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20. *Molluscan Fossils from the Raised Beach Deposit of Takai, Tateyama-Hôzyô-mati, Tiba Prefecture*

(Studies on the Fossil Mollusca of the Bôsô
Peninsula. No. 1)

By

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One of the present writers (ICHIMURA), while surveying the geology of the southern part of the Bôsô Peninsula in 1934, has made a large collection of fossil shells from the raised beach deposit of Takai, Tateyama-Hôzyô-mati, exposed along cliffs on both sides of River Taki. The shells are excellently preserved and even the colour patterns are retained in many of them, though more or less faded. The number of the species determined is attained to sixty-four in total, which are distributed in twenty-eight species of Bivalvia, one of Scaphopoda, and thirty-five of Gastropoda, as listed below:—

Bivalvia

1. <i>Nuculana confusa</i> (HANLEY), 1860.	Rare.
2. <i>Barbatia</i> (<i>Trigonodesma</i>) <i>yokoyamai</i> (NOMURA), 1933.	Rare.
3. <i>Anadara</i> (<i>Scapharca</i>) <i>inflata</i> (REEVE), 1844.	Not rare.
4. <i>Chlamys</i> (<i>Chlamys</i>) <i>nobilis</i> (REEVE), 1852.	Rare.
5. <i>Pecten</i> (<i>Pecten</i>) <i>laqueatus</i> SOWERBY, 1842.	Common.
6. <i>Ostrea</i> (<i>Ostrea</i>) <i>denselamellosa</i> LISCHKE, 1869.	Common.
7. <i>Ostrea</i> (<i>Lopha</i>) <i>rosacea</i> DESHAYES, 1836.	Not rare.
8. <i>Ostrea</i> (<i>Lopha</i>) <i>imbricata</i> LAMARCK, 1819.	Rare.

9.	<i>Ostrea (Crassostrea) gigas</i> THUNBERG, 1793.	Not rare.
*10.	<i>Lucina (Anodontia) bialata</i> (PILSBRY), 1895.	Rare.
11.	<i>Codakia (Pillucina) pisidium</i> (DUNKER), 1860.	Rare.
12.	<i>Cardium (Papyridea) muticum</i> REEVE, 1843.	Not rare.
*13.	<i>Dosinia (Dosinella) angulosa</i> (PHILIPPI), 1847.	Abundant.
14.	<i>Venus (Chione) micra</i> (PILSBRY), 1904.	Not rare.
*15.	<i>Venus (Clausinella) tiara</i> DILLWYN, 1817.	Rare.
16.	<i>Paphia (Paphia) euglypta</i> (PHILIPPI), 1847.	Common.
17.	<i>Paphia (Paratapes) undulata</i> (BORN), 1778.	Not rare.
*18.	<i>Clementia vatheleti</i> MABILLE, 1901.	Not rare.
*19.	<i>Zozia abbreviata</i> (GOULD), 1861, var.	Common.
20.	<i>Solecurtus divaricatus</i> (LISCHKE), 1869.	Rare.
21.	<i>Macoma (Pseudometis) praerupta</i> SALISBURY, 1934.	Rare.
22.	<i>Macoma (Macoma) tokyoensis</i> MAKIYAMA, 1927.	Rare.
*23.	<i>Macoma (Macoma) praetexta</i> (MARTENS), 1865.	Rare.
*24.	<i>Macoma (Psammacoma) canlida</i> (LAMARCK), 1819.	Rare.
*25.	<i>Macoma (Psammacoma) vestalioides</i> (YOKOYAMA), 1920.	Rare.
*26.	<i>Macoma (Psammacoma) awajiensis</i> (SOWERBY), 1914.	Rare.
*27.	<i>Tellina (Fabulina) nitidula</i> DUNKER, 1860.	Rare.
28.	<i>Solen gouldi</i> CONRAD, 1867.	Rare.

Scaphopoda

*29.	<i>Dentalium (Dentalium) octangulatum</i> DONOVAN, 1803.	Abundant.

Gastropoda

30.	<i>Lemintina imbricata</i> (DUNKER), 1860.	Rare.
31.	<i>Batillaria multiformis</i> (LISCHKE), 1869.	Rare.
32.	<i>Cerithium (Proclava) pfefferi</i> (DUNKER), 1877.	Abundant.
*33.	<i>Cerithium (Proclava) kochi</i> PHILIPPI, 1875.	Rare.
34.	<i>Gourmya (Contumax) kobelti</i> (DUNKER), 1864.	Rare.
35.	<i>Epitonium (Lineoscala?) yokoyamai</i> n. sp.	Rare.
36.	<i>Epitonium</i> sp.	Rare.
37.	<i>Leucotina (Actaeopyramis) eximia</i> (LISCHKE), 1874.	Common.
38.	<i>Diala picta</i> A. ADAMS, 1861.	Rare.
39.	<i>Odostomia hilgendorfi</i> CLESSIN, 1900.	Rare.
*40.	<i>Odostomia shimosenensis</i> YOKOYAMA, 1922.	Rare.
41.	<i>Turbonilla dunkeri</i> CLESSIN, 1900.	Rare.
42.	<i>Turbonilla approximata</i> DALL and BARTSCH, 1906.	Rare.
43.	<i>Turbonilla multigyrata</i> DUNKER, 1860.	Rare.
44.	<i>Amathina tricarinata</i> (LINNAEUS), 1767.	Rare.
45.	<i>Crepidula (Syphopatella) walshii</i> (HERMANSON) REEVE, 1859.	Rare.
46.	<i>Strombus (Canarium) japonicus</i> REEVE, 1851.	Not rare.

