoa?" sp. from Lower Pleistocene of Gobantyô, in Kôzimati-ku, Tokyo, agrees with this species.

Diala **A. ADAMS, 1861.**

Diala varia **A. ADAMS**

Pl. LIV, Fig. 80.

1861 *Diala varia* ADAMS, Ann. Mag. Nat. Hist., p. 243.

1924 *Litiopa (Diala) semistriata*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **45**, 1, p. 25, Pl. 1, fig. 20.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Western Japan. Occurrence.—Tumuki (2), Hypotype No. 2122; Miyainu (20) No. 2124; Hiradoko (1), No. 2125, Coll. E. R. I.

Bttium **GRAY, 1847.**

Bittium numamuranum **YOKOYAMA**

1924 *Bittium numamuranum* YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **45**, p. 20, Pl. 1, fig. 13.

1924 *Cerithiopsis hilaris* YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **45**, p. 21, Pl. 1, fig. 8.

This species resemble *Bittium perpusillum* of YOKOYAMA[42], but *Bittium perpusillum* TRYON[42] has a narrower and longer shell than the latter species.

Cerithiopsis hilaris YOKOYAMA may be a young specimen of this species.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Awa and Toyama. Occurrence.—Miyainu (40) No. 2127; Hiradoko (30) No. 2126.

Bittium satomii* (YOKOYAMA)

1924 *Cerithiopsis satomii* YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **45**, p. 22, Pl. 1, fig. 23.

This species may be identical with *Bittium perpusillum* TRYON (=*Cerithium pusillum* DUNKER, 1860)[43].

Geol. age.—Pleistocene-Recent. Geogr. distr.—Hukui pref. Occurrence.—Tumuki (30) No. 2130; Miyainu (60) No. 2129; Hiradoko (6) No. 2128; Akasaki (5) Coll. E. R. I.

***Cerithium* BRUGUIÈRE, 1789.**

***Cerithium (Proclava) kochi* (PHILIPPI)**

Plate LIV, Fig. 78.

1875 *Cerithium kochi* PHILIPPI, Abbild. u. Beschr. **3**, *Cerithium*, p. 2 (14), Pl. 1, fig. 3.

1922 *Cerithium (Clava) kochi*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **44**, 1, p. 71, Pl. 3, fig. 13.

1934 *Cerithium kochi*, HIRASE, Coll. Jap. Shells, Pl. 83. fig. 5.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Mutu Bay, Japan Sea, Toyama Bay, Tokyo Bay, Kisyu-nada, Kyusyu. Oc.—Tumuki (4), Hypotype, No. 2132; Hiradoko (3) No. 2131; Akasaki, Coll. E. R. I.

***Gourmya* FISCHER, 1884.**

***Gourmya (Contumax) sordidula* (GOULD)**

Plate LIII, Figs. 41 a, b.

1849 *Cerithium sordidulum* GOULD, Proc. Boston Soc. Nat. Hist., **3**, p. 119.

Shell elongate, acuminate, many whorled, slightly convex in lower half. Whorls about 11, of which nuclear 2 or 3, smooth, later whorl longitudinally plicate and spirally threaded; point of intersection of plicae and threads more or less tubercular. Spiral sculpture consists of three especially large threads and many fine ones on ultimate and penultimate whorl. Between suture and upper large one are two spi-

42) YOKOYAMA, *Jour. Coll. Sci. Tokyo Imp. Univ.*, **39**, 6 (1920), p. 67, Pl. 4, fig. 13.

43) TRYON, *Man. Conch.* **9**, p. 145, Pl. 30, fig. 17. {(=*Cerithium pusillum* DUNKER) *Moll. Jap.* (1860), p. 11, Pl. 2, fig. 6 (Not of GOULD.)}.

* *Bittium perpusillum* TRYON in Table I, Part I.

ral threads and between upper and middle large threads, two or three fine ones present; distance between midlle and lowest ones somewhat large, in which three fine spiral threads visible; below lowest large one, three or four fine spiral threads visible; below these spiral threads is a finely tuberculated spiral thread sunk into the succeeding whorl in upper whorls.

Number of longitudinal costae about 19—16 on ultimate whorl and 17—13 on penultimate whorl. Basal sculpture consists of 8—7 beaded spiral threads, of which two especially large; between these basal beaded spiral threads are intercalaetd one or two fine spiral threads. Later whorls have swollen varices at intervals of about half whorl. Aperture ovate, with sinus above it defined by cord on inner lip; outer lip strengthened by varix, sulcate within, there being usually pair of lirae between termination of two spiral threads of exterior; inner lip coated with rather thick callous deposit, which is thickend at upper and lower part; channel short and oblique.

Geol. age.—Pleistocene-Recent. Geol. distr.—Hukui prefectire, Mie prefecture. Oc.—Akasaki (6); Tumuki (37) Hypotype No. 2133, Coll. E. R. I.

***Gourmya* (*Contumax*) *kobelti* (DUNKER)**

Plate LIII, Fig. 42.

1877 *Cerithium kobelti* DUNKER, in malakoz. Bl., **24**, p. 67.

1920 *Cerithium kobelti*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **39**, 6, p. 66, Pl. 4, fig. 10.

1934 *Cerithium kobelti*, HIRASE, Coll. Jap. Shells, Pl. 83, fig. 11.

Geol. age.—Pliocene-Recent. Geogr. distr.—Tiba pref., Kisyu-nada, Kyusyu, Toyama Bay, Hukui pref. Occurrence.—Tumuki (5) Hypotype, No. 2134; Miyainu (35) No. 2135; Akasaki (1) Coll. E. R. I.

***Triphora* BLAINVILLE, 1828.**

***Triphora* (*Inella*) *tricincta* (DUNKER)**

1860 *Triforis cingulata* DUNKER in malakoz. Bl. **6**, p. 236.

1862 *Triforis cingulata*, DUNKER, Moll. Jap. p. 10, Pl. 2, fig. 1.

1882 *Triforis tricincta* DUNKER, Index Moll. Jap. p. 109.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Japan. Occurrence.—Miyainu (1) No. 2142; Hiradoko (1) No. 2136; Tumuki (1).

Triphora aff. purpurata* (PILSBRY)

Plate LIII, Fig. 33.

1895 *Triforis purpuratus* PILSBRY Cat. Mar. Moll Jap. p. 58.

Geol. age.—Pleistocene-Recent? Geogr. distr.—Noto, Sagami? Occurrence.—Tumuki (2) No. 2138; Hiradoko (6) No. 2139; Miyainu, (12) Hypotype No. 2137,Coll. E. R. I.

* *Triphora* sp. in Table I, Part I.

Epitonium **(BOLTEN) RÖDING, 1798.**

Epitonium (Turbiniscala) **sp.**

This species is closely allied to *Epitonium* (*Turbiniscala*) *angustum* (DUNKER)[44], but is much smaller (about 4 mm high), and has wider apical angles.

Occurrence.—Miyainu (2) No. 2140, Coll. E. R. I.

Epitonium (Boreoscala) angulatosimile **OTUKA**

Pl. LIII, Fig. 45, 46, 47, 48.

1931 *Epitonium* (*Boreoscala*) *simile*, KURODA, Geol. Middle Sinano, part 4. p. 77~78, Pl. 10, fig. 82.

1935 *Epitonium* (*Boreoscala*) *angulatosimile* OTUKA, Jour. Geol. Soc. Jap. **42**, p. 509, p. 492, fig. 3, d, e, f.

Shell imperforate, thick, rather solid, elongate, conical; whorls convex, contiguous, not disjointed, ornamented with strong distinct longitudinal ribs which number about 14—12, slightly curved posterior, occasionally varicose. Spiral ridges indistinct, flattened, closely set, about 5 on ultimate whorl. Suture fairly deep, obscured by longitudinal ribs. Mouth ovate, somewhat angulate above. Outer lip strengthened by last rib; Produced anterior inner lip thickened at base. Basal ridge more or less well defined and angulate.

This shell is closely allied to *Epitonium* (*Boreoscala*) *simile* (SOWERBY)[45] from the British Pliocene, but the latter has a more rounded shell. Basal ridge of the former shell is more angulate than that of the latter.

Epitonium (*Boreoscala*) *groenlandicum* (CHEMNITZ)[46] is another allied species, but ours has a more slender shell and more rounded whorl.

The measurements of *Epitonium* (*Boreoscala*) *angulatosimile* OTUKA are as follows:

No. of sp.	Length	Diameter		
No. 1. (Fig. 46)	25 mm	17 mm	(Holotype:	No. 1924.)
No. 2. (Fig. 48)	43 mm	15 mm	(Paratype:	No. 2141.)
No. 3. (Fig. 47)	30 mm	12·5 mm	(Paratype:	No. 2141.)
No. 4. (Fig. 45)	29 mm	15·5 mm	(	No. 1925.)

Geol. age.—Middle Neogene. (Sinano and Kaga). Occur.—Tobeiyati (type locality) in Higasiminato-mura, (Nozaki beds); Kozima (Kozima beds).

Strombiformis **DACOSTA, 1778.**

Strombiformis (Leiostraca) shibana **(YOKOYAMA)**

Pl. LIV, Fig. 71, 70.

1927 *Eulima* (*Leiostraca*) *shibana* YOKOYAMA, Jour. Fac. Sci. Imp. Univ. Tokyo, (2), **1**, 10, p. 418, Pl. 47, fig. 8.

44) DUNKER, *Moll. Jap.* (1861), p. 13, Pl. 1., fig. 24.
45 SOWERBY, *Min. Conch.* **1**, P. 49, Pl. 16, fig. 1, 2.
46) CHEMNITZ, *Conch. Cab.*, **11**, (1795), p. 155, Pl. 195 a, figs. 1878~79.

Geol. age.—Pleistocene-Recent? Geogr. distr.—Tokyo. Occurrence. —Hiradoko (3) Hypotype No. 4143, Coll. E. R. I.

***Chrysallida* CARPENTER, 1857.**

***Chrysallida (Miralda) gemma* A. ADAMS**

Plate LIV, Fig. 84.

1861 *Parthenia gemma* A. ADAMS, Ann. Mag. Nat Hist. 8, p. 302.

1906 *Odostomia (Miralda) gemma*, DALL et BARTSCH, Proc. U. S. Nat. Mus., 30, p. 356~7, Pl. 22, fig. 1.

Shell small, glassy, imperforate, ovately conical; spire moderately elevated, composed of nuclear whorl deeply and obliquely immersed in first of succeeding turns, four or five whorls regularly separated by clear suture; surface of whorl ornamented with three spiral ridges, and many longitudinal ribs, two upper spiral ridges of which are granulose at intersected part of spiral ridges and axial ribs. Intersticials between middle and lower ridges and sutural line ornamented with fine longitudinal striae. Base with two spiral nontuberculose ridges. Aperture lozenge, with thin callus deposits; columella arcuate, with one columellar fold.

Colour white. The following are measurements of the specimens from Hiradoko.

	Length	Diameter	
No. 1	2·5 mm	1·3 mm	(Hypotype)

Geol. age.—Pleistocene-Recent. Geogr. distr.—Japan.

Occur.—Hiradoko (5) Hypotype, No. 2144, Coll. E. R. I.

***Chrysallida (Babella) caelata* (A. ADAMS)**

Plate LIV, Fig. 85.

1863 *Parthenia caelata* A. ADAMS, Jour. Linne. Soc. London, 7, p. 4.

1906 *Turbonilla (Babella) caelatior* DALL et BARTSCH, Proc. U. S. N. Mus. 30, p. 347, Pl. 17, fig, 9.

Shell small, subglassy, ovately conical, imperforate. Spire elevated; whorls composed of one smooth embryonal and 5 (normal) or 4 excavated whorls; embryonal whorl 3, vertically elevated and about one-third immersed in first of them; excavated whorls ornamented with regular obliquely arranged vertical ribs which abruptly terminate near clearly defined suture line. Number of vertical ribs about 23 on last whorl, and about 24 on penultimate whorl in this specimen. Supra and sub sutural spiral threads well defined by suture line. Aperture rhombic, with one columnar fold, base with one subsutural thread and fine longitudinal growth lines. Colour white.

No. of sp.	Length	Diameter
(1)	3 mm	1·4 mm
(2)	2·75 mm	1·3 mm
(3)	2·5 mm	1·2 mm
(4)	2·5 mm	1·2 mm

Geol. age.—Pleistocene-Recent. Geogr. distr.—Japan, Tokyo Bay. Occurrence.—Hiradoko (4), Hypotype, No. 2145, Coll. E. R. I.

This species is closely allied to *Pyrgulina bartschi* DAUTZENBERG et FISCHER[47], but the latter has four whorls and many spiral basal sculpture. Although the longitudinal ribs in the former species terminate with tubercle at both ends, those of the latter do so with one more tubercle in the middle.

Pyrgulina A. ADAMS, 1863.

Pyrgulina densecostulata (GARRETT)

Plate LIV, Figure 96.

1906 *Odostomia* (*Pyrgulina*) *densecostulata* GARRETT, DALL et BARTSCH, Proc. U. S. Nat. Mus. **30**, p. 350, Pl. III, fig. 4.

Shell small, elongately ovately conical; spire elevated. Whorl composed of 1 smooth embryonal and 4 or 5 sculptured whorls; embryonal whorl smooth, deeply depressed in the succeeding whorls; whorls sculptured with many longitudinal costae and spiral threads. Costellae number about 24 on ultimate whorl, and about 22 on penultimate whorl; spiral threads number about 8, obsolete on longitudinal costellae. Periphery rounded; base convex, provided with longitudinal costellae and spiral threads as on whorls. Aperture semi-oval, sharper end being behind; inner margin of aperture has one fold.

	Length	Diameter (Specimen from Miyainu)
(1)	3·3 mm	1·25 mm
(2)	4·3 mm	1·7 mm

Geol. age.—Pleistocene-Recent. Geogr. distr.—Central Japan, Tokyo bay. Occurrence.—Tumuki (1) No. 2158; Miyainu (11) No. 2151; Hiradoko (1) No. 2152, Coll. E. R. I.

This shell resembles *Turbonilla* (*Pyrgiscus*) *candidissimus* DALL et BARTSCH[48] but the latter, besides having a more elongate conical shell, is more compressed at body whorl.

Menestho MÖLLER, 1842.

Menestho sp.

Plate LIV, Figure 98.

This species is closely allied to *Odostomia* (*Evalea*) *sulcata* A. ADAMS[49], but the latter species has a shorter shell.

Odostomia (*Evalea*) *lirata* A. ADAMS[50] is another allied species. But this species has a shell with more weak shoulder than the species from

47) DAUTZENBERG et FISCHER, *Jour. d. Conch.*, **54**, (1906), p. 191, Pl. 7, fig. 1.

48) DALL et BARTSCH, *Proc. U. S. Nat. Mus.* **30**, 1452, p. 342~3, Pl. 17. fig. 3. {(=Dunkeria candida A. ADAMS, *Ann. Mag. Nat. Hist.*, **8**, (1861), p. 301.}

49) A. ADAMS, *Ann. Mag. Nat. Hist.* (1860), p. 418.

50) A. ADAMS, *Ann. Mag. Nat. Hist.* (1860), p. 418.

Miyainu.

Occurrence.—Miyainu (1) Hypotype, No. 2148, Coll. E. R. I.

***Menestho lectissimoides* (YOKOYAMA)**

1927 *Odostomia (Odetta) lectissimoides* YOKOYAMA, Jour. Fac. Sci. Imp. Univ. Tokyo, (2), **1**, 10, p. 421, Pl. 47, fig. 12.

Geol. age.—Pleistocene. Geogr. distr.—Noto, Musasi. Oc.—Miyainu.

***Odostomia* FLEMING, 1813.**

***Odostomia limpida* DALL et BARTSCH**

Plate LIV. Figure 59.

1906 *Odostomia (Odostomia) limpida* DALL et BARTSCH, Proc. U. S. Nat. Mus. **30**, p. 364, Pl. 26, fig. 7.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Central and western Japan. Occurrence.—Miyainu (1) Hypotype, No. 3154; Hiradoko (11), No. 2155, Coll. E. R. I.

***Cingulina* A. ADAMS, 1860.**

***Cingulina triarata* PILSBRY**

Plate LIV, Figure 100.

1904 *Turbonilla (Cingulina) triarata* PILSBRY, Proc. Acad. Nat. Sci. Philadelphia, **56**, p. 31, Pl. 5, fig. 48.

1922 *Turbonilla (Cingulina) triarata*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **44**, p. 31, Pl. 5, fig. 14.

Geol. age.—Pleistocene-Recent. Geogr. distribution.—Noto, Hizen, Nagasaki, Sagami. Occurrence.—Hiradoko (1) Hypotype, No. 2157, Coll. E. R. I.

***Turbonilla* RISSO, 1826.**

***Turbonilla* aff. *imbana* YOKOYAMA**

Plate LIV, Figures 56, 57, 58, 59.

1922 *Turbonilla (Chemnitzia) imbana* YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **44**, 1, p. 101, Pl. 4, fig. 35.

Geol. age.—Pleistocene.

Occurrence.—Miyainu (11) Hypotype, No. 2158.

Fig. 222.

***Turbonilla* (*Strioturbonilla*) *nihona* OTUKA n. sp.**

Fig. 222, 223. (text-figure; Fig. 222 shows apical part.)

Shell small, slender, white; nuclear whorls helicoid immerged into one third or half into post-nuclear whorl, well rounded, having their axis at right angles to axis of post-nuclear turns; post-nuclear whorls smooth, rather high between sutures, moderately rounded, marked by axial ribs, which are about as wide as spaces seperating them, and extend strongly to very summit of whorl where they render the well-marked sutures

Fig. 223. *Turbonilla nihona* OTUKA

crenulate. About 16 of these ribs on first, 12 on second, 16 on penultimate and ultimate. Depressed intercostal spaces terminate abruptly at periphery. Spiral markings consist of two equall and equally spaced spiral cords in intercostal spaces between sutures near periphery; base smooth.

The holotype has 6 post-nuclear whorls and measures 3 mm long, 1·3 mm diam. This species is closely allied to *Turbonilla* (*Strioturbonilla*) *sagamiensis* YOKOYAMA[51] in its sculpture, but smaller than the latter, which is 8 mm long and has a distinct suture.

Turbonilla infantula DALL et BARTSCH[52] is another allied species, but without spiral cords.

Occurrence.—Tumuki (1) Homoeotype, No. 2161; Miyainu (1) Homoeotype No. 2160; Hiradoko Holotype and Hypotype No. 2159.

Outer lip of hypotype slightly broken.

***Turbonilla* (*Pyrgiscus*) *matunamiensis* OTUKA n. sp.**

Fig. 224. (text-figure).

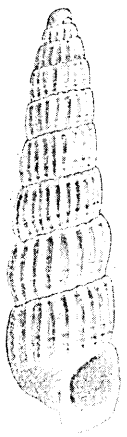

Fig. 224. *Pyrgiscus matunamiensis* OTUKA

Shell elongate conic and slender. Nuclear whorls 2, helicoid, deeply immersed in first post-nuclear turn, above which appear only half of nuclear whorls; lastnamed well rounded, having their axis about right angles to axis of post nuclear turn; post nuclear whorls smooth, moderately shouldered at summit; later one slightly exserted at summit, marked by strong, slightly sinuous, protoractive axial ribs, of which 12 occur upon first, 15 on second, 16 on third, 18~20 on penultimate and ultimate turn. Intercostal spaces about as wide as ribs, marked by three equal and equally spaced spiral cords, first of which is the periphery and third at posterior termination of anterior third between the sutures. Suture pinched; depressed intercostal spaces terminate abruptly at periphery; base very short, well rounded, marked by broad plain band about 5 unequal and unequally spaced strong incised lines, which intervals narrow regularly toward columella.

Monotype: Length 4·1 mm, diameter 1 mm.

Geologic age.—Pleistocene. Geogr. distr.—Noto. Occurrence.—Miyainu, Monotype, No. 2162. Coll. E. R. I.

This specimen is closely allied to the preceeding species, but the

51) M. YOKOYAMA, *Jour. Coll. Sci. Tokyo Imp. Univ.*, **44**, 1, (1922), p. 104. Pl. 5, fig. 12.

52) DALL et BARTSCH, *Proc. U. S. Nat. Mus.* **30**, (1906), p. 338, Pl. 20, fig. 2.

former has a longer shell and basal sculpture.

Turbonilla (*Pyrgiscus*) *pequensis* DALL et BARTSCH[53] is another allied species, which however has less number of straighter axial ribs than this new species.

The monotype of this species has 8 post-nuclear whorls and 2 nuclear whorls. On the last whorl of this type specimen, two more spiral cords are feebly marked in the posterior part of the intercostal spaces.

***Turbonilla* sp.**

Although this species is closely allied to *Turbonilla* (*Chemnitzia*) *edoensis* YOKOYAMA[54], it is smaller than the latter, being about 2·9 mm long.

Occurrence: Tumuki (1) No. 2163, Coll. E. R. I.

