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NOTICE.

Beginning with Vol. XVI., each article has a paging of its own; and the position of an article in a volume is indicated by the number placed at its head.

It is hoped that this arrangement, which enables us to print parts independently of one another, will ensure a more rapid publication of the material than has been possible heretofore.

All communications relating to this Journal should be addressed to the Director of the College of Science.

Errata.

In the explanation of Plate VI., after "*All figures in natural size*" add "*except Fig.* 6 *which is in* $^1/_2$ *nat. size.*"

Introduction.

The Mesozoic palæontology of Japan has been studied by many authors, such as MOJSISOVICS, NEUMAYR, YOKOYAMA, JIMBŌ, YABE, NATHORST, GEYLER etc.; but that of the Cainozoic group has received comparatively little attention. The only author who has written about its plant fossils is NATHORST, who recognized in them both Miocene and Pliocene forms. On the Molluscan remains, BRAUNS' "*Geology of the Environs of Tōkio*"** is the principal work. Its author studied shells collected chiefly at Shinagawa and Ōji, and described them as Pliocene. In the same work he also added a few notes on fossils from various other localities. After more than three years' careful study of these so-called Japanese Pliocene fossils, I have arrived at a conclusion differing from BRAUNS'. I have been several times at Ōji, Shinagawa and Tabata, and the number of species I have collected far exceeds that mentioned in BRAUNS' list. The collected specimens are now all preserved in the Science College.

* Formerly Yoshiwara.

** Memoirs of the Science Department, Tōkyō Daigaku, No. 4, 1881.

JOURNAL OF THE COLLEGE OF SCIENCE, IMPERIAL UNIVERSITY,
TOKYO, JAPAN.

VOL. XXI., ARTICLE 2.

Fossils from the Environs of Tōkyō.

By

S. Tokunaga,* *Rigakuhakushi.*

With 6 plates.

Introduction.

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Tōkyō is situated on the southern extremity of an extensive Diluvial plain of the Kwantō district which is bordered on the north and west chiefly by Palæozoic mountain ranges, and on the east and south by the sea. On the SE and SSW, there are two long peninsulas, Miura and Kazusa-Awa, both projecting southward and consisting chiefly of inclined Pliocene tuff layers. Everywhere in the plain, there is found a thick stratum

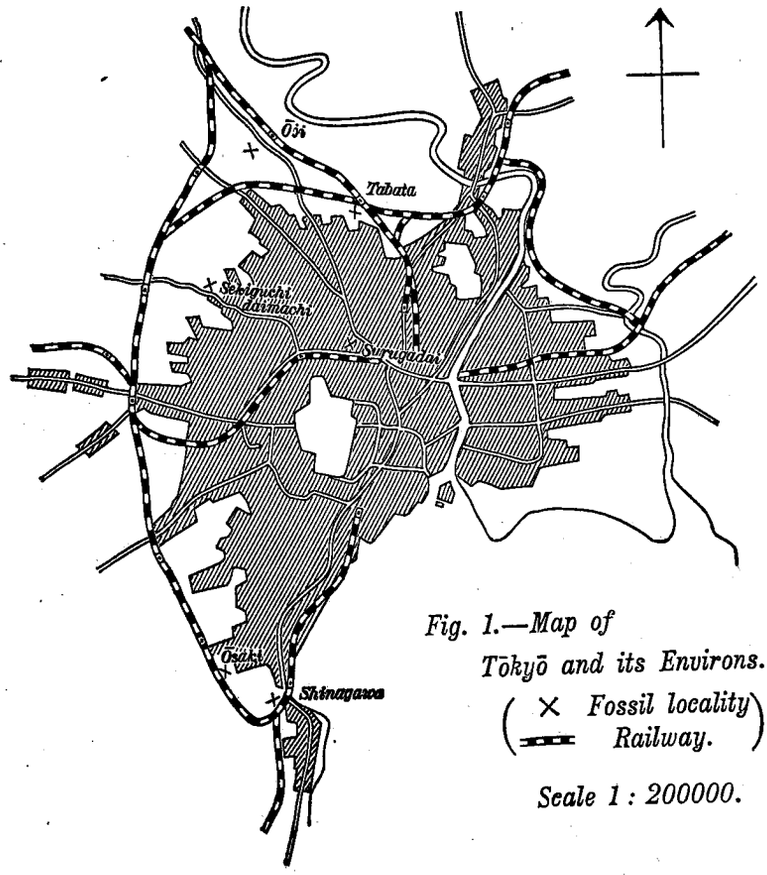

Fig. 1.—Map of Tōkyō and its Environs.
(× *Fossil locality*, ▬ *Railway.*)
Scale 1 : 200000.

of loam underlaid by gravel and sand. This sand is rich in fossils especially in localities to the east and north-east of Tōkyō. The greater part of these localities yield fossils of the "upper horizons," while those of the "lower horizons" are found only

at a few places, such as Shinagawa, Ōji, Tabata, etc. Shinagawa is a southern suburb of the capital and is very near the sea; the fossils are found at the foot of a hill along a railway cutting. Ōji and Tabata lie at the foot of the northern continuation of a hill in Tōkyō, and at Surugadai in Tōkyō the same fossil horizon as at Tabata is exposed along the cutting of the Kandagawa. Besides, a few fossils of a still higher horizon are found in Tōkyō at Sekiguchi-daimachi and also at Ōsaki at the foot of a hill which is a northern extension of the one in Shinagawa which has been mentioned.

The present paper consists of two parts, descriptive and general. In the former, the shells are arranged according to the system adopted by Tryon in his "*Manual of Conchology.*" The latter is a discussion of their geological age. Localities of shells mentioned either have been determined by my own observations or taken from works written by others, among which I may mention that of PILSBRY, which has proved to be very valuable.

Description of the Species.
Mollusca.

Gastropoda-Prosobranchiata,
Order Pectinibranchiata.

MURICIDÆ.

CM13400-1-1
(R)

1. **MUREX FALCATUS** Sow.

Pl. I. Fig. 1.

TRYON, Man. Conch., p. 127.—Proc. Zool. Soc., 1879, p. 181.
Synonym.—*M. aduncus* Sow.; *M. acanthophorus* A. AD.

Shinagawa (frequent).

Living: Hakodate (Hokkaidō), Tsusaki, Sumoto (Awaji), Gotō-Islands, Kii, Kagoshima and Misaki (Sagami).

CM13401-1-2
(R)

2. **MUREX LONGICANALIS** TOK.

Pl. I. Fig. 2.

Shell small, spiral, fusiform; whorls five, convex, crossed by numerous fine transverse striations; varices on each whorl nodulous, but not spinous; aperture oval, canal very long. Height 19^{mm}; breadth 9^{mm}.

Shinagawa (rare).

CM13402-1-3
(R)

3. **TROPHON EXIGUUS** TOK.

Pl. I. Fig. 3.

Shell fusiform, but more broadly ovate than in the two preceding species; spire prominent; whorls with numerous, sharp, laminated varices, the interstices spirally ribbed; aperture ovate; canal open.

Trophon has hitherto been known as an essentially boreal genus.

Shinagawa (very rare).

Some living specimens were collected at Nanao (Noto).

4. RAPANA BEZOAR L.

LISCHKE, Jap. Meeres-Conch., Vol. I., p. 51.—TRYON, Man. Conch., II., p. 202.—MORSE, Shell-Mound of Ōmori, p. 34.—BRAUNS, Geol. Env. Tōkiō, p. 51.

CM13403
CM13404
CM13405

Shinagawa, Tabata and Ōji (many).

Living: Tōkyō, Yokohama, Yokosuka, Misaki (Sagami), Shimoda (Izu), Hakodate, Ise, Kōbe, Higo, Nagasaki, Tosa, Kagoshima, China and Philippines.

TRITONIDÆ.

5. TRITON SAULIÆ L.

Pl. I. Fig. 4.

CM13406-1-4

LISCHKE, Jap. Meeres-Conch., I., p. 45.—TRYON, Man. Conch., III., p. 10.—SYST. Conch. Cab., III., 2, p. 171.

One fragmentary specimen of this species, which is very common in Japan, was found at Shinagawa.

Living: Tōkyō, Misaki (Sagami), Hitachi, Awaji, Nagasaki Tateyama (Awa), Setouchi (Inland sea in Japan), Takanoshima, Luzon (Philippine), Mauritius (Indian Ocean), Natal (South Africa) and Galapagos (South America).

FUSIDÆ.

6. FUSUS NODOSO-PLICATUS DKR.

Pl. I. Fig. 5.

CM13407-1-5

LISCHKE, Jap. Meeres-Conch., I., P. 33, II., p. 27.—Proc. Zool. Soc.,

1879, p. 181.—DUNKER, Nov. Conch., p. 11.—SYST. Conch. Cab., III., 3, p. 190.

Shinagawa (abundant).

Living: Yokohama, Misaki (Sagami), Nagasaki, Gotō-Is., Sumoto (Awaji), Mogi (Hizen) and Tomonotsu (Bingo).

CM13408-1-6 (R)

7. FUSUS PERPLEXUS A. AD.

Pl. I. Fig. 6.

MORSE, Shell-Mound of Ōmori.—LISCHKE, Jap. Meeres-Conch., I., p. 34, II., p. 26.—SYST. Conch. Cab., III., 3, p. 195.—BRAUNS, Geol. Env. Tōkiō, p. 55.

Synonym.—*F. inconstans* LISCHKE.

Shinagawa (many).

Living: Tōkyō, Hōjō (Awa or Bōshu), Yokohama, Aomori (Mutsu), Hakodate, Izugahara (Tsushima), Gotō (Hizen), Mogi (Hizen), Tosa, Futamigaura (Ise) and Nagasaki.

CM13409-1-7 (R)

8. FUSUS SIMPLEX E. A. SMITH.

Pl. I. Fig. 7.

Proc. Zool. Soc., 1879, p. 202.

Ōji (very rare).

Living: South of Corea.

CM13410 (R)

9. FUSUS SP.

Shell oval, small; spire short, 3–whorled, not plicate nor varicose, finely striated in the transverse direction on the last whorl; aperture oval; canal short. Probably this is a young form of a species different from the three preceding ones. Height 15^{mm}; and breadth 8^{mm}.

Ōji (very rare).

Living specimens were collected at Misaki (Sagami).

BUCCINIDÆ.

10. HEMIFUSUS TERNATANUS GMEL.

Pl. I. Fig. 8.

TRYON, Man. Conch., III., p. 112.

Shinagawa (rare).

Living: Chōshi (Shimōsa), Hōjō (Awa or Bōshu), Ajiro (Izu), Mogi (Hizen), Akune (Satsuma), Philippines and Indian Ocean.

11. NEPTUNEA DESPECTA LINNÉ.

SCHRENCK, Moll. Amurl. and Nord-Japan. Meeres.—TRYON, Man. Conch., II., p. 116.—LISCHKE, Jap. Meeres-Conch., I., p. 37.—SYST. Conch, Cab., III. 3, p. 107.—VERHAND. Russ-Kais. Miner. Gesell. St. Petersburg., II. Series, XXXVIII. Band, 1, 1900.

Synonym.—*N. arthritica* VAL.

Shinagawa and Ōji (frequent).

Post-pliocene of Murman and White Seas (North of Russia).

Living: Hakodate, Aomori, Hidaka, Nemuro, Gulf of Tartary (North Asia) Castries Bay (North Asia), East and West coast of Sakhalin, and White and Murman Seas (Russia).

12. SIPHONALIA CASSIDARÆFORMIS RVE.

Pl. I. Fig. 9.

LISCHKE, Jap. Meeres-Conch., I., p. 38.—PILSBRY, Catal. Mar. Moll. Jap., p. 28.

Shinagawa (frequent).

Living: Hakodate, Enoshima (Sagami), Shimoda and Oshima (Izu), Kōchi (Tosa), Nagasaki and Gotō Islands.

(52) CM13415-1-10
(53) CM13416

13. BUCCINUM UNDATUM Linné.

Pl. I. Figs. 10 *a* and *b*.

Syst. Conch. Cab., III. 1, p. 15 and 31.—Wood, Crag Moll., p. 35.—Tryon, Man. Conch., II., p. 173.—Sowerby, Genera rec. and fos. Shells.—Verhand. Russ.-Kais. Miner. Gesell. St. Petersburg., II. Series, XXXVIII. Band, 1, 1900.

Synonym.—*B. littoralis* King.—*B. striata* Sow.—*B. ochotense* Midd.—*B. pelagica* King.—*B. zitlandica* Forb.

The species of this genus are all restricted to the boreal seas. No living specimens are found south of Hakodate. Though my specimens differ in some points from the descriptions given of *Buccinum undatum* Linné in several works consulted, yet I believe they are only a varietal form of the species, for it is known as very variable in form.

Shinagawa (abundant), Ōji (rare).

Post-Pliocene of the northern coast of Russia (Murman Sea, White Sea and Nova Zembla).

Living: Hakodate, Kitami (Hokkaidō), Etorof, Siberia, Sea of Ochotsk, North Cape, White and Murman Sea (Russia), Baltic Sea, England, France, Iceland, Labrador, Newfoundland, Massachusetts, and Ocean to the south of New Jersey.

(54) CM13417-1-11

14. VOLUTHARPA PERRYI Jay.

Pl. I. Fig. 11.

Middendorf, Sib. Reise.—Ann. Mag. Nat. Hist., III. 6. (1860), p. 109.—Tryon Man. Conch., III., p. 173.—Syst. Conch. Cab., III.. p. 95.

Synonym.—*V. paulucciana* Tap.

This genus has only seven species, all of which are restricted to the North Pacific Ocean, with the exception of the present, which is found living at Hakodate, Tōkyō Bay and Enoshima (Sagami).

Ōji (rare).

CM13418
CM13419

15. **EBURNA JAPONICA** Sow.

BRAUNS, Geol. Env. Tōkio., p. 64.—MORSE, Shell-Mound of Ōmori., p. 30.—TRYON, Man. Conch., III., p. 211.—LISCHKE, Jap, Meeres-Conch., I., p. 67., II., p. 58.

Shinagawa and Ōji (frequent).

Living: Tateyama (Awa or Bōshu), Misaki (Sagami), Ōmori (in Tōkyō Bay), Enoshima (Sagami), Ajiro (Izu), Shimoda (Izu), Hakodate, Ōshima (Izu), Kamakura (Sagami), Tsusaki, Tsu (Ise), Tsuruga (Echizen), Sado, Nagasaki, Higo, Shigajima, Awa (Shikoku), Shimonoseki, Tosa and Kagoshima.

NASSIDÆ.

CM13420
CM13421
CM13422

16. **NASSA JAPONICA** A. AD.

BRAUNS, Geol. Env. Tōkio, p. 29.—LISCHKE, Jap. Meeres-Conch., III., p. 37.—PILSBRY, Catal. Mar. Moll. Japan., p. 34.

Synonym.—*N. tenuis* SMITH.

Ōji, Tabata and Shinagawa (abundant).

Living: Tōkyō, Enoshima (Sagami), Uraga (Sagami), Ōshima (Izu), Seto-uchi (Inland sea in Japan), Kino-Ōshima, Sado, Izugahara (Tsushima), and Shima.

CM13423
CM13424

17. **NASSA LIVESCENS** PHILIPPI.

BRAUNS, Geol. Env. Tōkio, p. 29.—LISCHKE, Jap. Meeres-Conch., II., p. 52.

Ōji and Tabata (frequent).

Living: Tōkyō, Ajiro (Izu), Kominato (Awa or Bōshu), Nagasaki, Kiu-shū, Enoshima (Sagami), Tsuruga (Echizen), Izugahara (Tsushima), China Sea, Manila (Philippines), Java and Indian Ocean.

MARGINELLIDÆ.

(R) CM13425-1-12

18. **ERATO CALLOSA** AD. and RVE.

Pl. I. Fig. 12.

TRYON, Man. Conch., V., p. 9.—PILSBRY, Catal. Mar. Moll. Japan., p. 52.—SYST. Conch. Cab., V. 4, p. 146.

Shinagawa (rare).

Living: Tōkyō Bay, Nagasaki and China Sea.

OLIVIDÆ.

(R) CM13426-1-13

19. **OLIVELLA CONSOBRINA** LISCH.

Pl. I. Fig. 13.

BRAUNS, Geol. Env. Tōkio., p. 29.—PILSBRY, Catal. Mar. Moll. Japan, p. 23.—LISCHKE, Jap. Meeres-Conch. II., p. 62.—SYST. Conch, Cab., V. I, p. 153.

Synonym.—*O. fabula* MARRAT.

Ōji (rare).

Living: Tōkyō, Enoshima (Sagami), Kamakura (Sagami), Hakodate, Yamada (Ise), Nagasaki and North coast of Tango.

COLUMBELLIDÆ.

(R) 13427
(R) 13428
(R) 13429

20. **COLUMBELLA MARTENSI** LISCHKE.

LISCHKE, Jap. Meeres-Conch., II., p. 47.—TRYON, Man. Conch., V., p. 130.—BRAUNS, Geol. Env. Tōkio, p. 29.

Brauns took the specimens of this species from Ōji as identical with *Collumbella scripta* LINNÉ of the Mediterranean Sea, but the former is clearly distinguished from the latter by the epidermal coloring. *C. scripta* LINNÉ has a yellowish-white epidermis, usually marbled or longitudinally 'broadly' striped

with chestnut or chocolate colour; while in *C. martensi* LISCHKE, the color is whitish with 'undulating lines' or flames of chestnut, and frequently articulated bands at the suture and on the middle and base of the body-whorl. In our specimens the coloring of the epidermis is distinctly preserved, so that our identification is quite certain.

Shinagawa, Ōji and Tabata (abundant).

Living: Tōkyō, Enoshima (Sagami) and Nagasaki.

21. **COLUMBELLA PUMILA** DKR.

Pl. I. Figs. 14 *a* and *b*.

DUNKER, Moll. Jap., p. 6.—TRYON, Man. Conch., V., p. 150.—PILSBY, Catal. Mar. Moll. Jap., p. 38.

Tabata (very rare).

Living: Tōkyō, Kamakura (Sagami) and Nagasaki.

CANCELLARIIDÆ.

22. **CANCELLARIA SPENGLERIANA** DESH.

Pl. I. Fig. 15.

TRYON, Man. Conch., VII., p. 67.—PILSBRY, Catal. Mar. Moll. Japan, p. 21.—CHALL. Report, XV., p. 273.—SYST. Conch. Cab., V., p. 25.

Synonym.—*C. tritonis* Sow.; *C. undulata* Sow.

Ōji and Shinagawa (abundant).

Living: Enoshima (Sagami), Misaki (Sagami), Kominato (Awa or Bōshu), Shimoda (Izu), Chōshi (Shimōsa), Futamigaura (Ise), Tsu (Ise), Kōbe, Nagasaki, Wakanoura (Kii), Akashi (Harima), Setouchi (Inland sea), China, Philippines and Australia.

CM13433-1-16

23. CANCELLARIA NODULIFERA Sow.

Pl. I. Fig. 16.

DUNKER, Index. Moll. Maris. Jap., p. 103.—TRYON, Man. Conch., VII., p. 68.—ANN. Mag. Nat. Hist., 1868, Vol. II., p. 368.—PILSBRY, Catal. Mar. Moll. Japan, p. 21.—SYST. Conch. Cab., V., p. 27.

Synonym.—*C. imperialis* MICH.

Ōji (rare).

Living: Yokohama, Shimizu (Suruga) and Kino-Ōshima.

TEREBRIDÆ.

CM13434
CM13435

24. TEREBRA BIPARTITA GLD.

BRAUNS, Geol. Env. Tōkio, p. 34.—GOULD, Otia Conch., p. 126.—PILSBRY, Catal. Mar. Moll. Japan, p. 11.

Ōji and Shinagawa (rare).

Living: Enoshima (Sagami) and Hakodate.

CM13436-1-17a-b

25. TEREBRA ALVEOLATA HINDS.

Pl. I. Figs. 17 *a* and *b*.

TRYON, Man. Conch., VIII., p. 23.—PROC. Zool. Soc., 1879, p. 183.—PILSBRY, Catal. Mar. Moll. Japan., p. 11.

Synonym.—*T. gotoensis* SMITH.

Shinagawa (rare).

Living: Enoshima (Sagami), Gotō Is. and Strait of Malacca.

CM13437-1-18a-b

26. TEREBRA PRETIOSA RVE.

Pl. I. Figs. 18 *a* and *b*.

TRYON, Man. Conch., VII., p. 27.—DUNKER, Index Moll. Maris. Jap., p. 71.

Shinagawa (very rare).

Living: Enoshima (Sagami) and China.

27. **TEREBRA SUBTEXTILIS** E. A. SMITH.

Pl. I. Figs. 19 *a* and *b*.

TRYON, Man. Conch., VII., p. 19.—PROC. Zool. Soc., 1879, p. 185 and p. 217.—PILSBRY, Catal. Mar. Moll. Japan, p. 11.

Shinagawa (very rare).

Living: Misaki (Sagami), Izu, Shikoku and Kii.

28. **TEREBRA** CFR. **SEROTINA** AD. and RVE.

Pl. I. Figs. 20 *a*, *a'*, *b* and *b'*.

TRYON, Man. Conch., VII., p. 29.—PILSBRY, Cat. Mar. Moll. Japan, p. 11.

Shinagawa (very rare).

Living: Izu, Kii and Nagasaki.

PLEUROTOMIDÆ.

29. **PLEUROTOMA OXYTROPIS** SOW.

Pl. I. Fig. 21.

TRYON, Man. Conch., VI., p. 168.—PILSBRY, Catal. Mar. Moll. Japan, p. 14.—CHALL. Rep., XV., 1886.—SYST. Conch. Cab., IV. 3, p. 27.

Synonym:—*P. nobilis* HINDS.—*P. leucotropis* AD. and RVE.—*P. albicarinata* SOW.

Shinagawa and Ōji (frequent).

Living: Tōkyō, Enoshima (Sagami), Hōjō (Awa or Bōshu), Ōshima (Izu), China, Mauritius, Panama to Gulf of California.

30. **PLEUROTOMA VERETEBRATA** SMITH.

Pl. I. Fig. 22.

TRYON, Man. Conch., VI., p. 169.—PILSBRY, Cat. Mar. Moll. Japan, p. 14.—ANN. Mag. Nat. Hist, 1875., XV., p. 416.—SYST. Conch. Cab., IV. 3, p. 31.

Shinagawa (very rare).

Living in Japan.

CM13443-1-23
CM13444

31. **PLEUROTOMA (DRILLIA) PRINCIPALIS** PILSBRY.

Pl. I. Fig. 23.

PILSBRY, Catal. Mar. Moll. Japan, p. 16.

Shinagawa (abundant), Ōji (rare).

Living: Enoshima (Sagami), Nanao (Noto), Katanoura (Kii), Tsu (Ise), Inland Sea, Kagoshima and Aomori.

CM13445-1-24

32. **PLEUROTOMA (DRILLIA) SUBAURIFORMIS** SMITH.

Pl. I. Fig. 24.

DUNKER, Index Moll. Maris. Jap., p. 24.—TRYON, Man. Conch., VI., p. 207.—Proc. Zool. Soc., 1879, p. 195 and p. 217.—PILSBRY, Catal. Mar. Moll. Jap., p. 16.—SYST. Conch. Cab., IV. 3, p. 199.

Ōji (rare).

Living: Tōkyō, Kamakura (Sagami), Moroiso (Sagami) and Inland Sea.

CM13446
CM13447

33. **PLEUROTOMA (DRILLIA) RECIPROCA** GLD.

BRAUNS, Geol. Env. Tōkio, p. 33.—GOULD, Otia Conch., p. 135.

Ōji (abundant), Shinagawa (rare).

Living: Ōshima (Izu).

CM13448-1-25

34. **PLEUROTOMA (DRILLIA) RARICOSTATA** SMITH.

Pl. I. Fig. 25.

TRYON, Man. Conch., VI., p. 202.—PROC. Zool. Soc., 1879, p. 192.—SYST. Conch. Cab. IV. 3, p. 195.—PILSBRY, Cat. Mar. Moll. Japan, p. 19.

Shinagawa (frequent).

Living near Nagasaki.

35. PLEUROTOMA (MANGILIA) GRACILENTA Rve.

Pl. I. Fig. 26.

Tryon, Man. Conch., VI., p. 251.—Proc. Zool. Soc., 1879, p. 195.—Pilsbry, Cat. Mar. Moll. Japan, p. 19.

Synonym:—*P. contracta* Rve.—*P. fusoides* Rve.

Ōji (rare).

Living: Kamakura (Sagami), Tōkyō, East Coast of Kii, Philippines and North Australia.

36. PLEUROTOMA (DRILLIA) TABATENSIS Tok.

Pl. I. Fig. 27.

Whorls six, the upper three smooth, the rest only coarsely (about right) longitudinally costated with no trace of transverse ribs; shell distinctly angulated at the shoulder; aperture long, a little shorter than half the height of the shell. Height 4^{mm}; breadth 1.5^{mm}.

Tabata (very rare).

37. PLEUROTOMA OJIENSIS Tok.

Pl. I. Fig. 28.

Whorls eight, longitudinally costate and transversely lirate; costæ number fourteen or more, and are traceable to the base of the body whorl; liræ very fine and numerous, crossing the costæ as only fine striations; canal long, only a little shorter than half the height of the shell. Height 5.5^{mm}; breadth 2^{mm}.

Ōji (frequent).

(R) CM13452-1-29ab

38. PLEUROTOMA SAGAMIENSIS Tok.

Pl. I. Figs. 29 *a* and *b*.

Shell more oval than in the two preceding species and turrated in form; oblique longitudinal costæ about twelve or more in number easily traceable from the upper suture line to the priphery in one whorl, but the lower half of each whorl usually devoid of the longitudinal plications; transverse liræ very distinct both on the costæ and in the interspaces; aperture oval, short, a little longer than one third the whole shell height. Height 30^{mm}; breadth 9^{mm}.

Shinagawa (very rare).

Living: Moroiso and Enoshima (Sagami).

(R) CM13453

(R) CM13801

39. PLEUROTOMA (MANGELIA) PARVA Tok.

Brauns, Geol. Env. Tōkio, p. 33.

Shell elongated, turriculated, acuminated; whorls seven, convex, with no any prominent angle near the suture; longitudinal ribs about nine or ten, somewhat oblique, crossed by transverse stiræ; canal lengthened; aperture narrow. Height and breadth 9^{mm} and 3.5^{mm}, or 7^{mm} and 2.5^{mm}.

Brauns determined the specimens as identical with *P.* (*Mangelia*) *striolata* Phil. of Europe and Madeira, but the latter species is distinctly though narrowly shouldered, and has fine, almost microscopic spiral lines, while in our specimens these lines are coarser and distinctly visible to the naked eye. Besides the figures of the European species given in Wood's Crag Mollusca show many other differences.

Ōji (abundant).

DOLIIDÆ.

40. DOLIUM LEUTEOSTOMUM Küster.

Pl. I. Fig. 30.

Brauns, Geol. Env. Tōkio, p. 60.—Pilsbry, Cat. Mar. Moll. Japan, p. 49.—Tryon, Man. Conch., VII., p. 261.—Schrenck, Moll. Amurl. and Nord-Jap. Meeres, p. 401.—Syst. Conch., Cab., III. 1, p. 66.

Synonym:—*D. japonicum* Dkr.—*D. variegatum* Künster.

Shinagawa (frequent).