47. <i>Strombus</i> (<i>Canarium</i>) <i>succinctus</i> LINNÉ, 1768.	Rare.
*48. <i>Polinices</i> (<i>Neverita</i>) <i>didyma</i> ("BOLTEN" RÖDING), 1798.	Abundant.
49. <i>Sinum</i> (<i>Eunaticina</i>) <i>papillum</i> (GMELIN), 1791.	Rare.
50. <i>Tonna luteostoma</i> (KÜSTER), 1857.	Not rare.
51. <i>Rapana thomasi</i> CROSSE, 1861.	Rare.
52. <i>Pyrene</i> (<i>Mitrella</i>) <i>varians</i> (DUNKER), 1860.	Rare.
*53. <i>Babylonia japonica</i> (REEVE), 1842.	Common.
54. <i>Nassarius</i> (<i>Hinia</i>) <i>festivus</i> (POWIS), 1835.	Not rare.
55. <i>Nassarius</i> (<i>Tritonella</i>) <i>japonicus</i> (A. ADAMS), 1851.	Rare.
*56. <i>Nassarius</i> (<i>Niotha</i>) <i>livescens</i> (PHILIPPI), 1848.	Abundant.
57. <i>Olivella consobrina</i> LISCHKE, 1871.	Rare.
58. <i>Cancellaria</i> (<i>Merica</i>) <i>laticosta</i> LÖBBECKE, 1881.	Rare.
*59. <i>Cancellaria</i> (<i>Narona</i>) <i>spengleriana</i> DESHAYES, 1830.	Abundant.
60. <i>Cancellaria</i> (<i>Solatia</i>) <i>nodulifera</i> SOWERBY, 1825.	Rare.
61. <i>Clavatula consimilis</i> (SMITH), 1879.	Common.
62. <i>Terebra</i> (<i>Strioterebrum</i>) <i>lischkeana</i> DUNKER, 1882.	Rare.
63. <i>Terebra</i> (<i>Strioterebrum</i>) <i>bathyrhapha</i> SMITH, 1875.	Rare.
64. <i>Ringicula</i> (<i>Ringiculella</i>) <i>arctata</i> GOULD, 1860.	Not rare.

All the species reported by S. NOMURA⁽¹⁾ from the same place a few years ago are also contained in this collection. They are marked with asterisks in the above list. *Barbatia yokoyamai*, *Chlamys nobilis*, *Epitonium yokoyamai*, *Diala picta*, *Odostomia shimosenensis*, *Strombus succinctus*, *Cancellaria nodulifera*, *Clavatula consimilis* and *Ringicula arctata* have not hitherto been known from any raised beach deposits of the Kwanto District. *Diala picta* and *Strombus succinctus* are the first ones found as fossils in Japan.

Looking over the above list, one can recognize that this fauna is composed in main of the species characteristic of the Japanese Kurosio fauna, that it contains no element typical of the Oyasio fauna, and that it is most closely allied to the recent molluscan fauna of the Pacific coast between Bôsyû and Kii. Several species of the fauna have wide distributions in the subtropical and tropical seas from the Malay Archipelago to Japan. *Venus tiara*, *Zozia abbreviata*, *Sinum papillum*, *Nassarius livescens* and *Ringicula arctata* are such examples. Therefore, it may be concluded that the temperature of the water indicated by this fauna approximates to, or is slightly warmer than, that of Tateyama Bay of to-day, but

(1) Sitihei NOMURA: "Mollusca from the Raised Beach Deposits of the Kwantô Region," Sci. Rep. Tôhoku Imp. Univ., ser. 2, vol. 15, 1932, no. 2, pp. 65 (1)-141 (77).

by no means warmer than that of the present Kii coast.

This faunal aspect is quite similar to that of the raised beach deposit of Zôsiki⁽¹⁾, about 1 km. north of Takai, as well as to that of the so-called "coral-bed of Awa"⁽²⁾ developed along the southern coast of Tateyama Bay. But it is more or less distinct from that of the so-called "warm-sea deposit" of Kokubu⁽³⁾, about 1.5 km. east of Takai, and from those of the raised beach deposits at Simohuziwaru⁽⁴⁾, Nagaoka⁽⁴⁾, Tikura, Seto⁽⁴⁾, Titose⁽⁴⁾ and others located on the Pacific side of the peninsula.

According to the ICHIMURA's field observation, the raised beach deposit of Takai can be correlated to those of Zôsiki, Tikura and Seto, but it is a little younger than the "warm-sea deposit" of Kokubu. He has observed also that both sets of the deposits are set on the "coral-bed of Awa" with a distinct unconformity between. As a result, the stratigraphical relation among the raised beach deposits of the southern part of the Bôsô Peninsula is tabulated below:—

Holocene	Raised	Shell-Beds of Takai, Zôsiki, Tikura, Seto and Others	
	Beach	Shell-Bed of Kokubu	
	Deposits	"Coral-Bed of Awa " (Shell-Beds of Numa, Kô, Kasana, etc)	
Pliocene- Miocene	Basement Complex		

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(1) S. NOMURA: *Op. cit.*

(2) M. YOKOYAMA: "Mollusca from the Coral-Bed of Awa", Jour. Coll. Sci., Imp. Univ. Tokyo, vol. 45, art. 1, 1924.