***Turbonilla* (*Pyrggiscus*) sp.**

This species is closelly allied to *Turbonilla* (*Pyrgiscus*) *lara* DALL et BARTSCH[55] from California, but the former has 11 spiral threads on the penultimate whorl.

Occurrence.—Tumuki (1) No. 2164 Coll. E. R. I.

***Turbonilla* (*Mormula*) sp.**

Turbonilla (*Mormula*) *ambusta* DALL et BARTSCH[56] is an allied species, but *Turbonilla* (*Mormula*) *ambusta* differs entirely from *Turbonilla* (*Mormula*) sp. from Miyainu, in its sculpture.

Occurrence.—Miyainu (1), No. 2165, Coll. E. R. I.

***Turbonilla hiradokoensis* OTUKA n sp.**

Plate LIV, Figures 90 a, b.

Shell moderate size, very elongate conic, milk white. Nuclear whorls $2\,1/2$, large, well rounded, abour one fourth immersed in first post-nuclear whorl, having axis at right angles to axis of later whorls. Number of axial ribs 18 on first post-nuclear, 15 on second, 16 on third, 23~24 on penultimate, 22 on ultimate whorl. Post-nuclear whorls decidedly rounded, slighty shouldered and somewhat constricted at periphery, marked by very strong lamellar oblique axial ribs and deeply impressed intercostal apices about twice as wide as ribs; ribs not fused at summit but terminate strongly at cusps, rendering outline

53) DALL et BARTSCH, *Smith. Inst. U. S. Nat. Mus. Bull.*, **68**, (1909), p. 79, Pl. 7, figs. 5, 5 a.

54) M. YOKOYAMA, *Jour. Fac. Sci. Imp. Univ. Tokyo*, (2), **1**, (1927), p. 424, Pl. 47, fig. 24.

55) DALL et BARTSCH, *Smith. Inst. U. S. National Mus. Bull.*, **68**, (1909), p. 107, Pl. 10, figs. 6, 6 a, 6 b.

56) DALL et BARTSCH, *Smith. Inst. U. S. National Mus. Bull.*, **68**, (1909), pp. 115~6, Pl. 11, fig. 13.

of summit wavy; they fuse at periphery and there suddenly terminate the deep intercostal spaces. Base smooth, with fine incremental lines.

This shell is closely allied to *Turbonilla scrobiculata* YOKOYAMA[57] in its sculpture. But the former species is decidedly small. YOKOYAMA measured 11 mm in the height of the latter species. Height of new species is about 5·5 mm.

Occur.—Hiradoko (1) Monotype, No. 2167, C. E. R. I.

***Syrnola* A. ADAMS, 1860.**

***Syrnola cinctella*? A. ADAMS**

1860 *Syrnola cinctella* A. ADAMS, Ann. Mag. Nat. Hist. **6**, p. 333.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Korean str., Noto. Occurrence.—Tumuki (1), No. 2166, Coll. E. R. I.

***Strombus* LINNÉ, 1758.**

***Strombus* (*Labiostrombus*) *japonicus* REEVE**

Pl. LIV, Fig. 99.

1851 *Strombus japonicus* REEVE, Conch. Icon., fig. 42.

1922 *Strombus japonicus*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **44**, 1, p. 70, Pl. 3, fig. 12.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Tiba pref., Kisyu-nada, Kyusyu, Hukui pref. Occurrence.—Tumuki (3), No. 2170; Miyainu (4) No. 2169; Hiradoko (42), Hypotype No. 2168, Coll. E. R. I.

***Polynices* MONTFORT, 1810.**

***Polynices didyma* (BOLTEN)**

1798 *Albula didyma* BOLTEN, Mus. Bolten. (2), p. 20.

1920 *Polinices* (*Neverita*) *ampla* PHILIPPI of YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **39**, 6, p. 77~78, Pl. 5, fig. 6.

Geol. age.—Miocene?-Recent. Geogr. distr.—Hokkaidô, Honsyu, Sikoku, Kyûsyû. Tyôsen. Occurrence.—Tumuki (1), No. 2171, Coll. E. R. I.

***Polynices sagamiensis* PILSBRY**

Pl. LIII, Fig. 36.

1904 *Polinices sagamiensis* PILSBRY, Proc. Acad. Nat. Sci. Philadelphia, **56**, p. 23, Pl. 4, fig. 37, 37 a.

This species is readily distinguished from *Polynices draparnaudii* RÉCLUZ, *Polynices effusa* SWAINSON, *Polynices powisianus* RÉCLUZ, *Polynices cumingianus* RÉCLUZ, by the large size of the umbilical lobe and the strong cord around the umbilical crescent.

Geol. age.—Pliocene-Recent. Geogr. distribution.—Sagami Bay, Kisyû-nada, Toyama Bay, Hukui pref. Occurrence.—Hiradoko (3), Hypotype, No. 2172, Coll. E. R. I.

57) M. YOKOYAMA, *Jour. Coll. Sci. Tokyo Imp. Univ.*, **44**, 1, (1922), p. 102, Pl. 4, fig. 38.

***Natica* SCOPOLI, 1777.**

***Natica concinna* DUNKER**

Pl. LIII, Fig. 32.

1860 *Natica concinna* DUNKER in malakoz. Bl. p. 232.

1934 *Natica concinna*, HIRASE, Coll. Jap. Shells, Pl. 90, fig. 6.

Shell globose, solid, moderately small; suture well marked, subdepressed, angled about 130° between shell surface of ultimate and penultimate whorl at suture. Number of whorls about $4\,^1/_2$~5, Surface ornamented with microscopical spiral lines and fine oblique growth lines; aperture semicircular; inner lip slightly arcuated; parietal callus small, funnicle running spirally up apertural wall; weak but definite ridge defines outer margin of umbilicus.

Measurements of these specimens from Miyainu are:

	Length	Diameter.
No. 1. (Hypotype)	15 mm	14·2 mm
No. 2.	14 mm	12·5 mm
No. 3.	12·5 mm	11·5 mm

This shell is closely allied to *Natica janthostoma* DESHAYES[58], but the latter has a larger funnicle and narrower umbilicus, and on spiral ridge defining the outer margin of the umbilicus area.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Northern and western Japan. Occurrence.—Tumuki (3), No. 2175; Hiradoko (3) No. 2184; Miyainu (5) Hypotype No. 2173.

***Sinum* (BOLTEN) RÖDING, 1798.**

***Sinum* (*Eunaticina*) *papillum* (GMELIN)**

Plate LIV, Figure 64.

1791~2 *Nerita papilla* GMELIN, Syst. Nat. **ed. 13**, p. 3675.

1922 *Sigaretus* (*Eunaticina*) *papilla*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **44**, **1**, p. 84, Pl. 5, fig. 8.

Specimen from Hiradoko has a shell with more or less depressed spire and finer spiral threads than the type species.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Mutu Bay, Matusima Bay, Tokyo Bay, Wakayama pref., Hukui pref., Toyama Bay. Occur.– Hiradoko. Hypotype. No. 2176, Coll. Earthq. Res. Inst.

***Earato* RISSO, 1826.**

***Erato callosa* (ADAMS et REEVE)**

Plate LIV, On the right of Figure 69.

1850 *Erato callosa* ADAMS et REEVE, Zool Voy. Samarang, p. 25, Pl. 10, fig. 32.

1922 *Erato callosa*, YOKOYAMA, Jour. Coll. Sci Tokyo Imp. Univ., **44**, **1**, p. 69, Pl. 3, fig. 11.

Geol. age.—Pliocene-Recent. Geogr. distr.—Amami-oosimi, Kyusyu, Sikoku, Tiba pref., Toyama Bay. Occur.—Hiradoko, (2), Hypotype

58) DESHAYES, *Revue Zool.*, p. 361.

No. 2177, Coll. E. R. I.

Erronea **TROSCHEL, 1863.**

Erronea japonica **(SCHILDER)**

Plate LIV, Figures 52 a, b.

1870 *Cypraea macula* SOWERBY, Thes. Conch., **4**, p. 96, Pl. 323, fig. 380~381.

1924 *Cypraea candida*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **44**, 7, p. 18, Pl. 2, fig 1.

1931 *Cypraea japonica* SCHILDER, Beitr. Kenntn. *Cypracacea*, **4**, 12~14 (Zool, Anz. **96**, 65.)

Geol. age.—Pleistocene-Recent. Geogr. distr.—Central and Western Japan. Occur.—Miyainu, Hypotype No. 2178, Coll. Earthq. Res. Inst.

Bursa **(BOLTEN) RÖDING, 1798.**

Bursa (Gyrineum) natatoria **("BOLTEN" RÖDING)**

Plate LIII. Figures 50 a, b.

1798 *Tritonium natator* "BOLTEN" RÖDING, Mus. Boltenianum Cat. Cimeliorum, p. 127, sp. 1636.

1780 *Buccina bufonia compressa* CHEMNITZ (ex. parte), Conch. Cab., **4**, p. 78, Pl. 128, fig. 1229, 1230 (tantum).

1852 *Apollon olivator* MEUSCHEN in MÖRCH, Catal. Yoldi, **1**, p. 106.

1906 *Bursa natatrix*, DAUTZENBERG et FISCHER, Jour. d. Conch., p. 158.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Southern and western Japan. Occur.—Miyainu (3), Hypotype, No. 2179.

Trophon **MONTFORT, 1810.**

Trophon (Bedeva) birileffi **LISCHKE**

Plate LIII, Figures 30 a, b.

1871 *Trophon birileffi* LISCHKE, malakoz. Bl. **18**, p. 39.

1871 *Trophon birileffi*, LISCHKE, Jap. Meeres Conch., **2**, p. 32.

1922 *Trophon pachyraphe*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **44**, 1, p. 63, Pl. 3, fig. 1.

Geol. age.—Pliocene-Recent. Geogr. distr.—Kyusyu, Hukui pref., Kisyu-nada, Tokyo bay. Occur.—Tumuki (5) No. 2180; Miyainu (7) Hypotype No. 2181 (15 mm high); Hiradoko (3) No. 2182.

Thais **(BOLTEN) RÖDING, 1798.**

Thais (Mancinella) bronni **(DUNKER)**

Pl. LIV, Fig. 77.

1860 *Purpura bronni* DUNKER, in malakoz. Bl. **2**, p. 235.

1861 *Purpura bronni*, DUNKER, Moll. Jap. p. 5, Pl. 1, fig. 23.

1934 *Thais (Mancinella) bronni*, HIRASE, Coll. Jap. Shells, Pl. 110, fig. 4.

Geol. age—Pliocene-Recent. Geogr. distr.—Akita pref., Toyama Bay, Hukui pref., Kyusyu, Kisyu-nada, Tiba pref., Miyagi pref. Occur. —Tumuki (7), No. 2183; Miyainu (1), No. 2185; Hiradoko (3) Hypotype No. 2184; Akasaki (1) Coll. E. R. I.

Pyrene **(BOLTEN) RÖDING, 1798.**

Pyrene (Mitrella) varians **(DUNKER)**

Plate LIV, Figure 82 a, b.

1860 *Amycla varians* DUNKER in malakoz. Bl. **6**, p. 231.

1861 *Amycla varians*, DUNKER, Moll. Jap. p. 6, Pl. 1, fig. 17.

1920 *Columbella (Mitrella) dunkeri*, YOKOYAMA, Jour, Coll. Sci. Tokyo Imp. Univ., **39**, 6, p. 59, Pl. 3, fig. 15.

1934 *Pyrene (Mitrella) varians*, HIRASE, Coll. Jap. Shells, Pl. 107, fig. 7.

Geol. age.—Pliocene-Recent. Geogr. distr.—Mutu-Bay, Toyama Bay, Matusima Bay, Kisyu nada, Kyusyu. Occur.—Tumuki (5) Hypotype, No. 2187; Miyainu (30) No. 2186; Hiradoko (5) No. 2188, Coll. E. R. I.

***Pyrene (Zafra) pumila* (DUNKER)**

Plate LIV, Figure 76 a, b.

1860 *Columbella pumila* DUNKER, in malakoz. Bl. **6**, p. 224.

1861 *Columbella pumila*, DUNKER, Moll. Jap., p. 6, Pl. 1, fig. 4.

1927 *Columbella (Atilia) pumila*, YOKOYAMA, Jour. Fac. Sci. Imp. Univ. Tokyo, (2), **1**, 10, p. 412, Pl. 46, fig. 10.

1934 *Pyrene (Anachis) pumila*, HIRASE, Coll. Jap. Shells, Pl. 107. fig. 13.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Amami-osima, Kyusyu, Kisyu-nada, Tokyo-Bay, Matusima Bay, Hukui pref., Toyama Bay. Occurrence.—Tumuki (2) Hypotype No. 2189; Miyainu (5) No. 2190; Hiradoko (2) No. 2191; Akasaki (2) Coll. E. R. I.

***Neptunea* (BOLTEN) RÖDING, 1798.**

***Neptunea uwasoensis* (OTUKA)**

Plate LIV, Figure 75.

1935 *Chrysodomus nwasoensis* OTUKA, Jour. Geol. Soc. Japan, **42**, 503, p. 510. fig. 3 g. (on p. 492.)

Shell of moderate size, heavy and solid; whorls more than 4 (type specimen is missed its apex), which surface are divided into upper and lower by a strong spiral keel; angles between upper and lower surface about 125°; on the upper surface of penultimate and ultimate whorls, 2 strong spiral ribs and fine interstcial grooves (about 5~6 in interspace between spiral ribs and keel on ultimate whorl) are visible. On lower surface, 3 strong spiral ribs and some intersticial grooves visible. Base ornamented with about 11 strong spiral and 8 oblique ribs, between which a weak secondary spiral thread presents. Sometimes, tertiary finer one is visible between these spiral ribs and threads.

Height about 57·5 mm; diameter 33·5 mm.

Geol. age.—Lower Pliocene. Occur.—Uwaso (Yabuta beds.) (monotype, No. 1915, C. E. R. I.)

This new species is closely allied to *Neptunea (Neptunea) andersoni hawleyi* (CARSON)[59], but the former has a shell with more pro-

59) CARSON, *Bull. Soc. Calif. Acad. Sci.*, **25**, pt. 2 (1926), p. 55, Pl. 2, fig. 3.

duced shoulder and with more and finer intersticial grooves.

Neptunea (*Neptunea*) *antiqua despecta* (LINNEAUS)[60] is another allied species. But the new species has strong spiral ribs on the shell surface.

Neptunea (*Neptunea*) *lirata* (MARTYN)[61] has a shell with small number of spiral ribs.

***Siphonalia* A. ADAMS, 1863.**

***Siphonalia* sp.**

2 fragments of a species of *Siphonalia* were collected at Hiradoko (Rg. No. 2192).

They seems to be fragments of *Siphonalia cassidariaeformis ornata* A. ADAMS.

***Engina* Gray, 1839.**

***Engina menkeana* (DUNKER)**

1860 *Cantharus* (*Pollia*) *menkeanus* DUNKER in malakoz. Bl 6, p. 222.
1861 *Cantharus menkeanus*, DUNKER, Moll. Jap., p. 7, Pl. 1, fig. 7.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Central western Japan. Occurrence.— Hiradoko (2), No. 2193, Coll. E. R. I.

***Nassarius* FRORIEP, 1806.**

***Nassarius* (*Hinia*) *festivus* (POWYS)**

Pl. LIII, Fig. 39 a, b.

1832 *Nassa festiva* POWYS, Proc. Zool. Soc., p. 95.
1861 *Nassa lirata* DUNKER, Moll. Jap., p. 7, Pl. 1, fig. 22.
1934 *Nassarius festivus*, HIRASE, Coll. Jap. Shells, p. 106, fig. 10.

Geol. age.—Pliocene-Pleistocene-Recent. Geogr. distr.—Tiba pref., Kyusyu. Mutu Bay, Toyama Bay. Occur.—Tumuki (2), No. 2203; Miyainu (3) Hypotype No. 2194; Hiradoko (?), No. 2195, Coll. E. R. I.

***Nassarius* (*Tritonella*) *japonicus* (A. ADAMS)**

Pl. LIII, Fig. 37.

1851 *Nassa japonica* A. ADAMS, Proc. Zool. Soc., p. 110.
1934 *Nassarius japonicus*, HIRASE, Coll. Jap. Shells, Pl. 106, fig. 12.

Geol. age.—Pliocene-Pleistocene-Recent. Geogr. distr—Matusima Bay, Tokyo Bay, Sagami Bay, Toyama Bay, Kyusyu. Occur.—Tumuki (1) Hypotype, No. 2196; Miyainu (20) No. 2197.

***Nassarius* (*Alectrion*) *balteatus* (LISCHKE)**

Pl. LIII. Fig. 35 a, b.

1868 *Nassa balteata* LISCHKE, Jap. Meeres Conch., 1, p. 16, Pl. 5, fig. 10, 11.
1934 *Nassarius balteatus*, HIRASE, Coll. Jap. Shells, Pl. 106, fig. 4.

Shell ovate, conic; moderately thick with slightly convex spire;

60) GRANT and GALE, *Mem. San Diego Soc. N. H.* 1, 1, p. 653, Pl. 28, fig. 10.
61) T. MARTYN, *Figures of Nondescript. Shells*, 2, (1784), table 2, Pl. 43.

yellowish brown with fine reddish brown spiral lines and irregular transverse patterns. Whorls $7\sim6\,^1/_2$, moderately inflated, sperated by depressed suture, apical two being protoconch, conic smooth, polished, the succeeding $2\,^1/_2\sim3$ being cancellately sculptured by somewhat coarse, oblique axial ribs and $4\sim5$ spiral grooves; interspace between the upper two grooves of which is tuberculated, sculpture then gradually fading away and becoming almost smooth toward last whorl, except however the very faint undulations with fine growth striae and obscure spiral striations; last whorl occupying about two-thirds whole length; base with 4 spiral sulci; aperture ovate, purplish brown inside; outer lip somewhat sinuated, edge obtuse, with notch below; inside thickened with 12 feeble horizontal short ridges; outer margin varixed, ascends a little at suture; inner lip arcuate, parietal wall not defined by callous deposits, with feeble toooth and shallowly channeled posteriorly; columella wall slightly concave, laminately calloused; callus with 4 folds; fasciole feebly sculptured with 4 grooves; channel very short, wide.

This species is closely allied to *Nassarius glans* LINNÉ[62], but the latter has a more acute spire, while the inner side of the aperture is smoother.

Nassarius (*Zeuxis*) *tateyamensis* KURODA[63] has a more elongated, well defined form, and thin callous deposits on the inner side of the aperture without any conspicuous coloration.

Geol. age.—Pleistocene-Recent. Geogr. distribution.—Sagami Bay, Kisyu-nada, Tosa Bay, Setouti, Hukui pref., Toyama Bay. Occur.—Hiradoko (1) Hypotype, No. 2198, Coll. E. R. I.

***Nassarius* (*Zeuxis*) *caelatus* (A. ADAMS)**

Pl. LIII, Fig. 44.

1851 *Nassa caelata* A. ADAMS, Proc. Zool. Soc., p. 79.

1920 *Nassa livescens*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **39**, 6, p. 58, Pl. 3, fig. 18.

1929 *Nassarius* (*Zeuxis*) *caelatus*, T. FUJITA, Venus, **1**, 3, p. 91.

1934 *Nassarius caelatus*, HIRASE, Coll. Jap. Shells, Pl. 106, fig. 5.

Geol age.—Pliocene-Pleistocene-Recent. Geogr. distr.—Tiba pref., Sagami Bay, Kisyu nada, Kyusyu, Hukui pref., Toyama Bay. Occur.—Miyainu (1), Hypotype No. 2199, Coll. E. R. I.

***Nassarius* (*Niotha*) *gemmulatus* (LAMARCK)**

Pl. LIII, Fig. 43 a, b.

1822 *Buccinum gemmulatum* LAMARCK, Anim. sans. vert. **10**, p. 169.

1928 *Nassa* (*Niotha*) *gemmulata*, YOKOYAMA, Imp. Geol. Serv. Japan, Rep. No. 101, p. 40, Pl. 2, fig. 7.

62) LINNÉ, *Syst. Nat. ed* 12, p. 1200.

63) T. KURODA, *Venus*, **1**, 3,

1934 *Nassarius gemmulatus*, HIRASE. Coll. Jap. Shells, Pl. 106, fig. 9.

Geol. age.—Pliocene-Pleistocene-Recent. Geogr. distr—Tokyo Bay, Sagami Bay, Kisyu-nada, Kyusyu, Hukui pref., Toyama pref., Amamiosima. Occur.—Hiradoko (2) Hypotype No. 2200.

***Nassarius* (*Niotha*) *livescens* (PHILIPPI)**

Pl. LIII, Fig. 28, Pl. LIV, Fig. 74.

1848 *Buccinum livescens* PHILIPPI, Zeitschrift für. Mal. p. 135.

1934 *Nassarius livescens*, HIRASE, Coll. Jap. Shells, Pl. 106, fig. 8.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Kyusyu, Tosa Bay, Setouti, Kisyu-nada, Sagami Bay, Mutu Bay, Toyama Bay, Hukui perf., China, Java, Philippines. Occur.—Matunami (59), Hypotype No. 2201; Tumuki (12), Hypotype No. 2202.