Living: Tōkyō, Misaki (Sagami), Hakodate, Nagasaki, Awa, in Shikoku, Satsuma and Indian Ocean.

NATICIDÆ.

41. NATICA CLAUSA Desh.

Pl. I. Fig. 31.

Lischke, Jap. Meeres-Conch., I., p. 81.—Schrenck, Moll. Amurl. and Nord-Jap. Meeres, I., p. 81.—Wood, Crag Mollusca, I., p. 147.—Ann. Mag. Nat. Hist., 17. (1866), p. 274.—Tryon, Man. Conch., VIII., p. 30.—Pilsbry, Cat. Mar. Moll. Japan, p. 71.—Middendorf, Mal. Ross. II., p. 91.—Syst. Conch. Cab., II. 1, p. 98.—Verhand. Russ.-Kais. Min. Gesell. zu St. Petersburg, II. Series, XXXVIII Band, 1, 1900.

Synonym:—*N. janthostoma* Desh.—*N. consolidata* Couth.—*N. septentrionalis* Beck.—*N. vittata* Jeffrey.

Ōji and Shinagawa (abundant).

Pliocene:—Red Crag, Sutton, (England); Mammilian Crag, Brindlington, (England).

Quarternary:—

Post-glacial:—Kelsea Hill (England).

Lower-glacial:—Rockheath (England).

Middle-glacial:—Hopton and Billockby (England).

Upper-glacial :—Santa Barbada (California) ; San Pedro (California) ; northern part of Russia (Murman Sea, White Sea and Nova Zembla).

This living Species is decidedly circumboreal. It is known to be found in the following localities :—Hakodate, Bekkai, Kuriro, Akkeshi, Nemuro, Otaru, (all in North Japan), Sachalin, Kamtschatka, Kaojak, Ochotsk Sea, Schlanter Is., Nova-Zembla, Sitka (Alaska), Melville Is. (Arctic America), Vancouver, Greenland, Massachusetts and Maine, Lappland (Russia), Portugal and Arctic Europe.

Living specimens rarely found near Tōkyō, Awa (or Bōshu) and Chōshi (Shimōsa) seem to be the remnants of those numerous in the colder epoch.

42. NATICA AMPLA Rve.

Pl. I. Figs. 32 *a*, *b* and *c*.

Brauns, Geol. Env. Tōkio, p. 30.—Schrenck, Moll. Amurl. and Nord-Jap. Meeres, p. 378.—Lischke Jap. Meeres-Conch., I., p. 80.—Morse, Shell-Mound of Ōmori, p. 66.—Dunker, Index. Moll. Maris Jap., p. 61.—Tryon, Man. Conch., VIII., p. 33.—Pilsbry Cat. Mar. Moll. Japan, p. 71.—Morse, Shell-Mound of Ōmori, p. 16.

Synonym :—*N. lamarckiana* Recl.—*N. didyma* Bolton.—*N. vesicalis* Phil.—*N. robusta* Dkr.—*N. chemnitzi* Recl.—*N. petiveriana* Recl.—*N. intermedia* Recl.—*N. problematica* Rve.—*N. bicolor* Schrenck.—*N. incisa* Dkr.

Ōji, Shinagawa and Tabata (frequent).

The living form is very common in Japan :—Tōkyō to Enoshima (Sagami), Awa or Bōshu, Chōshi (Shimōsa), Misaki (Sagami), Henda, Shibo, Kagoshima, Kure (Satsuma), Nagasaki, Hikata (Kii), Matsushima (Rikuzen), Uwajima, Futamigaura (Ise), Tsu (Ise), Awa in Shikoku, Kōchi (Tosa) and Kagoshima.

(2) CM13460-1-33

43. NATICA PAPYRACEA Busн.

Pl. I. Fig. 33.

Philippi, Abbild. u. Beschr. &c., II., p. 45.

Shinagawa (frequent).

(2) CM13461-1-34
(3) CM13462

44. SIGARETUS PAPILLA Gmel.

Pl. I. Fig. 34.

Tryon, Man. Conch., VIII., p. 58.—Pilsbry, Cat. Mar. Moll. Japan, p. 72.—Lischke, Jap. Meeres-Conch., II., p. 169.—Syst. Conch. Cab., VI. 1, p. 36.

Synonym:—*S. costulatus* Quoy and Gainard.—*S. acuminatus* A. Ad. and Rve.—*S. coarctatus* Rve.—*S. nitidus* Rve.

Ōji and Shinagawa (rare).

Living: Tōkyō Bay, Nagasaki, Okinoshima (Kii), Niijima (Izu), China, Philippines, Tranquebar, Moluccas, Negro Is. and Red Sea.

SCALARIDÆ.

(2) CM13463-1-35

45. SCALARIA IMMACULATA Sow.

Pl. I. Fig. 35.

Tryon, Man. Conch., IX., p. 61.—Pilsbry, Cat. Mar. Moll. Japan, p. 74.

Ōji (rare).

Living: Tōkyō Bay and Philippines.

(2) CM13464-1-36
(2) CM13465

46. SCALARIA LAMELLOSA Lam.

Pl. I. Fig. 36.

Tryon, Man. Conch., IX., p. 74.—Pilsbry, Cat. Mar. Moll. Jap., p. 74.—Brauns, Geol. Env. Tōkio, p. 31.—Woods, Crag Mollusca, I., p. 94.

BRAUNS identified the specimens of this species with *S. clathratula* MONT., found in the Crags as fossils and also living in the British Seas, at Madeira and New England. Though I can find no points of great difference by a mere comparison of our specimens with WOOD's figure, yet I deem it preferable to give it the name of *S. lamellosa* LAM. which is living in our waters; for the specimens of *Scalaria*, which is very rich in the number of its species, are often difficult to distinguish from one another by comparing figures only.

Tabata and Ōji (rare).

S. lamellosa LAM. was hitherto collected at Yokohama and Kamakura (Sagami), in the Mediterranean Ocean, near West Indies and Sandwich Islands.

(2) CM13466-1-37

47. **SCALARIA ACUMINATA** SOW.

Pl. I. Fig. 37.

TRYON, Man. Conch., IX., p. 83.—LISCHKE, Jap. Meeres-Conch., II., p. 168.—BRAUNS, Geol. Env. Tōkio, p. 31.—WOOD, Crag Mollusca, I., p. 95, Suppl. p. 59.

BRAUNS ever named this specimen as *S. cancellata* BROCH. of the Coralline Crag of England.

Ōji (rare).

Living: Tōkyō and Malacca.

TRICHOTROPIDÆ.

(2) CM13467-1-38
(2) CM13468

48. **TRICHOTROPIS UNICARINATA** BROD.

Pl. I. Fig. 38.

TRYON, Man. Conch., IX., p. 44.—PILSBRY, Cat. Mar. Moll. Japan, p. 59.—BRAUNS, Geol. Env. Tōkio, p. 34.—SOWERBY, Genera Rec. and Fossil Shells.

BRAUNS called the specimens here referred to "*Trichotropis coronata* GLD." but this Gould's species is distinguished from *T. unicarinata* BROD. by having a narrower keel at the upper angle of the last whorl.

Trichotropis is known as living in the Arctic Seas.

Shinagawa and Ōji (rare).

Living: Hakodate and Yamada Harbour.

EULIMIDÆ.

49. EULIMA LEVIS TOK.

Pl. I. Fig. 39.

Shell small, white, polished, elongated and tapering; whorls smooth, flattened; suture ill defined, scarcely distinct; aperture longly oval, acuminated at the upper part; outer lip straight; inner lip slightly reflected; not umbilicated. Height 7^{mm}, breadth 1.5^{mm}.

Ōji (rare).

50. EULIMA OVALIS TOK.

Pl. I. Fig. 40.

This small shell is distinguished from the preceding species by its general form which is more ovate being 5^{mm} in height and 1.5^{mm} in breadth. Other characters are similar to the preceding.

Tabata (rare).

TURBONILLIDÆ.

51. TURBONILLA AFF. ELEGANTISSIMA MONT.

Pl. I. Fig. 41.

BRAUNS, Geol. Env. Tōkio, p. 32.—TRYON, Man. Conch., VIII., p. 322. —WOOD, Crag Moll., Suppl., p. 184.

Synonym:—*Odostomia lactea* JEF.—*Chemnitzia jeffreysii* S. WOOD.

Our specimens seem to have more ribs than the European *T. elegantissima* MONT. figured by WOOD.

Ōji and Shinagawa (rare).

52. TURBONILLA FUSCA A. AD.

CM13473-1-42a

CM13474-1-42b

Pl. I. Figs. 42 *a* and *b*.

TRYON, Man. Conch., VIII., p. 356.—PROC. Zool. Soc., 1878, p. 864.

Ōji (rare.)

Living: Japan, Australia, Port Lincoln (Tasmania) Holdfast and Adringa Bay (near Adelaide in South Australia).

53. TURBONILLA PAUCICOSTULATA TOK.

CM13475

The general features, the characters of the body-whorl, etc., are similar to those of *Turbonilla elegantissima* MONT., but our species has fewer rows of longitudinal ribs. Height 10^{mm}; breadth 3^{mm}.

Ōji (frequent).

54. ODOSTOMIA FASCIATA DKR.

CM13476-1-43

Pl. I. Fig. 43.

TRYON, Man. Conch., VIII., p. 364.—DUNKER, Moll. Jap., p. 17.—PILSBRY, Cat. Mar. Moll. Japan, p. 84.

Shinagawa (rare).

Living at Nagasaki.

55. ODOSOMIA PLANATA GLD.

CM13477

BRAUNS, Geol. Env. Tōkio, p. 32.—GOULD, Otia Conch., p. 148.

Ōji (very abundant).

Living at Hong-kong.

56. **ODOSTOMIA** CFR. **SUBPLANATA** GLD. CM13478-1-44

Pl. I. Fig. 44.

BRAUNS, Geol. Env. Tōkio, p. 32.—GOULD, Otia Conch., p. 148.

Ōji (rare).

57. **ODOSTOMIA TAKINOGAWENSIS** TOK. CM13479-1-45

Pl. I. Fig. 45.

Shell tubulated; whorls six, longitudinally ribbed, partly smooth in the body-whorl, flattened a little on the upper side; suture distinct; aperture oval; inner lip thickened. Height 45^{mm}; breadth 2^{mm}.

Ōji (rare).

PYRAMIDELLIDÆ.

58. **PYRAMIDELLA EXIMIA** LISCHKE. CM13480-1-46

Pl. I. Fig. 46.

LISCHKE, Jap. Meeres-Conch., III., p. 59.—PILSBRY, Cat. Mar. Moll. Japan, p. 29.

Ōji (rare).

Living at Tōkyō and Kamakura (Sagami).

59. **PYRAMIDELLA SPIRATA** A. AD. CM13481-1-47

Pl. I. Fig. 47.

TRYON, Man. Conch., VIII., p. 297.—PILSBRY, Cat. Mar. Moll. Japan, p. 79.

Tabata (rare).

Living: Ōshima (Izu) and Philippines.

(R) CM 13482-1-48
(R) CM 13483

60. **PYRAMIDELLA CINCTELLA** A. Ad.

Pl. I. Fig. 48.

Tryon, Man. Conch., VIII., p. 307.—Pilsbry, Cat. Mar. Moll. Japan, p. 79.

Ōji and Tabata (rare).

Living: Tōkyō, Enoshima (Sagami), Setouchi (Inland Sea), and Ōshima (Izu).

CERITHIIDÆ.

(R) CM 13484-1-49 a-b

61. **CERITHIUM KOCHII** Phil.

Pl. I. Figs. 49 *a* and *b*.

Philippi, Abbild. and Besch. &c., III., p. 14.—Tryon, Man. Conch., IX., p. 147.—Pilsbry, Cat. Mar. Moll. Japan, p. 56.

Shinagawa (rare).

Living: Misaki (Sagami), Yokosuka, Banda (Awa or Bōshu), Kominato (Awa or Bōshu), Katanoura (Kii), Tango, Nagasaki, China, Port Jackson, Van Dieman's Is., E. Coast of Africa.

(R) CM 13485-1-50

(R) CM 13802

62. **CERITHIUM NIPPORIENSIS** Tok.

Pl. I. Fig. 50.

Shell subulate, small; whorls eight, flat, ornamented with a few, distinct, continuous longitudinal ribs, and three transverse bands in each whorl except the last, which also cross the ribs and project as granules; body-whorl distinctly angulated on periphery, the lower part devoid of longitudinal ribs and tra-

versed by narrow but distinct striations; aperture subquadrate; outer lips curved; canal pointed below. Height and breadth 15^{mm} and 6^{mm}; or 8.5^{mm} and 3.8^{mm}.

Tabata (rare).

63. **CERITHIUM (CERITHOPSIS) TABATENSIS** Tok.

Pl. I. Fig. 51.

Shell elongate-turreted, thick, many-whorled; spire subulate and elevated; volution flat, ornamented with three equally granulated bands and indistinct irregular varices; lower half of body-whorl smooth; aperture oval, narrowed below; inner lip thickened. Height 6^{mm} and breadth 1.5^{mm}.

Tabata (rare).

64. **POTAMIDES (LAMPANIA) ZONALE** Brug.

Lischke, Jap. Meeres-Conch., I., p. 73, and II., p. 69.—Tryon, Man. Moll., IX., p. 118 and p. 167.—Brauns, Geol. Env. Tōkio, p. 52. —Pilsbry, Cat. Mar. Moll. Japan, p. 57.

Ōji (rare), Tabata (abundant).

Living: Tōkyō, Yokohama, Hakodate, Matsushima (Rikuzen), Tsu (Ise), Nagasaki, Ōshima (Izu), Tosa and Hong-kong.

65. **POTAMIDES (TYMPANOTONOS) FLUVIATILIS** Potiez and Mich.

Pl. I. Fig. 52.

Tryon, Man. Conch., IX., p. 159.—Pilsbry, Cat. Mar. Moll. Japan, p. 57.—Lischke, Jap. Meeres-Conch., II., p. 69.

Synonym:—*P. micropterus* Kiener.—*P. alatus* Phil.—*P. radix* Dufo. —*P. retifera* A. Ad.—*P. euryptera* A. Ad.

Shinagawa (rare), Tabata (frequent).

Living: Tōkyō Bay, Nagasaki, Ise, Bonin Is., China, Hong-kong, Philippines, Shingapore, Borneo, Australia, Mergui Is. and India.

(2) CM13491-1-53

66. **POTAMIDES** CFR. **INCISUS** HOMBR. and JACQ.

Pl. I. Fig. 53.

TRYON, Man. Conch., IX., p. 160.

Hombrons Jacquinot

Tabata (frequent).

Living *P. incisus* HOMBR. and JACQ. was collected in the Philippines.

RISSOIDÆ.

(3) CM13492-1-54

67. **RISSOA (FENELLA)** CFR. **CERITHINA** PHIL.

Pl. I. Fig. 54.

TRYON, Man. Conch., IX., p. 395.—ANN. Mag. Nat. Hist., VI. 1860, p. 421.

Synonym:—*F. reticulata* A. AD.—*F. scabra* A. Ad.

Tabata (frequent).

Living specimens of *R. cerithina* PHIL. were collected in Japan, Red Sea, Persian Gulf and Rodriguez Is. (in Indian Ocean).

(4) CM13493-1-55

68. **RISSOA SEPTENTRIONALIS** TOK.

Pl. I. Fig. 55.

PL CM13803

Shell turreted; whorls seven, granulate at the intersections of the longitudinal and spiral ribs as in the preceding species, but the transverse liræ are not interrupted even upon the longitudinal costæ; both ribs are also narrower than in the preceding form and retain almost equal width throughout the whole spire. Height and breadth 4^{mm} and 1.5^{mm}; or 3.8^{mm} and 1.5^{mm}.

Tabata (frequent).

CM13496-1-56

69. RISSOA MERIDIONALIS Tok.

Pl. I. Fig. 56.

Shell turreted; whorls nine, angulated, each ornamented with two or three large transverse elevated ridges, decussated by longitudinal ribs; body-whorl angulated at the periphery, the lower part of which is only spirally striated; aperture subcircular; outer lip not thickened, and without denticulation. Height 4^{mm} and breadth 1.8^{mm}.

Shinagawa (rare).

CM13495-1-57

70. RISSOA SUBCYLINDRICA Tok.

Pl. I. Fig. 57.

Shell small, elongate, subcylindrical, with obtuse apex; whorls five, convex, finely transversely striated; suture deep; aperture ovate, rather narrow at the upper part; inner lip thickened. Height 32^{mm} and breadth 1.7^{mm}.

Tabata (rare).

Order Scutibranchiata.

ROTELLIDÆ.

CM13496-1-58
CM13497

71. ROTELLA COSTATA Lesson, var. SUPERBUS Gld.

Pl. I. Fig. 58.

Brauns, Geol. Env. Tōkio, p. 52.—Pilsbry, Cat. Mar. Moll. Japan, p. 100.—Lischke, Jap. Meeres-Conch., II., p. 83.—Gould, Otia Conch., p. 156.

The color of the shell is very variable. It is preserved in my specimen in numerous bands of a brownish tint somewhat

radially arranged, each one being placed between the striations of the whorl. In the base somewhat long brownish spots are found but only in the circumscribed region near the outer margin, the rest being uniformly cherry coloured without spots.

Shinagawa and Tabata (rare).

Living: Enoshima (Sagami), Awa or Bōshu, Shimoda (Izu), Hakodate, Shima, Futamigaura (Ise), Nagato, Katanoura (Kii), Mogi (Hizen), Tsushima and Nagasaki.

TURBINIDÆ.

(2)CM13498-1-59

72. TURBO GRANULATUS Gmel.

Pl. I. Fig. 59.

Tryon, Man. Conch., X., p. 217.—Pilsbry, Cat. Mar. Moll. Japan, p. 88.—Morse, Shell-Mound of Ōmori, p. 67.—Lischke, Jap. Meeres-Conch., II., p. 81.—Syst. Conch. Cab., II. 3, p. 37.

Synonym:—*T. modestus* Phil.—*T. coreensis* Recl.—*T. granulosus* Sow.

Tabata (very rare).

Found in the shell mounds of the Stone-age at Ōmori.

Living: Enoshima (Sagami), Ise, Okayama, Kōchi (Tosa), Nagasaki, Kii, Shima, China Sea and Nicobar (Indian Ocean).

TROCHIDÆ.

(2)CM13499-1-60

73. TROCHUS IMPERIALIS A. Ad.

Pl. I. Fig. 60.

Lischke, Jap. Meeres-Conch., III., p. 67.—Pilsbry, Cat. Mar. Moll. Japan, p. 92.—Schrenck, Moll. Amurl. and Nord-Jap. Meeres, p. 358.

Synonym:—*T. adamsianus* Schrenck.

Shinagawa (rare).

Living: Tōkyo, Hakodate, and Sumoto (Awaji).

74. TROCHUS ARGYROSTOMUS Gmel.

CM13500-2-1

Pl. II. Fig. 1.

Brauns, Geol. Env. Tōkio, p. 34.—Lischke, Jap. Meeres-Conch., I., p. 96.—Syst. Conch. Cab., II. 3, p. 25.

Ōji (rare).

Living: Tōkyō, Hakodate, Kii, China, Port Hamilton (southern coast of Corea), Posjet Bay, Formosa and Philippines.

75. TROCHUS AMUSSITATUS Gld.

CM13501-2-2

Pl. II. Fig. 2.

Tryon, Man. Conch., X., p. 188, and p. 250.—Ann. Mag. Nat. Hist., 1875, XVI., p. 109.

Shinagawa (very rare).

Living at Yamada and Endermo.

76. TROCHUS (ENIDA) JAPONICUS A. Ad.

CM13502-2-3

Pl. II. Fig. 3.

Dunker, Index Moll. Maris Jap., p. 130.

Shinagawa (rare).

Living at Misaki (Sagami) and Minoshima (Kii).

77. TROCHUS (CALLIOSTOMA) SHINAGAWENSIS Tok.

CM13503-2-4

Pl. II. Fig. 4.

CM13694
CM13695
CM13696
CM13697
CM13698
CM13699
CM13700
CM13701
CM13702

Shell imperforate. Spire elevated, acute with flat whorls. Whorls strongly sculptured on upper portion with granulated spiral ribs narrower than the interspaces, numbering two to four on each whorl; base nearly flat, coarsely but equally ribbed;

no longitudinal striæ. Height and breadth 17.5mm and 16mm—19mm, or 14mm and 13mm—14mm, or 7.5mm and 8mm—9mm.

This tolerably large form is not found living in Japan. In the deposits of Shinagawa, it is quite abundant.

(B) CM13504-2-5

78. **TROCHUS (MINOLIA) ANGULATUS** Tok.

Pl. II. Fig. 5.

Shell flatly conical, small, thin, distinctly angulated at the periphery; whorls five, quite smooth, ornamented with two transverse rows of crimson dots in the periphery and one row of larger dots of violet near the suture line; aperture angular; umbilicus wide, with many fine transverse ridges within. Similar in shape to *M. pulcherrima* Angas or *M. philippensis* Watson of the Philippines. Height 4mm and breadth 4mm.

Ōji (rare).

FISSURELLIDÆ.

(B) CM13505-2-6

79. **FISSURELLA (MACROCHISMA) LISCHKEI** Pilsbry.

Pl. II. Fig. 6.

Pilsbry, Cat. Mar. Moll. Japan, p. 106.

Shinagawa (rare).

Living at Enoshima (Sagami), and Nemoto (Awa or Bōshu).

(B) CM13506-2-7ab

80. **ACMAEA CONULUS** Dkr.

Pl. II. Figs. 7 *a* and *b*.

Dunker, Moll. Jap., XIII., p. 45.—Lischke, Jap. Meeres-Conch., II., p. 96.—Pilsbry, Cat. Mar. Moll. Japan, p. 110.

Tabata (rare).

Living: Tōkyō, Yokohama, Enoshima (Sagami) and Nagasaki.

PATELLIDÆ.

81. **PATELLA (HELCONISCUS) AMUSSITATA** RVE. (R) CM13507-2-8

Pl. II. Fig. 8.

TRYON, Man. Conch., XIII., p. 134.—LISCHKE, Jap. Meeres-Conch., II., p. 100.—SCHRENCK, Moll. Amurl. and Nord-Jap. Meeres, p. 300.
Synonym:—*P. granostriata* RVE.

Tabata (rare).

Living: Hakodate, Kachiyama (Awa or Bōshu), Atami (Izu), Futamigaura (Ise), Kii, Fukushimamura (Tosa), Kōchi (Tosa), Bonin Island, China, and Philippines.

Gastropoda-Opisthobranchiata.

Order Tectibranchiata.

TORNATELLIDÆ.

82. **TORNATINA EXILIS** DKR. (R) CM13508-2-9 (R) CM13509

Pl. II. Fig. 9.

BRAUNS, Geol. Env. Tōkio., p. 34.—DUNKER, Moll. Jap. p. 25.

Ōji and Tabata (rare).

Living at Nagasaki.

83. **TORNATELLA GIGANTEA** DKR. (R) CM13510-2-10 (R) CM13511

Pl. II. Fig. 10.

DUNKER, Index. Moll. Mar. Jap.

Shinagawa and Ōji (rare).

Living in Japan.

(2) CM13512-2-11
(2) CM13513
(2) CM13514

84. RINGICULA ARCTATA Gld.

Pl. II. Fig. 11.

Brauns, Géol. Env. Tōkio, p. 30.—Lischke, Jap. Meeres-Conch., II., p. 78.—Gould, Otia Conch., p. 122.—Pilsbry, Cat. Mar. Moll. Japan, p. 10.

Ōji, Shinagawa and Tabata (very abundant).
Living: Tōkyō, Nagasaki and Hong-kong.

CYLICHNIDÆ.

(2) CM13515-2-12
(2) CM13516
(2) CM13517

85. CYLICHNA MUSASHIENSIS Tok.

Pl. II. Fig. 12.

Brauns, Geol. Env. Tōkio, p. 35.—Wood, Crag Moll., I., 175.

Shell cylindrical, convolute, entirely smooth; vertex depressed, concave, with a hidden spire; aperture linear, dilated at the base, with an obtuse fold upon the columella. Height and breadth 17mm and 7mm; or 19mm and 7.5mm; or 7mm and 3mm.

Brauns identified this species with *Bulla cylindracea* Pennant. of the Crag and the British Seas, but it is easily distinguished from it by having a more elongated shell, no transverse striations on the surface, and by the narrower dilatation at the base of the aperture.

Shinagawa, Ōji and Tabata (rare).

(2) CM13518-2-13

86. CYLICHNA ACUTA Tok.

Pl. II. Fig. 13.

Shell small, thin, subfusiform, convolute; spire hidden, outer lip elevated and so elongated at the upper part as to give it the appearance of having an acuminated apex, rounded at the lower part; surface smooth; aperture linear, expanded below with an obsolate fold upon the columella. Height 5mm and breadth 2mm.

Ōji (frequent).

CM13519-2-1K

87. CYCLINA OBTUSA Tok.

Pl. II. Fig. 14.

Shell small, cylindrical, thin, convolute; spire almost hidden, appearing as if pushed in from above, and terminating in a small blunt point; surface transversely striated, the striæ being fine and close together; aperture as long as the shell, narrow, widened and truncated at the base; columella with two oblique plaits at its base. Height 4^{mm}; breadth 2^{mm}.

Tabata (rare).

Scaphopoda.

DENTALIIDÆ.

CM13520-2-15a-b

CM13521

88. DENTALIUM OCTOGONUM Lamk.

Pl. II. Figs. 15 *a* and *b*.

Lischke, Jap. Meeres-Conch., II., p. 103 and III., p. 75.—Schrenck, Moll. Amurl. and Nord-Jap. Meeres., p. 381.—Brauns, Geol. Env. Tōkio, p. 35.

Shinagawa and Ōji (rare).

Living: Tōkyō, Hakodate, Enoshima (Sagami), Kii, Nagasaki, China and Ceylon.

CM13522-2-16a-b

89. DENTALIUM cfr. WEINKAUFFI Dkr.

Pl. II. Figs. 16 *a* and *b*.

Dunker, Index. Moll. Maris. Jap., p. 153.—Tryon and Pilsbry, Man. Conch., XVII., p. 40.

Shell large, solid, the posterior third more curved than the remaining portion, not compressed between convex and concave

side, rounded in cross-section; the length about ten to eleven times the diameter of the aperture. Longitudinal ribs prominent near the apex, gradually decreasing in size towards the posterior, so that they are obsolete on the anterior third of the shell. At apex there are eight to eleven rather sharp and well raised ribs, separated by wider concave intervals; at a short distance from the apex, an interstitial riblet appears in these intervals, so that the ribs and the riblets alternate each other; in larger specimens there is a still smaller thread between the rib and the riblet. Circular sculpture not conspicuously developed. Apex with a v-shaped notch at the convex side. Length 55–80^{mm}.

On consulting the descriptions and figures given by DUNKER and PILSBRY, this species is closely allied to *Dentalium* (*Antalis*) *weinkauffi* DKR., but in fossil specimens the ribbed portion is not so distinctly separated from the smooth portion as shown in the figure of the living specimens. Moreover, the number of ribs at the apex is greater in the living than in the fossil one. One fragmentary living specimen collected in Asamiwan, province of Tsushima, and another one said to have been collected at an unknown place in Japan probably belong to the same species. The question whether the fossil form is really identical with *Dentalium weinkauffi* DKR. can only be settled by comparing a still greater number of specimens both living and fossil. The fossil has been taken by BRAUNS for *Dentalium entale* LINNÉ.