S. NOMURA: *Op. cit.*

(3) S. SAHEKI: "Warm Sea Deposits of Tateno-mura, Awa", Jour. Geol. Soc. Tokyo, vol. 36, 1929, no. 434, p. 502.

(4) S. NOMURA: *Op. cit.*

C. UEKI for photographing.

Descriptions of Interesting Species

14. *Venus (Chione) micra* (PILSBRY)

Pl. 40 (12), figs. 2-5

- ?1869. *Venus crenifera* A. ADAMS (not SOWERBY), Ann. Mag. Nat. Hist., ser. 4, vol. 2, p. 230.
 ?1882. *Chione crenifera* DUNKER (not SOWERBY), Ind. Moll. Mar. Japonici, p. 197.
 1904. *Chione micra* PILSBRY, Proc. Acad. Nat. Sci. Philadelphia, vol. 53, p. 552, pl. 41, fig. 45.
 1927. *Chione crenifera* YOKOYAMA (not SOWERBY), Jour. Fac. Sci., Imp. Univ. Tokyo, sect. 2, vol. 1, pt. 10, p. 456, pl. 52, figs. 9, 10.
 1932. *Chione (Timoclea) creniferoides* NOMURA, Sci. Rep. Tôhoku Imp. Univ., ser. 2, vol. 15, no. 2, p. 83 (19).

Four left valves and one right valve were collected.

Living :—Bôsyû to Kyûsyû.

This species closely resembles *Anomalo cardia squamosa* (LINNÉ) and even it is not improbable that the former merely represents an immature stage of the latter.

Out of YOKOYAMA's *Chione crenifera* from the shell-beds of Itikawa, NOMURA has established a new species, *Chione (Timoclea) creniferoides*. In comparison with the type specimens of *Chione micra* PILSBRY, the specimens of *creniferoides* illustrated by YOKOYAMA have certainly a less quadrated outline with a more strongly protruded posterior end and more numerous and finer radial ribs. But, among the YOKOYAMA's collection from the same locality, there are some specimens almost identical with the types of PILSBRY's species, and the two forms are united into a continuous morphological series by many intermediate ones. Therefore, it may be understood that *C. micra* is tolerably variable in the outline and surface sculpture and *C. creniferoides* might be no more than a variant within this species. The continuous variation from *C. micra* to *C. creniferoides* can also be seen among a number of the recent specimens procured from Sagami Bay and kept in our Institute collection (Pl. 40 (12), figs. 2-4).

Chione crenifera described by A. ADAMS from the Inland Sea of Japan (Setouti) may possibly belong to this species.

Incidentally, *Chione mindanensis* YOKOYAMA (not SMITH) from the Upper Musashino Formation of Semata, Tiba prefecture, ap-

parently resembles this species, but they are different in the hinge nature and surface sculpture and from which it is suggested that the former may be an immature form of a certain species of the genus *Protothaca*, probably of *P. jedomensis* (LISCHKE).

19. *Zozia abbreviata* (GOULD) var.

Pl. 39 (11), figs. 10-18

- Cf. 1861. *Solen abbreviatus* GOULD, Proc. Boston Soc. Nat. Hist., vol. 8, p. 26.
Cf. 1861. *Azor minutus* DUNKER, Proc. Zool. Soc. London, p. 425.
Cf. 1862. *Solen abbreviatus* GOULD, Otia Conch., p. 164.
Cf. 1874. *Solecurtus abbreviatus* SOWERBY, Conch. Icon., vol. 19, *Solecurtus* sp. 6, pl. 2, figs. 6a, b.
Cf. 1874. *Solecurtus minutus* SOWERBY, *Ibid.*, *Solecurtus* sp. 11, pl. 3, fig. 11.
Cf. 1888. *Solecurtus abbreviatus* CLESSIN, Conch. Cab., vol. 11, pt. 3, Solenaceen, p. 93, pl. 22, fig. 3.
Cf. 1888. *Solecurtus minutus* CLESSIN, *Ibid.*, p. 94, pl. 24, fig. 4.
Cf. 1920. *Solecurtus abbreviatus* YOKOYAMA, Jour. Coll. Sci., Imp Univ. Tokyo, vol. 39, art. 6, p. 111, pl. 7, figs. 12, 13.
Cf. 1928. *Solecurtus abbreviatus* YOKOYAMA, Imp. Geol. Surv. Japan, Rep. no. 101, p. 124, pl. 19, fig. 12.
1932. *Psammosolen abbreviatus* NOMURA, Sci. Rep. Tôhoku Imp. Univ., ser. 2, vol. 15, no. 2, p. 90 (26), (parts).