***Fusinus* RAFINESQUE, 1815,**

***Fusinus perplexus* (A. ADAMS)**

Pl. LIV, Fig. 81.

1864 *Fusum perplexum* A. ADAMS, Jour. Linne. Soc., **7**, p. 106.

1907 *Fusus perplexus*, HIRASE, Conchological Magazine, Japan, **1**, 9, Pl. 15, fig. 105.

1927 *Fusus nodoso-plicatus*, YOKOYAMA, Jour. Fac. Sci. Imp. Univ. Tokyo, (2), **1**, Pl. 46, fig. 14.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Mutu-Bay, Toyama Bay, Tiba pref., Sagami Bay, Kisyu nada, Kyusyu, Setouti, Hukui pref. Occur.—Tumuki (1) Hypotype No. 2204.

***Oliva* BRUGUIÈRE, 1789 (MARTYN 1789).**

***Oliva mustelina* LAMARCK**

Pl. LIV, Fig. 60.

1844 *Oliva mustelina* LAMARCK, Anim. sans vert. ed. 2. **10**, p. 616.

1927 *Oliva mustelina*, MAKIYAMA, Men. Coll. Sci. Kyoto Imp. Univ., B, **3**, **1**, p. 79, Pl. 3, fig. 14, 15.

Geol. age.—Pliocene-Pleistocene-Recent. Geogr. distr.—Toyama Bay, Hukui pref., Kyusyu, Sagami Bay, Sikoku. Occur.—Hiradoko (1) No. 2205.

***Mitra* LAMARCK, 1799.**

***Mitra* sp.**

A fragment of *Mitra* sp. No. 2206 was collected from Hiradoko.

***Cancellaria* LAMARCK, 1799.**

***Cancellaria* (*Narona*) *spengleriana* DESHAYES**

1843 *Cancellaria spengleriana* DESHAYES, Anim. sans vert. **9**, p. 415.

1920 *Cancellaria spengleriana*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **39**, 6, p. 44, Pl. 2, fig. 3, 2.

Geol. age.—Miocene-Pliocene-Pleistocene-Recent. Geogr. distr.—Honsyu, Sikoku, Kyusyu. Occur.—Hiradoko (1) No. 2207; Akasaki.

***Clavatula* LAMARCK, 1801.**

***Clavatula consimilis* (SMITH)**

Pl. LIV, 103 a, b, c.

1879 *Pleurotoma consimilis* SMITH, Proc. Zool. Soc. London, p. 188, Pl. 19, fig. 11.
1934 *Clavatula consimilis* HIRASE, Coll. Jap. Shells, Pl. 115, fig. 5.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Tokyo Bay, Matusima Bay, Hukui pref. Occur.—Tumuki (1), Hypotype No. 2208.

***Antiplanes* DALL, 1902.**

***Antiplanes kamchatica* DALL**

1919 *Antiplanes kamchatica* DALL, Proc. U. S. Nat. Mus., 56, p. 33, Pl. 10, fig. 1.
1921 *Antiplanes kamchatica*, DALL, Bull. U. S. Nat. Mus., 112, p. 71.
1934 *Antiplanes kamchatica*, HIRASE, Coll. Jap. Shells, Pl. 115, fig. 11.

Geol. age.—Pliocene-Recent. Geogr. distr.—Bering Sea, Japan Sea, Kaga (Pliocene). Occur.—Simazaki (No. 2021).

***Brachytoma* SWAINSON, 1840.**

***Brachytoma jeffreysii* SMITH**

1875 *Drillia jeffreysii* SMITH, Ann. Mag. Nat Hist., p. 417.
1920 *Pleurotoma (Drillia) principalis*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., 39, 6, p. 36, Pl. 1, fig. 20.

Geol. age.—Pliocene-Pleistocene-Recent. Geogr. distr.—Tokyo Bay, Sagami Bay, Setouti, Wakayama pref., Matusima Bay. Occur.—Miyainu (2) No. 2206, Coll. E. R. I.

***Asthenotoma* HARRIS et BURROWS, 1891.**

***Asthenotoma yokoyamai notoensis* OTUKA** n. subsp.*

Plate LIV, Figure 101.

Shell rather small, turriculate; spire moderately high; whorls more than 10, regularly increasing, surface nearly flat, spirally sculptured. Embryonal whorls broken. Sculpture of post-nuclear whorls consist of spiral ribs. Penultimate whorl ornamented with 3 equally interspaced strong equall spiral ribs on lower half, 1 strong rib near suture, and 3 weak threads between upper strong rib and lower strong ribs. Subsutural area a weak spiral thread visible. Spiral sculptures of body whorl similar to penultimate. But in type specimen a weak thread appears in interspace between upper two of 3 lower strong spiral ribs. Base slightly contracted ornamented with 6 equally interspaced equall ribs and few oblique ribs.

Geologic age.—Pleistocene. Occur.—Hiradoko, Monotype No. 2207, (height 17·2 mm)

This species closely allied to *Asthenotoma yokoyamai* MAKIYAMA[64] in its sculpture. *Asthenotoma yokoyamai* MAKIYAMA has eight whorls and has weak spiral thread in interspace between upper 2 of 3 lower

64) J. MAKIYAMA, *Mem. Coll. Sci. Kyoto Imp. Univ.* (*B*), 3, 1, (1927), p. 95~96.

* *Asthenotoma nivea* (PHILIPPI) in Table I.

strong spiral ribs on the body whorl.

The present writer obtained another *Asthenotoma* from Sagami Bay, which is called *Asthenotoma komakimonos* OTUKA n. sp. (Fig. 225, text fig.) Following description is based on three specimens from Sagami Bay.

"Shell rather small, turriculate; dark brown in color; spire moderately high; whorls about 12, regularly increasing, surface nearly flat, spirally sculptured. Embryonal whorls about 3, first 2 of which smooth, third longitudinally plicated. Sculpture of post-nuclear whorls consist of spiral ribs. Penultimate whorl ornamented with 3 equally interspaced equall strong spiral ribs on the lower half, 3 weak and 1 strong on upper half of whorl, and 1 weak on subsutural area above 1 strong rib. Lowest strong rib sometimes sprasutural. One preceeding whorl of penultimate upper most one of 3 weaks disappears. Spiral sculptures of body whorl similar to penultimate. Base slightly contracted ornamented with 5 equally interspaced equall ribs and few oblique ribs."

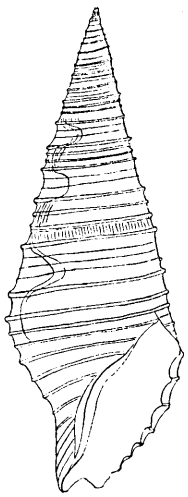

Fig. 225. *Asthenotoma komakimonos* n. sp.

Geol. age.—Recent. Occur.—Sagami Bay 13 m deep. Holotype and Cotype. No. 2499. (height 15mm, diameter 5·4mm; height 14.8 mm, diameter 4·7 mm)

Asthenotoma komakimonos OTUKA has 3 spiral weak threads between upper strong rib and lower strong ribs, but *Asthenotoma yokoyamai notoensis* OTUKA has 2 threads.

Asthenotoma makimonos (JOUSSEAUME)[65] is closely allied to the species written above. But the former species is large and differs from the latter three species in its surface ornamentations.

Asthenotoma pouloensis (JOUSSEAUME)[66] from Malacca is another allied shell, but this species has a large and broad shell.

***Mangelia* RISSO, 1826.**

Mangelia makiyamai* OTUKA n. sp.

Plate LIV, Figure 94 a, b, 95.

Shell very small; spire terraced, lower half conic. Sculpture consists of slightly curved obliquely longitudinal ribs, 9~10 on last whorl, the last one behind, near lip. These are crossed by spaced spiral groo-

65) F. JOUSSEAUME, *Bull. Soc. Zool. France*, (1883), p. 198, Pl. 10, Fig. 4.

66) F. JOUSSEAUME, *Bull. Soc. Zool. France*, 1883), p. 199.

* *Mangelia* (*Bella*) sp. in Table I, Part I,

ves, 3~4 on penultimate whorl. Whorls about 6 1/2 (in type specimen). Nuclear whorls 2 1/2, smooth, convex. Post-nuclear whorls weakly shouldered with spiral ridge near upper third of whorl, flattened, sloping above shoulder, slightly contracting below it; last whorl similarly angular, convex below shoulder, contracted below middle. Outer lip thin, with moderately deep rounded annal fasciole between suture and shoulder margin. Inner side of aperture smooth. Length 4·6mm, diameter 2·0 mm.

Occurrence.—Hiradoko (5) (Holotype and Cotype, No. 2330); Matunami (4) (No. 2329).

This species is closely allied to *Mangelia kamakurana* PILSBRY[67] 1904, but has less number of longitudinal ribs. The spiral sculpture of the former is simple, while the latter species has primary and secondary fine threads and more angulated shoulder. All the specimens of the former examined by the writer have thin outer lip: Pilsbry's species has thick outer lip.

Cythara tabatensis (TOKUNAGA)[68] is another allied species, but has a shell without spiral sculpture.

Philbertia **MONTEROSATO, 1884.**

Philbertia tincta **(REEVE)***

Plate LIV, Figures 83 a, b.

1846 *Pleurotoma tincta* REEVE, Conch. Icon., **1**, Pl. 38, fig. 347.

1904 *Clathurella centrosa* PILSBRY, Proc. Acad. Nat. Sci. Philadelphia, **56**, p. 12, Pl. 1, figs. 7, 7 a, 7 b.

1922 *Pseudodaphnella tincta*, HEDLEY, Rec. Australian Museum, **13**, 6.

Shell fusiform-turrete greyish white; rather thick. Nuclear whorl 2 1/2, first of which rounded convex, second ornamented with fine oblique axial lines; post-nuclear whorl about 4 (in specimen from Hiradoko shell bed) slightly angulated at upper fourth of whorl. Sculpture of many slightly oblique, longitudinal ribs, narrower than their concave interspaces, and about 11 to 10 in number on last whorl; last rib much larger, forming stout lip-varix. These ribs crossed by almost equally spaced equal spiral threads, about 4 on penultimate whorl, second of which is on shoulder. The first spiral thread on space above shoulder slightly weaker than others. First and second post-nuclear whorls sculptured with two septal threads; last whorl bears thick varix behind outer lip, which is thick. Aperture with two more weak

67) PILSBRY, *Proc. Acad. Nat. Sci. Phiradelphia*, **56** (1904), p. 10, Pl. 2, figs. 11, 11 a. (as *Mangilia.*)

68) S. TOKUNAGA, *Jour. Coll. Sci. Tokyo Imp. Univ.*, **21**, 2 (1906), p. 15, Pl. 1, fig. 27. (as *Pleurotoma.*)

* *Philbertia leuckarti* (DUNKER) in Table I., Part I.

teeth within outer lip, upper one large; annal sinus deep and rounded at end of space above shoulder. Lower part of base ornamented with oblique 3~5 beaded cords. Length 4·5 mm.

Geologic age.—Pleistocene-Recent. Geogr. distr.—Ogasawara, Mutu Bay (Nomura), Tokyo Bay, Noto. Occurrence.—Tumuki (1) No. 2331; Hiradoko (5) No. 2333, Coll. Earthq. Res. Inst.

This species is closely allied to *Philbertia leuckarti* (DUNKER)[69]. But according to Dunker's description, the latter species is 7 mm long while the former species is less than 5 mm.

Asperdaphne **HEDLEY, 1922.**

Asperdaphne subzonata **(SMITH)**

Plate LIV, Figure 104 a, b.

1927 *Daphnella subzonata* SMITH, Proc. Zool. Soc. London, p. 197, Pl. 19, fig. 27.

Shell fusiform, rather solid. Suture distinct, contracted. Nuclear whorls broken; post-nuclear whorls about $1\,^1/_2$ sculptured with almost equally spaced fine unequal spiral cords and strong longitudinal ribs, except ultimate and penultimate whorl. On first post-nuclear whorl 9 longitudinal ribs, spiral cords obsolete; on second post-nuclear whorl 11 to 12 longitudinal ribs, spiral cords 2 or 3; on third post-nuclear whorl, 12~13 longitudinal ribs and 3 primary spiral cords between which weak secondary cords appear; on fourth, 14~15 longitudinals, 3 strong primary spirals and 4 secondary spiral cords, and 8 weak tertiary spiral cords; on sixth, 18~19 longitudinals, 4 primary spirals, 4 secondary spirals, more than eight tertiary spirals, and many fine quarternary spiral cords. On penultimate whorl, longitudinal ribs suddenly becomes weak and ornamented with weak longitudinal furrows, but spiral sculpture continues as preceeding whorls. On penultimate whorl, 4 primaries, more than 6 secondaries, more than 11 tertiaries, more than 20 quarteries, and sometimes more finer cords observable. Ultimate wohrl long, more than half shell length, ornamented with longitudinal inclemental lines and spiral sculptures. Base contracted below, with many unequal spiral cords as on whorls. Aperture semi-oval, inner margin of which smooth, concave. Outer lip thick, but beveled to an edge, obliquely and deeply excised above to form annal sinus. Canal short and rather shallow.

Geologic age.—Pleistocene-Recent. Geogr. distr.—North of Kyusyu (Pilsbry). Occurrence.—Hiradoko (1) No. 2334, Coll. E. R. I.

Pseudorhaphitoma **BÖTTGER, 1895.**

Pseudorhaphitoma naganumaensis **OTUKA n. sp.**

Plate LIV, Figure 102 a, b.

69) DUNKER, *Moll. Jap.* (1861), p. 2, Pl. 1, fig. 1.

Shell small, fusiform, with rather high spire, solid, strong. Nuclear whorls 3, first two of which convex rounded, smooth, third ornamented with about 17 to 14 oblique longitudinal furrows; post-nuclear whorls about 5, slightly angulated, ornamented with coarse spiral riblets and many lines of very fine tubercles and 8 round longitudinal riblets which continue through every whorl. First post-nuclear whorl in type specimen, coarse spiral ribs about 3, middle of which most prominent on angle, upper of which relatively weak. Three lines of fine tubercles between succeeding suture line and lowest coarse riblet, also between middle and lowest. Two or three lines of fine tubercles visible between uppermost and middle coarse riblet; between uppermost coarse riblet and preceeding suture, 4 or 5 lines of fine tubercles visible. Second post-nuclear whorl sculptured with three coarse spiral riblets, between which and sutures, 4 to 6 lines of fine tubrcles present respectively. On third post-nuclear ones, three coarse riblets and 6 to 10 lines of fine tubercles present. Size of these fine tubercles about 45 on a line of 1 mm length. Ultimate whorl long, half shell length ornamented with three spiral riblets and lines of fine tubercles as in preceeding whorls. Base ornamented with almost equally spaced 5 to 6 spiral riblets, in interspaces of which are many lines of fine tubercles. Aperture narrow, both lips slightly arcuate; blunt at ends; inner lip smooth; inner margin of outer lip with teeth. Annal sinus above teeth broad, round, but deep; varix curves slightly backward near annal. Canal short.

	Length	Diameter
No. 1	7·6 mm	2·7 mm (Holotype, No. 855, Matusima Bay, Living).
No. 2	5·9 mm	2·3 mm (No. 2333, Hiradoko, Pleistocene).
No. 3	7·2 mm	2·8 mm (No. 552. Naganuma, Pliocene).

This species is closely allied to *Pseudorhaphitoma fairbankii* (NEVILL)[70] from the Indian Ocean, but the latter species has less number of longitudinal riblets and many teeth on the inner margin of the outer lip. The latter species is about 6 mm long.

Pseudorhaphitoma bipyramidata HEDLEY[71] is another allied species to this new species. But the former has seven longitudinal riblets.

Geol. age.—Pliocene-Recent. Geogr. distr.—Cnetral Japan. Occur. Matusima bay in Miyagi pref. Holotype, No. 855; Hiradoko, No. 2333; Naganuma in Kanagawa pref. No. 552.

***Pseudorhaphitoma*? sp.**

Plate LIV, Figures 97 a, b.

Occurrence.—Hiradoko (1) No. 2382.

70) *Jour. Asiat.Soc. Bengal*; TRYON's, *Man. Conch.* Pl. 22, fig. 48.

***Terebra* BRUGUIÈRE, 1789.**

***Terebra* (*Punctoterebra*) *lischkeana* DUNKER**

1882 *Terebra lischkeana* DUNKER, in malakoz. Bl. **24**, p. 74.

1882 *Terebra lischkeana*, DUNKER, Index, Moll. p. 71, Pl. 5, figs. 13~16.

1920 *Terebra lischkeana*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **39**, 6, p. 31, Pl. 1, fig. 10.

Geol. age.—Pliocene-Recent. Geogr. distr.—Sagami Bay, Setouti, Kyusyu, Hukui pref., Toyama Bay. Occur.—Hiradoko (2) No. 2336, Coll. E. R. I.

***Ringicula* DESHAYES, 1838.**

***Ringicula* (*Ringiculella*) *doliaris* GOULD**

Plate LIV, Figures 65.

1860 *Ringicula doliaris* GOULD, Proc. Boston Soc. Nat. Hist. **7**, p. 324.

1935 *Ringicula* (*Ringiculella*) *doliaris*, TAKEYAMA, Venus, **5** (2, 3,) 80, Pl. 5, fig. 17, 18.

Geol. age.—Pleistocene-Recent. Occurrence.—Tumuki No. 2337; Hiradoko No. 2339, Coll. E. R. I.

***Ringicula* (*Ringiculella*) aff. *yokoyamai* TAKEYAMA**

1922 *Ringicula musashinoensis*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **44**, 1. p. 30, fig. 16, 17. (not of YOKOYAMA, 1920).

1935 *Ringicula* (*Ringiculina*) *yokoyamai* TAKEYAMA, Venus, **5**, 2~3, pp. 74~78, Pl. 5, fig. 19, 20; Pl. 6, fig. 21~25.

Geol. age.—Pleistocene. Occurrence.—Miyainu (4), Hiradoko (3) No. 2339, Coll. E. R. I.

***Solidula* FISCHER von WALDHEIM, 1807.**

Solidula strigosa* (GOULD)

Plate LIV, Figures 54.

1859 *Buccinulus strigosus* GOULD, Proc. Bost. Soc. Nat. Hist., 7, p. 141.

1922 *Solidula strigosa*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **44**, p. 22, Pl. 1, fig. 1.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Tokyo bay, Setouti, Noto. Occurrence.—Tumuki (2) Hiradoko (2) Coll. E. R. I.

***Acteocina* GRAY, 1847.**

***Acteocina exilis* (DUNKER)**

Plate LIV, Figures 56 a, b.

1860 *Tornatina exilis* DUNKER, in malakoz. Bl. **6**, p. 222.

1861 *Tornatina exilis*, DUNKER, Moll. Jap. p. 25, Pl. 2, fig. 14.

1922 *Tornatina exilis*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., p. 24, Pl. 1, fig. 4.

Geol. age.—Pliocene-Recent. Geogr. distr.—Japan. Occur.—Hiradoko (15) No. 2342, Coll. E. R. I.

***Retusa* BROWN, 1827.**

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71) HEDLEY, *Records of Australian Museum*, **13**, 6 (1922), p. 308, 309, Pl. 51, fig. 132.

* *Pupa strigosa* (GOULD) in Table I, Part I.

Retusa minima YAMAKAWA

Plate LIV, Fig. 55.

1911 *Retusa minima* YAMAKAWA, Jour. Geol. Soc. Tokyo, **18**, 212, p. 47, Pl. 11, fig. 21~24.

1922 *Retusa truncata* YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **44**, 1, p. 25, Pl. 1, fig. 7.

Geol. age.—Pleistocene. Occur.—Tumuki (1) No. 2341; Hiradoko (44) No. 2340; Miyainu (9), Coll, E. R. I.

Rhizorus MONTFORT, 1810.

Rhizorus artiaperta (YAMAKAWA)

Plate LIV, Figures 57, 58.

1911 *Volvula artiaperta* YAMAKAWA, Jour. Geol. Soc. Tokyo, **18**, p. 50, Pl. 11, fig. 33~36.

1927 *Volvula artiaperta* YOKOYAMA, Jour. Fac. Sci. Imp. Univ., Tokyo, (2), 1, 10, p. 407, Pl. 46, fig. 4.

Geol. age.—Pliocene?-Pleistocene-Recent. Geogr. distr.—? Occur.—Tumuki (1) No. 2344; Hiradoko (2) No. 2343, Coll. E. R. I.

Cylichna LOVEN, 1846.

Chlichna yamakawai YOKOYAMA

1911 *Bullinella striata* YAMAKAWA, Jour. Geol. Soc. Tokyo, **38**, 5, p. 51, Pl. 11, fig. 37~38.

1920 *Cylichna yamakawai* YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **39**, 6, p. 29, Pl. 1, fig. 7.

Geol. age.—Pliocene-Pleistocene. Geogr. distr.—? Occurrence.—Tumuki (3) No. 2346; Hiradoko (1) No. 2345; Akasaki (2).

