

CATALOGUE OF THE TERTIARY AND QUARTERY MOLLUSCA FROM  
THE ISLAND OF TAIWAN (FORMOSA) IN THE INSTITUTE OF  
GEOLOGY AND PALAEOLOGY, TÔHOKU IMPERIAL  
UNIVERSITY, SENDAI, JAPAN

Part 2, SCAPHOPODA AND GASTROPODA

BY

SITIHEI<sup>1)</sup> NOMURA

With 5 Plates

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I. INTRODUCTION

Part 2 contains the species of Scaphopoda and Gastropoda from the Tertiary and later deposits of the Island of Taiwan. As in the case of Part 1, the specimens treated in this report are preserved in the Institute of Geology and Palaeontology, Tôhoku Imperial University, Sendai; these are derived from several localities of the Raised Coral Reef (Holocene deposits), the Ryûkyû<sup>2)</sup> Limestone (Pleistocene), the Byôritu Beds (Pliocene) and the Kaizan Beds (Miocene), and comprises the collection of Mr. S. ANDÔ of the Nippon Petroleum Company, Mr. S. HANZAWA of our Institute, and those of Messrs. Y. ICHIKAWA, T. MAKIYAMA and J. TORII, geologists of the Government General of Taiwan.

There are 14 species of Scaphopoda and 291 species of Gastropoda, altogether 305 species of mollusca<sup>3)</sup> represented in the collection, among which 60 species are considered to be new to science. The numerical terms of each shell-beds are given below:

1) SITIHEI = SHICHIHEI.

2) Geographical names in this paper are spelt in "Nippon siki" (Japanese system).

3) The species of Scaphopoda and Gastropoda described by Dr. YOKOYAMA in his report on the Mollusca from the Oil-Field of the Island of Taiwan (Imp. Geol. Surv. Jap., Rep. No. 101, 1928) are: *Ringicula foveolata* YOKOYAMA, *R. globulifera* YOKOYAMA, *Terebra lischkeana* DUNKER, *T. naumanni* YOKOYAMA, *T. subvariegata* YOKOYAMA, *T. formosana* YOKOYAMA, *T. sp.*, *Conus sinensis* SOWERBY var., *C. kikaiensis* PILSBRY, *C. comatosaeformis* YOKOYAMA, *C. oinouyei* YOKOYAMA, *Pleurotoma oxytropis* SOWERBY, *P. carinata* GRAY var. *woodwardi* MARTIN, *Drillia pseudoprincipalis* YOKOYAMA, *Surcula javana* (LINNÉ), *Mangilia perparva* YOKOYAMA, *Olivia mustellina* LAMARCK, *Olivella spretoides* YOKOYAMA, *Mitra isabella* SWAINSON, *M. sphaerulata* MARTYN, *M. gembacana* MARTIN, *Fasciolaria izukai* YOKOYAMA, *Hemifusus ternatanus* (GMELIN), *Siphonalia helletoides* YOKOYAMA, *Eburna sp.*, *Nassa (Niotha) gemmulata* (LAMARCK), *N. (Hima) verbeeki* MARTIN, *N.*

## A. Raised Coral Reef

1) Total number of forms distinguished .....	33. <sup>1)</sup>
2) Number of forms specifically determined .....	33.
3) Number of forms hitherto found only recent .....	11.
4) Number of forms hitherto found recent as well as fossil ...	22.
5) Number of forms "extinct" or "not known as living" .....	0.

## B. Ryûkyû Limestone

1) Total number of forms distinguished .....	9.
2) Number of forms specifically determined .....	8.
3) Number of forms specifically indetermined .....	1.
4) Number of forms hitherto found only recent .....	0.
5) Number of forms hitherto found recent as well as fossil ....	8.
6) Number of forms "extinct" or "not known as living" .....	0.

## C. Byôritu Beds

1) Total number of forms distinguished .....	274. <sup>2)</sup>
2) Number of forms specifically determined .....	246.
3) Number of forms specifically indetermined .....	28.
4) Number of forms hitherto found only recent .....	71.
5) Number of forms hitherto found recent as well as fossil ....	89.
6) Number of forms "extinct" or "not known as living" .....	86.
7) Percentage of "extinct" to the total species (except in- determined forms) .....	ca. 35.

## D. Kaizan Beds

This complex yielded only two species namely: *Tonna melanostoma* (JAY) and *Cypraea* sp.; although very scanty in number, it is certainly Miocene in age according to Mr. HANZAWA from his study of foraminifera remains.

(*Zeuxis*) *canaliculata* (LAMARCK), *Murex ternispina* LAMARCK, *Ocenebra* sp., *Rapana bezoar* LINNÉ var. *thomasi* CROSSE, *Triton* (*Simpulum*) *costatus* (BORN), *Distorsio cancellinus* (ROISSY), *Gyrineum scelsestum* YOKOYAMA, *Cassis japonica* REEVE, *C. gracilentata* YOKOYAMA, *Dolium olearium* BRUGUIÈRE, *D.* sp., *Pyrula taiwanica* YOKOYAMA, *Cypraea carneola* LINNÉ, *C. cinctoides* YOKOYAMA, *C.* sp., *Strombus* sp., *Rostellaria* (*Rimella*) *spinifera* MARTIN var. *formosana* YOKOYAMA, *R.* sp., *Cerithium satoi* YOKOYAMA, *C.* sp., *Potamides* (*Tympanotomus*) *fluviatilis* POTIEZ et MICHELLIN, *P.* (*Batillaria*) *murayamai* YOKOYAMA, *P. muritus* YOKOYAMA, *Cerithiopsis* (?) *shikoensis* YOKOYAMA, *Vermetus* sp., *Turritella terebra* LINNÉ, *T. bacillum* KIENER, *T. filiola* YOKOYAMA, *T.* sp., *Melania scabroides* YOKOYAMA, *M. submadiumensis* YOKOYAMA, *M. saigo* YOKOYAMA, *M. glabelliuscula* YOKOYAMA, *M. grossula* YOKOYAMA. *Solarium perspectivum* LINNÉ, *Polinices sagamiensis* PILSBRY, *Natica colliei* RECLUZ N. sp., *Sigaretus undulatus* LISCHKE, *Turbo marmoratus* LINNÉ var. *laevis* YOKOYAMA, *T.* (*Senectus*) *argyrostomus* LINNÉ var. *margaritacea* LINNÉ, *Gibbula* (?) *taiwanica* YOKOYAMA, *Scutus unguis* (LINNÉ), *Dentalium octagonum* LAMARCK, *D. vernedei* HANLEY, *D. subrectum* JEFFREYS, *D.* sp., *D.* sp., *Cadulus gordonis* YOKOYAMA.

Of the 81 species of Mollusca above mentioned, the following forms are not found in our collection: *Ringicula foveolata* YOKOYAMA, *R. globulifera* YOKOYAMA, *Terebra naumanni* YOKOYAMA, *T. subvariegata*, YOKOYAMA, *T. formosana* YOKOYAMA, *Comus sinensis* SOWERBY, var., *Siphonalia kelletoides* YOKOYAMA, *Cassis glacilenta* YOKOYAMA, *Dolium olearium* BRUGUIÈRE, *Cypraea carneola* LINNÉ, *C. cinctoides* YOKOYAMA, *Potamides muritus* YOKOYAMA, *Melania scabroides* YOKOYAMA, *M. glabelliuscula* YOKOYAMA, *Sigaretus undulatus* LISCHKE *Turbo marmoratus* LINNÉ var. *laevis* YOKOYAMA, *Scutus unguis* (LINNÉ), *Cadulus gordonis* YOKOYAMA.

1) There are many minute shells intermingled in sand and foraminifera collected from Kontei; these will be enumerated at a later date.

2) There are also many minute shells intermingling in sands collected from various localities of the Byôritu Beds; these will be described in another opportunity.

## II. A BRIEF NOTE ON THE BYÔRITU MOLLUSCAN FAUNA

The Molluscan fauna of the Byôritu Beds consists of 143 species of Pelecypoda,<sup>1)</sup> 13 species of Scaphopoda and 260 species of Gastropoda, 417 species in all, thus it may be regarded as the most fossiliferous deposits in Taiwan. The most prevalent types in the fauna are:

<i>Arca (Arca) inflata</i> REEVE	<i>Arca (Arca) tricenicosta</i> (NYST) <sup>2)</sup>
<i>Arca (Barbatia) yokoyamai</i> NOMURA	<i>Arca (Trisidos) kiyonoi</i> MAKIYAMA
<i>Glycymeris formosana</i> (YOKOYAMA)	<i>Cucullaea granulosa</i> (JONAS)
<i>Ostrea denselamellosa</i> LISCHKE	<i>Pecten (Pecten) subsquamatus</i> NOMURA
<i>Pecten (Vola) naganumanus</i> YOKOYAMA	<i>Pecten (Amusium) pleuronectes</i> (LINNAEUS)
<i>Crassatellites loebbeckei</i> (KOBELT) <sup>3)</sup>	<i>Venericardia crenulicostata</i> NOMURA
<i>Venericardia granulicostata</i> NOMURA	<i>Cardium (Trachycardium) burchardi</i> DUNKER
<i>Venus (Chione) tiara</i> DILLWYN	<i>Aloidis erythron</i> (LAMARCK)
<i>Aloidis taiwanensis</i> (NOMURA)	<i>Dentalium (Fissidentalium) byorituense</i> n. sp.
<i>Conus odengensis</i> MARTIN	<i>Conus djarianensis</i> MARTIN
<i>Conus aculeiformis</i> REEVE	<i>Turris (Turris) oxytropis</i> (SOWERBY)
<i>Turris (Turris) polytropa</i> (HELBLING)	<i>Turricula byorituensis</i> n. sp.
<i>Clavatula taiwanensis</i> n. sp.	<i>Clavus (Brachytoma) flavidulus</i> (LAMARCK)
<i>Clavus (Brachytoma) pseudoprincipalis</i> (YOKOYAMA)	<i>Mitra (Scabricola) sphaerulata</i> "MARTYN"
<i>Nassarius caelatus</i> (A. ADAMS)	<i>Nassarius gemmulatus</i> (LAMARCK)
<i>Murex (Murex) tribulus</i> LINNAEUS	<i>Lataxiena luliana</i> (MARTIN)
<i>Bursa (Gyrineum) subgranosa</i> (BECK)	<i>Strombus taiwanicus</i> n. sp.
<i>Turritella fliola</i> YOKOYAMA	<i>Lemintina javana</i> (MARTIN)
<i>Diala angustifera</i> n. sp.	<i>Architectonica perspectiva</i> (LINNAEUS)
<i>Architectonica maxima</i> (PHILIPPI)	<i>Polinices (Polinices) columnalis</i> (RECLUZ)

Together with the above mentioned species, *Ostrea ariakensis* FUJITA, *Macrocallista pacifica* (DILLWYN), *Anomia lischkei* DAUTZENBERG and FISCHER,<sup>4)</sup> *Tellina prototenuilirata* NOMURA, *Dentalium hexagonum* GOULD, *Clavus (Brachytoma) nodilirata* (SMITH), *Turris (Turris) tigrinaeformis* n. sp., *Olivella spretoides* YOKOYAMA, *Mitrella yabei* n. sp., *Natica rufa* BORN, *Natica vitellus* (LINNAEUS), and *Polinices didyma* (BOLTEN) are not rare in certain places.

The general features of the fauna are similar to that of the Pliocene deposits of: the Simaziri Beds of Ryûkyû,<sup>5)</sup> the Takanabe Group of Hyûga, the Kakegawa Series of Tosa and Tôtômi, the Naganuma Beds of Sagami and the Umegase Series of Kadusa as already stated in the Introduction to Part 1; farther it is also related to that of the Neogene of Java, Timor, Seran, the Philippines and India. Hence the fauna may be roughly regarded as representing most probably the lower Pliocene, and to a certain extent of its upper part. It is here noticed, that if we adopt the Malayan standard established by K. MARTIN and others, the lower part of the Beds will be taken as upper Miocene, that is to say Pontian.

Geographically considered, the elements of the fauna recent as well as fossil can be divided into the following three groups:

1) Taiwan elements. Species hitherto found only in Taiwan, South China as well as ranging north and south of it.

2) Nippon elements. Species hitherto found only in Kyûsyû (except small islands lying south of Ôsumi), Sikoku and Honsyû and farther north.

1) See part 1 of this Science Report, 1933.

2) *Arca tricenicosta* NYST = *A. philippiana* DUNKER.

3) The writer is inclined to believe that this species is a synonym of *C. nanus* (ADAMS and REEVE).

4) This species is considered to be a mere variation of *A. cytaeum* GRAY.

5) The Molluscan fauna of the Simaziri Beds is now in preparation.

3) Malay-Philippine elements. Species hitherto found only in the Malay Archipelago, Philippines, Indian Ocean and Pacific Islands.

Excluding the Taiwan elements the Byôritu fauna consists of 41 species of the Nippon elements and 39 species of the Malay-Philippine ones. The Nippon elements and their main localities are:

1. *Arca (Barbatia) yokoyamai* NOMURA ..... Honsyû (fossil).
2. *Pecten (Pecten) squamatus* (GMELIN) ..... Honsyû and Kyûsyû.
3. *Pecten (Vola) laqueatus* SOWERBY ..... Hokkaidô to Kyûsyû.
4. *Pecten (Vola) naganumanus* YOKOYAMA<sup>3)</sup> ..... Honsyû and Hokkaidô (fossil).
5. *Pecten (Amusium) japonicus* (GMELIN) ..... Honsyû and Kyûsyû.
6. *Pododesmus (Monia) radiatus* (SOWERBY) ..... Honsyû and Kyûsyû.
7. *Brechites giganteus* (SOWERBY) ..... Honsyû and Kyûsyû.
8. *Myodora proxima* SMITH ..... Honsyû and Kyûsyû.
9. *Crassatellites loebeckei* (KOBELT) ..... Honsyû.
10. *Lucina civica* (YOKOYAMA)<sup>2)</sup> ..... Honsyû.
11. *Thyasira nipponica* YABE and NOMURA ..... Karahuto, Hokkaidô and Honsyû (fossil).
12. *Alveinus ojanus* YOKOYAMA ..... Honsyû (fossil).
13. *Cardium (Trachycardium) burchardi* DUNKER ..... Honsyû and Kyûsyû.
14. "*Cardium (Cerastoderma?) toneanum* (YOKOYAMA) ..... Honsyû.
15. *Venus (Chione) creniferoides* (NOMURA) ..... Honsyû and Kyûsyû.
16. *Lioconcha gordonis* (YOKOYAMA) ..... Honsyû (fossil).
17. *Paphia (Paphia) amabilis* (PHILIPPI) ..... Honsyû and Kyûsyû.
18. *Paphia (Paphia) euglypta* (PHILIPPI) ..... Honsyû and Kyûsyû.
19. *Tellina nitidula* DUNKER<sup>3)</sup> ..... Honsyû and Kyûsyû.
20. *Dentalium (Antalis) pretiosum* SOWERBY ..... Honsyû.
21. *Leucotina diana* (A. ADAMS) ..... Honsyû.
22. *Cylichna sibaensis* YAMAKAWA ..... Honsyû (fossil).
23. *Cylichna musashiensis* TOKUNAGA ..... Honsyû (fossil).
24. *Retusa minima* YAMAKAWA ..... Honsyû (fossil).
25. *Retusa cucurbitiana* YOKOYAMA ..... Honsyû (fossil).
26. *Terebra torquata* ADAMS and REEVE ..... Honsyû and Kyûsyû.
27. *Clavus (Clavus?) braunsi* (YOKOYAMA) ..... Honsyû (fossil).
28. *Clavus (Brachytoma) pseudoprincipalis* (YOKOYAMA) ..... Honsyû (fossil).
29. *Cythara hiradoensis* (MAKIYAMA) ..... Kyûsyû.
30. *Lienardia (Etrema) gainesi* (PILSBRY) ..... Honsyû.
31. *Lienardia (Etrema) fortilirata* (SMITH) ..... Honsyû and Kyûsyû.
32. *Olivella spretoides* YOKOYAMA ..... Honsyû (fossil).
33. *Fusinus nodosoplicatus* (DUNKER) ..... Honsyû and Kyûsyû.
34. *Siphonalia spadicea* (REEVE) ..... Honsyû.
35. *Siphonalia stearnsi* PILSBRY ..... Honsyû.
36. *Siphonalia cassidariaeformis* (REEVE) ..... Hokkaidô to Kyûsyû.
37. *Nassaricus (Hinia) festivus* (POWYS) ..... Honsyû and Kyûsyû.
38. *Pyrene (Mitrella) niveomarginata* (SMITH) ..... Honsyû and Kyûsyû.
39. *Phalium (Semicassis) japonicum* (REEVE)<sup>4)</sup> ..... Honsyû to Kyûsyû.
40. *Tegula (Chlorostoma) pfeifferi* (PHILIPPI) ..... Hokkaidô to Kyûsyû.
41. *Odostomia (Odostomia) limpida* DALL and BARTSCH ..... Honsyû to Kyûsyû.

1) This species was once reported by DICKERSON from the Vigo Group of the Philippines.

2) Formerly known as *Corbis civica*; *Dentilucina (Bellucina) hedleyi* PRASHAD in the Lamellibranchiata of the Siboga Expedition is a similar species.

3) PRASHAD reported it recently from the Indo-Pacific Islands.

4) Also found from the Neogene deposits of the Malay Islands.

The Malay-Philippine elements (including a few Australian elements) and their main localities are:

1. *Arca (Arca) sedanensis* MARTIN .....Java (fossil).
2. *Pecten (Pecten) pseudolima* SOWERBY .....The Philippines.
3. *Pecten (Aequipecten) nux* REEVE .....Marquesas Island.
4. *Pecten (Vola) javanus* MARTIN .....Java (fossil).
5. *Cardium (Laevicardium) biradiatum* BRUGUIÈRE .....The Philippines.
6. *Cardium (Trachycardium) unicolor* SOWERBY .....The Philippines.
7. *Cardium (Fragum) alfuricum* (FISCHER) .....Timor (fossil).
8. *Cardium (Acanthocardia) exasperatum* SOWERBY .....New Holland.
9. *Pitar pallescens* (SOWERBY) .....Anna.
10. *Tellina semitorta* SOWERBY .....Australia.
11. *Macoma birmanica* (PHILIPPI) .....Birma.
12. *Dentalium (Rhabdus) philippinarum* SOWERBY .....The Philippines.
13. *Dentalium (Episiphon) subrectum* JEFFREYS .....The Philippines.
14. *Ringicula caron* HINDS .....Strait of Malacca.
15. *Conus odengensis* MARTIN .....Java (fossil).
16. *Conus djarianensis* MARTIN .....Java (fossil).
17. *Conus ngavianus* MARTIN .....Java (fossil).
18. *Conus ornatissimus* MARTIN .....Java (fossil).
19. *Clavatula serana* FISCHER .....Seran (fossil).
20. *Astenostoma epitonica* (FISCHER) .....Seran (fossil).
21. *Clavus (Clavus?) tjibaliungensis* (MARTIN) .....Java (fossil).
22. *Clavus (Brachytoma) nodiliratus* (SMITH) .....The Philippines.
23. *Mangelia pyramis* (HINDS) .....Straits of Macassar.
24. *Vexillum (Pusia) gembacanum* (MARTIN) .....Java (fossil).
25. *Hemifusus patinacea* (REEVE) .....Australia.
26. *Latrunculus canaliculatus* (SCHUMACHER) .....Indian Ocean.
27. *Pollia obliquicostata* (REEVE) .....The Philippines.
28. *Nassarius (Alectrion) canaliculatus* (LAMARCK) .....The Philippines.
29. *Murex (Murex) rarispina* LAMARCK .....Indian Ocean.
30. *Lataxiena luliana* (MARTIN) .....Java (fossil).
31. *Cypraea cincta* MARTIN .....Java (fossil).
32. *Triphora (Viriola) corrugata* (HINDS) .....New Guinea.
33. *Heliculus asperus* (HINDS) .....Straits of Macassar.
34. *Hipponyx danieli* CROSSE .....New Caledonia.
35. *Umbonium vestarium* (LINNAEUS) .....The Philippines.
36. *Ethalia pulchella* (A. ADAMS) .....The Philippines.
37. *Monilea lentiginosa* A. ADAMS .....The Philippines.
38. *Fissuridea crucifera* (PILSBRY) .....Natal.
39. *Lemintina javana* (MARTIN) .....Java (fossil).

It is quite interesting to find that the two elements are nearly equal in number, hence natural to say that during the deposition of the Byôritu Beds, the temperature of the marine water around the Island of Taiwan was almost the same as at the present time; if cooler at all, it was very slightly so, and not as distinct as once expressed by Dr. YOKOYAMA.<sup>1)</sup> This is

1) Dr. YOKOYAMA stated in his "Mollusca from the Oil-Field of the Island of Taiwan" (Imp. Geol. Surv. Rep. No. 101, 1928, p. 17): "The strong Japanese affinity shown by the fauna of the Upper Byôritu can only be explained by assuming that the seas around Taiwan during the deposition of the said beds had been more temperate than at present. And this is quite in accordance with the conclusion arrived at by me by studying the Pliocene Mollusca of Japan. Repeatedly I said in my papers previously published that the Pliocene molluscan fauna of our country represents that of a somewhat cooler sea than that of the present. And this cooler character, I may say, is more deeply, and therefore more clearly, impressed on the Taiwan fossil than on those of Japan Proper."

perhaps also the case with the temperature of the Pliocene marine water along the Pacific coast<sup>1)</sup> of Central Japan.

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### III. LIST OF THE SPECIES

Species	Horizon 2) 3)	Raised Coral Reef	Ryūkyū Limestone	Byōritu Beds	Kaizan Beds	Range in Time
<b>Scaphopoda</b>						
1 <i>Dentalium (Dentalium) hexagonum</i> GOULD .....				X		Pliocene-Recent
2 <i>Dentalium (Dentalium) sp. indet. (1)</i> .....				X		
3 <i>Dentalium (Dentalium) sp. indet. (2)</i> .....				X		
4 <i>Dentalium (Antalis) pretiosum</i> SOWERBY .....				X		Pliocene-Recent
5 <i>Dentalium (Fissidentalium) vernelei</i> SOWERBY .....			X	X		Pliocene-Recent
6 <i>Dentalium (Fissidentalium) byorituense</i> n. sp. ....				X		Pliocene
7 <i>Dentalium (Fissidentalium) hungerfordi</i> PILSBRY and SHARP.....				X		Pliocene-Recent
8 <i>Dentalium (Fissidentalium) sp. indet.</i> .....			X			
9 <i>Dentalium (Laeidentalium) sp. indet.</i> .....				X		
10 <i>Dentalium (Laeidentalium?) sp. indet.</i> .....				X		
11 <i>Dentalium (Rhabdus) philippinarum</i> SOWERBY .....				X		Pliocene-Recent
12 <i>Dentalium (Episiphon) subrectum</i> JEFFREYS .....				X		Pliocene-Recent
13 <i>Cadulus wangwaensis</i> n. sp. ....				X		Pliocene
14 <i>Cadulus sp. indet.</i> .....				X		
<b>Gastropoda</b>						
15 <i>Aceton siebaldi</i> (REEVE) .....				X		Pliocene-Recent
16 <i>Leucotina diana</i> (A. ADAMS) .....				X		Pliocene-Recent
17 <i>Retusa minima</i> YAMAKAWA .....				X		Pliocene-Recent
18 <i>Retusa cucurbitiana</i> YOKOYAMA .....				X		Pliocene-Recent
19 <i>Retusa (Pyrunculus) pyriformis</i> (A. ADAMS) .....				X		Pliocene-Recent
20 <i>Acteocina fusiformis</i> (A. ADAMS) .....				X		Pliocene-Recent
21 <i>Volvula acuminata</i> (BRUGUIÈRE) .....				X		Pliocene-Recent
22 <i>Alys sp. indet.</i> .....				X		

1) The present writer considers the Lower Musasino Formation of Kosiba to have been deposited in deep water, at the depth of 100 m. ±.

2) The fossils found in the ejecta of the mud-volcanoes at Konsuihei near Kyōsītō, Takao-syū were treated, in my previous papers, but are not represented in the collection upon which this report is based. In regard to the molluscan remains of this unknown horizon, the reader is referred to the following note written by Mr. K. TAN, of the Institute of Geology, Taihoku Imperial University, Taiwan:

"On the Fossil Mollusca ejected from the Mud-Volcanoes near Kyōsītō, Takao Prefecture" (Taiwan Tigaku Kizi, Vol. 3, No. 3, March 18, 1932, pp. 34-36).

3) No Gastropoda and Scaphopoda remains are found in our collection from the Karisan Beds of Eocene age.

Species	Horizon	Raised Coral Reef	Ryūkyū Limestone	Fyōritu Beds	Kaizan Beds	Range in Time
23 <i>Cylichna sibaensis</i> YAMAWAKA				X		Pliocene-Recent
24 <i>Cylichna koryusyoensis</i> n. sp.				X		Pliocene
25 <i>Cylichna musashiensis</i> TOKUNAGA				X		Pliocene-Recent
26 <i>Cylichna</i> sp. indet.				X		
27 <i>Hydatina physis</i> (LINNAEUS)				X		Pliocene-Recent
28 <i>Ringicula arctata</i> GOULD				X		Pliocene-Recent
29 <i>Ringicula caron</i> HINDS				X		Pliocene-Recent
30 <i>Terebra evoluta</i> DESHAYES				X		Pliocene-Recent
31 <i>Terebra dussumieri</i> KIENER				X		Pliocene-Recent
32 <i>Terebra t-makiyamai</i> n. sp.				X		Pliocene
33 <i>Terebra reticostaeformis</i> n. sp.				X		Pliocene
34 <i>Terebra orthocostulata</i> n. sp.				X		Pliocene
35 <i>Terebra cumingii</i> DESHAYES				X		Pliocene-Recent
36 <i>Terebra torquata</i> ADAMS and REEVE				X		Pliocene-Recent
37 <i>Terebra triseriata</i> GRAY				X		Pliocene-Recent
38 <i>Terebra prototextilis</i> n. sp.				X		Pliocene
39 <i>Terebra pereoa</i> n. sp.				X		Pliocene
40 <i>Terebra melanaeae</i> SMITH				X		Pliocene-Recent
41 <i>Terebra</i> sp. indet.				X		
42 <i>Conus odengensis</i> MARTIN				X		Miocene-Pliocene
43 <i>Conus djarianensis</i> MARTIN				X		Miocene-Pliocene
44 <i>Conus ngavianus</i> MARTIN				X		Miocene-Pliocene
45 <i>Conus flavidus</i> LAMARCK			X			Pleistocene-Recent
46 <i>Conus vexillum</i> GMELIN				X		Pliocene-Recent
47 <i>Conus yabei</i> n. sp.				X		Pliocene
48 <i>Conus coronatus</i> GMELIN		X				Recent
49 <i>Conus d'orbigny</i> (AUDOUIN)				X		Pliocene-Recent
50 <i>Conus pseudosulcatus</i> n. sp.				X		Pliocene
51 <i>Conus ornatissimus</i> MARTIN				X		Miocene-Pliocene
52 <i>Conus aculeiformis</i> REEVE				X		Miocene-Recent
53 <i>Conus comatosaeformis</i> YOKOYAMA				X		Pliocene
54 <i>Conus bonus</i> n. sp.				X		Pliocene
55 <i>Conus significatus</i> n. sp.				X		Pliocene
56 <i>Conus</i> sp. indet.					X	
57 <i>Turris (Turris) oxytropis</i> (SOWERBY)				X		Miocene-Recent
58 <i>Turris (Turris) polytropia</i> (HELBLING)				X		Pliocene-Recent
59 <i>Turris (Turris) tigrinaeformis</i> n. sp.				X		Pliocene
60 <i>Turris (Gemmula) granosa</i> (HELBLING)				X		Miocene-Recent
61 <i>Turricula byoritensis</i> n. sp.				X		Pliocene

Species	Horizon	Raised Coral Reef	Ryūkyū Limestone	Byōritu Beds	Kaizen Beds	Range in Time
62 <i>Turricula wangwana</i> n. sp. ....				X		Pliocene
63 <i>Turricula sobrina</i> (YOKOYAMA) ? .....				X		Pliocene
64 <i>Clavatula taiwanensis</i> n. sp. ....				X		Pliocene
65 <i>Clavatula serana</i> FISCHER .....				X		Miocene (?) - Pliocene
66 <i>Astenostoma epitonica</i> (FISCHER) .....				X		Pliocene
67 <i>Astenostoma perepitonica</i> n. sp. ....				X		Pliocene
68 <i>Astenostoma vertebrata</i> (SMITH) .....				X		Pliocene-Recent
69 <i>Clavus tjibaliungensis</i> (MARTIN) .....				X		Pliocene
70 <i>Clavus braunsi</i> (YOKOYAMA) .....				X		Pliocene
71 <i>Clavus rinsuikwaensis</i> n. sp. ....				X		Pliocene
72 <i>Clavus (Cymatosyrinx) pseudohumilis</i> n. sp. ....				X		Pliocene
73 <i>Clavus (Cymatosyrinx) hangawai</i> n. sp. ....				X		Pliocene
74 <i>Clavus (Brachytoma) flavidulus</i> (LAMARCK) .....				X		Pliocene-Recent
75 <i>Clavus (Brachytoma) nodiliratus</i> (SMITH) .....				X		Pliocene-Recent
76 <i>Clavus (Brachytoma) pernodiliratus</i> n. sp. ....				X		Pliocene
77 <i>Clavus (Brachytoma) suturalis</i> (GRAY) .....		X				Miocene-Recent
78 <i>Clavus (Brachytoma) pseudoprincipalis</i> (YOKOYAMA) .....				X		Pliocene
79 <i>Clavus (Brachytoma) crassitestulatus</i> n. sp. ....				X		Pliocene
80 <i>Clavus (Brachytoma) turriculoides</i> n. sp. ....				X		Pliocene
81 <i>Clavus (Brachytoma)</i> sp. indet. ....				X		
82 <i>Cythara hiradoensis</i> (MAKIYAMA) .....				X		Pliocene-Recent
83 <i>Mangelia perparva</i> (YOKOYAMA) .....				X		Pliocene
84 <i>Mangelia pyramis</i> (HINDS) .....				X		Pliocene-Recent
85 " <i>Mangelia</i> " <i>boshoensis</i> n. sp. ....				X		Pliocene
86 " <i>Mangelia</i> " sp. indet. ....				X		
87 <i>Lienardia gainesi</i> (PILSBRY) .....				X		Pliocene-Recent
88 <i>Lienardia hayasakai</i> n. sp. ....				X		Pliocene
89 <i>Lienardia keiyukwana</i> n. sp. ....				X		Pliocene
90 <i>Lienardia (Etrema) fortilirata</i> (SMITH) .....				X		Pliocene-Recent
91 <i>Lienardia (Etrema) sintikuensis</i> n. sp. ....				X		Pliocene
92 <i>Daphnella subzon. taeformis</i> n. sp. ....				X		Pliocene
93 <i>Cancellaria spengleriana</i> DESHAYES .....				X		Pliocene-Recent
94 <i>Cancellaria reeveana</i> CROSSE .....				X		Miocene-Recent
95 <i>Cancellaria macrospira</i> ADAMS and REEVE .....				X		Pliocene-Recent
96 <i>Cancellaria (Trigonostoma) taiwanensis</i> n. sp. ....				X		Pliocene
97 <i>Oliva mustellina</i> LAMARCK .....		X		X		Pliocene-Recent
98 <i>Oliva ispidula</i> (LINNAEUS) .....		X				Miocene-Recent
99 <i>Olivella spretoides</i> YOKOYAMA .....				X		Pliocene-Pleistocene
100 <i>Olivella pulicaria</i> (MARRATT) .....				X		Pliocene-Recent



Species	Horizon	Raised Coral Reef	Ryūkyū Limestone	Byōritu Beds	Kaizan Beds	Range in Time
101 <i>Ancilla rubiginosa</i> (SWAINSON) .....				X		Pliocene-Recent
102 <i>Persicula bernardii</i> (LARGILLIER) .....				X		Pliocene-Recent
103 <i>Voluta sikoensis</i> n. sp. ....				X		Pliocene
104 <i>Fulgoraria rupestris</i> (GMELIN) .....				X		Pliocene-Recent
105 <i>Cymbium indicum</i> (GMELIN) .....				X		Pliocene-Recent
106 <i>Tudicla cumingii</i> (JONAS) .....				X		Pliocene-Recent
107 <i>Mitra (Scabricola) sphaerulata</i> "MARTYN" .....				X		Pliocene-Recent
108 <i>Mitra (Scabricola) yokoyamai</i> n. sp. ....				X		Pliocene
109 <i>Mitra (Cancilla) filaris</i> (LINNAEUS) .....		X		X		Pleistocene(?) -Recent
110 <i>Mitra (Cancilla) flammea</i> QUOY .....				X		Miocene-Recent
111 <i>Mitra (Cancilla) astenostomoides</i> n. sp. ....				X		Pliocene
112 <i>Mitra (Cancilla) pruinosa</i> REEVE .....				X		Pliocene-Recent
113 <i>Mitra (Chrysome) rutila</i> A. ADAMS .....				X		Pliocene-Recent
114 <i>Mitra</i> sp. indet. ....				X		
115 <i>Vexillum (Pusia) gembacanum</i> (MARTIN) .....				X		Miocene-Pliocene
116 <i>Vexillum (Pusia) obeliscum</i> (REEVE) .....				X		Miocene-Recent
117 <i>Fusinus gracillimus</i> (ADAMS and REEVE) .....				X		Pliocene-Recent
118 <i>Fusinus nodosoplicatus</i> (DUNKER) .....				X		Pliocene-Recent
119 <i>Fusinus laticanaliculatus</i> n. sp. ....				X		Pliocene
120 <i>Fusinus colus</i> (LINNAEUS) .....				X		Pliocene-Recent
121 <i>Latirus (Persternia) coreanicus</i> (SMITH) .....				X		Pliocene-Recent
122 <i>Latirus (Persternia)</i> sp. indet. ....				X		
123 " <i>Latirus</i> " <i>minutisquamosus</i> (REEVE) .....				X		Pliocene-Recent
124 <i>Hemifusus colosseus</i> (LAMARCK) .....				X		Pliocene-Recent
125 <i>Hemifusus protolacteus</i> n. sp. ....				X		Pliocene
126 <i>Hemifusus pastinaca</i> (REEVE)? .....				X		Pliocene-Recent
127 <i>Siphonalia spadica</i> (REEVE) .....				X		Miocene(?) -Recent
128 <i>Siphonalia stearnsi</i> PILSBRY .....				X		Miocene(?) -Recent
129 <i>Siphonalia cassidariaeformis</i> (REEVE) .....				X		Miocene(?) -Recent
130 <i>Nassaria monospina</i> n. sp. ....				X		Pliocene
131 <i>Latrunculus canaliculatus</i> (SCHUMACHER) .....				X		Miocene-Recent
132 <i>Latrunculus formosus</i> (SOWERBY) .....				X		Pliocene-Recent
133 <i>Latrunculus lamarcki</i> n. sp. ....				X		Pliocene
134 <i>Metula mitrella</i> (ADAMS and REEVE) .....				X		Pliocene-Recent
135 <i>Cantharus wanguaensis</i> n. sp. ....				X		Pliocene-Recent
136 <i>Pollia obliquicostata</i> (REEVE) .....				X		Pliocene-Recent
137 <i>Nassarius (Alectrion) canaliculatus</i> (LAMARCK) .....				X		Miocene Recent
148 <i>Nassarius (Alectrion) pictus</i> (DUNKER) .....				X		Pliocene-Recent
139 <i>Nassarius (Zeuxis) caelatus</i> (A. ADAMS) .....		X		X		Miocene(?) -Recent

Species	Horizon	Raised Coral Reef	Ryōkyū Limestone	Eyōritu Beds	Kaizan Beds	Range in Time
140 <i>Nassarius (Niotha) gemmulatus</i> (LAMARCK) .....				X		Miocene(?) - Recent
141 <i>Nassarius (Hinia) eximius</i> (H. and A. ADAMS) .....				X		Pliocene - Recent
142 <i>Nassarius (Hinia) festivus</i> (POWYS) .....				X		Pliocene - Recent
143 <i>Nassarius</i> spp(?) indet. ....				X		
144 <i>Cyllene pulchella</i> ADAMS and REEVE .....				X		Pliocene - Recent
145 <i>Cyllene lugubris</i> ADAMS and REEVE .....				X		Pliocene - Recent
146 <i>Cyllene concinna</i> SOLANDER .....				X		Pliocene - Recent
147 <i>Pyrene (Mitrella?) baculus</i> (REEVE) .....				X		Pliocene - Recent
148 <i>Pyrene (Mitrella) niveomarginata</i> (SMITH) .....				X		Pliocene - Recent
149 <i>Pyrene (Mitrella) yabei</i> n. sp. ....				X		Pliocene
150 <i>Anachis (Zofra)</i> sp. indet. ....				X		
151 <i>Columbella (Euplica) versicolor</i> SOWERBY .....				X		Pliocene - Recent
152 <i>Murex (Murex) tribulus</i> LINNAEUS .....				X		Miocene - Recent
153 <i>Murex (Murex) rarispina</i> LAMARCK .....				X		Pliocene - Recent
154 <i>Murex (Chicoreus) sinensis</i> REEVE .....				X		Pliocene - Recent
155 <i>Murex (?)</i> sp. indet. ....				X		
156 <i>Rapana bezoar</i> (LINNAEUS) .....				X		Pliocene - Recent
157 <i>Trophon (?)</i> sp. indet. ....				X		
158 <i>Typhis duplicatus</i> SOWERBY .....				X		Pliocene - Recent
159 <i>Thais luteostoma</i> (DILLWYN) .....				X		Pliocene - Recent
160 <i>Thais problematica</i> (BAKER) .....				X		Pliocene - Recent
161 <i>Lataxiena tuliana</i> (MARTIN) .....				X		Miocene - Pliocene
162 <i>Lataxiena fimbriata</i> (HINDS) .....				X		Pliocene - Recent
163 <i>Coralliophila pilsbryi</i> n. sp. ....				X		Pliocene
164 <i>Latiaxis yabei</i> n. sp. ....				X		Pliocene
165 <i>Bursa (Gyrineum) subgranosa</i> (BECK) .....				X		Miocene - Recent
166 <i>Cymatium vespaceum</i> (LAMARCK) .....				X		Pliocene - Recent
167 <i>Cymatium sinense</i> (REEVE) .....				X		Pliocene - Recent
168 <i>Cymatium parthenopeum</i> (SALIS) .....				X		Pliocene - Recent
169 <i>Cymatium andoi</i> n. sp. ....				X		Pliocene
170 <i>Distorsio reticulata</i> (LINK) .....				X		Miocene - Recent
171 <i>Phalium (Phalium) areolum</i> (LINNAEUS) .....				X		Pliocene - Recent
172 <i>Phalium (Phalium) cancellianum</i> n. sp. ....				X		Pliocene
173 <i>Phalium (Phalium) decussatum</i> (LINNAEUS) .....				X		Pliocene - Recent
174 <i>Phalium (Semicassis) japonicum</i> (REEVE) .....				X		Miocene - Recent
175 <i>Morum subcancellatum</i> n. sp. ....				X		Pliocene
176 <i>Tonna zonata</i> (GREEN) .....				X		Pliocene - Recent
177 <i>Tonna melanostoma</i> (JAY) .....					X	Miocene - Recent
178 <i>Tonna luteostoma</i> (KÜSTER) .....				X		Pliocene - Recent