Shell relatively small, thin, transversely oblong, slightly reniform, more than twice as long as high, compressed, inequilateral. Beaks situated at about the anterior two-fifths, contiguous, small, low, incurved and turned backward. Dorsal margin nearly straight, being the arching very slight; antero-dorsal very slowly descending, a trifle convex; anterior end regularly rounded; ventral margin almost straight, feebly excavated in the middle, and strongly arcuate up to neighbouring margins; posterior end obliquely sub-truncated, making a sharply rounded corner with the ventral border; postero-dorsal margin straight, scarcely descending. Surface concentrically marked with irregular incremental striae and provided with an indistinct groove running obliquely from the umbone to the posterior ventral side across the middle of the shell in addition to some very obsolete radiating ribs and furrows; median radial groove rather rapidly widening, and slightly or often even hardly depressed from the general surface, its posterior boundary more or less distinctly marked by a fine furrow, but its anterior border obsolete and sometimes scarcely discernible. Interior of the shell with an indistinct, broad, but slightly elevated median radial ridge, which is corresponding to the external groove and obsoletely bounded by two furrows, besides many fine and faint radiating lines. Muscular impressions distinct but rather small, more or less irregularly ovate, the posterior one broader than the anterior. Pallial sinus tolerably large and broad, round or roundly quadrated, deep, approaching the me-

dian radial elevation but not extending beyond it. Right valve with two small, short, comparatively strong teeth, of which the posterior one is obliquely directed backward; left valve with one small but strong tooth.

Several right and three left valves were collected.

Living :—Japan (exact locality unknown). (*Zozia abbreviata* : Bôsyû to Ryûkyû, Japan Sea, Taiwan (Formosa), China Sea, Philippines, Malay, Netherlands East Indies, Malacca.)

Zozia abbreviata and its allies exhibit certain amounts of variation in outline and sculpture. Recently, B. PRASHAD⁽¹⁾ has ascertained that *Macha sheepmackeri* DUNKER 1852, *Solen abbreviatus* GOULD 1861, *Azor oblongus* DUNKER 1861, *Azor solidus* DUNKER 1861 (non GRAY) and *Novaculina andamanensis* PRESTON 1908 are all synonyms of *Zozia coarctata* (GMELIN) 1790.⁽²⁾

The fossil shell from Takai is easily distinguishable from the typical form of *Zozia abbreviata* in its slightly more slender and evidently more inequilateral shell with a sub-triangularly protruded posterior end and a more obsolete and oblique medial groove, and its pallial sinus which is not extended beyond the median radial ridge. The proportion of the height to the length of the shell, the position of the beaks and the strength of the median radial groove are, however, variable to some extent in *Zozia coarctata*, *Z. abbreviata* and the fossil form of Takai in each (see Table). *Z. coarctata* illustrated by FORBES and HANLEY⁽³⁾ is, for example, closely akin to the typical form of *Z. abbreviata* in its general outline, while the specimens illustrated by SOWERBY⁽⁴⁾ and M. HÖRNES⁽⁵⁾ are similar to some fossil specimens of *Z. abbreviata* from Naganuma and Tumuki and also to the fossil form from Takai in regard to the somewhat more slender and inequilateral shell. Since there is no specimen of *Z. coarctata* in our collection, this species may now be put outside of the discussion. The typical form of *Z. abbreviata* appears to be linked to the fossil form from Takai without any distinct gap. The collections of fossil shells from the

(1) B. PRASHAD : Siboga Exped., monograph 53c, 1932, p. 311.

(2) *Solen coarctatus* GMELIN in LINNAEUS, Syst. Nat., ed. 13, 1790, p. 3227.

(3) *Solecurtus coarctatus* FORBES & HANLEY, British Mollusca, 1853, vol. 1, p. 259, vol. 4, pl. 15, fig. 3.

(4) *Solecurtus coarctatus* SOWERBY, Conch. Icon., vol. 19, 1874, *Solecurtus* sp. 8, pl. 2, fig. 8.

(5) *Psammosolen coarctatus* M. HÖRNES, Die Fossilen Mollusken des Tertiär-Beckens von Wien, 1856, vol. 3, p. 21, vol. 4, pl. 1, fig. 18.

Naganuma (Pliocene) and Tumuki (Holocene) beds contains such intermediate forms, a few specimens (Pl. 39 (11), figs. 6-8) of which are very closely allied to the form from Takai, besides many specimens of typical *abbreviata* (Pl. 39 (11), figs. 9, 9a; YOKOYAMA, 1920, pl. 7, figs. 12, 13; YOKOYAMA, 1928, pl. 19, fig. 12). Therefore, the fossil shell from Takai may securely be understood as an extremity of the individual variation, or at most as a subspecies, of *Z. abbreviata*. In our Institute collection of Japanese recent Mollusca, there is found a single right valve (Pl. 39 (11), fig. 10) from an unknown locality which is almost indistinguishable from the fossil from Takai.

Zozia minuta (DUNKER), living now in the Philippines, can hardly be distinguished from a certain immature form of *Z. abbreviata* (Pl. 39 (11), figs. 7, 8) from the Tumuki shell-beds. Further, it is also very similar to the fossil from Takai in the external feature, but its size is smaller and its posterior end is rather regularly rounded. The poor illustrations and brief descriptions of *Z. minuta* by DUNKER, SOWERBY and CLESSIN are insufficient for accurate comparison. Unless DUNKER's specimen is actually studied, it can hardly be decided whether his species represents an immature stage of *Z. abbreviata* or not.