Shinagawa (abundant).

(2) CM/3523-2-17
(2) CM/3524

90. **DENTALIUM EDOENSIS** TOK.

Pl. II. Fig. 17.

Shell small, curved, very slender and tapering, thin and fragile, slightly swollen close to the aperture; surface glossary,

entirely devoid of longitudinal and transverse striations, sometimes with a few annular swellings. Apex with simple orifice, no slit; aperture as well as apical orifice circular. Length 25^{mm} in the largest specimen, and forteen to sixteen times the greatest diameter.

Shinagawa and Ōji (rare).

The living specimens were collected near Enoshima and Nagasaki.

Pelecypoda.

Order Siphonida.

PHOLADIDÆ.

91. **MARTESIA STRIATA** LINNÉ. ⓡCM13525-2-18

Pl. II. Fig. 18.

DUNKER, Index Moll. Maris Jap.,—Chall. Report, Vol. XIII., p. 19 and 27.—TRYON, Struct. and Syst. Conch., III., p. 128.

Synonym.—*Pholas pusilla* LINNÉ.

In the drift woods found in the bluish clay of Tabata (frequent).

Living chiefly in the floating woods and found in Japan, Philippines, West Indies, German Ocean, Mediterranean Sea, Antillus, Central America, etc.

SOLENIDÆ.

92. **SOLEN GOULDII** CONRAD. ⓡCM13526

DUNKER, Index Moll. Maris Jap., p. 173.—LISCHKE, Jap. Meeres-Conch., II., p. 123.—GOULD, Otia Conch., p. 165.—Syst. Conch. Cab., XI. 3, p. 21.—BRAUNS, Geol. Env. Tōkio, p. 36.

Synonym.—*S. gracilis* GLD.

Ōji (rare).

Living: Enoshima (Sagami), Misaki (Sagami), Hakodate, Ise, Nagasaki and China Sea.

(R)CM13527-2-19
(R)CM13528
(R)CM13529

93. **SOLEN KRUSENSTERNII** SCHRENCK.

Pl. II. Fig. 19.

SCHRENCK, Moll. Amurl. and Nord-Jap. Meeres., p. 594.—BRAUNS, Geol. Env. Tōkio, p. 36.

Ōji (abundant), Tabata and Shinagawa (frequent).

Living: Hakodate, Kuriles, East Coast of Sakhalin and Akashi Bay.

(R)CM13530-2-20a-b

94. **MACHA DIVARICATA** LKE.

Pl. II. Figs. 20 *a* and *b*.

LISCHKE, Jap. Meeres-Conch., I., p. 142.—PILSBRY, Cat. Mar. Moll. Japan, p. 121.—Syst. Conch. Cab., XI. 3, p. 87.

Shinagawa (frequent).

Living: Enoshima (Sagami), Misaki (Sagami), Hakodate, Wakanoura (Kii), Nagasaki, and Setouchi (Inland Sea).

SAXICAVIDÆ.

(R)CM13531-2-21a-b

95. **SAXICAVA ARCTICA** DESH.

Pl. II. Figs. 21 *a* and *b*.

WOOD, Crag. Moll., II., p. 287.—DESHAYES, Traité élém. Conch., p. 480.—WEINKAUFF, Conch. Mittelmeeres, II.—Ann. Mag. Nat. Hist., IV. 20, (1877), p. 131.—Trans. Royal Soc. South Australia.—Verh. Russ.-kais. Min. Gesell. zu St. Petersburg, II series, XXXVIII Band, 1, 1900.—Chall. Report, Vol. XIII., p. 78.—TRYON, Struc. and Syst. Conch., II., p. 135.—KOEBELT, Conchylien-buch,

p. 318.—LISCHKE, Jap. Meeres-Conch., I., p. 134, and III., p. 100.—SCHRENCK, Moll. Amurl. and Nord-Jap. Meeres, p. 553.—PILSBRY, Cat. Mar. Moll. Japan, p. 117.—GOULD, Otia Conch., p. 163.

Synonym:—*S. lithophagella* DA COSTA; *S. elongata* BRONN; *S. rhomboides* POLI; *S. minutes* LINNÉ; *S. præcisus* MONTAGU; *Mytilus rugosa* LINNÉ; *M. pholadis* LINNÉ.

In the determination of this species the form of the shell, the inequilateral state of the valves, and the imbrication on the siphonal side can not be availed of; for, on comparing my specimens with the figure in WOOD's "*Crag Mollusca*," I find that in WOOD's specimen the outer imbricating ridge (not imbrication), runs not along the posterior edge of the shell as in my specimens, but leaves broad spaces between it and the posterior edge; also the surface of the shell in the English form is furnished with many elevations and depressions. Some specimens from the Grand Banks in Newfoundland and from Great Britain, which are preserved in our Science College, are furnished not with ridges, but only with great elevations not so strongly curved as in my specimens.

Tabata (abundant).

Miocene—Vienna (Vörslan, Garifahren, Enzesfeld, Pötzleinsdorf, Grund, Grinzing, Steinbrun), Turin.

Pliocene—Asti, Castel Anquanto, Messina, Belgium, Crag of England (Cor. Crag—Sutton, Red Crag—Sutton, Walton Naze, Cleyde Beds, Brindlington).

Younger Tertiary—Sicily, Rhodus, Ischia, Puzzabli, Christiana, Scandinavia, Australia.

Diluvium—England, Canada, Sweden, Russia (Murman and White Seas, and Nova Zembla).

World wide in Recent time:

Fukagawa and Susaki (Tōkyō), Misaki (Sagami), Nanao

(Noto), Nemoto, Shirahama and Kominato (Awa or Bōshu), Ōsaka, Hakodate.

East Coast of Northern Asia—Kamtschatka, Ochotschk Sea, Avikamch Is., Behring Sea, Awatka Bay, Castries Bay, White Sea.

North Coast of Asia—Siberia.

West Coast of America—Sitka, Puget-Sund, Vancouver Is., San Francisco, Monterey, Sta. Barbara, S. Diego, Mangarita Bay, Cape St. Lucas, Mazatlan, Acapulco, Peru, St. Elena, West Patagonia.

East Coast of America—Champlain Sea, Prince Edward Is., Newfoundland, Massachusettes, Mosse-a-bec Beach (Maine) &c.

Europe—Great Britain, Christiania (Norway), Sicily, Modena (Italy), Rudelsdorf (Bavaria), Scandinavia, Azopes, Mediterranean Sea, Nova Zembla, &c.

Africa—off Cape of Good Hope, West African Coast, &c.

Indian Ocean—Madagascar, &c.

Australia (Port Jackson) and New Zealand, &c.

(2) CM 13532
(3) CM 13533

96. **PANOPÆA GENEROSA** GLD.

BRAUNS, Geol. Env. Tōkio, p. 36.—GOULD, Otia Conch., p. 165.—DUNKER, Index Moll. Maris Jap., p. 176.—Geol. Surv. California-Palæont. II.—ARNOLD, Pal. and Str. Mar. Pliocene and Pleistocene San Pedro (Mem. Cal. Acad. Sc., Vol. III., 1903).

Ōji and Shinagawa (frequent).

Miocene—Oregon, Martinez, Waltnut Creek, near Mt. Diabla, Estrella, Foxinis; (California).

Pliocene—San Ferdinando, San Pedro, Santa Barbara; (California).

Diluvium—Santa Barbara, San Pedro; (California).

Living: Hakodate, Awatcha Bay (Kamtschatka) and Puget Sound (Oregon).

CORBULIDÆ.

97. **CORBURA VENUSTA** GLD.

Pl. II. Figs. 22. *a*, *a'*, *b* and *b'*.

SCHRENCK, Moll. Amurl. and Nord-Jap. Meeres., p. 583.—GOULD, Otia, Conch., p. 164.

Shinagawa (frequent), Ōji (rare).
Living at Hakodate and Whampoa (near Canton).

98. **NEÆRA GOULDIANA** HINDS.

Pl. II. Figs. 23 *a* and *b*.

KOEBELT, Illustr. Conch.

Shinagawa (very rare).
Living: Uraga (Sagami), Gotō Is. and Tsushima.

ANATINIDÆ.

99. **MYODORA FLUCTUOSA** GLD.

Pl. II. Figs. 24 *a* and *b*.

GOULD, Otia Conch., p. 161.—BRAUNS, Geol. Env. Tōkio, p. 37.
Synonym.—*M. proxima* SMITH.

Shinagawa and Ōji (frequent).
Living in Kagoshima Bay.

MACTRIDÆ.

100. **MACTRA SACHALINENSIS** SCHRENCK.

Pl. II. Figs. 25 *a* and *b*.

SCHRENCK, Moll. Amurl. and Nord-Jap. Meeres, p. 515.—Syst. Conch. Cab., XI. 2, p. 67.
Synonym.—*M. lühdorfii* DKR.

What BRAUNS designated by the name of *M. sachalinensis* SCHRENCK is *M. sulcataria* DESH., as I am now fully convinced.

Ōji (rare).

Living: Kujūkurihama (Shimōsa), Hakodate, Otaru (Hokkaidō), Dui Choji and Wjatchu (West Coast of Sakhalin), Kaisenhaufen and Castries Bay (Mandschurian Coast of North Japanese Sea).

This species which is conspicuous for its large shell appears to have its southern limit at Chōshi (Shimōsa).

CM13540
CM13541

101. MACTRA VENERIFORMIS DESH.

BRAUNS, Geol. Env. Tōkio, p. 38.—LISCHKE, Jap. Meeres-Conch., I., p. 153, and II., p. 121.—MORSE, Shell-mound of Ōmori, p. 58.—Syst. Conch. Cab., XI., 3, p. 63.

Synonym.—*M. quadrangularis* DESH.

Ōji (frequent), Shinagawa (rare).

Living: Ōmori (in Tōkyō Bay), Kii, Higo, Nagasaki, Kagoshima, Tschifu, North China.

CM13542-2-26a-b
CM13543

102. MACTRA SULCATARIA DESH.

Pl. II. Figs. 26 *a* and *b*.

LISCHKE, Jap. Meeres-Conch., I., p. 133.—SCHRENCK, Moll. Amurl. and Nord-Jap. Meeres, p. 570.—BRAUNS, Geol. Env. Tōkio, p. 28.

Ōji (abundant), Shinagawa (rare).

Living: Tōkyō, Enoura (Suruga), Izumi, Kōchi (Tosa), Nagasaki, Kagoshima, Hakodate, North China, Possjet Bay, Kurile Sea at the east coast of Sakhalin.

103. MACTRA CROSSEI DKR.

Pl. II. Figs. 27 *a* and *b*.

DUNKER, Index Moll. Maris Jap., p. 183.

Ōji (rare).

Living: Tōkyō, Kominato (Awa or Bōshu), Sagami and Kii.

104. LUTRARIA OVALIS TOK.

Pl. II. Figs. 28 *a*, *b* and *c*.

Shell oblong, thick, compressed, subequilateral; the curvature very different in the anterior and posterior sides; surface sculptured with fine concentric striations; umbones exceedingly anterior in situation.

Length	90mm,	88mm,	83mm
Height	47mm,	47mm,	43mm
Breadth	28mm,	24mm,	24mm

My specimens greatly resemble to the European species *Lutraria oblonga* LAM., but the curvature of the upper margin, and also of the anterior and posterior ends is somewhat different.

Shinagawa (rare).

Living: Ajiro (Izu), Hyōgo (Settsu) and Kōchi (Tosa).

105. TRESUS SP.

Pl. II. Figs. 29 *a*, *b* and *b'*.

Shell small, oblong; umbilicus nearly at the centre of upper margin; very low ridge running from the umbilicus to the postero-ventral edge; pallial sinus deep. Length 25mm, height 16.5mm, and breadth 10mm.

This specimen may be perhaps the young of *Tresus nuttali* CONRAD, but compared with the adult shell of *Tresus nuttali* CONRAD the posterior side is not truncated and more elongated. The four living species of Japanese *Lutraria* are not identical with the present species.

Ōji (rare).

(R) CM 13549
(R) CM 13550

106. **TRESUS NUTTALI** CONRAD.

BRAUNS, Geol. Env. Tōkio, p. 38.—MIDDENDORF, Mal. Ross., III., p. 66.—MORSE, Shell-Mound of Ōmori, p. 61.—GOULD, Otia Conch., p. 76.—LISCHKE, Jap. Meeres-Conch., I., p. 136.—Geol. Surv. California-Palæont. II.—ARNOLD, Pal. and Str. Mar. Pliocene and Pleistocene. San Pedro, (Mem. Cal. Acad. Sc., Vol. III., 1903).

Synonym.—*Lutraria maxima* MIDD.; *L. capax* GOULD.

Ōji (abundant), Shinagawa (rare).

Pliocene—Santa Barbara (California).

Diluvium—Santa Barbara, San Diego, San Pedro, (Californa).

Living: Tōkyō, Yokohama, Hokodate, Sitcha, along west coast of America from 34° N. to 58° N. (Vancouver Is., Fuscastrasse, Puget sound, San Francisco, Montari, Sta Barbara, S. Pedro, S. Diego).

TELLINIDÆ.

(R) CM 13551-2-30 a a' b b'.
(R) CM 13552

107. **TELLINA NITIDULA** DKR.

Pl. II. Figs. 30 *a*, *a'*, *b* and *b'*.

BRAUNS, Geol. Env. Tōkio, p. 39.—LISCHKE, Jap. Meeres-Conch., I., p. 129, and II., p. 113.—Syst. Conch. Cab., X. 4, p. 161.

Shinagawa and Ōji (frequent).

Living: Misaki (Sagami) and Kii.

108. TELLINA YEDOENSIS LISCHKE.

Pl. II. Figs. 31 *a* and *a'*.

BRAUNS, Geol. Env. Tōkio, p. 39.—LISCHKE, Jap. Meeres-Conch., II., p. 92.

Oji and Tabata (frequent), Shinagawa (rare).

Living: Tōkyō and Kii.

109. TELLINA SERRICOSTATA TOK.

Pl. II. Figs. 32 *a*, *a'* and *b*.

Shell ovate, solid, equilateral, flattened; anterior margin rounded, posterior pointed, with the surface near it abruptly concave, and either somewhat undulatory or irregularly ribbed; concentric ribs very strong, serrated and dense, especially in the posterior portion of the shell; lunule small and lanceolate; two median and two lateral teeth in each valve; mantle impression deep. This species resembles *Tellina serrata* BROCCHI, but the thickness of the shell and the form of the postero-dorsal margin of the inner surface distinguish these two species.

Length	34^{mm},	25^{mm},	25^{mm}
Height	24^{mm},	17^{mm},	15^{mm}
Breadth	10^{mm},	8^{mm},	9^{mm}.

Shinagawa and Tabata (rare).

110. TELLINA TENERA SAY.

Pl. II. Figs. 33 *a* and *a'*.

Syst. Conch. Cab., X. 4, p. 152.

Ōji and Shinagawa (rare).

Living along the Northern Atlantic Coast of North America (from Cape Anu to New York and Massachusetts).

(7) CM13561 -2-34 a a' b.

111. **TELLINA OJIENSIS** Tok.

Pl. II. Figs. 34 *a*, *a'* and *b*.

Shell thick, tolerably swollen in the right valve; anterior side uniformly rounded; posterior shortened and not so abruptly truncate as in many other species, but with a only slightly depression running from the umbonal region to near the postero-ventral angle; ventral margin, uniformly rounded; whole surface with densely numerous, regularly arranged, strong ribs; pallial sinus very large; hinge with a bifid cardinal tooth and a strong lateral tooth on each side. Length 22^{mm} (or 20^{mm}); height 18^{mm} (or 15^{mm}); and breadth 10^{mm} (or 8^{mm}).

Oji (rare).

Living at Hakodate.

(8) CM13562 -2-35 a a'
(9) CM13563

112. **TELLINA** aff. **RUTILE** Dkr.

Pl. II. Figs. 35 *a* and *a'*.

Dunker, Index Moll. Maris Jap., p. 191.—Pilsbry, Cat. Mar. Moll. Jap., p. 124.

Oji and Shinagawa (rare).

T. rutile Dkr. is found living near Enoshima (Sagami) and Nagasaki.

(10) CM13564 -2-36 a a'

113. **TELLINA NIPPONICA** Tok.

Pl. II. Figs. 36 *a* and *a'*.

Shell transversely ovate, compressed, inequilateral; anterior side rounded, posterior short and subrostrated; surface with fine concentric striations; cardinal tooth bifid in both valves; one indistinct lateral tooth present. Length 21^{mm}; height 15^{mm}; and breadth 9^{mm}.

Ōji (rare).

Living: Tōkyō, Yokohama and Nagasaki.

114. **GARI** CFR. **RADIATA** DKR.

Pl. III. Figs. 1 *a*, *a'*, *a''* and *b*.

PHILIPPI, Abbild. and Besch. &c., I.

Synonym.—*Psammobia amethystus* RVE.

Shinagawa (rare).

Living specimens are found near Misaki (Sagami).

115. **MACOMA NASUTA** CONRAD.

Pl. III. Figs. 2 *a* and *b*.

BRAUNS, Geol. Env. Tōkio, p. 39.—LISCHKE, Jap. Meeres-Conch., II. p. 115.—GOULD, Otia Conch., p. 188.—MIDDENDORF, Mal. Ross., p. 61.—MIDDENDORF, Sib. Reise., p. 256.—Ann. Mag. Nat. Hist., III. 16. (1865).—Syst. Conch. Cab., X. 4, p. 229.—Geol. Surv. California-Palæont. II.—ARNOLD, Pal. and Str. Mar. Pliocene and Pleistocene San Pedro (Mem. Cal. Acad. Sc., Vol. III., 1903).

Synonym.—*Tellina tersa* GLD.; *T. dissimilis* MARTENS.

Ōji (abundant), Tabata (frequent), Shinagawa (rare).

Upper Miocene—Foxins (California).

Pliocene—San Fernando, Santa Rosa; (California).

Diluvium—San Pedro (California).

Living: Hakodate, Echigo, Tōkyō, Misaki (Sagami) Kamtschatka, Behring Sea, Sitcha, South Coast of Ochotsk-Bay, Esquimalt Harbour, West Coast of North America from the Northern limit (Vancouver, Oregon, Montery, S. Diego).

PETRICOLIDÆ.

116. **SAXIDOMUS NUTTALI** CONRAD.

BRAUNS, Geol. Env. Tōkio, p. 40.—SCHRENCK, Moll. Amurl. and Nord-Jap. Meeres, p. 253.—LISCHKE, Jap. Meeres-Conch. I., p. 127.—

DUNKER, Index. Moll. Maris Jap., p. 208.—Syst. Conch. Cab., XI. 1, p. 242.—TRYON, Struc. and Syst. Conch., p. 175.—Geol. Surv. California-Palæont. II.

Synonym:—*Venus sulcata* POT. and MICH.; *Venurupis gigantea* DESHAYES; *Venus maxima* ANTON; *Saxidomus squalidus* DESHAYES; *S. purpuratus* DESHAYES.

Ōji (abundant), Shinagawa (rare).

Diluvium—Santa Barbara and San Pedro (California).

Living: Tōkyō, Misaki (Sagami), Ōtsu (Sagami), Enoshima (Sagami), Hakodate, Akashi (Harima), Setouchi (Inland Sea), Chichijima (Bonin Is.), Kamtschatka, Sitcha, San Diego (California), Kuraché (Mouth of the Indus, India), Copisco (Chile).

VENERIDÆ.

117. VENUS STIMPSONI GLD.

BRAUNS, Geol. Env. Tōkio, p. 48.—COULD, Otia Conch., p. 169.

Ōji (frequent), Shinagawa (rare).

Living at Hakodate and Etorofu (Chishima).

118. VENUS FOLIACEA PH.

Pl. III. Figs. 3 *a* and *b*.

PHILIPPI, Abbild. and Besch. &c., II., p. 107.—Chall Report.

Shinagawa (frequent).

Living: Tōkyō, Enoshima (Sagami), Katanoura, Torres Strait, North Australia, Port Curtis, Queensland, Ceylon, Red Sea, and Madagascar.

119. CYTHEREA CHINENSIS CHEM.

Pl. III. Figs. 4 *a* and *b*.

LISCHKE, Jap. Meeres-Conch., p. 122.—SCHRENCK, Moll. Amurl. and Nord-Jap. Meeres., p. 541.—Syst. Conch. Cab., XI. 1, p. 31.

Synonym:—*C. pacifica* DILL; *C. sinensis* SOW.

Shinagawa (frequent).

Living: Sagami, Kii, Nagasaki, Hakodate, Kitami (Hokkaidō), West and East Coast of Sakhalin, China, New-Holland, Dui and Ssakato (Tartary Strait), and Castries Bay.

120. CYTHEREA MERETRIX LINNÉ.

Pl. III. Figs. 5 *a* and *b*.

BRAUNS, Geol. Env. Tōkio, p. 53.—SCHRENCK, Moll. Amurl. and Nord-Jap. Meeres, p. 545.—LISCHKE, Jap. Meeres-Conch., I., p. 122 and II., p. 108.—MORSE, Shell-Mound of Ōmori, p. 59.—DUNKER, Moll. Jap., p. 26.—PHILIPPI, Abbild. and Besch. &c.—Syst. Conch. Cab., XI. 1, p. 15.

Synonym:—*Venus lisoria* CHEM.; *Cytherea fusca* ROCH.; *C. formosa* SOW.; *C. petachalis* LAM.; *C. impudica* LAM.; *C. castanea* LINNÉ.; *C. zonaria* LAM.; *C. graphica* LAM.; *C. morphina* LAM.; *C. ponderosa* SCHUM.

Shinagawa (rare).

Living: Tōkyō, Enoshima (Sagami), Chōshi (Shimōsa), Tsuda (Awa), Misaki (Sagami), Yokohama, Kuwana (Ise), Gōnoura (Iki), Kagoshima, Higo, Fushiki (Noto), Hakodate, Naruto (Awa), Nagasaki, Riu-Kiu, Formosa, E. Indies, Canton River, Chi-fu, Hongkong, Siam, Philippines, Singapore, Amboina, Ceram, Tenimber Is. (in Banda Sea), Molucca, Nicobar, Ceylon, Mazatlan, Shanghai, Labuan (Borneo) and Java.

121. DOSINIA EXOLETA LINNÉ

BRAUNS, Geol. Env. Tōkio, p. 41.—RÖMER, Monogr. Venus.—LISCHKE, Jap. Meeres-Conch., I., p. 127.—Weinkauff, Conch. Mittel-Meer, I., p. 120.—MORSE, Shell-Mound of Ōmori, p. 57.—Hörner, Tertiärbecken Wien, II., p. 143.—Syst. Conch. Cab., XI. 1, p. 90.

Synonym:—*D. japonica* RVE.; *D. troscheli* LKE; *Pectunculus capillaceus* DA COSTA; *Cytherea sinuata* TURTON; *Exoleta orbicularis* BROWN; *Artemis lentiformis* WOOD.

Ōji (very abundant), Shinagawa (frequent).

Miocene—Vienna, Schneitzenland, Touranie.

Pliocene—Crag of England and Belgium, Sub-appennine, Castel Arquanto, Asti, Rome, Livorino, Sicily.

Younger Tertiary—Calabria, Tarents, Sicily.

Diluvium—Palermo, Morea, Cyperu, Rhodus, Glacial bed of England.

Living: Tōkyō, Shimōsa, Hakodate, Enoshima (Sagami), Misaki (Sagami), Enoura (Suruga), Setouchi (Inland Sea), Ōsaka, Awa, Kōchi (Tosa), Kagoshima, Chi-fu, Spain, France, Piedmont, Corsica, Naple, Tarent, Sicily, Ustica, Adria-Zara, Venedig, Morca, Tunis, Algeria, Balearen, Norway, Great Britain, Portugal, Mediterranean Sea, and from North Cape of 72° N. to Senegal of 15° N.

122. CYCLINA CHINENSIS CHEM.

BRAUNS, Geol. Env. Tōkio, p. 53.—LISCHKE, Jap. Meeres-Conch., I., p. 126 and II., p. 111.—DESHAY, Traité Elém., I. 2, p. 526.—Proc. Zool. Soc. 1865, p. 196.—MORSE, Shell-Mound of Ōmori, p. 27.—Syst. Conch. Cab., XI. 1, p. 111.

Synonym:—*Venus sinensis* GMEL.; *Cyprina tenuitria* LAM.

Tabata (very abundant).

Living: Tōkyō, Yokohama, Ōmori (in Tōkyō Bay), Misaki (Sagami), Nagasaki, Tsu (Ise), Matsushima (Rikuzen), Shima, Higo, Kagoshima, Kōchi (Tosa), Formosa, Shanghai, Hongkong, East Coast of Cochin China, and China Sea.

123. CLEMENTIA AFF. PAPYRACEA GRAY.

Pl. III. Figs. 6 *a* and *b*.

Syst. Conch. Cab., XI. 1, p. 251.—ADAM, Genera Recent Moll.—KOEBELT, Illustr. Conch.—DESHAY, Cat. Bivalve Shells Brit. Mus., I.

Shinagawa (rare).

124. TAPES DECUSSATA DKR. VAR PHILIPPINARUM A. AD. and RVE.

Pl. III. Fig. 7.

BRAUNS, Geol. Env. Tōkio, p. 53.—SCHRENCK, Moll. Amurl. and Nord-Jap. Meeres, p. 537.—LISCHKE, Jap. Meeres-Conch., I., p. 115.—Syst. Conch. Cab., XI. 1, p. 180 and p. 230.

In spite of various opinions on the distinctions between the European and the Asiatic forms, the latter seems to me to be a mere variety of the former.

Ōji and Tabata (rare).

Pliocene—Crag (England).

Living: Tōkyō, Hakodate, Kitami (Hokkaidō), Enoshima and Misaki (Sagami), Tanoura (Rikuzen), Nagasaki, Ōshima (Izu), Setouchi (Inland Sea), Mogi (Hizen), Nagasaki, Formosa, West Coast of Sakhalin, Olga Bay, Rifunsiri I., Corea, Possjet Bay, Castries Bay, Cape Notoro, Cape Tofuto, Singapore, China, East Indies, New Zealand, Java, Amboina, Alexander (Egypt), Britain, Lido (Mediterranean), Frankreich, Pyrenese Peninsula.

125. TAPES RIGIDUS GLD.

BRAUNS, Geol. Env. Tōkio, p. 37.—GOULD, Otia Conch., p. 85.

Ōji (frequent).

Living: Hakodate, Puget Sound, and Strait of De Fusca.

CM13584-3-8aa'b
CM13585-3-8b

126. **TAPES EUGLYPTUS** Ph.

Pl. III. Figs. 8 *a*, *a'* and *b*.

Lischke, Jap. Meeres-Conch., I., p. 119.—Philippi, Abbild. and Beschr. &c.—Römer, Monogr. Venus.

Shinagawa (frequent).

Living: Nagasaki and Setouchi (Inland Sea).

CARDIIDÆ.

CM13586-3-9aa'
CM13587

127. **CARDIUM CALIFORNIENSE** Deshayes.

Pl. III. Figs. 9 *a* and *a'*.

Brauns, Geol. Env. Tōkio, p. 42.—Middendorf, Sib. Reise, p. 248.—Pilsbry, Cat. Mar. Moll. Japan, p. 131.—Lischke, Jap. Meeres-Conch., I., p. 144, and II., p. 125.—Middendorf, Moll. Ross., II., p. 40.—Syst. Conch. Cab., X. 2, p. 45.