Philine ASCANIUS, 1772.

Philine japonica LISCHKE.

1872 *Philine japonica* LISCHKE, Malakoz. Bl. **19**, p. 105.

1874 *Philine japonica*, LISCHKE, Jap. Meeresconch., **3**, p. 77, Pl. 5, fig. 13, 14.

1927 *Philine japonica*, YOKOYAMA, Jour. Fac. Sci. Imp. Univ. Tokyo, (2), **1**, 10, p. 408, Pl. 46, fig. 5.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Central Japan. Occur.—Hiradoko (1).

SCAPHOPODA

Dentalium LINNÉ,.1758.

Dentalium (Dentalium) hexagonum GOULD

Plate LIV, Fig. 88.

1859 *Dentalium hexagonum* GOULD, Proc. Bost. Soc. N. H. **7**, p. 166.

1860 *Dentalium sexcostatum* SOWERBY, Thes. Conch, **3**, p. 103, Pl. 223.

1931 *Dentalium hexagonum*, HIRASE, Jour. Conch. **19**, 5, p. 133~134, Pl. 3, fig. 2.

Geol. age.—Pliocene-Recent. Geogr. distr.—Tokyo Bay, Noto, Hiradoko. Nagasaki. Occurrence.—Tumuki (5) No. 2398; Miyainu (20) No. 2399; Hiradoko (12) No. 2400.

Dentalium (Antalis) motidukii OTUKA n. sp.

Plate LIV, Figure 89.

The writer has only one complete specimen from Hiradoko bed. This speciemen is smaller than *Dentalium pretiosum*[72] SOWERBY described by Hirase. It is opaque white, ivory like with some light buff rings. Sculptures like *weinkauffi*, but longitudinal threads are fine; primary threads number about 10 at the apical part, and the tertiary threads about 40 in the middle part of the shell length. The apical part very weakly notched on the convex side. The length of the shell is about 16 mm. The diameter of apical part 0·5 mm; the aperture is 2·0 mm in diameter.

Occurrence.—Hiradoko (1) No. 2400, Monotype.

Dentalium (*Antalis*) *weinkauff* DUNKER[73] is a large shell.

Dentalium (*Antalis*) *buccinulum* GOULD[74] is closely allied to this new species, but the former has no distinct about 30 longitudinal sculptures on the apical one third of the shell length.

Dentalium (*Antalis*) *pretiosum* SOWERBY is an allied species, but this species has a long shell with a short apical notch and numerous fine longitudinal threads.

Dentalium (*Antalis*) *rhabdotum* PILSBRY[75] has some rude longitudinal sculptures on the whole shell surface.

Dentalium (*Antalis*) *marukawai* OTUKA[76] has a long fine shell with a deep apical notch.

***Siphonodentalium* M. SARS, 1859.**

***Siphonodentalium* (*Pulsellum*) *ozawai* YOKOYAMA**

1928 *Siphonodentalium* (*Pulsellum*) *ozawai* YOKOYAMA, Jour. Fac. Sci. Imp. Univ. Tokyo, (2), **1**, Pt. 8, p. 239, Pl. 3, 4, fig. 11.

1931 *Siphonodentalium* (*Pulsellum*) *ozawai*, HIRASE, Jour. Conch., **19**, p. 140, Pl. 3, fig. 12.

Geol. age.—Pliocene-Recent. Geogr. distr.—Toyama Bay (KIKUCHI, and HIRASE). Occurrence.—Hiradoko (1) No. 2401.

PELECYPODA

***Nucula* LAMARCK, 1799.**

***Nucula* sp.**

A small *Nucula* (*Nucula*) was collected.

Occurrence.—Hiradoko No. 2384, Coll. E. R. I.

***Acila* H. and A. ADAMS, 1858.**

***Acila divaricata* (HINDS)**

72) SOWERBY, *Thesaurus Conch.*, **3**, (1866),

73) GOULD, *Proc. Bost. Soc. Nat. Hist.*, **7**, p. 141, (1859).

74) DUNKER, *Malak. Bl.* **24**, (1877), p. 68.

75) PILSBRY, *Proc. Acad. Nat. Sci. Philadelphia*, (1905), p. 116, Pl. 5, figs. 45, 46, 47.

76) OTUKA, *Venus*, **4**, 3, pp. 159~161, figs. a~f.

1843 *Nucula divaricata* HINDS, Proc. Zool. Soc. London, p. 97.
1850 *Nucula mirabilis* ADAMS et REEVE, Samarang, Moll., p. 75, Pl. 21, fig. 8.
1934 *Nucula divaricata*, H. G. SCHENCK, Bull. Mus. Royal. Hist. Nat. Belgique, **10**, 20, pp. 41~2.

Geol. age.—Miocene-Recent. Geogr. distr.—Hokkaido, Honsyu, Hukui pref., Toyama pref. Occur.—Kayato (Nozaki beds).

Nuculana LINK, 1907.

Nuculana onoyamai OTUKA

Plate LV, Figures 105, 106.

1935 *Nuculana onoyamai* OTUKA, Jour. Geol. Soc. Japan, **42**, 503, pp. 507~8, fig. 3 b, c (p. 492).

Shell small, thick, solid, equivalve, inequilateral; the posterior side longer, rostrated with a slight curve; the anterior end rounded; surface sculptured with fine concentric lines and three weak and a prominent ridge, which divides a postero-dorsal depressed area, from beak to postero-ventral margin. The postero-dorsal surface ornamented with concentric sculpture and a weak ridge from beak to postero-ventral margin. A weak ridge (or a weak groove) runs from beak to antero-ventral margin. Apex small, but obtuse. Teeth v-shaped; horizontal ridge on inner side of posterior end is prominent.

	Length	height	thickness
No. 1.	23 mm	13 mm	5 mm (with one valve)(Holotype)
No. 2.	18 mm	11 mm	3 mm (with one valve)(Cotype)

This new species is closely allied to *Nuculana* sp. 1[77], from Japan sea in its sculpture. But fossil species are slightly larger, and thicker than the latter sp. Concentric sculpture in fossil species is slightly weaker than the latter species. Horizontal ridge on inner side of posterior end and radiating anterior ridge (or a groove) are obsolete in the Japan sea species.

This new species is closely allied to *Nuculana pernula* MÜLLER[78] from Arctic Ocean, but the former has a less prominent beak and longer shell than the latter.

Nuculana conceptionis (DALL)[79] resembles to this new species, but the former species has longer shell.

Occurrence.—Kamiyukawa (Yabuta series) No. 2528, C. E. R. I.

Limopsis SACCO, 1827.

Limopsis multistriata (FORSKÅL)

Plate LV, Figures 113 a, b.

1775 *Arca multistriata* FORSKÅL, Descr. Anim. Itin. Orient, p. 123.
1843 *Pectunculus cancellata* REEVE, Proc. Zool. Soc. London.

77) Y. OTUKA, *Bull. Earthq. Res. Inst.* **13**, (1934), 3, p. 608, Pl. 74, figs. 12, 13.
78) MÜLLER, *Beschaft. Ges. Naturf. Freunde zu Berlin*, **44**, 55, (1977).
79) DALL, *The Nautilus*, **10** (1896), **1**, p. 2.

1862 *Limopsis woodwardii* A. ADAMS, Proc. Zool. Soc., 1862, p. 231.

1922 *Limopsis woodwardii*, YOKOYAMA, Jour. Coll. Sci. Imp. Univ., **44**, 1, p. 192~193, Pl. 17, fig. 5.

1930 *Limopsis multistriata*, KURODA, "Venus" **1**, 6, App. p. 17., sp. 59. fig. 26.

Geol. age.—Pliocene-Recent. Geogr. distr.—Taiwan, Yakusima, Noto, Awa. Occurrence.—Hiradoko (29) No. 2402, Col. E. R. I.

***Limopsis tokaiensis* YOKOYAMA**

1910 *Limopsis tokaiensis*, YOKOYAMA, Jour. Geol. Soc. Tokyo, **17**, 205, p. 1, Pl. 9, figs. 1~3, 5, 6.

Geol. age.—Pliocene-Recent. Geogr. distr.—Central Japan, Kyusyu (Hyuga). Occurrence.—Zyunityô, Simazaki, nr. Himi. No. 2035, Coll. E. R. I.

***Glycymeris* DACOSTA, 1778.**

***Glycymeris rotunda* (DUNKER)**

1882 *Pectunculus rotundus* DUNKER, Index. Moll. Jap., p. 236, Pl. 16, figs. 9, 10.

1920 *Pectunculus nipponicus* YOYOYAMA, Jour. Coll. Sci. Imp. Univ. Tokyo, **39**, p. 168, Pl. 18, figs. 3~6, 7.

1922 *Pectunculus yamakawai* YOKOYAMA, Jour. Coll. Sci. Imp. Univ. Tokyo, **44**, p. 190, Pl. 16, figs. 4, 5.

Geol. age.—Pliocene-Recent. Geogr. distr.—Tokyo bay (Dunker), Wakasa (Hirano), Kii, Nagasaki, Tosa, Iyo (Hirase, Kaneko), Tazima (Yagura), Hyuga (Yokoyama). Occurrence.—Zyunityo No. 2045, Coll. E. R. I.

***Navicula* BLAINVILLE, 1825.**

***Navicula ocellata* (REEVE)**

Plate LV, Figures 109, 110.

1844 *Arca ocellata* REEVE, Conch. Icon., sp. 102.

1904 *Arca ocellata*, PILSBRY, Proc. Acad. Nat. Sci. Philadelphia, **56**, p. 560, Pl, 4, fig. 21.

This shell very resembles to *Navicula boucardi* (JOUSSEAUME)[80] in its outline, but the former has smooth ligament area scored by only a few, usually imperfect ligament grooves. The teeth in the former species are finer than the latter.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Awa, Kii, Hizen. Occurrence.—Tumuki (4) No. 2386; Miyainu (24) No. 2385; Hiradoko (10) No. 2403, Coll. E. R. I.

***Navicula boucardi* (JOUSSEAUME)**

(1894 *Arca boucardi* JOUSSEAUME, The Humming Bird, 4, p. 41).

1904 *Arca kobeltiana* PILSBRY, Proc. Acad. Nat. Sci. Philadelphia, **56**, p. 559, Pl. 40, figs. 16~19.

1906 *Arca rectangularis* TOKUNAGA, Jour. Coll. Sci. Imp. Univ. Tokyo, **21**, 2, p. 61, Pl. 3, fig. 23 a~c.

Geol. age.—Miocene-Recent. Geogr. distr.—Hokkaido, Mutu bay,

80) JOUSSEAUME, *The Humming Bird*, 4, p. 41. (1894).

Tokyo bay?, Noto, Setouti, Tanegasima. Occurrence.—Miyainu (1) No. 2396; Simazaki, Zyunityo, No. 2019, Coll. E. R. I.

***Barbatia* GRAY, 1847.**

***Barbatia obtusoides* (NYST)**

Plate LVII, Figures. 198, 197.

1848 *Arca obtusoides* NYST, Mem. Acad. Belgique, **22**, (1847), p. 50.

1844 *Arca obtusa* REEVE, Conch. Icon., sp. 77 (Non (Philippi) de Koninck, 1842).

1869 *Arca decurvata* LISCHKE, Jap. Meeres Conch., **1**, p. 148.

1928 *Arca decurvata* YAKOYAMA, Rep. Imp. Geol. Surv. Jap., No. 101, p. 128, Pl. 20, fig. 4.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Miyagi pref. Tiba pref., Wakayama pref., Ryukyu, Taiwan. Occur.—Tumuki (10) No. 2389, Coll. E. R. I.

***Barbatia stearnsi* (PILSBRY)**

1895 *Arca stearnsi* PILSBRY, Cat. Mar. Mol. Jap., p. 148, Pl. 3, fig. 8~10.

1920 *Arca stearnsi*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **39**, 6, p. 165, Pl. 16, fig. 9.

Geol. age.—Pliocene-Recent. Geogr. distr.—Tokyo bay, Toyama Bay, Wakayama pref., Kyusyu, Setouti, Amami-Osima. Occurrence.—Miyainu (1) No. 2388; Hiradoko (40) No. 2408, Coll. E. R. I.

***Barbatia symmetrica* (REEVE)**

Plate LV, Figures 107 a, b.

1844 *Arca symmetrica* REEVE, Conch. Icon, sp. 117, fig. 120 (not fig. 117).

Yokoyama's *Arca symmetrica* (Jour. Coll. Sci. Imp. Univ. Tokyo **39**, p. 166, Pl. 17, Fig. 7, 8.) may be a distinct species. S. NOMURA[81] has distinguished this species from *Barbatia symmetrica* (REEVE), and has proposed a specific name *Barbatia yokoyamai* for YOKOYAMA's species (Pl. LV, Figs. 108, 113.)

Geol. age.—Pliocene-Recent. Geogr. distr.—Kii, Hizen, Toyama, Tokyo. Occurrence.—Miyainu (33) No. 2391; Hiradoko (80) No. 2409; Akasaki (3), Coll. E. R. I.

Barbatia reticulata* (GMELIN)

Plate LV, Figures 111 a, b.

(1791~2 *Arca reticulata* GMELIN, Syst. Nat., et. **13**, p. 3311.)

1833 *Byssoarca divaricata* SOWERBY, Proc. Zool. Soc. London, p. 22.

1930 *Barbatia reticulata*, KURODA, Venus, **1**, 6, App. p. 25, fig. 34.

1923 *Arca* (*Barbatia*) *domingensis*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **45**, 1, p. 60, Pl. 5, fig. 6 (not of LAMARCK).

Geol. age.—Pleistocene-Recent. Geogr. distr.—Toyama, Kadusa, Kii, Hizen, Amami. Occurrence.—Hiradoko (40) No. 2410.

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81) NOMURA, *Sci. Rep. Tohoku Imp. Univ.*, (2), **16**, 1, (1933), p. 41, Pl. 1, fig. 3 a~d.

* *Barbatia divaricata* (SOWERBY) in Table I, Part I.

Barbatia decussata (SOWERBY)

Plate LV, Figures 118.

1833 *Byssoarca decussata* SOWERBY, Proc. Zool. Soc. London, p. 22.

1924 *Arca (Barbatia) decussata*, YOKOYAMA, Jour. Coll. Sci. Tokyo, Imp. Univ. **45**, p. 59.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Awa Sagami, Kii, Tosa, Kyusyu, Ryukyu, Taiwan. Occurrence.—Tumuki (2) No. 2387; Miyainu (29) No. 2390, Coll. E. R. I.

Arca LINNÉ, 1758.

Arca subcrenata LISCHKE

1869 *Arca subcrenata* LISCHKE, Malakoz. Bl., **16**, p. 107.

1869 *Arca subcrenata*, LISCHKE, Jap. Meeres Conch., **1**, p. 146, Pl. 9, fig. 1~3.

Geol. age.—Pliocene-Recent. Geogr. distr.—Miyagi pref., Tokyo bay, Sikoku, Kyusyu, Setouti, Toyama, Ryukyu. Occur.—Miyainu (1) No. 2394, Coll. E. R. I.

Arca inflata REEVE

1844 *Arca inflata* REEVE, Conch. Icon., sp. 30.

1859~67 *Arca broughtoni* SCHRENCK, Reis, Amurl., Zool., Moll. p. 578, Pl. 24. fig. 1~3.

1906 *Arca tenuis* TOKUNAGA, Jour. Coll. Sci. Tokyo Imp. Univ., **21**, 2, p. 58, Pl. 4, fig. 12, b.

Geol. age.—Pliocene-Recent. Geogr. distr.—Hakodate, Mutu bay, Noto, Tokyo bay, Kyusyu. Occurrence.—Tumuki (5) (No. 3395).

Arca amicula YOKOYAMA

1925 *Arca amicula* YOKOYAMA, Jour. Fac. Sci. Imp. Univ. Tokyo, (2), **1**, p. 19, Pl. 7, fig. 2~4.

1934 *Arca amicula*, OTUKA, Bull. Earthq. Res. Inst., **2**, 3, p. 609, Pl. 47, fig. 20.

Geol. age.—Miocene-Pliocene. Geogr. distr.—Sinano, Iwate pref. Akita pref. Isikawa pref. Occurrence.—Kayato (Nozaki beds), Simazaki No. 2029.

Bathyarca KOBELT, 1891.

"Bathyarca" uwaensis (YOKOYAMA)

Plate LV, Figures 114, 115.

1928 *Arca uwaensis* YOKOYAMA, Jour. Fac. Sci. Imp. Univ. Tokyo, (2), **2**, p. 349, Pl. 67, figs. 13, 14.

1928 *Bathyarca uwaensis*, KURODA, Venus, **2**, **1**, App. p. 33.

Geol. age.—Pliocene-Recent. Geogr. distr.—Musasi, Hyuga. Occurrence.—Hiradoko (1). No. 2392, Coll. E. R. I.

Some living specimens of this species were collected from Hyuganada by Soyomaru.

Trichomusculus IREDALE, 1924.

Trichomusculus divaricatus (PHILIPPI)

Plate LV, Figures 116, 117.

1847 *Modiola divaricata* PHILIPPI, Zeitschr. f. Malak. p. 115.
1851 *Modiola divaricata*, PHILIPPI, Abbild. u. Beschr. **3**, p. 21, Pl. 2, fig. 8.
1933 *Trichomusculus divaricatus*, KURODA, Venus, **4**, 1, App. p. 136, sp. 415.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Noto, Kii, Kadusa, Nagasaki, Amami Osima. Occur.—Miyainu (7) No. 2419; Hiradoko (5) No. 2420.

***Anomia* (LINNÉ) MÜLLER, 1776.**

***Anomia* sp.**

Occur.—Zyunityo, Simazaki. No. 2041, Coll. E. R. I.

***Ostrea* LINNÉ, 1758.**

***Ostrea denselamellosa* LISCHKE**

1869 *Ostrea denselamellosa* LISCHKE, Malakoz. Bl. **16**, p. 109.
1869 *Ostrea denselamellosa*, LISCHKE, Jap. Meeres Conch., **1**, p. 177, Pl. 13, fig. a, b. Pl. 15, fig. 1.

Geol. age.—Pliocene-Recent. Geogr. distr.—Hokkaido, Honsyu, Sikoku, Kyusyu. Occur.—Miyainu (5) No. 2421, Coll. E. R. I.

***Ostrea gigas* THUNBERG**

(1793 *Ostrea gigas* THUNBERG, K. Vet. Ac. Nya. Handl. **4**, p. 140.)
1895 *Ostrea gigas*, PILSBRY, Cat. Mar. Moll. Jap. p. 145.
1920 *Ostrea gigas*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **3**. 6, p. 162, Pl. 15, fig. 1~4, Pl. 17, fig. 2 (only).

Geol. age.—Miocene-Pliocene-Pleistocene-Recent. Geogr. distr.—Hokkaido, Honsyu, Sikoku. Kyusyu, Amami Osima. Occur.—Tumuki (4) No. 2422, Coll. E. R. I.

***Ostrea* sp.**

Occur.—Simazaki No. 2042, Coll. E. R. I.

***Plicatula* LAMARCK, 1801.**

***Plicatula horrida* DUNKER**

1882 *Plicatula horrida* DUNKER, Index Moll. Jap. p. 247, Pl. 11, figs. 6, 7.
1882 *Plicatula irregularis* DUNKER, Index Moll. Jap., p. 261, Pl. 11, fig. 5.
1924 *Plicatula irregularis*, YOYOYAMA, Jour. Coll. Sci. Tokyo, Imp. Univ., **45**, 1, p. 55, Pl. 4, figs. 5, 6.
1931 *Plicatula horrida*, KURODA, Venus, **3**, 1, App. p. 79.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Saga pref., Wakayama pref., Tiba pref. Occur.—Hiradoko (10) No. 2423, C. E. R. I.

***Pseudamussium* H. and A. ADAMS, 1858.**

***Pseudamussium intuscostatum* (YOKOYAMA)**

1920 *Pecten intuscostatus* YOKOYAMA, Jour. Coll. Sci. Imp. Univ. Tokyo, **39**, 6, p. 156, Pl. 13, figs. 9, 10.
1922 *Pecten tenuicostulatus* YOKOYAMA, Jour. Coll. Sci. Imp. Unvi. Tokyo, **44**, 1, p. 184, Pl. 17, fig. 15.
1931 *Pseudamussium intuscostatum*, KURODA, Venus, **3**, 1, App. p. 80, sp. 250.

Geol. age.—Pliocene-Recent. Geogr. distr.—East coast of Honsyu, Kii, Noto. Occur.—Simazaki, Zyunityo No. 2018.

***Chlamys* (BOLTEN) RÖDING, 1718.**

Chlamys irregularis (SOWERBY)

1842 *Pecten irregularis* SOWERBY, Thes. Conch., 1, p. 69, Pl. 13, figs. 51, 52.

Geol. Age.—Pliocene-Recent. Geogr. distr.—Nagasaki, Tusima, Bay of Toyama, Tiba pref. Mutu. Occur.—Hiradoko (3), No. 2424, Coll. E. R. I.