The dimensions of some individuals of *Zozia abbreviata* and its allies are listed below:—

Species	Locality	Specimen number	Kind of valve	Figure number on Pl. 39 (11)	Length in mm.	Height in mm.	Thickness in mm.	Ratio of length to height	Ratio of posterior side to the anterior	Ratio of thickness to length in percentage
<i>abbreviata</i>	Malacca (Recent)	REEVE'S specimen (after SOWERBY)	right	—	40.0	19.0	—	2.11	1.17	—
	Coast of Bôsyû (Recent)	1	left	2,2a	43.2	21.2	6.0	2.04	1.34	13.9
		2	right	1,1a	43.2	21.0	6.0	2.06	1.34	13.9
		3	"	4	38.4	19.0	4.8	2.02	1.34	12.5
		4	"	3,3a	36.8	18.6	4.6	1.98	1.30	12.5
		5	"	5,5a	34.4	17.1	4.9	2.01	1.29	14.2
		kf 552a	left	—	43.0	20.3	5.5	2.12	1.35	12.8

Species	Locality	Specimen number	Kind of valve	Figure number on Pl. 39 (11)	Length in mm.	Height in mm.	Thickness in mm.	Ratio of length to height	Ratio of posterior side to the anterior	Ratio of thickness to length in percentage
<i>abbreviata</i>	Naganuma (Upper Pliocene)	kf 552c	right	9,9a	42.1	21.0	6.2	2.00	1.20	14.7
		kf 552b	"	—	38.4	18.3	5.2	2.10	1.26	13.5
		kf 552d	left	—	38.3	18.0	5.0	2.13	1.25	13.1
		kf 552e	right	—	30.5	14.8	—	2.06	1.52	—
	Tumuki (Holocene)	kf 5550a	left	—	26.7	13.2	2.9	2.02	1.43	10.9
		kf 5550b	left	6,6a	20.6	9.8	2.4	2.10	1.58	11.1
		kf 5550c	right	8,8a	16.7+	8.0	1.9	2.09+	1.49+	11.4—
		kf 5550d	left	7,7a	16.7	7.8	2.0	2.14	1.49	12.0
<i>abbreviata</i> var.	Japan (Recent)	—	left	10,10a	24.8	12.2	3.1	2.03	1.68	12.5
	Takai (Holocene)	1	right	12	31.6	14.7	—	2.15	1.66	—
		2	left	—	31.0±	14.8±	3.6	2.09±	1.56±	11.6±
		3	"	17	31.0	14.5	—	2.14	1.74	—
		4	right	14,14a	31.0	13.7	3.6	2.26	1.70	11.6
		5	"	13,13a	30.6	14.3	3.4	2.14	1.76	11.1
		6	"	16	30.1+	14.5	3.2	2.08+	1.62+	10.6—
		7	"	—	29.8±	13.0±	3.3	2.29±	1.50±	11.1±
		8	"	15	28.2	13.7	3.5	2.06—	1.56	12.1
		9	left	18	27.7	13.3	—	2.08	1.56	—
		10	right	—	26.3	12.0	3.0	2.19	1.63	11.4
		11	"	—	26.2+	12.9	3.1	2.03+	1.38+	11.8—
		12	"	11,11a	24.2	10.7	2.6	2.26	1.72	10.7
<i>minuta</i>	Philippines (Recent)	DUNKER'S specimen (after CLES-SIN)	right	—	17.0	8.0	(2?)	2.13	1.43	(11.8?)
<i>coarctata</i>	Naples (Recent)	REEVE'S specimen	left	—	31.4	14.3	—	2.20	1.75	—
	Britain? (Recent)	FORBES & HANLEY'S specimen	right	—	1 3/4 inch	7/8 inch	—	2.00	1.40	—
	Wien (Tertiary)	HÖRNES' specimen	right	—	42.4	18.5	—	2.29	1.74	—

35. *Epitonium* (*Lineoscala*?) *yokoyamai* n.sp.

1927. *Scala lyra* YOKOYAMA (not SOWERBY, 1847), Jour. Fac. Sci., Imp. Univ. Tokyo, sect. 2, vol. 1, pt. 10, p. 417, pl. 47, fig. 2.

Only one small, imperfect specimen was collected.

Living:—Central Japan?

This species is quite distinct from *Epitonium lyrum* (SOWERBY) in its evidently smaller size and its coarser sculpture. Also it is easily distinguishable from any other species of the genus from Japan, both recent and fossil, in the shape and sculpture of the shell.

38. *Diala picta* A. ADAMS

Pl. 40 (12), figs. 14–16

1861. *Diala picta* A. ADAMS, Ann. Mag. Nat. Hist., ser 3, vol. 8, p. 243.

1862. *Diala picta* A. ADAMS, *Ibid.*, vol. 9, p. 295.

1878. *Diala picta* ANGAS, Proc. Zool. Soc. London, p. 867.

1901. *Diala picta* TATE and MAY, Proc. Linn. Soc. New South Wales, vol. 26, p. 388.

1906. *Diala picta* PRITCHARD and GATLIFF, Proc. Roy. Soc. Victoria, vol. 18, p. 61.

1913. *Diala picta* HEDLEY, Proc. Linn. Soc. N. S. Wales, vol. 38, p. 285, pl. 18, fig. 55.