Shinagawa and Ōji (frequent).

Living: Tōkyō Bay, Hakodate, Etrofu, Nagasaki, Castries Bay, West Coast of Sakhalin, Behring Sea, Sitcha, Vancouver Is., Fuean Strait, Puget-Sound, Ochotsk Sea, Unalaschka, and from Fusca Strait to Montery (California).

CM13588-3-10
CM13589

128. **CARDIUM MUTICUM** Rve.

Pl. III. Fig. 10.

Brauns, Geol. Env. Tōkio, p. 42.—Lischke, Jap. Meeres-Conch., I., p. 144.—Dunker, Index Moll. Maris Jap., p. 211.—Schrenck, Moll. Amurl. and Nord-Jap. Meeres, p. 517.

Synonym:—*C. japonicum* Dkr.; *C. papyraceum* Schrenck.

Shinagawa and Ōji (frequent).

Living: Tōkyō, Hakodate, Tsu (Ise), Awa, Nagasaki, Kōchi (Tosa), East Coast of Luzon, and East Indies.

129. CARDIUM BRAUNSI Tok.

Pl. III. Figs. 11.

Shell very large, nearly trigonal, ventricose, equivalve, posteriorly closed; anterior and posterior sides nearly equal in curvature, ventral margin semicircular; umbones median and prominent; highly projecting radiating ribs, numbering twenty in a large specimen of 82mm length; each rib rippled with very fine transverse ridges. Characterized by having a trigonal shape and a small number of ribs. Length 82mm, height 88mm, and breadth 50mm.

Ōji (rare).

130. CARDIUM TOKYOENSIS Tok.

Pl. III. Figs. 12 *a* and *a'*.

Shell ovate; anterior side rounded, posterior subtruncated, ventral, almost semilunar; umbones prominent; radial ribs forty two in number, alternating with tolerably deep narrow grooves; ribs smooth, crenulated only at the posterior part; cardinal teeth two, lateral tooth one on each side.

Length	Height	Breadth
38mm	41mm	26mm
20mm	21mm	12mm

This species differs from *C. burchardi* Dkr. in having smooth ribs, a rather rounded outline, and a wider dorsal part. It much resembles *C. unicolor* Sow. from the Philippines, but the latter has crenulated and more numerous ribs and a greater height (100 : 66).

One living specimen of this species in the collection of our College was found somewhere in Japan, but the locality is not given.

Shinagawa (rare).

(2) CM13593
(2) CM13594

LUCINIDÆ.

131. LUCINA BOREALIS LINNÉ.

BRAUNS, Geol. Env. Tōkio, p. 44.—WOOD, Crag Mollusca, II., p. 139. —WEINKAUFF, Conch. Mittelmeer., I., p. 162.—HÖRNES, Tertiärbecken Wien, II., p. 299.—Geol. Surv. California, Palæont. II.—JEFFREY, Moll. Lightening and Porcup. Exp.

Ōji (very abundant), Shinagawa (frequent).

This species is widely distributed, but now entirely extinct in Japan. It also occurs rarely in the Miocene (Italy, Austria, Poland, America) and in the Pliocene (Italy, Belgium, England, Norway, America etc.) In Diluvium it is found in Norway, Iceland, Sweden, Great Britain, Ireland, throughout Continental Europe to Mogador and Rhodus; Santa Barbara, San Pedro, Dead Man's Is., San Diego (America).

Living specimens are only rarely met with in the Mediterranean, viz. on the coast of Piedmont, Corsica, Sicily and Algeria. But in the Atlantic Ocean it is quite frequent, especially in Norway, Great Britain, Holland, France and North America. In the Pacific, it is found on the north-west coast of America although not at all frequent. From the above, it will be seen that this species mostly occurs in the arctic regions.

(2) CM13595

132. CRYPTODON CFR. FLEXUOSUS MONT.

TRYON, Struc. and Syst. Conch., III., p. 211.

Shinagawa (rare).

C. flexuosus MONT. was found living at Hakodate.

UNGULIDÆ.

133. MYSIA PACIFICA Tok.

Brauns, Geol. Env. Tōkio, p. 44.—Weinkauff, Conch. Mittel-Meer., I., p. 158.—Wood, Crag Moll., II., p. 146.

Brauns described this species as *Diplodonta trigonula* Bronn, which according to a figure given by Wood is much thickened in the interior of the shell and more triangular at the angle beneath the beak. Besides these two distinguishing characters I can find no other marked difference between the two species. The present species occurs very abundantly at Ōji, but has not been found living in Japan.

134. MYSIA aff. SEMIASPERA Phil.

Pl. III. Figs. 13 *a*, *b* and *b'*.

Lischke, Jap. Meeres-Conch., II., p. 134.

Shinagawa (rare).

Specimens similar to the fossil species have been found living at Nagasaki. Mysia *semiaspera* Phil. is mentioned as living at Nagasaki, in the West Indies, at Mazatlan, Acapulco, Bachiade, San Blas in North Patagonia, Rio Janeiro, Puerto, Cabello and Tams, and in the northern part of N. America (?)

ERYCINIDÆ.

135. LASÆA STRIATA Tok.

Pl. III. Figs. 14 *a* and *b*.

Brauns, Geol. Env. Tōkio, p. 43.—Wood, Crag Moll., II., p. 125.

Shell small, orbicular, tumid, slightly equilateral, nearly circular; surface with visible concentric lines; umbones promi-

nent; hinge with two teeth on each valve and a trigonal pit for the reception of the ligament. Length 9.5mm (or 7mm); height 9.5mm (or 6.5mm); and breadth 8mm (or 5mm).

BRAUNS designated this species as *L. rubra* MONT., but the latter is distinguished by having no concentric striations, the surface being quite smooth.

Shinagawa (abundant), Ōji and Tabata (rare).

The species is known as living near Misaki (Sagami) and Shima.

CM13601-3-15aa'

136. LASÆA AFF. SUBORBICULARIS MONT.

Pl. III. Figs. 15 *a* and *a'*.

BRAUNS, Geol. Env. Tōkio, p. 43.—WOOD, Crag Moll., II., p. 119.—WEINKAUFF, Conch. Mittel-Meer, I., p. 174.—JEFFREY, Moll. Lightening and Porcup. Exp.—CHALL. Report, Vol. XIII., p 201 and 203.

Ōji (rare).

L. suborbicularis MONT. was found in the Pliocene and Diluvium of Norway, Great Britain, Ireland and Italy; and known as living in the Mediterranean and Adriatic Seas, Indian Ocean, North-west Coast of America, France, Portugal, Piedmont, Naple, Sicily, Spain, Norway and Madeira.

ASTARTIDÆ.

CM13602-3-16aa'
CM13603-3-b

137. ASTARTE JAPONICA TOK.

Pl. III. Figs. 16 *a*, *a'* and *b*.

CM13774
CM13775

Shell trigonal, compressed, thick, equivalved, concentrically ribbed; lunule impressed; ligament external; cardinal teeth existing in each valve; pallial line entire. Length 2.5mm; height 2.4mm.

Shinagawa (rare).

The living species of this genus are chiefly found in arctic regions such as Behring Sea, Ochotsk Sea, Norway, Wellington Channel (North Canada), Kara Sea; but it also occurs in the United States, Great Britain and the Canaries. In Japanese waters not a single specimen belonging to the genus has ever been collected.

138. **CARDITA ROTUNDA** Tok.

Pl. III. Figs. 17 *a* and *a'*.

Shell oval, valves nearly equal in length and height, unequilateral, exceedingly thick; anterior side rounded, posterior shortened and somewhat narrowed; equally rounded on the ventral margin; surface with from eighteen to twenty radial ribs which are crenulated and separated by fine shallow grooves; umbones very prominent and directed anteriorly; margin crenulated; ligament external; hinge teeth two, posterior elongated; pallial line simple; lunule very small, lanceolate.

Length	15mm	14mm	13mm	13mm	9.5mm
Height	15mm	13mm	13mm	13mm	9mm
Breadth	13mm	10mm	10mm	9mm	7mm

In Japan we find two species of *Cardita* which resemble this fossil one. They are *C. ferruginea* A. Adams and *C. vesitata* Deshayes. But the fossil form is distinguished from *C. ferruginea* A. Ad. by having a more rounded shape, more prominent and pointed umbones, and less breadth. *C. vesitata* Deshayes differs from ours in having a very narrow shell (the breadth being only 7.5mm and the length 17mm) and less prominent umbones. *C. ventricosa* Gld. from Vancouver shows great

resemblance to the Japanese form, but the latter is to be distinguished by the thickness of the shell and the prominence of the umbone.

Shinagawa (frequent), Ōji (rare).

Order Asiphonida.

NUCULIDÆ.

CM13609

139. **NUCULA MIRABILIS** HINDS.

BRAUNS, Geol. Env. Tōkio, p. 46.—WOOD, Crag Moll., II., p. 82.—DUNKER, Index Moll. Maris Jap., p. 238.—WOODWARD, Man. Moll. pl. 17, fig. 18.

Shinagawa (frequent).

Living: Tōkyō Bay, Kōbe, Nagasaki and Kagoshima.

This is the species taken by BRAUNS for *Nucula cobboldiæ* Sow. as I am now convinced by an examination of the specimens left by him in the Museum of our Science College.

CM13610
CM13611

140. **NUCULA INSIGNIS** GLD.

BRAUNS, Geol. Env. Tōkio, p. 46.—GOULD, Otia Conch., p. 175.—WOOD, Crag. Moll., II., p. 82.—WOODWARD, Man. Moll., p. 117.

Shinagawa (abundant); Oji (abundant).

Living: Hakodate, and East Coast of Japan at 37° N. Lat.

This species was also taken by BRAUNS for *N. cobboldiæ* Sow.

CM13612
CM13613

141. **LEDA CONFUSA** HANLEY.

BRAUNS, Geol. Env. Tōkio, p. 49.—LISCHKE, Jap. Meeres-Conch., III., p. 109.

Ōji and Shinagawa (rare).

Living: Tōkyō Bay, Enoshima (Sagami), Hakodate and China Sea.

142. YOLDIA LANCEOLATA J. Sow.

Pl. III. Fig. 18.

BRAUNS, Geol. Env. Tōkio, p. 47.—WOOD, Crag. Moll., II., p. 88., and suppl., p. 115.—Arch. für Naturg., 51. I., 1885, p. 14 and 256.— JEFFREY, Moll. Lightning and Porcup. Exp.

Synonym.—*Y. arctica* BROD.

Ōji (rare).

Pliocene—Red Crag (Brawdsey) and Mam. Crag (Chillesfold).

Diluvium—Norway, Sweden, Scotland and N.E. America.

Living in the circumpolar regions of North Atlantic and Pacific Ocean, and well known as a boreal species:—Nova Zembla, Jenissei, Iceland; Metschigmen Bay and Nytschigane Point in the Behring Sea; Puget Sound; Avatscha Bay, Seniavin Strait; Enoshima (Sagami) and Hakodate.

ARCIDÆ.

143. ARCA INFLATA REVE.

Pl. III. Figs. 19 *a* and *b*.

REEVE, Monogr. Arca, fig. 30.—SCHRENCK, Moll. Amurl. and Nord-Jap. Meeres, p. 578.—Syst. Conch. Cab., VIII. 2.—BRAUNS, Geol. Env. Tōkio, p. 44.—LISCHKE, Jap. Meeres-Conch., I., p. 146, and II., p. 144.—PILSBRY, Cat. Mar. Moll. Jap., p. 148.—MORSE, Shell-Mound of Ōmori, p. 26.—DUNKER, Index Moll. Jap., p. 235.

Synonym:—*A. broughtonii* SCHRENCK; *A. subcrenata* LISCHKE.

Tabata, Ōji and Shinagawa (abundant).

Living: Tōkyo, Tartary (Amur-Liman), East Coast of

Hokkaidō, Hakodate, Enoshima (Sagami), Awa, Miyajima (Aki), Loochoo Is., Philippines and Kingsmill Is.

CM13618-4-1a
CM13619-4-1b
CM13620
CM13621
CM13622

CM13787
CM13788
CM13789
CM13790

144. ARCA TENUIS Tok.

Pl. IV. Figs. 1 *a* and *b*.

This species which greatly resembles *A. inflata* Rve., has hitherto been taken for the full-grown form of *A. subcrenata* Lke. But the full-grown specimens of *Arca tenuis* Tok. show both valves quite equal in shape and with no marginal crenulations caused by ribs. The distinctions from *A. inflata* Rve. are the following:

1. The shell is more pointed at the antero-dorsal edge.
2. The shell is thinner.
3. The umbones are wider apart and not abruptly pointed as in *A. inflata* Rve.; sometimes they are slightly depressed at the middle.
4. The shell surface slopes towards the posterior edge, gradually and not suddenly.
5. The breadth of the shell is generally less than in *A. inflata* Rve.
6. The ligamental area is decidedly narrower.

		Length	Height	Breadth	No. of ribs.
A. inflata Rve.	(Tōkyo)	87mm	70mm	54mm	37
	(„)	71mm	58mm	49mm	38
	(„)	39mm	31mm	28mm	31
	(„)	78mm	63mm	51mm	39
	(Enoshima)	90mm	70mm	58mm	36
	(Loochoo Is.)	60mm	48mm	38mm	39

		Length	Height	Breadth	No. of ribs.
A. tenuis Tok.	(Ōji)	91mm	72mm	60mm	40
	(„)	95mm	76mm	66mm	48
	(Shinagawa)	90mm	69mm	64mm	45
	(„)	96mm	78mm	60mm	44

Tabata, Shinagawa and Ōji (frequent).

145. ARCA GRANOSA Linné.

Pl. III. Fig. 20.

Brauns, Geol. Env. Tōkio, p. 66.—Morse, Shell-Mound of Ōmori, p. 26.—Lischke, Jap. Meeres-Conch., I., p. 145.—Pilsbry, Cat. Mar. Moll. Japan, p. 148.—Sowerby, Genera rec. and foss. Shells.—Reeve, Monogr. Arca, fig. 15.—Syst. Conch. Cab., VIII. 2, p. 38.—Petermann's Geogr. Mittheil., X., XI., XII.

Tabata (frequent).

Diluvium—Tempé (South Celebes).

Found in Neolithic Shell Mounds, but now extinct in Tōkyō Bay.

Living: Enoshima (Sagami), Tottori, Imō (Bicchū), Okayama, Nagasaki, Hyakwanzaki (Higo), Cochin China, Chi-fu, Philippines, Singapore, Cape St. Jacques,, Ceram, Celebes, Tranquebar, Nicobar, Java, Mergui and E. Indies.

146. ARCA KAGOSHIMENSIS Tok.

Pl. III. Figs. 21 *a* and *b*.

Shell small, solid, oblong, tumid; anterior side rounded; posterior subtruncated; surface sculptured with from thirty-one to thirty-four finely granulated radial ribs, with interstices broader than the ribs; umbones slightly directed anteriorly; teeth numerous.

Length	Height	Breadth	No. of ribs.
26mm	20mm	18mm	31
15mm	12.5mm	12mm	34

Arca troscheli DKR. strongly resembles this species, but the anterior and posterior edges of the dorsal margin are more prolonged, and the number of ribs is only twenty four in a specimen of 22mm length.

Ōji (rare).

The living specimens of this species were collected at Kagoshima.

(R) CM13626-3-22a b

147. ARCA *α* SP.

Pl. III. Figs. 22 *a* and *b*.

The present form seems to be a young of some species of *Arca*. It is only rarely found at Ōji and is characterized by the beaked shape, the form of the postero-dorsal angle, the very small ligamental area and the oblique teeth.

Living specimens were collected near Misaki (Sagami). Length 9mm; height 8mm; breadth 7mm.

(R) CM13627

148. ARCA *β* SP.

This species frequently found at Ōji is nearly rectangular, the breadth very small and the posterior portion of the shell much elongated. Length 15mm; height 9mm; breadth 7.5mm. Like the preceding it seems to be a young specimen of some species of *Arca*.

(R) CM13628
(R) CM13629

149. ARCA *γ* SP.

This species abundantly found at Ōji, but rare at Shinagawa, has a nearly rectangular shape at the dorso-anterior edge;

the posterior half of the dorsal margin is also much produced and straight, giving a distinctly truncated shape at the posterior side. The umbones are sunken at the middle. It may however be a young form of some other species of *Arca*.

150. ARCA RECTANGULARIS Tok.

Pl. III. Figs. 23 *a*, *b* and *c*.

Shell subquadrate, gaping anteriorly and posteriorly; anterior side short, distinctly truncate, the posterior surface of the shell distinctly marked off from the anterior; dorsal side almost straight, angulate at the antero-dorsal margin; ventral margin curved in the middle; surface with fine granulated radial ribs; hinge linear, straight, formed of a large number of small pectinated teeth; ligament external, attached on a very broad lozenge-shaped area between the beaks; beaks high, rather wide apart. Length 15^{mm}; height 7^{mm}; breadth 11.5^{mm}.

Our species differs slightly from *A. navicularis* Brug. found in the Indian Ocean and the Philippines by its thicker shell and more numerous ribs in the anterior part. *A. noæ* Linn. differs from ours, firstly, in its size and in the shape of the posterior side, secondly in having more than thirty ribs without intermediate riblets, and thirdly in the form of the posterior portion of the internal surface. *A. maculata* Rve. much resembles the Japanese species, but its antero-dorsal margin is almost rectangularly truncated.

Shinagawa (very rare).

The living specimens were collected at Hakodate.

151. PECTUNCULUS ALBO-LINEATUS Lischke.

Brauns, Geol. Env. Tōkio, p. 45.—Wood, Crag Moll., II., p. 66, and suppl. p. 43.—Lischke, Jap. Meeres-Conch., III., p. 108.

BRAUNS took this species as identical with *P. glycimeris* L. from the Mediterranean Sea and Great Britain, but these two species seem to me to have many points of difference. Firstly, *P. glycimeris* L. is quite orbicular and equilateral, having the same dimensions in length and height, while our species is oval, and inequilateral, the length being greater than the height; secondly, *P. glycimeris* L. has a broader ligamental area; thirdly, the breadth is decidedly less in *P. albo-lineatus* LKE. than in *P. glycimeris* L.

Ōji (very abundant), Shinagawa (frequent).

Living: Tōkyō, Possjet Bay, Hakodate, Kitami, Bekkai (Hokkaidō), Aomori, Kii, Izugahara (Tsushima), Tosa and Fusan (Corea).

152. **LIMOPSIS WOODWARDI** A. ADAMS.

BRAUNS, Geol. Env. Tōkio, p. 57.—DUNKER, Index Moll. Maris Jap., p. 237.—Rep. Chall. Exp., Vol. XIII., p. 256.—WOOD, Crag Moll., II., p. 70.

BRAUNS determined the specimens of this species abundantly found at Ōji as *L. aurita* BR. hitherto found in the Crag and the Miocene of North Germany and the Sub-appennine formation, and said that this still living species only known from the N. W. Coast of Britain had been found neither in the Pacific Ocean, nor in the East Indian Seas. But by a careful study I have found many differences between them: firstly, the umbones in *L. aurita* BR. are not central but turned forwards, thus giving an oblique inequilateral outline to the shell; secondly, the breadth is greater in *L. aurita* BR.; thirdly, *L. woodwardi* A. AD. is distinctly angular at both edges of the dorsal side, while in *L. aurita* BR. they are rounded. Beside these signi-

ficant differences, a still more important distinction is that *L. aurita* BR. has a nearly smooth surface.

Shinagawa (very abundant).

Living in Japan.

MYTILIDÆ.

153. MODIOLA MODIOLUS LINNÉ.

Pl. III. Fig. 24.

REEVE, Monogr. Modiola, fig. 2.—Syst. Conch. Cab., VIII. 3, p. 93.—WOOD, Crag Moll., II., p. 57.—PILSBRY, Cat. Mar. Moll. Japan, p. 139.—MIDDENDORF, Mal. Ross., II., p. 21.—Verh. Russ-Kais. Miner. Gesell. St. Petersburg, II series, XXXVIII Band, I. 1900.

Synonym:—*M. papuana* LAM., *M. vulgaris* FLEMING; *M. barbata* L.; *Mytilus umbilicatus* PENNANT; *M. curtus* PENNANT; *M. curvirostratus* DA COSTA.

Tabata (very rare).

Pliocene—Red Crag (Sutton) and Mamm. Crag (Postwick, Brindlington).

Post-pliocene—White Sea and the western part of Murman Sea.

Living: Tōkyō, Hakodate, Setouchi (Inland Sea); Sitcha Is.; St. Paul Is. and Kadjak in Behring Sea; Kildrin Is. in Russ. Lapland, Russia; whole North Atlantic Coast of Europe and America—North Seas, Scarborough (England), Neeah Bay, Kinnibei Floro (Norway), Eastport (Maine U.S.), New England; and Mediterranean Sea.

154. MODIOLA AFF. JAPONICA DKR.

Pl. III. Figs. 25 *a* and *b*.

REEVE, Monogr. Modiola,—Syst. Conch. Cab., VIII. 3, p. 130.

Shinagawa (rare).

Living specimens were collected near Tōkyō and Hakodate.

(12) CM13636

PINNIDÆ.

155. **PINNA** SP.

Only found as fragments at Ōji.

LIMIDÆ.

(2) CM13637-3-26ab

156. **LIMA** AFF. **JAPONICA** A. ADAMS.

Pl. III. Figs. 26 *a* and *b*.

HUTTON, New Zealand Moll., p. 172.

Shinagawa (rare).

Living specimens were collected near Hakodate, and also 3 miles off Misaki (Sagami). *Lima japonica* A. ADAMS was found near Stewart Is. and also in Japan.

(2) CM13638-3-27a-b

157. **LIMA HAKODATENSIS** TOK.

Pl. III. Figs. 27 *a* and *b*.

Shell distinctly inequilateral, and thin; posterior side produced, anterior slightly angular; dorsal margin straight; surface with numerous rather indistinct scaly radial ribs which are crossed by a few indistinct concentric lines. Length 26^{mm}; height 32.5^{mm}; breadth 20^{mm}.

Shinagawa (frequent).

Living specimens were collected at Hakodate.

(4) CM13639
(2) CM13640

PECTINIDÆ.

158. **PECTEN LAQUEATUS** SOW.

BRAUNS, Geol. Env. Tōkio, p. 48.—LISCHKE, Jap. Meeres-Conch., I., p. 167, and II., p. 157.—SCHRENCK, Moll. Amurl. and Nord-Jap. Meeres.—PILSBRY, Cat. Mar. Moll. Jap., p. 143.—Report Chall. Exp., Vol. XIII., p. 307.

Ōji (frequent), Shinagawa (rare).

Living specimens are very common in Japan, but their occurrence is limited to the western coast of the North Pacific Ocean and to the north-west coast of N. America, probably not extending far from California. In Japan they occur in the following places: Tōkyō Bay, Misaki and Koajiro (Sagami), Ajiro (Izu), Chōshi (Shimōsa), Hakodate, Sapporo, Enoura (Suruga), Takashima (Kii), Futamiga-ura (Ise), Sakai (Settsu), Ōsaka, Kōbe, Tsuruga (Echizen), Tomo (Bingo), Awaji, Miyajima (Aki), Gōnoura (Iki), Nagahama (Iyo), Asamiwan (Tsushima), Nagasaki, Kanze (Satsuma), Kagoshima, and Loochoo Is.

CM13641-4-2
CM13642.

159. **PECTEN LÆTUS** GLD.

Pl. IV. Fig. 2.

LISCHKE, Jap. Meeres-Conch., I., p. 169, and II., p. 157.—SCHRENCK, Moll. Amurl. and Nord-Jap. Meeres, p. 603.—BRAUNS, Geol. Env. Tōkio, p. 57.—PILSBRY, Cat. Mar. Moll. Jap., p. 143.

Shinagawa and Ōji (frequent).

Living: Tōkyō Bay, Jōgashima (Sagami), Chōshi (Shimōsa), Hakodate, Rikuzen and Nagasaki.

CM13643-4-1
CM13644-4-2
CM13645-4-3
CM13646-4-4
CM13647-4-5
CM13648-4-6
CM13649-4-7
CM13650-4-8
CM13651-4-9
CM13652-4-10
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160. **PECTEN TOKYOENSIS** TOK.

Pl. V. Figs. 1–10.

BRAUNS, Geol. Env. Tōkio, p. 48.—SOWERBY, Thes. Conch., I., p. 65.—Syst. Conch. Cab., VIII. 2, p. 256.

Shell very large reaching 150^{mm} in length, equilateral, inequivalved, thin, nearly round in outline. Right valve strongly swollen; surface with undulating ribs and furrows; ribs very

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broad without any distinct limit toward the interstices; they number three or more near the central part of the shell, where each rib is broadest at the ventral margin of the shell, being about 3^{mm} in breadth, and again divided into three or more riblets; near the anterior and posterior portion of the shell broad ribs are separated by a very narrow interspace, and a few coarse lines of growth are visible; in the younger specimens, the furrows and ribs are more sharply bordered, the interspace being wider; ears nearly symmetrical, radially ribbed, the anterior one only slightly notched. Left valve almost flat, only very slightly swollen; ribs few, eight in number, sharp and keel-like beneath the umbones, but becoming less sharp near the ventral margin; interspaces broad and smooth, with very fine concentric scaly lines; ears radiately striated, the anterior one higher and furnished with broad grooves.

	Length	Height	Breadth
(1) Right valve	140^{mm}	136^{mm}	30^{mm}
(2) „	114^{mm}	114^{mm}	22^{mm}
(3) „	55^{mm}	53^{mm}	10^{mm}
(4) „	37^{mm}	35^{mm}	8^{mm}

This species which is abundant at Ōji, and in some Tertiary districts in Japan, was identified by BRAUNS with *Pecten plica* L., but according to my own observations, there exist many points of difference between the two. *P. plica* L. is a small shell with a very small auricle, nearly equal blunt radial striations, and only three central ribs and two much smaller ones in each valve. These characters alone are sufficient to prove that they do not belong to the same species.

CM13694-4-3

161. PECTEN AFF. IRRADIANS LAM.

Pl. IV. Fig. 3.

SOWERBY, Thes. Conch., I., p. 20.—Syst. Conch. Cab., VII. 2, p. 77, and p. 208.

Shinagawa (very rare).

CM13675-4-4

162. PECTEN PULCHELLIMUS TOK.

Pl. IV. Fig. 4.

Shell small, round, radially ribbed; ribs sixteen in number, without any distinct limit toward the interstices; surface without concentric ribs, but with a few undulating lines of growth; ears unequal, the anterior one more prominent, radially striated, with a distinct notch below, the posterior one serrated. Length 9^{mm}; height 10^{mm}.

Ōji (rare).

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ANOMIIDÆ.

163. ANOMIA AFF. PATELLIFORMIS LINNÉ.

BRAUNS, Geol. Env. Tōkio, p. 49.—WOOD, Crag Moll., II., p. 11.—JEFFREY, Moll. 'Lightening' and Porc. Exp.

Tabata and Ōji (frequent), Shinagawa (rare).

Living specimens were collected near Misaki (Sagami).

A. patelliformis L. is found as a fossil in the Cor. Crag (Sudbourn and Sutton), Red Crag (Sutton, Bawdsey, and Walton Naze), Pliocene and Diluvium of Scandinavia, Great Britain, Ireland, Belgium, Vienna Basin and Italy. It is also known to live in Britain, Scandinavia, Faroe Is., Mediterranean and Adriatic Sea, N. W. America, and probably in Japan.