Chlamys swiftii etchegoini (ANDERSON)

Plate LV, Figure 140.

1905 *Pecten etchegoini* ANDERSON, Proc. Calif. Acad. Sci., (3), **2**, p. 198, Pl. 18, fig. 92, 93.

1934 *Pallium swiftii etchegoini*, OTUKA, Bull, Earthq. Res. Inst. **12**, pt. 3, p. 613.

Geol. age.—Pliocene-Miocene. Geogr. distr.—West coast of America, Northeast Japan. Occur.—Simazaki, No. 2020; Siratori No. 1914, Coll. E. R. I.

Chlamys hastatus aff. ***ingeniosa*** YOKOYAMA

1929 *Chlamys hastatus ingeniosa* YOKOYAMA, Imp. Geol. Surv. Rep. No. 104, p. 5, Pl. 6, fig. 2.

1934 *Chlamys hastatus* aff. *ingeniosa*, OTUKA Bull. Earthq. Res. Inst. **12**, p. 611, 611, Pl. 47, fig. 25.

Geol. age.—Miocene?-Lower Pliocene? Oocur.—Iwaya(Nanao beds) No. 1137? Coll. E. R. I.

Chlamys crassivenia (YOKOYAMA)

Plate LV, Figures 137, 139, 141.

1929 *Pecten* (*Chlamys*) *crassivenia* YOKOYAMA, Imp. Geol. Surv. Rep. No. 104, p. 6, Pl. 6, fig. 1.

Type specimen lacks both ears. MOCHIZUKI sends to the writer some specimens with ears. Fig. 137, 139, 141 in Plate LV show these specimens.

Geol. age.—Miocene-Lower Pliocene. Geogr. distr.—Isikawa pref.; Iwate pref.; Toyama pref. Occur.—Iori (Iori beds) No. 1904, 1905, 1906; Tobayasi No. 1912, 1913, Coll. E. R. I.

Chlamys notoensis (YOKOYAMA)

1929 *Pecten notoensis* YOKOYAMA, Imp. Geol. Surv. Japan, Rep. No. 104, p. 4, Pl. 3, Pl. 4, Pl. 5, figs. 1, 2.

1930 *Pecten natoriensis* MATSUMOTO, Sci. Rep. Tohoku Imp. Univ., (2), **13**, 3, p. 104, Pl. 40, figs. 10, 11.

1930 *Pecten natoriensis subovalis* MATSUMOTO, Sci. Rep. Tohoku Imp. Univ., (2), **13**, 3, p. 105, Pl. 40, fig. 12.

1930 *Pecten natoriensis inequilateralis* MATSUMOTO, Sci. Rep. Tohoku Imp. Univ., (2), **13**, 3, p. 105, Pl. 40, figs. 13, 14.

Geol. age.—Pliocene (ONOYAMA)-Miocene. Geogr. distr.—Pliocene (Toyama pref.); Natori in Ugo (Miocene); Isikawa pref. (Miocene); Enniti, South Tyosen (Miocene by KANEHARA). Occur.—Iwaya near Nanao (Nanao beds).

Chlamys nipponensis KURODA

1861 *Pecten lactus* GOULD, Proc. Boston Soc. N. H., **8**, p. 39, (Not of *Pecten lactus* Gould, Proc. Bost. Soc. N. H., **3**, p. 345, 1850, a new Zealand species).

1920 *Pecten lactus*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **39**, 6, p. 152, Pl. 14, figs. **1**, 2.

1932 *Chlamys farreri nipponensis* KURODA, Venus, **3**, 2, App. p. 91.

Geol. age.—Pliocene-Recent. Geogr. distr.—Hokkaido, Honsyu, Sikoku, Kyusyu. Occur.—Tumuki (4) No. 2425; Hiradoko (1) No. 2426; Akasaki (2) (No. 2052); Simazaki, Zyunityo (Himi bed) No. 2033, Coll. E. R. I.

***Chlamys* sp.**

Plate LV, Figure 143.

This shell is a shell of *Chlamys islandicus* MÜLLER type. It has a large shell (about 150 mm in height) with many bifurcated ribs which are 3 in 10 mm width at the ventral margin. These ribs are crossed by fine concentrical grows lines. Interstices of these bifurcated ribs are narrower than the rib.

Only one fragmental specimen was collected.

Occurrence.—Tobeiyati in Higasiminato-mura (Nozaki beds) (No. 1923).

***Pecten* MÜLLER, 1776.**

***Pecten laqueatus* SOWERBY**

1842 *Pecten laqueatus* SOWERBY, Thesaurus Conch., **1**, p. 46, Pl. 15, fig. 101.

1844 *Pecten antonii* PHILIPPI, Abbild. u. Beschr. **1**, p. 99, Pl. **1**, fig. 1.

1922 *Pecten excavatus*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **44**, 1, p. 183, Pl. 15, fig. 6, 7. (not of ANTON)

Geol. age.—Pliocene-Recent. Geogr. distr.—Hokkaido, Honsyu, Sikoku, Kyusyu. Occurr.—Tumuki (1) No. 2433; Miyainu (4) No. 2434; Hiradoko (20) No. 2435.

***Patinopecten* DALL, 1898.**

***Patinopecten tokyoensis kimurai* (YOKOYAMA)**

Plate LVII, Figure 212.

1925 *Pecten kimurai* YOKOYAMA, Jour. Coll. Sci. Imp. Univ. Tokyo, **45**, 5, p. 27, Pl. 4, figs. 1~6; Pl. 2, fig. 4.

1934 *Patinopecten tokyoensis kimurai*, OTUKA, Bull. Earthq. Res. Inst., **12**, pt. 3, p. 613.

Geol. age. - Middle Neogene-Pliocene. Geogr. distr.—Hukusima pref., Isikawa pref., Iwate pref., Hokkaido. Occurrence.—Simazaki, Himi (Himi beds) No. 2030, Coll. E. R. I.

***Patinopecten plebejus* (YOKOYAMA)**

1926 *Pecten plebejus* YOKOYAMA, Jour. Fac. Sci. Imp. Univ. Tokyo, (2), **1**, pt. 8, p. 305, p. 305, p. 136, figs. 1, 2.

1931 *Pecten* sp., K. Mochizuki, Isikawaken Tennenkinenbutu Hokoku, **7**, Pl. 34, fig. 2, Pl. 35, fig. 3.

Geol. age.—Pliocene. Geogr. distr.—Sado, Noto, Iwaki?. Occur.

—Simazaki, Himi (Himi beds) No. 2037, Coll. E. R. I.

***Patinopecten kagamianus* (YOKOYAMA)**

Plate LV, Figures 128, 134.

1923 *Pecten kagamianus* YOKOYAMA. Jap. Jour. Geol. Geogr. **2**, p. 2, Pl. 11, fig. 1.

1926 *Pecten permirus* YOKOYAMA, Jour. Geol. Soc. Tokyo, **33**, p. 9, Pl. 2.

1929 *Pecten (Patinopecten?) kogamianus*, YOKOYAMA, Imp. Geol. Surv. Japan, Rep. 104, pp. 2~4, Pl. 1, Pl. 2.

1930 *Patinopecten plicicostulatus* MATSUMOTO, Sci. Rep. Tohoku Imp. Univ. Sendai, (2), **13**, 3, pp. 105, 106, Pl. 40, fig. 15.

Geol. age.—Upper Miocene. Geogr. distr.—Miyagi pref., Simane ref., Isikawa pref., (in Miocene). Occur.—Iwaya, Kokubu (Nanao beds) (No. 1138).

***Spondylus* LINNÉ, 1758.**

***Spondylus cruentus* LISCHKE**

Plate LV, Figure 129.

1868 *Spondylus cruentus* LISCHKE, malakoz. Blätt. **15**, p. 221.

1869 *Spondylus cruentus*, LISCHKE, Jap. Meeres Conch, **1**, p. 172, Pl. 12, fig. 1~5.

1922 *Spondylus cruentus*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **44**, 1, p. 179, Pl. 14, fig. 24.

Geol. age.—Pliocene-Recent. Geogr.. distr.—Tiba pref., Toyama pref., Sikoku, Kyusyu. Occur.—Tumuki (4) No. 2437; Miyainu (4) No. 2436, C. E. R. I.

***Lima* CUVIER, 1798.**

***Lima lischkei* LAMY**

Plate LV, Figure 132, 133.

1877 *Lima japonica* DUNKER, malakoz. Bl., **2**, p. 70 (Not of A. ADAMS).

1885 *Lima dunkeri* SMITH, Challenger Report, Lamellibranchia, p. 291 (Not of HAGENOW, 1642).

1924 *Lima dunkeri*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **45**, 1, p. 45. Pl. 5, fig. 19.

1930 *Lima lischkei* Lamy, Jour. d. Conch., **74**, 3, p. 196.

1932 *Lima lischkei*, KURODA, Venus, **3**, 4, App. p. 115.

Geol. age.—Pliocene? (Katase beds)-Pleistocene-Recent. Geogr. distr.—Sagami bay, Toyama bay, Wakayama pref., Sikoku. Occur.—Miyainu (15) No. 2438; Hiradoko (30) No. 2439, Col. E. R. I.

***Lima basilanica* ADAMS et REEVE**

Plate LV, Figures 131, 130.

1843 *Lima angulata* SOWERBY, Thesaurus Conch, **1**, p. 86, Pl. 22, fig. 39, 40.

1850 *Lima basilanica* ADAMS et REEVE, Zool. "Samarang", Moll., p. 75, Pl. 21, fig. 6.

1850 *Lima orientalis* ADAMS et REEVE, Zool. "Samarang", Moll. p. 75, Pl. 21, fig. 7.

1906 *Lima hakodatensis* TOKUNAGA, Jour. Coll. Sci. Tokyo Imp. Univ., **21**, 2, p. 64, Pl. 3, fig. 27 (a, b.)

1932 *Lima basilanica*, KURODA, Venus, **3**, App. p. 114, fig. 131.

Geol. age.—Pliocene-Recent. Geogr. distr.—Matusima bay; Noto; Tokyo bay; Wakayama pref.; Sikoku; Kyusyu; Taiwan. Occur.—Tumuki (8) No. 2440; Hiradoko (3) Coll. E. R. I.

***Limatula* S. V. WOOD, 1839.**

***Limatula subauriculata* (MONTAGU)**

Plate LV, Figures 121, 122.

1808 *Pecten subauriculatus* MONTAGU, Test. Brit. Suppl. p. 63, Pl. 26, fig. 2.

1843 *Lima subauriculata* SOWERBY, Thesaurus Conch, **1**, p. 84, Pl. 22.

1920 *Lima subauriculata*, YOKOYAMA, Jour. Coll. Sci. Imp. Univ. Tokyo, **39**, 6, p. 150, Pl. 12., fig. 10.

Geol. age.—Pliocene-Recent.Geogr. distr.—Northern Pacific, Atlantic, Karahuto. Occur.—Simazaki, (Himi beds) No. 2017, Coll. Earthq. Res. I.

***Crassatellites* KRUEGER, 1823.**

***Crassatellites nanus* (ADAMS et REEVE)**

Plate LVI, Figures 146, 147.

1850 *Crassatella nana* ADAMS et REEVE, Zoology of the Voyage of H. M. Samarang, Mollusca, p. 81~2, Pl. 23, fig. 2.

Geol. age. - Pleistocene-Recent. Geogr. distr.—Central and western Japan. Occur.—Hiradoko (4) No. 2505, Coll. Earthq. Res. Inst.

***Trapezium* MEGERLE von MÜHLFELD 1811.**[82]

Trapezium japonica* PILSBRY

Plate LVII, Figures 202, 203.

1905 *Trapezium japonicum* PILSBRY, Proc. Acad. Nat. Sci. Philadelphia, p. 119, Pl. 5, figs. 34, 35, 36.

1922 *Trapezium nipponicum* YOKOYAMA, Jour, Coll. Sci. Tokyo Imp. Univ., **44**, 1, p. 167, Pl. 13, fig. 17.

1922 *Traaezium liratum*, YOKOYAMA. Jour. Coll. Sci. Tokyo Imp. Univ., **44**, 1, p. 168, Pl. 13, fig. 16.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Tokyo bay, Setouti, Sikoku, Matusima bay. Occurrence.—Tumuki(1) No. 2441, Coll. Earthq. Res. Inst.

***Astarte* SOWERBY, 1816.**

***Astarte hakodatensis* YOKOYAMA**

Plate LVI, Figures 148, 149, 150.

1920 *Astarte hakodatensis* YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **39**, 6, p. 140, Pl. 11, figs. 5, 6.

1922 *Astarte hakodatensis*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **44**, 1, p. 164.

1926 *Astarte hakodatensis*, YOKOYAMA, Jour. Fac. Sci. Imp. Univ. Tokyo, (2), **1**, 8, p. 299.

1933 *Astarte hakodatensis*, SASAKI, Suisan Kenkyu Iho, **3**, p. 16, sp. 59.

Geol. age.—Pliocene-Recent. Geogr. distr.—Hokkaido (Living);

82) *Trapezium*, Mus. Calonn., 1798=Nom. Nud.

* *Beguina japonica* (PILSBRY) in Table I, Part I.

Lower and Upper Musasino formation. Sado (Pliocene), Isikawa pref. (Pliocene). Occur.—Simazaki (Himi beds) No. 2027, Coll. Earthq. Res. Inst.

***Astarte alaskensis* DALL**

Plate LVII, Figure 195.

1903 *Astarte alaskensis* DALL, Proc. U. S. Mus., **26**, 944, Pl. 63, fig. 2.

1924 *Astarte alaskensis* OLDROYD, Stanford University Publ. Geol. Sci. **1**, 1, p. 106, Pl. 13, fig. 20.

1926 *Astarte sulcata*, YOKOYAMA, Jour. Fac. Sci. Tokyo Imp. Univ., (2), **1**, 8, p. 298, Pl. 37, figs. 9, 10. (not of DACOSTA).

1933 *Astarte undata*, SASAKI, Suisankenkyuiho, **3**, p. 16, sp. 58, Pl. 2, fig. 14. (not of GOULD)

Geol. age.—Pliocene-Recent. Geogr. distr.—Northern Pacific. Occur.—Simazaki, (Himi beds) No. 2023.

***Cardita* BRUGUIÈRE, 1792.**

***Cardita cumingiana* DUNKER**

Plate LVI, Figures 157 a, b.

1860 *Cardita cumingiana* DUNKER, Malakoz. Bl. **6**, p. 223.

1861 *Cardita cumingiana*, DUNKER, Moll. Jap., p. 29, Pl. 3, fig. 18.

1920 *Cardita cumingiana*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **39**, 6, p. 137, Pl. 10, fig. 16; Pl. 11, fig. 1.

Geol. age.—Pliocene?-Recent. Geogr. distr.—Mutu bay, Matusima bay, Toyama bay, Tokyo bay, Wakayama pref., Kyusyu, Amami Osima. Occur.—Tumuki (2) No. 2443; Miyainu (14) No. 2444; Hiradoko (20) No. 2445, Coll. Earthq. Res. Inst.

***Venericardia* LAMARCK, 1801.**

***Venericardia ferruginosa* (ADAMS et REEVE)**

Plate LVII, Figures. 210, 211.

1850 *Cardita ferruginosa* ADAMS et REEVE, Zoology Voy. H. M. S. Samarang, sp. 78, Pl. 21, fig. 21.

1920 *Venericardia cipangoana* YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **44**, 139, Pl. 11, figs. 3, 4.

1934 *Venericardia ferruginosa*, OTUKA, Bull. Earthq. Res. Inst., **12**, 3. p. 614.

Geol. age.—Miocene-Recent. Geogr. distr.—Honsyu, Japan sea, Northern Japan. Occur. - Simazaki No. 2031, Coll. Earthq. Res. Inst.

***Venericardia ferruginea* (A. ADAMS)**

Plate LVI, Figures 174 a, b.

1888 *Cardita ferruginea* ADAMS, Syst. Conchylien Cabinet, Martini and Chemnitz, *Cardita*, p. 17, Pl. 6, fig. 11.

1920 *Venericardia ferruginea*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **44**, 137, Pl. 11, fig. 2.

1934 *Venericardia ferruginea*, OTUKA, Bull. Earthq. Res. Inst., **12**, 3, p. 614.

Geol. age.—Miocene-Recent. Geogr. distr.—Northern Japan. and Central Japan. Occur.—Simazaki (Himi beds) No. 2032, Coll. Earthq. Res. Inst.

Venericardia nakamurai YOKOYAMA

1923 *Venericardia nakamurai* YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **44**, 7, pp. 5, 6, Pl. 1, fig. 9.

1926 *Venericardia nakamurai*, YOKOYOMA, Jour. Fac. Sci. Imp. Univ. Tokyo, (2), **1**, 8, p. 298, Pl. 36, fig. 3.

1627 *Venericardia nakamurai*, YOKOYAMA. Jour. Fac. Sci. Imp. Univ. Tokyo, (2), **2**, 4, p. 169.

This species may be identical with *Venericardia prolongata* CARPENTER, 1864.[83] The Japanese species has more vertical muscular impression than the American species.

Geol. age.—Pliocene. Geogr. distr.—Saisyu-to, Isikawa pref., Sado island. Occur.—Simazaki (Himi beds) No. 2016.

Corbicula MEGERLE von MÜHLFELD, **1811.**

Corbicula **sp.**

Plate LVII, Figure 196.

Occur.—Simazaki (Himi beds) No. 2034.

Basterotia C. MAYER, **1859.**

Basterotia gouldii (A. ADAMS)

Plate LV, Figs. 125, 126, 127, 128.

1864 *Eucharis gouldii* A. ADAMS, Ann. Mag. Nat. Hist., p. 309.

1920 *Basterotia gouldii*, YOKOYAMA, Jour. Coll. Sci. Imp. Univ. Tokyo, **39**, 6, p. 108, Pl. 7, fig. 7.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Sagami bay; Setouti: Kyusyu. Occur.—Hiradoko (4), No. 2446, Coll. Earthq. Res. Inst.

Thyasira (LEACH) LAMARCK, **1818.**

Thyasira nipponica YABE et NOMURA

Plate LVII, Figure 194.

1925 *Thyasira bisecta nipponica* YABE et NOMURA, Sci. Rep. Tohoku Imp. Univ., (2), **7**, **4**, p. 48, Pl. 24, fig. 2 (a, b), 3 a, b.

1925 *Thyasira bisecta*, YOKOYAMA, p. 14 (not of CONRAD).

1931 *Thyasira nipponica*, KURODA, Gology of Middle Sinano, Fossil Shells, pp. 48~49, Pl. 5, fig. 28.

Geol. age.—Oligocene-Recent. Geogr. distr.—Japan Sea; Sagami-bay; Northern Japan. Occur.—Kayato, Nozaki, Yabuta beds.

Thyasira yabei KURODA

1931 *Thyasira yabei* KURODA, Geology of Middle Sinano, Fossil Shells, pp. 49~50.

Geol. age.—Miocene ?-Recent. Geogr. distr.—Northern Japan; Japan sea. Occur.—Nozaki (Yabuta series.) No. 2447, Coll. E. R. I.

Taras RISSO, **1826.**

Taras lunaris (YOKOYAMA)

Plate LVI, Figs. 167 a, b, 175, 176.

1927 *Diplodonta lunaris* YOKOYAMA, Jour. Fac. Sci. Imp. Univ. Tokyo, (2), **1**, 10, p. 433, Pl. 50, figs. 5, 6.

83) CARPENTER, *Suppl. Rep. Brit. Assoc.*, (1864), pp. 236 and 642.

Geol. age.—Pleistocene. Geogr. distr.—Isikawa pref., Southern Kwanto. Occur.—Hiradoko (4) No. 2448, Coll. Earthq. Res. Inst.

***Lucina* BRUGUIÈRE, 1797.**

***Lucina* (*Lucinoma*) *acutilineata* CONRAD.**

1849 *Lucina acutilineata* T. A. CONRAD, U. S. Exped., x, Geol., p. 725.

1850 *Lucina annulata* EEEVE, Conch. Icon., **6**, *Lucina*, sp. 17, Pl. 4, fig. 17.

1920 *Lucina borealis*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **39**, 6, p. 133, Pl. 10, fig. 6.

1934 *Lucina acutilineata*, OTUKA, Bull. Earthq. Res. Inst., **13**, 3, p. 614.

Geol. age.—Oligocene-Recent. Geogr. distr.—Northern Pacific. Occur.—Hiradoko (20) No. 2449, Coll. Earthq. Res. Inst.

***Pillucina* PILSBRY, 1920.**

***Pillucina pisidium* (DUNKER)**

Plate LVII, Figures 200 a, b.

1860 *Lucina pisidium* DUNKER, Malakoz. Bl. p. 227.

1861 *Lucina pisidium*, DUNKER, Moll. Jap., p. 28, Pl. 3, fig. 9.

1920 *Lucina pisidium*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **39**, 9, pp. 132~133, Pl. 10, fig. 6.