Shell small, thin, regularly elongate-ovate, shining, with angled body whorl. Spire elevated, narrow and acuminate, about twice the height of the aperture. Protoconch small, conical, and composed of two smooth convex whorls. Whorls exclusive of the protoconch six, regularly slowly increasing, rather high between the sutures, feebly convex, somewhat contracted at the sutures; suture impressed, but not very deep. Last whorl slightly inflated, with angulated periphery; base rounded and very slightly contracted. Entire surface of spire and base marked by numerous spiral threads and lines of growth; spiral threads subequal, equidistant, and very closely set; these on the shoulder somewhat narrower and more obsolete than those on the base; lines of growth subvertical, a few of which are developed obsolete varices. Aperture subvertical, broadly oval, rather acutely angled above and somewhat effused below; outer lip simple, thin and sharp; columella slender, comparatively strong, slightly oblique and hardly arched; inner lip thin, very feebly expanded; parietal wall covered by a thin callus. Ground colour turned out into white, but colour bands and lines still discernible; bands spiral, narrow, chestnut brown coloured, five on the base and three on the shoulder, among the latter of which one is located near the upper suture, another at about the midst of the shoulder and still another close to the angle; on the later whorls a narrower band inserted between each pair of these three; colour lines, numerous, chestnut

coloured, fine, divided into short strips and arranged in longitudinal parallels.

Only a single specimen was collected.

Living:—Bôsyû to Kyûsyû. Japan Sea. Tyôsen (Korea).

In his description of this species from Takano-sima in Tateyama Bay, Bôsyû, A. Adams has given neither its illustration nor dimensions. The fossil from Takai as well as the recent shells from Urusan in Tyôsen (Pl. 40 (12), figs. 14, 15) agrees with the original description given by Adams and the illustration of the type specimen given by Hedley except for a band of opaque white spots on the last whorl. In comparison with the recent specimens from Urusan, this fossil is slightly less convex and less slender, more distinctly angulated and marked by spiral colour bands which are more uniform in breadth, a little more numerous and arranged more or less in different way. Moreover, its last whorl is not so strongly inflated.

The dimensions of the fossil from Takai and the recent specimens from Urusan are as follows:—

Loc.	Figure	Height in mm.	Diameter in mm.	Height of aperture in mm.	Diameter of apt. in mm.
Takai	(Pl. 40 (12), fig. 16)	6.8	3.0	2.7	2.0
Urusan	(Pl. 40 (12), fig. 14)	8.2	3.4	3.2	2.0
Urusan	(Pl. 40 (12), fig. 15)	7.2	3.1	2.7	2.0

47. *Strombus (Canarium) succinctus* LINNÉ

Pl. 40 (12), figs. 18, 18a

1768. *Strombus succinctus* LINNÉ, Syst. Nat., ed. 12, p. 1212.
 1845. *Strombus succinctus* KÜSTER, Conch. Cab., vol. 4, pt. 1, p. 39, pl. 7, fig. 14.
 1847. *Strombus succinctus* SOWERBY, Thes. Conch., vol. 1, p. 28, pl. 6, figs. 20, 21.
 1851. *Strombus succinctus* REEVE, Conch. Icon., vol. 6, *Strombus* sp. 43, pl. 17, fig. 43.
 1885. *Strombus succinctus* TRYON, Man. Conch., vol. 7, p. 116, pl. 6, figs. 56, 57.
 1933. *Strombus (Labiostrombus) succinctus* IW. TAKI, Suisan Dô-yokubutu Zuse-tu, p. 492, text-fig.

A single well preserved specimen was collected. Its dimensions are as follows: Height, 52 mm.; Diameter, 29 mm. Height of the aperture (exclusive of the canal and channel), 40 mm.; Diameter of the aperture, 11 mm.

Living:—Sagami to Ryûkyû. Taiwan (Formosa). Philippines.

Although this characteristic and fine species is not uncommon

in the warm waters of Japan, its occurrence as a fossil has not hitherto been reported from Japan.

The fossil from Takai perfectly agrees with the descriptions and illustrations of this species given by KÜSTER, SOWERBY, REEVE, TRYON and TAKI.

60. *Clavatula consimilis* (SMITH)

Pl. 40 (12), figs. 6-12

1879. *Pleurotoma consimilis* SMITH, Proc. Zool. Soc. London, 1879, p. 188, pl. 19, fig. 11.
1882. *Pleurotoma consimile* KOBELT, Conch. Cab., vol. 4, pt. 3, p. 190, pl. 37, fig. 7.
1920. *Drillia nivalioides* YOKOYAMA, Jour. Coll. Sci., Imp. Univ. Tokyo, vol. 39, art. 6, p. 39, pl. 1, fig. 27.
1927. *Drillia nivalioides* YOKOYAMA, Jour. Fac. Sci., Imp. Univ. Tokyo, sect. 2, vol. 1, pt. 10, pp. 393 (part), 410.
1935. *Clavatula consimilis* OTUKA, Bull. Earthq. Res. Inst., vol. 13, pt. 4, p. 872, pl. 54, figs. 103, a-c.

Several specimens were collected.

Living:—Mutu Bay to Kyûsyû. Japan Sea. Tyôsen (Korea). China Sea.