Species	Horizon	Raised Coral Reef	Ryūkyū Limestone	Eyōritsu Beds	Kaizan Beds	Range in Time
179 <i>Ficus ficoides</i> (LAMARCK)				X		Miocene-Recent
180 <i>Cypraea arabica</i> LINNAEUS		X				Recent
181 <i>Cypraea caput-serpentis</i> LINNAEUS		X				Recent
182 <i>Cypraea caurica</i> LINNAEUS		X				Recent
183 <i>Cypraea cincta</i> MARTIN				X		Miocene-Pliocene
184 <i>Cypraea felina</i> GMELIN			X			Pleistocene-Recent
185 <i>Cypraea mappa</i> LINNAEUS			X			Pleistocene-Recent
186 <i>Cypraea miliaris</i> GMELIN				X		Pliocene-Recent
187 <i>Cypraea talpa</i> LINNAEUS		X				Recent
188 <i>Cypraea testudinaria</i> LINNAEUS			X			Pleistocene-Recent
189 <i>Cypraea onyx</i> LINNAEUS			X	X		Miocene-Recent
190 <i>Cypraea</i> sp. indet. (1)				X		
191 <i>Cypraea</i> sp. indet. (2)				X		
192 <i>Pustularia cicercula</i> (LINNAEUS)		X				Recent
193 <i>Volva volva</i> (LINNAEUS)				X		Pliocene-Recent
194 <i>Erato callosa</i> ADAMS and REEVE				X		Pliocene-Recent
195 <i>Strombus taiwanicus</i> n. sp.				X		Pliocene
196 <i>Strombus bivaricosus</i> n. sp.				X		Pliocene
197 <i>Strombus dentatus</i> LINNAEUS				X		Pliocene-Recent
198 <i>Strombus luhuanus</i> LINNAEUS				X		Miocene-Recent
199 <i>Strombus succinctus</i> LINNAEUS				X		Pliocene-Recent
200 <i>Strombus</i> sp. indet.				X		
201 <i>Tibia fusus</i> (LINNAEUS)				X		Miocene-Recent
202 <i>Tibia formosana</i> (YOYAYAMA)				X		Pliocene
203 <i>Cerithium kochi</i> PHILIPPI		X		X		Pliocene-Recent
204 <i>Cerithium sinense</i> (GMELIN)		X				Pliocene-Recent
205 <i>Gourmya corallia</i> (KIENER)		X				Miocene-Recent
206 <i>Gourmya carbonaria</i> (PHILIPPI)				X		Pliocene-Recent
207 <i>Gourmya satoi</i> (YOKOYAMA)				X		Pliocene
208 <i>Trochocerithium shikoense</i> (YOKOYAMA)				X		Pliocene
209 <i>Bittium alutaceum</i> (GOULD)				X		Pliocene-Recent
210 <i>Telescopium telescopium</i> (LINNAEUS)		X		X		Miocene-Recent
211 <i>Cerithidea cingulata</i> (GMELIN)		X		X		Pliocene-Recent
212 <i>Cerithidea morchii</i> A. ADAMS				X		Pliocene-Recent
213 <i>Terebralia caledonica</i> (JOUSSEAUME)		X				Recent
214 <i>Terebralia sulcata</i> (BORN)		X				Miocene-Recent
215 <i>Terebralia semitrisulcata</i> (BOLTEN)				X		Pliocene-Recent
216 <i>Batillaria zonalis</i> (BRUGUIÈRE)		X		X		Miocene-Recent
217 <i>Triphora (Viriola) corrugata</i> (HINDS)				X		Pliocene-Recent

Species	Horizon	Raised Coral Reef	Ryūkyū Limestone	Byōritu Beds	Kaizan Beds	Range in Time
218 <i>Melanoides obliquegranosa</i> (SMITH)				X		Pliocene-Recent
219 <i>Melanoides tuberculata</i> (MÜLLER)				X		Miocene-Recent
220 <i>Melanoides grossula</i> (YOKOYAMA)				X		Pliocene
221 " <i>Melania</i> " <i>saigoï</i> YOKOYAMA				X		Pliocene
222 <i>Rissoina</i> ( <i>Rissoina</i> ) <i>formosana</i> n. sp.				X		Pliocene
223 <i>Turritella filiola</i> YOKOYAMA				X		Pliocene
224 <i>Turritella terebra</i> (LINNAEUS)		X		X		Miocene-Recent
225 <i>Turritella kityoensis</i> n. sp.				X		Pliocene
226 <i>Turritella millepunctata</i> n. sp.				X		Pliocene
227 <i>Turritella</i> sp. indet.				X		
228 <i>Mathilda sinensis</i> FISCHER				X		Pliocene-Recent
229 <i>Lemintina javana</i> (MARTIN)				X		Miocene-Pliocene
230 <i>Lemintina</i> sp. indet.				X		
231 <i>Siliquaria cumingii</i> MÖRCH				X		Pliocene-Recent
232 <i>Diala angustifera</i> n. sp.				X		Pliocene
233 <i>Architectonica perspectiva</i> (LINNAEUS)				X		Miocene-Recent
234 <i>Architectonica maxima</i> (PHILIPPI)			X	X		Miocene-Recent
235 <i>Heliacus dorsuosus</i> (HINDS)				X		Pliocene-Recent
236 <i>Heliacus asperus</i> (HINDS)				X		Pliocene-Recent
237 <i>Heliacus taiwanicus</i> (YOKOYAMA)				X		Pliocene
238 <i>Hipponyx danieli</i> CROSSE				X		Pliocene-Recent
239 <i>Calyptrea taiwanensis</i> n. sp.				X		Pliocene
240 <i>Crepidula</i> ( <i>Siphopatella</i> ) <i>walshi</i> REEVE				X		Pliocene-Recent
241 <i>Xenophora exuta</i> (REEVE)				X		Miocene-Recent
242 <i>Natica</i> ( <i>Natica</i> ) <i>ala-papilionis</i> (BOLTEN)				X		Miocene(?) - Recent
243 <i>Natica</i> ( <i>Natica</i> ) <i>solida</i> BLAINVILLE				X		Pliocene-Recent
244 <i>Natica</i> ( <i>Natica</i> ) <i>zebra</i> LAMARCK				X		Miocene-Recent
245 <i>Natica</i> ( <i>Natica</i> ) <i>rufa</i> BORN				X		Miocene-Recent
246 <i>Natica</i> ( <i>Natica</i> ) <i>vitellus</i> (LINNAEUS)				X		Miocene-Recent
247 <i>Natica</i> ( <i>Tectonatica</i> ?) <i>andoi</i> n. sp.				X		Pliocene
248 <i>Polinices</i> ( <i>Polinices</i> ) <i>columnalis</i> (RECLUZ)		X		X		Pliocene-Recent
249 <i>Polinices</i> ( <i>Polinices</i> ) <i>mamilla</i> (LINNAEUS)		X				Miocene-Recent
250 <i>Polinices</i> ( <i>Polinices</i> ) <i>melanostoma</i> (GMELIN)				X		Miocene-Recent
251 <i>Polinices</i> ( <i>Polinices</i> ?) <i>filosus</i> (REEVE)				X		Pliocene-Recent
252 <i>Polinices</i> ( <i>Neverita</i> ) <i>didyma</i> (BOLTEN)				X		Miocene-Recent
253 <i>Polinices</i> ( <i>Neverita</i> ?) sp. indet.				X		
254 <i>Eunaticina papilla</i> (GMELIN)				X		Miocene-Recent
255 <i>Sinum neritoideum</i> (LINNAEUS)				X		Pliocene-Recent
256 <i>Cellana toreuma</i> (REEVE)				X		Pliocene-Recent

Species	Horizon	Raised Coral Reef	Ryūkyū Limestone	Eyōritu Beds	Kaizan Beds	Range in Time
257 <i>Turbo (Turbo) petholatus</i> LINNAEUS				X		Miocene-Recent
258 <i>Turbo (Turbo) argyrostomus</i> LINNAEUS		X				Pliocene-Recent
259 <i>Turbo (Turbo) ticaonicus</i> REEVE			X			Pliocene-Recent
260 <i>Turbo (Turbo) regenfussi</i> DESHAYES		X				Recent
261 <i>Turbo (Lunella) granulatus</i> GMELIN				X		Pliocene-Recent
262 " <i>Turbo</i> " sp. indet.				X		
263 <i>Astraea pseudomodesta</i> n. sp.				X		Pliocene
264 <i>Collonista laeta</i> (MONTROUZIER)		X				Recent
265 <i>Liotia hanzawai</i> n. sp.				X		Pliocene
266 <i>Liotia</i> sp. indet. (1)				X		
267 <i>Liotia</i> (?) sp. indet. (2)				X		
268 " <i>Cyclostrema</i> " <i>eburnaeforme</i> n. sp.				X		Pliocene
269 " <i>Cyclostrema</i> " <i>sulcatum</i> A. ADAMS				X		Pliocene-Recent
270 " <i>Cyclostrema</i> " sp. indet.				X		
271 <i>Trochus (Trochus) incrassatus</i> LAMARCK		X				Recent
272 <i>Trochus (Trochus) calcaratus</i> SOUVERBIE		X				Recent
273 <i>Trochus (Pyramidea) niloticus</i> LINNAEUS		X				Recent
274 <i>Monodonta labio</i> (LINNAEUS)				X		Pliocene-Recent
275 <i>Turcica elisa</i> (GOULD)				X		Pliocene-Recent
276 <i>Tegula (Chlorostoma) Pfeifferi</i> (PHILIPPI)				X		Pliocene-Recent
277 <i>Umboonium (Umboonium) vestarium</i> (LINNAEUS)				X		Pliocene-Recent
278 <i>Umboonium (Suchium) moniliferum</i> (LAMARCK)				X		Pliocene-Recent
279 <i>Umboonium (Suchium) equistriatum</i> n. sp.				X		Pliocene
280 <i>Etalia pulchella</i> (A. ADAMS)				X		Pliocene-Recent
281 <i>Monilea lentiginosa</i> A. ADAMS		X		X		Pliocene-Recent
282 <i>Calliostoma cecillei</i> (PHILIPP.)				X		Pliocene-Recent
283 <i>Calliostoma semigranatum</i> n. sp.				X		Pliocene
284 <i>Teniotoma andoi</i> n. sp.				X		Pliocene
285 <i>Solariella formosana</i> n. sp.				X		Pliocene
286 <i>Nerita undata</i> LINNAEUS		X				Miocene-Recent
287 <i>Nerita chamaeleon</i> LINNAEUS				X		Pliocene-Recent
288 <i>Nerita planospira</i> ANTON		X				Recent
289 <i>Nerita plicata</i> LINNAEUS		X				Miocene-Recent
290 <i>Theodoxus (Cliton) sowerbianus</i> (RECLUZ)				X		Pliocene-Recent
291 <i>Fissuridea crucifera</i> (PILSBRY)				X		Pliocene-Recent
292 <i>Epitonium neglectum</i> (ADAMS and REEVE)				X		Pliocene-Recent
293 <i>Epitonium pulcherrimum</i> (SOWERBY)				X		Pliocene-Recent
294 <i>Melanella candida</i> (MARRATT)				X		Pliocene-Recent
295 <i>Melanella tortuosa</i> (ADAMS and REEVE)				X		Pliocene-Recent

Species	Horizon	Raised Coral Reef	Ryûkyû Limestone	Byôritu Beds	Kaizan Beds	Range in Time
296 <i>Niso brunnea</i> (SOWERBY) .....				X		Pliocene-Recent
297 <i>Pyramidella</i> ( <i>Pyramidella</i> ) <i>teres</i> (A. ADAMS) .....				X		Pliocene-Recent
298 <i>Pyramidella</i> ( <i>Pharcidella</i> ) sp. indet. ....				X		
299 " <i>Pyramidella</i> " <i>longicostifera</i> n. sp. ....				X		Pliocene
300 <i>Turbonilla</i> ( <i>Pyrgisculus</i> ) <i>hanzawai</i> n. sp. ....				X		Pliocene
301 <i>Turbonilla</i> ( <i>Turbonilla</i> ) <i>bosihensis</i> n. sp. ....				X		Pliocene
302 <i>Turbonilla</i> ( <i>Turbonilla</i> ) <i>byorituana</i> n. sp. ....				X		Pliocene
303 <i>Turbonilla</i> ( <i>Strioturbonilla</i> ) sp. indet. ....				X		
304 <i>Odostomia</i> ( <i>Odostomia</i> ) <i>limpida</i> DALL and BARTSCH .....				X		Pliocene-Recent
305 <i>Odostomia</i> ( <i>Odostomia</i> ) <i>venustaeformis</i> n. sp. ....				X		Pliocene

## IV. LOCALITIES AND THEIR FAUNA

## (A) Raised Coral Reef

1. Kaikô, Kôsyun-gun, Takao-syû (高雄州恒春郡海口): coll. Mr. S. HANZAWA.

*Trochus calcaratus* SOUVERBIE.*Trochus incrassatus* LAMARCK.

2. Kontei, Kôsyun-syô, Kôsyun-gun, ditto (同 恒春郡恒春庄郷丁): coll. Messrs. S. HANZAWA and T. MAKIYAMA.

*Cypraea arabica* LINNAEUS.*Nerita plicata* LINNAEUS.*Cypraea caput-serpentis* LINNAEUS.*Trochus incrassatus* LAMARCK.*Cypraea caurica* LINNAEUS.*Trochus niloticus* LINNAEUS.*Cypraea talpa* LINNAEUS.

3. Sisitô, Kôsyun-syô, Kôsyun-gun, ditto (同 恒春郡恒春庄獅子頭): coll. Mr. S. HANZAWA.

*Batillaria zonalis* (BRUGUIÈRE).*Oliva ispidula* (LINNAEUS).*Cerithidea cingulata* (GMELIN).*Oliva mustellina* LAMARCK.*Cerithium kochi* PHILIPPI.*Phalium areolum* (LINNAEUS).*Cerithium sinense* (GMELIN).*Polinices columnalis* (RECHUZ).*Clavus suturalis* (GRAY).*Polinices mamilla* (LINNAEUS).*Conus coronatus* GMELIN.*Pustularia cicercula* (LINNAEUS).*Gourmya corollia* (KIENER).*Telescopium telescopium* (LINNAEUS).*Mitra filaris* (LINNAEUS).*Terebralia caledonica* (JOUSSEAUME).*Monilea lentiginosa* A. ADAMS.*Terebralia sulcata* (BORN).*Nassarius caelatus* (A. ADAMS).*Turbo argyrostomus* LINNAEUS.*Nerita planospira* ANTON.*Turbo regenfussi* DESHAYES.*Nerita undata* LINNAEUS.*Turritella terebra* (LINNAEUS).

## (B) Ryûkyû Limestone

1. Hanpeizan, Okayama-gun, Takao-syû (高雄州岡山郡半屏山): coll. Messrs. S. HANZAWA and S. ANDÔ.

*Dentalium vernedei* SOWERBY.*Architectonica maxima* (PHILIPPI).*Dentalium* sp. indet.*Conus flavidus* LAMARCK.

*Cypraea felina* GMELIN.  
*Cypraea onyx* LINNAEUS.

*Cypraea testudinaria* LINNAEUS.  
*Turbo ticaonicus* REEVE.

2. Kotobuki-yama, Takao-si, ditto (同 高雄市壽山): coll. Mr. K. YAMAMOTO.

*Cypraea mappa* LINNAEUS.

## (C) Byôritu Beds

1. Bôsiho, Siko-syô, Byôritu-gun, Sintiku-syû (新竹州苗栗郡四湖庄茅子埔). Station 7 (S. of Bôsiho): coll. Mr. S. HANZAWA.

*Dentalium byorituense* n. sp.  
*Dentalium pretiosum* SOWERBY.  
*Clavus hanzawai* n. sp.  
"Cyclostrema" sp.  
*Diala angustifera* n. sp.  
*Hipponyx danieli* CROSSE.  
*Lienardia fortilirata* (SMITH).  
*Liotia* sp. indet.  
*Mangelia bosihoensis* n. sp.  
*Mangelia* sp. indet.  
*Mitra sphaerulata* "MARTYN".  
*Nassarius caelatus* (A. ADAMS).

*Nassarius gemmulatus* (LAMARCK).  
*Oliva mustellina* LAMARCK.  
*Olivella spreteoides* YOKOYAMA.  
*Polinices columnalis* (RECLUZ).  
*Pyrene niveomarginata* (SMITH).  
*Ringicula arcata* GOULD.  
*Turbonilla bosihoensis* n. sp.  
*Turricula byorituensis* n. sp.  
*Turris oxytropis* (SOWERBY).  
*Turritella filiola* YOKOYAMA.  
*Turritella* sp. indet.  
*Umbonium moniliferum* (LAMARCK).

- Station 13 (Bôsiho): coll. Mr. S. ANDÔ.

*Dentalium hexagonum* GOULD.  
*Bursa subgranosa* (BECK).  
*Clavatula taiwanensis* n. sp.  
*Clavus flavidulus* (LAMARCK).  
*Clavus nodilirata* (SMITH).  
*Clavus pseudohumilis* n. sp.  
*Clavus pseudoprincipalis* (YOKOYAMA).  
*Conus comatosaeformis* YOKOYAMA.  
*Coraliphila pilsbryi* n. sp.  
*Diala angustifera* n. sp.  
*Heliacus asperus* (HINDS).  
*Lienardia fortilirata* (SMITH).  
*Liotia hanzawai* n. sp.  
*Nassarius caelatus* (A. ADAMS).

*Nassarius gemmulatus* (LAMARCK).  
*Phalium areolum* (LINNAEUS).  
*Polinices didyma* (BOLTEN).  
*Pyrene yabei* n. sp.  
*Strombus taiwanicus* n. sp.  
*Terebra dussumieri* KIENER.  
*Terebra evoluta* DESHAYES.  
*Turricula byorituensis* n. sp.  
*Turris oxytropis* (SOWERBY).  
*Turris polytropia* (HELBLING).  
*Turritella filiola* YOKOYAMA.  
*Typhis duplicatus* SOWERBY.  
*Umbonium vestarium* (LINNAEUS).

2. Dainankwa, Tûsyô-syô, Byôritu-gun, ditto (同 苗栗郡通霄庄大桶窩).

- Station 5 (500 m. SW. of Dainankwa): coll. Mr. S. HANZAWA.

*Dentalium hexagonum* GOULD.  
*Bursa subgranosa* (BECK).

*Hemifusus coloseus* (LAMARCK).  
*Siphonlia stearnsi* PILSBRY.

3. Goko, Dôra-syô, Byôritu-gun, ditto (同 苗栗郡銅鑼庄五湖): coll. Mr. S. HANZAWA.

*Dentalium philippinarum* SOWERBY.  
*Bursa subgranosa* (BECK).  
*Heliacus dorsuosus* (HINDS).  
*Hemifusus pastinacca* (REEVE)?  
*Latiaxis yabei* n. sp.  
*Lemintina javana* (MARTIN).  
*Nassarius caelatus* (A. ADAMS).

*Nassarius gemmulatus* (LAMARCK).  
*Natica solida* BLAINVILLE.  
*Tibia fusus* (LINNAEUS).  
*Turcica elisa* (GOULD).  
*Turricula byorituensis* n. sp.  
*Turris oxytropis* (SOWERBY).  
*Vexillum gembacanum* (MARTIN).

## 4. Hakusyatou, Kôryû-syô, Tikunan-gun, ditto (阿竹南郡後龍庄白沙屯): coll. Messrs. S. HANZAWA and S. ANDÔ.

<i>Architectonica maxima</i> (PHILIPPI).	<i>Nassarius gemmulatus</i> (LAMARCK).
<i>Fusinus nodosoplicatus</i> (DUNKER).	<i>Natica zebra</i> LAMARCK.
<i>Lemintina javana</i> (MARTIN).	<i>Phalium japonicum</i> (REEVE).
<i>Mitra sphaerulata</i> "MARTYN".	<i>Strombus taiwanicus</i> n. sp.

## Station 1 (300 m. E. of Hakusyatou): coll. Mr. S. HANZAWA.

<i>Dentalium hexagonum</i> GOULD.	<i>Nassarius caelatus</i> (A. ADAMS).
<i>Bursa subgranosa</i> (BECK).	<i>Nassarius gemmulatus</i> (LAMARCK).
<i>Cerithium kochi</i> PHILIPPI.	<i>Terebra orthocostulata</i> n. sp.
<i>Clavus flavidulus</i> (LAMARCK).	<i>Terebra torquata</i> ADAMS and REEVE.
<i>Clavus pseudoprincipalis</i> (YOKOYAMA).	<i>Turcica elisa</i> (GOULD).
<i>Lataxiena luliana</i> (MARTIN).	<i>Turricula byorituensis</i> n. sp.
<i>Lemintina javana</i> (MARTIN).	<i>Turris oxytropis</i> (SOWERBY).
<i>Murex tribulus</i> LINNAEUS.	<i>Xenophora exuta</i> (REEVE).

## Station 1 (Hakusyatou): coll. Mr. S. ANDÔ.

<i>Clavus pseudoprincipalis</i> (YOKOYAMA).	<i>Terebra t-makiyamai</i> n. sp.
<i>Mitra sphaerulata</i> "MARTYN".	<i>Terebra</i> sp. indet.
<i>Nassarius caelatus</i> (A. ADAMS).	<i>Turricula byorituensis</i> n. sp.
<i>Nassarius gemmulatus</i> (LAMARCK).	<i>Turris oxytropis</i> (SOWERBY).
<i>Olivella spretoides</i> YOKOYAMA.	<i>Turritella filiola</i> YOKOYAMA.

## Station 3 (700 m. E. of Hakusyatou): coll. Mr. S. ANDÔ.

<i>Dentalium hexagonum</i> GOULD.	<i>Nassarius eximius</i> (A. ADAMS).
<i>Dentalium</i> sp. indet. (1).	<i>Nassarius gemmulatus</i> (LAMARCK).
<i>Architectonica perspectiva</i> (LINNAEUS).	<i>Olivella pulicaria</i> (MARRATT).
<i>Bursa subgranosa</i> (BECK).	<i>Odostomia limpida</i> DALL and BARTSCH.
<i>Clavatula serana</i> FISCHER.	<i>Phalium cancellianum</i> n. sp.
<i>Clavus flavidulus</i> (LAMARCK).	<i>Polinices didyma</i> (BOLTEN).
<i>Clavus nodilirata</i> (SMITH).	<i>Pyrene yabei</i> n. sp.
<i>Clavus pseudohumilis</i> n. sp.	<i>Rapana bezoar</i> (LINNAEUS).
<i>Clavus pseudoprincipalis</i> (YOKOYAMA).	<i>Ringicula arctata</i> GOULD.
<i>Conus aculeiformis</i> REEVE.	<i>Strombus taiwanicus</i> n. sp.
<i>Crepidula walshi</i> REEVE.	<i>Terebra evoluta</i> DESHAYES.
<i>Diala angustifera</i> n. sp.	<i>Terebra orthocostulata</i> n. sp.
<i>Fulgoraria rupestris</i> (GMELIN).	<i>Terebra pereoa</i> n. sp.
<i>Lataxiena luliana</i> (MARTIN).	<i>Turcica elisa</i> (GOULD).
<i>Lemintina javana</i> (MARTIN).	<i>Turricula byorituensis</i> n. sp.
<i>Lienardia sintikuensis</i> n. sp.	<i>Turris oxytropis</i> (SOWERBY).
<i>Melanella tortuosa</i> (ADAMS and REEVE).	<i>Turris polytropia</i> (HELBLING).
<i>Murex rarispina</i> LAMARCK.	<i>Turritella filiola</i> YOKOYAMA.
<i>Murex tribulus</i> LINNAEUS.	<i>Umbonium moniliferum</i> (LAMARCK).
<i>Nassarius caelatus</i> (A. ADAMS).	<i>Xenophora exuta</i> (REEVE).

## Station 4 (1000 m. E. of Hakusyatou): coll. Mr. S. ANDÔ.

<i>Dentalium byorituense</i> n. sp.	<i>Lemintina javana</i> (MARTIN).
<i>Dentalium hungerfordi</i> PILSBRY and SHARP.	<i>Murex</i> (?) sp. indet.
<i>Architectonica perspectiva</i> (LINNAEUS).	<i>Nassarius gemmulatus</i> (LAMARCK).
<i>Bursa subgranosa</i> (BECK).	<i>Sinum neritoideum</i> (LINNAEUS).
<i>Cancellaria macrospira</i> ADAMS and REEVE.	<i>Strombus taiwanicus</i> n. sp.
<i>Conus odengensis</i> MARTIN.	<i>Turritella</i> sp. indet.
<i>Ficus ficoides</i> (LAMARCK).	



Station 5 (700 m. E. of Hakusyaton) : coll. Mr. S. ANDÔ.

*Fusinus nodosoplicatus* (DUNKER).

Station 6 (1200 m. N. of Hakusyaton) : coll. Mr. S. ANDÔ.

*Conus odengensis* MARTIN.

Station 7 (600 m. E. of Hakusyaton) : coll. Mr. S. ANDÔ.

*Bursa subgranosa* (BECK).

*Nassarius gemmulatus* (LAMARCK).

Station 9 (1100 m. NE. of Hakusyaton) : coll. Mr. S. ANDÔ.

*Astenostoma perepitonica* n. sp.

*Diala angustifera* n. sp.

*Clavatula taiwanensis* n. sp.

*Turricula byorituensis* n. sp.

*Clavus* sp. indet.

Station 10 (1900 m. NE. of Hakusyaton) : coll. Mr. S. ANDÔ.

*Diala angustifera* n. sp.

*Oliva mustellina* LAMARCK.

*Fusinus nodosoplicatus* (DUNKER).

*Umbonium moniliferum* (LAMARCK).

Station 12 (800 m. NE. of Hakusyaton) : coll. Mr. S. ANDÔ.

*Nassarius gemmulatus* (LAMARCK).

*Turricula byorituensis* n. sp.

*Terebra torquata* ADAMS and REEVE.

*Turritella filiola* YOKOYAMA.

Station 20 (100 m. E. of Hakusyaton) : coll. Mr. S. ANDÔ.

*Dentalium byorituense* n. sp.

*Nassarius caelatus* (A. ADAMS).

*Dentalium hexagonum* GOULD.

*Nassarius gemmulatus* (LAMARCK).

*Architectonica perspectiva* (LINNAEUS).

*Niso brunnea* (SOWERBY).

*Clavatula taiwanensis* n. sp.

*Polinices didyma* (BOLTEN).

*Clavus flavidulus* (LAMARCK).

*Strombus taiwanicus* n. sp.

*Clavus nodilirata* (SMITH).

*Terebra t-makiyamai* n. sp.

*Clavus pseudoprincipalis* (YOKOYAMA).

*Turricula byorituensis* n. sp.

*Diala angustifera* n. sp.

*Turris oxytropis* (SOWERBY).

*Hemifusus colosseus* (LAMARCK).

*Turris polytropa* (HELBLING).

*Lataxiena luliana* (MARTIN).

*Turritella filiola* YOKOYAMA.

*Murex tribulus* LINNAEUS.

*Xenophora exuta* (REEVE).

Station 25 (1000 m. E. of Hakusyaton) : coll. Mr. S. ANDÔ.

*Dentalium philippinarum* SOWERBY.

*Lataxiena luliana* (MARTIN).

*Dentalium pretiosum* SOWERBY.

*Mangelia boshoensis* n. sp.

*Dentalium* sp. indet. (1).

*Mitra sphaerulata* "MARTIN".

*Architectonica maxima* (PHILIPPI).

*Nassarius caelatus* (A. ADAMS).

*Astenostoma epitonica* (FISCHER).

*Nassarius gemmulatus* (LAMARCK).

*Bursa subgranosa* (BECK).

*Natica ala-papilionis* (BOLTEN).

*Clavus braunsi* (YOKOYAMA).

*Natica rufa* BORN.

*Clavus pseudoprincipalis* (YOKOYAMA).

*Natica* (?) sp. indet.

*Conus djarianensis* MARTIN.

*Phalium japonicum* (REEVE).

*Cyllene lugubris* A. ADAMS.

*Polinices didyma* (BOLTEN).

*Cymbium indicum* (GMELIN).

*Pyrene yabei* n. sp.

*Cypraea miliaris* GMELIN.

*Ringicula arctata* GOULD.

*Diala angustifera* n. sp.

*Ringicula caron* HINDS.

*Epitonium* sp. indet.

*Strombus dentatus* LINNAEUS.

*Ethalia pulchella* (A. ADAMS).

*Strombus taiwanicus* n. sp.

*Terebra cumingii* DESHAYES.  
*Terebra evoluta* DESHAYES.  
*Tibia formosana* (YOKOYAMA).  
*Turcica elisa* (GOULD).  
*Turricula byorituensis* n. sp.

*Turris oxytropis* (SOWERBY).  
*Turris polytropa* (HELBLING).  
*Turritella filiola* YOKOYAMA.  
*Xenophora exuta* (REEVE).

Station 27 (700 m. SE. of Hakusyaton): coll. Mr. S. ANDÔ.

*Dentalium hungerfordi* PILSBRY and SHARP.  
*Bursa subgranosa* (BECK).  
*Clavus pseudoprincipalis* (YOKOYAMA).  
*Mitra sphaerulata* "MARTYN".  
*Nassarius caelatus* (A. ADAMS).

*Nassarius gemmulatus* (LAMARCK).  
*Turris oxytropis* (SOWERBY).  
*Turris polytropa* (HELBLING).  
*Turritella filiola* YOKOYAMA.

Station 32 (1000 m. SE. of Hakusyaton): coll. Mr. S. ANDÔ.

*Bursa subgranosa* (BECK).  
*Ficus ficoides* (LAMARCK).  
*Nassarius gemmulatus* (LAMARCK).

*Solariella formosaensis* n. sp.  
*Strombus biviricosus* n. sp.

Station 69 (Hakusyaton): coll. Mr. S. ANDÔ.

*Dentalium byorituense* n. sp.  
*Conus ornatissimus* MARTIN.

*Nassarius caelatus* (A. ADAMS).  
*Turris oxytropis* (SOWERBY).

5. Hokkô, Obokô Siko-syô, Byôritu-gun, ditto (同 苗栗郡四湖庄鴨母坑北坑).

Station 14 (1450 m. W. of Hokkô): coll. Mr. ANDÔ.

*Dentalium hexagonum* GOULD.  
*Bursa subgranosa* (BECK).  
*Clavatula taiwanensis* n. sp.  
*Clavus flavidulus* (LAMARCK).  
*Clavus nodiliratus* (SMITH).  
*Clavus pseudoprincipalis* (YOKOYAMA).  
*Conus aculeiformis* REEVE.  
*Conus comatosaeformis* YOKOYAMA.  
*Fusinus nodosoplicatus* (DUNKER).  
*Mangelia perparva* (YOKOYAMA).  
*Mitra sphaerulata* "MARTYN".

*Nassarius caelatus* (A. ADAMS).  
*Nassarius gemmulatus* (LAMARCK).  
*Polinices columnalis* (RECLUZ).  
*Polinices didyma* (BOLTEN).  
*Strombus taiwanicus* n. sp.  
*Terebra t-makiyamai* n. sp.  
*Turricula byorituensis* n. sp.  
*Turris oxytropis* (SOWERBY).  
*Turris polytropa* (HELBLING).  
*Turritella filiola* YOKOYAMA.  
*Turritella terebra* (LINNAEUS).

6. Keiyukwa, Tûsyô-syô, Byôritu-gun, ditto (同 苗栗郡通霄庄雞油窩).

Station 25: coll. Mr. S. ANDÔ.

*Natica zebra* LAMARCK?

Station 33 (900 m. NW. of Keiyukwa): coll. Mr. S. ANDÔ.

*Dentalium hexagonum* GOULD.  
*Dentalium byorituense* n. sp.  
*Architectonica mazima* (PHILIPPI).  
*Bursa subgranosa* (BECK).  
*Clavatula taiwanensis* n. sp.  
*Clavus pernodiliratus* n. sp.  
*Clavus pseudoprincipalis* (YOKOYAMA).  
*Conus aculeiformis* REEVE.  
*Diala angustifera* n. sp.  
*Hemifusus protolacteus* n. sp.  
*Lataxiena luliana* (MARTIN).

*Nassarius caelatus* (A. ADAMS).  
*Nassarius gemmulatus* (LAMARCK).  
*Olivella spretoides* YOKOYAMA.  
*Polinices* sp. indet.  
*Ringicula arcata* GOULD.  
*Terebra t-makiyamai* n. sp.  
*Turricula byorituensis* n. sp.  
*Turris oxytropis* (SOWERBY).  
*Turris polytropa* (HELBLING).  
*Turritella filiola* YOKOYAMA.

## Station 50: coll. Mr. S. ANDÔ.

- |  |  |
|--|--|
| <i>Dentalium hexagonum</i> GOULD.        | <i>Nassarius gemmulatus</i> (LAMARCK).       |
| <i>Architectonica maxima</i> (PHILIPPI). | <i>Natica zebra</i> LAMARCK.                 |
| <i>Bursa subgranosa</i> (BECK).          | <i>Polinices columnalis</i> (RECLUZ).        |
| <i>Clavatula serana</i> FISCHER.         | <i>Polinices didyma</i> (BOLTEN).            |
| <i>Clavatula taiwanensis</i> n. sp.      | <i>Strombus taiwanicus</i> n. sp.            |
| <i>Clavus flavidulus</i> (LAMARCK).      | <i>Tibia fusus</i> (LINNAEUS).               |
| <i>Hemifusus colosseus</i> (LAMARCK).    | <i>Trochocerithium shikoense</i> (YOKOYAMA). |
| <i>Mitra flamma</i> QUOY.                | <i>Turcica elisa</i> (GOULD).                |
| <i>Murex sinensis</i> REEVE.             |  |

## Station 52: coll. Mr. S. ANDÔ.

- |   |  |
|---|--|
| <i>Clavatula taiwanensis</i> n. sp.         | <i>Nassarius caelatus</i> (A. ADAMS).    |
| <i>Clavus pseudoprincipalis</i> (YOKOYAMA). | <i>Nassarius gemmulatus</i> (LAMARCK).   |
| <i>Conus comatosaeformis</i> YOKOYAMA.      | <i>Terebra torquata</i> ADAMS and REEVE. |
| <i>Lienardia keiyukwana</i> n. sp.          | <i>Turris oxytropis</i> (SOWERBY).       |
| <i>Mitra flamma</i> QUOY.                   | <i>Turritella filiola</i> YOKOYAMA.      |

## Station 54 (920 m. NW. of Keiyukwa): coll. Mr. S. ANDÔ.

- |                                       |                                      |
|---------------------------------------|--------------------------------------|
| <i>Clavus nodilirata</i> (SMITH).     | <i>Turricula byorituensis</i> n. sp. |
| <i>Nassarius caelatus</i> (A. ADAMS). |                                      |

## Station 55 (940 m. NW. of Keiyukwa): coll. Mr. S. ANDÔ.

- |   |  |
|---|--|
| <i>Bursa subgranosa</i> (BECK).         | <i>Nassarius gemmulatus</i> (LAMARCK). |
| <i>Clavatula serana</i> FISCHER.        | <i>Natica rufa</i> BORN.               |
| <i>Clavus flavidulus</i> (LAMARCK).     | <i>Olivella pulicaria</i> (MARRATT).   |
| <i>Clavus pseudohumilis</i> n. sp.      | <i>Strombus taiwanicus</i> n. sp.      |
| <i>Fusinus nodosoplicatus</i> (DUNKER). | <i>Theodoxus sowerbianus</i> (RECLUZ). |
| <i>Lataxiena luliana</i> (MARTIN).      | <i>Turcica elisa</i> GOULD.            |
| <i>Mitra astenostomoides</i> n. sp.     | <i>Turricula byorituensis</i> n. sp.   |
| <i>Nassarius caelatus</i> (A. ADAMS).   | <i>Turris oxytropis</i> SOWERBY.       |

## 7. Kityô, Ryûki-syô, Niitoyo-gun, Tainan-syû (臺南州新豐郡龍崎庄崎頂): coll. Mr. J. TORII.

- |                                     |                                     |
|-------------------------------------|-------------------------------------|
| <i>Cancellaria reeveana</i> CROSSE. | <i>Turritella kityoensis</i> n. sp. |
| <i>Polinices didyma</i> (BOLTEN).   |                                     |

## Station 52 (N. of Kityô): coll. Mr. J. TORII.

- |  |  |
|--|--|
| <i>Batillaria zonalis</i> (BRUGUIÈRE). | <i>Telescopium telescopium</i> (LINNAEUS). |
|--|--|

## 8. Kôkwan, Kôryû-syô, Tikunan-gun, Sintiku-syû (新竹州竹南郡後龍庄公館).

## Station 27 (700 m. SW. of Kôkwan): coll. Mr. S. ANDÔ.

- |   |                                       |
|---|---------------------------------------|
| <i>Dentalium byorituense</i> n. sp.     | <i>Nassarius</i> sp. indet.           |
| <i>Clavus pseudohumilis</i> n. sp.      | <i>Olivella spretoides</i> YOKOYAMA.  |
| <i>Fusinus nodosoplicatus</i> (DUNKER). | <i>Phalium japonicum</i> (REEVE).     |
| <i>Helicacis dorsuosus</i> (HINDS).     | <i>Pyramidella teres</i> (A. ADAMS).  |
| <i>Lienardia fortilirata</i> (SMITH).   | <i>Rissoina formosana</i> n. sp.      |
| <i>Lataxiena luliana</i> (MARTIN).      | <i>Tenistoma andoi</i> n. sp.         |
| <i>Mathilda sinensis</i> FISCHER.       | <i>Tonna luteostoma</i> (KÜSTER).     |
| <i>Mitra pruïnosa</i> REEVE?            | <i>Turricula byorituensis</i> n. sp.  |
| <i>Mitra sphaerulata</i> "MARTYN".      | <i>Umbonium vestarium</i> (LINNAEUS). |
| <i>Nassarius gemmulatus</i> (LAMARCK).  | <i>Vexillum obeliscum</i> (REEVE).    |

9. Kôryô, Sinkwa-gai, Sinkwa-gun, Tainan-syû (臺南州新化郡新化街後寮) (SW. of Kôryô): coll. Mr. J. TORII.

*Monilea lentiginosa* A. ADAMS.