OSTREIDÆ.

164. OSTREA GIGAS Thunb.

Pl. IV. Figs. 5 *a* and *b*.

Brauns, Geol. Env. Tōkio, p. 48.—Lischke, Jap. Meeres-Conch., I., p. 174, and II., p. 160, and III., p. 114.—Schrenck, Moll. Amurl. and Nord-Jap. Meeres, p. 475.—Reeve, Monogr. Ostrea Sp., 21.

Synonym :—*O. talienwanensis* Cross; *O. laperousii* Schrenck.

Ōji and Shinagawa (frequent).

Living: Tōkyō Bay, Chōshi (Shimōsa), Wadanohara (Rikuzen), Nagasaki, Tchifu, and Talienwan.

165. OSTREA DENSELAMELLOSA Lke.

Pl. IV. Figs. 6 *a* and *b*.

Brauns, Geol. Env. Tōkio, p. 58.—Morse, Shell-Mound of Ōmori.—Lischke, Jap. Meeres-Conch., I., p. 177.

Ōji and Shinagawa (frequent).

Living: Tōkyō, Sumoto (Awaji), South Shikoku, Bungo, and Loochoo Is.

166. OSTREA IRREGULARIS Tok.

Pl. IV. Figs. 7 *a* and *b*.

Shell small, very irregular, convex; valves nearly equal in length and breadth; surface plaited or spinous, somewhat foliated, concentric striations usually invisible.

Tabata (very abundant).

Living specimens were collected near Misaki (Sagami).

Vermes.

Brachiopoda.

TEREBRATULIDÆ.

CB ②CB 13684-4-8ab

WALDHEIMIA GRAYI DAVIDSON.

Pl. IV. Figs. 8 *a* and b.

BRAUNS, Geol. Env. Tōkio, p. 58.—DAVIDSON, Jap. Brachiopod, p. 300. —DAVIDSON, Monogr. Rec. Brachiopoda, p. 54.

Shinagawa (very rare).

Living: Hakodate, Hitachi, Matsushima (Rikuzen), and Strait of Corea.

CB CB 13685-4-9-ab

WALDHEIMIA ELONGATA TOK.

Pl. IV. Figs. 9 *a* and b.

The shell is more elongated than in the preceding species, with apex more prominent and projecting; the shape of the hinge-portion of the shell is also quite different; ribs less distinct; foramen complete.

Shinagawa (very rare).

LINGULIDÆ.

CB ②CB 13686-4-10

LINGULA HIANS SWAINS.

Pl. IV. Fig. 10.

DAVIDSON, Monogr. Rec. Brachiopoda, p. 216.

Ōji (very rare).

Living: Enoshima and Moroiso (Sagami), China Sea, Australia.

Echinodermata.

Echinoidea.

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TEMNOPLEURUS TOREUMATICUS KLEIN.

A. AGASSIZ, Rev. Echini, p. 463.—A. AGASSIZ, Report Chall. Exp., p. 108.—A. AGASSIZ. List Echinoderm &c. (Bull. Mus. Comp. Zool. Harvard Coll., Vol. I., 1863).—BELL, Observ. Charac. Ech. &c. (Proc. Zool. Soc. London, 1880, p. 423).—MARTIN, Tertiärschichten auf Java; Anhang p. 1).—DÖDERLEIN, Seeigel Jap. and Liukiu Ins. (Arch. f. Natur., I., 5, 1885, p. 73).—IVES, Echinod. and Arthr. Japan. (Proc. Acad. Nat. Sc. Ph., 1891).

Synonym:—*T. hardwicki* AGASS.; *T. bothyoides* AGASS.; *T. reevesii* A. AGASS.; *Echinus sculptus* LAMK.

Miocene—Java.

Shinagawa and Ōji (frequent).

Living: Tōkyō Bay, Misaki (Sagami), Hakodate, Sendai (Rikuzen), Wakanoura (Kii), Kōbe, Maizuru and Miyatsu (Tango), Tomo (Bingo), Miyatsu (Tango), Nagasaki, Tsuruga (Echizen), Kagoshima, Kamtschatka, Hongkong, North China, Philippines, Arafura Sea, Unalaska, Gulf of Persia, Karrax I., Siam, Ceylon, and East Indies.

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LAGANUM DECAGONALIS LESS.

A. AGASSIZ, Rev. Ech., p. 520.—A. AGASSIZ, Report dredg. Gulf Mexico "Blake."—BELL, Echinod. coll. 'Perguin' and 'Egeria' &c. (Proc. Zool. Soc. London, 1894).—DÖDERLEIN, Seeigel Japan and Liukiu Ins. (Arch. f. Naturg., I., 51 Jahr., 1885, p. 73).—MARTIN, Tertiärschichten auf Java, Anhang p. 3.—DUNCAN, Rev. Genera and Great Group Ech., p. 156.

Synonym:—*L. lesueuri* VAL.; *L. elongatum* AGASS.; *L. australe* GRAY; *Polyaster elegans* MICH.

Miocene—Java.

Shinagawa and Ōji (rare).

Living: Tōkyō Bay, Misaki (Sagami), Wakanoura (Kii) Kagoshima, Hongkong, Philippines, Gasper Strait, Frumanth Bay, Australia, Bay of Bengal, New Caledonia, Torres Strait Amboyna, Tongatabu, Paputi, and Tahiti.

ECHINARACHNIUS MIRABILIS Barn.

A. Agassiz, Rev. Ech., p. 526.—Döderlein, Seeigel Jap. and Liukiu Ins.
Synonym:—*Chætodiscus scultella* Lütk.; *Scutella japonica* Mart.

Shinagawa (rare).

Living: Tōkyō Bay, Misaki (Sagami), Tomo (Bingo), Hakodate, and Otaru (Hokkaidō).

FIBULARIA ACUTA Yosh.

Yoshiwara, Prelim. Notice new Jap. Ech. (Ann. Zool. Jap., Vol. II., Pars II., 1898, p. 57).—Tokunaga, Fossil Ech. Jap. (Journ. Coll. Sc. Imp. Univ. Tokyo Japan, Vol. XVII., Art. 12, p. 7).

As to a fossil the species of *Fibularia* were only found in the Upper Cretaceous and the Eocene.

Ōji (rare).

Living at Misaki (Sagami) and Shigajima (Chikuzen).

Vertebrata.

Vertebrate remains are very seldom met with. If we except indeterminable fragments of bones of fishes we have the following three important species.

MYLIOBATIS Sp.

Pl. VI. Fig. 1.

A part of a tooth of ray-fish was found at Tabata by Prof. Yokoyama. It is one of those flat, rectangular plates, which, when the tooth is perfect, are placed close together, united by suture, and laterally adorned with many small rhombic plates, so as to form a kind of mosaic pavement on both the upper and lower jaws. Our plate measures 30^{mm} in length, 5.5^{mm} in thickness. The inner surface is furnished with twenty-eight ridges and furrows.

The shape of the plate resembles that of the Japanese *M. cornuta* Gthr. found in the sea near Rikuzen and Hizen. But the latter, in which the head is 6^{cm}, the trunk 24.5^{cm} and the tail 35^{mm} long, and which is probably one of the largest forms, a dental plate of only 14^{mm} in length, 3.5^{mm} in width and 2^{mm} in thickness.

ELEPHAS ANTIQUUS Falc.

Pl. VI. Figs. 2–6.

Naumann, Jap. Elephant der Vorzeit, 1881, p. 25.—Brauns, Geol. Env. Tōkio, 1881, p. 24.—Brauns, Ueber Jap. Dil. Saugethiere (Zeitschr. deuts. geolog. Gesells., I., 1883).—Roger, Vez. bischer bekannten fossilen Saugethiere (Naturw. Vereins Schwaben and Neuburg. Augsburg, 1896).—Falconer, Palæontological Memoirs, II., p. 147.—Falconer and Cautley, Fauna antiqua Sivalensis.

Synonym :—*E. namadicus* Falc. and Caut.

This interesting fossil mammal was dug out, in the year 1898, from the lower part of a bluish clay at Tabata. The specimens consist of two molar teeth (Pl. VI. Figs. 2–5) and a splendid tusk (Pl. VI. Fig. 6.) which are now in the Imperial

University of Tōkyō. Subsequently some fragments of skeletons were also collected by Prof. YOKOYAMA and myself.

The molar teeth are both broken at the anterior end. The crown of the larger specimen (Pl. VI. Figs. 2 and 3) exhibits the discs of seven worn ridges, the anterior most being half broken. The anterior five ridges are worn down into transverse discs, but the penultimate one is more slightly worn into two irregular shaped bands, while the most posterior one shows only the summits of five small digitations. The anterior four discs are worn off short, but the others are less so, the degree of wearing gradually diminishing as we go backwards. Each disc is rounded at its lateral terminations, and has a crescentic shape, the anterior enamel boundary being somewhat concave and the posterior convex. The horns of the crescent are bent abruptly forwards. There is a rhomboidal expansion in the middle of the third and fourth discs, which is 1.15^{cm}, measured between the outer surfaces of the enamel. The enamel plates are thick and their outer edges present an appearance of considerable crimpling, caused by the deep vertical grooving of the outer surface. The grinding surface is concave from back to front. The extreme length of the crown surface is 9.2^{cm}, and the width at the first ridge 4^{cm}, at the fourth 5.3^{cm}, and at the last ridge 3.6^{cm}. The greatest height of the tooth is 10.2^{cm}. It is evident that, the tooth, when entire, was composed of about nine ridges, and that it was about 12^{cm} long. The inner side of the tooth is convex as seen in the other specimens of Elephas, and the outer edge concave in the upper view of the crown.

The other specimen (Pl. VI. Figs. 3 and 4.) has a large part of its anterior half broken off. We find in it only three

discs and two posterior less digitated ridges. The two anterior discs are very much abraded, the enamel edge of the succeeding one strongly projecting above them. The penultimate ridge is partly worn and forms separate, transverse or oval bands. The last ridge is almost wholly broken off. The width of the crown at the first ridge is 5^{cm}, while its greatest height is 10^{cm}.

From the general form of the teeth, the shape and number of the ridges, the mode of crimpling of the enamel plates, and other characters, our specimens seem to belong to the third premolar of *E. antiquus* FALC. or *E. namadicus* FALC. and CAUT. Compared with the specimen found at Edobashi in Tōkyō our specimens are much smaller both in the height and length of the crown, but among the specimens described as third premolars of *E. antiquus* FALC. in "*Palæontological Memoirs*," there is one having a crown 12.4^{cm} or even 10.7^{cm} in length. Therefore I am quite justified in referring our two specimens to the third premolar, the larger being probably one belonging to the right side of the upper jaw, and the smaller to the left side of the same.

Furthermore the anterior portion of a tusk (Pl. VI. Fig. 6.) of the same species was dug out from the same locality. It is somewhat curved, with the cross section at the posterior extremity slightly elliptical where it has a diameter of about 9^{cm}.

Hitherto there has been great confusion in the distinction of the two species, *E. antiquus* FALC. and *E. namadicus* FALC. and CAUT. This has been due to the fact that it is very difficult to distinguish them merely by the form and structure of the teeth. In our country, elephants belonging to the above two species have been found at several places. NAUMANN, in his "*Japanische Elephanten der Vorzeit*," identified them with

E. namadicus FALC. and CAUT. found in the Pleistocene of India, while BRAUNS determined them to belong to *E. antiquus* FALC. found in Europe and Northern Asia. According to the latter author all the Japanese elephants are to be taken as Diluvial forms. According to several works relating to these two species it seems to me that there do not exist sufficient characters to separate the Indian form from the European and North Asiatic one. Therefore it will be preferable to follow OTTO ROGER, and to consider them as belonging to one and the same species.

INDETERMINABLE UNGULATE BONE.

Pl. VI. Fig. 7.

Only the articulating portion of a limb of an indeterminable *Ungulate* was found together with *E. antiquus* FALC. at Tabata.

CONCLUSION.

BRAUNS collected the fossils of *Mollusca* and *Brachiopoda* at Ōji, Shinagawa and Surugadai, and described:

from Ōji,

26 *Gastropoda*, 2 *Scaphopoda* and 33 *Polecypoda*;

from Shinagawa,

13 *Gastropoda*, 1 *Scaphopoda*, 21 *Polecypoda* and 1 *Brachiopoda*;

from Surugadai,

7 *Gastropoda*, 1 *Scaphopoda* and 17 *Polecypoda*;

making in all 75 different species from the three localities: thus

33 *Gastropoda*, 2 *Scaphopoda*, 39 *Polecypoda* and 1 *Brachiopoda*.

I myself have collected at Ōji

45 *Gastropoda*, 2 *Scaphopoda*, 48 *Polecypoda* and 1 *Brachiopoda*;

at Shinagawa

47 *Gastropoda*, 3 *Scaphopoda*, 52 *Polecypoda* and 2 *Brachiopoda*;

at Tabata

27 *Gastropoda* and 15 *Polecypoda*;

in total 168 different species, viz.,

87 *Gastropoda*, 3 *Scaphopoda*, 75 *Polecypoda* and 3 *Brachiopoda*.

The following species mentioned by BRAUNS from Ōji, Shinagawa and Surugadai are not found in my collections. This is mainly due to the fact that my determinations are in many cases different from his.

Columbella scripta LINNÉ.; *Mangelia striolata* PHIL.; *Trichotropis coronata* GLD.; *Bulla cylindracea* PENN.; *Dentalium entale* LINNÉ.; *Solen grandis* DKR.; *Lascea rubra* MONT.; *Pectunculus glycimeris* LINNÉ.; *Nucula cobboldiæ* SOW.; *Limopsis aurita* BROC.; *Pecten plica* LINNÉ.; *Scalaria clathratula* MONT.; *Scalaria cancellata* BROC.

Looking at all the species described, it is quite certain that our fossil bearing layers are deposits of a shallow sea.

In settling the question whether our fossil *Mollusca* belong to a fauna, warmer or colder than the living, 117 species out of 165 are to be availed of, for the remainder are either extinct or are such as are very rarely found in a living state.* Among the 117 species I find the following 26 tropical ones:

Rapana bezoar L.; *Triton sauliæ* L.; *Hemifusus ternatanus* GMEL.; *Nassa livescens* PHIL.; *Cancellaria spengleriana* DESH.; *Terebra alveolata* HINDS.; *Pleurotoma oxytropis* SOW.; *Pleurotoma gracilenta* RVE.; *Dolium luteostomum* KÜNSTER; *Sigaretus papilla* GMEL.; *Scalaria immaculata* SOW.; *Scalaria lamellosa* LAM.; *Scalaria acuminata* SOW.; *Turbonilla fusca* A. AD.; *Pyramidella spirata* A. AD.; *Cerithium kochii* PHIL.; *Potamides fluviatilis* PORT. and MICH.; *Potamides incisus* HINDS and JACQ.; *Turbo granulatus* GMEL.; *Trochus amussitatus* GLD.; *Trochus argyrostomus* GMEL.; *Dentalium octogonum* LAMK.; *Venus foliacea* PHIL.; *Cytherea meretrix* L.; *Cardium muticum* RVE.; *Arca granosa* L.

And to the arctic species belong the following seventeen:

Neptunea despecta LINNÉ.; *Buccinum undatum* LINNÉ.; *Natica clausa* DESH.; *Trichotropis unicarinata* BROD.; *Solen krausensternii* SCHRENCK; *Panopœa generosa* GLD.; *Mactra sachalinensis* SCHRENCK; *Mactra sulcataria* DESH.; *Tressus nuttali* CONRAD; *Tellina tenera* SAY; *Macoma nasuta* CONRAD; *Venus stimpsoni* GLD.; *Cytherea chinensis* CHEM.; *Tapes rigidus* GLD.; *Cardium californiense* DESH.; *Astarte japonica* TOK.; *Yoldia lanceolata* SOW.

* It must be acknowledged that our three localities belong to the same facies. The reasons are explained later on.

The following seven species are found in latitudes both north and south of Japan, and for the most part are world-wide in distribution:

Martesia striata LINNÉ; *Saxicava arctica* DESH.; *Saxidomus nuttali* CONRAD.; *Dosinia exoleta* L.; *Tapes decussata* DKR.; *Lucina borealis* L.; *Modiola modiolus* LINNÉ.

The remaining ones are those found only in Japan (or in the same latitude in Eastern Asia).

(I) Species chiefly found south of Tōkyō:

Fusus nodoso-plicatus DKR.; *Fusus simplex* E. A. SMITH; *Nassa japonica* AD.; *Erato callosa* AD. and RVE.; *Columbella martensi* LKE.; *Columbella pumila* DKR.; *Cancellaria nodulifera* SOW.; *Terebra subtextilis* E. A. SMITH; *Terebra* cfr. *serotina* AD. and RVE.; *Pleurotoma subauriformis* E. A. SMITH; *Pleurotoma raricostata* SMITH; *Natica ampla* RVE.; *Odostomia fasciata* DKR.; *Odostomia planata* GLD.; *Pyramidella cinctella* A. AD.; *Acmæa conulus* DKR.; *Tornatina exilis* DKR.; *Dentalium* cfr. *weinkauffi* DKR.; *Nœera gouldiana* HINDS; *Myodora fluctuosa* GLD.; *Mactra veneriformis* DESH.; *Mactra crossei* DKR.; *Tellina nitidula* DKR.; *Tellina yedoensis* LKE.; *Tellina rutile* DKR.; *Tellina nipponica* TOK.; *Lutraria ovalis* TOK.; *Cyclina chinensis* CHEM.; *Tapes euglyptus* PH.; *Nucula mirabilis* HINDS; *Arca kagoshimensis* TOK.; *Ostrea denselamellosa* LKE.

(II) Species chiefly found north of Tōkyō:

Trophon exiguus TOK.; *Volutharpa perryi* JAY; *Nucula insignis* GLD.; *Terebra bipartita* GLD.; *Cryptodon flexuosus* MONT.; *Arca rectangularis* TOK.; *Modiola japonica* DKR.; *Lima hakodatensis* TOK.

(III) Species found both north and south of Tōkyō.

Murex falcatus SOW.; *Fusus perplexus* A. AD.; *Siphonalia cassidaræformis* RVE.; *Eburna japonica* SOW.; *Clivella consobrina* LKE.; *Pleurotoma principalis* PILSBRY; *Natica papyracea* BUSH.; *Potamides zonale* BRUG; *Rotella costata* LESSON; *Trochus imperialis* A. AD.; *Trochus*

japonicus A. AD.; *Ringicula arctata* GLD.; *Solen gouldi* CONRAD; *Macha divaricata* LKE.; *Leda confusa* HANLEY; *Arca tenuis* TOK.; *Pectunculus albo-lineatus* LKE.; *Limopsis woodwardi* A. AD.; *Pecten laqueatus* SOW.; *Pecten lætus* GLD.; *Ostrea gigas* THUNB.

(IV) Species found only near Tōkyō or in places of nearly equal latitude in Eastern Asia:

Pleurotoma reciproca GLD.; *Pyramidella eximia* LKE.; *Fissurella lischkei* PILSBRY; *Lasæa striata* TOK.; *Gari radiata* DKR.; *Ostrea irregularis* TOK.

The following list shows the distribution of the species living in the sea near Tōkyō.

(A) Tropical species (114 sp.)

Arca krausii PHIL.—East coast of Japan, Tōkyō to Awaji, Nagasaki and Africa.

* *Arca granosa* L.—Enoshima, Nagasaki, Hyakwanzaki, Tchifu, Singapore, Philippines, Cape St. Jacques, Cochin China, Ceram, Celebes, Tranquebar, Nicobar, Java, Mergui, E. Indies.

Cancellaria asperella LAM.—Yokohama, Inland Sea, Kiushū, Tōkyō, Tomo, China, Philippines.

* *Cancellaria spengleriana* DESH.—Enoshima, Misaki, Shimoda, Chōshi, Kōbe, Nagasaki, Wakanoura, Setouchi, China, Philippines, Australia.

Cantharus undosa LINNÉ.—Yokohama, Molucca.

Collumbella scripta LAM.—Ōshima, Tōkyō Bay, Nagasaki, Ukushima, Gotō Is., Philippines, Indian Ocean, Australia, Polynesia.

Columbella misera SOW.—Nagasaki, Gotō Is., Kamakura, Tōkyō Bay, Ise, N. Shore of Tango. New Zealand, Paumotus, Sandwich Is.

Cassis strigata GMEL.—Tōkyō Bay, Setouchi, Sagami coast, China, Molucca, Philippines.

Cypræa arabica LINNÉ.—Tōkyō, Tago, Samoa, New Caledonia, Australia, Indian Ocean.

Cypræa tigris LINNÉ.—Tōkyō, Satsuma, Pacific and Indian Ocean.

Cypræa macula ADAMS.—Australia, Awa (or Bōshu), Tsuruga, Ōshima, Kii, Enoshima (Ōshima), Formosa, N. Coast of Tango.

Cypræa felina GMEL.—Nagasaki, Kino-Ōshima, Misaki, Kii, Niijima, Formosa, Indian Ocean.

Cyprœa lutea GRON.—Awa (or Bōshu), New Caledonia, Australia.

Cyprœa poraria L.—Awa (or Bōshu), Formosa, Ogasawarajima, Hachijō, Fiji, Australia, New Caledonia.

Cyprœa onoyx LINNÉ.—Tateyama, Tanabe, Tsu-saki, Ceylon, Philippines.

Cyprœa lynx LINNÉ.—Tōkyō, Indian Ocean, Australia, New Caledonia, Red Sea.

Cyprœa claudestina LINNÉ.—Tateyama, Tsushima, Kino-Ōshima, Ceylon, Australia.

Cyprœa miliaris GMEL.—Tōkyō Bay, N. S. Wales.

Cyprœa erosa LINNÉ.—Yokohama, Tanabe, Takanoshima, Pacific and Indian Ocean.

Cyprœa staphylœa LINNÉ.—Tateyama, Satanomisaki, Takanoshima, Pacific and Indian Ocean.

Cyprœa helvola L.—Awa (or Bōshu), Formosa, Ogasawarajima, Niijima, Indian Ocean.

Cyprœa flaveola L.—Awa (or Bōshu), Formosa, Australia.

Cyclostrema micans A. AD.—Tōkyō Bay, Inland Sea, Singapore, Australia.

* *Cerithium kochii* PHIL.—Misaki, Banda, Kominato, Katanoura, Tango, Nagasaki, China, Port Jackson, Van Dieman's Is., E. coast of Africa.

Clementia papyracea GRAY.—Tateyama, New Holland, Molucca, Australia, (Torres Straight, Moreton Bay &c.).

Cardita variegata BRUG.—Yokohama, Hongkong, Cape of Good Hope to Indian Ocean.

Cardium apertum CHEM.—Tōkyō Bay, Hongkong, Luzon, East Coast of the Philippines.

* *Cardium muticum* RVE.—Tōkyō, Nagasaki, E. coast of Luzon, East Indies.

* *Cytherea meretrix* L.—Tōkyō, Awa (or Bōshu), Misaki, Yokohama, Higo, Fushiki, Hakodate, Naruto, Nagasaki, Kuwana, Gōnoura, Kagoshima, Riukiu, Formosa, East Indies, Canton River, Tchifu, North China, Siam, Philippines, Singapore, Amboina, Ceram, Temimber Is., Molucca, Nicobar, Ceylon, Mazatlan, Singhai, Hongkong, Labuan, Java.

Donox bicolor GMEL.—Yokohama, Nagasaki, Negro Is., Zanziber.

Donox australis LAM.—Awa (or Bōshu), Australia.

Donox dysoni DESH.—Tōkyō Bay, Yokohama, Nagasaki, Siam, Indian Ocean.

* *Dolium leuteostomum* KÜNSTER.—Tōkyō, Misaki, Nagasaki, Awa, Hakodate, Satsuma, Indian Ocean.

* *Dentalium octogonum* LAMK.—Tōkyo, Enoshima, Kii, Nagasaki, Hakodate, China, Ceylon.

Erato lachryma GRAY.—Tōkyo, Kamakura, Australia.
Eulima cumingii SOW.—Tōkyo, Sandwich Is., Lord Hood's and Viti Is.
Eulima bilineata AD. and RVE.—Tōkyo, Uraga, Setouchi, Sooloo Sea.
Fissurella sinensis A. AD.—Awa (or Bōshu), Tabu-shima, China Sea, Singapore.
* *Hemifusus ternatanus* GMEL.—Tōkyo, Yokohama to Kii, Indian Ocean, Philippines.
Hipponyx pilosus DESH.—Yokohama, Nagasaki, Natal Coast, Cape of Good Hope, Loanda, Guadeloupe, Mazatlan, Galapagos, Polynesia.
Haliotis grunneri PHIL.—Tōkyo, Nagasaki, China, Australia.
Ianthina globosa SWAINS.—Tōkyo Bay, Mazatlan, Mauritius, Atlantic Ocean, Mediterranean Sea.
Latirus polygonus GMEL.—Tateyama, Ticao Is., Mascarene Is., Central Pacific, Red Sea.
Littorina malaccana PHIL.—Tōkyo, Philippines.
Lyria nucleus LAM.—Tateyama, Okinoshima, N.E. Australia.
Leucozonia smargdula LINNÉ.—Yokohama, Philippines, Viti Is.
Lithodomus curtus LIS.—Tōkyo Bay, Misaki, Madrepore, China Sea.
Murex sinensis RVE.—Tōkyo, Tateyama, Nagasaki, China, Indian Ocean.
Murex adustus LAM.—Tateyama, Tsushima, Ōshima, Philippines, Indian Ocean.
Murex speciosus A. AD.—Yokohama, Seneganbia.
Magilus rostratus A. AD.—Tōkyo Bay, Kino-Ōshima, Madrepore, Red Sea, Bourbon Is.
Macoma truncata JONAS.—Tōkyo Bay, Red Sea, Philippines.
Mytilus atratus LISCHKE.—Tōkyo Bay, South Coast of Ise, Nagasaki, China, Port Jackson in Australia.
Modiola nitida HANLEY.—Tōkyo Bay, Inland Sea, Port Essington in Australia.
Modiola arcuatula HANLEY.—Tōkyo Bay, Singapore, Philippines, Java, Malacca.
Nassa suturalis LAM.—Yokohama, Philippines, Australia, New Caledonia.
Nassa papillosa L.—Yokohama, Central Polynesia, Philippines.
Nassa gemmulata LAM.—Tōkyo Bay, Kii, Goza Harbour, Kagoshima, Philippines, Sunda Strait.
* *Nassa livescens* PHIL.—Tōkyo, Nagasaki, China Sea, Manila, Java.
Nassa dominula TAP.—Yokohama, Gotō Is., East Indies.
Natica powisianus RECL.—Yokohama, Nagasaki, China, Moluccas.
Natica colliei RECL.—Tōkyo, Nagasaki, Hakodate, Australia.

Natica mamilla LINN.—Tōkyo Bay, East Indies, Philippines, New Caledonia, Central Polynesia.

Nerita adspersa REC.—Tōkyo, East Indies to Central Pacific.

Nerita crepidularia LAM.—Tōkyo Bay, Yokohama, China, Philippines, Indian Ocean, India to Malayan Archipelago, New Caledonia.

Oliva fulgurata AD. and RVE.—Tōkyo, Yamada Harb., Kamakura, Nagasaki, N. Coast of Tango, China Sea, Philippines.

Ostrea folium GM.—Misaki, Wakayama, Indian Ocean.