Geol. age. –Pliocene-Recent. Geogr. distr.—Hokkaido; Matusima bay; Amami Osima. Occur. –Tumuki (6) No. 2450; Miyainu (15) No. 2451; Akasaki (2), Coll. E. R. I.

***"Lucina" contraria* DUNKER**

Plate LVII, Figure 190, 191.

1882 *Lucina contraria* DUNKER, Index. Moll. Mar. Jap., p. 215, Pl. 13, figs. 12, 13, 14.

1920 *Lucina contraria* YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **39**, 6, p. 134, Pl. 10, fig. 8.

Geol. age.—Miocene-Recent. Geogr. distr.—Central Japan. Occur. —Tumuki (7), No. 2452, Coll. Earthq. Res. Inst.

***Anodontia* LINK, 1807.**

***Anodontia bialata* (PILSBRY)**

Plate LVI, Figures 153, 154.

1895 *Loripes bialata* PILSBRY, Cat. Mar. Mol. Jap. p. 133—4, Pl. 3, figs. 13, 14.

1927 *Loripes philippiana*, YOKOYAMA, Jour. Fac. Sci. Imp. Univ. Tokyo, (2), **1**, p. 431, Pl. 50, figs. 1, 2. (not of REEVE)

Geol. age.—Pleistocene-Recent. Geogr. distr.—Setouti, Noto, Tokyo bay, Mutu bay. Occur.—Tumuki (10) No. 2453; Miyainu (1) No. 2454; Akasaki (2) No. 2056, Coll. E. R. I.

***Codakia* SCOPOLI, 1777.**

***Codakia divergens* (PHILIPPI)**

Plate LVI, Figures 177, 178.

1851 *Lucina divergens* PHILIPPI, Abbild. Beschr. **3**, p. 103, *Lucina* Pl. 2, fig. 4.

1923 *Codakia bella delicatula*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **44**, p. 50, Pl. 3, fig. 8.

Geol. age.—Pleistocene-Recent. Geogr. distr. Kyusyu, Sikoku, Honsyu. Occur.—Tumuki(1) No. 2456; Miyainu(9) No. 2457; Hiradoko (1) No. 2473, Coll. E. R. I.

***Kellya* TURTON, 1822. (=*Kellia*)**

***Kellya notoensis* YOKOYAMA**

Plate LVI, Fig. 163; LVII, Fig. 195.

1928 *Kellya notoensis* YOKOYAMA, Imp. Geol. Surv. Japan, 101, p. 127, Pl. 19, fig. 13.

Geol. age.—Pleistocene. Geogr. distr.—Tumuki(Pleistocene). Occur.—Tumuki (1) No. 2458, Coll. Earthq. Res. Inst.

***Scintilla* DESHAYES, 1855.**

***Scintilla nipponica* YOKOYAMA**

Plate LVI, Figure 182 a, b.

1924 *Scintilla nipponica* YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., 45, 1, Pl. 4, fig. 1.

Geol. age.—Early Holocene. Geogr. distr.—Awa (Coral bed). Occur.—Miyainu (1) No. 2463, Coll. Earthq. Res. Inst.

***Jousseaumiella* BOURNE, 1907.**

***"Jousseaumiella" crassa* (YOKOYAMA)**

Plate LVII, Figures 207, 208.

1927 *Montacuta? crassa*, YOKOYAMA, Jour. Fac. Sci. Imp. Univ. Tokyo, (2), p. 433, Pl. 49, figs. 4, 5.

Geol. age.—Pleistocene. Geogr. distr.—Tokyo in Pleistocene deposits. Occur.—Hiradoko (1), No. 2464, Coll. Earthq. Res. Inst.

***Mysella* ANGAS, 1877. (=*Rochefortia* VELAIN 1878).**

***Mysella oblongata* (YOKOYAMA)**

Plate LVII, Figures 213, 214.

1922 *Montacuta oblongata* YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., 44, 1, p. 157, Pl. 13, figs. 9, 10.

Geol. age.—Pleistocene. Geogr. distr.—Tokyo in Pleistocene deposit. Occur.—Hiradoko (1), No. 2465, Coll. Earthq. Res. Inst.

***Chama* (LINNÉ, 1758) BRUGUIÈRE, 1789.**

***Chama aspersa* REEVE**

Plate LV, Figures 119, 120, 123, 124.

1846 *Chama aspersa* REEVE, Conch. Icon., 4, *Chama* sp. 24.

1934 *Chama kikuzaru* HIRASE, *Coll. Japanese Shells*, Pl. 26,

Geol. age.—Pliocene-Recent. Geogr. distr.—Toyama bay, Hukui pref., Sagami bay, Kii, Sikoku. Occur.—Akasaki (1) No. 2061; Tumuki (4) No. 2466; Miyainu (40) No. 2467; Hiradoko (20) No. 2468, Coll. Earthq. Res. Inst.

***Papyridea* SWAINSON, 1840.**

***Papyridea(Fulvia) muticum* (REEVE)**

Plate LVI, Figures 160, 165.

1844 *Cardium muticum* REEVE, Conch. Icon. *Cardium*, Pl. 6, fig. 32.

Geol. age.—Miocene?-Recent. Geogr. distr.—Hakodate, Mutu bay, Noto, Matusima, Tokyo, Nagasaki, Setouti. Occur.—Tumuki (1) No. 2469; Miyainu (1) No. 2470; Hiradoko (2) No. 2471; Akasaki (1) No. 2057, Coll. E. R. I.

***Papyridea* (*Fulvia*) *hungerfordi* (SOWERBY)**

Plate LVI, Figures 155, 156, 164, 166.

1901 *Cardium hungerfordi* SOWERBY, Jour. of Malacology, **8**, p. 103.

1904 *Cardium* (*Leiocardium*) *hungerfordi*, PILSBLY, Proc. Acad. Nat. Sci. Philadelphia, **56**, p. 555~556, Pl. 41, fig. 17.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Sagami bay, Tokyo bay, Toyama bay, Hiradoko. Occur.—Hiradoko (15) No. 2472, Coll. E. R. I.

***Cardium* LINNÉ, 1758.**

***Cardium* sp. (*shinjiense*? YOKOYAMA)**

Occur.—Simazaki, (Himi beds) No. 2038, Coll. Earthq. Res. Inst..

***Corculum* (BOLTEN) RÖDING, 1798.**

***Corculum* (*Fragum*) *ebaranum* YOKOYAMA**

Plate LVI, Figures 170, 171.

1927 *Cardium ebaranum*, YOKOYAMA, Jour. Fac. Sci. Imp. Univ. Tokyo, (2), **1**, 10, p. 430~1, Pl. 48, fig. 15.

Geol. age. - Pleistocene. Geogr. distr.—Tokyo. Occur.—Miyainu (1) No. 2475; Hiradoko (2) No. 2476.

***Gafrarium* (BOLTEN) RÖDING, 1798.**

***Grafrarium divaricatum* (GMELIN)**

Plate LVI, Figure 179.

Venus divaricatus CHEMNITZ, Conch. Cab. **6**, p. 317, Pl. 30, fig. 316.

1869 *Cytherea divaricata* GMELIN, in PFEIFFER's Syst. Conch. Cab. MARITINI CHEMN., p. 44, Pl. 16, fig. 8.

1928 *Circe divaricata*, YOKOYAMA, Imp. Geol. Surv. Rep., **101**, p. 127, Pl. 20, fig. 1,

Geol. age.—Pleistocene-Recent. Geogr. distr.—Ise, Sikoku, Kyusyu, Hukui, Toyama, Tokyo. Occur.—Tumuki (6) No. 2474; Akasaki (4) No. 2047, Coll. Earthq. Res. Inst.

***Gafrarium* (*Circe*) *scriptum stutzeri* (DONOVAN)**

Plate LVI, Figure 180.

1825 *Venus stutzeri* DONOVAN, Naturalist's Repository, 3, Pl. 78.

1921 *Venus stutzeri*, PILSBRY, The Nautilus, **34**, 4.

Circe scripta personata DESHAYES may be synonym with this sp.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Central and western Japan. Occur.—Akasaki(4) No. 2047; Tumuki(15)No. 2475, C. E. R. I.

***Saxidomus* CONRAD, 1837.**

***Saxidomus purpuratus* (SOWERBY)**

1855 *Tapes purpuratus* SOWERBY, Thes. Conch. **2**, p. 692, Pl. 150, figs. 124, 125.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Hakodate, Mutu bay, Matusima bay, Tokyo bay, Setouti. Occur.—Akasaki No. 2050.

***Pitar* RÖMER, 1857.**

Pitar lineolata* SOWERBY.

Plate LVI, Figures 158, 159.

1855 *Cytherea lineolata* SOWERBY, Thesaurus Conch., **2**, p. 786, sp. 124, Pl. 168, figs. 214, 215.

1924 *Meretrix (Callista) limatula*, YOKOYAMA, Jour. Coll. Sci. Imp. Univ. Tokyo, **44**, 7, p. 43, Pl. 2, fig. 21, (Not of SOWERBY).

Zigzag pattern is feebly preserved on the surface of these fossil specimens.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Ryukyu, Amami Osima. Occurence.—Tumuki (8) No. 2477; Miyainu (1) No. 2478; Hiradoko (1) No. 2479; Akasaki (4), Coll. E. R. I.

***Callista* (POLI, 1791) MÖRCH, 1853.**

***Callista pacifica* (DILLWYN)**

Plate LVI, Figure 181.

1817 *Venus pacifica* DILLWYN, Cat. Rec. Shells **1**, p. 175.

1855 *Cytherea sinensis*, SOWERBY, Thes. Conch., **2**, p. 624, Pl. 131, figs. 78. 80.

1864 *Cytherea chinensis*, PFEIFFER, Syst. Conch. Cab. Mart, Chemn., **11**, pt. 1, p. 31, Pl. 11, fig. 2.

1920 *Meretrix (Callista) chinensis*, YOKOYAMA, Jour. Coll. Sci. Imp. Univ. Tokyo, **39**, 6, p. 120, Pl. 8, figs. 9, 10.

Geol. age.—Cretaceous-Pliocene-Recent. Geogr. distr.—Central and western Japan, China. Occur.—Miyainu (1) No. 2488; Hiradoko (20) No. 2489, C. E. R. I.

***Meretrix* LAMARCK, 1799.**

Meretrix meretrix* (LINNÉ)*

1758 *Venus meretrix*, LINNÉ, Syst. Nat. ed. 10, p. 686.

1927 *Meretrix gordonis* YOKOYAMA, Jour. Fac. Sci. Tokyo Imp. Univ., Sec. (2), **1**, p. 429, Pl. 48, figs. 13, 14.

Geol. age.—Pliocene-Recent. Geogr. distr.—Hokkaido, Honsyu, Sikoku, Kyusyu. Occur.—Hiradoko (30) No. 2490, Coll. Earthq. Res. Inst.

***Dosinia* SCOPOLI, 1777.**

***Dosinia japonica* REEVE**

1850 *Artemis japonica* REEVE, Conch. Icon., *Artemis*, Pl. 3, fig. 17.

1920 *Dosinia troscheli*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **39**, 6, p. 119, Pl. 8, figs. 5, 6. (Not of LISCHKE).

Geol. age.—Pliocene-Recent. Geogr. distr.—Central and western Japan. Occur.—Akasaki (1) No. 2049; Tukuki (2) No. 2491, Coll. Earthq. Res. Inst..

***Protothaca* DALL, 1902.**

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* *Pitar pellucida* LAMARCK in Table I, Part I.

** *Chamaeformis meretrix* LINNÈ in Table I, Part I.

***Protothaca jedoensis* (LISCHKE)**

1874 *Venus jedoensis* LISCHKE, Jap. Meeres Conch., **3**, p. 84, Pl. 7, figs. 1~9.

1920 *Venus jedoensis*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **39**, 6, p. 120, Pl. 8, figs. 9, 10.

Geol. age.—Pliocene-Recent. Geogr. distr.—Hokkaido, Honsyu, Sikoku, Kyusyu. Occur.—Akasaki, (2) No. 2046; Tumuki (15) No. 2492; Miyainu (7) No. 2493, Coll. Earthq. Res. Inst.

***Paphia* (BOLTEN) RÖDING, 1798.**

***Paphia euglypta* (PHILIPPI)**

Plate LVI, Figures 172, 173.

1847 *Venus euglyptus*, PHILIPPI, Zeitschr. f. Malak., p. 89.

1934 *Paphia (Paphia) euglypta*, HIRASE, Coll. Japanese Shell. Pl. 38, fig. 5.

Geol. age.—Pliocene-Recent. Geogr. distr.—Central western Japan, Kyusyu. Occur.—Hiradoko (4) No. 2494, C. E. R. I.

***Paphia* sp.**

A fragmental specimen was collected from Hukazawa.

Occur.: Hukazawa (Nozaki bed).

***Paphia (Paratapes) undulata* (BORN)**

Plate LVI, Figures 168, 169.

~ *Venus undulata* BORN, Mus. Caes. Mind. p. 67.

1934 *Paphia (Paratapes) undulata*, HIRASE, Coll. Jap. Shell. Pl. 39, fig. 5.

1928 *Tapes undulatus*, YOKOYAMA, Imp. Geol. Surv. Japan, Rep., 101, p. 82, Pl. 8, fig. 2.

Geol. age.—Pliocene-Recent. Geogr. distr.—Southern Japan, Central and western Japan. Occur.—Miyainu (12) No. 2495, C. E. R. I.

***Petricola* LAMARCK, 1801.**

***Petricola japonica* DUNKER**

Plate LVII, Figures 188, 189.

1882 *Petricola japonica* DUNKER, Index. moll. p. 209, Pl. 9, figs. 4, 5, 6.

1928 *Petricola japonica*, YOKOYAMA, Imp. Geol. Surv. Rep. 101, Pl. 14, figs. 14, 15.

1934 *Petricola japonica*, KURODA, Venus, **4**, 6, p. 386.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Kyusyu, Honsyu. Occur.—Tumuki (2) No. 2496; Akasaki (2), Coll. E. R. I.

***Raeta* GRAY, 1853.**

***Raeta pulchella* (ADAMS et REEVE)**

1848 *Poromya pulchella* ADAMS et REEVE, Zoology Voy. Samarang. Moll., p. 83, Pl. 23, fig. 1.

1854 *Mactra rostralis*, DESHAYES, Proc. Zool. Soc., p. 69.

1927 *Raeta pulchella*, MAKIYAMA, Mem. Coll. Sci. Kyoto Imp. Univ., B, **3**, 1, p. 54.

Geol. age.—Pliocene-Recent. Geogr. distr.—Tokyo bay, Setouti, Saga pref. Occur.—Tumuki (2).

***Lutraria* LAMARCK, 1799.**

***Lutraria arcuata* REEVE**

1854 *Lutraria arcuata* REEVE, Conch. Icon. **8**, *Lutraria*, sp. 6.

Geol. age.—Pliocene-Recent. Geogr. distr.—Hizen, Amami Osima, Wakayama pref. Occur.—Hiradoko (7) No. 2503, Coll. Earthq. Res. Inst.

***Sanguinolaria* LAMARCK, 1799.**

***Sanguinolaria* (*Nuttallia*) *olivacea* (JAY)**

1856 *Psammobia olivacea* JAY, Rep. M. C. PERRY, U. S. N. Jap. Exp., p. 292, Pl. 1, figs. 8, 9.

1922 *Soletellina olivacea*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **39**, 6, p. 138, Pl. 7, fig. 11, Pl. 9, fig. 17.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Tisima, Hokkaido, Honsyu, Sikoku, Kyusyu. Occur.—Tumuki (1) No. 2504, C. E. R. I.

***Theora* H. *and* A. ADAMS, 1856.**

***Theora lubrica* GOULD**

1861 *Theora lubrica* GOULD, Proc. Bost. Soc. Nat. Hist. **8**, 14.

1882 *Theora lubrica*, DUNKER, Index. Moll. Mar. Jap., p. 181, Pl. 7, figs. 20~22.

1927 *Theora lubrica*, YOKOYAMA, Jour. Fac. Sci. Imp. Univ. Toko, (2), **1**, 10, p. 429, Pl. 48, figs. 11, 12.

Geol. age.—Pliocene-Recent. Goegr. distr.—Hakodate (Stimpson), Tokyo bay, Setouti, Saga pref. Occur.—Tumuki (2), Miyainu (1), No. 2523, Coll. E. R. I.

***Macoma* LEACH, 1819.**

***Macome* (*Pseudometis*) *praerupta* SALISBURY**

Plate LVI, Figures 161, 162.

1843 *Tellina truncata* JONAS, in PHILIPPI, Abbild. u. Beschr., **1**, p. 71, *Tellina*, Pl. **1**, fig. 2. (Not of LINNÉ, 1767).[34]

1934 *Macoma* (*Psammacoma*) *truncata*, HIRASE, Coll. Jap. Shell, Pl. 45, fig. 5.

1934 *Macoma* (*Pscudometis*) *praerapta* SALSUBRY, Proc. Malac. Soc. **21**, 2, p. 90.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Kii, Sikoku, Tokyo bay. Occur.—Miyainu (3) No. 2500, Coll. Earthq. Res. Inst.

***Macoma tokyoensis* MAKIYAMA**

1920 *Macoma dissimilis*, YOKOYAMA, Jour. Coll. Sci. Imp. Univ. Tokyo, **39**, 6, p. 116~117, Pl. 7, figs. 19, 20. (oot of MARTENS.)

1927 *Macoma tokyoensis* MAKIYAMA, Mem. Coll. Sci. Kyoto Imp. Univ., (B), **1**, 50.

1934 *Macoma tokyoensis*, OINOMIKADO, Venus., **4**, 6, p. 355, figs. **1**, 2, 3.

Geol. age.—Miocene?-Pliocene-Recent. Geogr. distr.—Northern-Central Japan. Occur.—Tumuki (2) No. 2501; Miyainu (2) No. 2502; Simazaki? (3) No. 2039, Coll. E. R I.

***Macoma* (*Psammacoma*) *awajiensis* SOWERBY**

Plate LVII, Figures 192, 193.

1914 *Macoma awajiensis* SOWERBY, Ann. Mag. Nat. Hist. (8), **14**, p. 38, Pl. 2, fig. 11.

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84) *Macoma truncata* LINNÉ (=*Macoma pulchella* LAMARCK)

Shell white, thin, transversely elongated, inequivalves and inequilateral; surface sculptured with fine concentric striae. Posterior margin obtusely truncated. Posterior area defined by a blant keel from beak to postero ventral margin. Posterior area sculptured with fine concentric striae. Beak situated posterior two fifth of dorsal margin. Posterior dorsal margin slightly concave; anterior dorsal margin slightly arched or straight. Anterior margin broadly rounded. Radial striations visible from beak to ventral margin with magnifieing lens. Ventral margin slightly arched. Cardinal teeth small, two on each valve, diverged. Lateral teeth absent.

Fossil specimens from Miyainu measures 10·5 mm long and 3·5 mm thick with one valve.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Awazi, Simidu harbour. Occur.—Miyainu (2) No. 2508; Hiradoko No. 2509, C. E. R. I.

***Merisca* DALL, 1900.**

***Merisca diaphana* DESHAYES**

Plate LVI, Figures 151, 152.

1854 *Tellina diaphana* DESHAYES, Proc. Zool. Soc. London, p. 364, No. 216.

1871 *Tellina diaphana*, RÖMER, Conch. Cab. MARTINI CHEMNITZ, **10**, 4, p. 47, Pl. 13, figs. 7, 8, 9.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Central and western Japan. Occur.—Hiradoko (1) No. 2507.

***Angulus* MEGERLE von MÜHLFELD, 1811.**

***Angulus* (*Fabulina*) *iridella* (v. MARTENS)**

1865 *Tellina iridella* v. MARTENS, Ann. Mag. Nat. Hist., p. 431.

1924 *Tellina iridella*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **45**, 1, p. 41, Pl. 5, fig. 23.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Tokyo bay, Sagami bay, Setouti, Hukui pref. Occur.—Hiradoko (2) No. 2506, Coll. Earthq. Res. Inst.

Angulus* (*Fabulina*) *miyatensis* (YOKOYAMA)

1020 *Tellina miyatensis* YOKOYAMA, Jour. Coll. Sci. Tokyo, Imp. Univ., **39**, 6, p. 115, Pl. 7, fig. 18.

Geol. age.—Pleistocene-Recent. Geogr. distr.—Sagami bay, Southern Kwanto. Occur.—Hiradoko (7) No. 2534, Coll. Earthq. Res. Inst.

***Angulus* (*Peronidia*) *salmonea* (CARPENTER)**

1894 *Macra salmonea* CARPENTER, Brit. Assn. Adv. Sci. Rep. for 1863, p. 639.

1930 *Tellina* (*Moerella*) *salmonea*, ARNOLD, Mem. Calif. Acad. Sci., **3**, p. 157, Pl. 13, fig. 7.

1924 *Tellina* (*Moerella*) *salmonea*, OLDROYD, Univ. Washington Publ. Puget Sound Biol. Station, **4**, p. 51, Pl. 41, fig. 3 a, b.