10. Kôsirin, Satin-syô, Sinkwa-gun, ditto (同 新化郡左鎮庄岡子林).

Station 35: coll. Mr. J. TORII.

*Batillaria zonalis* (BRUGUIÈRE).

*Cerithidea cingulata* (GMELIN).

11. Kôsui, Hokuseikwa, Tûsyô-syô, Byôritu-gun, Sintiku-syû (新竹州苗栗郡通霄庄北勢窩甲水).

Station 6 (Between Kôsui and Zyuna): coll. Mr. S. HANZAWA.

*Bursa subgranosa* (BECK).

*Natica zebra* LAMARCK.

*Clavatula taiwanensis* n. sp.

*Olivella spretooides* YOKOYAMA.

*Clavus flavidulus* (LAMARCK).

*Polinices didyma* (BOLTEN).

*Clavus pseudoprincipalis* (YOKOYAMA).

*Terebra t-makiyamai* n. sp.

*Conus aculeiformis* REEVE.

*Terebra orthocostulata* n. sp.

*Fusinus nodosoplicatus* (DUNKER).

*Terebra torquata* ADAMS and REEVE.

*Nassarius caelatus* (A. ADAMS).

*Turris oxytropis* (SOWERBY).

*Nassarius gemmulatus* (LAMARCK).

*Turris polytropa* (HELBLING).

Station 61 (Kôsui): coll. Mr. S. ANDÔ.

*Rapana bezoar* (LINNAEUS).

*Umbonium moniliferum* (LAMARCK).

12. Kozantyô, Siko-syô, Byôritu-gun, ditto (同 苗栗郡四湖庄湖山頂).

Station 5 (400 m. N. of Kozantyô): coll. Mr. S. ANDÔ.

*Clavus pseudoprincipalis* (YOKOYAMA).

*Conus ornatissimus* MARTIN.

*Conus odengensis* MARTIN.

*Nassarius gemmulatus* (LAMARCK).

Station 24 (Kozantyô): coll. Mr. S. ANDÔ.

*Clavus tjibaliungensis* (MARTIN).

*Murex tribulus* LINNAEUS.

*Lataxiena luliana* (MARTIN).

*Nassarius caelatus* (A. ADAMS).

*Leucotina diana* (A. ADAMS).

*Nassarius gemmulatus* (LAMARCK).

*Melanooides grossula* (YOKOYAMA).

*Terebra orthocostulata* n. sp.

*Mitra sphaerulata* "MARTYN".

*Turris oxytropis* (SOWERBY).

*Murex rarispina* LAMARCK.

13. Kwandenkei, Rinhô-ei, Rokkô-syô, Sobun-gun, Tainan-syû (臺南州曾文郡六甲庄林鳳營官佃溪): coll.?

*Turritella terebra* (LINNAEUS).

14. Naikotô, Tûsyô-syô, Byô-ritu-gun, Sintiku-syû (新竹州苗栗郡通霄庄內湖島).

Station 28 (550 m. SE. of Naikotô): coll. Mr. S. ANDÔ.

*Clavus pseudoprincipalis* (YOKOYAMA).

*Terebra dussumieri* KIENER.

*Lataxiena luliana* (MARTIN).

*Turcica elisa* (GOULD).

*Nassarius caelatus* (A. ADAMS).

*Turris oxytropis* (SOWERBY).

*Nassarius gemmulatus* (LAMARCK).

*Turris polytropa* (HELBLING).

Station 29 (700 m. E. of Naikotô): coll. Mr. S. ANDÔ.

*Bursa subgranosa* (BECK).

*Turris oxytropis* (SOWERBY).

Station 30 (1000 m. SE. of Naikotô): coll. Mr. S. ANDÔ.

*Bursa subgranosa* (BECK). *Nassarius gemmulatus* (LAMARCK).  
*Clavus pseudoprincipalis* (YOKOYAMA). *Turricula byorituensis* n. sp.

Station 31 (700 m. E. of Naikotô): coll. Mr. S. ANDÔ.

*Clavus flavidulus* (LAMARCK). *Olivella spretoides* YOKOYAMA.  
*Clavus pseudohumilis* n. sp. *Siphonalia spadicea* (REEVE).  
*Clavus pseudoprincipalis* (YOKOYAMA). *Turricula byorituensis* n. sp.  
*Nassarius caelatus* (A. ADAMS). *Turris oxytropis* (SOWERBY).  
*Nassarius gemmulatus* (LAMARCK).

Station 66 (900 m. SE. of Naikotô): coll. M. S. ANDÔ.

*Dentalium* sp. indet. (2). *Mitra flammea* QUOY.  
*Bursa subgranosa* (BECK). *Nassarius caelatus* (A. ADAMS).  
*Cancellaria macrospira* ADAMS and REEVE. *Nassarius gemmulatus* (LAMARCK).  
*Clavus pseudohumilis* n. sp. *Natica ala-papilionis* (BOLTEN).  
*Conus djarianensis* MARTIN. *Natica rufa* BORN.  
*Cymatium vespereum* (LAMARCK). *Strombus taiwanicus* n. sp.  
*Hemifusus protolacteus* n. sp. *Turricula byorituensis* n. sp.  
*Lataxiena luliana* (MARTIN). *Turris oxytropis* (SOWERBY).  
*Lataxiena yabei* n. sp. *Turris polytropa* (HELBLING).

15. Nanseizan, Kôryû-syô, Tikunan-gun, ditto (同 竹南郡後龍庄南勢山).

Station 11: coll. Mr. S. ANDÔ.

*Bursa subgranosa* (BECK). *Nassarius caelatus* (A. ADAMS).  
*Calliostoma semigranatum* n. sp. *Nassarius gemmulatus* (LAMARCK).  
*Clavus pseudoprincipalis* (YOKOYAMA). *Natica rufa* BORN.  
*Conus aculeiformis* REEVE. *Retusa pyriformis* (A. ADAMS).  
*"Cyclostrema" sulcatum* A. ADAMS. *Terebra evoluta* DESHAYES.  
*Cyllene lugubris* A. ADAMS. *Turricula byorituensis* n. sp.  
*Lataxiena luliana* (MARTIN). *Turris oxytropis* (SOWERBY).  
*Mitra flammea* QUOY.

Station 19 (700 m. NE. of Nanseizan): coll. Mr. S. ANDÔ.

*Dentalium hexagonum* GOULD. *Lataxiena luliana* (MARTIN).  
*Dentalium pretiosum* SOWERBY. *Mangelia perparva* (YOKOYAMA).  
*Acteon siebaldi* (REEVE). *Nassarius caelatus* (A. ADAMS).  
*Architectonica perspectiva* (LINNAEUS). *Nassarius gemmulatus* (LAMARCK).  
*Bursa subgranosa* (BECK). *Natica rufa* BORN.  
*Calliostoma semigranatum* n. sp. *Natica solida* BLAINVILLE.  
*Cerithium kochi* PHILIPPI. *Olivella spretoides* YOKOYAMA.  
*Clavus flavidulus* (LAMARCK). *Polinices filiosus* (REEVE).  
*Clavus nodilirata* (SMITH). *Pyrene baculus* (REEVE).  
*Clavus pseudoprincipalis* (YOKOYAMA). *Terebra dussumieri* KIENER.  
*Conus aculeiformis* REEVE. *Terebra evoluta* DESHAYES.  
*Conus ornatissimus* MARTIN. *Turricula byorituensis* n. sp.  
*Conus pseudosulcatus* n. sp. *Turris oxytropis* (SOWERBY).  
*"Cyclostrema" eburnaeforme* n. sp. *Turritella filiola* YOKOYAMA.  
*Fusinus nodosoplicatus* (DUNKER).

## 16. Rinsuikwa, Ôbokô, Byôritu-gun, ditto (同 苗栗郡鴨母坑蘭水窩)

Station 2 (E. of Rinsuikwa): coll. Mr. S. ANDÔ.

*Conus aculeiformis* REEVE.

Station 3 (1100 m. E. of Rinsuikwa): coll. Mr. S. ANDÔ.

*Terebra dussumieri* KIENER.

Station 4 (600 m. E. of Rinsuikwa): coll. Mr. S. ANDÔ.

*Oliva mustellina* LAMARCK.*Ringicula arcata* GOULD.

Station 5 (1000 m. NW. of Rinsuikwa): coll. Mr. S. ANDÔ.

*Dentalium hexagonum* GOULD.*Clavatula taiwanensis* n. sp.*Clavus pseudoprincipalis* (YOKOYAMA).*Conus comatosaeformis* YOKOYAMA.*Fusinus nodosoplicatus* (DUNKER).*Latirus coreanicus* (SMITH).*Mangelia pyramis* (HINDS).*Mitra flammea* QUOY.*Mitra sphaerulata* "MARTYN".*Nassarius caelatus* (A. ADAMS).*Natica zebra* LAMARCK.*Olivella spretoides* YOKOYAMA.*Strombus taiwanicus* n. sp.*Terebra t-makiyamai* n. sp.*Turris granosa* (HELBLING).*Turris oxytropis* (SOWERBY).*Turritella filiola* YOKOYAMA.

Station 6 (900 m. NW. of Rinsuikwa): coll. Mr. S. ANDÔ.

*Dentalium hexagonum* GOULD.*Bursa subgranosa* (BECK).*Cantharus wangwaensis* n. sp.*Clavatula serana* FISCHER.*Clavatula taiwanensis* n. sp.*Clavus pseudoprincipalis* (YOKOYAMA).*Clavus rinsuikwaensis* n. sp.*Conus aculeiformis* REEVE.*Conus comatosaeformis* YOKOYAMA.*Diala angustifera* n. sp.*Fusinus nodosoplicatus* (DUNKER).

"Latirus" minutisquamosus (REEVE).

*Mangelia pyramis* (HINDS).*Mitra flammea* QUOY.*Mitra sphaerulata* "MARTYN".*Murex tribulus* LINNAEUS.*Nassarius caelatus* (A. ADAMS).*Nassarius gemmulatus* (LAMARCK).*Natica ula-papilionis* (BOLTEN).*Natica vitellus* (LINNAEUS).*Natica zebra* LAMARCK.*Oliva mustellina* LAMARCK.*Olivella spretoides* YOKOYAMA.*Polinices didyma* (BOLTEN).*Pyrene niveomarginata* (SMITH).*Rapana bezoar* (LINNAEUS).*Strombus taiwanicus* n. sp.*Terebra t-makiyamai* n. sp.*Terebra melanacme* SMITH.*Terebra reticostaeformis* n. sp.*Tibia fusus* (LINNAEUS).*Turricula byorituensis* n. sp.*Turris oxytropis* (SOWERBY).*Turris polytropa* (HELBLING).*Turritella filiola* YOKOYAMA.

Station 7 (550 m. NW. of Rinsuikwa): coll. Mr. S. ANDÔ.

*Fusinus nodosoplicatus* (DUNKER).*Polinices didyma* (BOLTEN).*Tonna zonata* (GREEN).

## 17. Rokuzyûkei, Sirakawa-syô, Sin-ei-gun, Tainan-syû (臺南州新營郡白河庄六重溪): coll. Mr. S. ANDÔ.

*Cypraea cincta* MARTIN.

18. Sairyôkyô, Satin-syô, Sinkwa-gun, ditto (同 新化郡左鎮庄菜寮橋). The upper course of Sairyôkyô:  
coll. Mr. S. HANZAWA.

*Dentalium hexagonum* GOULD.  
*Dentalium pretiosum* SOWERBY.  
*Batillaria zonalis* (BRUGUIÈRE).  
*Cerithidea cingulata* (GMELIN).  
*Diala angustifera* n. sp.  
*Gourmya satoi* (YOKOYAMA).  
*Heliaeus taiwanicus* (YOKOYAMA).  
*Latrunculus lamarcki* n. sp.  
*Liotia* (?) sp. indet.  
*Melanoides obliquegranosa* (SMITH).  
*Nassarius festivus* (POWYS).  
*Pyramidella* sp. indet.  
*Pyrene yabei* n. sp.  
*Turbo* sp. indet.  
*Turbonilla hanzawai* n. sp.  
*Turricula byorituensis* n. sp.

*Turris oxytropis* (SOWERBY).  
*Turritella fliola* (YOKOYAMA).  
*Nassarius caelatus* (A. ADAMS).  
*Nassarius gemmulatus* (LAMARCK).  
*Natica ala-papilionis* (BOLTEN).  
*Natica rufa* BORN.  
*Persicula bernardii* (LARGILLIER).  
*Polinices didyma* (BOLTEN).  
*Polinices* sp. indet.  
*Tibia formosana* (YOKOYAMA).  
*Turricula byorituensis* n. sp.  
*Turris granosa* (HELBLING).  
*Turris oxytropis* (SOWERBY).  
*Turris tigrinaeformis* n. sp.  
*Turritella fliola* YOKOYAMA.

19. Sankwakô, Tûsyô-syô, Byôritu-gun, Sintiku-syû (新竹州苗栗郡通霄庄三窩口).

Station 35 (1200. E. of Sankwakô): coll. Mr. S. ANDÔ.

*Conus aculeiformis* REEVE.  
*Natica zebra* LAMARCK?

*Turris oxytropis* (SOWERBY).

Station 38 (Sankwakô): coll. Mr. S. ANDÔ.

*Natica rufa* BORN.

*Turritella fliola* YOKOYAMA.

Station 39 (300 m. E. of Sankwakô): coll. Mr. S. ANDÔ.

*Dentalium byorituense* n. sp.  
*Dentalium pretiosum* SOWERBY.  
*Bursa subgranosa* (BECK).  
*Clavatulula taiwanensis* n. sp.  
*Clavus nodilirata* (SMITH).  
*Clavus pseudoprincipalis* (YOKOYAMA).  
*Conus djarianensis* MARTIN.  
*Conus odengensis* MARTIN.

*Lataxiena luliana* (MARTIN).  
*Lemintina javana* (MARTIN).  
*Melanella candida* (MARRATT).  
*Murex tribulus* LINNAEUS.  
*Siphonalia spadicea* (REEVE).  
*Turricula byorituensis* n. sp.  
*Turritella fliola* YOKOYAMA.  
*Xenophora exuta* (REEVE).

Station 41 (500 m. E. of Sankwakô): coll. Mr. S. ANDÔ.

*Dentalium byorituense* n. sp.  
*Dentalium hexagonum* GOULD.  
*Astenostoma epitonica* (FISCHER).  
*Bursa subgranosa* (BECK).  
*Calyptrea taiwanensis* n. sp.  
*Cancellaria reeveana* CROSSE.

*Clavus pseudoprincipalis* (YOKOYAMA).  
*Cyllene lugubris* A. ADAMS.  
*Lataxiena luliana* (MARTIN).  
*Latrunculus formosanus* (SOWERBY).  
*Melanella tortuosa* (ADAMS and REEVE).

Station 44 (300 m. S. of Sankwakô): coll. Mr. S. ANDÔ.

*Dentalium byorituense* n. sp.  
*Dentalium hexagonum* GOULD.  
*Dentalium vernedei* SOWERBY.  
*Bursa subgranosa* (BECK).

*Clavatulula taiwanensis* n. sp.  
*Mitra sphaerulata* "MARTYN".  
*Nassarius caelatus* (A. ADAMS).  
*Turris oxytropis* (SOWERBY).

Station 46 (700 m. SE. of Sankwakô) : coll. Mr. S. ANDÔ.

*Fusinus nodosoplicatus* (DUNKER).  
*Siphonalia spadicea* (REEVE).

*Terebra orthocostulata* n. sp.

Station 60 (1200 m. SE. of Sankwakô) : coll. Mr. S. ANDÔ.

*Architectonica maxima* (PHILIPPI).  
*Bursa subgranosa* (BECK).  
*Cantharus wangwaensis* n. sp.  
*Mitra sphaerulata* "MARTYN".  
*Nassarius caelatus* (A. ADAMS).  
*Natica rufa* BORN.

*Olivella spretoides* YOKOYAMA.  
*Phalium areolum* (LINNAEUS).  
*Ringicula caron* HINDS.  
*Tibia fusus* (LINNAEUS).  
*Turris oxytropis* (SOWERBY).  
*Turritella filiola* YOKOYAMA.

Station 43 (550 m. E. of Sankwakô) : coll. Mr. S. ANDÔ.

*Dentalium byorituense* n. sp.  
*Dentalium subrectum* JEFFREYS.  
*Bursa subgranosa* (BECK).  
*Clavatula taiwanensis* n. sp.  
*Clavus flavidulus* (LAMARCK).  
*Clavus pseudoprincipalis* (YOKOYAMA).  
*Conus djarianensis* MARTIN.  
*Conus ornatissimus* MARTIN.  
*Erato callosa* ADAMS and REEVE.  
*Ethalia pulchella* (A. ADAMS).  
*Lataxiena luliana* (MARTIN).  
*Latirus* sp. indet.

*Mitra sphaerulata* "MARTYN".  
*Mitra flammae* QUOY.  
*Mitra* sp. indet.  
*Murex tribulus* LINNAEUS.  
*Nassarius gemmulatus* (LAMARCK).  
*Nassarius caelatus* (A. ADAMS).  
*Olivella spretoides* YOKOYAMA.  
*Pyrene yabei* n. sp.  
*Ringicula arctata* GOULD.  
*Strombus taiwanicus* n. sp.  
*Turris oxytropis* (SOWERBY).  
*Turritella filiola* (YOKOYAMA).

20. Sanzyûkei, Satin-syô, Sinkwa-gun, Tainan-gun (臺南州新化郡左鎮庄三重溪).

Station 43 (A cliff W. of Sanzyûkei) : coll. Mr. J. TORII.

*Telescopium telescopium* (LINNAEUS).

Station 47: coll. Mr. J. TORII.

*Batillaria zonalis* (BRUGUIÈRE).

*Cerithidea cingulata* (GMELIN).

21. Sikô, Kôsyun-syô, Kôsyun-gun, Takao-syû (高雄州 恒春郡 恒春庄 四溝) : coll. Messrs. S. HANZAWA and J. MAKIYAMA.

*Dentalium vernedei* SOWERBY.  
*Ancila rubiginosa* (SWAINSON).  
*Architectonica perspectiva* (LINNAEUS).  
*Astraea pseudomodesta* n. sp.  
*Batillaria zonalis* (BRUGUIÈRE).  
*Cancellaria taiwanensis* n. sp.  
*Cellana toreuma* (REEVE).  
*Clavus flavidulus* (LAMARCK).  
*Columbella vermicolor* SOWERBY.  
*Conus djarianensis* MARTIN.  
*Conus d'orbigny* (AUDOUIN).  
*Conus odengensis* MARTIN.  
*Cypraea* sp. indet. (1).  
*Daphnella subzonataeformis* n. sp.  
*Distorsio reticulata* (LINK).

*Epitonium neglectum* (ADAMS and REEVE).  
*Eunaticina papilla* (GMELIN).  
*Fusinus colus* (LINNAEUS).  
*Fusinus glacialimus* (ADAMS and REEVE).  
*Fusinus laticanaliculatus* n. sp.  
*Fissuridea crucifera* (PILSBRY).  
*Gourmya satoi* (YOKOYAMA).  
*Hydatina physis* (LINNAEUS).  
*Latrunculus canaliculatus* (SCHUMACHER).  
*Melanoides obliquegranosa* (SMITH).  
*Metula mitrella* (ADAMS and REEVE).  
*Mitra flammae* QUOY.  
*Mitra yokayamai* n. sp.  
*Morum subcancellatum* n. sp.  
*Murex tribulus* LINNAEUS.



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|---|--|
| <i>Nassarius caelatus</i> (A. ADAMS).     | <i>Strombus lukuanus</i> LINNAEUS.       |
| <i>Nassarius canaliculatus</i> (LAMARCK). | <i>Terebra torquata</i> ADAMS and REEVE. |
| <i>Nassarius gemmulatus</i> (LAMARCK).    | <i>Terebra triseriata</i> GRAY.          |
| <i>Nassarius pictus</i> (DUNKER).         | <i>Tonna zonata</i> (GREEN).             |
| <i>Natica solida</i> BLAINVILLE.          | <i>Tudicla cumingii</i> (JONAS).         |
| <i>Persicula bernardii</i> (LARGILLIER).  | <i>Turbo petholatus</i> LINNAEUS.        |
| <i>Phalium areolum</i> (LINNAEUS).        | <i>Turricula byorituensis</i> n. sp.     |
| <i>Phalium japonicum</i> (REEVE).         | <i>Turris granosa</i> (HELBLING).        |
| <i>Polinices columnalis</i> (RECLUZ).     | <i>Turris oxytropis</i> (SOWERBY).       |
| <i>Pyrene baculus</i> (REEVE).            | <i>Turritella filiola</i> YOKOYAMA.      |
| <i>Sinum neritoideum</i> (LINNAEUS).      | <i>Volva volva</i> (LINNAEUS).           |
| <i>Siphonalia spadicea</i> (REEVE).       | <i>Voluta sikoensis</i> n. sp.           |
| <i>Strombus taiwanicus</i> n. sp.         | <i>Xenophora exuta</i> (REEVE).          |

## 22. Sikwakô, Bansya-syô, Sin-ei-gun, Tainan-syû (臺南州新營郡蕃社庄芝花坑).

Station 10 (1600 m. N. of Sikwakô): coll. Mr. S. ANDÔ.

- |                                       |  |
|---------------------------------------|--|
| <i>Cerithidea cingulata</i> (GMELIN). | <i>Phalium japonicum</i> (REEVE).      |
| <i>Conus aculeiformis</i> REEVE.      | <i>Umbonium moniliferum</i> (LAMARCK). |
| <i>Oliva mustellina</i> LAMARCK.      |  |

## 23. Sinpo, Tûsyô-syô, Byôritu-gun, Sintiku-syû (新竹州苗栗郡通霄庄新埔).

Station 16 (1520 m. E. of Sinpo): coll. Mr. S. ANDÔ.

- Clavus pernodiliratus*
- n. sp.

Station 56 (1600 m. E. of Sinpo): coll. Mr. S. ANDÔ.

- Phalium japonicum*
- (REEVE).

Station 67 (1500 m. E. of Sinpo): coll. Mr. S. ANDÔ.

- |  |                                |
|--|--------------------------------|
| <i>Conus aculeiform</i> REEVE.         | <i>Tibia fusus</i> (LINNAEUS). |
| <i>Nassarius gemmulatus</i> (LAMARCK). |                                |

Station 68 (1520 m. E. of Sinpo): coll. Mr. S. ANDÔ.

- |   |  |
|---|--|
| <i>Dentalium byorituense</i> n. sp.           | <i>Nassarius caelatus</i> (A. ADAMS).  |
| <i>Dentalium</i> sp. (2).                     | <i>Nassarius gemmulatus</i> (LAMARCK). |
| <i>Architectonica maxima</i> (PHILIPPI).      | <i>Olivella spretoides</i> YOKOYAMA.   |
| <i>Architectonica perspectiva</i> (LINNAEUS). | <i>Polinices didyma</i> (BOLTEN).      |
| <i>Clavatula taiwanensis</i> n. sp.           | <i>Siphonalia stearnsii</i> PILSBRY.   |
| <i>Clavus flavidulus</i> (LAMARCK).           | <i>Strombus taiwanicus</i> n. sp.      |
| <i>Clavus pseudoprincipalis</i> (YOKOYAMA).   | <i>Terebra t-makiyamai</i> n. sp.      |
| <i>Diala angustifera</i> n. sp.               | <i>Turricula byorituensis</i> n. sp.   |
| <i>Lataxiena luliana</i> (MARTIN).            | <i>Turris oxytropis</i> (SOWERBY).     |
| <i>Murex rarispina</i> LAMARCK.               | <i>Turris polytropa</i> (HELBLING).    |
| <i>Nassaria monospina</i> n. sp.              | <i>Typhis duplicatus</i> SOWERBY.      |

Station 69 (1550 m. E. of Sinpo): coll. Mr. S. ANDÔ.

- |   |   |
|---|---|
| <i>Astenostoma epitonica</i> (FISCHER).     | <i>Conus djarianensis</i> MARTIN.       |
| <i>Bursa subgranosa</i> (BECK).             | <i>Conus ornatissimus</i> MARTIN.       |
| <i>Clavatula taiwanensis</i> n. sp.         | <i>Diala angustifera</i> n. sp.         |
| <i>Clavus flavidulus</i> (LAMARCK).         | <i>Fusinus nodosoplicatus</i> (DUNKER). |
| <i>Clavus pseudohumilis</i> n. sp.          | <i>Lataxiena luliana</i> (MARTIN).      |
| <i>Clavus pseudoprincipalis</i> (YOKOYAMA). | <i>Murex tribulus</i> LINNAEUS.         |

- Nassarius caelatus* (A. ADAMS).  
*Nassarius gemmulatus* (LAMARCK).  
*Olivella spretoides* YOKOYAMA.  
*Ringicula arctata* GOULD.  
*Strombus bivaricosus* n. sp.  
*Strombus taiwanicus* n. sp.
- Turricula byorituensis* n. sp.  
*Turris granosa* (HELBLING).  
*Turris oxytropis* (SOWERBY).  
*Turritella fliola* YOKOYAMA.  
*Turritella millepunctata* n. sp.
24. Sinsui, Ensô-syô, Okayama-gun, Takao-syû; 1500 m. NW. of the Police Station (高雄州 岡山郡 燕巢庄深水): coll. Messrs. S. HANZAWA and K. YOSHIDA.
- Oliva mustellina* LAMARCK. *Umbonium equestratum* n. sp.
25. Sokeisi, Kwanden-syô, Sobun-gun, Tainan-syû (臺南州曾文郡官田庄雙溪子): coll. Mr. T. MAKIYAMA.
- Cymatium parthenopeum* (SALIS).  
*Helicac taiwanicus* (YOKOYAMA).  
*Latrunculus lamarcki* n. sp.  
*Mitra flammea* QUOY.
- Polinices columnalis* (RECLUZ).  
*Strombus succinctus* LINNAEUS.  
*Turritella terebra* (LINNAEUS).  
*Umbonium moniliferum* (LAMARCK).
26. Syôgun-yama, Byôritu-gai, Byôritu-gun, Sintiku-syû (新竹州 苗栗郡 苗栗街 將軍山): coll. Mr. S. ANDÔ.
- Dentalium pretiosum* SOWERBY.  
*Clavus flavidulus* (LAMARCK).  
*Clavus pseudoprincipalis* (YOKOYAMA).  
*Clavus tjibaliungensis* (MARTIN).  
*Ethalia pulchella* (A. ADAMS).  
*Nassarius caelatus* (A. ADAMS).  
*Nassarius gemmulatus* (LAMARCK).  
*Polinices didyma* (BOLTEN).
- Pyrene yabei* n. sp.  
*Tibia formosana* (YOKOYAMA).  
*Turcica elisa* (GOULD).  
*Turricula byorituensis* n. sp.  
*Turris granosa* (HELBLING).  
*Turris oxytropis* (SOWERBY).  
*Umbonium vestarium* (LINNAEUS).  
*Vexillum gembacanum* (MARTIN).
27. Taikwa, Kôryû-syô, Tikunan-gun, ditto (同 竹南郡後龍庄大窩).  
 Station 9 (600 m. SW. of Taikwa): coll. Mr. S. ANDÔ.
- Polinices columnalis* (RECLUZ).
- Station 10 (950 m. SW. of Taikwa): coll. Mr. S. ANDÔ.
- Dentalium pretiosum* SOWERBY. *Odostomia venustaeformis* n. sp.  
*Diala angustifera* n. sp.
- Station 11 (1100 m. SW. of Taikwa): coll. Mr. S. ANDÔ.
- Cadulus* (?) sp. indet.  
*Dentalium byorituense* n. sp.  
*Dentalium philippinarum* SOWERBY.  
*Cancellaria reeveana* CROSSE.  
*Diala angustifera* n. sp.  
*Eunaticina papilla* (GMELIN).  
*Mitra sphaerulata* "MARTYN".
- Nassarius gemmulatus* (LAMARCK).  
*Polinices columnalis* (RECLUZ).  
*Polinices melanostoma* (GMELIN).  
*Siphonalia cassidariaeformis* (REEVE).  
*Siphonalia stearnsii* PILSBRY.  
*Strombus taiwanicus* n. sp.
28. Tyû-tûsyôwan, Tûsyô-syô, Byôritu-gun, ditto (同 苗栗郡通霄庄中通霄灣).  
 Station 47: coll. Mr. S. ANDÔ.
- Clavus taiwanensis* n. sp.  
*Nassarius* sp. indet.  
*Strombus taiwanicus* n. sp.
- Turritella fliola* YOKOYAMA.  
*Vexillum gembacanum* (MARTIN).  
*Xenophora exuta* (REEVE).

## Station 48: coll. Mr. S. ANDÔ.

*Mitra rutila* A. ADAMS?*Mitra sphaerulata* "MARTYN".*Ringicula arctata* GOULD.*Turritella filiola* YOKOYAMA.

## Station 49 (1500 m. E. of Tyû-tûsyôwan): coll. Mr. S. ANDÔ.

*"Latirus" minutisquamosus* (REEVE).

## 29. Wangwa, Kôryû-syô, Tikunan-gun, ditto (同竹南郡後龍庄灣瓦).

## Station 1: coll. Mr. S. ANDÔ.

*Lemintina javana* (MARTIN).*Murex?* sp. indet.*Nassarius gemmulatus* (LAMARCK).

## Station 4: coll. Mr. S. ANDÔ.

*Nassarius gemmulatus* (LAMARCK).*Natica rufa* BORN.*Strombus taiwanicus* n. sp.

## Station 5: coll. Mr. S. ANDÔ.

*Bursa subgranosa* (BECK).*Clavatula taiwanensis* n. sp.*Clavus flavidulus* (LAMARCK).*Clavus pseudoprincipalis* (YOKOYAMA).*Heliacus dorsuosus* (HINDS).*Monodonta labio* (LINNAEUS).*Nassarius caelatus* (A. ADAMS).*Nassarius gemmulatus* (LAMARCK).*Thais problematica* (BAKER).*Turbo granulatus* GMELIN.*Turricula byorituenensis* n. sp.*Turris oxytropis* (SOWERBY).*Turritella filiola* YOKOYAMA.

## Station 6: coll. Mr. S. ANDÔ.

*Dentalium hexagonum* GOULD.*Dentalium philippinarum* SOWERBY.*Astenostoma epitonica* (FISCHER).*Bursa subgranosa* (BECK).*Clavus flavidulus* (LAMARCK).*Clavus pernodiliratus* n. sp.*Clavus pseudohumilis* n. sp.*Clavus pseudoprincipalis* (YOKOYAMA).*Conus aculeiformis* REEVE.*Crepidula walshi* REEVE.*Cyellene concinna* SOLANDER.*Cyellene lugubris* A. ADAMS.*Cyellene pulchella* ADAMS and REEVE.*Fusinus nodosoplicatus* (DUNKER).*Heliacus asperus* (HINDS).*Nassarius caelatus* (A. ADAMS).*Nassarius gemmulatus* (LAMARCK).*Natica vitellus* (LINNAEUS).*Natica zebra* LAMARCK.*Olivella pulicaria* (MARRATT).*Phalium areolum* (LINNAEUS).*Polinices columnalis* (RECLUZ).*Polinices melanostoma* (GMELIN).*Pyrene yabei* n. sp.*Rapana bezoar* (LINNAEUS).*Siphonalia cassidariaeformis* (REEVE).*Siphonalia stearnsii* PILSBRY.*Strombus taiwanicus* n. sp.*Terebra cumingii* DESHAYES.*Terebra evoluta* DESHAYES.*Terebra torquata* ADAMS and REEVE.*Turricula byorituenensis* n. sp.*Turris oxytropis* (SOWERBY).*Turris polytropa* (HELBLING).*Turritella filiola* YOKOYAMA.

## Station 7: coll. Mr. S. ANDÔ.

*Lemintina javana* (MARTIN).*Nassarius gemmulatus* (LAMARCK).*Turcica elisa* (GOULD).

## Station 8: coll. Mr. S. ANDÔ.

*Dentalium byorituense* n. sp.  
*Clavus pseudohumilis* n. sp.  
*Cythara hiradoensis* (MAKIYAMA).  
*Lienardia fortilirata* (SMITH).  
*Nassarius* sp. indet.  
*Natica ala-papilionis* GMELIN.

*Olivella spretoides* YOKOYAMA.  
*Pyrene yabei* n. sp.  
*Tibia formosana* (YOKOYAMA).  
*Turcica elisa* (GOULD).  
*Turritella filiola* YOKOYAMA.

## Station 9: coll. Mr. S. ANDÔ.

*Dentalium hungerfordi* PILSBRY and SHARP.  
*Lemintina javana* (MARTIN).  
*Murex tribulus* LINNAEUS.  
*Nassarius gemmulatus* (LAMARCK).

*Strombus taiwanicus* n. sp.  
*Turcica elisa* (GOULD).  
*Turris oxytropis* (SOWERBY).  
*Turris polytropa* (HELBLING).

## Station 10: coll. Mr. S. ANDÔ.

*Diala angustifera* n. sp.  
*Lataxiena fimbriata* (HINDS).

*Murex tribulus* LINNAEUS.  
*Nassarius gemmulatus* (LAMARCK).

## Station 11: coll. Mr. S. ANDÔ.

*Clavus flavidulus* (LAMARCK).  
*Clavus pseudohumilis* n. sp.  
*Conus aculeiformis* REEVE.  
*Lemintina javana* (MARTIN).  
*Nassarius gemmulatus* (LAMARCK).

*Oliva mustellina* LAMARCK.  
*Polinices melanostoma* (GMELIN).  
*Siliquaria cumingii* MORCH.  
*Turris polytropa* (HELBLING).  
*Turritella filiola* YOKOYAMA.

## Station 12: coll. Mr. S. ANDÔ.

*Bursa subgranosa* (BECK).  
*Clavus pseudoprincipalis* (YOKOYAMA).  
*Cypraea* sp. indet. (2).  
*Lemintina* (?) sp. indet.  
*Mitra sphaerulata* "MARTYN".  
*Nassarius gemmulatus* (LAMARCK).

*Phalium japonicum* (REEVE).  
*Strombus taiwanicus* n. sp.  
*Turris oxytropis* (SOWERBY).  
*Turris polytropa* (HELBLING).  
*Turritella filiola* YOKOYAMA.

## Station 13: coll. Mr. S. ANDÔ.

*Dentalium* sp. indet. (1).  
*Architectonica maxima* (PHILIPPI).  
*Bursa subgranosa* (BECK).  
*Conus vexillum* GMELIN.  
*Lemintina javana* (MARTIN).

*Nassarius gemmulatus* (LAMARCK).  
*Phalium areolum* (LINNAEUS).  
*Polinices columnalis* (RECLUZ).  
*Strombus taiwanicus* n. sp.  
*Turritella filiola* YOKOYAMA.

## Station 14: coll. Mr. S. ANDÔ.

*Dentalium byorituense* n. sp.  
*Architectonica maxima* (PHILIPPI).  
*Architectonica perspectiva* (LINNAEUS).  
*Atys* sp. indet.  
*Bursa subgranosa* (BECK).  
*Calliostoma cecillei* (PHILIPPI).  
*Clavus flavidulus* (LAMARCK).  
*Clavus nodifera* (SMITH).  
*Clavus pseudoprincipalis* (YOKOYAMA).

*Conus djurienensis* MARTIN.  
*Cylichna sibaensis* YAMAKAWA.  
*Cymatium andoi* n. sp.  
*Diala angustifera* n. sp.  
*Lataxiena tuliana* (MARTIN).  
*Lemintina javana* (MARTIN).  
*Mitra sphaerulata* "MARTYN".  
*Murex rarispina* LAMARCK.  
*Murex sinensis* REEVE.

*Nassarius caelatus* (A. ADAMS).  
*Nassarius gemmulatus* (LAMARCK).  
*Odostomia limpida* DALL and BARTSCH.  
*Persicula bernardii* (LARGILLIER).  
*Phalium areolum* (LINNAEUS).  
*Pollia obliquicostata* (REEVE).  
*Pyrene baculus* (REEVE).  
*Pyrene yabei* n. sp.  
*Ringicula caron* HINDS.  
*Strombus taiwanicus* n. sp.  
*Terebra cumingii* DESHAYES.

*Terebra dussumieri* KIENER.  
*Terebra orthocostulata* n. sp.  
*Terebra torquata* ADAMS and REEVE.  
*Turricula byorituensis* n. sp.  
*Turris granosa* (HELBLING).  
*Turris oxytropis* (SOWERBY).  
*Turris polytropa* (HELBLING).  
*Turris tigrinaeformis* n. sp.  
*Turritella filiola* YOKOYAMA.  
*Vexillum gambacanum* (MARTIN).  
*Volvula acuminata* (BRUGUIÈRE).

## Station 15: coll. Mr. S. ANDÔ.

*Dentalium hexagonum* GOULD.  
*Dentalium philippinarum* SOWERBY.  
*Anachis* sp. indet.  
*Architectonica perspectiva* (LINNAEUS).  
*Bursa subgranosa* (BECK).  
*Calliostoma semigranatum* n. sp.  
*Cancellaria reeveana* CROSSE.  
*Clavatula serana* FISCHER.  
*Clavatula taiwanensis* n. sp.  
*Clavus flavidulus* (LAMARCK).  
*Clavus nodilirata* (SMITH).  
*Clavus pseudoprincipalis* (YOKOYAMA).  
*Cyllene lugubris* A. ADAMS.  
*Cythara hiradoensis* (MAKIYAMA).