Ostrea cucullæta BORN.—Yokohama, E. Coast of Sagami, Misaki, Nagasaki, Nicobar, Ceylon, Natal Coast, Indian Ocean.

Ostrea plicata CHEM.—Misaki, Kii, West Indies.

Pleurotoma unedo VAL.—Tōkyo Bay, Misaki, Nagasaki, East Indies, Indian Ocean.

Pleurotoma tuberculata GRAY.—Tōkyo Bay, Hongkong, Java, Australia.

* *Pleurotoma oxytropis* SOW.—Tōkyo, Sagami, Ōshima, Mauritius, Panama to Gulf of California.

Pleurotoma gracilenta RVE.—Tōkyo, Kamakura, E. Coast of Kii, Philippines, N. Australia.

Peristernia pulchra RVE.—Kominato in Awa (or Bōshu), Philippines, Indian Ocean, Red Sea.

Purpura alveolata RVE.—Awa (or Bōshu), Kamakura, Oki Is., Seta Coast, Ōshima, Nagasaki, Philippines, Zanziber, Paumotus, Muscat Bay, Indian Ocean.

Pyrula reticulata LAM.—Tōkyo, Nagasaki, Kuroshima, Matsuenohama, E. Indies, Indian Ocean.

* *Potamides fluviatilis* PORT. and MICH.—Tōkyo Bay, Nagasaki, China, Hongkong, Philippines, Singapore, Borneo, Australia, Mergui, India.

Pyramidella pulchella A. AD.—Tōkyo Bay, Goza Harbour, Mososeki, Red Sea.

* *Patella amussitata* RVE.—Enoshima, Kii, Fukushimamura in Tosa, Bonin Is., China, Chifu, Philippines.

Patella stellæformis RVE.—Tōkyo, Tsushima, Japan to Port Jackson, S. Australia, Eastwards to Viti Cook's and Society Archipelago.

Pecten plica LINNÉ.—Misaki, Takashima, Nagasaki, Ceylon, China Sea.

Pecten subpricatus SOW.—Misaki, Shima, Kagoshima, Philippines.

Pecten squamatus GMEL.—Tōkyo Bay, Sagami Sea, Zebu Is., Philippines.

Pecten irregularis SOW.—Banda and Nemoto in Awa (or Bōshu), Takashima, East Indies.

Pinna nigrina LAM.—Tōkyo, Ōshima (Ōsumi), Philippines, Red Sea.

Rapana bulbosa SOL.—Yokohama, China, Philippines.

Rissoina subfuniculata NEW.—near Kachiyama in Awa (or Bōshu), Persian Gulf to Singapore.

* *Rapana bezoar* L.—Tōkyo, Yokohama, Misaki, Shimoda, Hakodate, Ise, Kōbe, Higo, Nagasaki, Kagoshima, China, Philippines.

Siphonalia hinnulus AD. and RVE.—Tateyama, Tsu-saki, Sooloo Sea.

Strombus aratrum MART.—Tōkyo Bay, Society Is., Australia.

Strombus succinctus L. var. *robustus* Sow.—Tateyama, Okino-Ōshima, Hongkong, Philippines, Indian Ocean.

Strombus luhuanus LINNÉ.—Tōkyo, Nagasaki, Takanoshima, Tango, New Caledonia, Philippines, West Coast of Australia, Port Jackson, N. S. Wales, Port Dorey in New Guinea, Molucca, Java, Bourbon Is.

Siliquaria cumingii MORCH.—Tōkyo Bay, Nemoto in Awa (or Bōshu), Philippines.

Siliquaria australis QUOY.—Tōkyo, Nemoto in Awa (or Bōshu), Australia.

Sigaretus undulatus LIS.—Tōkyo, Yokohama, China, Strait of Malacca.

* *Sigaretus papilla* GMEL.—Tōkyo Bay, Yokohama, Nagasaki, Okino-shima in Kii, Niijima, China, Chifu, Philippines, Tranquebar, Molucca, Negro Is., Red Sea.

Scalaria aculeata Sow.—Tōkyo Bay, Tsushima, Hongkong, Malacca, Philippines.

Scalaria trifasciata de HAAN.—Tōkyo, Yokohama, Singapore, Philippines.

Scalaria latefasciata Sow.—Tōkyo, Mauritius.

* *Scalaria acuminata* Sow.—Tōkyo Bay, Chifu, Malacca.

Scalaria immaculata Sow.—Tōkyo Bay, Luzon.

Scalaria sulcata Sow.—Tōkyo Bay, Luzon and Catanuam in Philippines.

Scalaria lamellosa LAM.—Yokohama, Kamakura, Mediterranean Sea, W. Indies, Sandwich Is., Mauritius.

Stomatia rubra LAM.—Tōkyo Bay, Setouchi, Corean Strait, Philippines.

Sunetta excavata HANLEY.—Tōkyo Bay, Kyushū, Satanomisaki, Kuro-shima, Hakodate, Yokohama, Kamakura, New Holland, S. Australia.

Terebra polygyrata DESHAY.—Tōkyo, Kamakura, Goza Harbour, Izu, Kii, Philippines.

Terebra strigillata LINNÉ.—Nemoto in Awa (or Bōshu), Kamakura, Nagasaki, Polynesia, Sandwich Is.

* *Triton sauliæ* RVE.—Tōkyo, Misaki, Hitachi, Tateyama, Awaji, Naga-saki, Tsusaki, Setouchi, Luzon, Mauritius, Natal, Galapagos, Matnog.

Triton costatus BORN.—Tōkyo, Tateyama in Awa (or Bōshu), Nagasaki, Ōshima, Atlantic Coast of Europe and Africa, Canary and Cape Verde Is., St. Helena, W. Indies to Brazil, Polynesia, Australia, New Zealand, Tahiti, Cape of Good Hope.

Triton moritinctum RVE.—Tateyama, W. Indies, Philippines.

Terebellum terebellum LINNÉ—Tōkyo Bay, Nagasaki, Yobuko, Philip-pines, Australia, New Guinea, Viti Is.

* *Turbo granulatus* GMEL.—Enoshima, Nagasaki, Kii, Shima, China Sea, Nicobar.

Tellina vulsella CHEM.—Tōkyo Bay, Kyushū, Zebu Is. in Philippines, Amboina, Ceylon, E. Coast of Africa, Sechelisen.

Tellina pulcherrima SOW.—Tōkyo Bay, Singapore, Banka Strait.

Tellina rhomboides Q. and G.—Tōkyo Bay, Philippines, Marianen.

Tapes variegatus HANLEY.—Tōkyo, Nagasaki, Oki, Tsushima, Philippines, Coast of New Holland.

* *Venus foliacea* CHEM.—Tōkyo Bay, Madagascar, Red Sea.

Venerupis monstrosa CHEM. — Tōkyo Bay, Tsushima, Kino-Ōshima, Philippines, Nicobar.

Xenophora pallidula RVE.—Tōkyo Bay, Ceylon.

(B) Arctic species: (13 sp.)

* *Cardium californiense* DESH.—Tōkyo, Hakodate, Nagasaki, Etrof, Castries Bay, West Coast of Sakhalin, Behring Sea, Sitcha, Vancouver Is., Fuean Strait, Puget-Sound, Ochotsk Sea, Unalachka, Fusca Straight to Montery.

Cardium grœnlandicum CHEM.—Misaki, Arctic Seas of America, Asia and Europa.

* *Cytherea chinensis* CHEM.—Sagami, Kii, Nagasaki, Hakodate, Kitami, West and East Coast of Sakhalin, China, New Holland, Dui and Ssa-Kato, Castries Bay.

Hiatula nuttari CONRAD.—Tōkyo Bay, Hakodate, Etrof.

* *Mactra sulcataria* DESH.—Tōkyo, Nagasaki, Hakodate, North China, Kurile Sea at the East Coast of Sakhalin, Coast opposite Possjet Bay.

* *Macoma nasuta* CONRAD.—Tōkyo, Misaki, Hakodate, Kamtschatka, Behring Sea, Sitcha, South Coast of Ochotsk Bay, Esquimalt Harbour, West Coast of North America from the northern limit to Vancouver, Oregon, Montery, California.

* *Natica clausa* DESH.—Tōkyo, Banda in Awa (or Bōshu), Chōshi, Hakodate, Nemuro, Otaru, Sakhalin, Kamtschatka, Kadjak, Ochotsk Sea, Schlanter Is., Kowajasemlja, Sitka, Melville Is., Vancouver, Eastport, Greenland, Atlantic Ocean southwards to Massachusetts, Lapland, Portugal, Arctic Europe.

Placunanomia macroschisma DESH.—Tōkyo, Hakodate, Kamtschaka, Ochotsk.

Pecten yessœnsis JAY.—Tōkyo, Hakodate, Castries Bay, West Coast of Sakhalin.

Pecten vitreus CHEM.—Yokohama, Norway, Greenland.
Triton oregonensis RED.—Tōkyo Bay, Hakodate, Aniwa Bay, Okusiri, Magellan Strait (Chili), Alaska, Oregon.
* *Tressus nuttali* CONRAD.—Tōkyo, Hakodate, Sitcha, along West Coast of America from 34° N. to 58° N.
* *Yoldia lanceolata* SOW.—Enoshima, Hakodate, Nova Zembla, Jenissei, Iceland, Metschigmen Bay, Nytschigane Point in Behring Sea, Puget Sound, Avatscha Bay, Seniavin Strait.

(C) Species chiefly found only in Japan: (164 sp.)

I. Species found chiefly south of Tōkyo.

Alcyna ocellata A. AD.—Tateyama and Nemoto in Awa (or Bōshu), off Talenshima.
Arca obtusa RVE.—Tōkyo, Misaki, Nagasaki, Setouchi.
Arca ambigna RVE.—Yokohama, Nagasaki.
Bela pyrrha WATSON.—Yokohama, Kōbe.
Acmœa heroldi DKR.—Awa (or Bōshu), Enoshima, Sagami, Nagasaki.
* *Acmœa conulus* DKR.—Yokohama, Tōkyo, Enoshima, Nagasaki.
* *Cancellaria nodulifera* SOW.—Yokohama, Kino-Ōshima, Shimizu.
Cantharus undulata SCHEP.—Kominato in Awa (or Bōshu), N. Shore of Tango.
Columbella pumila DKR.—Tōkyo, Kamakura, Nagasaki.
* *Columbella martensii* LKE.—Tōkyo, Enoshima, Nagasaki.
Columbella compta L.—Tōkyo, Kamakura, Nagasaki.
Cassis japonica RVE.—Tateyama, Tsusaki, Nagasaki.
Calliostoma argenteoniteus LIS.—Tōkyo, Setouchi.
Calliostoma consors LIS.—Tōkyo Bay, Setouchi.
Cyclostorema dunkeri TRYON.—Tōkyo, Nagasaki.
Corbula erythrodon LAM.—Tōkyo, Yokohama, Kii, Nagasaki.
Cytherea lusoria CHEMN.—East Coast from Tōkyo to Izumi, Nagasaki, China Sea.
* *Cyclina chinensis* CHEMN.—Tōkyo, Yokohama, Misaki, Nagasaki, Shima, Higo, Kagoshima, Tsushima, Ise, Formosa, Shanghai, Hongkong, East Coast of Cochin China.
Cardita cumingiana DKR.—Tōkyo, Yokohama, Nagasaki, Riukiu
Dolium zonatum GRUN.—South of Tōkyo Bay, Nagasaki, China.
* *Erato callosa* AD. and RVE.—Tōkyo Bay, Nagasaki, China Sea.
* *Fusus nodoso-plicatus* DKR.—Yokohama, Misaki, Nagasaki, Ukushima, Gotō Is., Sumoto, Moji, Tomonotsu.

Hiatura olivacea JAY.—Tōkyo Bay, Nagasaki, near Sakai, Setouchi, Chifu.

Imperator hæmatragus MKE.—Tōkyo, Nagasaki, Setouchi.

Lylia cassidula RVE.—Nemoto in Awa (or Bōshu), Nagasaki, Kino-Ōshima, Tsusaki, Satanomisaki, N. Coast of Tango.

Lima dunkeri SMITH.—Awa (or Bōshu), Misaki, Shima.

Lima lima LINNÉ.—Yokohama, Nagasaki.

Murex emarginata SOW.—Awa (or Bōshu), off Gotō Is.

* *Mactra veneriformis* DESH.—Tōkyo Bay, Higo, Nagasaki, Kii, Kagoshima, Chifu.

Modiola senhausii RVE.—near Enoshima, Tōkyo Bay, Nagasaki, Bizen, Chusan, Chifu.

* *Nassa japonica* A. AD.—Tōkyo, Enoshima, Uraga, Ōshima, Setouchi, Kino-Ōshima, Sado, Izugahara, Goza, Shima.

Nassa fuscolineata E. A. SMITH.—Tōkyo, Cape Shima, N. Shore of Tango.

* *Natica ampla* RVE.—Tōkyo to Enoshima, Awa, Chōshi, Misaki, Henda, Shibo, Kagoshima, Kiire, Nagasaki, Hikata, Uwajima.

* *Nucula mirabilis* HINDS.—Tōkyo Bay, Nagasaki.

* *Ostrea denselamellosa* LIS.—Tōkyo, Awaji, Bungo, South Shikoku, Riukiu.

Philine scalpta A. AD.—Tōkyo Bay, Tsushima, Corean Strait.

Pleurotoma japonica LIS.—Awa (or Bōshu), Kamakura, Tōkyo, Kii, Nagasaki, North Kyushū, Hongkong.

* *Pleurotoma subauriformis* SMITH.—Tōkyo, Kamakura, Setouchi.

Pleurotoma texta DKR.—Tōkyo, Nagasaki.

Pleurotoma costulata DKR.—Tōkyo, Nagasaki.

Pleurotoma leuckarti DKR.—Tōkyo, Kamakura, Deshima.

* *Pyramidella cinctella* AD.—Tōkyo, Ōshima in Izu, Setouchi, Matoza.

Pecten crassicostatus SOW.—Tōkyo, Misaki, Ise, Nagasaki, Kii, Hongkong, Shanghai.

Pecten japonicum GMEL.—Tōkyo, Tateyama in Awa (or Bōshu), Setouchi, Nagasaki, Misaki, Enoura in Suruga, Tateishi in Tosa, Kagoshima, Riukiu, China.

Pinna japonica HANLEY.—Tōkyo, Yokohama, Nagasaki.

Pinna lischkeana CLES.—Yokohama, Tōkyo, Misaki, Okayama, Setouchi.

Siphonalia fusoides RVE.—Tōkyo Bay, Tsushima, Satanomisaki, S. E. Coast of Kii.

Siliqua pulchella DKR.—Tōkyo Bay, between Tōkyo and Ōshima, Kyushū.

Spondylus crenulatus LKE.—Misaki, Kii, Nagasaki.

Tornatella strigosa GLD.—Tōkyo, Goza, Nagasaki, Riukiu, Kagoshima.

Triton excavatum RVE.—Tōkyo, Nagasaki.

Triforis fusca DKR.—Tōkyo, Kamakura, Tateyama in Awa (or Bōshu), Nagasaki, North Coast of Tango.
Triforis tricincta DKR.—Tōkyo, Tateyama in Awa (or Bōshu), Kamakura, North Coast of Tango.
Trochus neritoides PHIL.—Yokohama, Southeast Coast of Kii.
* *Trochus japonicus* AD.—Tōkyo, Yokohama, Nemoto in Awa (or Bōshu), Nagasaki, Setouchi, North Coast of Tango.
* *Tellina nitidula* DKR.—Yokohama, Kamakura, Nagasaki.
Tellina rutila DKR.—Yokohama, Nagasaki.
Tellina irridella V. MARTENS.—Tōkyo Bay, Kamakura, Nagasaki.
Tellina prætexta V. MARTENS.—Tōkyo, Yokohama, Nagasaki.
* *Tellina yedœnsis* LKE.—Tōkyo, Kii.
Tapes melanœgis RÖMER.—Tōkyo Bay, Setouchi.

II. Species found chiefly north of Tōkyo.

Dosinia japonica RVE.—Tōkyo, Hakodate.
Glycimeris japonica A. AD.—Tōkyo Bay, Hakodate.
Modiola japonica DKR.—Tōkyo Bay, Hakodate.
* *Nucula insignis* GLD.—Tōkyo, Hakodate.
* *Volutharpa perryi* JAY.—Tōkyo, Enoshima, Hakodate.

III. Species found both north and south of Tōkyo.

Acmæa schrenckii LKE.—Yokohama, Nagasaki, Ojima, Hakodate.
Anomia laqueata RVE.—Tōkyo, Misaki, off Kōbe, Hakodate.
* *Arca inflata* RVE.—Tōkyo Bay, Nagasaki, Hakodate, East Coast of Hokkaido (also in Tartarei, Kingsmill Is., Philippines).
Columbella varians DKR.—Tōkyo, Kamakura, Yokohama, Hakodate, N. Shore of Tango, Rifunsiri.
* *Eburna japonica* SOW.—Tōkyo, Tateyama, Misaki, Enoshima, Izu, Hakodate, Ōshima, Kamakura, Tsusaki, Echizen, Sado, Nagasaki, Higo, Fukuoka, Awa, Shimonoseki.
* *Fusus perplexus* A. AD.—Tōkyo, Nagasaki, Sagami Bay, near Gotō Is., Hakodate, Tsushima, Moji in Hizen.
Hemifusus tuba GMEL.—Tateyama, Nagasaki, Hakodate, Tsushima, China.
Haliotis gigantea GMEL.—Tōkyo, Nagasaki, Kii, Kamakura, Hakodate.
* *Leda confusa* HANLEY.—Enoshima, Hakodate, China Sea, Tōkyo.
* *Limopsis woodwardi* A. AD. (?)—Japan.
Mya arenaria var. *japonica* JAY.—Tōkyo, Nagasaki, Hakodate.

* *Macha divaricata* LKE.—Enoshima, Misaki, Hakodate, Wakanoura, Nagasaki, Setouchi.

Nassa fraterculus DKR.—Tōkyo, Ise, Kamakura, Gotō, Tateyama, Hakodate, Simoda, Nagasaki, Deshima.

* *Ostrea gigas* THUNB.—Yokohama, Nagasaki, Chōshi, Rikuzen, North China, Talienwan, Chifu.

Olivella consobrina LKE.—Tōkyo, Enoshima, Kamakura, Hakodate, Yamada, Nagasaki, N. Coast of Tango.

Purpura luteostoma DILLW.—Tōkyo, Hakodate, Nagasaki, Seta Coast, Suruga, Riukiu.

* *Pleurotoma principalis* PILSBRY.—Enoshima, Noto, Setouchi, Kii.

* *Potamides zonale* BRUG.—Tōkyo, Yokohama, Hakodate, Matsushima, Ōshima, Fla, Hongkong.

Patella toreuma RVE.—Banda in Awa (or Bōshu), Enoshima, Nagasaki, Hakodate, China.

* *Pecten lætus* GLD.—Tōkyo, Hakodate, Sagami Bay, Ikai, Nagasaki, Yokohama, Chōshi.

* *Pecten laqueatus* SOW.—Tōkyo, Awa (or Bōshu), Misaki, Bingo, Miyajima, Kii, Awaji, Iki, Iyo, Satsuma, Suruga, Tsushima, Echizen, Chōshi, Riukiu, Kōbe, Nagasaki, Setouchi, California.

* *Pectunulus albo-lineatus* LKE.—Tōkyo, Kii, Hakodate, Tsushima, Kitami, Fusan, Possjet Bay.

* *Rotella costata* LESSON.—Enoshima, Hakodate, Izu, Shima, Kii, Hizen, Tsushima, Nagasaki.

* *Siphonalia cassidaræformis* RVE.—Misaki, Enoshima, Nagasaki, Hakodate, Izu, Gotō Is., Ōshima, Awa.

* *Solen gouldii* CONRAD.—Enoshima, Misaki, Hakodate, Ise, Nagasaki, China Sea.

* *Terebra bipartita* GLD.—Enoshima, Hakodate.

Trochus pfeifferi PHIL.—Tōkyo, Shimoda. S.E. Coast of Kii, Hakodate.

Trochus subfuscens SCHRENCK.—Tōkyo, Hakodate, Ōshima, Endermo.

* *Trochus imperialis* A. AD.—Tōkyo Bay, Hakodate.

* *Tornatella gigantea* DKR. (?)—Japan.

Telina inquinata DESH.—Tōkyo, Yokohama, Kii, Nagasaki, Hakodate, Fusan, Castries Bay, West Coast of Sakhalin, Ochotsk Sea, Vancouver, Columbia, West Coast of America north or south from Vancouver.

Tapes vernicosa GLD.—Tateyama, Kagoshima, off Hakodate.

* *Trochus argyrostomus* GMEL.—Tōkyo, Kii, Hakodate, Possjet Bay, China, Port Hamilton (Corea), Formosa, Philippines.

Voluta megaspire SOW.—Tōkyo Bay, Setouchi, Hakodate.

IV. Speces found only near Tōkyo.

Anatina japonica LKE.—Tōkyo, Yokohama.
Anomia cytæum GRAY.—Misaki.
Arca satowi DKR.—Tōkyo.
Buccinum leucostoma LKE.—Tōkyo Bay, Yokohama.
Conus sieboldi RVE. (?)—Tōkyo Bay, China.
Cancellaria bocageana CROOSSE and DAB. (?)—Tōkyo Bay, China.
Cyclostrema duplicata LKE.—Tōkyo.
Cardilia semisulcata DESH.—Tōkyo Bay.
Cultellus cultellus LINNÉ.—Tōkyo Bay.
Dentalium yokohamense WATSON.—Yokohama.
Dosinia bilunulata GRAY.—Tōkyo Bay, Yokohama, Sagami Coast.
Dosinia trailli A. AD.—Yokohama.
Dosinia gibba A. AD.—Tateyama.
Cyclina orientalis SOW.—Yokohama.
Cypricardia lirata RVE.—Tōkyo Bay, Awa (or Bōshu).
Fissure'la dilatata A. AD.—Nemoto in Awa (or Bōshu).
* *Fissurella lischkei* PILSBRY.—Nemoto in Awa (or Bōshu).
Fissuridea sieboldii RVE.—Tōkyo Bay.
Gari oruata DESH.—Tōkyo Bay.
Gari bipartita PHIL.—Tōkyo Bay.
Gastrana japonica V. MARTENS.—Yokohama.
Hiatula atrata DESH.—Tōkyo.
Lacuna oxytropis PILSBRY.—Tōkyo.
Lacuna stenotomorpha PILSBRY.—Tōkyo.
Lucinopsis divaricata LKE.—Tōkyo.
Lucina contraria DKR.—Tōkyo.
Lepton suburotundum DKR.—Tōkyo.
Lima japonica A. AD.—3 miles off Jōgashima (Misaki).
Limopsis pelagica E. A. SMITH.—Yokohama, Enoshima.
Lingula anatina BRUG.—Tōkyo, Enoshima.
* *Mactra crossei* DKR.—Tōkyo.
Modiola philippinarum HANLEY.—Nemoto in Awa (or Bōshu).
Modiolaria semigranata RVE.—Tōkyo.
Philine japonica LKE.—Tōkyo Bay, Yokohama.
Oliva signata L. (?)—Tōkyo, Awa, China.
Pleurotoma patruelis SMITH. (?)—Tōkyo Bay, Japan Sea.
Pleurotoma ludhorfi LKE.—Tōkyo Bay, Nemoto in Awa (or Bōshu).
Pleurotoma tokyœnsis PILSBRY.—Tōkyo, Kamakura.
Pleurotoma makimonos JOUSS.—neighborhood of Tōkyo Bay.
Pleurotoma kaderleyi LKE.—Tōkyo Bay, Enoshima.

Potamides multiformis L.—Tōkyo.
Pyramidella tenuisculpta LKE.—Tōkyo Bay.
Phasianella oligomphala PILSBRY.—Tōkyo, Nemoto in Awa (or Bōshu).
Parapholas penita CONRAD.—Tōkyo.
Pectunculus rotundus DKR.—Tōkyo Bay.
Pyramidella eximia LKE.—Tōkyo, Kamakura.
Rissoina adamsiana WKFF.—Kachiyama in Awa (or Bōshu).
Rœta pulchella AD. and RVE.—Yokohama.
Rœta yokohamensis PILSBRY.—Yokohama.
Separatista separatista DILLV.—Nemoto in Awa (or Bōshu).
Sigaretus japonicus LKE.—Tōkyo.
Scalaria casta A. AD.—Tōkyo, Yokohama, Kamakura.
Terebra bathyrhaphe SMITH.—Tōkyo Bay.
Triton dorsuosum AD.—Tateyama in Awa (or Bōshu).
Turbo guttatus A. AD.—Tateyama in Awa (or Bōshu).
Trochus yokohamensis PILSBRY.—Yokohama.
Trochus japonica SMITH.—Tōkyo Bay.
Trochus pauperculus L.—Tōkyo.
Tellina ovalis SOW.—Tōkyo.
Tapes undulatus BORN.—Tōkyo Bay, Tateyama in Awa (or Bōshu).
Vermetus tokyœnsis PILSBRY.—Tōkyo.
Venerupis purpurea DKR.—Nemoto in Awa (or Bōshu).
Yoldia lischkei E. A. SMITH.—Yokohama, Enoshima.
Tellina minuta LKE.—Tōkyo Bay.
Venus yedœnsis LKE.—Kamakura, Tōkyo Bay.

V. Species found in Tōkyo and elsewhere very widely distributed.

* *Saxicava arctica* DESH.—Tōkyo, Noto, Awa, Ōsaka, Hakodate, North-eastern and Northern Sea of Asia, Western Coast of America, Europe, Africa, Indian Ocean, Australia.

* *Saxidomus nuttali* CONRAD.—Tōkyo, Misaki, Enoshima, Hakodate, Harima, Setouchi, Bonin Is., Kamtschatska, Sitcha, India, Chile, California.

* *Dosinia exoleta* LINN.—Tōkyo, Hakodate, Misaki, Kii, Setouchi, Chifu, North China, Spain, France, Piedmont, Corsica, Naples, Tarent, Sicily, Ustrica, Adria-Zara, Venedig, Morca, Tunis, Algeria, Balearen, Norway, Great Britain, Portugal, Mediterranean Sea, from North Cape (72° N.) to Senegal (15° N).

* *Tapes decussata* DKR.—Tōkyo, Hakodate, Kitami, Enoshima, Misaki, Nagasaki, Rikuzen, Ōshima, West Coast of Sakhalin, Olga Bay,

Rifusiri, Korea, Possjet Bay, Castries Bay, Cape Notoro, Cape Tofuts, Formosa, Singapore, China, East Indies, New Zealand, Java, Amboina, Egypt, Britain, Mediterranean, France, Pyrennese Peninsula.

* *Modiola modiolus* LINN.—Tōkyo, Hakodate, Setouchi, Behring Sea, Lapland in Russia, entire North Atlantic Coast of Europe and America, and New England in America, Miditerranean Sea.

As may be seen from the above list, in which species marked with asterisks are those found also in our fossil localities, the number of tropical forms found living and in the fossil state is quite small. The tropical living species amount to 39% of the whole, while the arctic amount to 4%, and those found only in Japan to 55%. But the percentage in our fossil forms is as follows:

Tropical species	22 %
Arctic species	15 %

It is quite interesting to observe that, while the proportion of the arctic to tropical species in the list of the above living fauna is 1 : 9.75, that of the fossils is 1 : 1.46.