1934 *Tellina* (*Peronidia*) *salmonea*, OINOMIKADO, Chikyu, **22**, 4, p. 37~39, text fig.

* *Tellina miyatensis* YOKOYAMA in Table I, Part I.

Geol. age.—Miocene-Recent. Geogr. distr.—Northern Japan. Northern America., Is. Sado, Tiba pref. Occur.—Simazaki (Himi beds) No. 2036.

***Arcopagia* BROWN, 1827.**

Arcopagia (Pinguitellina)*[85] *kurodai* OTUKA n. sp.

Plate LVI, Figures 185, 186, 187.

Shell small, elliptical, moderate in thickness, almost equilateral; surface sculptured with fine concentric lamina and few deep incremental lines; Ventral margin broadly arcuated; postero- and antero-dorsal margin slightly arcuated forming angles (about 130°) at beak; anterior and posterior margins narrowly rounded. Posterior surface slightly flexed. Beak small. Cardinal teeth two, small, diverged; lateral teeth prominent, one on postero and other on antero dorsal margin. Parial sinus large and deep (text fig. 226.).

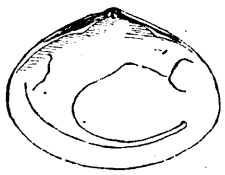

Fig. 226. *Arcopagia (Pinguitellina) kurodai* OTUKA n. sp.

Height (from beak to ventral) 8 mm; length (from postero-margin to antero-margin) 9·7 mm; thickness 2·1 mm (with one valve).

This species is closely allied to *Arcopagia (Pinguitellina) nux* Hanley,[86] but the latter species has a more inequilateral shell with more flexed posterior margin.

Occur. - Miyainu, Monotype, No. 2579, Coll. E. R. I.

***Solen* LINNÉ, 1758.**

***Solen* sp.**

Occurrence - Hiradoko (2), No. 2511, Coll. E. R. I.

***Aloidis* MEGERLE von MÜHLFELD, 1811.**

***Aloidis venustus* (GOULD)**

1861 *Corbula venusta* GOULD, Proc. Boston Soc. Nat. Hist., **8**, 14.

1920 *Corbula venusta*, YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **39**, 6, p. 107, Pl. 7, figs. 4~6.

Geol. age. Pliocene-Recent. Geogr. distr.—Hukui pref., Tokyo bay, Toyama bay, Matusima bay, Mutu bay, Hakodate. Occur.—Hiradoko (2), No. 2512; Miyainu (2) No. 2513; Simazaki (15) No. 2022, Coll. Earthq. Res. Inst.

***Aloidis substriatus* (YOKOYAMA)**

Plate LVII, Figures 204, 205, 206.

1922 *Corbula substriata* YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **44**, 1, p. 125, Pl. 7, fig. 3.

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85) *Rec. Australian Museum*, **16**, 1, p. 76. Pl. 5, figs. 6~8.

86) HANLEY, *Proc. Zool. Soc.*, 1844; Thes. Conch., *Tellina*, fig. 33.

* *Tellina* sp. in Table I, Part I.

Geol. age. - Pleistocene. Geogr. distr. - Southern Kwanto. Occur. Hiradoko (4) No. 2514, Coll. E. R. I.

***Cryptomya* CONRAD, 1848.**

***Cryptomya busoensis* YOKOYAMA**

1922 *Cryptomya busoensis* YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **44**, 1, p. 126, Pl. 7, figs. 1, 2.

1934 *Cryptomya busoensis*, OTUKA, Bull. Earthq. Res. Inst., **12**, 3, p. 620, Pl. 48, fig. 52.

Geol. age.—Miocene-Recent. Geogr. distr.—Tokyo bay (Otuka); Matusima bay(Nomura); Mutu bay(Nomura); Noto. Occur. - Tumuki (1) No. 2518, Coll. Earthq. Res. Inst.

***Mya* LINNÉ, 1758.**

***Mya arenaria* LINNÉ**

1758 *Mya arenaria*, LINNÉ, Syst. Nat. Ed. 10, p. 670.

1856 *Mya japonica*, JAY, in PERRY'S Jap. Exp. Rep. Shell, p. 232, Pl. 1, figs. 7, 10.

Geol. age. - Pleiocene-Recent. Geogr. distr.—Hokkaido, Mutu bay, Matusima bay, Tokyo bay, Setouti, Toyama bay. Occur.—Tumuki (4) No. 2519; Akasaki (2) No. 2051, Coll. Earthq. Res. Inst.

***Barnea* (LEACH) RISSO, 1826.**

Barnea japonica* (YOKOYAMA)

1920 *Pholadomya japonica* YOKOYAMA, Jour. Coll. Sci. Tokyo Imp. Univ., **39**, 6, p. 106, Pl. 6, figs. 30, 31.

1934 *Barnea dilatata*, HIRASE, Coll. Jap. Shell., Pl. 54, fig. 2.(not of SOULEYET)

Geol. age. Pleistocene-Recent. Geogr. distr.—Central Japan. Occur.—Miyainu.

Barnea dilatata (SOULEYET)[87] (=*Pholas latissima* SOWERBY)[88] is closely allied to this species, but the former species is more equilteral shell than *Barnea japonica* (YOKOYAMA).

***Barnea fragilis* (SOWERBY)**

Plate LVII, Figure 201.

1849 *Pholas fragilis* SOWERBY, Thes. Conch., **2**, p. 488, Pl. 108, figs. 92, 93.

1922 *Pholas fragilis*, YOKOYAMA, Jour. Coll. Sci. Tokyo, Imp. Univ., **39**, 6, p. 104, Pl. 6, fig. 29.

Geol. age.—Pliocene-Recent. Geogr. distr.—Hokkaido, Honsyu, Sikoku, Kyusyu. Occur.—Tumuki (2) No. 2520, Coll. Earthq. Res. Inst.

***Martesia* (LEACH) BLAINVILLE, 1825.**

Martesia striata* (LINNÉ)*

Plate LVII, Figures 183, 184.

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87) SOULEYET, *Rev. Zool. Soc. Cuvier*. p. 176.

88) SOWERBY, *Proc. Zool. Soc. London*, (1849), p. 162; PHLIPPI, *Abbild. Beschr.* **3**. p. 127, Pl. 2, figs. 1.

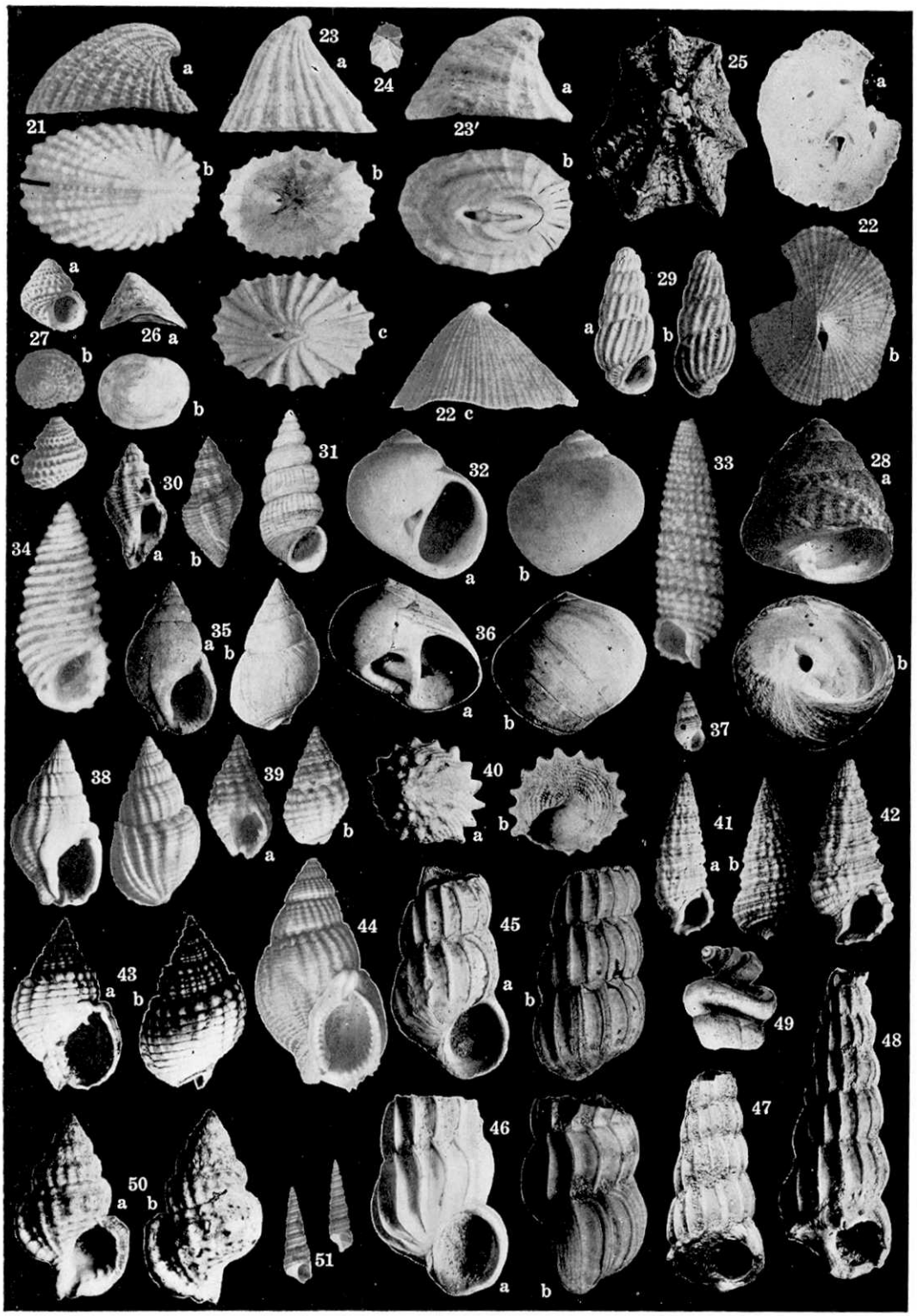
* *Barnea dilatata* (SOULEYET) in Table I, Part I.

** *Pholadidea penita tokyoensis* (YOKOYAMA) in Table I, Part I.

Plate LIII.

Plate LIII.

Fig. 21. *Emarginula crassicostata* SOWERBY.
Fig. 22. *Puncturella hirasei* OTUKA, n. n.
Fig. 23. *Puncturella nobilis* (A. ADAMS).
Fig. 23. *Puncturella nobilis* (A. ADAMS).
Fig. 24. *Diodora sieboldii* (REEVE).
Fig. 25. *Patelloida saccharina* (LINNÉ).
Fig. 26. *Patelloida conulus* (DUNKER).
Fig. 27. *Euchelus foveolatus* (A. ADAMS).
Fig. 28. *Tegula* (*Chlorostoma*) *rustica* (GMELIN).
Fig. 29. *Rissoina* (*Rissoina*) *laevicostulata* PILSBRY.
Fig. 30. *Trophon* (*Bedeva*) *birileffi* LISCHKE.
Fig. 31. *Obtortio perpupoides* (YOKOYAMA).
Fig. 32. *Natica concinna* DUNKER.
Fig. 33. *Triphora* aff. *purpurata* (PILSBRY).
Fig. 34. *Iravadia annulata* (DUNKER).
Fig. 35. *Nassarius* (*Alectrion*) *balteatus* (LISCHKE).
Fig. 36. *Polinices sagamiensis* PILSBRY.
Fig. 37. *Nassarius* (*Tritonella*) *japonicus* (A. ADAMS).
Fig. 38. *Nassarius* (*Niotha*) *livescens* (PHILIPPI).
Fig. 39. *Nassarius* (*Hinia*) *festivus* (POWYS).
Fig. 40. *Astraea* (*Calcar*) *haematraga* (MENKE).
Fig. 41. *Gourmya* (*Contumax*) *sordidula* (GOULD).
Fig. 42. *Gourmya* (*Contumax*) *kobelti* (DUNKER).
Fig. 43. *Nassarius* (*Niotha*) *gemmulatus* (LAMARCK).
Fig. 44. *Nassarius* (*Zeuxis*) *caelatus* (A. ADAMS).
Fig. 45. *Epitonium* (*Boreoscala*) *angulatosimile* OTUKA.
Fig. 46. *Epitonium* (*Boreoscala*) *angulatosimile* OTUKA.
Fig. 47. *Epitonium* (*Boreoscala*) *angulatosimile* OTUKA.
Fig. 48. *Epitonium* (*Boreorcala*) *angulatosimile* OTUKA.
Fig. 49. *Siliquaria cumingii* (MÖRCH).
Fig. 50. *Bursa* (*Gyrinoum*) *natatoria* ("BOLTEN" RÖDING).
Fig. 51. *Turritella fascialis* MENKE.



Figs. 21～51.

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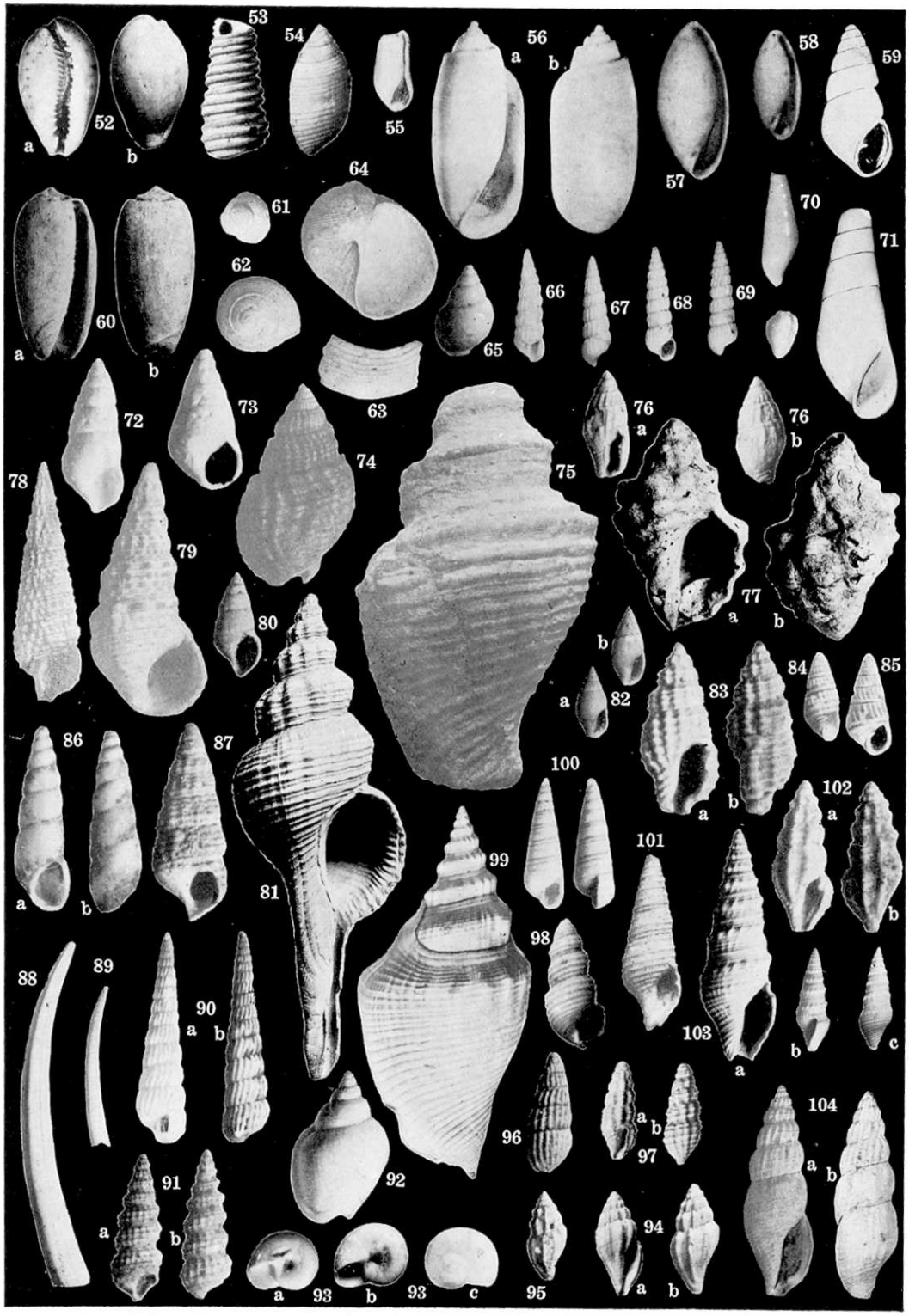
Plate LIV.

Plate LIV.

Fig. 52. *Erronea japonica* (SCHILDER).
Fig. 53. *Turritella fortilirata motidukii* OTUKA. n. sbsp.
Fig. 54. *Solidula strigosa* (GOULD).
Fig. 55. *Retusa minima* YAMAKAWA.
Fig. 56. *Acteocina exilis* (DUNKER).
Fig. 57. *Rhizorus artiaperta* (YAMAKAWA).
Fig. 58. *Rhizorus artiaperta* (YAMAKAWA).
Fig. 59. *Odostomia limpida* DALL et BARTSCH.
Fig. 60. *Oliva mustelina* LAMARCK.
Fig. 61. *Homalopoma amussitata* (GOULD).
Fig. 62. *Umbonium* (*Suchium*) *akitanum* SUZUKI.
Fig. 63. *Umbonium* (*Suchium*) *akitanum* SUZUKI.
Fig. 64. *Sinum* (*Eunaticina*) *papillum* (GMELIN).
Fig. 65. *Ringicula doliaris* (GOULD).
Fig. 66. *Turbonilla* aff. *imbana* YOKOYAMA.
Fig. 67. *Turbonilla* aff. *imbana* YOKOYAMA.
Fig. 68. *Turbonilla* aff. *imbana* YOKOYAMA.
Fig. 69. *Turbonilla* aff. *imbana* YOKOYAMA.
Fig. 70. *Strombiformis* (*Leiostraca*) *shibana* (YOKOYAMA).
Fig. 71. *Strombiformis* (*Leiostraca*) *shibana* (YOKOYAMA).
Fig. 72. Gen. sp. unknown.
Fig. 73. Gen. sp. unknown.
Fig. 74. *Nassarius* (*Niotha*) *livescens* (PHILIPPI).
Fig. 75. *Neptunea uwasoensis* (OTUKA).
Fig. 76. *Pyrene* (*Zafra*) *pumila* (DUNKER).
Fig. 77. *Thais bronni* (DUNKER).
Fig. 78. *Cerithium* (*Proclava*) *kochi* (PHILIPPI).
Fig. 79. *Batillaria multiformis* (LISCHKE).
Fig. 80. *Diala varia* A. ADAMS.
Fig. 81. *Fusinus perplexus* (A. ADAMS).
Fig. 82. *Pyrene* (*Mitrella*) *varians* (DUNKER).
Fig. 83. *Philbertia tincta* (REEVE).
Fig. 84. *Chrysallida* (*Miralda*) *gemma* (A. ADAMS).
Fig. 85. *Chrysallida* (*Babella*) *caelata* (A. ADAMS).
Fig. 86. *Amphithalamus yendoi* (YOKOYAMA).
Fig. 87. *Tachyrhynchus* ? sp.
Fig. 88. *Dentalium* (*Dentalium*) *hexagonum* GOULD.
Fig. 89. *Dentalium motidukii* OTUKA. n. sp.
Fig. 90. *Turbonilla hiradokoensis* OTUKA, n. sp.
Fig. 91. *Obtortio orientalis* (YOKOYAMA).
Fig. 92. *Ringicula* sp.
Fig. 93. *Skenea nipponica* ? YOKOYAMA.
Fig. 94. *Mangelia makiyamai* OTUKA. n. sp.
Fig. 95. *Mangelia makiyamai* OTUKA. n. sp.
Fig. 96. *Pyrgulina densecostulata* (GARRETT).
Fig. 97. *Pseudorhaphitoma* sp.
Fig. 98. *Menestho* sp.
Fig. 99. *Strombus* (*Labiostrombus*) *japonicus* REEVE.
Fig. 100. *Cingulina triarata* PILSBRY.
Fig. 101. *Asthenotoma yokoyamai notoensis* OTUKA, n. subsp.
Fig. 102. *Pseudorhaphitoma naganumaensis* OTUKA. n. sp.
Fig. 103. *Clavatula consimilis* (SMITH).
Fig. 105. *Asperdaphne subzonata* (SMITH).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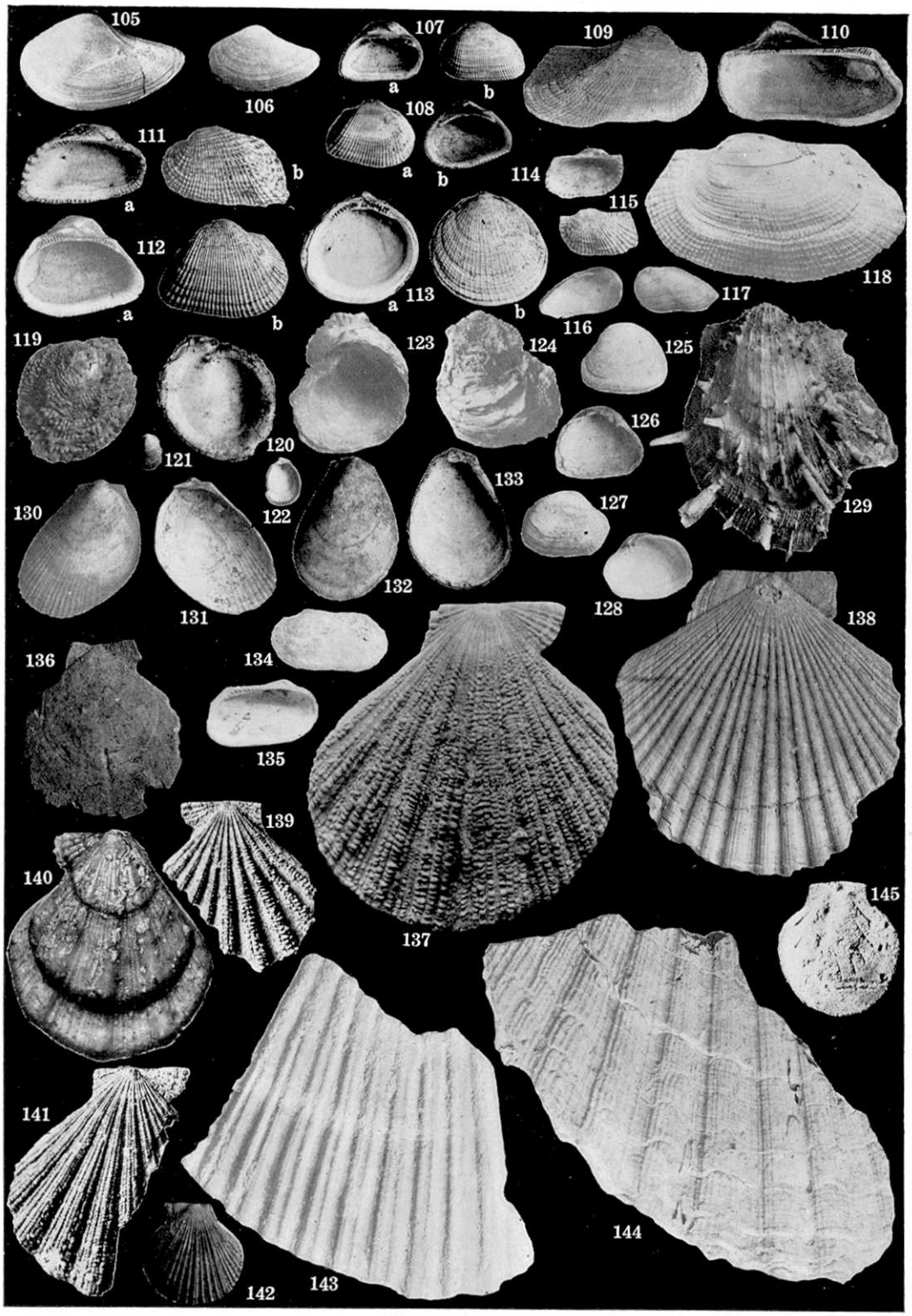
Figs. 52～104.