*Diala angustifera* n. sp.  
*Fusinus laticanaliculatus* n. sp.  
*Heliacus dorsuosus* (HINDS).  
*Hemifusus pastinaca* (REEVE)?  
*Nassarius gemmulatus* (LAMARCK).  
*Phalium cancellianum* n. sp.  
*Polinices columnalis* (RECLUZ).  
*Pyrene yabei* n. sp.  
*Terebra prototextilis* n. sp.  
*Turris oxytropis* (SOWERBY).  
*Turris tigrinaeformis* n. sp.  
*Turritella filiola* YOKOYAMA.  
*Xenophora exuta* (REEVE).

## Station 16: coll. Mr. S. ANDÔ.

*Dentalium philippinarum* SOWERBY.  
*Bursa subgranosa* (BECK).  
*Cancellaria reeveana* CROSSE.  
*Clavus flavidulus* (LAMARCK).  
*Cypraea miliaris* GMELIN.  
*Fusinus nodosoplicatus* (DUNKER).  
*Lemintina javana* (MARTIN).  
*Nassarius caelatus* (A. ADAMS).  
*Nassarius gemmulatus* (LAMARCK).  
*Phalium areolum* (LINNAEUS).

*Phalium cancellianum* n. sp.  
*Polinices columnalis* (RECLUZ).  
*Polinices melanostoma* (GMELIN).  
*Strombus taiwanicus* n. sp.  
*Tibia formosana* (YOKOYAMA).  
*Turcica elisa* (GOULD).  
*Turricula byorituensis* n. sp.  
*Turris oxytropis* (SOWERBY).  
*Turris polytropa* (HELBLING).

## Station 17: coll. Mr. S. ANDÔ.

*Architectonica maxima* (PHILIPPI).  
*Bursa subgranosa* (BECK).  
*Cerithidea cingulata* (GMELIN).  
*Cerithidea morchi* A. ADAMS.  
*Clavus flavidulus* (LAMARCK).  
*Clavus pseudohumilis* n. sp.  
*Clavus pseudoprincipalis* (YOKOYAMA).  
*Cyllene lugubris* A. ADAMS.  
*Fusinus nodosoplicatus* (DUNKER).  
*Hemifusus colosseus* (LAMARCK).  
*Lienardia fortilirata* (SMITH).  
*Nassarius gemmulatus* (LAMARCK).

*Natica rufa* BORN.  
*Olivella spretoides* YOKOYAMA.  
*Polinices didyma* (BOLTEN).  
*Pyrene yabei* n. sp.  
*Rapana bezoar* (LINNAEUS).  
*Retusa cucurbitina* YOKOYAMA.  
*Strombus taiwanicus* n. sp.  
*Turricula byorituensis* n. sp.  
*Turris oxytropis* (SOWERBY).  
*Turritella filiola* YOKOYAMA.  
*Xenophora exuta* (REEVE).

## Station 18: coll. Mr. S. ANDÔ.

*Cadulus wangwaensis* n. sp.  
*Dentalium philippinarum* SOWERBY.  
*Dentalium subrectum* JEFFREYS.  
*Acteocina fusiformis* (A. ADAMS).  
*Clavus hanzawai* n. sp.  
*Cylichna* sp. indet.  
*Diala angustifera* n. sp.  
*Melanoides tuberculata* (MÜLLER).

*Nassarius* sp. indet.  
*Olivella spretooides* YOKOYAMA.  
*Pyrene yabei* n. sp.  
*Ringicula arctata* GOULD.  
*Strombus taiwanicus* n. sp.  
*Turbonilla* sp. indet.  
*Turritella fliola* YOKOYAMA.  
*Turritella* sp. indet.

## Station 19: coll. Mr. S. ANDÔ.

*Dentalium byorituense* n. sp.  
*Dentalium hungerfordi* PILSBRY and SHARP.  
*Dentalium subrectum* JEFFREYS.  
*Architectonica perspectiva* (LINNAEUS).  
*Bursa subgranosa* (BECK).  
*Cantharus wangwaensis* n. sp.  
*Clavus flavidulus* (LAMARCK).  
*Crepidula walshi* REEVE.  
*Diala angustifera* n. sp.  
*Fusinus nodosoplicatus* (DUNKER).  
*Lataxiena luliana* (MARTIN).

*Lemintina javana* (MARTIN).  
*Murex tribulus* LINNAEUS.  
*Nassarius gemmulatus* (LAMARCK).  
*Natica rufa* BORN.  
*Natica vitellus* (LINNAEUS).  
*Pyrene yabei* n. sp.  
*Strombus taiwanicus* n. sp.  
*Tonna zonata* (GREEN).  
*Turricula byorituensis* n. sp.  
*Turris oxytropis* (SOWERBY).  
*Turritella fliola* YOKOYAMA.

## Station 20: coll. Mr. S. ANDÔ.

*Conus odengensis* MARTIN.

## Station 21: coll. Mr. S. ANDÔ.

*Architectonica perspectiva* (LINNAEUS).  
*Bursa subgranosa* (BECK).  
*Conus djarianensis* MARTIN.  
*Diala angustifera* n. sp.  
*Nassarius caelatus* (A. ADAMS).

*Nassarius gemmulatus* (LAMARCK).  
*Natica rufa* BORN.  
*Odotomia limpida* DALL and BARTSCH.  
*Turris oxytropis* (SOWERBY).  
*Turritella fliola* YOKOYAMA.

## Station 22: coll. Mr. S. ANDÔ.

*Fusinus nodosoplicatus* (DUNKER).  
*Rapana bezoar* (LINNAEUS).

*Strombus taiwanicus* n. sp.  
*Turricula byorituensis* n. sp.

## Station 23: coll. Mr. S. ANDÔ.

*Bursa subgranosa* (BECK).  
*Cantharus wangwaensis* n. sp.  
*Clavus flavidulus* (LAMARCK).  
*Clavus pseudoprincipalis* (YOKOYAMA).  
*Conus djarianensis* MARTIN.  
*Cylichna koryusyoensis* n. sp.  
*Diala angustifera* n. sp.  
*Lemintina javana* (MARTIN).  
*Lienardia fortilirata* (SMITH).  
*Murex rarispina* LAMARCK.  
*Nassarius caelatus* (A. ADAMS).  
*Nassarius eximius* (A. ADAMS).  
*Nassarius gemmulatus* (LAMARCK).  
*Natica vitellus* (LINNAEUS).

*Persicula bernardii* (LARGILLIER).  
*Pyrene baculus* (REEVE).  
*Rapana bezoar* (LINNAEUS).  
*Siliquaria cumingii* MÖRCH.  
*Strombus taiwanicus* n. sp.  
*Triphora corrugata* (HINDS).  
*Turricula byorituensis* n. sp.  
*Turris oxytropis* (SOWERBY).  
*Turris polytropia* (HELBLING).  
*Turris tigrinaeformis* n. sp.  
*Turritella fliola* YOKOYAMA.  
*Typhis duplicatus* SOWERBY.  
*Vexillum gembacanum* (MARTIN).

## Station 24: coll. Mr. S. ANDÔ.

*Dentalium byorituense* n. sp.  
*Dentalium subrectum* JEFFREYS.  
*Dentalium vernelei* SOWERBY.  
*Dentalium* sp. indet. (1).  
*Architectonica maxima* (PHILIPPI).  
*Bursa subgranosa* (BECK).  
*Clavus pseudoprincipalis* (YOKOYAMA).  
*Conus aculeiformis* REEVE.  
*Conus bonus* n. sp.  
*Conus djarianensis* MARTIN.  
*Conus ngavianus* MARTIN.  
*Conus ornatisimus* MARTIN.  
*Conus significatus* n. sp.  
*Conus pseudosulcatus* n. sp.  
*Cypraea onyx* LINNAEUS.  
*Diala angustifera* n. sp.  
*Fulgoraria rupestris* (GMELIN).  
*Fusinus nodosoplicatus* (DUNKER).  
*Hipponyx danieli* CROSSE.  
*Lataxiena luliana* (MARTIN).  
*Latiaxis yabei* n. sp.  
*Latrunculus lamarecki* n. sp.  
*Lemintina javana* (MARTIN).  
*Mitra flammea* QUOY.

*Mitra sphaerulata* "MARTYN".  
*Murex rarispina* LAMARCK?  
*Nassarius caelatus* (A. ADAMS).  
*Nassarius gemmulatus* (LAMARCK).  
*Natica andoi* n. sp.  
*Oliva mustellina* LAMARCK.  
*Olivella spretooides* YOKOYAMA.  
*Phalium japonicum* (REEVE).  
*Polinices columnalis* (RECLUZ).  
*Pyrene baculus* (REEVE).  
*Pyrene yabei* n. sp.  
*Sinum neritoideum* (LINNAEUS).  
*Siphonalia spadicea* (REEVE).  
*Terebra orthocostulata* n. sp.  
*Terebra reticostaeformis* n. sp.  
*Trophon?* sp. indet.  
*Turricula byorituensis* n. sp.  
*Turricula sobrina* (YOKOYAMA).  
*Turricula wangwana* n. sp.  
*Turris oxytropis* (SOWERBY).  
*Turris tigrinaeformis* n. sp.  
*Turritella filiola* YOKOYAMA.  
*Typhis duplicatus* SOWERBY.

## Station 25: coll. Mr. S. ANDÔ.

*Dentalium byorituense* n. sp.  
*Bursa subgranosa* (BECK).  
*Lemintina javana* (MARTIN).

*Nassarius gemmulatus* (LAMARCK).  
*Strombus taiwanicus* n. sp.  
*Turcica elisa* (GOULD).

## Station 26: coll. Mr. S. ANDÔ.

*Conus aculeiformis* REEVE.  
*Heliacus taiwanicus* (YOKOYAMA).  
*Nassarius caelatus* (A. ADAMS)?  
*Oliva mustellina* LAMARCK.

*Phalium cancellianum* n. sp.  
*Turricula byorituensis* n. sp.  
*Turris oxytropis* (SOWERBY).  
*Umbonium moniliferum* (LAMARCK).

## Station 27: coll. Mr. S. ANDÔ.

*Dentalium hexagonum* GOULD.  
*Clavatula serana* FISCHER.  
*Clavus flavidulus* (LAMARCK).  
*Clavus pseudoprincipalis* (YOKOYAMA).  
*Conus aculeiformis* REEVE.  
*Diala angustifera* n. sp.

*Murex tribulus* LINNAEUS.  
*Nassarius caelatus* (A. ADAMS).  
*Polinices didyma* (BOLTEN).  
*Turricula byorituensis* n. sp.  
*Turris polytropa* (HEBLING).  
*Turritella filiola* YOKOYAMA.

## Station 31: coll. Mr. S. ANDÔ.

*Gourmya carbonaria* (PHILIPPI).  
*Monodonta labio* (LINNAEUS).  
*Nerita chamaeleon* LINNAEUS.

*Tegula pfeifferi* (PHILIPPI).  
*Thais luteostoma* (DILLWYN).  
*Turbo granulatus* GMELIN.

## Station 32: coll. Mr. S. ANDÔ.

*Dentalium byorituense* n. sp.  
*Fusinus nodosoplicatus* (DUNKER).  
*Lataxiena luliana* (MARTIN).  
*Lemintina javana* (MARTIN).  
*Olivella spretoides* YOKOYAMA.

*Strombus taiwanicus* n. sp.  
*Terebra dussumieri* KIENER.  
*Terebra orthocostulata* n. sp.  
*Turricula byorituensis* n. sp.  
*Turris oxytropis* (SOWERBY).

## Station 33: coll. Mr. S. ANDÔ.

*Dentalium byorituense* n. sp.  
*Dentalium vernelei* SOWERBY.  
*Architectonica perspectiva* (LINNAEUS).  
*Astenostoma epitonica* (FISCHER).  
*Bursa subgranosa* (BECK).  
*Cancellaria reeveana* CROSSE.  
*Clavus flavidulus* (LAMARCK).  
*Conus aculeiformis* REEVE.  
*Conus bonus* n. sp.  
*Conus djarianensis* MARTIN.  
*Conus ornatissimus* MARTIN.  
*Fulgoraria rupestris* (GMELIN).  
*Lataxiena luliana* (MARTIN).  
*Mitra yokoyamai* n. sp.

*Nassaria monospina* n. sp.  
*Nassarius caelatus* (A. ADAMS).  
*Nassarius gemmulatus* (LAMARCK).  
*Natica ala-papilionis* (BOLTEN).  
*Polinices columnalis* (RECLUZ).  
*Siphonalia spadicea* (REEVE).  
*Siphonalia stearnsii* PILSBRY.  
*Terebra reticostaeformis* n. sp.  
*Turcica elisa* (GOULD).  
*Turris granosa* (HELBLING).  
*Turris oxytropis* (SOWERBY).  
*Turris tigrinaeformis* n. sp.  
*Volva volva* (LINNAEUS).

## Station 34: coll. Mr. S. ANDÔ.

*Conus pseudosulcatus* n. sp.  
*Nassarius gemmulatus* (LAMARCK).

*Turris oxytropis* (SOWERBY).  
*Turris polytropa* (HELBLING).

## Station 35: coll. Mr. S. ANDÔ.

*Dentalium byorituense* n. sp.  
*Bursa subgranosa* (BECK).  
*Clavatula taiwanensis* n. sp.  
*Clavus flavidulus* (LAMARCK).  
*Clavus pseudohumilis* n. sp.  
*Clavus pseudoprincipalis* (YOKOYAMA).  
*Lataxiena luliana* (MARTIN).  
*Mitra flammea* QUOY.  
*Nassarius caelatus* (A. ADAMS).

*Nassarius gemmulatus* (LAMARCK).  
*Siphonalia spadicea* (REEVE).  
*Strombus taiwanicus* n. sp.  
*Terebra dussumieri* KIENER.  
*Turricula byorituensis* n. sp.  
*Turris oxytropis* (SOWERBY).  
*Turris polytropa* (HELBLING).  
*Turritella filiola* YOKOYAMA.

## Station 37: coll. Mr. S. ANDÔ.

*Dentalium hexagonum* GOULD.  
*Clavus pseudohumilis* n. sp.  
*Clavus pseudoprincipalis* (YOKOYAMA).  
*Conus aculeiformis* REEVE.  
*Hemifusus colosseus* (LAMARCK).  
*Nassarius caelatus* (A. ADAMS).  
*Nassarius* sp. indet.

*Retusa cucurbitiana* YOKOYAMA.  
*Retusa minima* YAMAKAWA.  
*Terebra t-makiyamai* n. sp.  
*Tonna zonata* (GREEN).  
*Turris oxytropis* (SOWERBY).  
*Turris polytropa* (HELBLING).

## Station 38: coll. Mr. S. ANDÔ.

*Nassarius caelatus* (A. ADAMS).  
*Natica rufa* BORN.  
*Olivella spretoides* YOKOYAMA.

*Terebra torquata* ADAMS and REEVE.  
*Turritella filiola* YOKOYAMA.



Station 39: coll. Mr. S. ANDÔ.

- |                                       |                                     |
|---------------------------------------|-------------------------------------|
| <i>Cancellaria reeveana</i> CROSSE.   | <i>Turris oxytropis</i> (SOWERBY).  |
| <i>Clavus flavidulus</i> (LAMARCK).   | <i>Turris polytropa</i> (HEBELING). |
| <i>Phalium decussatum</i> (LINNAEUS). | <i>Turritella fliola</i> YOKOYAMA.  |
| <i>Siphonalia stearnsii</i> PILSBRY.  |                                     |

Station 40: coll. Mr. S. ANDÔ.

- |   |                                       |
|---|---------------------------------------|
| <i>Architectonica maxima</i> (PHILIPPI).    | <i>Natica solida</i> BLAINVILLE.      |
| <i>Bittium alutaceum</i> (GOULD).           | <i>Olivella pulicaria</i> (MARRATT).  |
| <i>Bursa subgranosa</i> (BECK).             | <i>Polinices columnalis</i> (RECLUZ). |
| <i>Calliostoma semigranatum</i> n. sp.      | <i>Pyrene yabei</i> n. sp.            |
| <i>Clavus pseudoprincipalis</i> (YOKOYAMA). | <i>Ringicula caron</i> HINDS.         |
| <i>Conus d'orbigny</i> (AUDOUIN).           | <i>Sinum neritoidium</i> (LINNAEUS).  |
| <i>Cylichna musashiensis</i> TOKUNAGA.      | <i>Strombus taiwanicus</i> n. sp.     |
| <i>Fulgoraria rupestris</i> (GMELIN).       | <i>Terebra dussumieri</i> KIENER.     |
| <i>Murex sinensis</i> REEVE.                | <i>Tibia fusus</i> (LINNAEUS).        |
| <i>Murex tribulus</i> LINNAEUS.             | <i>Turris oxytropis</i> (SOWERBY).    |
| <i>Nassarius caelatus</i> (A. ADAMS).       | <i>Turritella fliola</i> YOKOYAMA.    |
| <i>Nassarius gemmulatus</i> (LAMARCK).      | <i>Vexillum gembacanum</i> (MARTIN).  |
| <i>Natica ala-papilionis</i> (BOLTEN).      |                                       |

Station (?): coll. Mr. S. ANDÔ.

- Strombus* sp. indet.

30. Wanzaki, Kwanbyô-syô, Niitoyo-gun, Tainan-syû (臺南州新豐郡關廟庄灣崎).

Station 55: coll. Mr. J. TORII.

- |  |  |
|--|--|
| <i>Batillaria zonalis</i> (BRUGUIÈRE). | <i>Terebralia semitrisulcata</i> (BOLTEN). |
| <i>Cerithidea cingulata</i> (GMELIN).  |  |

31. Zyô-tusyôwan, Tûsyô-syô, Byôritu-gun, Sintiku-syû (新竹州苗栗郡通霄庄上通霄灣).

Station 4 (300 m. E. of Hakusyatou): coll. Messrs. S. HANZAWA and S. ANDÔ.

- |   |  |
|---|--|
| <i>Bursa subgranosa</i> (BECK).             | <i>Nassarius gemmulatus</i> (LAMARCK).   |
| <i>Cerithium kochi</i> PHILIPPI.            | <i>Natica vitellus</i> (LINNAEUS).       |
| <i>Clavatula taiwanensis</i> n. sp.         | <i>Persicula bernardii</i> (LARGILLIER). |
| <i>Clavus pseudoprincipalis</i> (YOKOYAMA). | <i>Tibia formosana</i> (YOKOYAMA)?       |
| <i>Conus djarianensis</i> MARTIN.           | <i>Turris oxytropis</i> (SOWERBY).       |
| <i>Conus odengensis</i> MARTIN.             | <i>Turris tigrinaeformis</i> n. sp.      |
| <i>Lataxiena luliana</i> (MARTIN).          | <i>Vexillum gembacanum</i> (MARTIN).     |
| <i>Mangelia perparva</i> (YOKOYAMA).        |  |

Station 6 (400 m. SE. of Zyô-tusyôwan): coll. Mr. S. ANDÔ.

- Natica rufa* BORN.

Station 13 (400 m. SE. of Zyô-tusyôwan): coll. Mr. S. ANDÔ.

- |   |                                     |
|---|-------------------------------------|
| <i>Architectonica perspectiva</i> (LINNAEUS). | <i>Conus yabei</i> n. sp.           |
| <i>Bursa subgranosa</i> (BECK).               | <i>Cyllene lugubris</i> A. ADAMS.   |
| <i>Clavus crassitestulatus</i> n. sp.         | <i>Cymatium sinense</i> (REEVE).    |
| <i>Clavus pseudoprincipalis</i> (YOKOYAMA).   | <i>Cypraea miliaris</i> GMELIN.     |
| <i>Conus djarianensis</i> MARTIN.             | <i>Diala angustifera</i> n. sp.     |
| <i>Conus odengensis</i> MARTIN.               | <i>Distorsio reticulata</i> (LINK). |

- Fusinus gracillimus* (ADAMS and REEVE).  
*Hydatina* (?) sp. indet.  
*Lataxiena luliana* (MARTIN).  
*Lemintina javana* (MARTIN).  
*Lienardia hayasakai* n. sp.  
*Melanella candida* (MARRATT).  
*Mitra pruinosa* REEVE?  
*Mitra sphaerulata* "MARTYN".  
*Nassaria monospina* n. sp.  
*Nassarius caelatus* (A. ADAMS).  
*Oliva mustellina* LAMARCK.
- Persicula bernardii* (LARGILLIER).  
*Polinices columnalis* (RECLUZ).  
*Pyrene yabei* n. sp.  
*Ringicula caron* HINDS.  
*Rissoina formosana* n. sp.  
*Strombus taiwanicus* n. sp.  
*Turricula byorituensis* n. sp.  
*Turris oxytropis* (SOWERBY).  
*Turris polytropa* (HELBLING).  
*Turris tigrinaeformis* n. sp.  
*Turritella filiola* YOKOYAMA.

## Station 14 (500 m. SE. of Zyô-tûsyôwan) : coll. Mr. S. ANDÔ.

- Cadulus wanguaensis* n. sp.  
*Dentalium hexagonum* GOULD.  
*Dentalium philippinarum* SOWERBY.  
*Dentalium subrectum* JEFFREYS.  
*Bursa subgranosa* (BECK).  
*Cancellaria spengleriana* DESHAYES.  
*Clavus flavidulus* (LAMARCK).  
*Clavus pseudohumilis* n. sp.  
*Clavus pseudoprincipalis* (YOKOYAMA).  
*Conus djarianensis* MARTIN.  
*Conus odengensis* MARTIN.  
*Diala angustifera* n. sp.  
*Lataxiena luliana* (MARTIN).  
*Lienardia ginesi* (PILSBRY).  
*Melanella tortuosa* (ADAMS and REEVE).  
*Murex tribulus* LINNAEUS.  
*Nassarius caelatus* (A. ADAMS).  
*Nassarius gemmulatus* (LAMARCK).  
*Natica ala-papilionis* (BOLTEN).
- Natica rufa* BORN.  
*Natica vitellus* (LINNAEUS).  
*Oliva mustellina* LAMARCK.  
*Olivella pulicaria* (MARRATT).  
*Olivella spretoides* YOKOYAMA.  
*Phalium areolum* (LINNAEUS).  
*Polinices didyma* (BOLTEN).  
*Pyrene niveomarginata* (SMITH).  
*Rapana bezoar* (LINNAEUS).  
*Ringicula arctata* GOULD.  
*Strombus taiwanicus* n. sp.  
*Terebra orthocostulata* n. sp.  
*Theodoxus sowerbianus* (RECLUZ).  
*Tibia formosana* (YOKOYAMA).  
*Turricula byorituensis* n. sp.  
*Turritella filiola* YOKOYAMA.  
*Typhis duplicatus* SOWERBY.  
*Xenophora exuta* (REEVE).

## Station 15 (510 m. SE. of Zyô-tûsyôwan) : coll. Mr. S. ANDÔ.

- Dentalium hexagonum* GOULD.  
*Dentalium pretiosum* SOWERBY.  
*Bursa subgranosa* (BECK).  
*Cantharus wanguaensis* n. sp.  
*Clavus flavidulus* (LAMARCK).  
*Clavus pseudoprincipalis* (YOKOYAMA).  
*Conus aculeiformis* REEVE.  
*Cyllene lugubris* A. ADAMS.  
*Heliacus asperus* (HINDS).  
*Mitra astenostomoides* n. sp.  
*Mitra sphaerulata* "MATYN".  
*Murex sinensis* REEVE.
- Nassarius caelatus* (A. ADAMS).  
*Nassarius gemmulatus* (LAMARCK).  
*Natica ala-papilionis* (BOLTEN).  
*Natica rufa* BORN.  
*Olivella spretoides* YOKOYAMA.  
*Polinices melanostoma* (GMELIN).  
*Terebra evoluta* DESHAYES.  
*Turricula byorituensis* n. sp.  
*Turris oxytropis* (SOWERBY).  
*Turris polytropa* (HELBLING).  
*Turritella filiola* YOKOYAMA.

## Station 16 (550 m. SE. of Zyô-tûsyôwan) : coll. Mr. S. ANDÔ.

- Bursa subgranosa* (BECK).  
*Clavus flavidulus* (LAMARCK).  
*Clavus pseudoprincipalis* (YOKOYAMA).  
*Conus aculeiformis* REEVE.  
*Fusinus nodosoplicatus* (DUNKER).
- Lataxiena luliana* (MARTIN).  
 "Melania" saigoï YOKOYAMA.  
*Nassarius caelatus* (A. ADAMS).  
*Nassarius gemmulatus* (LAMARCK).  
*Natica rufa* BORN.

<i>Niso brunnea</i> (SOWERBY).	<i>Strombus taiwanicus</i> n. sp.
<i>Rapana bezoar</i> (LINNAEUS).	<i>Terebra dussumieri</i> KIENER.
<i>Simum neritoideum</i> (LINNAEUS).	<i>Turricula byorituensis</i> n. sp.
<i>Siphonalia cassidariaeformis</i> (REEVE).	<i>Turris oxytropis</i> (SOWERBY).
<i>Siphonalia spadicea</i> (REEVE).	<i>Vexillum gembacanum</i> (MARTIN).

Station 17 (600 m. SE. of Zyô-tûsyôwan): coll. Mr. S. ANDÔ.

<i>Dentalium byorituense</i> n. sp.	<i>Nassarius gemmulatus</i> (LAMARCK).
<i>Astenostoma vertebrata</i> (SMITH).	<i>Siphonalia cassidariaeformis</i> (REEVE).
<i>Bursa subgranosa</i> (BECK).	<i>Strombus taiwanicus</i> n. sp.
<i>Cerithium kochi</i> PHILIPPI.	<i>Turricula byorituensis</i> n. sp.
<i>Clavus flavidulus</i> (LAMARCK).	<i>Turris oxytropis</i> (SOWERBY).
" <i>Latirus</i> " <i>minutisquamosus</i> (REEVE).	<i>Vexillum gembacanum</i> (MARTIN).
<i>Nassarius caelatus</i> (A. ADAMS).	

Station 18 (650 m. SE. of Zyô-tûsyôwan): coll. Mr. S. ANDÔ.

*Umbonium moniliferum* (LAMARCK).

Station 36 (1200 m. E. of Zyô-tûsyôwan): coll. Mr. S. ANDÔ.

<i>Dentalium byorituense</i> n. sp.	<i>Lataxiena luliana</i> (MARTIN).
<i>Dentalium hungerfordi</i> PILSBRY and SHARP.	<i>Lataxis yabei</i> n. sp.
<i>Architectonica maxima</i> (PHILIPPI).	" <i>Latirus</i> " <i>minutisquamosus</i> (REEVE).
<i>Architectonica perspectiva</i> (LINNAEUS).	<i>Nassarius gemmulatus</i> (LAMARCK).
<i>Bursa subgranosa</i> (BECK).	<i>Olivella pulcaria</i> (MARRATT).
<i>Clavus flavidulus</i> (LAMARCK).	<i>Olivella spretoides</i> YOKOYAMA.
<i>Clavus pseudohumilis</i> n. sp.	<i>Pyramidella? longicostifera</i> n. sp.
<i>Clavus pseudoprincipalis</i> (YOKOYAMA).	<i>Turris oxytropis</i> (SOWERBY).
<i>Clavus turriculoides</i> n. sp.	<i>Turris polytropha</i> (HELBLING).
<i>Conus aculeiformis</i> REEVE.	<i>Turritella filiola</i> YOKOYAMA.
<i>Conus ornatisimus</i> MARTIN.	

Station 37 (1100 m. E. of Zyô-tûsyôwan): coll. Mr. S. ANDÔ.

*Strombus taiwanicus* n. sp.

Station 58 (580 m. E. of Zyô-tûsyôwan): coll. Mr. S. ANDÔ.

<i>Tonna luteostoma</i> (KÜSTER).	<i>Turris oxytropis</i> (SOWERBY).
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Station 59 (1000 m. E. of Zyô-tûsyôwan): coll. Mr. S. ANDÔ.

<i>Architectonica maxima</i> (PHILIPPI).	<i>Turricula byorituensis</i> n. sp.
<i>Conus odengensis</i> MARTIN.	<i>Vexillum gembacanum</i> (MARTIN).
<i>Murex tribulus</i> LINNAEUS.	

#### (D) Kaizan Beds

1. Arisan, Kagi-gun, Tainan-syû (臺南州嘉義郡阿里山): coll. Mr. Y. ICHIKAWA.

*Tonna melanostoma* (JAY).

2. Dakaho, Denryô-syô, Kizan-gun, Takao-syû (高雄州旗山郡田寮庄打鹿埔): coll. Mr. Y. ICHIKAWA.

*Conus* sp. indet.

## V. DESCRIPTION OF THE SPECIES

Class Scaphopoda

Order Solenoconcha

Family Dentaliidae

Genus *Dentalium* LINNAEUS, 1758Subgenus *Dentalium* s. s.*Dentalium* (*Dentalium*) *hexagonum* GOULD, 1859

*Dentalium* (*Dentalium*) *hexagonum*. PILSBRY and SHARP in TRYON, Man. Conch., 1 Ser., Vol. 17, p. 18, Pl. 2, figs. 20, 21, 23, 24, 1897-8.

*Dentalium octagonum*. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 68, 1928 (in part).

Several six sided, rarely seven sided specimens. Interspaces between ribs wide, more or less concave bottomed and ornamented by unequal threads except for apical or narrower part. The Formosan fossil agrees well with *D. sexcostatum* SOWERBY in essential characters, which is a variety of the present species.

*D. hexagonum* and *D. octangulatum* DONOVAN are perhaps conspecific, but here I treat them provisionally as distinct, until more precise studies are accomplished.

Type locality: China; Recent.

Fossil occurrence: Byôritu Beds.—300 m. E. of Hakusyatou: station 1; Reg. No. 37436. 700 m. E. of Hakusyatou: station 3; Reg. No. 54425. 1000 m. NW. of Rinsuikwa: station 5; Reg. No. 52431. 500 m. SW. of Dainankwa: station 5; Reg. No. 37443. 900 m. NW. of Rinsuikwa: station 6; Reg. No. 52426. Wangwa: station 6; Reg. No. 52399. Bôsiho: station 13; Reg. No. 52397. 1450 m. W. of Hokkô: station 14; Reg. No. 52429. 500 m. SE. of Zyô-tûsyôwan: station 14; Reg. No. 52400. Wangwa: station 15; Reg. No. 52572. 510 m. SE. of Zyô-tûsyôwan: station 15; Reg. No. 52396. 700 m. NE. of Nanseizan: station 19; Reg. No. 52398. 1000 m. E. of Hakusyatou: station 20; Reg. No. 52430. Wangwa: station 28; Reg. No. 52569. 900 m. NW. of Keiyukwa: station 33; Reg. No. 52428. Wangwa: station 37; Reg. No. 52568. 500 m. E. of Sankwakô: station 41; Reg. No. 52432. 300 m. S. of Sankwakô: station 44; Reg. No. 52427. Keiyukwa: station 50; Reg. No. 52395. The upper course of Sairyôkyô; Reg. No. 52595.

Living: Northern Honsyû to Kyûsyû. Japan Sea, China, Singapore.

Geologic distribution: Post-Pleistocene, Pleistocene and Pliocene of Honsyû; Pliocene of Ryûkyû.

*Dentalium* (*Dentalium*) species indet. (1)

A single, somewhat fractured specimen; 18 mm. long.

Shell small, tapering rather rapidly towards apex; test comparatively thick and solid; 10 ribs near apex, prominent, separated by wide, more or less concave-bottomed intervals provided with secondary and tertiary riblets; riblets grow rather rapidly, soon become subequal to main ribs. Aperture apparently simple.

Fossil occurrence: Byôritu Beds.—Wangwa: station 24; Reg. No. 52435.

**Dentalium (Dentalium) species indet. (2)**

A small fragment, about 18 mm. long, with 18 subequal ribs separated by wider interspaces; resembles *D. buccinulum* GOULD of our seas, but apparently more cylindrical.

Fossil occurrence: Byôritu Beds.—900 m. SE. of Naikotô: station 66; Reg. No. 52434.

Subgenus **Antalis** H. and A. ADAMS, 1854

**Dentalium (Antalis) pretiosum** SOWERBY, 1860

*Dentalium pretiosum*. SOWERBY, Thes. Conch., Vol. 3, p. 95, Pl. 225, fig. 57, 1860: SOWERBY in REEVE, Conch. Icon., Vol. 18, Pl. 7, fig. 54, 1872: PILSBRY and SHARP in TRYON, Man. Conch., 1 Ser., Vol. 17, p. 54, Pl. 13, figs. 1-8, 1897-8: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 15, No. 456, 1931.

?*Dentalium nipponicum*. YOKOYAMA, Jour. Coll. Sci. Tôkyô Imp. Univ., Vol. 44, Art. 1, p. 119, Pl. 6, fig. 7, 1922.

Several fragmental specimens. Although none of these smooth, moderately arcuate, rather thin-shelled specimens retain the anal end, they agree well with the named one in dimensions, curvature, and surface features, and are perhaps identical with its so-called southern types which is said to have more persistent axial riblets upon the apical portion than the northern type of North America.

Type locality: Pacific coast of N. America; Recent.

Fossil occurrence: Byôritu Beds.—950 m. SW. of Taikwa: station 10; Reg. No. 52449. 510 m. SE. of Zyô-tûsyôwan: station 15; Reg. No. 52447. 700 m. NE. of Nanseizan: station 19; Reg. No. 52446. 1000 m. E. of Hakusyatou: station 25; Reg. No. 52445. 300 m. E. of Sankwakô: station 39; Reg. No. 52448. On road S. of Bôsiho; Reg. No. 52444. Western side of Syôgun-yama; Reg. No. 37554. The upper course of Sairyôkyô; Reg. No. 52567.

Living: Sitka, Alaska to Lower California, and also in Central Honsyû, Japan. Japan Sea.

Geologic distribution: Pleistocene of Central Honsyû.

Subgenus **Fissidentalium** FISCHER, 1885

**Dentalium (Fissidentalium) vernedei** SOWERBY, 1860

*Dentalium vernedei*. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 68, Pl. 6, fig. 6, 1928.

Several excellently preserved specimens. A part of *D. vernedei* mentioned by Dr. YOKOYAMA from the Tertiary deposits of Taiwan, is perhaps identical with the next species, which is more common. Several measure (in mm.):

	1	2	3
Length .....	140	105	99
Diameter of aperture .	13	11	11

Type locality: China; Recent.

Fossil occurrence: Byôritu Beds.—Wangwa: station 24; Reg. No. 52369. Wangwa: station 33; Reg. No. 52368. 300 m. E. of Sankwakô: station 44; Reg. No. 52371. Sikô; Reg. Nos. 49406, 52576.

Ryûkyû Limestone.—Hanpeizan; Reg. No. 52370.

Living: Western Honsyû and Taiwan. China.

Geologic distribution: Known only from the Pliocene of Taiwan.

### **Dentalium (Fissidentalium) byorituense n. sp.**

Pl. VI (I), Figs. 1a, 1b, 1c.

Shell resembling *D. vernedei* in some respects, rather large, slender, elongated and slightly curved; test thick and solid. About 7–9 narrow, prominent riblets apically, number immediately increasing by intercalation of subequal secondary and tertiary ones to about 40 in middle portion; weaken towards aperture where they are almost indistinct in aged specimens. Interspaces between riblets primarily much wider than riblets, but finally becoming quite reverse. Incremental lines rather fine, almost indistinct, and scarcely visible under lens. Constrictions or annular rings present, especially frequent near apertural portion. Aperture circular in cross-section; anal orifice small, pear-shaped with a short pipe or tubular appendage projecting outwardly; notch triangular, rather shallow, continuous to a short fissure above it, and situated on convex side of shell.

Approximate dimensions (in mm.):

	1	2
Length .....	90.0	95.0
Diameter of aperture .....	8.0	8.5

Numerous specimens are found in the collection, but they are mostly imperfectly preserved. The thickness of the test is seemingly somewhat variable.

Compared with *D. vernedei*, this shell is more slender, a little more slowly enlarging, and has a much shallower anal slit; further, riblets and incremental lines also differ in detail between the two.

*Dentalium subrectum* MARTIN<sup>1)</sup> (not JEFFREYS) from the Neogene of Java is, nearly identical in form and sculpture, and perhaps conspecific with the present fossil, but I hesitate to do this identification definitely, because the apical characters of MARTIN's type specimens are totally unknown. *D. yokoyamai* MAKIYAMA<sup>2)</sup> (= *D. complexum* of YOKOYAMA, not of DALL) is perhaps also a related species.

Fossil occurrence: Byôritu Beds.—1000 m. E. of Hakusyaton: station 4; Reg. No. 52389. Wangwa: station 8; Reg. No. 52376. 1100 m. SW. of Taikwa: station 11; Reg. No. 52383. Wangwa: station 14; Reg. No. 52379. 600 m. SE. of Zyô-tûsyôwan: station 17; Reg. No. 52388. Wangwa: station 19; Reg. No. 52570. 1000 m. E. of Hakusyaton: station 20; Reg. No. 52453. 700 m. SW. of Kôkwan: station 23; Reg. No. 52390. Wangwa: station 24; Reg. No. 52378. Wangwa: station 25; Reg. No. 52574. Wangwa: station 32; Reg. No. 52575. 900 m. NW. of Keiyukwa: station 33; Reg. No. 52380. Wangwa: station 33; Reg. No. 52382. Wangwa: station 35; Reg. No. 52392. 1200 m. E. of Zyô-tûsyôwan: station 36; Reg. No. 52385. 300 m. E. of Sankwakô: station 39; Reg. No. 52381. 500 m. E. of Sankwakô: station 41; Reg. No. 52384. 550 m. E. of Sankwakô: station 43; Reg. No. 52386. 300 m. S. of Sankwakô: station 44; Reg.

1) MARTIN: Tiefb. auf Java, p. 185, pl. 10, figs. 180, 181, 1887.

2) MAKIYAMA: Mem. Coll. Sci. Kyôto Imp. Univ., Ser. B, Vol. 7, No. 1, Art. 1, p. 44, pl. 1, fig. 1, 1931.

No. 52377. 1520 m. E. of Sinpo: station 68; Reg. No. 52387. Hakusyatou; Reg. No. 52391. On road S. of Bôsiho; Reg. No. 37435.