The followings may be suggested by our renewed study on the YOKOYAMA's original specimens of *Drillia nivalioides*:—

1) *D. nivalioides* YOKOYAMA which has originally been instituted with two specimens from the Kosiba and Naganuma beds of the Pliocene age in Kanagawa prefecture may be a synonym of *Clavatula consimilis* (SMITH).

2) The specimens collected from the Pleistocene shell-beds of Ôzi in Tokyo and Namamugi in Yokohama, and referred to *D. nivalioides* by YOKOYAMA also seem to belong to the SMITH's species.

3) Those collected from the Pleistocene deposit of Dôkwan-yama in Tokyo and from the Pliocene Omma beds at Omma and Nagaya, Isikawa prefecture, and referred also to *D. nivalioides* by YOKOYAMA on the other hand may be identifiable with *Clavatula patruelis* (SMITH) and *C. patruelis dainichiensis* (YOKOYAMA) respectively.

4) Among the specimens of *C. consimilis* in our Institute collection, there are, however, two forms to be distinguished. One is represented by the specimens from Takai, Naganuma and Namamugi (Pl. 40 (12), figs. 6-8, 10, 11) and the other is typified by those

from Kosiba, Ôzi and Tumuki (Pl. 40 (12), figs. 9, 12) as well as the living specimens of Sagami Bay kept also in our Institute. The two differ in the axial ribs which are stronger in the former, but such a minor distinction may be insufficient even for the sub-specific separation.

The dimensions of some individuals are as follows:—

Locality	Specimen number	Figure number on Pl. 40 (12)	Height in mm.	Diameter in mm.	Aperture	
					Height in mm.	Diameter in mm.
Sagami Bay (Recent)	1		15.3	5.2	5.6	2.1
Takai (Holocene)	1	6,6a	12.4	4.3	4.3	2.0
	2	7,7a	12.3	4.2	4.9	2.3
	3	—	12.1	4.2	4.7	2.0
	4	—	10.4	3.8	3.8	1.6
	5	8	10.2	3.9	3.9	1.8
	6	—	7.6	3.0	3.1	1.3
Ôzi (Pleistocene)	kf3349a (<i>D. nivalioides</i>)	9	12.2	4.4	4.7	2.0
Namamugi (Pleistocene)	kf3828 (<i>D. nivalioides</i>)	—	13.3	4.6	5.4	2.3
Naganuma (Upper Pliocene)	kf332 (Type of <i>D. nivalioides</i>)	10	14.0	4.6	4.6	2.2
	Another specimen	11	12.2	4.3	4.6	2.1
Kosiba (Pliocene)	kf331 (Type of <i>D. nivalioides</i>)	12	16.0	5+	6.4	?

千葉縣館山北條町高井産沖積世貝化石 (摘要)

鈴木 好一, 市村 賢一

昭和 9 年市村が採集同定せる標本を, 更に鈴木が調査の上此處に報告する事とした。

總種數 64, 内双殻類 28, 掘足類 1, 腹足類 35 種。化石の保存状態は甚だ良好。

既に昭和 2 年に, 野村七平氏が同一場所より 16 種の貝化石を報告して居られるが, 其全部が筆者等の標本中にも見出された。又全 64 種中 9 種は野村氏が關東地方全體の沖積層から報告して居られないものである。

本貝化石群は主として日本要素と黒潮要素とより成り, 典型的な親潮要素は 1 つも含まれてゐない。全體として, 房州より紀州に至る海岸の貝類相に酷似する。従つて本貝層堆積地の水温は現在の館山灣のそれと略々同じか, 幾分之より温かゝつた程度で, 紀州沿岸の水温より高温であつたとは思はれぬ。

又本貝化石群は近接せる國府村藏敷の沖積世貝化石群に最もよく類似し, 所謂安房珊瑚層のそれとも可成り似てゐる。しかし館野村國府の「暖海堆積物」(佐伯四郎)や太平洋側諸地點(下藤原, 長岡, 瀬戸, 千倉, 千歳等)に於ける沖積層の貝化石群とは相當異なる。これは堆積地(棲息地)環境の小差に基くのであらう。

市村の調査によれば, 高井, 藏敷, 瀬戸, 千倉等の沖積層は略々同時期のものであるが, 國府の「暖海堆積物」は之等より幾分古い。更に上記兩層は明瞭な不(非)整合を以て安房珊瑚層の上に載る。

最後に興味ある種類 6 種に就て記載並びに説明を加へておいた。尙 *Scala lyra* YOKOYAMA, 1927 (not SOWERBY, 1847) に對し *Epitonium yokoyamai* なる新種名を提出した。

Explanation of Plates 39 (11), 40 (12)

Plate 39 (11)

(All figures natural size)

Zozia abbreviata (GOULD)

Figs. 1-5. Recent specimens from the coast of Bôsyû.

Fig. 1. Specimen No. 1. Right valve; fig. 1, exterior; fig. 1 a, interior.

Fig. 2. Specimen No. 2. Left valve; fig. 2, exterior; fig. 2 a, interior.

Fig. 3. Specimen No. 4. Right valve; fig. 3, exterior; fig. 3 a, interior.

Fig. 4. Specimen No. 3. Exterior of right valve.

Fig. 5. Specimen No. 5. Right valve; fig. 5, exterior; fig. 5 a, interior.

Figs. 6-8. Specimens from the Holocene terrace deposit of Tumuki, Isikawa prefecture.