Among the fossil forms, the following are not found in the environs of Tōkyō:—

Neptunea despecta LINNÉ.—*Buccinum undatum* LINNÉ.—*Natica clausa* DESH.—*Panopœa generosa* GLD.—*Mactra sachalinensis* SCHRENCK.—*Venus stimpsoni* GLD.—*Tapes rigidus* GLD.—*Astarte japonica* TOK.—*Tapes euglyptus* PH.—*Martesia striata* LINNÉ.—*Lucina borealis* L.

These species are never found in tropical regions, and the first eight species are restricted to arctic fauna. From this we see that the sea near Tōkyo was formerly inhabited by univalves and bivalves of a climate colder than that which prevails at present.

Next let us consider the question of the geological age of our fossil beds. BRAUNS assumed the existence of a line of unconformability between the shell bed and the Diluvium above it, and identified many of the shells with those of the English

Crag, although he recognized no extinct species in his collection. The result obtained by myself is slightly different. Before stating it, however, it is necessary first to examine whether the fossil beds represent a single geological horizon or not. Fig. 2

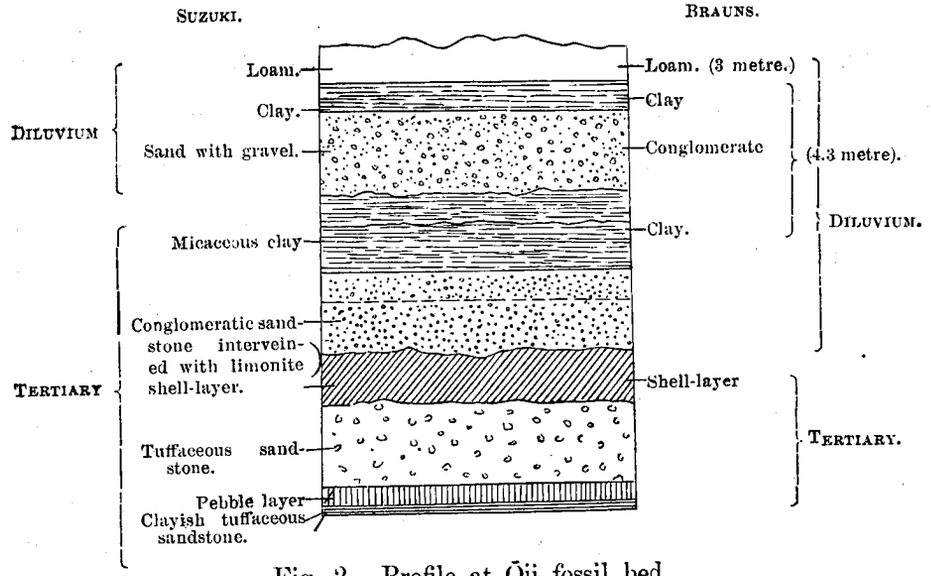

Fig. 2.—Profile at Ōji fossil bed.

shows the order of succession of the layers at Ōji as observed by BRAUNS and Dr. T. SUZUKI. The boundary line between the Tertiary and Quaternary is assumed by BRAUNS to be directly above the shell layer, while SUZUKI takes for it a micaceous clay, in which badly preserved plant impressions were discovered. Of this line in the layers of Shinagawa SUZUKI makes no precise statement in his "Explanatory Text to the Geological Sheet, Tōkyo, 1887," (published in Japanese). As shown in my profile (Fig. 3), a bluish clay and sand are overlaid by a brownish clay, and are found above the shell layer which cor-

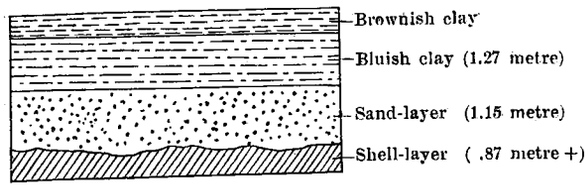

Fig. 3.—Profile at Shinagawa fossil bed.

responds to that of Ōji. This brownish clay contains plant leaves like those found in the corresponding clay at Ōji. A fossil locality of Tabata, a place situated between Ōji and Tōkyo, lies at the foot of a plateau which is a southern continuation of that of Ōji. Some years ago a good geological profile was exposed by a cutting made for railway purposes. The brownish and bluish clay layers at the bottom of my profile (Fig. 4) contain different kinds of fossils at different parts even of the same horizon. In some parts we find numerous plant leaves, while in others trunks of trees and shells. Where the shells are numerous, the clay passes into sands. These clay layers must represent those of the plant bearing clay of Ōji and Shinagawa. The fossil layer of Surugadai, whence BRAUNS obtained some of his specimens, is at present not accessible on account of the considerable weathering of the rock surface. But it is almost certain that it is a continuation of the shell-bed of Tabata, the geological profile being the same in both localities, and most of the shells collected by BRAUNS belong to those forms which are found at Tabata. In the three profiles above mentioned, the uppermost part which consists of loam with underlying gravel is decidedly diluvial. Below the gravel lie brownish and bluish clays which are represented partly by a shell-bearing sand, as at Tabata.

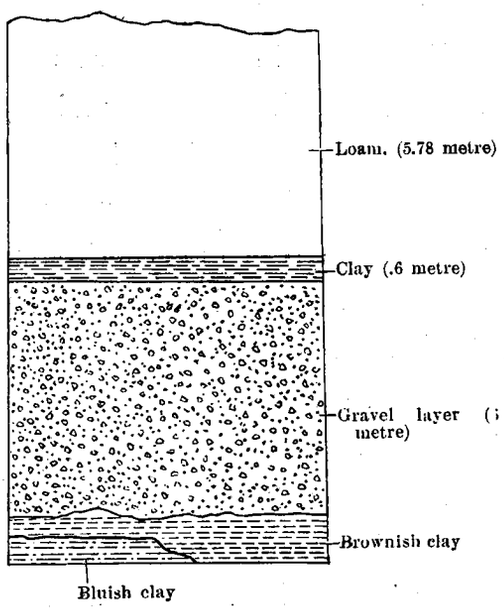

Fig. 4.—Profile at Tabata fossil bed.

In the brownish clay of Ōji and Shinagawa, plant leaves rarely occur, while at Tabata the brownish as well as the bluish clay contains great quantities of them. Below the clays is found a bluish sand, which yields some molluscan casts* at Shinagawa and Ōji and numerous shells at Tabata. At the last locality no bed lower than this sand is exposed. But at Shinagawa and Ōji, there is a sand with numerous shells, showing a wavy line of boundary against the overlying sand on natural profiles.

BRAUNS regarded this wavy line as an important demarcation between his "non-fossiliferous zone" (in reality containing shell casts at Ōji and Shinagawa) and the underlying shell bed. However, as is well known, the surface of shell heaps constantly disturbed by sea waves is usually not perfectly flat and horizontal, but shows numerous depressions and elevations. The same thing is also observable in strata, for instance in those of the Tertiary of Sendai, Province of Rikuzen, where there are three shell zones in a thick tufaceous sandstone, each shows a wavy surface. On the eastern side of a railway cutting at Shinagawa, the line is not always distinct, and the overlying sand, which does not differ from the shell bed either in colour or hardness, sometimes contains shells irregularly pushed in from the lower bed. From the above facts it will be seen that the so-called line of demarcation is not of any great significance in the determination† of the age of the shell-bed.

The bluish clay overlying the sand is to be considered as belonging to the same geological epoch as the latter, for in some places the clay alters its nature according to the sand,

* Casts found at Ōji and Shinagawa belong to *Arca inflata* RVE., *Pecten laqueatus* SOW., *Pectunculus albo-lineatus* LKE., *Panopœa generosa* GLD., *Saxidomus nuttali* CONRAD, *Tapes rigidus* GLD. and *Macoma nasuta* CONRAD, &c.

† It must be kept in mind that the layers now under discussion lie almost horizontally.

so that these two form a single bed as is seen on the western side of the Shinagawa railway cutting and also at Tabata. Next relating to this bluish clay and the overlying brownish one, the difference of colour is quite unimportant, the line of boundary between them being very irregular at Tabata as shown in the figure 5. The insignificance of this line is also shown by a regular horizontal pebbly layer traversed by it. So the brown color of clay will be only the result of oxidation caused by the action of percolating water.

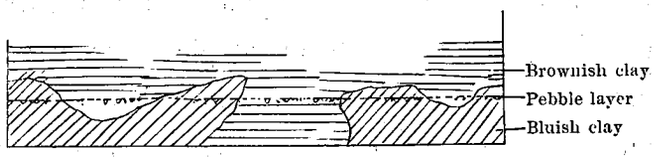

Fig. 5.—Profile showing the boundary line between brownish and bluish clay at Tabata.

So if indeed any geological gap exists in our profiles, it must be found high up between the brownish clay and the gravel layer and not lower down. BRAUNS determined the age of our fossil beds to be Pliocene by identifying their mollusks chiefly with those of the Crag. But it very seldom happens that non-pelagic species, either Recent or Pliocene, show so wide a distribution as to be found in Japan and Europe at the same time. No recent Japanese shells, excepting a few, which are mostly cosmopolitan, pass the Red Sea on the one side or the west coast of America on the other. Of the twenty-two species described by BRAUNS as identical with those of the Crag, only five are so according to my own determination, and of these four are either cosmopolitan or circumpolar. In BRAUNS' work no extinct species are mentioned; but I recognize about ten* which are considered as surely extinct. Still this

* *Trochus shinagawensis* TOK., *Tellina serricostata* TOK., *Tellina ojiensis* TOK., *Cardium braunsi* TOK., *Cardita rotunda* TOK, *Pecten tokyoensis* TOK., *Mysia pacifica* TOK., &c.

number may be regarded too small to warrant us in assuming the Tertiary age of the fossils. It is also interesting to note that there was a decided diminution of temperature as shown by the predominance of arctic forms in the molluscan fauna. Another feature that leads us to think that our fossil zones may be younger than the Pliocene is the discovery of a tusk, teeth and bone fragments of an elephant from a bed below the shell-layer of Tabata. The specimens belonging to the same species and collected at other places in Japan were determined by NAUMANN as *Elephas namadicus* FALC., which had formerly been restricted to the Post-pliocene of the Narbada series according to BLANFORD;* while BRAUNS, as before mentioned, took them for those of *Elephas antiquus* FALC. and CAUT. This author, moreover, assumed all of the Japanese elephants, including those from Tōkyo, to be Diluvial forms. Therefore I consider the shells formerly taken for Tertiary as belonging to the Diluvial epoch.

---

* NAUMANN, Ueber Japanische Elephanten der Vorzeit.——Palæontographica, Bd. XXVIII., Heft I., 1881, p. 34.

PLATE I.

Fig. 1. *Murex falcatus* Sow. (Nat. size).
Fig. 2. *Murex longicanalis* Tok. (Nat. size).
Fig. 3. *Trophon exiguus* Tok. (Magnified).
Fig. 4. *Triton saulicæ* L. (Nat. size).
Fig. 5. *Fusus nodoso-plicatus* Dkr. (Nat. size).
Fig. 6. *Fusus perplexus* A. Ad. (Nat. size).
Fig. 7. *Fusus simplex* E. A. Smith. (Magnified).
Fig. 8. *Hemifusus ternatanus* Gmel. (Nat. size).
Fig. 9. *Siphonalia cassidaræformis* Rve. (Nat. size).
Figs. 10 *a* and *b*. *Buccinum undatum* Linn. (Nat. size).
Fig. 11. *Volutharpa perryi* Jay. (Magnified).
Fig. 12. *Erato callosa* Ad. and Rve. (Magnified).
Fig. 13. *Olivella consobrina* Lke. (Magnified).
Figs. 14 *a* and *b*. *Columbella pumila* Dkr. (Magnified).
Fig. 15. *Cancellaria spengleriana* Desh. (Nat. size).
Fig. 16. *Cancellaria nodulifera* Sow. (Nat. size).
Figs. 17 *a* and *b*. *Terebra alveolata* Hinds. (Fig. 17*a* in natural size; fig. 17*b* magnified).
Figs. 18 *a* and *b*. *Terebra pretiosa* Rve. (Fig. 18*a* in natural size; fig. 18*b* magnified).
Figs. 19 *a* and *b*. *Terebra subtextilis* E. A. Smith. (Fig. 19*a* in natural size; fig. 19*b* magnified).
Figs. 20 *a*, *a'*, *b* and *b'*. *Terebra* cfr. *serotina* Ad. and Rve. (Figs. 20*a* and *b* in natural size; figs. 20 *a'* and *b'* magnified).
Fig. 21. *Pleurotoma oxytropis* Sow. (Nat. size).

Fig. 22. *Pleurotoma vertebrata* SMITH. (Nat. size).
Fig. 23. *Pleurotoma principalis* PILSBRY. (Nat. size).
Fig. 24. *Pleurotoma sabauriformis* SMITH. (Magnified).
Fig. 25. *Pleurotoma raricostata* SMITH. (Magnified).
Fig. 26. *Pleurotoma gracilenta* RVE. (Magnified).
Fig. 27. *Pleurotoma tabatensis* TOK. (Magnified).
Fig. 28. *Pleurotoma ojiensis* TOK. (Magnified).
Figs. 29 *a* and *b*. *Pleurotoma sagamiensis* TOK. (Fig. 29*a* in natural size; fig. 29*b* magnified).
Fig. 30. *Dolium leuteostomum* KÜNSTER. (Nat. size).
Fig. 31. *Natica clausa* DESH. (Nat. size).
Figs. 32 *a*, *b* and *c*. *Natica ampla* RVE. (Nat. size).
Fig. 33. *Natica papyracea* BUSH. (Nat. size).
Fig. 34. *Sigaretus papilla* GMEL. (Nat. size).
Fig. 35. *Scalaria immaculata* SOW. (Magnified).
Fig. 36. *Scalaria lamellosa* LAM. (Nat. size).
Fig. 37. *Scalaria acuminata* SOW. (Magnified).
Fig. 38. *Trichotropis unicarinata* BROD. (Nat. size).
Fig. 39. *Eulima levis* TOK. (Magnified).
Fig. 40. *Eulima ovalis* TOK. (Magnified).
Fig. 41. *Turbonilla* AFF. *elegantissima* MONT. (Magnified).
Figs. 42 *a* and *b*. *Turbonilla fusca* A. AD. (Magnified).
Fig. 43. *Odostomia fasciata* DKR. (Magnified).
Fig. 44. *Odostomia* CFR. *subplanata* GLD. (Magnified).
Fig. 45. *Odostomia takinogawensis* TOK. (Magnified).
Fig. 46. *Pyramidella eximia* LKE. (Magnified).
Fig. 47. *Pyramidella spirata* A. AD. (Magnified).
Fig. 48. *Pyramidella cinctella* A. AD. (Magnified).
Figs. 49 *a* and *b*. *Cerithium kochii* PHIL. (Fig. 49*a* in natural size; fig. 49*b* magnified).
Fig. 50. *Cerithium nipporiensis* TOK. (Magnified).
Fig. 51. *Cerithium tabatensis* TOK. (Magnified).
Fig. 52. *Potamides fluviatilis* POT. and MICH. (Nat. size).
Fig. 53. *Potamides incisus* HOMBR. and JACQ. (Nat. size).
Fig. 54. *Rissoa* CFR. *cerithina* PHIL. (Magnified).
Fig. 55. *Rissoa septentrionalis* TOK. (Magnified).
Fig. 56. *Rissoa meridionalis* TOK. (Magnified).
Fig. 57. *Rissoa subcylindrica* TOK. (Magnified).
Fig. 58. *Rotella costata* LESSON, var. *superbus* GLD. (Nat. size).
Fig. 59. *Turbo granulatus* GLD. (Nat. size).
Fig. 60. *Trochus imperialis* A. AD. (Nat. size).

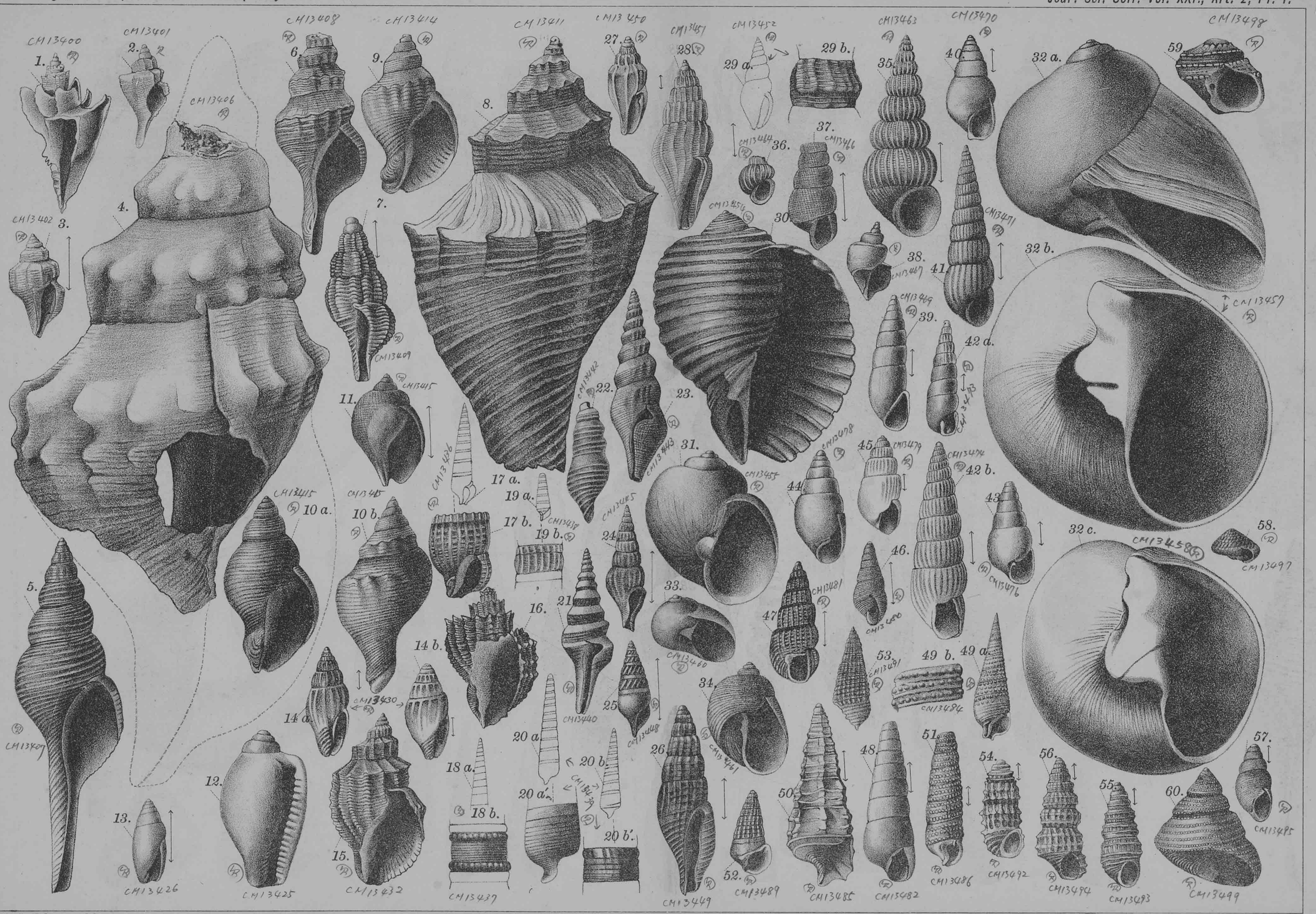

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PLATE II.

Fig. 1. *Trochus argyrostomus* GMEL. (Nat. size).
Fig. 2. *Trochus amussitatus* GLD. (Magnified).
Fig. 3. *Trochus japonicus* A. AD. (Magnified).
Fig. 4. *Trochus shinagawensis* TOK. (Nat. size).
Fig. 5. *Trochus angulatus* TOK. (Magnified).
Fig. 6. *Fissurella lischkei* PILSBRY. (Nat. size).
Figs. 7 *a* and *b*. *Acmæa conulus* DKR. (Magnified).
Figs. 8 *a* and *b*. *Patella amussitata* RVE. (Fig. 8*a* in natural size; fig. 8*b* magnified).
Fig. 9. *Tornatina exilis* DKR. (Magnified).
Fig. 10. *Tornatella gigantea* DKR. (Nat. size).
Fig. 11. *Ringicula arctata* GLD. (Magnified).
Fig. 12. *Cylichna musashiensis* TOK. (Nat. size).

Fig. 13. *Cylichna acuta* Tok. (Magnified).
Fig. 14. *Cylichna obtusa* Tok. (Magnified).
Figs. 15 *a* and *b*. *Dentalium octogonum* Lamk. (Nat. size).
Figs. 16 *a* and *b*. *Dentalium weinkauffi* Dkr. (Nat. size).
Fig. 17. *Dentalium edœnsis* Tok. (Nat. size).
Fig. 18. *Martesia striata* Linné. (Nat. size).
Fig. 19. *Solen krausensternii* Schrenck. (Nat. size).
Figs. 20 *a* and *b*. *Macha divaricata* Lke. (Nat. size).
Figs. 21 *a* and *b*. *Saxicava arctica* Desh. (Nat. size).
Figs. 22 *a*, *a'*, *b* and *b'*. *Corbula venusta* Gld. (Figs. 22 *a* and *b* in natural size; figs. 22 *a'* and *b'* magnified).
Figs. 23 *a* and *b*. *Neœrea gouldiana* Hinds. (Magnified).
Figs. 24 *a* and *b*. *Myodora fluctuosa* Gld. (Nat. size).
Figs. 25 *a* and *b*. *Mactra sachalinensis* Schrenck. (Nat. size).
Figs. 26 *a* and *b*. *Mactra sulcataria* Desh. (Nat. size).
Figs. 27 *a* and *b*. *Mactra crossei* Dkr. (Nat. size).
Figs. 28 *a*, *b* and *c*. *Lutraria ovalis* Tok. (Nat. size).
Figs. 29 *a*, *b* and *b'*. *Lutraria sp.* (Figs. 29 *a* and *b* in natural size; fig. 29 *b'* magnified).
Figs. 30 *a*, *a'*, *b* and *b'*. *Tellina nitidula* Dkr. (Figs. 30 *a* and *b* in natural size; figs. 30 *a'* and *b'* magnified).
Figs. 31 *a* and *a' Tellina yedœnsis* Lke. (Fig. 31 *a* in natural size; fig. 31 *b* magnified).
Figs. 32 *a*, *a'* and *b*. *Tellina serricostata* Tok. (Figs. 32 *a* and *b* in natural size; fig. 32 *a'* magnified).
Figs. 33 *a* and *a'*. *Tellina tenera* Say. (Figs. 33 *a* in natural size; fig. 33 *a'* magnified).
Figs. 34 *a*, *a'* and *b*. *Tellina ojiana* Tok. (Figs. 34 *a* and *b* in natural size, fig. 34 *a'* magnified).
Figs. 35 *a* and *a'*. *Tellina* aff. *rutile* Dkr. (Fig. 35 *a* in natural size; fig. 35 *a'* magnified).
Figs. 36 *a* and *a'*. *Tellina nipponica* Tok. (Fig. 36 *a* in natural size; fig. 36 *a'* magnified).

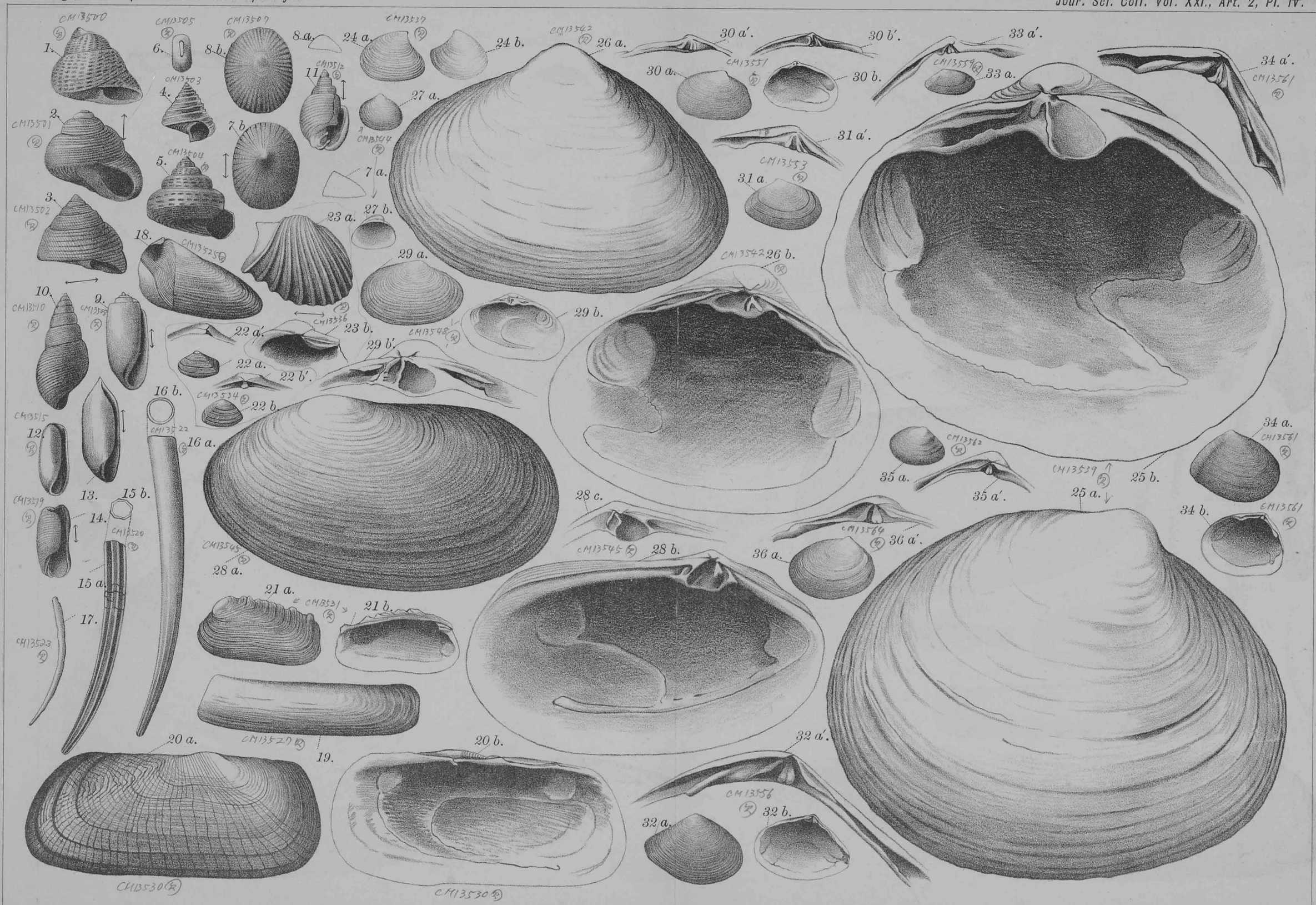

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Plate III.