**Dentalium (Fissidentalium) hungerfordi PILSBRY and SHARP, 1898**

*Dentalium (Fissidentalium) hungerfordi*. PILSBRY and SHARP in TRYON, Man. Conch., 1 Ser., Vol. 17, p. 84, Pl. 6, fig. 83, 1897-8: FUJITA, The Venus, Vol. 1, No. 2, p. 64; Vol. 1, No. 3, Pl. 3, fig. 6, 1929: YOKOYAMA, Cat. Mar. Fresh-W. a. Land Shells, Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 15, No. 458, 1931.

The specimens are easily distinguished from the other allied forms by their characteristically compressed shell with elliptical cross-section of apertural portion. The shell enlarges rather rapidly and nearly straight.

Approximate dimensions of a specimen are: Length, 70 mm.; diameter of aperture, 12 mm.

Type locality: China; Recent.

Fossil occurrence: Byôritu Beds.—1000 m. E. of Hakusyatou: station 4; Reg. No. 52373. Wangwa: station 9; Reg. No. 52374. Wangwa: station 19; Reg. Nos. 52571, 52573. 7000 m. SE. of Hakusyatou: station 27; Reg. No. 52372. 1200 m. E. of Zyô-tûsyôwan: station 36; Reg. No. 52375.

Living: Central and Western Honsyû. China.

**Dentalium (Fissidentalium ?) species indet.**

A large fragment resembling *D. vernedei*, but the riblets are more numerous and increase in number by division.

Fossil occurrence: Ryûkyû Limestone.—Hanpeizan; Reg. No. 37596.

**Subgenus Laevidentalium COSSMANN, 1888**

**Dentalium (Laevidentalium ?) species indet. (1)**

A nearly straight and rather thin-shelled *Dentalium*, tapering moderately towards apex; surface entirely smooth except for distinct growth lines. It somewhat resembles *D. coruscum* PILSBRY<sup>1)</sup> from the Japanese waters, but is indeterminable.

Fossil occurrence: Byôritu Beds.—700 m. E. of Hakusyatou: station 3; Reg. No. 52566. Wangwa: station 13; Reg. No. 52442. 1000 m. E. of Hakusyatou: station 25; Reg. No. 52441.

**Dentalium (Laevidentalium ?) species indet. (2)**

Resembling superficially the preceding one, but tapering more gradually; shell is more solid.

Fossil occurrence: Byôritu Beds.—1520 m. E. of Sinpo: station 68; Reg. No. 52443.

1) PILSBRY: Proc. Acad. Nat. Sci. Phila., p. 117, Pl. 5, figs. 42, 43, 1905.

Subgenus **Rhabdus** PILSBRY and SHARP, 1898**Dentalium (Rhabdus) philippinarum** SOWERBY, 1860

Pl. VI (I), Fig. 2.

*Dentalium philippinarum*. SOWERBY, Thes. Conch., Vol. 3, p. 98, Pl. 225, fig. 54, 1860: SOWERBY in REEVE, Conch. Icon., Vol. 18, Pl. 3, fig. 18, 1872: PILSBRY and SHARP in TRYON, Man. Conch., 1 Ser., Vol. 17, p. 116, Pl. 20, figs. 31, 32, 1897-8.

Several rather ill-preserved specimens. Elongate, narrow, smooth and thin-shelled with irregularly spaced ring-like swellings and intermediate impressed lines. The longitudinal striae, which are said to be distinct in the recent specimens from the Philippines, are rather indistinct in the Formosan fossils, perhaps due to being water-worn. *D. gonatodes* MARTIN<sup>1)</sup> is a similar species.

Type locality: The Philippines; Recent.

Fossil occurrence: Byôritu Beds.—E. of Goko: station 8; Reg. No. 37442. 500 m. SE. of Zyô-tûsyôwan: station 14; Reg. No. 52437. Wangwa: station 6; Reg. No. 52439. 1100 m. SW. of Taikwa: station 11; Reg. No. 52440. Wangwa: station 15; Reg. Nos. 52560, 52565. Wangwa: station 16; Reg. No. 52562. Wangwa: station 18; Reg. No. 52561. 1000 m. E. of Haku-syaton: station 25; Reg. No. 52438.

Living: The Philippines.

Subgenus **Episiphon** PILSBRY and SHARP, 1898**Dentalium (Episiphon) subrectum** JEFFREYS 1882

*Dentalium (Episiphon) subrectum*. PILSBRY and SHARP in TRYON, Man. Conch., 1 Ser., Vol. 17, p. 119, Pl. 18, fig. 5, 1897-8 (not of MARTIN).

Several ill-preserved specimens; the longest, 4 mm. in length.

Shell very small, slightly curved, quite smooth and tapering slowly towards apex; test rather thin; cross-sections at both ends circular.

Dr. YOKOYAMA's *D. subrectum* from the Byôritu Beds of Taiwan,<sup>2)</sup> needs confirmation; his figure being insufficient for specific identification of this small shell.

Type locality: The Philippines; Recent.

Fossil occurrence: Byôritu Beds.—500 m. SE. of Zyô-tûsyôwan: station 14; Reg. No. 52433. Wangwa: station 18; Reg. No. 52564. Wangwa: station 19; Reg. No. 52563. Wangwa: station 24; Reg. No. 52596. 550 m. E. of Sankwakô: station 43; Reg. No. 52454.

Living: The Philippines.

1) MARTIN: Tiefb. auf Java, p. 192, Pl. 10, fig. 194, 1887.

2) YOKOYAMA: Imp. Geol. Surv. Jap., Rep. No. 101, p. 69, Pl. 4, fig. 11, 1928.



Family **Siphonodentaliidae**

Genus **Cadulus** PHILIPPI, 1844

**Cadulus wangwaensis**, n. sp.

Pl. VI (I), Fig. 3.

Shell small, slender, slightly curved; test rather thick, solid; cross-section circular; surface quite smooth, polished; no distinct incremental lines; tapering towards apex, and slightly constricted at aperture; anal orifice simple.

Two specimens; the figured one, 8.5 mm. in length, 1.3 mm. in apertural diameter, and about 0.6 mm. in anal one.

This neat shell resembles *C. gordonis* YOKOYAMA, a species first found in the Neogene deposits of the Kwantô region, but it differs from that species in being less contracted anteriorly.

Fossil occurrence: Byôritu Beds.—500 m. SE. of Zyô-tûsyôwan: station 14; Reg. No. 52460. Wangwa: station 18; Reg. No. 52450.

**Cadulus** species indet.

Similar to the preceding in general respects, but more slowly tapering towards apex, constriction at aperture slightly more marked. It may perhaps be nearly identical with *C. gordonis* reported by Dr. YOKOYAMA from the Byôritu Beds of Taiwan; but an accurate naming requires better specimens.

A fragmental specimen; length, 2 mm.

Fossil occurrence: Byôritu Beds.—1100 m. SW. of Taikwa: station 11; Reg. No. 52436.

Class **Gastropoda**

Order **Opisthobranchiata**

Family **Acteonidae**

Genus **Acteon** MONTFORT, 1810

**Acteon siebaldi** (REEVE), 1842

Pl. VI (I), Fig. 5.

*Tornatella siebaldii*. REEVE, Conch. Icon., Vol. 15, Pl. 3, fig. 11, 1865.

*Acteon siebaldii*. PILSBRY in TRYON, Man. Conch., 1 Ser., Vol. 15, p. 148, Pl. 19, figs. 18, 19, 1893: PILSBRY, Cat. Mar. Moll. Jap., p. 7, 1895.

One specimen, 7.4 mm. in height and 4 mm. in diameter. Transverse grooves in body-whorl numerous as described by REEVE, but rather unequal; possibly a varietal form.

Type locality: Japan; Recent.

Fossil occurrence: Byôritu Beds.—700 m. NE. of Nanseizan: station 19; Reg. No. 53871.

Living: Japan (exact locality unknown).

Genus *Leucotina* A. ADAMS, 1860*Leucotina diana* (A. ADAMS), 1854

*Leucotina diana*. PILSBRY in TRYON, Man. Conch., 1 Ser., Vol. 15, p. 167, Pl. 18, figs. 68, 69, 88, 89, 1893: PILSBRY, Cat. Mar. Moll. Jap., p. 7, 1895: YOKOYAMA, Jour. Fac. Sci. Imp. Univ. Tôkyô, Sec. 2, Vol. 2, Pt. 4, p. 171, Pl. 47, fig. 1, 1927: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 52, 1931.

*Tornatella diana*. REEVE, Conch. Icon., Vol. 15, Pl. 4, fig. 19, 1865: LISCHKE, Jap. Meeres-Conch., Vol. 2, p. 171, 1871: LISCHKE, *ibid.*, Vol. 3, p. 76, 1874.

One imperfect specimen; 6.5 mm. in diameter. The genus perhaps belongs to the Pyramidellidae as considered by some authors.

Type locality: Japan; Recent.

Fossil occurrence: Byôritu Beds.—Kozantô: station 24; Reg. No. 53868.

Living: Central Honsyû and Inland Sea.

Geologic distribution: Pliocene of Honsyû.

Family *Retusidae*Genus *Retusa* BROWN, 1827*Retusa minima* YAMAKAWA, 1912

*Retusa minima*. YAMAKAWA, Jour. Geol. Soc. Tôkyô, Vol. 18, p. 47, Pl. 11, figs. 21–24, 1912: YOKOYAMA, Jour. Coll. Sci. Imp. Univ. Tôkyô, Vol. 39, Art. 6, p. 26, Pl. 1, fig. 1, 1920: NOMURA and ZINBÔ, Sci. Rep. Tôhoku Imp. Univ. Ser. 2 (Geol.), Vol. 16, No. 2, p. 129, 1934.

One specimen; nearly equal to the type in size.

Type locality: Japan; Pleistocene.

Fossil occurrence: Byôritu Beds.—Wangwa; station 37; Reg. No. 53874.

Geologic distribution: Post-Pleistocene, Pleistocene and Pliocene of Honsyû; Pleistocene of Kikai-zima.

Living: Japan. China(?).

*Retusa cucurbitiana* YOKOYAMA, 1927

*Retusa cucurbitiana*. YOKOYAMA, Jour. Fac. Sci. Imp. Univ. Tôkyô, Sec. 2, Vol. 1, Pt. 10, p. 449, Pl. 51, fig. 4, 1927.

Two specimens. Resembles *R. minima* YAMAKAWA in shape, but excavation of upper half of shell much stronger.

Type locality: Japan; Pleistocene.

Fossil occurrence: Byôritu Beds.—Wangwa: station 17; Reg. No. 53876. Wangwa: station 37; Reg. No. 53875.

Geologic distribution: Pleistocene of Honsyû.

Subgenus **Pyrrunculus** PILSBRY, 1894

**Retusa (Pyrrunculus) pyriformis** (A. ADAMS) 1855

Pl. VI (I), Fig. 7.

*Retusa (Pyrrunculus) pyriformis*. PILSBRY in TRYON, Man. Conch., 1 Ser., Vol. 15, p. 229, Pl. 33, fig. 68, 1893.  
*Bulla (Atys) pyriformis*. ADAMS in SOWERBY, Thes. Conch., Vol. 2, p. 589, Pl. 125, fig. 128, 1855.

One small pyriform shell, 3.2 mm. in height and 2.4 mm. in diameter; spire sunken. Surface smooth due to abrasion.

Type locality: China; Recent.

Fossil occurrence: Byôritu Beds.—Nanseizan: station 11; Reg. No. 53877.

Living: China Sea.

Genus **Acteocina** GRAY, 1847

**Acteocina fusiformis** (A. ADAMS), 1855

Pl. VI (I), Fig. 6.

*Bulla fusiformis*. ADAMS in SOWERBY, Thes. Conch., Vol. 2, p. 570, Pl. 121, fig. 37, 1855.  
*Tornatina fusiformis*. DUNKER, Ind. Moll. Mar. Jap., p. 165, 1882: PILSBRY in TRYON, Man. Conch., 1 Ser., Vol. 15, p. 194, Pl. 22, fig. 27, 1893: PILSBRY, Cat. Mar. Moll. Jap., p. 7, 1895.

Several specimens; agree best with the named species than any other figured ones from Japan and China. One measures 3.8 mm. in height, and 1.5 mm. in diameter.

Type locality: China; Recent.

Fossil occurrence: Byôritu Beds.—Wangwa: station 18; Reg. No. 53880.

Living: Japan. China Sea. Pacific Islands. Gulf of Suez. N. Australia.

Genus **Volvula** A. ADAMS, 1850

(= ? **Rhizorus** MONTFORT, 1810)

**Volvula acuminata** (BRUGUIÈRE), 1792

*Volvula acuminata*. YOKOYAMA, Jour. Coll. Sci. Tôkyô Imp. Univ., Vol. 39, Art. 6, p. 26, Pl. 1, fig. 2, 1920.  
*Volvula acuta*. TOKUNAGA, Jour. Coll. Sci. Tôkyô Imp. Univ., Vol. 21, Art. 2, p. 32, Pl. 2, fig. 13, 1906.  
*Volvulella acuminata tokunagai*. MAKIYAMA, Mem. Coll. Sci. Kyôto Imp. Univ., Ser. B, Vol. 3, No. 1, Art. 1, p. 141, 1927.

One specimen, about 4 mm. in height, and 1.4 mm. in diameter. The difference between the Japanese and European forms seems to be very slight, and are here taken to be conspecific.

Type locality: Europe; Recent.

Fossil occurrence: Byôritu Beds.—Wangwa: station 14; Reg. No. 53872.

Living: Japan(?). Persian Gulf. Suez. Atlantic, from Norway to Mediterranean Sea.

Geologic distribution: Pleistocene and Pliocene of Honsyû; Pliocene of Europe.

Family **Atyidae**Genus **Atys** MONTFORT, 1810**Atys** species indet.

A single mould, resembling *A. cylindrica* from the Indo-Pacific region in form; but the obscured sculpture prevents an accurate determination. Height, 27.5 mm.; diameter, 15.5 mm.

Fossil occurrence: Byôritu Beds.—Wangwa: station 14; Reg. No. 53869.

Genus **Cylichna** LOVÉN, 1846**Cylichna sibaensis** YAMAKAWA, 1911

*Cylichna sibaensis*. YAMAKAWA, Jour. Geol. Soc. Tôkyô, Vol. 18, p. 48, Pl. 11, figs. 25–29, 1911; YOKOYAMA, Jour. Coll. Sci. Tôkyô Imp. Univ., Vol. 39, Art. 6, p. 28, Pl. 1, fig. 6, 1920.

A single well preserved specimen; agrees very well with the type figures.

Type locality: Japan; Pleistocene.

Fossil occurrence: Byôritu Beds.—Wangwa: station 14; Reg. No. 53873.

Geologic distribution: Post-Pleistocene, Pleistocene and Pliocene of Honsyû.

**Cylichna koryusyoensis**, n. sp.

Pl. VI (I), Figs. 4a, 4b.

Shell small, elongate, cylindrical, slightly contracted in middle. Test thin. Surface transversely finely striated; striae more distant towards apex, crossed by incremental lines, finer than striae. Apex sunken, surrounded by acute margin. Aperture very narrow and linear, slightly curved; base rounded; columella twisted with a rather distinct, oblique fold bounded behind by a narrow groove.

One specimen, 6 mm. in height and 2.2 mm. in diameter.

This species resembles *C. braunsi* YOKOYAMA<sup>1)</sup> from the Lower Musasino Formation of Naganuma near Tôkyô, but is distinguished in the shell having a more distinct columellar fold. It is also closely related to *C. pulvisculus* EHRENBERG<sup>2)</sup> from the Red Sea, but the two differ in ornamentation; EHRENBERG's species is said to be striated only at both ends of the shell. It is also similar to *C. strigella* A. ADAMS<sup>3)</sup> (not of LOVÉN) from the Philippines and Australia except for lacking "undulating transverse striae".

Fossil occurrence: Byôritu Beds.—Wangwa: station 23; Reg. No. 53878.

**Cylichna musashiensis** TOKUNAGA, 1906

*Cylichna musashiensis*. TOKUNAGA, Jour. Coll. Sci. Tôkyô Imp. Univ., Vol. 21, Art. 2, p. 32, Pl. 2, fig. 12, 1906; YOKOYAMA, Jour. Coll. Sci. Tôkyô Imp. Univ., Vol. 39, Art. 6, p. 27, Pl. 1, fig. 4, 1920; and also in his later papers.

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- 1) YOKOYAMA: Jour. Coll. Sci. Imp. Univ. Tôkyô, Vol. 39, Art. 6, p. 28, Pl. 1, fig. 5, 1920.
  - 2) PILSBRY in TRYON: Man. Conch., 1 Ser., Vol. 15, p. 311, Pl. 27, fig. 95, 1893.
  - 3) PILSBRY in TRYON: *ibid.*, p. 314, Pl. 48, fig. 14, 1893.

One small specimen agreeing with the named species; height, 6 mm., diameter, 2.4 mm. It resembles very much the Australian *C. arachis* QUOY and GAIMARD, and perhaps will be proved to be identical by future study.

Type locality: Japan; Pleistocene.

Fossil occurrence: Byôritu Beds.—Wangwa: station 40; Reg. No. 53879.

Living: Central Honsyû, and perhaps it is distributed southwards in Japan.

Geologic distribution: Pleistocene and Pliocene of Honsyû: Pleistocene of Kikai-zima(?).

### **Cylichna species indet.**

A small, ovate cylindrical species, having its surface quite smooth; resembles somewhat *C. mongii* AUDOUIN<sup>1)</sup> from the Red Sea.

Fossil occurrence: Byôritu Beds.—Wangwa: station 18; Reg. No. 53882.

## **Family Hydatinidae**

### **Genus Hydatina SCHUMACHER, 1817**

#### **Hydatina physis (LINNAEUS), 1758**

Pl. VI (I), Figs. 8a, 8b.

*Hydatina physis*. SOWERBY in REEVE, Conch. Icon., Vol. 16, Pl. 1, fig. 2, 1869. LISCHKE, Jap. Meeres-Conch., Vol. 1, p. 114, 1869: DUNKER, Ind. Moll. Mar. Jap., p. 162, 1882: PILSBRY in TRYON, Man. Conch., 1 Ser., Vol. 15, p. 387, Pl. 45, figs. 14-17, 1893: PILSBRY, Cat. Mar. Moll. Jap., p. 10, 1895: SUGITANI, Cat. Luchu Shells, p. 35, 1926: KURODA, Cat. Shell-bearing Moll. Amami-Ôsima, p. 83, 1928: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 55, No. 1904, 1931. *Bulla physis*. ADAMS in SOWERBY, Thes. Conch., Vol. 2, p. 565, Pl. 120, figs. 9-11, 1855.

One rather small specimen. The Formosan fossil has the whorl more or less angular at the upper part, but this is usual among the living Japanese specimens.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Byôritu Beds.—Sikô; Reg. No. 48982.

Living: Central Honsyû to Taiwan. Widely distributed in the Indo-Pacific regions. West Indies(?).

## **Family Ringiculidae**

### **Genus Ringicula DESHAYES, 1838**

#### **Ringicula arctata GOULD, 1859**

Pl. VI (I), Fig. 9.

*Ringicula arctata*. GOULD, Proc. Bost. Soc. Nat. Hist., Vol. 7, p. 325, 1859: GOULD, Otia Conch., p. 122, 1862: LISCHKE, Jap. Meeres-Conch., Vol. 2, p. 78, Pl. 5, figs. 15, 16, 1871: LISCHKE, *ibid.*, Vol. 3, p. 59,

1) PILSBRY in TRYON: Man. Conch., 1 Ser., Vol. 15, p. 311, Pl. 27, fig. 96, 1893.

1874: PILSBRY in TRYON, *Man. Conch.*, 1 Ser., Vol. 15, p. 403, Pl. 47, figs. 74, 79, 1893: PILSBRY, *Cat. Mar. Moll. Jap.*, p. 10, 1895: TOKUNAGA, *Jour. Coll. Sci. Tôkyô Imp. Univ.*, Vol. 21, Art. 2, p. 32, Pl. 2, fig. 11, 1906.

*Ringicula musashinoensis*. YOKOYAMA, *Jour. Coll. Sci. Tôkyô Imp. Univ.*, Vol. 39, Art. 6, p. 30, Pl. 1, figs. 3, 8, 1920: YOKOYAMA, *ibid.*, Vol. 44, Art. 1, p. 30, Pl. 1, figs. 16, 17, 1922 and his later papers: MAKIYAMA, *Mem. Coll. Sci. Kyôto Imp. Univ.*, Ser. B, Vol. 3, No. 1, Art. 1, p. 142, 1927: NOMURA, *Sci. Rep. Tôhoku Imp. Univ. Ser. 2 (Geol.)*, Vol. 15, No. 2, p. 128, No. 455, 1932.

An examination of several Formosan fossil specimens of *Ringicula* showed that *R. musashinoensis* YOKOYAMA is certainly a synonym of *R. arctata* GOULD; the shell varies considerably in form and sculpture. The type of *R. musashinoensis* from the Lower Musasino Formation is a form with a less thickened outer lip, and less heavier callous on the inner lip.

Type locality: China; Recent.

Fossil occurrence: Byôritu Beds.—700 m. E. of Hakusyatou: station 3; Reg. No. 53853. 600 m. E. of Rinsuikwa: station 4; Reg. No. 53852. 500 m. SE. of Zyô-tûsyôwan: station 14; Reg. No. 53855. Wangwa: station 18; Reg. No. 53848. 1000 m. E. of Hakusyatou: station 25. Reg. No. 53850. 900 m. NW. of Keiyukwa: station 33; Reg. No. 53854. 550 m. E. of Sankwakô: station 43; Reg. No. 53856. Tyû-tûsyôwan: station 48; Reg. No. 53851. 1550 m. E. of Sinpo: station 69; Reg. No. 53847: S. of Bôsiho; Reg. No. 37421.

Living: Northern Honsyû to Kyûsyû. Hongkong, China. North Australia.

Geologic distribution: Post-Pleistocene, Pleistocene and Pliocene of Honsyû.

### **Ringicula caron HINDS, 1844**

Pl. VI (I), Fig. 10.

*Ringicula caron*. TRYON, *Man. Conch.*, 1 Ser., Vol. 15, p. 407, Pl. 47, figs. 63, 64, 1893: TESCH, *Paläont. von Timor*, Vol. 8, p. 79, Pl. 16, fig. 222, 1920: FISCHER, *Paläont. von Timor*, Vol. 15, p. 107, Pl. 215, fig. 93, 1927: NOMURA and ZINBÔ, *Sci. Rep. Tôhoku Imp. Univ. Ser. 2 (Geol.)*, Vol. 16, No. 2, p. 130, 1934.

Shell ovate, acuminate, striated, shining; whorls rounded, the last with subtransverse, rounded distant striae; spire exserted; aperture subabbreviated, the lip corrugated (HINDS after TRYON).

Several well preserved specimens. The elevated spire and minutely corrugated outer lip are the characteristic features of this species.

Type locality: Strait of Malacca; Recent.

Fossil occurrence: Byôritu Beds.—400 m. SE. of Zyô-tûsyôwan: station 13; Reg. No. 53845. Wangwa: station 14; Reg. Nos. 53841, 53843. 1000 m. E. of Hakusyatou: station 25; Reg. No. 53844. Wangwa: station 40; Reg. No. 53846. 500 m. E. of Sankwakô: station 41; Reg. No. 53842.

Living: Strait of Malacca. Australia. Torres Strait. Gwadar.

Geologic distribution: Pleistocene of Kikai-zima; Pliocene of Timor(?) and Seran.

## Order Ctenobranchiata

## Family Terebridae

Genus *Terebra* BRUGUIÈRE, 1789*Terebra evoluta* DESHAYES, 1859

Pl. VI (I), Fig. 26.

*Terebra evoluta*. REEVE, Conch. Icon., Vol. 12, fig. 55, 1860: PILSBRY, Cat. Mar. Moll. Jap., p. 11, 1895: HIRASE, Terebridae Jap. Emp., p. 16, Pl. 2, figs. 11, 12; Pl. 4, figs. 42-44, 57, 1917: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 52, No. 1796, 1931: YAGURA, Cat. Moll. Hyôgo-ken, p. 48, No. 631, 1932: KURODA, Cat. Moll., Hukui-ken, p. 191, No. 203, 1933.

*Terebra dussumieri*. TRYON (pars), Man. Conch., Vol. 7, p. 17, Pl. 3, fig. 47, 1855 (not of KIENER).

This species is characterized by its rather large and slender shell with about 18, subvertical axial ribs which are separated by wider interspaces; subsutural groove rather broad, distinct and with oblique, elongate nodes at shoulder; no spirals.

Several specimens; most of the larger ones are unfortunately ill-preserved.

Type locality: The Far East; Recent.

Fossil occurrence: Byôritu Beds.—700 m. E. of Hakusyaton: station 3; Reg. No. 52465. Wangwa: station 6; Reg. No. 52461. Nanseizan: station 11; Reg. No. 52464. Bôsiho: station 13; Reg. No. 52462. 510 m. SE. of Zyô-tûsyôwan: station 15; Reg. No. 52463. 700 m. NE. of Nanseizan: station 19; Reg. No. 53499. 1000 m. E. of Hakusyaton: station 25; Reg. No. 52466.

Living: Western Honsyû and Kyûsyû. Japan Sea. China.

Geologic distribution: Pliocene of Central Honsyû.

*Terebra dussumieri* KIENER, 1835-57

Pl. VI (I), Fig. 27.

*Terebra dussumieri*. KIENER, Spec. Coq. viv., p. 31, Pl. 8, fig. 17, 1835-1857: REEVE, Conch. Icon., Vol. 12, Pl. 2, fig. 7, 1860: LISCHKE, Jap. Meeres-Conch., Vol. 1, p. 62, 1869 (pars): TRYON, Man. Conch., 1 Ser., Vol. 7, p. 16, Pl. 3, figs. 46-48, 1885: PILSBRY, Cat. Mar. Moll. Jap., p. 11, 1895: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 52, No. 1798, 1931.

*Terebra lischkeana*. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 24, Pl. 1, fig. 9, 1928 (not of DUNKER).

Several fine specimens; the largest one ca. 55 mm. in height, and 13 mm. in diameter.

The shell resembles the preceding one in general aspects, but is invariably broader, and has a greater number of axial ribs. The subsutural groove is less distinctly bounded, and hence the ribs are subcontinuous from suture to suture.

Type locality: China; Recent.

Fossil occurrence: Byôritu Beds.—1100 m. E. of Rinsuikwa: station 3; Reg. No. 52469. Bôsiho: station 13; Reg. No. 52470. Wangwa: station 14; Reg. No. 52468. 550 m. SE. of Zyô-tûsyôwan: station 16; Reg. No. 52474. 700 m. NE. of Nanseizan: station 19; Reg. No. 52472. 550 m. SE. of Naikotô: station 28; Reg. No. 52467. Wangwa: station 32; Reg. No. 52473. Wangwa: station 35; Reg. No. 52471. Wangwa: station 40; Reg. No. 52475.

Living: Central Honsyû to Taiwan. Tyôsen. China.

**Terebra t-makiyamai n. sp.**

Pl. VI (I), Figs. 16a, 16b, 17a, 17b.

Shell rather small, subulate, consisting of 13-14 whorls; apical two embryonal, smooth and globular; the rest slightly convex with a distinct constriction or groove which defines subsutural band at about two-thirds of height of whorl. Surface longitudinally ribbed; ribs nearly straight or slightly oblique to right, about 20 on body-whorl, somewhat roof-like, discontinuous, interrupted by a subsutural groove. Interspaces between ribs wider, rather shallow and concave. Entire surface covered by fine growth lines and occasionally with a few obsolete revolving ones on the lower whorls. Body-whorl about 1/3 shell-height; periphery rounded; base somewhat concave with obsolete axial ribs at upper half. Aperture subrhombic, oblique, columella straight above, oblique below; canal short and recurved.

Dimensions (in mm.):

	1	2	3
Height .....	26.0	28.0	21.0
Diameter .....	6.2	6.2	5.5

*T. longiscata* DESHAYES<sup>1)</sup> from the Philippines is somewhat similar in form and sculpture yet not quite identical in details.

The specific name is given in honor of Mr. T. MAKIYAMA, a geologist of the Government General of Taiwan, in recognition of his contribution on the geology of the Island.

Fossil occurrence: Byôritu Beds.—Hakusyaton: station 1; Reg. No. 52492. 1000 m. NW. of Rinsuikwa: station 5; Reg. No. 52490. 900 m. NW. of Rinsuikwa: station 6; Reg. No. 52496. 1450 m. W. of Hokkô: station 14; Reg. No. 52491. 1000 m. E. of Hakusyaton: station 20; Reg. No. 52495. 900 m. NW. of Keiyukwa: station 33; Reg. No. 52494. Wangwa: station 37; Reg. No. 52493. 1520 m. E. of Sinpo: station 68; Reg. No. 52497. Between Kôsui and Zyuna; Reg. No. 37427.

**Terebra reticostaeformis, n. sp.**

Pl. VI (I), Figs. 18a, 18b, 19a, 19b.

Shell resembling *T. reticostata* YOKOYAMA in sculpture, rather small, subulate. Whorls 13-15; apical two (or one and a half) embryonal, smooth, globular; the rest slightly convex with a distinct constriction at about two-thirds of height of whorl. Longitudinally ribbed; ribs rounded, about 15 on a whorl, nearly vertical, intervened by a subsutural incised groove; interspaces rather shallow, concave, nearly equal to ribs in breadth on upper part of spire, broadening gradually towards lower, and two times as broad on ultimate whorl; ribs on last whorl frequently almost obsolete at rounded periphery; incremental lines rather distinct and occasionally with a few, obsolete spiral lines in interspaces. Columella straight above, oblique to left below; canal short and recurved with a truncate base; aperture slightly oblique, ovate in outline.

1) TRYON: Man. Conch., 1 Ser., Vol. 7, p. 18, Pl. 4, fig. 58, 1885.



Dimensions (in mm.):

	1	2
Length .....	21.5	23.0
Diameter .....	5.0	5.0

This is more slender than *T. reticostata* YOKOYAMA<sup>1)</sup> from the Pliocene of Naganuma, near Tôkyô, and has fewer and more vertical ribs than *T. t-makiyamai*, mentioned above.

Fossil occurrence: Byôritu Beds.—900 m. NW. of Rinsuikwa: station 6; Reg. No. 52498. Wangwa: station 24; Reg. No. 52499. Wangwa: station 33; Reg. No. 52500.

### *Terebra orthocostulata* n. sp.

Pl. VI (I), Figs. 20a, 20b, 21a, 21b.

Similar in sculpture to *T. awajiensis* PILSBRY,<sup>2)</sup> a recent species of Japan proper, but differs from that species in being invariably smaller and more narrowly subulate in form with whorls more flattened. Its body-whorl is relatively shorter and base more abruptly narrowed than in *T. nitida* HINDS.<sup>3)</sup>

Subsutural bands varied in development at different parts of this shell; subsutural band occurring on whorls, represented by punctate grooves in interspaces on those of middle part and those in upper part; defined by a continuous groove which traverses the ribs on whorls in lower part.

Dimensions (in mm.):

	1	2
Length .....	31.0	21.0
Diameter .....	6.0	5.0

Fossil occurrence: Byôritu Beds.—700 m. E. of Hakusyaton: station 3; Reg. No. 53103. 500 m. SE. of Zyô-tûsyôwan: station 14; Reg. No. 53103. Wangwa: station 14; Reg. No. 53106. Kozantyo: station 24; Reg. No. 53105. Wangwa: station 24; Reg. No. 53107. Wangwa: station 32; Reg. No. 53104. 700 m. SE. of Sankwakô: station 46; Reg. No. 53108. 300 m. E. of Hakusyaton: Reg. No. 37567. Between Kôsui and Zyuna; Reg. No. 53101.

### *Terebra cumingii* DESHAYES, 1857

Pl. VI (I), Figs. 13, 14, 15.

*Terebra cumingii*. REEVE, Conch. Icon., Vol. 12, Pl. 8, fig. 29, 1860: TRYON, Man. Conch., 1 Ser., Vol. 7, p. 28, Pl. 8, fig. 49, 1885: MARTIN, Foss. von Java, Vol. 1, p. 9, Pl. 1, fig. 4, 1906: FISCHER, Paläont. von Timor, Vol. 15, p. 87, Pl. 214, figs. 63-64, 1927.

Shell subulate; many-whorled, apical three embryonal, smooth and rather high, situated slightly oblique to succeeding ones. Supra- and subsutural band distinct, granular; the former generally about two times larger than the latter. Surface sculptured by 2 or 3 revolving cords,

1) YOKOYAMA: Jour. Coll. Sci. Imp. Univ. Tôkyô, Vol. 39, Art. 6, p. 32, Pl. 1, fig. 1, 1920.

2) PILSBRY: Proc. Acad. Nat. Sci. Philad., p. 4, Pl. 4, figs. 3a, b, 1904.

3) TRYON: Man. Conch., 1 Ser., Vol. 7, p. 35, Pl. 10, figs. 93, 96, 1885.

coarsely latticed by intersection of longitudinal riblets. Most perfect specimen 57 mm. in height, and 10 mm. in diameter.

Type locality: China; Recent.

Fossil occurrence: Byôritu Beds.—Wangwa: station 6; Reg. No. 52477. Wangwa: station 14; Reg. No. 52478. 1000 m. E. of Hakusyaton: station 25; Reg. No. 52476.

Living: China Sea.

Geologic distribution: Pliocene of Java, Timor, Seran and India.

### ***Terebra torquata* ADAMS and REEVE, 1850**

Pl. VI (I), Fig. 25.

*Terebra torquata*. REEVE, Conch. Icon., Vol. 12, Pl. 15, fig. 69, 1860: LISCHKE, Jap. Meeres-Conch., Vol. 3, p. 39, 1874: SMITH, Proc. Zool. Soc., p. 184, 1879: TRYON, Man. Conch., 1 Ser., Vol. 7, p. 20, Pl. 15, fig. 78, 1885: PILSBRY, Cat. Mar. Moll. Jap., p. 13, 1895: HIRASE, Terebridae Jap. Emp., p. 11, Pl. 3, figs. 30-32, 1917: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 51, No. 1789, 1931: YAGURA, Cat. Moll. Hyôgo-ken, p. 48, No. 625, 1932.

Resembles the preceding one in general aspects, but distinguished by its subequal subsutural bands and finer lattice-sculpture on entire surface. Most perfect specimen 32.5 mm. in height, and 6 mm. in diameter.

*T. naumani* figured by Dr. YOKOYAMA from the Byôritu Beds of Taiwan is not perfectly identical with its type figured in 1920 from the Pliocene Beds of Naganuma near Tôkyô; the Formosan shell looks more like a varietal form of *T. torquata*.

Type locality: Japan; Recent.

Fossil occurrence: Byôritu Beds.—Wangwa: station 6; Reg. No. 52483. 800 m. NE. of Hakusyaton: station 12; Reg. No. 52482. Wangwa: station 14; Reg. No. 52480. Wangwa: station 38; Reg. No. 52484. Keiyukwa: station 52; Reg. No. 52479. 300 m. E. of Hakusyaton; Reg. No. 37556. Sikô; Reg. No. 52481. Between Kôsui and Zyuna; Reg. No. 37411.

Living: Western Honsyû and Kyûsyû.

### ***Terebra triseriata* GRAY, 1834**

Pl. VI (I), Figs. 11, 12.

*Terebra triseriata*. REEVE, Conch. Icon., Vol. 12, Pl. 13, fig. 52, 1860: DUNKER, Ind. Moll. Mar. Jap., p. 72, Pl. 5, figs. 19, 20, 1882: TRYON, Man. Conch., 1 Ser., Vol. 7, p. 30, Pl. 9, fig. 56, 1885: WATSON, Chall. Gastr., Vol. 15, p. 379, 1886: PILSBRY, Cat. Mar. Moll. Jap., p. 13, 1895: HIRASE, Terebridae Jap. Emp., p. 18, Pl. 5, figs. 61, 62, 1917: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 52, No. 1799, 1931: NOMURA and ZINBÔ, Sci. Rep. Tôhoku Imp. Univ. Ser. 2 (Geol.), Vol. 16, No. 2, p. 131, No. 95, 1934.

Markedly slender shell having numerous whorls (about 40); decidedly much narrower and more elongated than the preceding two species, although nearly similar in surface sculpture.

*T. triseriata* of YOKOYAMA<sup>1)</sup> from the Pliocene of Tôtômi is certainly distinct from the normal type of *T. triseriata*; and perhaps requires another specific name.

1) YOKOYAMA: Jour. Fac. Sci. Imp. Univ. Tôkyô, Sec. 2, Vol. 1, Pt. 9, p. 326, Pl. 38, fig. 1, 1926.

Approximate dimensions of the specimens are (in mm.):

	1	2
Height .....	71.0	91.0
Diameter .....	7.5	8.0

Type locality: The Philippines; Recent.

Fossil occurrence: Byôritu Beds.—Sikô; Reg. No. 49413.

Living: Central and Western Honsyû. The Philippines.

Geologic distribution: Pleistocene of Kikai-zima.

### ***Terebra prototextilis*, n. sp.**

Pl. VI (I), Figs. 24a, 24b.

Shell small, subulate. Whorls about 15, or more in number, apical ones broken off; nearly flat, longitudinally ribbed and spirally grooved; ribs 18–20 on a whorl, rounded, almost vertical, slightly arcuate, extending from suture to suture, separated by wider interspaces; transverse grooves impressed only in interspaces, very distinct, 4 on a whorl, uppermost one slightly stronger than others; subsutural band well defined. Body-whorl with 6 transverse grooves above rounded periphery; uppermost one transversing ribs. Base convex, obsoletely ribbed above, distinctly trisulcate below, uppermost sulcus largest. Outer lip and canal fractured.

Approximate dimensions: Length, ca. 25 mm., diameter, 5.1 mm.

Resembling in some respects *T. textilis* HINDS,<sup>1)</sup> a recent species of Japan and the Philippines, but appears to be specifically distinct. It has more flattened whorls, more vertical ribs with a different subsutural band.

*T. hizenensis* PILSBRY<sup>2)</sup> is also related to the Formosan fossil, but is distinguishable by different surface ornamentation.

Fossil occurrence: Byôritu Beds.—Wangwa: station 15; Reg. No. 52487.

### ***Terebra pereoa*, n. sp.**

Pl. VI (I), Figs. 22a, 22b, 23a, 23b.