Fig. 6. Specimen No. kf 5550 b in the collection at Imperial University of Tokyo. Left valve; fig. 6, exterior; fig. 6 a, interior.

- Fig. 7. Specimen No. kf 5550 d. Left valve; fig. 7, exterior; fig. 7 a, interior.
- Fig. 8. Specimen No. kf 5550 e. Right valve; fig. 8, exterior; fig. 8 a, interior.
- Fig. 9. Specimen No. kf 552 c from the Upper Pliocene Naganuma beds at Naganuma, Kanagawa prefecture. Right valve; fig. 9, exterior; fig. 9 a, interior.

Zozia abbreviata (GOULD) var.

- Fig. 10. Recent specimen from an unknown locality in Japan. Left valve; fig. 10, exterior; fig. 10 a, interior.
- Figs. 11-18. Specimens from the raised beach deposit of Takai, Tiba prefecture.
- Fig. 11. Specimen No. 12. Right valve; fig. 11, exterior; fig. 11 a, interior.
- Fig. 12. Specimen No. 1. Exterior of right valve.
- Fig. 13. Specimen No. 5. Right valve; fig. 13, exterior; fig. 13 a, interior.
- Fig. 14. Specimen No. 4. Right valve; fig. 14, exterior; fig. 14 a, interior.
- Fig. 15. Specimen No. 8. Exterior of right valve.
- Fig. 16. Specimen No. 6. Exterior of right valve.
- Fig. 17. Specimen No. 3. Interior of left valve.
- Fig. 18. Specimen No. 9. Exterior of left valve.

Plate 40 (12)

- Fig. 1. *Macoma* (*Psammacoma*) *awajiensis* SOWERBY. Fossil from Takai. Left valve; fig. 1, exterior; fig. 1 a, interior. Length 16.0 mm., height 10.0 mm., thickness 2.5 mm. $\times 2$.
- Figs. 2-4. *Venus* (*Chione*) *micra* (PILSBRY). Recent specimens from Sagami Bay. $\times 2$.
- Fig. 2. Right valve; fig. 2, exterior; fig. 2 a, interior. Length 11.1 mm., height 9.1 mm., thickness 2.9 mm.
- Fig. 3. Exterior of right valve. Length 9.3 mm., height 8.0 mm., thickness 2.5 mm.
- Fig. 4. Exterior of left valve. Length 11.5 mm., height 10.0 mm., thickness 3.0 mm.
- Fig. 5. *Venus* (*Chione*) *micra* (PILSBRY). Fossil from Takai. Exterior of left valve. Length 10.3 mm., height 8.6 mm., thickness 3.0 mm. $\times 2$.
- Figs. 6-8. *Clavatula consimilis* (SMITH). Fossils from Takai. $\times 2$.
- Fig. 6. Specimen No. 1. Fig. 6, apertural view; fig. 6 a, back view.

- Fig. 7. Specimen No. 2. Fig. 7, apertural view ; fig. 7 a, back view.
Fig. 8. Specimen No. 5. Side view.
Fig. 9. *Clavatula consimilis* (SMITH). Specimen No. kf 3349 a in the collection at Imperial University of Tokyo, from the Pleistocene shell-beds of Ôzi in Tokyo. (*Drillia nivalioides* YOKOYAMA.) $\times 2$.
Figs. 10, 11. *Clavatula consimilis* (SMITH). Specimens from the Upper Pliocene Naganuma beds at Naganuma, Kanagawa prefecture. $\times 2$.
Fig. 10. Specimen No. kf 332 in the collection at Imp. Univ. Tokyo, one of the type specimens of *Drillia nivalioides* YOKOYAMA. Apertural view.
Fig. 11. Apertural view of another specimen from Naganuma.
Fig. 12. *Clavatula consimilis* (SMITH). Specimen No. kf 331 in the collection at Imp. Univ. Tokyo, from the Pliocene Kosiba beds at Kosiba, Kanagawa prefecture. One of the type specimens of *Drillia nivalioides* YOKOYAMA illustrated by YOKOYAMA (Fossils from the Miura Peninsula and Its Immediate North, 1920, pl. 1, fig. 27). $\times 2$.
Fig. 13. *Cancellaria (Merica) laticosta* LÖBBECKE. Fossil from Takai. Fig. 13, apertural view ; fig. 13 a, back view. Height 37.2 mm., diameter 21.8 mm. Natural size.
Figs. 14, 15. *Diala picta* A. ADAMS. Recent specimens from Urusan, Tyôsen (Korea). $\times 3$.
Fig. 14. Specimen No. 1. Fig. 14, apertural view ; fig. 14 a, back view.
Fig. 15. Specimen No. 2. Fig. 15, apertural view ; fig. 15 a, back view.
Fig. 16. *Diala picta* A. ADAMS. Fossil from Takai. Fig. 16, apertural view ; fig. 16 a, back view. $\times 3$.
Fig. 17. *Cerithium (Proclava) pfefferi* DUNKER. Fossil from Takai. Fig. 17, apertural view ; fig. 17 a, back view. Height 25.0 mm., diameter 8.0 mm. $\times 2$.
Fig. 18. *Strombus (Canarium) succinctus* LINNÉ. Fossil from Takai. Fig. 18, apertural view ; fig. 18 a, back view. Natural size.