Figs. 1 *a*, *a'*, *a''* and *b*. *Gari* CFR. *radiata* DKR.
Figs. 2 *a* and *b*. *Macoma nasuta* CONRAD.
Figs. 3 *a* and *b*. *Venus foliacea* PH.
Figs. 4 *a* and *b*. *Cytherea chinensis* CHEM.
Figs. 5 *a* and *b*. *Cytherea meretrix* LINNÉ.
Figs. 6 *a* and *b*. *Clementia* AFF. *papyracea* GRAY.
Fig. 7. *Tapes decussata* DKR. VAR. *philippinarum* AD. and RVE.
Figs. 8 *a*, *a'* and *b*. *Tapes euglyptus* PH.
Figs. 9 *a* and *a'*. *Cardium californiense* DESH.
Fig. 10. *Cardium muticum* RVE.
Fig. 11. *Cardium braunsi* TOK.
Figs. 12 *a* and *a'*. *Cardium tokyoensis* TOK.
Figs. 13 *a*, *b* and *b'*. *Mysia* AFF. *semiaspera* PHIL.
Figs. 14 *a* and *b* *Lascea striata* TOK.
Figs. 15 *a* and *a'* *Lascea* AFF. *suborbicularis* MONT.
Figs. 16 *a*, *a'* and *b*. *Astarte japonica* TOK.
Figs. 17 *a* and *a'*. *Cardita rotunda* TOK.
Fig. 18. *Yoldia lanceolata* J. SOW.
Figs. 19 *a* and *b*. *Arca inflata* RVE.
Fig. 20. *Arca granosa* LINNÉ.
Figs. 21 *a* and *b*. *Arca kagoshimensis* TOK.
Figs. 22 *a* and *b*. *Arca a* SP.
Figs. 23 *a*, *b* and *b*. *Arca rectangularis* TOK.
Fig. 24. *Modiola modiolus* LINN.
Figs. 25 *a* and *b*. *Modiola* AFF. *japonica* DKR.
Figs. 26 *a* and *b*. *Lima* AFF. *japonica* AD.
Figs. 27 *a* and *b*. *Lima hakodatensis* TOK.

(All the figures excepting figs. 1 *a''* and *b*, figs. 2 *a* and *b*, fig. 8 *b*, fig. 9 *a'*, fig. 13 *b'*, figs. 14 *a* and *b*, fig. 15 *a'*, figs. 16 *a*, *a'* and *b*, fig. 17 *a'*, fig. 18, figs. 22 *a* and *b*, figs. 23 *a*, *b* and *c*, fig. 24, figs. 25 *a* and *b*, and figs. 26 *a* and *b* are in natural size).

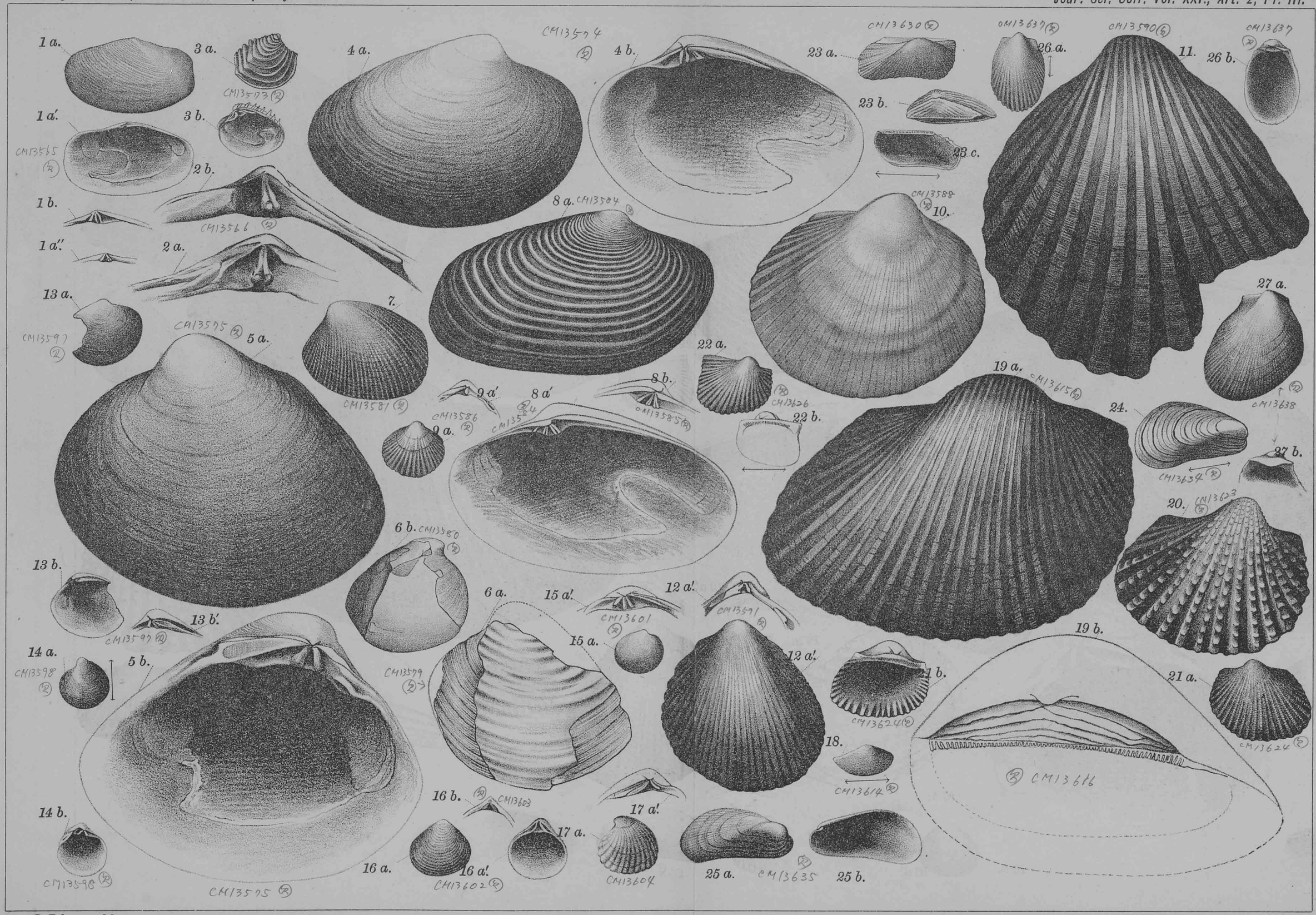

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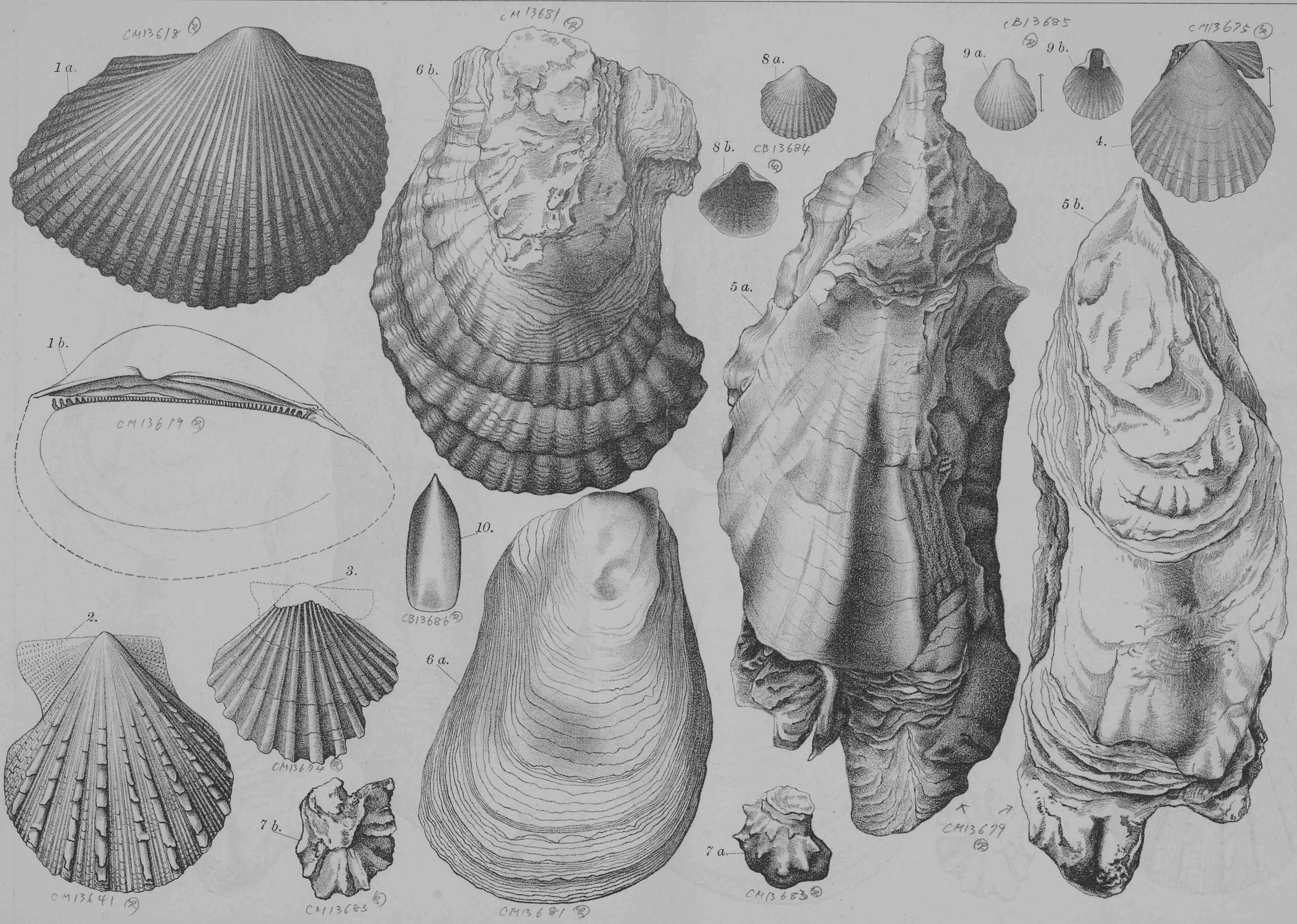
Plate IV.

Figs. 1 *a* and *b*. *Arca tenuis* TOK.
Fig. 2. *Pecten lætus* GLD.
Fig. 3. *Pecten* AFF. *irradians* LAM.
Fig. 4. *Pecten pulchellimus* TOK.
Figs. 5 *a* and *b*. *Ostrea gigas* THUMB.
Figs. 6 *a* and *b*. *Ostrea denselamellosa* LKE.
Figs. 7 *a* and *b*. *Ostrea irregularis* TOK.
Figs. 8 *a* and *b*. *Waldheimia grayi* DAV.
Figs. 9 *a* and *b*. *Waldheimia irregularis* TOK.
Fig. 10. *Lingula hians* SWAINS.

(All the figures excepting figs. 4, 9*a* and 9*b* are in natural size).



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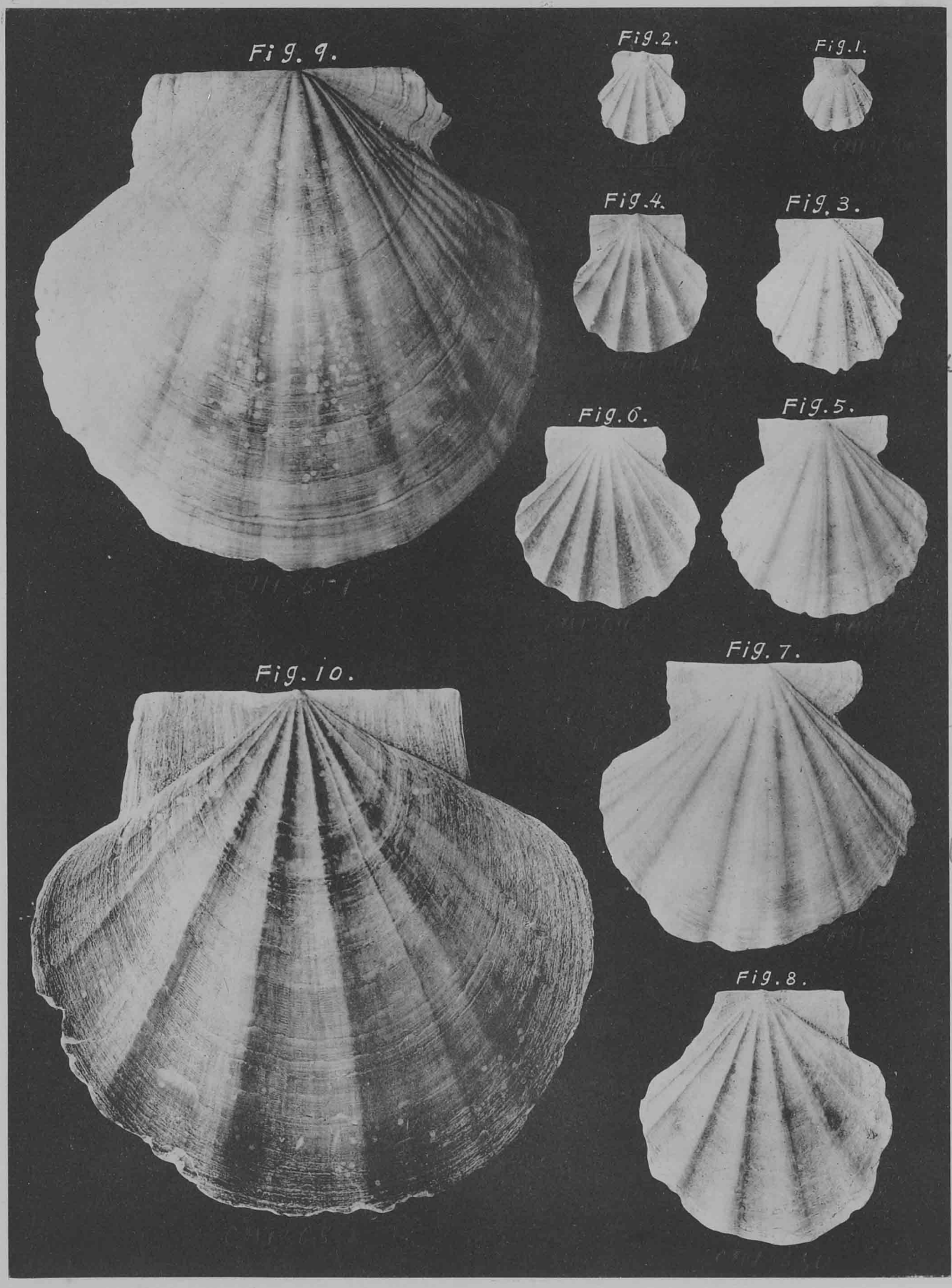

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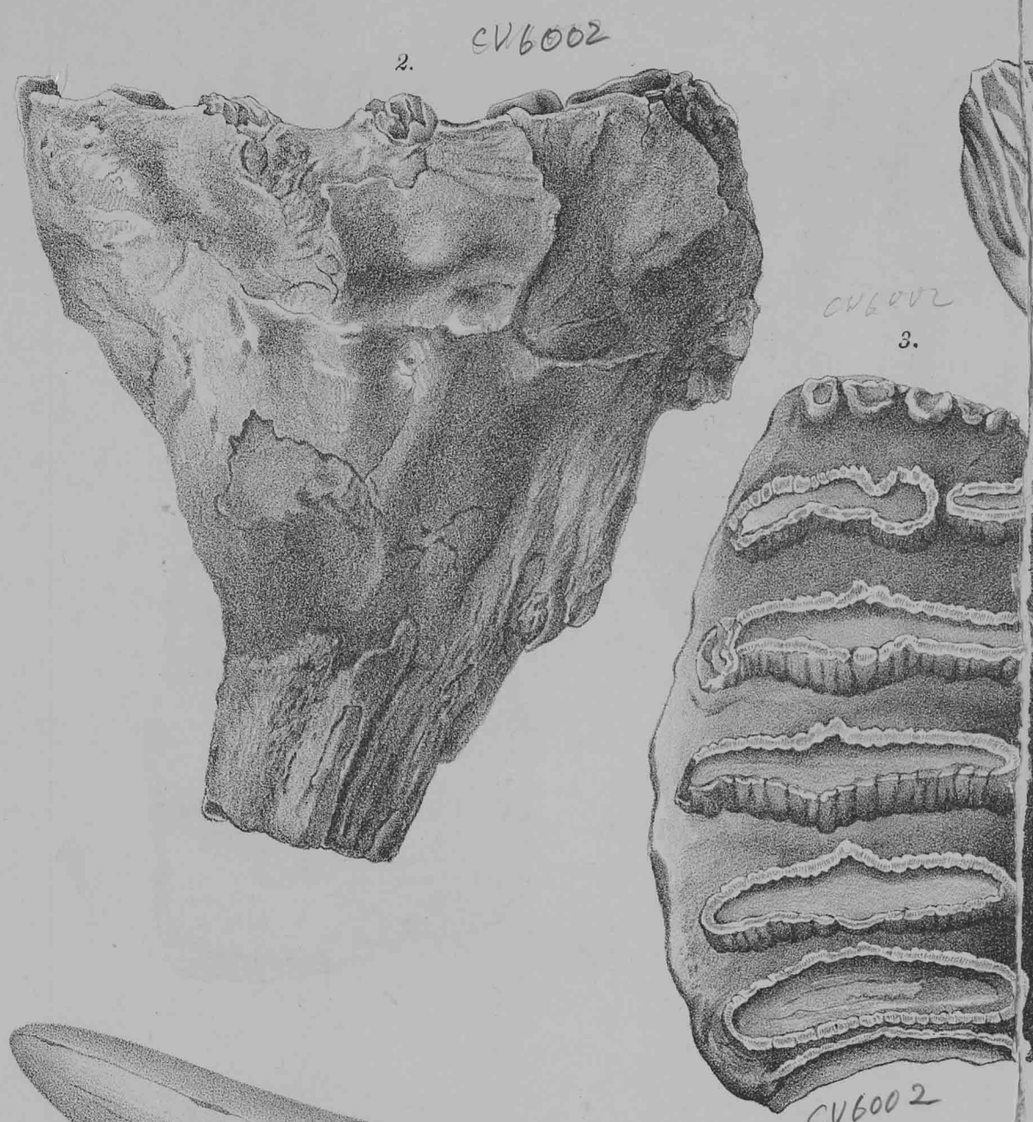
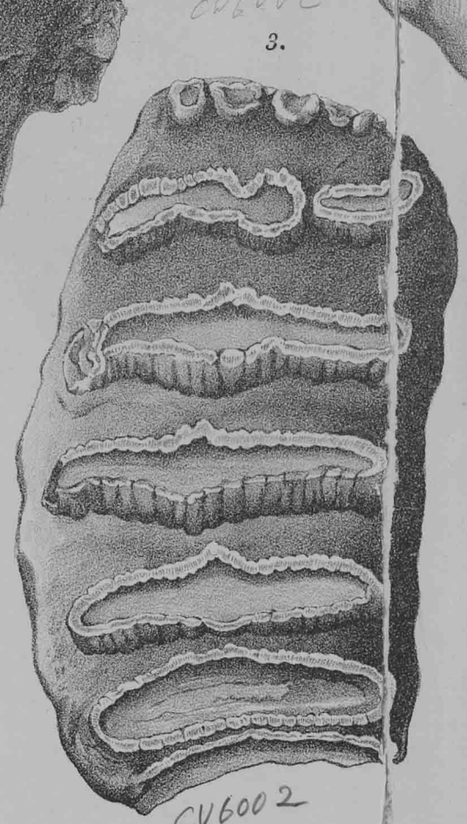
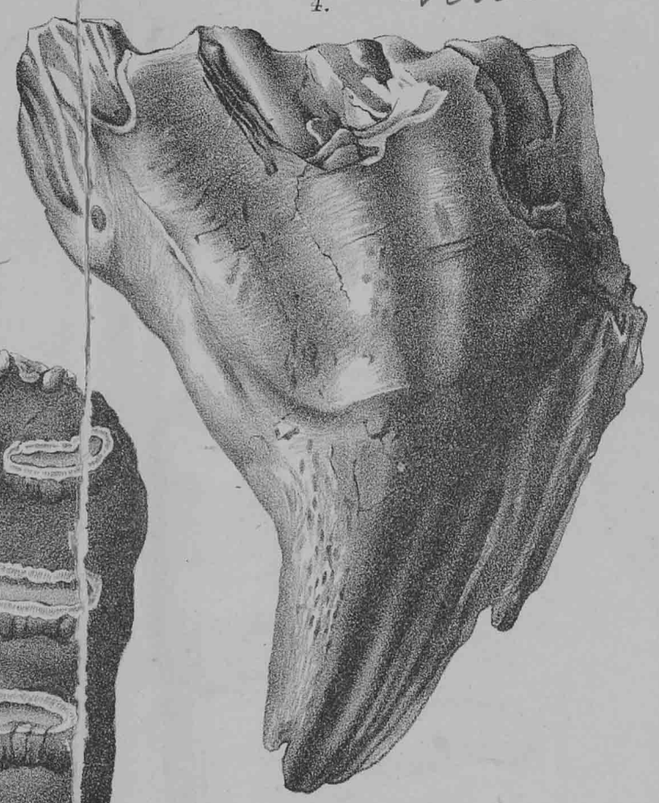
Plate VI.

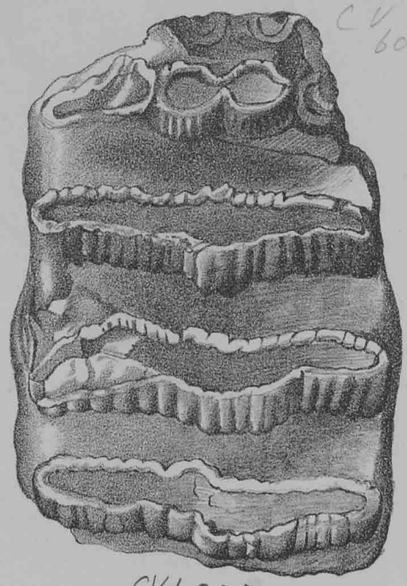
Fig. 1. *Myliobatis* Sp.
Figs. 2–6. *Elephas antiquus* Falc.
Fig. 7. Indeterminable Ungulate bone.

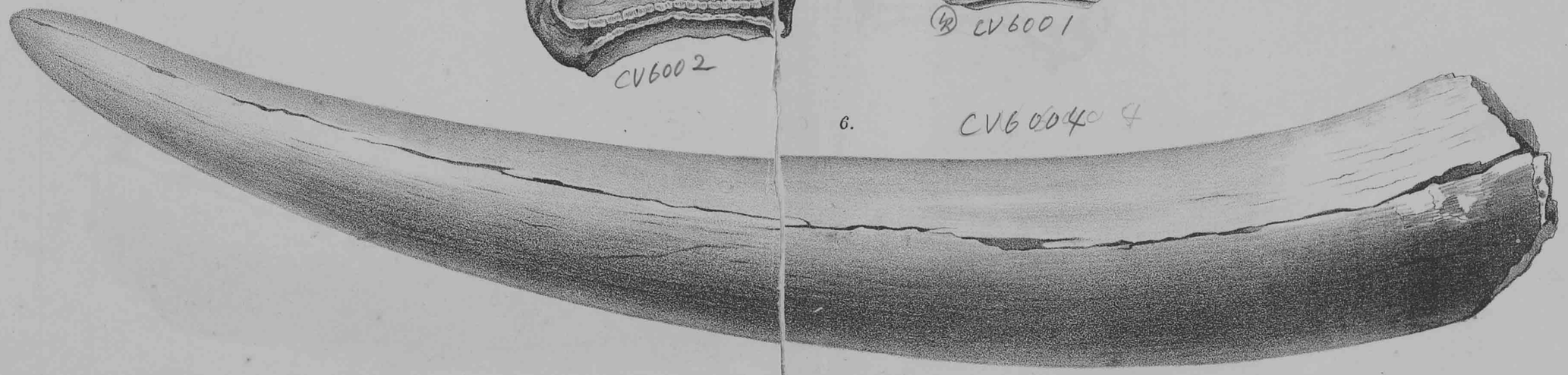
(All figures in natural size).











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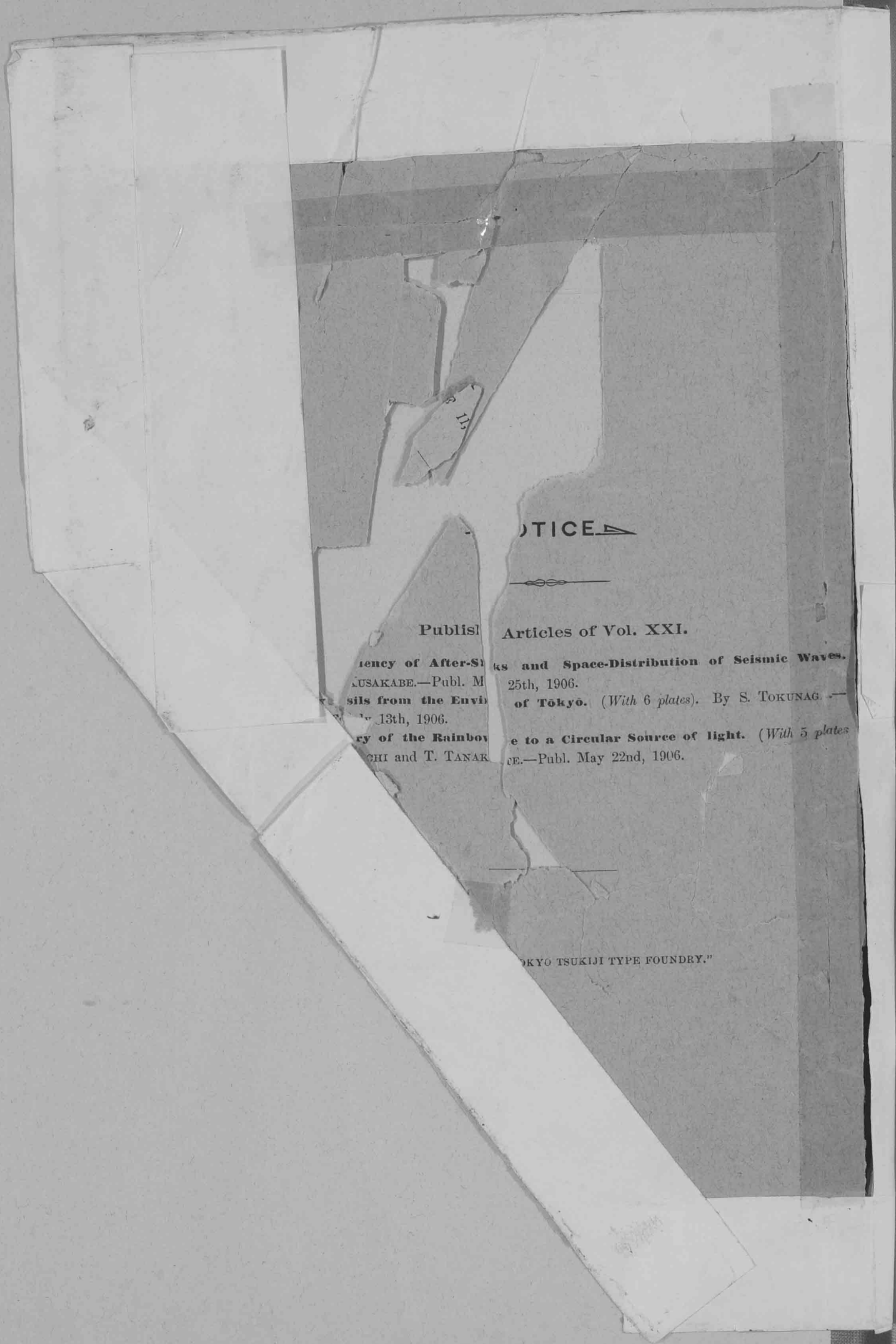

OTICE

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