Shell small, subulate. Whorls about 18, somewhat concave, separated by well impressed sutures. Protoconch consisting of 3 whorls, smooth and elongate-conic; succeeding few ones ornamented with granular infra- and supra- sutural bands, former being larger; rest or older whorls provided with another smaller revolving row of grains, which gradually become larger and nearly equal in size with those of supra-sutural cord in penultimate whorl. Body-whorl with four revolving rows of grains which are alternately large and small; grains connected by oblique longitudinal riblets (or coarse threads), and more or less elongated, especially on infra-sutural band. Periphery angulate; base concave, roughly sculptured by incremental lines. Aperture oblique, more or less quadratic in outline; canal short and recurved with a distinct fold behind.

1) TRYON: *Man. Conch.*, 1 Ser., Vol. 7, p. 20, Pl. 5, figs. 75, 76, 1885.

2) PILSBRY: *Proc. Acad. Nat. Sci. Phila.*, p. 4, Pl. 1, figs. 2, 2a, 1904.

Two specimens; their dimensions are (in mm.):

	1	2
Height .....	18.5	16.5
Diameter .....	5.0	3.5

The smaller one is relatively more granulated than the larger, but this slight difference is taken as mere variation.

In sculpture, this shell resembles *T. eoa* MAKIYAMA<sup>1)</sup> from the Pliocene of Tôtômi, but is decidedly narrower. *T. bathyraphe* SMITH is perhaps also a similar species.

Fossil occurrence: Byôritu Beds.—700 m. E. of Hakusyaton: station 3; Reg. No. 52485.

### ***Terebra melanacme* SMITH, 1875**

*Terebra melanacme*. HIRASE, Terebridae Jap. Emp., p. 6, Pl. 2, figs. 15, 16, 1917.

A single specimen; it agrees with an immature individual of the named species. Height, ca. 5 mm.

Type locality: Japan; Recent.

Fossil occurrence: Byôritu Beds.—900 m. NW. of Rinsuikwa: station 6; Reg. No. 52486.

Living: Central Honsyû to Ryûkyû.

Geologic distribution: Pleistocene of Central Honsyû.

### ***Terebra* species indet.**

A fragment of *Terebra* resembling somewhat *T. subvariegata* YOKOYAMA,<sup>2)</sup> however, the ribs are quite reverse in direction.

Fossil occurrence: Byôritu Beds.—Hakusyaton: station 1; Reg. No. 52488.

## **Family Conidae**

### **Genus *Conus* LINNAEUS, 1758**

#### ***Conus odengensis* MARTIN, 1906**

Pl. VII (II), Figs. 8a, 8b, 9a, 9b.

*Conus odengensis*. MARTIN, Foss. von Java, Vol. 1, p.19, Pl. 3, figs. 39-44, 1906.

*Conus oinouyei*. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 30, Pl. 1, fig. 16, 1928.

Several well preserved specimens. The Formosan fossils are rather small, but identical with figures 39 and 39a of MARTIN. *C. oinouyei* YOKOYAMA cited above is perhaps an immature form of MARTIN's species in the essential characters being quite similar.

Some specimens from 400 m. SE. of Zyô-tûsyôwan measure (in mm):

	1	2	3	4	5	6	7	8	9	10
Height .....	47.0	45.0	44.0	42.5	40.0	36.5	36.0	35.0	33.0	31.5
Diameter .....	26.0	23.0	23.0	23.5	23.0	20.0	20.0	18.0	17.0	16.5
Length of aperture.	41.0	38.0	38.0	38.0	35.0	31.0	32.0	30.0	28.5	27.0

1) MAKIYAMA: Mem. Coll. Sci. Kyôto Imp. Univ., Ser. B, Vol. 3, No. 1, Art. 1, p. 88, Pl. 4, fig. 13, 1927.

2) YOKOYAMA: Imp. Geol. Surv. Jap., Rep. No. 101, p. 28, Pl. 1, fig. 4, 1928.

Type locality: Java; Pliocene.

Fossil occurrence: Byôritu Beds.—1000 m. E. of Hakusyaton: station 4; Reg. No. 52412. 300 m. E. of Zyô-tûsyôwan: station 4; Reg. No. 37381. 400 m. N. of Kozantyô: station 5; Reg. No. 52408. 1200 m. N. of Hakusyaton: station 6; Reg. No. 52405. 400 m. SE. of Zyô-tûsyôwan: station 13; Reg. Nos. 52403, 52407. 500 m. SE. of Zyô-tûsyôwan: station 14; Reg. No. 52404. Wangwa: station 20; Reg. No. 52409. 300 m. E. of Sankwakô: station 39; Reg. No. 52410. 1000 m. E. of Zyô-tûsyôwan: station 59; Reg. No. 52411. Sikô; Reg. No. 52413.

Geologic distribution: Pliocene of Ryûkyû(?); Pliocene of Sumatra; Pliocene and Miocene of Java.

### *Conus djarianensis* MARTIN, 1906

Pl. VII (II), Figs. 13a, 13b, 14a, 14b.

*Conus djarianensis*. MARTIN, Foss. von Java, p. 20, Pl. 3, figs. 45-50, 1906.

This resembles the preceding one in some respects, but is quite distinct. The body-whorl of this species has a straighter outline and is slightly more acutely angled at the shoulder; the basal grooves are coarser and fewer, being restricted to a smaller area. The shell never grows as large as that species. The Formosan specimens show considerable variation in regard to the height of the spire; however, the young forms, as a rule, have a longer spire than the adult.

Some specimens from 400 SE. of Zyô-tûsyôwan measure (in mm.):

	1	2	3	4	5	6	7	8	9	10
Height .....	42.5	36.2	30.0	26.0	23.0	22.0	19.0	18.0	16.0	13.5
Diameter .....	21.5	20.0	15.5	13.0	12.0	11.0	9.5	9.0	8.0	6.5
Length of aperture.	35.0	31.5	25.0	20.0	19.0	18.0	15.0	14.0	12.0	10.0

Type locality: Java; Miocene.

Fossil occurrence: Byôritu Beds.—300 m. E. of Zyô-tûsyôwan: station 4; Reg. No. 37352. 400 m. SE. of Zyô-tûsyôwan: station 13; Reg. No. 52414. 500 m. SE. of Zyô-tûsyôwan: station 14; Reg. No. 52422. Wangwa: station 14; Reg. No. 52416. Wangwa: station 21; Reg. No. 52420. Wangwa: station 23; Reg. No. 52415. Wangwa: station 24; Reg. No. 52417. 1000 m. E. of Hakusyaton: station 25; Reg. No. 52421. Wangwa: station 33; Reg. No. 52583. 300 m. E. of Sankwakô: station 39; Reg. No. 52423. 1200 m. SE. of Sankwakô: station 60; Reg. No. 52419. 900 m. SE. of Naikotô: station 66; Reg. No. 52418. 1550 m. E. of Sinpo: station 69; Reg. No. 52424. Sikô; Reg. No. 48990.

Geologic distribution: Miocene of Java.

### *Conus ngavianus* MARTIN, 1906

Pl. VII (II), Figs. 11, 12.

*Conus ngavianus*. MARTIN, Foss. von Java, Vol. 1, p. 23, Pl. 4, figs. 57-61, 1906: TESCH, Paläont. von Timor, Vol. 5, p. 21, Pl. 124, fig. 24, 1915.

Only two specimens; their dimensions (in mm.) are:

	1	2
Height .....	45.0	35.0
Diameter .....	21.0	16.0
Length of aperture .....	40.0	30.0

Medium in size; outlines straight, rather elongate, very broadly and acutely shouldered; test moderate in thickness. Spire low and concave-conical with pointed apex. Body-whorl straight in lateral view, provided with narrow and distant spiral grooves which are rather indistinct on upper two-thirds of whorl. Aperture very narrow, obliquely straight and parallel.

Type locality: Java; Pliocene.

Fossil occurrence: Byôritu Beds.—Wangwa: station 24; Reg. No. 52402.

Geologic distribution: Pliocene of Java, Timor, and Sumatra; Miocene of Java.

### **Conus flavidus** LAMARCK, 1810

*Conus flavidus*. REEVE, Conch. Icon., Vol. 1, Pl. 28, fig. 207, 1843: TRYON, Man. Conch. 1 Ser., Vol. 6, p. 44, Pl. 13, figs. 48-50, 1884: SUGITANI, Cat. Luchu Shells, p. 30, 1926: KURODA, Cat. Shell-bearing Moll. Amami-Ôsima, p. 76, No. 891, 1928.

One specimen; height, about 35 mm.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Ryûkyû Limestone.—Hanpeizan; Reg. No. 52406.

Living: Kyûsyû and Ryûkyû. Indian Ocean. Red Sea. E. coast of Africa.

Geologic distribution: Post-Pleistocene of Central Honsyû; Pleistocene of the Philippines; Post-Pliocene of Celebes.

### **Conus vexillum** GMELIN, 1792

*Conus vexillum*. REEVE, Conch. Icon., Vol. 1, Pl. 1, fig. 3, 1843: TRYON, Man. Conch. Icon., 1 Ser., Vol. 6, p. 39, Pl. 11, figs. 12a-14, 1884: SUGITANI, Cat. Luchu Shells, p. 30, 1926: KURODA, Cat. Shell-bearing Moll., Amami-Ôsima, p. 70, No. 882, 1928.

One ill-preserved specimen; approximate dimensions, height, 67 mm., diameter, 35 mm. A large *Conus* with short spire; body-whorl almost straight in lateral view and smooth except for a few basal threads and alternating grooves. Secondary calcification makes specific identity somewhat doubtful.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Byôritu Beds.—Wangwa: station 13; Reg. No. 52401.

Living: Kyûsyû and Ryûkyû. The Philippines. Java. Indian Ocean. E. coast of Africa. New Caledonia. Samoan Isles.

**Conus yabei**, n. sp.

Pl. VII (II), Figs. 5a, 5b, 6a, 6b.

Shell medium in size, narrow and rather elongated, height slightly exceeding  $2\frac{1}{2}$  times diameter. Spire rather high, considerably concave in lateral view with apex acute. Whorls 15, apical 2 embryonal, smooth and globular, succeeding ones angulated at lower two-thirds, finely plicated, or crenulated especially marked by on surface below angle, lower or most aged whorls flat or sometimes slightly concave in middle. No spiral lines. Body-whorl almost straight in lateral profile, peripheral angle acute, smooth, except for a few unequal basal threads which are coarser towards lower. Incremental lines fine and not prominent. Aperture very narrow, sides parallel; inner lip slightly oblique at base.

The specimens measure (in mm.):

	1	2
Height .....	43.0	ca. 43.0
Diameter .....	16.0	17.0
Length of aperture .....	33.0	34.0

Two specimens, which faintly retain their original coloration. *C. bayani* JOUSSEAUME<sup>1)</sup> and *C. ngavianus* MARTIN<sup>2)</sup> are somewhat related to this new species but the present shell has a longer spire.

Fossil occurrence: Byôritu Beds.—400 m. SE. of Zyô-tûsyôwan: station 13; Reg. No. 52367.

**Conus coronatus** GMELIN, 1792

Pl. VII (II), Fig. 15.

*Conus coronatus*. KÜSTER u. WEINKAUFF in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 4, Pt. 2, p. 131, Pl. 25, figs. 9, 10; Pl. 28, figs. 5, 6, 1875: SUGITANI, Cat. Luchu Shells, p. 30, 1926: KURODA, Cat. Shell-bearing Moll. Amami-Ôsima, p. 70, No. 871, 1928: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 48, No. 1635, 1931.

*Conus miliaris*. TRYON, Man. Conch., 1 Ser., Vol. 6, p. 21, Pl. 5, figs. 84-90; Pl. 27, fig. 12, 1884.

*Conus minimus*. REEVE, Conch. Icon., Vol. 1, Pl. 24, fig. 143, 1843.

One well preserved specimen; height, 30 mm.; diameter, 18.5 mm.

This well known living shell bears many synonyms due to its intense variability in coloration. It is widely distributed both in the Pacific and Indian Oceans.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Raised Coral Reef.—S. of Sisitô; Reg. No. 37473.

Living: Southern Kyûsyû to Taiwan. The Philippines. Polynesia. Indian Ocean. Red Sea. E. coast of Africa. Sandwich Island. Galapagos Islands.

1) TRYON: Man. Conch., 1 Ser., Vol. 6, p. 35, Pl. 10, fig. 88, 1884.

2) MARTIN: Foss. von Java, p. 23, Pl. 4, figs. 58-61, 1906.

**Conus d'orbignyi (ANDOUIN), 1831**

Pl. VII (II), Fig. 1.

*Conus d'orbignyi*. REEVE, Conch. Icon., Vol. 1, Pl. 4, fig. 17, 1843: KÜSTER u. WEINKAUFF in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 4, Pt. 2, p. 258, Pl. 43, fig. 1, 1875: KIENER, Spec. Coq. viv., p. 33, Pl. 13, fig. 3, 1835-1857: SOWERBY, Thes. Conch., Vol. 3, p. 12, Pl. 16, fig. 368, 1866: DUNKER, Ind Moll. Mar. Jap., p. 93, 1882: TRYON, Man. Conch., 1 Ser., Vol. 6, p. 75, Pl. 23, figs. 95, 96, 1884: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 48, No. 1639, 1931.  
 ?*Conus comatosa*. PILSBRY, Proc. Acad. Nat. Sci. Phila., p. 6, Pl. 1, fig. 9, 1904 (= *C. dormitor* PILSBRY).  
*Conus insculptus*. TESCH, Paläont. von Timor, Vol. 5, p. 19, Pl. 73, figs. 13, 14, 1915. (not of KIENER).

Several well preserved specimens; largest one 60 mm. in height, and 20 mm. in diameter. Quite identical with the Chinese specimen figured by KIENER in the work above cited. *C. comatosa* PILSBRY slightly differs from the present species in sculpture of the spire. According to TRYON, *C. planicostulatus* SOWERBY and *C. gemmulatus* SOWERBY are synonyms.

Type locality: China; Recent.

Fossil occurrence: Byôritu Beds.—Wangwa: station 40; Reg. No. 52364. Sikô; Reg. Nos. 48976, 52365.

Living: Western Honsyû. China. The Philippines.

Geologic distribution: Pleistocene of Kikai-zima (?); Pliocene of Timor.

**Conus pseudosulcatus, n. sp.**

Pl. VII (II), Figs. 3a, 3b.

*Conus sulcatus* var. MARTIN, Foss. von Java, Vol. 1, p. 12, Pl. 1, figs. 11, 12, 1906.

Shell of medium size, elongate-conic; test moderate in thickness. Spire conical, rather high, slightly concave in lateral outline, with pointed apex. Whorls about 12, apical 2 embryonal, smooth and globular; succeeding 2 also globular; others regularly increasing, and slightly shouldered; angle of shoulder somewhat projecting immediately above suture, surface above it concave and furnished with 4-6, subequal revolving threads, interspaces wider and provided with a few unequal spiral threads. Angle indistinctly granulate on upper whorls and broadly undulate on lower, forming distant, elongate nodules on periphery. Suture impressed, and also undulate. Body-whorl below peripheral angle nearly straight or slightly convex in side view, ornamented with about 20 subequal revolving cords which are beautifully punctate in aged specimens; entire surface covered by numerous, fine growth lines which are marked best in grooves of body-whorls. Aperture narrow, slightly wider in lower part truncated at base. Height, 50 mm.; diameter, 23 mm.

This species closely resembles *C. sulcatus* HAWASS living in Chinese waters but is distinguished by grooves on body-whorl being wider than cords

*C. ornatissimus* MARTIN mentioned below is also related to the present species, but that species is somewhat narrower and has more numerous spiral grooves and cords (more than 30) on body-whorl.



*C. sulcatus* of TESCH<sup>1)</sup> is a varietal or at least subspecifically different from the present new species; the two differ slightly in form.

Fossil occurrence: Byôritu Beds.—700 m. NE. of Nanseizan: station 19; Reg. No. 52335. Wangwa: station 24; Reg. No. 52336. Wangwa: station 34; Reg. No. 52334.

Geologic distribution: Pliocene of Java.

### **Conus ornatissimus** MARTIN, 1906

Pl. VII (II), Figs. 4a, 4b.

*Conus ornatissimus*. MARTIN, Foss. von Java, Vol. 1, p. 12, Pl. 1, figs. 8-10, 1906: TESCH, Paläont. von Timor, p. 16, Pl. 73, figs. 3-6, 1915: DICKERSON, Rev. Philip. Paleont., Pl. 2, fig. 11, 1922: FISCHER, Paläont. von Timor, Vol. 15, p. 104, Pl. 214, fig. 87, 1927.

Several well preserved specimens; figured one 38 mm. in height, and 16 mm. in diameter.

The Formosan specimens agree perfectly with the typical examples of the species, which are excellently illustrated by MARTIN and by TESCH in the works cited above, though invariably smaller. *C. mucronatus* REEVE from the Philippines is perhaps the nearest recent ally of this species.

Type locality: Java; Miocene.

Fossil occurrence: Byôritu Beds.—400 m. N. of Kozantô: station 5; Reg. No. 52340. 700 m. NE. of Nanseizan: station 19; Reg. No. 52342. Wangwa: station 24; Reg. No. 52339. Wangwa: station 33; Reg. No. 52579. 1200 m. E. of Zyô-tûsyôwan: station 36; Reg. No. 52338. 1200 m. SE. of Sankwakô: station 60; Reg. No. 52337. 1550 m. E. of Sinpo: station 69; Reg. No. 52341. Hakusyaton: station 69; Reg. No. 52343.

Geologic distribution: Pliocene of Timor and Seran; Pliocene (?) and Miocene of Java and the Philippines.

### **Conus aculeiformis** REEVE, 1844

Pl. VII (II), Figs. 10a, 10b.

*Conus aculeiformis*. REEVE, Conch. Icon., Vol. 1, Pl. 44, fig. 240, 1844: TRYON, Man. Conch., 1 Ser., Vol. 6, p. 75, Pl. 23, figs. 90-94, 1884.

*Conus insculptus*. MARTIN, Foss. von Java, Vol. 1, p. 14, Pl. 1, fig. 18, 1906 (not of TESCH).

*Conus longurionis*. MARTIN, *ibid.*, p. 16, Pl. 2, figs. 20-22, 1906.

*Conus vimineus*. MARTIN, *ibid.*, p. 16, Pl. 2, figs. 24-25, 1906.

*Conus kikaiensis*. PILSBRY, Proc. Acad. Nat. Sci. Phila., p. 6, Pl. 1, fig. 8, 1904: YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 29, Pl. 1, fig. 7, 1928: NOMURA and ZINEÔ, Sci. Rep. Tôhoku Imp. Univ. Ser. 2, Vol. 16, No. 2, p. 131, No. 98, 1934.

*Conus comatosa*. YOKOYAMA, Jour. Fac. Imp. Univ. Tôkyô, Sec. 2, Vol. 2, Pt. 7, p. 338, Pl. 66, fig. 2, 1928 (not of PILSBRY).

Several well preserved specimens; largest one, 43 mm. in height, and 14 mm. in diameter.

Shell narrow and long; spire high and conical. Angle of whorl almost smooth projecting slightly above suture, surface above it flat, sloping and with a few spiral cords. Body-whorl

1) TESCH: Paläont. von Timor, Vol. 5, p. 16, Pl. 73, fig. 12, 1915.

below peripheral angle nearly straight in outline with many spiral grooves, often weaker on upper part, stronger and closer towards base, in this way merging apparently into *C. comatosaeformis* YOKOYAMA, mentioned below. Entire surface covered by numerous fine growth lines, especially marked in grooves.

In form and sculpture, this species is related to *C. sondaianus* MARTIN and *C. palabuanensis* MARTIN both from the Pliocene of Java; it is also hardly distinguishable from *C. australis* LAMARCK, and if it proves to be identical with LAMARCK's species, the specific name *australis* should be used.

Type locality: The Philippines; Recent.

Fossil occurrence: Byôritu Beds.—E. of Rinsuikwa: station 2; Reg. No. 52358. 700 m. E. of Hakusyaton: station 3; Reg. No. 52354. 900 m. NW. of Rinsuikwa: station 6; Reg. No. 52351. Wangwa: station 6; Reg. No. 52357. 1600 m. N. of Sikwakô: station 10; Reg. No. 52577. Nanseizan: station 11; Reg. No. 52353. Wangwa: station 11; Reg. No. 52349. 1450 m. W. of Hokkô: station 14; Reg. No. 52360. 510 m. SE. of Zyô-tûsyôwan: station 15; Reg. No. 52355. 550 m. SE. of Zyô-tûsyôwan: station 16; Reg. No. 52361. 700 m. NE. of Nanseizan: station 19; Reg. No. 52359. Wangwa: station 24; Reg. No. 52356. Wangwa: station 26; Reg. No. 52362. Wangwa: station 28; Reg. No. 52578. 900 m. NW. of Wangwa: station 33; Reg. No. 52582. Keiyukwa: station 33; Reg. No. 52350. 1200 m. E. of Sankwakô: station 35; Reg. No. 52352. 1200 m. E. of Zyô-tûsyôwan: station 36; Reg. No. 52363. Wangwa: station 37; Reg. No. 52584. 1500 m. E. of Sinpo: station 67; Reg. No. 52580. Between Kôsui and Zyuna; Reg. No. 37336.

Living: China. The Philippines. Indian Ocean. Australia.

Geologic distribution: Pleistocene of Kikai-zima; Pliocene of Kyûsyû; Pliocene and Miocene of Java; Pliocene of Sumatra, Timor and Seran.

### **Conus comatosaeformis** YOKOYAMA, 1928

*Conus comatosaeformis*. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 29, Pl. 1, fig. 10, 1928.

Several rather well preserved specimens; one of them 44 mm. in height, and 14.5 mm. in diameter.

As stated in the preceding description, this species may prove to be a varietal form, or at least only a subspecies of *C. aculeiformis* by future study; the spiral grooves on the body-whorl seem to be considerably variable in their number and strength.

Type locality: Taiwan; Pliocene.

Fossil occurrence: Byôritu Beds.—1000 m. NW. of Rinsuikwa: station 5; Reg. No. 52345. 900 m. NW. of Rinsuikwa: station 6; Reg. No. 52347. Bôsiho: station 13; Reg. No. 52344. 1450 m. W. of Hokkô: station 14; Reg. No. 52346. Keiyukwa: station 52; Reg. No. 52348.

### **Conus bonus** n. sp.

Pl. VII (II), Figs. 7a, 7b.

Shell medium in size, elongate conic; test rather thin. Spire short, outline nearly straight, or slightly concave, acutely pointed at top of spire. Whorls about 12, apical ones smooth,

globular, embryonal; rest more or less concave with peripheral angle projecting above suture; angles on upper (about 5 whorls) whorls minutely beaded or crenulated, those on lower ones almost smooth. Spirally striate; striae rather unequal, 4-5 between suture and angle, crossed by fine oblique growth lines. Body-whorl almost straight in lateral outline, acutely angulated at periphery; densely and spirally grooved, or ridged throughout, grooves stronger on lower one-third than upper two-thirds; aperture narrow, obliquely straight, sides parallel.

Three beautifully preserved specimens; one figured, 42.5 mm. in height, 20.5 mm. in diameter, and 36.5 mm. in length of aperture.

In form, this shell resembles the recent Japanese species *C. sieboldi* REEVE,<sup>1)</sup> but it certainly differs from that species in the surface sculpture. The Formosan fossil has spirals which are finer, more numerous and cover the entire surface, while *C. sieboldi* is said to have only a few distant grooves on the basal part of the body-whorl.

*C. sieboldianus* MAKIYAMA<sup>2)</sup> is a smaller shell with a more elongated spire, and has a slightly different ornamentation.

Fossil occurrence: Byôritu Beds.—Wangwa: station 24; Reg. No. 52393. Wangwa: station 33; Reg. No. 52581.

### ***Conus significatus*, n. sp.**

Pl. VII (II), Figs. 2a, 2b.

Shell medium in size, obconical: test moderately thick. Spire very low; apex acute, decidedly concave in general outline. Whorls 12, apical ones embryonal, smooth and globular; post-embryonal ones shouldered and spirally striated; angle of shoulder minutely granulated on earlier whorls, more or less undulate on later ones; striae 4-5 in number, crossed by rather distinct, oblique, growth lines, making surface appear more or less granular. Body-whorl large, outline straight, peripheral angle acute; spirally grooved throughout; grooves about 45, rather unequal, wider on lower part than on upper. Outer lip fractured; aperture apparently narrow, straight, parallel sided as in *C. sieboldi*.

One specimen; 47 mm. in height, 22 mm. in diameter, and 42 mm. in the length of aperture.

Compared with the preceding species, this shell has a spire less elevated and more concave in outline; revolving grooves and ridges are more extensively marked upon its body-whorl. *C. decollatus* MARTIN from the Neogene of Java somewhat resembles the Formosan fossil, but differs in its much smaller shell with a different sculpture.

Fossil occurrence: Byôritu Beds.—Wangwa: station 24; Reg. No. 52394.

### ***Conus* species indet.**

A small, imperfect mould of *Conus* resembling somewhat *C. hardi* MARTIN of the Javan Tertiary.

Fossil occurrence: Kaizan Beds(?).—Dakaho; Reg. No. 28142.

1) REEVE: Conch., Icon., Vol. 1, supp. Pl. 1, fig. 269, 1844.

2) MAKIYAMA: Mem. Coll. Sci. Kyôto Imp. Univ. Ser. B, Vol. 3, No. 1, Art. 1, p. 92, Pl. 4, figs. 16, 17, 1927.

## Family Turridae

Genus **Turris** (BOLTEN) RÖDING, 1798Subgenus **Turris**, s. s.**Turris (Turris) oxytropis** (SOWERBY), 1833

Numerous well preserved specimens. The following oriental forms are considered to be specifically identical with this as there is no good ground for separation; "*Pleurotoma*" *nobilis* HINDS, "*Pleurotoma*" *albicarinata* SOWERBY, "*Pleurotoma*" *leucotropis* ADAMS and REEVE, and "*Pleurotoma*" *gendinganensis* MARTIN.

Type locality: Panamic region, Pacific coast; Recent.

Fossil occurrence: Byōritu Beds.—Hakusyaton: station 1; Reg. No. 51449. 300 m. E. of Hakusyaton: station 1; Reg. Nos. 37320, 37386, 37375. 700 m. E. of Hakusyaton: station 3; Reg. No. 51445. 300 m. E. of Zyō-tūsyōwan: station 4; Reg. No. 37376. 1000 m. NE. of Rin-suikwa: station 5; Reg. No. 51441. Wangwa: station 5; Reg. No. 51461. 900 m. NW. of Rin-suikwa: station 6; Reg. No. 51459. Wangwa: station 6; Reg. Nos. 51463, 51466. Between Kōsui and Zyuna: station 6; Reg. No. 37322. S. of Bōsiho: station 7; Reg. No. 37307. E. of Goko: station 8; Reg. No. 37317. Wangwa: station 9; Reg. No. 51424. Nanseizan: station 11; Reg. No. 51448. Wangwa: station 12; Reg. No. 51426. 400 m. SE. of Zyō-tūsyōwan: station 13; Reg. No. 51438. Bōsiho: station 13; Reg. No. 51460. Wangwa: station 14; Reg. No. 51435. 1450 m. NW. of Hokkō: station 14; Reg. No. 51439. Wangwa: station 15; Reg. No. 51412. 510 m. SE. of Zyō-tūsyōwan: station 15; Reg. No. 51437. 550 m. E. of Zyō-tūsyōwan: station 16; Reg. No. 51409. Wangwa: station 16; Reg. No. 51411. Wangwa: station 17; Reg. No. 51440. 600 m. SE. of Zyō-tūsyōwan: station 17; Reg. No. 51454. Wangwa: station 19; Reg. No. 51444. 700 m. NE. of Nanseizan: station 19; Reg. Nos. 51416, 51432. 1000 m. E. of Hakusyaton: station 20; Reg. No. 51406. Wangwa: station 21; Reg. No. 51421. Wangwa: station 23; Reg. No. 51453. Kozantyō: station 24; Reg. No. 51423. Wangwa: station 24; Reg. No. 51452. 1000 m. E. of Hakusyaton: station 25; Reg. Nos. 51414, 51422. Wangwa: station 26; Reg. No. 51428. 700 m. SE. of Hakusyaton: station 27; Reg. No. 51451. 550 m. SE. of Naikotō: station 28; Reg. No. 51447. 700 m. E. of Naikotō: station 29; Reg. No. 51405. 700 m. E. of Naikotō: station 31; Reg. No. 51431. Wangwa: station 32; Reg. No. 51427. Wangwa: station 33; Reg. No. 51420. 900 m. NW. of Keiyukwa: station 33; Reg. No. 51434. Wangwa: station 34; Reg. No. 51442. Wangwa: station 35; Reg. No. 51418. 1200 m. E. of Sankwakō: station 35; Reg. No. 51433. 1200 m. E. of Zyō-tūsyōwan: station 36; Reg. No. 51465. Wangwa: station 37; Reg. No. 51425. 300 m. E. of Sankwakō: station 39; Reg. No. 51450. Wangwa: station 39; Reg. No. 51462. Wangwa: station 40; Reg. No. 51430. 500 m. E. of Sankwakō: station 41; Reg. No. 51457. 300 m. S. of Sankwakō: station 44; Reg. No. 51446. Keiyukwa: station 52; Reg. Nos. 51429, 51436. 940 m. NW. of Keiyukwa: station 55; Reg. No. 51456. 580 m. E. of Zyō-tūsyōwan: station 58; Reg. No. 51458. 1200 m. SE. of Sankwakō: station 60; Reg. No. 51410. 900 m. SE. of Naikotō: station 66; Reg. Nos. 51413, 51464. 1520 m. E. of Sinpo: station 68; Reg. No. 51408. 1550 m. E. of Sinpo: station 69; Reg. No. 52206. Hakusyaton; Reg. No. 51455. Sikō: Reg. Nos. 51443, 49402. Western side of Syōgun-yama; Reg. No. 37346. The upper course of Sairyōkyō; Reg. No. 53740.

Living: Central and Western Honsyū. China. Mauritius. Panama to Gulf of California.

Geologic distribution: Pleistocene and Pliocene of the Honsyû; Pliocene of Seran, New Guinea, Sumatra, Java and Timor; Miocene of Sumatra, Borneo and Timor(?).

**Turris (Turris) polytropa (HELBLING), 1779**

Pl. VII (II), Fig. 31.

*Turris polytropa*. YAGURA, Cat. Moll. Hyôgo-ken, p. 46, No. 597, 1932.

*Pleurotoma deshayesii*. REEVE, Conch. Icon., Vol. 1, Pl. 3, fig. 19, 1843: WEINKAUFF u. KOBELT in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 4, Pt. 3, p. 26, Pl. 5, fig. 7, 1887.

Numerous well preserved specimens; largest one about 45 mm. in length. Median keels on lower whorls smooth and feebly sulcate on top, those on upper ones minutely granulated.

This is "*Pleurotoma*" *deshayesii* DOUMET, 1834, not "*Pleurotoma (Mangilia)*" *deshayesii*, DUNKER, 1861.<sup>1)</sup>

Type locality: Oriental region; Recent.

Fossil occurrence: Byôritu Beds.—700 m. E. of Hakusyaton: station 3; Reg. No. 51482. 900 m. NW. of Rinsuikwa: station 6; Reg. No. 51479. Between Kôsui and Zyuna: station 6; Reg. No. 37379. Wangwa: station 6; Reg. No. 51483. Wangwa: station 9; Reg. No. 51481. Wangwa: station 11; Reg. No. 51480. Wangwa: station 12; Reg. No. 51484. Bôsiho: station 13; Reg. No. 51489. 400 m. SE. of Zyô-tûsyôwan: station 13; Reg. No. 51477. 1450 m. W. of Hokkô: station 14; Reg. No. 51407. Wangwa: station 14; Reg. No. 51492. 510 m. SE. of Zyô-tûsyôwan: station 15; Reg. No. 51491. Wangwa: station 16; Reg. No. 51496. 1000 m. E. of Hakusyaton: station 20; Reg. No. 51495. Wangwa: station 23; Reg. No. 51476. 1000 m. E. of Hakusyaton: station 25; Reg. No. 51417. 700 m. SE. of Hakusyaton: station 27; Reg. No. 51490. 550 m. E. of Naikotô: station 28; Reg. No. 51493. Wangwa: station 28; Reg. No. 51494. 900 m. NW. of Keiyukwa: station 33; Reg. No. 51488. Wangwa: station 34; Reg. No. 51470. Wangwa: station 35; Reg. No. 51478. 1200 m. E. of Zyô-tûsyôwan: station 36; Reg. No. 51487. Wangwa: station 37; Reg. No. 51436. Wangwa: station 39; Reg. No. 51419. 900 m. SE. of Naikotô: station 66; Reg. No. 51485. 1520 m. E. of Sinpo: station 68; Reg. No. 51467.

Living: Central and Western Honsyû. China.

**Turris (Turris) tigrinaeformis, n. sp.**

Pl. VII (II), Figs. 32a, 32b.

More or less similar in general respects to *T. tigrina* (LAMARCK) from the tropic seas of Asia, but on comparison side by side, the two are specifically distinguishable in the following respects: the Formosan specimens are a trifle broader, have a slightly shorter and recurved canal.

Several specimens; largest one 45 mm. in height; figured one lacking outer lip, 30 mm. in height, and 13 mm. in diameter.

1) DUNKER: Moll. Jap., p. 3, Pl. 1, fig. 3, 1861.

Fossil occurrence: Byôritu Beds.—300 m. E. of Zyô-tûsyôwan: station 4; Reg. No. 37321. 400 m. SE. of Zyô-tûsyôwan: station 13; Reg. No. 51472. Wangwa: station 14; Reg. No. 51473. Wangwa: station 15; Reg. No. 51475. Wangwa: station 23; Reg. No. 51468. Wangwa: station 24; Reg. No. 51474. Wangwa: station 33; Reg. No. 51471. 300 m. E. of Sankwakô: station 39; Reg. No. 51469.

Subgenus **Gemmula** WEINKAUFF, 1876

**Turris (Gemmula) granosa** (HELBLING), 1779

*Turris (Gemmula) granosa*. MAKIYAMA, Mem. Coll. Sci. Kyôto Imp. Univ., Ser. B, Vol. 3, No. 1, Art. 1, p. 95, 1927; NOMURA and ZINBÔ, Sci. Rep. Tôhoku Imp. Univ. Ser. 2 (Geol.), Vol. 16, No. 2, p. 132, No. 104, 1934.

*Pleurotoma carinata* var. *woodwardi*. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 32, pl. 1, fig. 17, 1928.

*Pleurotoma asukana*. YOKOYAMA, Jour. Fac. Sci. Imp. Univ. Tôkyô, Sec. 2, Vol. 2, Pt. 7, p. 340, Pl. 66, fig. 10, 1928 (not 1926).

Several well preserved specimens, both adult and young; a specimen from Sikô, ca. 11 mm. in diameter, and 47 mm. in height, the largest. Precise accounts of this species are found in the work of Dr. MAKIYAMA cited above.

Type locality of *T. granosa*; Indian Ocean. That of *T. carinata woodwardi*; Pliocene of Java.

Fossil occurrence: Byôritu Beds.—1000 m. NW. of Rinsuikwa: station 5; Reg. No. 52451. Wangwa: station 14; Reg. No. 51503. Wangwa: station 33; Reg. No. 51497. 300 m. E. of Sankwakô: station 39; Reg. No. 51502. 1550 m. E. of Sinpo: station 69; Reg. No. 51501. W. of Sikô: Reg. No. 48998. Western side of Syôgun-yama; Reg. No. 37343.

Living: Central Honsyû to Kyûsyû. Indian Ocean. Persian Gulf.

Geologic distribution: Pleistocene of Kikai-zima; Pliocene of Honsyû, Sikoku and Kyûsyû; Pliocene of Java, Sumatra, Timor and Seran; Miocene of Java, Borneo and the Philippines.

Genus **Turricula** SCHUMACHER, 1817

**Turricula byorituensis** n. sp.

Pl. VI (I), Figs. 28a, 28b, 29a, 29b.

*Surcula javana*. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 33, Pl. 1, fig. 12, 1928 (not of LINNAEUS).

Shell resembling *T. javana* (L.) the genotype, in general form and sculpture, medium in size, and longly fusiform, with 12 carinated whorls. Spire rather high, slightly shorter than aperture including canal, apical angle about 35°; uppermost two whorls embryonal, smooth and globular, the first standing somewhat side-way to second; rest strongly carinated; carina situated much nearer to lower suture than to upper, with about 18, more or less oblique tubercles on each whorl; concave above, vertically receding below carina. Suture impressed, well defined by sub- and supra-sutural revolving cords, latter found only in lower whorls of large specimen. Entire surface closely sculptured by unequal spiral threads and curved growth lines, especially marked on concave surface. Body-whorl convex below carina, rounded periphery, and narrowed

base; ornamented with many unequal spiral threads, upper ones strongly granulated. Aperture nearly rhombic in form, angulated behind and rather abruptly contracted in front; canal long, somewhat curved; inner lip smooth with thin and narrow callous deposit; outer lip thin, very sharp, produced forwards, smooth within, with a deep and wide sinus at about the center of concave surface.

Measurements (in mm.)	Specimens from Sikô, the type locality.				Those from 700 m. East of Hakusyaton.						
	1	2	3	4	5	6	7	8	9	10	11
Height .....	41.0	39.0	39.0	37.0	40.0	35.0	34.0	33.0	33.0	33.0	31.5
Diameter .....	14.5	14.5	13.0	13.0	13.5	12.5	12.0	11.5	11.0	10.5	10.5
Height/Diameter ....	2.8+	2.7-	3	2.9-	3-	2.8	2.8+	2.9-	3	3.1+	3

This species is similar to *T. javana* (L.)<sup>1)</sup> from Java, China and Japan, in form and sculpture, but the latter is larger, possessing broader whorls, and a proportionally shorter spire.