Plate LV.

Plate LV.

Fig. 105. *Nuculana onoyamai* OTUKA.
Fig. 106. *Nuculana onoyamai* OTUKA.
Fig. 107. *Barbatia symmetrica* (REEVE).
Fig. 108. *Barbatia yokoyamai* (NOMURA).
Fig. 109. *Navicula ocellata* (REEVE).
Fig. 110. *Navicula ocellata* (REEVE).
Fig. 111. *Barbatia reticulata* (GMELIN).
Fig. 112. *Barbatia yokoyamai* NOMURA.
Fig. 113. *Limopsis multistriata* (FORSKÅL).
Fig. 114. *"Bathyarca" uwaensis* (YOKOYAMA).
Fig. 115. *"Bathyarca" uwaensis* (YOKOYAMA).
Fig. 116. *Trichomusculus divaricatus* (PHILIPPI).
Fig. 117. *Trichomusculus divaricatus* (PHILIPPI).
Fig. 118. *Barbatia decussata* (SOWERBY).
Fig. 119. *Chama aspersa* REEVE.
Fig. 120. *Chama aspersa* REEVE.
Fig. 121. *Limatula subauriculata* (MONTAGU).
Fig. 122. *Limatula subauriculata* (MONTAGU).
Fig. 123. *Chama aspersa* REEVE.
Fig. 124. *Chama aspersa* REEVE.
Fig. 125. *Basterotia gouldii* (A. ADAMS).
Fig. 126. *Basterotia gouldii* (A. ADAMS).
Fig. 127. *Basterotia gouldii* (A. ADAMS).
Fig. 128. *Basterotia gouldii* (A. ADAMS).
Fig. 129. *Spondylus cruentus* LISCHKE.
Fig. 130. *Lima basilanica* ADAMS et REEVE.
Fig. 131. *Lima basilanica* ADAMS et REEVE.
Fig. 132. *Lima lischkei* LAMY.
Fig. 133. *Lima lischkei* LAMY.
Fig. 134. *Barbatia* sp.
Fig. 135. *Barbatia* sp.
Fig. 136. *Chlamys* sp. From Nanao bed.
Fig. 137. *Chlamys crassivenia* YOKOYAMA.
Fig. 138. *Patinopecten kagamianus* (YOKOYAMA).
Fig. 139. *Chlamys crassivenia* YOKOYAMA.
Fig. 140. *Chlamys swiftii etchegoini* (ANDERSON).
Fig. 141. *Chlamys crassivenia* YOKOYAMA.
Fig. 142. *Chlamys* sp. From Nanao beds.
Fig. 143. *Chlamys* sp. From Nozaki beds.
Fig. 144. *Patinopecten kagamianus* YOKOYAMA.
Fig. 145. *Propeamussium transnippcnica* MOCHIZUKI MS.



Figs. 105～145.

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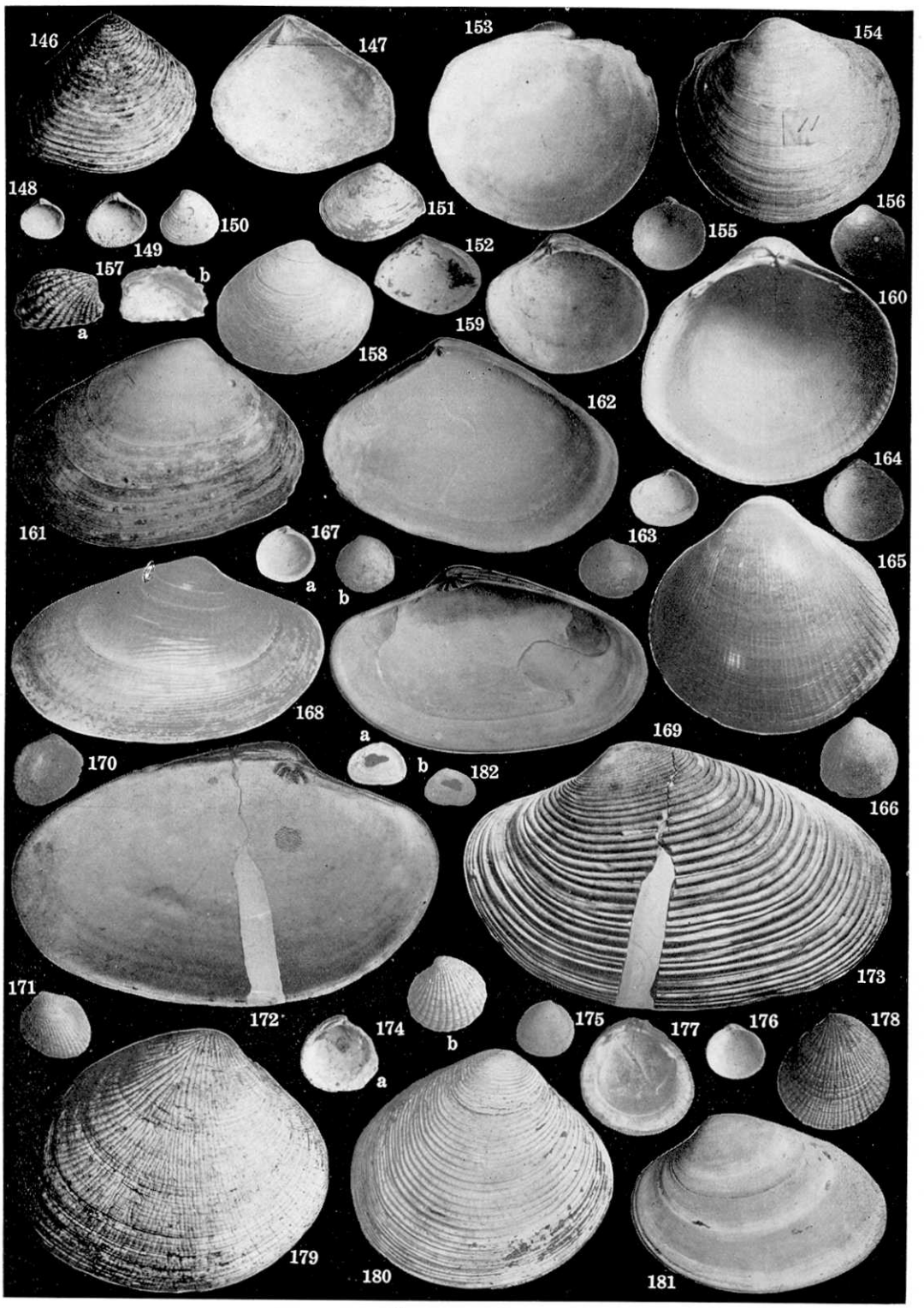
Plate LVI.

Plate LVI.

Fig. 146. *Crassatellites nanus* (ADAMS et REEVE).
Fig. 147. *Crassatellites nanus* (ADAMS et REEVE).
Fig. 148. *Astarte hakodatensis* YOKOYAMA.
Fig. 149. *Astarte hakodatensis* YOKOYAMA.
Fig. 150. *Astarte hakodatensis* YOKOYAMA.
Fig. 151. *Merisca diaphana* (DESHAYES).
Fig. 152. *Merisca diaphana* (DESHAYES).
Fig. 153. *Anodontia bialata* (PILSBRY).
Fig. 154. *Anodontia bialata* (PILSBRY).
Fig. 155. *Papyridea* (*Fulvia*) *hungerfordi* (SOWERBY).
Fig. 156. *Papyridea* (*Fulvia*) *hungerfordi* (SOWERBY).
Fig. 157. *Cardita cumingiana* DUNKER.
Fig. 158. *Pitar lincolata* (SOWERBY).
Fig. 159. *Pitare lineolata* (SOWERBY).
Fig. 160. *Papyridea* (*Fulvia*) *muticum* (REEVE).
Fig. 161. *Macoma* (*Pseudometis*) *praerupta* SALISBURY.
Fig. 162. *Macoma* (*Pseudometis*) *praerupta* SALISBURY.
Fig. 163. *Kellya notoensis* YOKOYAMA.
Fig. 164. *Papyridea* (*Fulvia*) *hungerfordi* (SOWERBY).
Fig. 165. *Papyridea* (*Fulvia*) *muticum* (REEVE).
Fig. 166. *Papyridea* (*Fulvia*) *hungerfordi* (SOWERBY).
Fig. 167. *Taras lunaris* (YOKOYAMA).
Fig. 168. *Paphia* (*Paratapes*) *undulata* (BORN).
Fig. 169. *Paphia* (*Paratapes*) *undulata* (BORN).
Fig. 170. *Corculum* (*Fragum*) *ebaranum* (YOKOYAMA).
Fig. 171. *Corculum* (*Fragum*) *ebaranum* (YOKOYAMA).
Fig. 172. *Paphia euglypta* (PHILIPPI).
Fig. 173. *Paphia euglypta* (PHILIPPI).
Fig. 174. *Venericardia ferruginea* (A. ADAMS).
Fig. 175. *Taras lunaris* (YOKOYAMA).
Fig. 176. *Taras lunaris* (YOKOYAMA).
Fig. 177. *Codakia divergens* (PHILIPPI).
Fig. 178. *Codakia divergens* (PHILIPPI).
Fig. 179. *Gafrarium divaricatum* (GMELIN).
Fig. 180. *Gafrarium* (*Circe*) *scriptum stutzeri* (DONOVAN).
Fig. 181. *Callista pacifica* (DILLWYN).
Fig. 182. *Scintilla nipponica* YOKOYAMA.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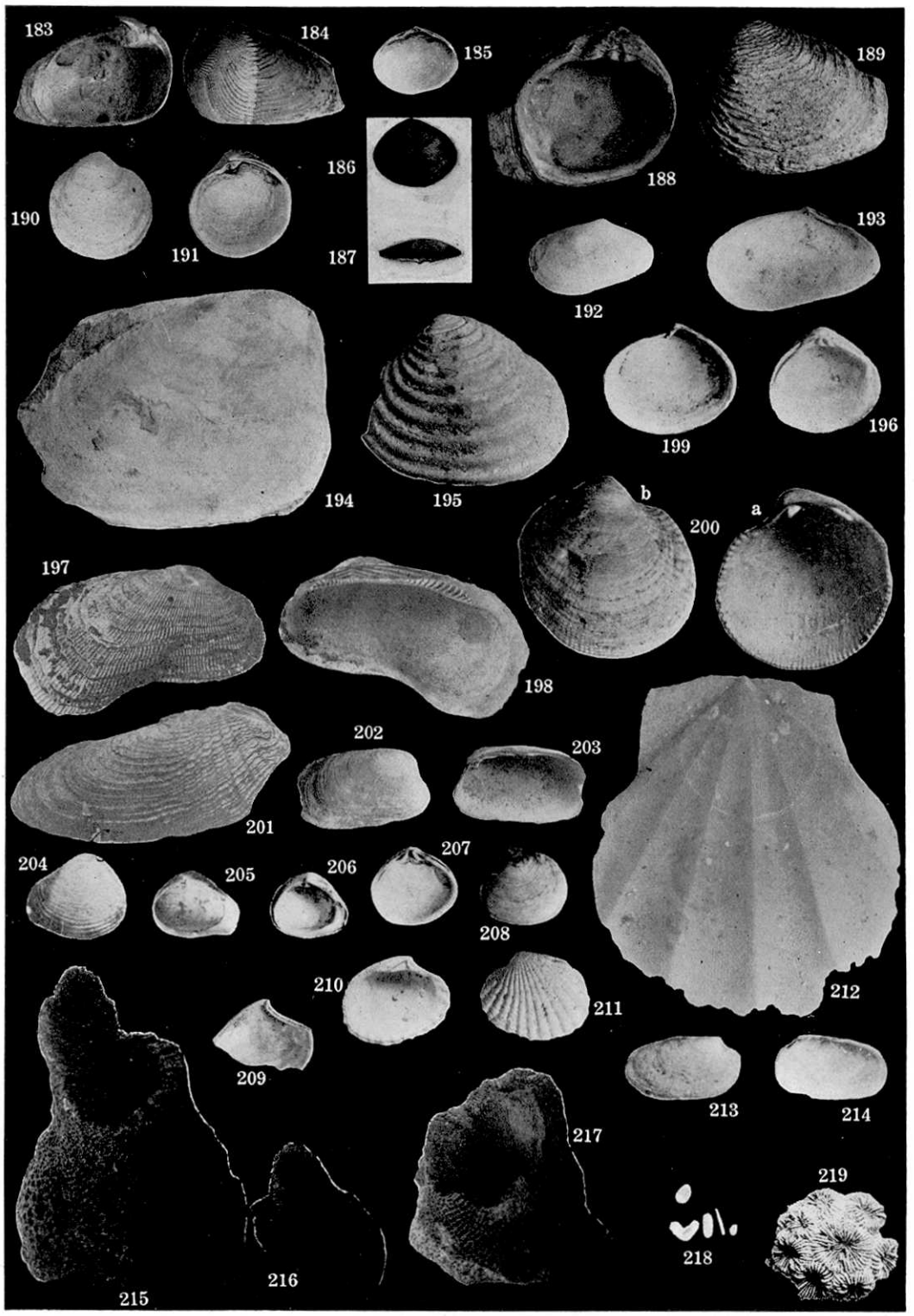
Figs. 146～182.

Plate LVII.

Plate LVII.

Fig. 183. *Martesia striata* (LINNÉ).
Fig. 184. *Martesia striata* (LINNÉ).
Fig. 185. *Arcopagia* (*Pinguitellina*) *kurodai* OTUKA n. sp.
Fig. 186. *Arcopagia* (*Pinguitellina*) *kurodai* OTUKA n. sp.
Fig. 187. *Arcopagia* (*Pinguitellina*) *kurodai* OTUKA n. sp.
Fig. 188. *Petricola japonica* DUNKER.
Fig. 189. *Petricola japonica* DUNKER.
Fig. 190. *"Lucina" contraria* DUNKER.
Fig. 191. *"Lucina" contraria* DUNKER.
Fig. 192. *Macoma* (*Psamacoma*) *awajiensis* SOWERBY.
Fig. 193. *Macoma* (*Psamacoma*) *awajiensis* SOWERBY.
Fig. 194. *Thyasira nipponica* YABE et NOMURA.
Fig. 195. *Astarte alaskensis* DALL.
Fig. 196. *Corbicula* sp.
Fig. 197. *Barbatia obtusoides* (NYST).
Fig. 198. *Barbatia obtusoides* (NYST).
Fig. 199. *Kellya notoensis* YOKOYAMA.
Fig. 200. *Pillucina pisidium* DUNKER.
Fig. 201. *Barnea fragilis* (SOWERBY).
Fig. 202. *Trapezium japonicum* PILSBRY.
Fig. 203. *Trapezium japonicum* PILSBRY.
Fig. 204. *Aloidis substriatus* (YOKOYAMA).
Fig. 205. *Aloidis substriatus* (YOKOYAMA).
Fig. 206. *Aloidis substriatus* (YOKOYAMA).
Fig. 207. *"Jousseaumiella" crassa* (YOKOYAMA).
Fig. 208. *"Jousseaumiella" crassa* (YOKOYAMA).
Fig. 209. *Myadora fluctuosa* (GOULD).
Fig. 210. *Venericardia ferruginosa* (ADAMS et REEVE).
Fig. 211. *Venericardia ferruginosa* (ADAMS et REEVE).
Fig. 212. *Patinopecten tokyoensis kimurai* (YOKOYAMA).
Fig. 213. *Mysella oblongata* (YOKOYAMA).
Fig. 214. *Mysella oblongata* (YOKOYAMA).
Fig. 215. *Aphrocallistes* sp.
Fig. 216. *Aphrocallistes* sp.
Fig. 217. *Aphrocallistes* sp.
Fig. 218. *Sagarites* ? sp. (White materials contained in Yositaki beds).
Fig. 219. *Oulastraea crispata* (LAMARCK) from Tumuki bed.



Figs. 183~219.

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1758 *Pholas striata* LINNÉ, Syst. Nat. ed. 10, p. 669.

1906 *Martesia striata*, TOKUNAGA, Jour. Coll. Sci. Tokyo Imp. Univ., **21**, 2, p. 35, Pl. 2, fig. 18.

1927 *Martesia striata tokyoensis*, YOKOYAMA, Jour. Fac. Sci. Imp. Univ. Tokyo, (2), **1**, 10, p. 428, Pl. 48, figs. 2, 3.

Geol. age.—Pleistocene-Recent. Occur.—Tumuki (2) No. 2521, Coll. Earthq. Res. Inst.

***Myadora* GRAY, 1840.**

***Myadora fluctuosa* (GOULD)**

Plate LVII, Figure 209.

1860 *Myadora fluctuosa* GOULD, Bost. Soc. Nat. Hist., 8.

1990 *Myadora fluctuosa*, SMITH, Proc. Zool. Soc. London, p. 583.

1922 *Myadora fluctuosa*, YOKOYAMA, Jour. Coll. Sci. Tokyo, Imp. Univ., **44**, 1, pp. 170~171, Pl. 14, figs. 6, 7.

Geol. age.—Pliocene-Recent. Geogr. distr.—China, Kagosima, Tokyo bay. Occur.—Simazaki (Himi beds) (1) No. 2040, C. E. R. I.

***Thracia* (LEACH) BLAINVILLE, 1824.**

***Thracia transmontana* (YOKOYAMA)**

1922 *Thracia transmontona* YOKOYAMA, Jour. Coll. Sci. Tokyo, Imp. Univ., **44**, 1, p. 172, Pl. 14, figs. 13, 14.

Geol. age.—Pliocene-Recent. Geogr. distr.—Tokyo bay, Southern Kwanto, Noto. Occur.—Simazaki (3) No. 2015, Coll. Earthq. Res. Inst.

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68. 能登半島南部邑知地溝（3）

地震研究所 大塚彌之助

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Index of Species.