Fossil occurrence: Byôritu Beds.—Hakusyaton: station 1; Reg. No. 52137. 700 m. E. of Hakusyaton: station 3; Reg. No. 52116. Wangwa: station 5; Reg. No. 52124. Wangwa: station 6; Reg. No. 52117. 900 m. NW. of Rinsuikwa; Reg. No. 52123. 1100 m. NE. of Hakusyaton: station 9; Reg. No. 52118. Nanseizan: station 11; Reg. No. 52159. 800 m. NE. of Hakusyaton: station 12; Reg. No. 52127. 400 m. SE. of Zyô-tûsyôwan: station 13; Reg. No. 52150. Bôsiho: station 13; Reg. No. 52142. Wangwa: station 14; Reg. No. 52158. 500 m. SE. of Zyô-tûsyôwan: station 14; Reg. No. 52157. 1450 m. W. of Hokkô: station 14; Reg. No. 52119. 510 m. SE. of Zyô-tûsyôwan: station 15; Reg. No. 52151. 550 m. SE. of Zyô-tûsyôwan: station 16; Reg. No. 52120. Wangwa: station 16; Reg. Nos. 52147, 52132. Wangwa: station 17; Reg. No. 52129. 600 m. SE. of Zyô-tûsyôwan: station 17; Reg. No. 52126. 700 m. NE. of Nanseizan: station 19; Reg. No. 52121. Wangwa: station 19; Reg. No. 52125. 1000 m. E. of Hakusyaton: station 20; Reg. No. 52145. Wangwa: station 22; Reg. No. 52144. Wangwa: station 23; Reg. No. 52143. 700 m. SW. of Kôkwan: station 23; Reg. No. 52134. Wangwa: station 24; Reg. No. 52131. 1000 m. E. of Hakusyaton: station 25; Reg. No. 52130. Wangwa: station 26; Reg. No. 52128. Wangwa: station 28; Reg. No. 52122. 1000 m. SE. of Naikotô: station 30; Reg. No. 52140. 700 m. E. of Naikotô: station 31; Reg. No. 52139. Wangwa: station 32; Reg. No. 52136. 900 m. NW. of Keiyukwa: station 33; Reg. No. 52135. Wangwa: station 35; Reg. No. 52133. 300 m. E. of Sankwakô: station 39; Reg. No. 52138. 550 m. E. of Sankwakô: station 43; Reg. No. 52141. 920 m. NW. of Keiyukwa: station 54; Reg. No. 52149. 940 m. NW. of Keiyukwa: station 55; Reg. No. 52148. 1000 m. E. of Zyô-tûsyôwan: station 59; Reg. No. 52146. 900 m. SE. of Naikotô: station 66; Reg. No. 52153. 1520 m. E. of Sinpo: station 68; Reg. No. 52152. 1550 m. E. of Sinpo: station 69; Reg. No. 52154. On road S. of Bôsiho; Reg. No. 37308. 300 m. E. of Hakusyaton; Reg. No. 37318. E. of Goko; Reg. No. 37333. Western side of Syôgun-yama; Reg. No. 37345. The upper course of Sairyôkyô; Reg. No. 52156. Sikô; Reg. Nos. 49408, 52155.

### *Turricula wangwana*, n. sp.

Pl. VI (I), Figs. 37a, 37b.

Shell medium in size, longly fusiform, spire shorter than aperture and canal. Apical whorls lost and later 8 whorls preserved; whorls convex though slightly concave at about upper

1) *Turricula javana* (L.) = *T. nodifera* (LAMARCK).

one-third; longitudinally ribbed and spirally striated. Ribs very strong, rounded and slightly oblique to left, about 10 on each whorl, separated by somewhat wider interspaces. Ribs much narrower than their intervals and vanish towards rounded periphery. Spirals very unequal and numerous, 5 on convex surface of penultimate whorl, rather prominent; entirely devoid on concave portion below suture. Aperture elongated; canal long, widely open and very slightly recurved; inner lip smooth with uniform callosity except at very base. Outer lip unfortunately fractured, possibly thin; sinus apparently deep, wide and situated at concave portion of shell as indicated by flexuous growth lines.

The strong axial ribs, long aperture and canal are the most characteristic features of this species. No allied forms recent or fossil have been reported from the orient, except for "*Pleurotoma (Surcula) rembangensis* MARTIN<sup>1)</sup> from the Pliocene of Java.

A single specimen. Length, 35 mm., diameter, 11 mm.

Fossil occurrence: Byôritu Beds.—Wangwa: station 24; Reg. No. 52221.

#### **Turricula sobrina (YOKOYAMA), 1923**

*Turricula (Surcula) sobrina*. MAKIYAMA, Mem. Coll. Sci. Kyôto Imp. Univ., Ser. B, Vol. 3, No. 1, Art. 1, p. 100, 1927.

*Drillia sobrina*. YOKOYAMA, Jour. Coll. Sci. Tôkyô Imp. Univ., Vol. 45, Art. 2, p. 5, Pl. 1, fig. 1, 1923; YOKOYAMA, Jour. Fac. Sci. Imp. Univ. Tôkyô, Sec. 2, Vol. 1, Pt. 9, p. 331, 1926.

Two imperfect specimens; specific identification somewhat questionable.

Type locality: Tôtômi, Japan; Pliocene.

Fossil occurrence: Byôritu Beds.—Wangwa: station 24; Reg. No. 53423.

Geologic distribution: Pliocene of Tôtômi, Central Honsyû.

#### Genus **Clavatula** LAMARCK, 1801

##### **Clavatula taiwanensis**, n. sp.

Pl. VI (I), Figs. 59a, 59b.

Shell resembling *C. consimilis* (SMITH) in general aspect; rather small, ovately fusiform, turreted, spire acute; apical angle about 30°. Whorls 10½ in number, regularly increasing, broader than high, separated by well defined marginated sutures. Protoconch globular, rather high, smooth, consisting of 1½ whorls; others concave above, shouldered at middle, vertical or at least slightly concave below. Body-whorl nearly equal to spire in length, evenly rounded at periphery, and somewhat contracted at base. Surface ornamentation consists of longitudinal plicae and spiral lirae. Plicae flexuous, about 17 on shoulder of last whorl, branching to 25 on periphery; nodulous at lower suture, and more prominently double beaded at angle. 2-3 revolving series of smaller nodules on surface beneath shoulder; body-whorl ornamented by a number of series of small nodules except at base where only revolving ridges are present. Lirae connecting the nodules rather unequal, 2-3 in number on surface below angle, and 3 or often more above it, and 1 on sutural band. About 10 lirae on body-whorl, separated

1) MARTIN: Foss. von Java, Vol. 1, p. 292, Pl. 43, fig. 701, 1906.



by somewhat wider interspaces, occasionally with an interstitial thread. Upper 4 whorls extending to protoconch smaller and entirely devoid of spirals except for the subsutural band and beaded shoulder. Aperture equal to about one-third entire shell-length, rather narrow and passing gradually into a short and slightly recurved canal below. Columella more or less flexuous, turned to left below; callous of inner lip narrow, smooth and moderately thick, being almost free from remaining part of base; outer lip thin, evenly curved, with distant transverse lirae within, leaving narrow smooth marginal area; sinus shallow and wide, placed at angle of shoulder.

Numerous well preserved specimens; the following are the measurements (in mm.) of the type specimens collected by Mr. S. ANDÔ from 1450 m. W. of Hokkô, Obokô, Sintiku-syû; station 14.

	1	2	3	4
Height .....	17.0	16.0	15.0	13.0
Diameter .....	5.5	5.0	5.0	4.5
Height/Diameter ...	3.1	3.2	3.0	2.9-

*Clavatula taiwanensis* greatly resembles *Clavatula consimilis* (SMITH)<sup>1)</sup> from Japan and China, but differs in having a more granular sculpture, and by its double beaded angle of shoulder. *Clavatula patruelis* (SMITH),<sup>2)</sup> *Clavatula dainichiensis* (YOKOYAMA),<sup>3)</sup> *Clavatula kakegawensis* MAKIYAMA<sup>4)</sup> are also somewhat related to it, but invariably much longer in body-whorl. The Malayan fossil ally of the present species is perhaps "*Pleurotoma (Drillia) djocdjocartae* MARTIN,<sup>5)</sup> but the two may be distinguished by different ornamentation; MARTIN's species has a relatively larger body-whorl and a much finer sculpture on the surface.

Several Japanese Neogene forms of *Clavatula*, *C. dainichiensis muraokensis*, *C. dainichiensis ninomiyana*, *C. dainichiensis nisiyatensis*, and *C. dainichiensis makiyamai* were named by Mr. Y. OTUKA of the Earthquake Research Institute, Tôkyô Imperial University, in 1930<sup>6)</sup>; unfortunately, these have been neither figured nor described, I can not bring the present new species into comparison with them.

Fossil occurrence: Byôritu Beds.—300 m. E. of Zyô-tûsyôwan: station 4; Reg. No. 51596. Wangwa: station 5; Reg. No. 52060. 1000 m. NW. of Rinsuikwa: station 5; Reg. No. 52111. 900 m. NW. of Rinsuikwa: station 6; Reg. No. 52112. 1100 m. NW. of Hakusyatou: station 9; Reg. No. 52113. Bôsiho: station 13; Reg. No. 52114. 1450 m. W. of Hokkô: station 14; Reg. No. 51597. Wangwa: station 15; Reg. No. 51598. 1000 m. E. of Hakusyatou: station 20; Reg. No. 51600. 900 m. NW. of Keiyukwa: station 33; Reg. No. 52109. Wangwa: station 35; Reg. No. 52110. 300 m. E. of Sankwakô: station 39; Reg. No. 52059. 550 m. E. of Sankwakô: station 43; Reg. No. 52105. 300 m. S. of Sankwakô: station 44; Reg. No. 52107. Tyû-tûsyôwan: station 47; Reg. No. 52101. Keiyukwa: station 50; Reg. No. 52104. Keiyukwa: station 52; Reg. No. 52106. 1200 m. SE. of Sankwakô: station 60; Reg. No. 52108. 1520 m. E. of Sinpo: station 68; Reg. No. 52103. 1550 m. E. of Sinpo: station 69; Reg. No. 52102. Between Kôsui and Zyuna; Reg. No. 37355.

1) SMITH: Proc. Zool. Soc., p. 188, Pl. 19, fig. 11, 1879.

2) SMITH: *ibid.*, p. 188, Pl. 19, fig. 10, 1879.

3) YOKOYAMA: Jour. Coll. Sci. Tôkyô Imp. Univ., Vol. 45, Art. 2, p. 6, Pl. 1, fig. 2, 1923.

4) MAKIYAMA: Mem. Coll. Sci. Kyôto Imp. Univ., Ser. B. Vol. 3, No. 1, Art. 1, p. 100, Pl. 4, fig. 5, 1927.

5) MARTIN: Tiefb. auf Java, p. 66, Pl. 4, fig. 69, 1887.

6) OTUKA: Jour. Geol. Soc. Tôkyô, Vol. 37, No. 441, p. 275, 1930.

**Clavatula serana** FISCHER, 1927

Pl. VI (I), Figs. 58a, 58b.

*Clavatula djocdjocartae* var. *serana*. FISCHER, Paläont. von Timor, Vol. 15, p. 98, Pl. 214, fig. 77, 1927.

Several specimens; one measured: diameter, 7 mm., height, ca. 20 mm.

Shell small and fusiform in outline, whorls somewhat turreted. Surface ornamented with a spiral series of granules, fine flexuous longitudinal threads, and a prominent, somewhat nodulous subsutural cord. The Formosan specimens agree in all respects with *C. djocdjocartae serana* from Timor, although the embryonal whorls, which are said to be characteristic in this species, are unfortunately broken.

This is not "*Drillia*" *serana* FISCHER, 1927.

Type locality: Seran; Pliocene.

Fossil occurrence: Byôritu Beds.—700 m. E. of Hakusyaton: station 3; Reg. No. 52115. 900 m. NW. of Rinsuikwa: station 6; Reg. No. 53551. Wangwa: station 15; Reg. No. 52975. Wangwa: station 28; Reg. No. 52977. Keiyukwa: station 50; Reg. No. 52976. 940 m. NW. of Keiyukwa: station 55; Reg. No. 53550.

Geologic distribution: Pliocene of Timor; Miocene of Java(?).

Genus **Astenostoma** HARRIS and BURROWS, 1891**Astenostoma epitonica** (FISCHER), 1927

Pl. VI (I), Fig. 44.

*Oligotoma epitonica*. FISCHER, Paläont. von Timor, Vol. 15, p. 98, Pl. 214, fig. 78, 1927.

Several specimens; one figured, 12 mm. in height, and 4.5 mm. broad, it is the largest in the collection.

Type locality: Seran; Pliocene.

Fossil occurrence: Byôritu Beds.—Wangwa: station 6; Reg. No. 52250. 1000 m. E. of Hakusyaton: station 25; Reg. No. 52249. Wangwa: station 33; Reg. No. 52251. 500 m. E. of Sankwakô: station 41; Reg. No. 52980. 1550 m. E. of Sinpo: station 69; Reg. No. 51599.

Geologic distribution: Pliocene of Seran.

**Astenostoma perepitonica**, n. sp.

Pl. VI (I), Figs. 43a, 43b.

Shell resembling *A. epitonica* mentioned above but smaller and relatively broader, has suture more indistinct, and two subequal keels on each whorl. Two oblique folds on inner lip more or less obsolete.

Approximate dimensions: Height, 9.5 mm.; diameter 4.5 mm.

Fossil occurrence: Byôritu Beds.—1100 m. NE. of Hakusyaton: station 9; Reg. No. 52252.

**Astenostoma vertebrata** (SMITH), 1875

Pl. VI (I), Figs. 35a, 35b.

*Astenostoma vertebrata*. KURODA, Cat. Shell-bearing Moll. Amami-Ōsima, p. 72, No. 921, 1928: NOMURA, Sci. Report Tôhoku Imp. Univ., Ser. 2 (Geol.), Vol. 15, No. 2, p. 119, No. 379, 1932.

*Pleurotoma vertebrata*. SMITH, Proc. Zool. Soc., p. 186, Pl. 19, figs. 6, 6a, 1879: TRYON, Man. Conch., 1 Ser., Vol. 6, p. 170, Pl. 3, figs. 29, 29a, 1884: PILSBRY, Cat. Mar. Moll. Jap., p. 15, 1895.

One well preserved specimen. It agrees well with fig. 6a given by SMITH in the work cited above.

Dr. YOKOYAMA's "*Pleurotoma*" *vertebrata*<sup>1)</sup> from the Upper Musasino Formation of Kadusa is quite distinct from the present species; the Musasino shell can be identified with *Suavodrillia declivis* (MARTIN) from Northern Japan as pointed out by Mr. T. KURODA.

Type locality: Persian Gulf.

Fossil occurrence: Byôritu Beds.—600 m. SE. of Zyô-tûsyôwan: station 17; Reg. No. 53406.

Living: Western Honsyû to Southern Kyûsyû. Persian Gulf.

Geologic distribution: Post-Pleistocene, Pleistocene and Pliocene of Honsyû.

**Genus Clavus** MONTFORT, 1810Subgenus **Clavus** s. s.**Clavus (Clavus?) tjibaliungensis** (MARTIN), 1906

Pl. VI (I), Fig. 40.

*Pleurotoma (Surcula) tjibaliungensis*. MARTIN, Foss. von Java, Vol. 1, p. 32, Pl. 5, fig. 78, 1906: TESCH, Paläont. von Timor, Vol. 5, p. 30, Pl. 78, fig. 61, 1915.

?*Drillia serana*. FISCHER, Paläont. von Timor, Vol. 15, p. 95, Pl. 214, fig. 76, 1927.

Several well preserved specimens. The Formosan fossils are identical with MARTIN's species in form; but have fine revolving impressed lines lacking in the type. This character, according to TESCH, is not sufficient to separate them into two distinct species. A specimen from Kozantyô measures 25 mm. in length, and 9 mm. in diameter.

Type locality: Java; Pliocene.

Fossil occurrence: Byôritu Beds.—Kozantyô: station 24; Reg. No. 51595. Western side of Syôgun-yama; Reg. No. 37324.

Geologic distribution: Pliocene of Java, Timor and Seran(?).

**Clavus (Clavus?) braunsi** (YOKOYAMA), 1920

*Pleurotoma (Drillia) braunsi*. YOKOYAMA, Jour. Coll. Sci. Imp. Univ. Tôkyô, Vol. 39, Art. 6, p. 40, Pl. 1, fig. 25, 1920.

1) YOKOYAMA: Jour. Coll. Sci. Imp. Univ. Tôkyô, Vol. 44, Art. 1, p. 37, Pl. 1, fig. 26, 1922.

One specimen. Shell small, strongly ribbed, polished, no spirals. Base remarkably contracted, canal comparatively long. The specimen is quite similar to YOKOYAMA's species, and is tentatively referred to that species, although it is slightly smaller.

Type locality: Kosiba, Central Honsyû; Pliocene.

Fossil occurrence: Byôritu Beds.—1000 m. E. of Hakusyaton: station 25; Reg. No. 52220.

Geologic distribution: Pliocene of Honsyû and Sikoku.

**Clavus (Clavus?) rinsuikawaensis, n. sp.**

Pl. VI (I), Figs. 45a, 45b.

Shell slender, rather small; test moderately solid, spire high. Whorls  $10\frac{1}{2}$ , convex, regularly increasing, ornamented throughout with 9, oblique, axially elongate ribs and fine, obscure spiral lirae excepting apical  $1\frac{1}{2}$  whorls which are globular and smooth; whorls separated by well impressed sutures; interspaces between ribs much wider than ribs, concave at base. Body-whorl almost equal to half shell-height, well rounded at periphery where ribs are almost obsolete. Aperture elongate, longly ovate; outer lip thickened externally at a short distance from sharp edge, smooth internally; inner lip narrow, smooth and distinctly bounded from its outer margin; columella nearly vertical; canal somewhat fractured, but apparently short, wide and almost straight; sinus rather shallow, situated slightly apart from suture. Height, 17.5 mm.; diameter, 6.5 mm.

In form, this shell somewhat resembles *Inquisitor? eoa* MAKIYAMA<sup>1)</sup> from the Pliocene of Tôtômi, but is distinguished by its narrower and sharper axial ribs, and much broader interspaces. It has more ribs than "*Drillia*" *longispirata*,<sup>2)</sup> as the latter is said to have only six ribs according to SMITH.

Fossil occurrence: Byôritu Beds.—900 m. NW. of Rinsuikwa: station 6; Reg. No. 52253.

Subgenus **Cymatosyrinx** DALL, 1889

**Clavus (Cymatosyrinx) pseudohumilis n. sp.**

Pl. VI (I), Figs. 46a, 46b, 46c, 47, 48.

Shell resembling living "*Drillia*" *humilis* SMITH in general aspect, rather small, ovately fusiform, spire conical. Whorls 9, apical two smooth and globular; somewhat depressed on upper third of later especially of last whorl; last whorl nearly equal to length of spire, or slightly longer. Suture well defined. Surface covered by prominent axial ribs extending from lower to upper sutures; ribs nearly vertical upon upper whorls and oblique upon lower ones, separated by interspaces as wide as ribs. On last whorl, ribs become subobsolete toward outer lip and base. Periphery well rounded, transversely striated on base. Aperture nearly oval in outline, with a deep and wide sinus situated at concave area above angle; outer lip thin, sharp and produced, evenly arcuated, smooth within; inner lip smooth, columella straight; canal very short and widely open, not sufficiently separated from aperture.

1) MAKIYAMA: Mem. Coll. Sci. Kyôto Imp. Univ., Ser. B, Vol. 3, No. 1, Art. 1, p. 103, Pl. 5, figs. 1, 2, 1927.

2) SMITH: Proc. Zool. Soc., p. 190, Pl. 19, fig. 14, 1879.

Dimensions: Height, 15 mm., length, 6 mm., length of aperture, 6 mm.

This species shows considerable variation both in form and sculpture.

Variety, a: shell a little more slender, and the ribs more numerous (about 16) than in the type.

Variety, b: shell also more slender than in the type, and the ribs obsolete, especially on the last whorl.

At first sight I took them to be quite distinct from the type, but I am now convinced that they merely range within the variation of a species, linked by many intermediate form. In general young specimens, have base rather abruptly narrowed.

Fossil occurrence: Byôritu Beds.—700 m. E. of Hakusyaton: station 3; Reg. No. 52230. Wangwa: station 6; Reg. Nos. 52226, 52235. Wangwa: station 8; Reg. No. 52239. Wangwa: station 11; Reg. No. 52232. Bôsiho: station 13; Reg. No. 52225. 500 m. SE. of Zyô-tûsyôwan: station 14; Reg. No. 52229. Wangwa: station 17; Reg. No. 52223. 700 m. SE. of Kôkwan: station 23; Reg. No. 52233. 700 m. E. of Naikotô: station 31; Reg. No. 52236. Wangwa: station 35; Reg. No. 52234. 1200 m. E. of Zyô-tûsyôwan: station 36; Reg. No. 52238. Wangwa: station 37; Reg. No. 52231. Keiyukwa: station 55; Reg. No. 52237. 900 m. SE. of Naikotô: station 66; Reg. No. 52227. 1550 m. E. of Sinpo: station 69; Reg. Nos. 52240, 52224.

### *Clavus (Cymatosyrinx) hanzawai*, n. sp.

Pl. VI (I), Figs. 57a, 57b.

Two specimens from different localities.

Shell small, elongate ovate, spire nearly equal to body-whorl in length. Whorls 7, apical two (at least one and a half) embryonal, apparently smooth and globular; rest markedly concave above middle, and convex below, with rather broad and distinct subsutural elevation; coarsely, somewhat obliquely plicated; plicae rounded, separated by interspaces of nearly same breadth, about 8 on last whorl, and obsoleted toward periphery as well as outer lip. No visible spirals. Suture well defined. Aperture narrow; outer lip thin and smooth within, with an apparently small sinus at concave area above angle; inner lip smooth; canal very short and straight. Height, 8 mm.; diameter, 3 mm.

This species is quite characteristic in its small and polished shell with only a few rather strong plications; no allied forms have hitherto been reported from Japan and Eastern Asia.

Fossil occurrence: Byôritu Beds.—Wangwa: station 18; Reg. No. 52244. S. of Bôsiho; Reg. No. 37387.

### Subgenus *Brachytoma* SWAINSON, 1840

### *Clavus (Brachytoma) flavidulus* (LAMARCK), 1822

Pl. VI (I), Fig. 33.

*Clavus (Clathrodrillia) flavidulus*. GRANT and GALE, Mem. San Diego Soc. Nat. Hist., Vol. 1, p. 579, Pl. 26, fig. 4, 1931; YAGURA, Cat. Moll. Hyôgo-ken, p. 47, No. 602, 1932.

*Clathrodrillia flavidula*. YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus., Imp. Geol. Surv. Jap., p. 49, No. 1697, 1931.

- Drillia flavidula*. TRYON, Man. Conch., 1 Ser., Vol. 6, p. 177, Pl. 10, figs. 56,? 57, 1884: PILSBRY, Cat. Mar. Moll. Jap., p. 16, 1895: FISCHER, Paläont. von Timor, Vol. 15, p. 95, 1927: LISCHKE, Jap. Meeres-Conch., Vol. 2, p. 25, 1871: LISCHKE, *ibid.*, Vol. 3, p. 24, 1874.
- Pleurotoma flavidula*. KIENER, Spec. Coq. viv., p. 30, Pl. 6, fig. 2; Pl. 18, fig. 2, 1839-40: WEINKAUFF u. KOBELT in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 4, Pt. 1, p. 45, Pl. 10, figs. 1-5, 1887: MARTIN, Foss. von Java, Vol. 1, p. 41, Pl. 6, figs. 102-104; Pl. 7, fig. 105, 1906: TESCH, Paläont. von Timor, Vol. 5, p. 30, Pl. 78, fig. 62, 1915.
- Pleurotoma pseudoprincipalis*. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 32, Pl. 1, fig. 15, 1928 (not 1920).

Numerous well preserved specimens; mostly small in size except for a few; largest specimen figured, collected from Sikô, 65 mm. in height, and 16.5 mm. in diameter.

*C. flavidulus* resembles *C. jeffreysii* (SMITH) which is better known as "*Drillia*" *principalis* PILSBRY,<sup>1)</sup> but it is proportionally longer, and differs in details of sculpture. "*Drillia*" *pseudoprincipalis* figured by Dr. YOKOYAMA from the Byôritu Beds of Taiwan in 1928 is certainly an immature individual of the present species, as the distinct subsutural cord on each whorl, characteristic of the typical *pseudoprincipalis*, is wanting in that figure. What DICKERSON figured as "*Turris*" *flavidula* from the Vigo Miocene of the Philippines<sup>2)</sup> seems to represent another species; it is more related to *C. pseudoprincipalis*.

Type locality: Oriental Sea.

Fossil occurrence: Byôritu Beds.—700 m. E. of Hakusyaton: station 3; Reg. No. 52187. Wangwa: station 5; Reg. No. 52180. Between Kôsui and Zyuna: station 6; Reg. No. 37331. Wangwa: station 6; Reg. No. 52163. E. of Goko: station 8; Reg. No. 37342. Wangwa: station 11; Reg. No. 52179. Bôsiho: station 13; Reg. No. 52188. 1450 m. W. of Hokkô: station 14; Reg. No. 52162. 550 m. SE. of Zyô-tûsyôwan: station 14; Reg. No. 52186. Wangwa: station 14; Reg. No. 52185. 510 m. SE. of Zyô-tûsyôwan: station 15; Reg. No. 52164. Wangwa: station 15; Reg. No. 52161. 550 m. SE. of Zyô-tûsyôwan: station 16; Reg. No. 52168. Wangwa: station 16; Reg. No. 52170. 600 m. SE. of Zyô-tûsyôwan: station 17; Reg. No. 52167. Wangwa: station 17; Reg. No. 52166. Wangwa: station 19; Reg. No. 52165. 700 m. NE. of Nanseizan: station 19; Reg. No. 52160. 1000 m. E. of Hakusyaton: station 20; Reg. No. 52184. Wangwa: station 23; Reg. No. 52182. Wangwa: station 28; Reg. No. 52181. 700 m. E. of Naikotô: station 31; Reg. No. 52174. Wangwa: station 33; Reg. No. 52183. Wangwa: station 35; Reg. No. 52173. 1200 m. E. of Zyô-tûsyôwan: station 36; Reg. No. 52172. Wangwa: station 39; Reg. No. 52171. 550 m. E. of Sankwakô: station 43; Reg. No. 52178. Keiyukwa: station 50; Reg. No. 52177. 940 m. NW. of Keiyukwa: station 55; Reg. No. 52176. 1520 m. E. of Sinpo: station 68; Reg. No. 52175. 1550 m. E. of Sinpo: station 69; Reg. No. 52169. 300 m. E. of Hakusyaton; Reg. No. 37506. Sikô; Reg. Nos. 49401, 48986. Western side of Syôgun-yama; Reg. No. 37511.

Living: Central Honsyû to Taiwan. China. Singapore. Indian Ocean. Red Sea.

Geologic distribution: Pliocene of Kyûsyû, Post-Pliocene of Celebes; Pliocene of Java, Timor and Seran.

1) PILSBRY: Cat. Mar. Moll. Jap., p. 17, Pl. 2, figs. 9, 10, 1895.

2) DICKERSON: Rev. Philippine Paleont., Pl. 5, fig. 9, 1922.

**Clavus (Brachytoma) nodiliratus (SMITH), 1875**

Pl. VI (I), Fig. 39.

*Pleurotoma (Drillia) nodilirata*. TESCH, Paläont. von Timor, Vol. 5, p. 31, Pl. 78, fig. 64, 1915.

Several rather well preserved specimens. In surface sculpture, this shell is similar to *C. flavidulus* (LAMARCK) and *C. jeffreysii* (SMITH) from our seas, but has a less higher spire and proportionally longer aperture; the aperture and canal together is nearly equal to the spire in length, thus approaching certain species of *Turricula*.

"*Pleurotoma (Surcula)*" *bantamensis* MARTIN<sup>1)</sup> is perhaps most related to the present species, though slightly different in sculpture.

Type locality: The Philippines; Recent.

Fossil occurrence: Byôritu Beds.—700 m. E. of Hakusyaton: station 3; Reg. No. 52214. Bôsiho: station 13; Reg. No. 52210. 1450 m. W. of Hokkô: station 14; Reg. No. 52215. Wangwa: station 14; Reg. No. 52216. Wangwa: station 15; Reg. No. 52212. 700 m. NE. of Nanseizan: station 19; Reg. No. 52211. 1000 m. E. of Hakusyaton: station 20; Reg. No. 52213. 300 m. E. of Sankwakô: station 39; Reg. No. 52208. 920 m. NW. of Keiyukwa: station 54; Reg. No. 52209.

Living: The Philippines.

Geologic distribution: Pliocene of Timor and Seran.

**Clavus (Brachytoma) pernodiliratus, n. sp.**

Pl. VI (I), Figs. 41a, 41b, 42a, 42b.

Shell resembling *C. nodiliratus* mentioned above; medium in size, fusiform; spire slightly shorter than aperture and canal. Whorls 10, apical two embryonal, smooth and globular, rest angular at upper one-third, surface somewhat concave above angle, convex below it; lower surface bears rounded, axial ribs separated by much narrower interspaces. Body-whorl with 10 ribs which are distinct on and near angle, and gradually become obsolete towards periphery. Entire surface reticulated by intersection of or microscopically granulated with rather fine, revolving and growth lines. Revolving lines larger and smaller in more or less regular alternation. Aperture longly oval, outer lip thickened, sinus profound, large, situated at concave area above angle; inner lip smooth; canal rather long, slightly recurved below.

This species is similar to *C. nodiliratus* (SMITH) in form, but certainly differs from that species by having a quite different surface sculpture. The vertical ribs and the microscopic reticular sculpture may be the most characteristic features of this species.

A few ill-preserved specimens. One of them height, ca. 20 mm.; diameter, 8 mm.

Fossil occurrence: Byôritu Beds.—Wangwa: station 6; Reg. No. 52218. 1520 m. E. of Sinpo: station 16; Reg. No. 52217. 900 m. NW. of Keiyukwa: station 33; Reg. No. 52219.

**Clavus (Brachytoma) suturalis (GRAY), 1838**

Pl. VI (I), Fig. 30.

*Pleurotoma (Drillia) suturalis*. MARTIN, Foss. von Java, Vol. 1, p. 39, Pl. 6, figs. 97, 98, 1906; TESCH, Paläont. von Timor, Vol. 5, p. 32, Pl. 78, fig. 65, 1915.

1) MARTIN: Foss. von Java, Vol. 1, p. 28, Pl. 5, figs. 72, 73, 1906.

One excellently preserved specimen. Height, 32 mm.; diameter, 11.5 mm.

Shell of medium size, rather stout, somewhat fusiform, with about 12 angular whorls; spire nearly equal or slightly shorter than aperture and canal; angle of each whorl with prominent, longitudinal rounded ribs, about 13 in number on body-whorl where ribs are somewhat weaker, vanishing on periphery; upper slope of whorl slightly concave, provided with a distinct subsutural thread, and making sutures well marked; surface also sculptured with rather coarse and irregular spiral lines or threads throughout. Aperture elongated, deep sinus above, short and wide canal below; outer lip thickened and produced, its inner surface smooth.

"*Pleurotoma*" *nodilirata* SMITH<sup>1)</sup> and "*Pleurotoma*" cf. *drilliaeformis* MARTIN,<sup>2)</sup> figured by TESCH are closely related to the present species; the specific distinction of those species is questionable.

It is here added, that a species figured by REEVE as "*Pleurotoma*" *suturalis* BRONN,<sup>3)</sup> is quite distinct from GRAY's species, that species is said to be living in the European seas.

Type locality: Unknown; Recent.

Fossil occurrence: Raised Coral Reef.—S. of Sisitô; Reg. No. 37481.

Living: Unknown; somewhere in the tropic seas of Asia.

Geologic distribution: Pliocene(?) and Miocene of Java; Pliocene of Timor.

### *Clavus (Brachytoma) pseudoprincipalis* (YOKOYAMA), 1920

Pl. VI (I), Fig. 38.

*Pleurotoma (Drillia) pseudoprincipalis*. YOKOYAMA, Jour. Coll. Sci. Imp. Univ. Tôkyô, Vol. 39, Art. 6, p. 37, Pl. 1, fig. 21, 1920.

*Drillia pseudoprincipalis*. YOKOYAMA, Jour. Coll. Sci. Imp. Univ. Tôkyô, Vol. 45, Art. 2, p. 5, 1923; YOKOYAMA, Jour. Fac. Sci. Imp. Univ. Tôkyô, Sec. 2, Vol. 1, Pt. 9, p. 330, 1926.

*Inquisitor pseudoprincipalis*. MAKIYAMA, Mem. Coll. Sci. Kyôto Imp. Univ., Ser. B. Vol. 3, No. 1, Art. 1, p. 104, 1927.

Several specimens. *C. pseudoprincipalis* was first established by Dr. YOKOYAMA on a specimen from the Lower Musasino Formation of Naganuma, as a species related to "*Drillia*" *principalis* PILSBRY (= *Clavus jeffreysi* SMITH), a living species of Japan; the same species occurs also in the Pliocene deposit in the vicinity of Kakegawa, province of Tôtômi, as reported by Dr. YOKOYAMA, and Dr. MAKIYAMA.<sup>4)</sup> The Formosan fossils now under consideration are of nearly the same type as those of Naganuma and Kakegawa, and are therefore confidently referred to that species, though the majority of the Formosan specimens, I confess, have somewhat narrower whorls than in the type; the difference may be regarded as variation.

The following are some of the measurements (in mm.):

	1	2	3	4	5	6	7	8	9	10
Height	31.0	30.0	28.0	26.5	26.0	25.0	25.0	24.0	20.5	20.0
Diameter	8.5	8.0	8.0	7.5	7.5	7.0	7.0	7.0	6.0	6.0

1) TESCH: Paläont. von Timor, Vol. 5, p. 31, Pl. 78, fig. 64, 1915.

2) TESCH: ibid., p. 30, Pl. 78, fig. 60, 1915.

3) REEVE: Conch. Icon., Vol. 1, Pl. 3, fig. 50, 1843.

4) An allied form, but not quite identical with the type, was once collected by Mr. KURODA, of the Kyôto Imperial University from the coast of Kii, Western Honsyû according to Dr. MAKIYAMA.



Type locality: Sagami, Central Honsyû; Pliocene.

Fossil occurrence: Byôritu Beds.—Hakusyaton: station 1; Reg. No. 52039. 700 m. E. of Hakusyaton: station 3; Reg. No. 52194. 400 m. N. of Kozantô: station 5; Reg. No. 52057. 1000 m. NW. of Rinsuikwa: station 5; Reg. No. 52193. Wangwa: station 5; Reg. No. 52199. 900 m. NW. of Rinsuikwa: station 6; Reg. No. 52042. Wangwa: station 6; Reg. No. 52190. Nanseizan: station 11; Reg. No. 52200. Wangwa: station 12; Reg. No. 52030. Bôsiho: station 13; Reg. No. 52046. 400 m. SE. of Zyô-tûsyôwan: station 13; Reg. No. 52032. 1450 m. W. of Hokkô: station 14; Reg. No. 52032. 550 m. SE. of Zyô-tûsyôwan: station 14; Reg. No. 52058. Wangwa: station 14; Reg. No. 52052. 510 m. SE. of Zyô-tûsyôwan: station 15; Reg. No. 52050. Wangwa: station 15; Reg. No. 52197. 550 m. SE. of Zyô-tûsyôwan: station 16; Reg. No. 52038. Wangwa: station 17; Reg. No. 52035. 700 m. NE. of Nanseizan: station 19; Reg. No. 52040. 1000 m. E. of Hakusyaton: station 20; Reg. No. 52047. Wangwa: station 23; Reg. No. 52043. Wangwa: station 24; Reg. No. 52045. 1000 m. E. of Hakusyaton: station 25; Reg. No. 52196. 700 m. SE. of Hakusyaton: station 27; Reg. No. 52196. 550 m. SE. of Naikotô: station 28; Reg. No. 52054. Wangwa: station 28; Reg. No. 52049. 1000 m. S. of Naikotô: station 30; Reg. No. 52055. 700 m. E. of Naikotô: station 31; Reg. No. 52031. 900 m. NW. of Keiyukwa: station 33; Reg. No. 52053. Wangwa: station 35; Reg. No. 52192. 1200 m. E. of Zyô-tûsyôwan: station 36; Reg. No. 52048. Wangwa: station 37; Reg. No. 52037. 300 m. E. of Sankwakô: station 39; Reg. No. 52033. Wangwa: station 40; Reg. Nos. 52036, 52056. 500 m. E. of Sankwakô: station 41; Reg. No. 52044. 550 m. E. of Sankwakô: station 43; Reg. No. 52041. Keiyukwa: station 52; Reg. No. 52198. 1520 m. E. of Sinpo: station 68; Reg. No. 52189. 1550 m. E. of Sinpo: station 69; Reg. Nos. 52195, 52051. 300 m. E. of Hakusyaton; Reg. No. 37303. Between Kôsui and Zyuna; Reg. No. 37305. Western side of Syôgun-yama; Reg. No. 37319. 300 m. E. of Zyô-tûsyôwan; Reg. No. 37306.

Geologic distribution: Pliocene of Honsyû, Kyûsyû, and Ryûkyû.

**Clavus (Brachytoma) crassitestulatus, n. sp.**

Pl. VI (I), Figs. 49a, 49b, 49c.

Shell small, ovately fusiform, of about 8, more or less shouldered whorls; spire conical in lateral outline, short, about equal in length to aperture and canal. Whorls with about 11, prominent, nearly straight, vertical rounded ribs, broader than their interspaces. On body-whorl, ribs obsolete below periphery, totally disappearing at base. Surface marked by many, distinct rather irregular revolving threads, about 4 above shoulder and 3 below it; latter on lower two whorls associated with a smaller one in each interspace. Periphery rounded; base rather abruptly narrowed towards canal with subequal revolving cords and slightly wider interspaces. Aperture narrow with large and distinct sinus situated at middle of sloping surface above shoulder; outer lip thin and sharp, smooth within, obsoletely crenate at edge corresponding to external sculpture; inner lip smooth with thin and narrowly spread callosity; columella slightly curved; canal short, nearly straight. Test rather heavy and solid.

One specimen lacking apical whorls; ca. 14 mm. in height, and 6.6 mm. in diameter.

No similar form has hitherto been described from Japan and eastern Asia both recent and fossil.

Fossil occurrence: Byôritu Beds.—400 m. SE. of Zyô-tûsyôwan: station 13; Reg. No. 53739.

**Clavus (Brachytoma) turriculoides**, n. sp.

Pl. VI (1), Figs. 34a, 34b.

One specimen lacking its apex.

Shell small, fusiform, with aperture and canal nearly equal to spire in length. Preserved whorls 5, convex, with 9 or 10, rather prominent, slightly oblique axial ribs and narrower interspaces; ribs on last whorl not extending below periphery. Entire surface covered with numerous, small, unequal concentric threads; threads finer on upper surface of whorls than on lower; flexuous growth lines not well marked, and scarcely visible under a lens. Periphery distinctly rounded, rather abruptly narrowed towards base. Outer lip fractured; columella and canal curved. Height, ca. 14 mm.; diameter, ca. 5.5 mm.

This species resembles "*Pleurotoma (Surcula)*" *dijki* MARTIN<sup>1)</sup> from the Neogene of Java, but is mainly distinguishable from that species by its broader shell, with a trifle shorter canal and covered by more numerous spiral threads.

Fossil occurrence: Byôritu Beds.—1200 m. E. of Zyô-tûsyôwan: station 36; Reg. No. 53460.

**Clavus (Brachytoma) species indet.**

One rather small and slender *Clavus* resembling "*Pleurotoma*" *bataviana*<sup>2)</sup> and "*Pleurotoma*" *tjemoroënsis*,<sup>3)</sup> both described by MARTIN from the Pliocene of Java, but an accurate determination is impossible due to the greater part of the canal being fractured.

Fossil occurrence: Byôritu Beds.—1100 m. NE. of Hakusyaton: station 9; Reg. No. 52248.

Genus **Cythara** SCHUMACHER, 1817**Cythara hiradoensis** (MAKIYAMA), 1927

*Cythereella hiradoensis*. MAKIYAMA, Mem. Coll. Sci. Kyôto Imp. Univ., Ser. B, Vol. 3, No. 1, Art. 1, p. 110, Pl. 5, fig. 12, 1927.

Two specimens exactly agree in form and sculpture with the named species, though slightly smaller.

Type locality: Tôtômi, Central Honsyû; Pliocene.

Fossil occurrence: Byôritu Beds.—Wangwa: station 8; Reg. No. 52203. Wangwa: station 15; Reg. No. 52201.

Living: Hirado, Hizen, Kyûsyû.

Geologic distribution: Pliocene of Central Honsyû.

1) MARTIN: Tiefb. auf Java, p. 62, Pl. 4, fig. 62, 1887.

2) MARTIN: Foss. von Java, Vol. 1, p. 43, Pl. 8, fig. 108, 1906.

3) MARTIN: *ibid.*, p. 205, Pl. 43, fig. 705, 1906.

Genus *Mangelia* RISSO, 1826Subgenus *Mangelia* s. s.*Mangelia (Mangelia) perparva* (YOKOYAMA), 1927

*Mangilia perparva*. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 33, Pl. 2, fig. 2, 1928.

Two well preserved specimens. This species is said to be related to "*Mangilia*" *parva* TOKUNAGA from the Pleistocene deposits in the environs of Tôkyô, by which the specific name "*perparva*" was introduced.

The generic name has hitherto been often erroneously spelled "*Mangilia*" by many authors.<sup>1)</sup>

Type locality: Sikô, Taiwan; Pliocene.

Fossil occurrence: Byôritu Beds.—1450 m. W. of Hokkô: station 14; Reg. No. 52207. 700 m. NE. of Nanseizan: station 19; Reg. No. 52245. 300 m. E. of Zyô-tûsyôwan; Reg. No. 37330.

Geologic distribution: Known only from the Pliocene of Taiwan.

*Mangelia (Mangelia) pyramis* (HINDS), 1843

Pl. VI (I), Figs. 51a, 51b.

*Pleurotoma pyramis*. REEVE, Conch. Icon., Vol. 1, Pl. 18, fig. 147, 1843.

Two specimens, unfortunately lacking apical whorls and outer lips, but otherwise agreeing well with the following description given by REEVE:

"Shell elongately pyramidal, somewhat club-shaped anteriorly; white, angularly ribbed, six-sided, transversely very closely striated, ribs sharp, flowing one under the other; lip thickened, sinus broad and rather superficial; aperture small, canal very short".

Type locality: Straits of Maccassar; Recent.

Fossil occurrence: Byôritu Beds.—1000 m. NW. of Rinsuikwa: station 5; Reg. No. 52222. 900 m. NW. of Rinsuikwa: station 6; Reg. No. 52223.

*"Mangelia" bosihoensis*, n. sp.

Pl. VI (I), Figs. 55a, 55b.

Shell small, slender, turreted; test rather thin. Whorls about 8 in number, apical 2 nucleal, smooth and convex; the third whorl, angular, but smooth; remaining ones strongly angulated at middle by sharp revolving ridges with about 10 small ribs or nodes; ribs separated by interspaces of different width, but in general narrower than ribs; surface sloped, or more or less concave above angle, almost vertical below it. Suture well defined by fine supra-sutural and slightly larger sub-sutural threads. Body-whorl nearly half of shell-height, biangulate, upper angle larger; periphery angulated; base abruptly narrowed, ornamented by numerous, fine, but distinct spiral lirae. Aperture small, ovate; outer lip thin, arched forwardly, and smooth

1) GRANT and GALE: Mem. San Diego Soc. Nat. Hist., Vol. 1, p. 585, 1931.

within; sinus large and deep, situated nearer to carina than to suture; inner lip smooth; columella straight; canal short and slightly oblique. Height, 5.5 mm.; diameter, 2—mm.

Fossil occurrence: Byôritu Beds.—1000 m. E. of Hakusyaton: station 25; Reg. No. 52242. S. of Bôsiho: station 7; Reg. No. 37385.

“*Mangilia*” species indet.

A fragmental specimen lacking its apex, about 2 mm. broad. Resembles the preceding one in general features, but its whorls less angulated, axial ribs fewer and more prominent, and periphery less angulated.

Fossil occurrence: Byôritu Beds.—S. of Bôsiho; Reg. No. 52243.

Genus *Lienardia* JOUSSEAUME, 1884

Subgenus *Lienardia* s. s.

*Lienardia* (*Lienardia*) *gainesi* (PILSBRY), 1895

*Clathurella?* *gainesi*. PILSBRY, Cat. Mar. Moll. Jap., p. 20, Pl. 2, fig. 4, 1895.

*Clathurella* *gainesi*. YAGURA, Cat. Moll. Hyôgo-ken, p. 47, No. 612, 1932.

*Lienardia* *gainesi*. YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 50, No. 1736, 1931; NOMURA, Sci. Rep. Tôhoku Imp. Univ., Ser. 2 (Geol.), Vol. 15, No. 2, p. 120, No. 386, 1932.

One well preserved specimen; height, 7.5 mm., diameter, a little less than 3 mm. The shell has 8 angular whorls which are coarsely latticed by revolving threads and longitudinal plicae except for a few apical ones which are smooth and globular. Outer lip considerably thickened to varix.

“*Mangilia*” *sawanensis* YOKOYAMA<sup>1)</sup> from the Pliocene of Sado is perhaps identical with the present species. This shell is apparently related to *Clathurella rava* (HINDS) from the Philippines which is the type of this genus.

Type locality: Kamakura, Japan; Recent.

Fossil occurrence: Byôritu Beds.—500 m. SE. of Zyô-tûsyôwan: station 14; Reg. No. 52246.

Living: Northern to Western Honsyû; Japan Sea.

Geologic distribution: Post-Pleistocene of Central Honsyû; Pliocene of the Island of Sado, Japan Sea.

*Lienardia* (*Lienardia*) *hayasakai*, n. sp.

Pl. VI (I), Figs. 52a, 52b.

Shell resembling *L. gainesi* (PILSBRY) mentioned above in general aspect, small in size, rather narrowly fusiform, with spire nearly half shell-height. Whorls 8, apical 2 embryonal, smooth, globular, rather high and more or less loosely coiled; rest angulated at about middle,

1) YOKOYAMA: Jour. Fac. Imp. Univ. Tôkyô, Sec. 2, Vol. 1, Pt. 8, p. 263, Pl. 32, fig. 6, 1926.

surface flat and somewhat sloping above angle, vertical or more or less convex below it; suture distinct, impressed, bounded by a supra-sutural thread upon penultimate whorl. Surface of each mature whorl ornamented with about 12 rather small, subequidistant, axial plicae, crossed by small revolving ridges or striae; 2 revolving striae on each whorl of spire (one at angle and other below it) and 3 on body-whorl above periphery forming rather indistinct nodes or beads at point of intersection with plicae; no nodes on the sloping surface above the angle. Entire surface ornamented by very fine, obscure revolving striae as well as growth lines visible under lens. Periphery rounded, and passing into rather abruptly narrowed base with numerous rather distinct spiral striae. Aperture elongate ovate; outer lip thickened behind to varix, obsoletely dentate within; sinus deep, round at top, situated at angle of whorls; inner lip smooth, with moderate callosity; columella straight, but slightly oblique to left at base; canal short, broad, nearly straight, rather well differentiated from aperture.

A single specimen. Height, 8 mm.; diameter, 3 mm.

Distinguished from *L. gainesi*, only by finer sculpture, otherwise almost similar. The specific name is given for Dr. I. HAYASAKA, Prof. of the Taihoku Imperial University, Taiwan.

Fossil occurrence: Byōritu Beds.—400 m. SE. of Zyō-tūsyōwan: station 13; Reg. No. 52366.

#### **Lienardia (Lienardia?) keiyukwana, n. sp.**

Pl. VI (I), Figs. 54a, 54b.

Shell minute, ovate-fusiform; test rather thin. Whorls angulated, composed of 7 volutions, apical 3 embryonal, smooth and convex; rest sloping above, vertical below. Last whorl slightly longer than half shell-height, angulated at periphery and rather abruptly narrowed at base. Axially plicate and spirally striate; plicae 10 on last whorl, vertical, subequidistant, almost equal to interspaces in width, crossed by a series of beaded spirals on angle and below it. Suture rather distinct, provided with subsutural small lira. Aperture ovate, inner lip smooth, columella slightly oblique below; canal short, more or less twisted; outer lip somewhat fractured. Height, 4 mm.; diameter, 2 mm.

*L. gainesi* (PILSBRY), mentioned in this paper, is related to the present fossil in form and apparent sculpture, though different in details.

Fossil occurrence: Byōritu Beds.—Keiyukwa: station 52; Reg. No. 52247.

#### Subgenus **Etrema** HEDLEY, 1918

#### **Lienardia (Etrema) fortilirata (SMITH), 1879**

*Etrema fortilirata*. YOKOYAMA. Cat. Mar. Fresh-W. and Land Shells, Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 50, No. 1745, 1931.

*Drillia fortilirata*. SMITH, Proc. Zool. Soc., p. 195, Pl. 19, fig. 22, 1879: TRYON, Man. Conch., 1 Ser., Vol. 6, p. 207, Pl. 12, fig. 36, 1884: WEINKAUFF u. KOBELT in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 4, Pt. 3, p. 189, Pl. 38, fig. 10, 1887: PILSBRY, Cat. Mar. Moll. Jap., p. 16, 1895: YOKOYAMA, Jour. Fac. Sci. Imp. Univ. Tôkyô, Sec. 2, Vol. 1, Pt. 10, p. 410, Pl. 46, fig. 20, 1927.

Two specimens, both agree perfectly with the Musasino fossils as well as recent specimens collected from our seas. One of the specimens is about 8 mm. long and 2.5 mm. broad.

Type locality: Kyûsyû, Japan; Recent.

Fossil occurrence: Byôritu Beds.—Wangwa: station 8; Reg. No. 52243. Bôsiho: station 13; Reg. No. 54210. Wangwa: station 17; Reg. No. 52205. Wangwa: station 23; Reg. No. 52204. Bôsiho; Reg. No. 52241. 700 m. SW. of Kôkwan; station 23; Reg. No. 52255.

Living: Central Honsyû and Kyûsyû.

Geologic distribution: Pleistocene of Honsyû; Pliocene of Sikoku.

**Lienardia (Etrema) sintikuensis, n. sp.**

Pl. VI (I), Figs. 36a, 36b.

Shell small, slender, turreted, height slightly exceeding three times diameter, consisting of 11 whorls; apical 3 embryonal, rather smooth; the rest sub-angulated a little below middle, somewhat constricted above and below angle. Suture rather minutely channeled, well defined by one upper and one lower marginal thread; threads undulated, lower one larger. Each whorl ornamented by 10, small, vertical plicae separated by interspaces of nearly same breadth and crossed by unequal spiral series of beads; spirals 4 on whorls of spire, the second from lower suture largest and at angle. Body-whorl above periphery sculptured by alternating spirals, of which one at angle and one at periphery being larger than others. Base contracted with obsolete axial plicae and two kinds of spirals, the lowest 4 especially larger. Entire surface covered by numerous obscure growth lines, flexuous at angle. Aperture ovate, narrowed into a short and oblique canal; outer lip fractured, lirate within; inner lip smooth; columella rather straight, slightly oblique to left at lower. Sinus situated at angle of whorl, indicated by flexuous growth lines.

One specimen. Height, 13 mm., diameter, 4 mm. No allied forms are found among the hitherto described species both fossil and recent in Japan and eastern Asia.

Fossil occurrence: Byôritu Beds.—1100 m. E. of Hakusyaton: station 3; Reg. No. 52254.

Genus **Daphnella** HINDS, 1844

**Daphnella subzonataeformis, n. sp.**

Pl. VI (I), Figs. 50a, 50b, 50c.

Shell resembling *Daphnella subzonata* SMITH in general aspect, rather small, elongate-ovate, consisting of 9 whorls; apical two globular, apparently smooth, upper-most being oblique to the second; the rest more or less angulated at two-thirds of length of whorl; sloping above, and convex below angle. Surface ornamented by longitudinal costae and spiral lirae; costae slightly oblique and rounded, separated by much wider interspaces, 12 on body-whorl, obsolete at base; lirae very unequal, distinct below, almost obsolete above angle, 20 on body-whorl; each interspace provided with a finner one; lirae fewer on upper whorls, about 8 on penultimate of which two are larger than the other. Aperture shorter than spire, broad; outer lip evenly arcuate, thickened by terminal costa, apparently smooth within; inner lip smooth; columella slightly oblique to left at lower; canal short, wide and slightly recurved; sinus small, but well marked, situated close to suture.

One specimen. Length, 16 mm., diameter, 6.5 mm.

This species is distinguishable from *Daphnella subzonata* SMITH<sup>1)</sup> mainly in being a trifle broader, and has fewer and more distinct costae; farther the whorls of the Formosan fossil are more or less angulated instead of well rounded as in SMITH's species.

Fossil occurrence: Byōritu Beds.—Sikō; Reg. No. 52202.

### Family Cancellariidae

Genus *Cancellaria* LAMARCK, 1799

Subgenus *Cancellaria* s. s.

#### *Cancellaria* (*Cancellaria*) *spengleriana* DESHAYES, 1830

*Cancellaria spengleriana*. YOKOYAMA, Jour. Coll. Sci. Imp. Univ. Tōkyō, Vol. 39, Art. 6, p. 44, Pl. 2, figs. 2, 3, 1920.

One large fragmental specimen.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Byōritu Beds.—500 m. SE. of Zyō-tūsyōwan: station 14; Reg. No. 53109.

Living: Widely distributed in Japan from North to South. China. The Philippines. Australia.

Geologic distribution: Post-Pleistocene, Pleistocene and Pliocene of Honsyū. Pliocene of Sikoku.

#### *Cancellaria* (*Cancellaria*) *reeveana* CROSSE, 1863

Pl. VI (I), Fig. 62.

*Cancellaria reeveana*. DUNKER, Ind. Moll. Mar. Jap., p. 104, 1882: LISCHKE, Jap. Meeres-Conch., Vol. 2, p. 56, 1871: LOEBBECKE in MARTINI u. CHEMNITZ, Syst. Conch., Cab., Vol. 4, Pt. 4, p. 12, Pl. 2, figs. 1-9, 1887: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 46, No. 1586, 1931: YAGURA, Cat. Moll. Hyōgo-ken, p. 45, No. 586, 1932: KURODA, Cat. Moll., Hukui-ken, p. 190, No. 191, 1933: NOMURA and ZINBŌ, Sci. Rep. Tōhoku Imp. Univ., Ser. 2 (Geol.), Vol. 16, No. 2, p. 133, No. 109, 1934.

*Cancellaria elegans*. SOWERBY, Thes. Conch., Vol. 2, p. 446, Pl. 93, fig. 63; Pl. 94, fig. 104, 1855: REEVE, Conch. Icon., Vol. 10, Pl. 3, fig. 12a, b, 1856. (non DESHAYES).

*Cancellaria asperella*. TRYON, Man. Conch., 1 Ser., Vol. 7, p. 74, 1885 (pars) (non LAMARCK).

?*Cancellaria asperella* LAMARCK, var. *reeviana*. YOKOYAMA, Jour. Coll. Sci. Tōkyō Imp. Univ., Vol. 44, Art. 1, p. 46, Pl. 2, fig. 2, 1922.

Several well preserved specimens. This is a globose shell, which is beautifully cancellated. The form and the sculpture of this species are considerably variable. A specimen which has fewer longitudinal plicae, and with somewhat longer spire than that of the type is called *C. laticosta*. This varietal form is also found in our collection. *C. sinensis* REEVE, *C. subsinensis* KOBELT and *C. melanostoma* are considered to be synonyms.

1) SMITH: Proc. Zool. Soc., p. 197, Pl. 19, fig. 21, 1879.

Annexed are some of the measurements (in mm.):

	1	2	3	4	5
Height . . . . .	36.0	34.4	34.0	24.2	22.4
Diameter . . . .	23.0	19.0	21.0	8.3	14.8

Type locality: Eastern Asia; Recent.

Fossil occurrence: Byôritu Beds.—1100 m. SW. of Taikwa: station 11; Reg. No. 53120. Wangwa: station 15; Reg. No. 53116. Wangwa: station 16; Reg. No. 53115. Wangw: station 33; Reg. No. 53121. Wangwa: station 39; Reg. No. 53118. 500 m. E. of Sankwakô: station 41; Reg. No. 53117. N. of Kityô; Reg. No. 53119.

Living: Central Honsyû to Kyûsyû. Japan Sea. The Philippines.

Geologic distribution: Post-Pleistocene, Pleistocene and Pliocene of Honsyû; Pleistocene of Kikai-zima; Miocene of Java.

### **Cancellaria (Cancellaria) macrospira** ADAMS and REEVE, 1850

Pl. VI (I), Fig. 61.

*Cancellaria macrospira*. REEVE, Conch. Icon., Vol. 10, Pl. 11, figs. 50a, b, 1856: DUNKER, Ind. Moll. Mar. Jap., p. 104, 1882. TRYON, Man. Conch., 1 Ser., Vol. 7, p. 76, Pl. 4, fig. 67, 1885: LOBBECKE in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 4, Pt. 4, p. 56, Pl. 16, figs. 7, 8, 1887: PILSBRY, Cat. Mar. Moll. Jap., p. 22, 1895.

Two specimens. Shell small in size, with high spire. Whorls 7, apical two embryonal, smooth and globular; the rest convex and ornamented by longitudinal plicae and several unequal spiral threads making surface finely cancellated. Suture distinctly channeled. Columellar plaits 3, rather strong and oblique. The number of longitudinal plicae is considerably variable; in our smaller specimen the plicae are 23, but in the larger (figured) there are only 15.

Type locality: The Far East; Recent.

Fossil occurrence: Byôritu Beds.—1000 m. E. of Hakusyaton: station 4; Reg. No. 53114. 900 m. SE. of Naikotô: station 66; Reg. No. 53113.

Living: Japan. China. Borneo.

#### Subgenus **Trigonostoma** BLAINVILLE, 1827

### **Cancellaria (Trigonostoma) taiwanensis** n. sp.

Pl. VI (I), Figs. 60a, 60b.

Shell small, nearly ovate in general outline, widely umbilicate; test thick and solid. Whorls, 7, the apical two embryonal, smooth and globular; the rest, moderately convex, excavately channelled along sutures. Surface sculptured with strong axial ribs and obsolete spiral threads; ribs 9 on last whorl, narrow, sharp on top, oblique and much narrower than concave interspaces; spirals rather distinct, irregular, stronger on ribs than in interspaces. Aperture ovate, nearly equal to spire in length; outer lip thickened by a terminal rib, transversely finely lirate within; columella straight, with three oblique folds, upper-most being largest and lower-most smallest. Height, 18.4 mm.; diameter, 12 mm.



No allied forms have been reported from the Oriental regions except *C. bicolor* HINDS<sup>1)</sup> which is nearly similar in form but not in sculpture.

Fossil occurrence: Byôritu Beds.—Sikô; Reg. No. 48985.

### Family *Olividae*

Genus *Oliva* BRUGUIÈRE, 1789

#### *Oliva mustellina* LAMARCK, 1811

*Oliva mustellina*. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 34, Pl. 2, fig. 5, 1928.

Several well preserved specimens. The original zigzag color markings are fairly well preserved in some specimens.

Type locality: Eastern Sea.

Fossil occurrence: Byôritu Beds.—600 m. E. of Rinsuikwa: station 4; Reg. No. 53777. 900 m. NW. of Hokkô: station 6; Reg. No. 53769. Wangwa: station 11; Reg. No. 53768. 400 m. SE. of Zyô-tûsyôwan: station 13; Reg. No. 53767. 500 m. SE. of Zyô-tûsyôwan: station 14; Reg. No. 53766. Wangwa: station 24; Reg. No. 53776. Wangwa: station 26; Reg. No. 53778. On road, S. of Bôsiho; Reg. No. 37310. Sinsui; Reg. No. 37439.

Raised Coral Reef.—S. of Sisitô; Reg. No. 37478.

Living: Central Honsyû to Taiwan. Japan Sea. China. Singapore.

Geologic distribution: Pliocene of Honsyû, Sikoku and Kyûsyû.

#### *Oliva ispidula* (LINNAEUS), 1758

Pl. VII (II), Fig. 16.

*Oliva ispidula*. REEVE, Conch. Icon., Vol. 6, Pl. 17, fig. 34, 1850: WEINKAUFF in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 5, Pt. 1, p. 34, Pl. 4, figs. 1-4, 6-10, 15, 16, 18, 19, 1878: SOWERBY, Thes. Conch., Vol. 4, p. 21, Pl. 16, figs. 240-254, 1880: TRYON, Man. Conch., 1 Ser., Vol. 5, p. 86, Pl. 33, figs. 34-43, 29, 38, 1883: PILSBRY, Cat. Mar. Moll. Jap., p. 23, 1895: SUGITANI, Cat. Luchu Shells, p. 29, 1926: KURODA, Cat. Shell-bearing Moll. Amami-Ôsima, p. 69, No. 857, 1928: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 47, No. 1909, 1931.

Several well preserved specimens, some of them retain their original color markings.

Like the preceding in general respects, but is invariably smaller, and has a higher spire. Height, 23 mm.; diameter, 9.7 mm.

Type locality: The Philippines; Recent.

Fossil occurrence: Raised Coral Reef.—S. of Sisitô; Reg. No. 37461.

Living: Southern Kyûsyû and Ryûkyû. The Philippines. Fiji Island. Indian Ocean.

Geologic distribution: Pliocene of Java, Sumatra and Timor; Miocene of Java and Sumatra.

1) TRYON: Man. Conch., 1 Ser., Vol. 7, p. 79, Pl. 5, fig. 86; Pl. 6, figs. 89, 90, 1885,

Genus *Olivella* SWAINSON, 1840*Olivella spretooides* YOKOYAMA, 1922

Pl. VII (II), Fig. 18.

*Olivella spretooides*. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 35, Pl. 1, fig. 14, 1928.

Several well preserved specimens. The Formosan specimens in our possession are generally more globose than the types figured by Dr. YOKOYAMA, hence our shells may be regarded as variants, or distinct species.

Type locality: Central Honsyû, Japan; Pleistocene.

Fossil occurrence: Byôritu Beds.—Hakusyaton: station 1; Reg. No. 53774. 1000 m. NW. of Rinsuikwa: station 5; Reg. No. 53770. 900 m. NW. of Rinsuikwa: station 6; Reg. No. 53780. Wangwa: station 8; Reg. No. 53773. 500 m. SE. of Zyô-tûsyôwan: station 14; Reg. No. 53785. 510 m. SE. of Zyô-tûsyôwan: station 15; Reg. No. 53786. Wangwa: station 18; Reg. No. 53881. 700 m. NE. of Nanseizan: station 19; Reg. No. 53787. 700 m. SW. of Kôkwan: station 23; Reg. No. 53783. Wangwa: station 24; Reg. No. 53775. 700 m. E. of Naikotô: station 31; Reg. No. 53789. Wangwa: station 32; Reg. No. 53781. 900 m. NW. of Keiyukwa: station 33; Reg. No. 53772. 1200 m. E. of Zyô-tûsyôwan: station 36; Reg. No. 53779. Wangwa: station 38; Reg. No. 53788. 500 m. E. of Sankwakô: station 41; Reg. No. 53771. 550 m. E. Sankwakô: station 43; Reg. No. 53782. 1520 m. E. of Sinpo: station 68; Reg. No. 53849. 1550 m. E. of Sinpo: station 69; Reg. No. 53782. Between Kôsui and Zyuna; Reg. No. 37332. S. of Bôsiho; Reg. No. 37420.

Geologic distribution: Pleistocene and Pliocene of Honsyû; Pliocene of Sikoku.

*Olivella pulicaria* (MARRATT), 1871

Pl. VII (II), Fig. 17.

*Olivella pulicaria*. KURODA, Cat. Shell-bearing Moll. Amami-Ôsima, p. 69, No. 863, 1928.*Oliva (Olivella) pulicaria*. WEINKAUFF in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 5, Pt. 1, p. 158, Pl. 39, fig. 12, 1878.*Oliva pulicaria*. MARRATT in SOWERBY, Thes. Conch., Vol. 4, p. 41, Pl. 20, fig. 464, 1880.*Olivella lepta*, TRYON, Man. Conch., 1 Ser., Vol. 5, p. 69 (pars.), 1883.

Several well preserved specimens. The Formosan fossils agree with the description and figures of the named species, and also with the recent specimens collected from Ryûkyû.

Type locality: Unknown; Recent.

Fossil occurrence: Byôritu Beds.—700 m. E. of Hakusyaton: station 3; Reg. No. 53794. Wangwa: station 6; Reg. No. 53791. 550 m. SE. of Zyô-tûsyôwan: station 14; Reg. No. 53793. 1200 m. E. of Zyô-tûsyôwan: station 36; Reg. No. 53790. Wangwa: station 40; Reg. No. 53795. 940 m. NW. of Keiyukwa: station 55; Reg. No. 53792.

Living: Southern Kyûsyû and Ryûkyû.

Genus *Ancilla* LAMARCK, 1799*Ancilla rubiginosa* (SWAINSON), 1823

*Ancilla rubiginosa*. YOKOYAMA, Jour. Fac. Sci. Imp. Univ. Tôkyô, Vol. 1, Pt. 9, p. 334, Pl. 38, fig. 11, 1926; NOMURA and ZINBÔ, Sci. Rep. Tôhoku Imp. Univ., Ser. 2 (Geol.), Vol. 16, No. 2, p. 133, No. 110, 1934.

Three well preserved specimens. One measures: 33.3 mm. in height and 15 mm. in diameter. *A. mammilata* (HINDS), *A. albocallosa* (LISCHKE), *A. hinomotoensis* YOKOYAMA<sup>1)</sup> and *A. okawai* YOKOYAMA<sup>2)</sup> may perhaps prove to be only varietal forms of the present species by future study, but now I shall leave this question open.

Type locality: Indian Ocean.

Fossil occurrence: Byôritu Beds.—Sikô; Reg. No. 48972.

Living: Central Honsyû to Ryûkyû. China. Malacca. Indian Ocean.

Geologic distribution: Pleistocene and Pliocene of Honsyû; Pleistocene of Kikai-zima; Pliocene of Sikoku and Kyûsyû.

### Family Marginellidae

Genus *Persicula* SCHUMACHER, 1817

Subgenus *Persicula* s. s.

*Persicula* (*Persicula*) *bernardii* (LARGILLIER), 1845

Pl. VII (II), Fig. 19.

*Marginella bernardii*. REEVE, Conch. Icon., Vol. 15, Pl. 10, fig. 38, 1864: WEINKAUFF in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 5, Pt. 6, p. 45, Pl. 8, figs. 14, 15, 1879: TRYON, Man. Conch., 1 Ser., Vol. 5, p. 31, Pl. 9, fig. 76, 1883.

Several fine specimens. A well preserved specimen, 23 mm. in height and 13.5 mm. in diameter.

The shell is cylindrically oblong in outline with an immersed spire. The columella has six plications, of which the upper ones are nearly horizontal, the lower being oblique and stouter.

"*Marginella*" *tricincta* HINDS and "*Marginella*" *quinqueplicata* LAMARCK var. *minor* MARTIN are nearly similar in form with the present species, but the columellar folds of these shells are said to be five in number.

Type locality: China; Recent.

Fossil occurrence: Byôritu Beds.—400 m. SE. of Zyô-tûsyôwan: station 13; Reg. No. 53907. Wangwa: station 14; Reg. No. 53909. Wangwa: station 23; Reg. No. 53908. 300 m. E. of Sankwakô: station 39; Reg. No. 53906. Sikô; Reg. No. 49413. 300 m. E. of Hakusyatton; Reg. No. 37344.

Living: China Sea.

### Family Volutidae

Genus *Voluta* LINNAEUS, 1758

*Voluta sikoensis*, n. sp.

Pl. VI (I), Figs. 5a, 5b.

Shell medium in size, oblong fusiform, rather solid, consisting of 5½ convex whorls, apical 1½ embryonic, large, smooth and globular. Surface of post-embryonic whorls sculptured

1) YOKOYAMA: Jour. Coll. Sci. Tôkyô Imp. Univ., Vol. 44, Art. 1, p. 48, Pl. 2, fig. 5, 1922.

2) YOKOYAMA: Jour. Coll. Sci. Tôkyô Imp. Univ., Vol. 45, Art. 2, p. 7, Pl. 1, figs. 4-7, 1923.

with fine transverse striae and longitudinal growth lines, the former obsolete in the middle part of body-whorl. Aperture two times longer than spire; outer lip a little thickened, smooth within. Columella with 7, distinct folds in the type specimen.

Two specimens from the same locality. The paratype specimen differs from the type by having a smaller number of columellar folds (4 instead 7), otherwise quite similar.

Holotype: Height, 57 mm., diameter, ca. 23 mm.

Paratype: Height, 54 mm., diameter, 22 mm.

This species is quite characteristic in surface ornamentation, and no allied recent as well as fossil forms have hitherto been found in Japan and tropic Asia.

Fossil occurrence: Byôritu Beds.—Sikô; Reg. No. 48979.

#### Genus *Fulgoraria* SCHUMACHER, 1817

#### *Fulgoraria rupestris* (GMELIN), 1791

Pl. VII (II), Fig. 40.

*Fulgoraria rupestris*. YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 47, No. 1595, 1931: YAGURA, Cat. Moll. Hyôgo-ken, p. 45, No. 589, 1932.

*Voluta rupestris*. REEVE, Conch. Icon., Vol. 6, Pl. 6, fig. 14, 1849: LISCHKE, Jap. Meeres-Conch., Vol. 1, p. 68, 1869: LISCHKE, *ibid.*, Vol. 2, p. 59, 1871: TRYON, Man. Conch., 1 Ser., Vol. 4, p. 85, Pl. 24, figs. 41, 42, 1882: PILSBRY, Cat. Mar. Moll. Jap., p. 24, 1895.

*Voluta fulminata*. KÜSTER in MARTINI u. CHEMNITZ, Syst. Conch., Cab., Vol. 5, Pt. 6, p. 159, Pl. 22, figs. 5, 6, 1841: KIENER, Spec. Coq. viv., p. 46, No. 39, Pl. 42, fig. 1, 1835-1857: SOWERBY, Thes. Conch. Vol. 1, p. 209, No. 39, Pl. 50, figs. 51-53, 1847.

*Voluta fulgura*. DUNKER, Ind. Moll. Mar. Jap., p. 49, 1882.

Several specimens. Like *F. prevostiana* (CROSSE) in general respects, but the concentric grooves in the surface are more distinct and the whorls are more angular.

"*Voluta*" *hamilla* CROSSE and *Fulgoraria chinensis* SCHUMACHER are synonyms according to LISCHKE.

Type locality: The Far East; Recent.

Fossil occurrence: Byôritu Beds.—700 m. E. of Hakusyaton: station 3; Reg. No. 53904. Wangwa: station 24; Reg. No. 53901. Wangwa: station 33; Reg. No. 53905. Wangwa: station 40; Reg. No. 53902.

Living: Kyûsyû to Taiwan. Japan Sea. Tyôsen. China. Indian Ocean.

Geologic distribution: Pleistocene of Honsyû.

#### Genus *Cymbium* (BOLTEN) RÖDING, 1798

#### *Cymbium indicum* (GMELIN), 1791

*Cymbium indicum*. YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 46, No. 1591, 1931.

*Melo indica*. TRYON, Man. Conch., 1 Ser., Vol. 4, p. 80, Pl. 23, fig. 14, 1882.

A large, thin shelled specimen is represented by fragments. It may perhaps be the named species as is indicated by the preserved features.

Type locality: Indian Ocean.

Fossil occurrence: Byôritu Beds.—1000 m. E. of Hakusyaton: station 25; Reg. No. 53903.

Living: Taiwan. Indian Ocean.

Family **Vasidae**

Genus **Tudicla** (BOLTEN) RÖDING, 1798

**Tudicla cumingii** (JONAS), 1848

Pl. VII (II), Fig. 38.

*Tudicla cumingii*. TRYON, Man. Conch., 1 Ser., Vol. 3, p. 144, Pl. 58, figs. 407, 408, 1881.

*Fusus cumingi*. REEVE, Conch. Icon., Vol. 4, Pl. 17, fig. 67, 1848: KOBELT in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 3, Pt. 3b, p. 193, Pl. 62, figs. 5, 6, 1881.

*Fasciolaria iizukai*. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 37, Pl. 2, fig. 3, 1928.

Three well preserved and one imperfect specimens. The Formosan fossils are invariably low spired, and hence quite agree with figure No. 408 given by TRYON as *Tudicla couderti* PETIT which according to him is identical with *T. cumingii*.

*Fasciolaria iizukai* YOKOYAMA, cited above appears to me to be an immature individual of *T. cumingii*. One of the specimens measures 60 mm. in height, and 25 mm. in diameter. The others are nearly equal in size. This is not "*Fusus cumingii* CROSSE.

Type locality: China; Recent.

Fossil occurrence: Byôritu Beds.—Sikô; Reg. No. 48977.

Living: China seas.

Family **Vexillidae**

Genus **Mitra** LAMARCK, 1799

Subgenus **Scabricola** SWAINSON, 1840

**Mitra (Scabricola) sphaerulata** "MARTYN", 1784

*Mitra sphaerulata*. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 36, Pl. 2, fig. 4, 1928.

Several well preserved specimens, both large and small. The surface sculpture of the Formosan fossil resembles *M. scabricola* (LINNAEUS), but is much coarser. Below are some of the measurements (in mm.):

	1	2	3	4	5
Length .....	34.0	23.5	21.0	20.0	19.0
Diameter .....	12.5	8.4	8.4	8.0	7.0
Length of aperture ..	20.0	13.4	13.5	12.0	11.5

Type locality: The Philippines?; Recent.

Fossil occurrence: Byôritu Beds.—Hakusyaton: station 1; Reg. No. 53413. 1000 m. NW. of Rinsuikwa: station 5; Reg. No. 53511. 900 m. NW. of Rinsuikwa: station 6; Reg. No. 53531.

1100 m. SW. of Taikwa: station (?); Reg. No. 53538. Wangwa: station 12; Reg. No. 53536. 400 m. SE. of Zyô-tûsyôwan: station 13; Reg. No. 53525. 1450 m. W. of Hokkô: station 14; Reg. No. 53530. Wangwa: station 14; Reg. No. 53526. 510 m. SE. of Zyô-tûsyôwan: station 15; Reg. No. 53532. 700 m. SW. of Kôkwan: station 23; Reg. No. 53529. Kozantô: station 24; Reg. No. 53527. Wangwa: station 24; Reg. No. 53528. 1000 m. E. of Hakusyaton: station 25; Reg. No. 53533. 700 m. SE. of Hakusyaton: station 27; Reg. No. 53534. 500 m. E. of Sankwakô: station 41; Reg. No. 53540. 500 m. E. of Sankwakô: station 43; Reg. No. 53537. 300 m. S. of Sankwakô: station 44; Reg. No. 53539. Tyû-tûsyôwan: station 48; Reg. No. 53483. Hakusyaton; Reg. No. 53535. S. of Bôsiho; Reg. No. 37374.

Living: Southern Kyûsyû and Ryûkyû. The Philippines. Polynesia.

Geologic distribution: Pliocene of Java and Sumatra.

### **Mitra (Scabricola) yokoyamai, n. sp.**

Pl. VII (II), Figs. 25a, 25b.

*Mitra isabella*. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 35, Pl. 2, fig. 1, 1928 (non SWAINSON).

Shell resembling *M. isabella* SWAINSON in general aspects, large, longly fusiform, narrowly umbilicate with long spire; whorls about 10 in number, slightly convex, separated by well impressed sutures. Surface latticed by crossing of numerous spiral cords and longitudinal threads. Spiral cords about 10 on penultimate whorl and 30 or more on body-whorl, rounded; interspaces nearly equal to cords in breadth; no interstitial smaller cords except on basal part of shell. Longitudinal threads numerous, rather fine and somewhat irregular in strength. Aperture narrow much longer than spire with truncate base. Columellar folds 5, distinct oblique, becoming weaker towards lower; outer lip thin and smooth within.

This species is strongly related to *M. isabella* SWAINSON which lives in the water adjacent to Japan and China, but it has a finer and greater number of spiral cords; further the interspaces between cords are much narrower than in that species.

Length, 61.5 mm.: diameter, 17 mm.: length of aperture, 32 mm. (from the figure of Dr. YOKOYAMA).

Fossil occurrence: Byôritu Beds.—Wangwa: station 33; Reg. No. 53514.

### Subgenus **Cancilla** SWAINSON, 1840

### **Mitra (Cancilla) filaris** (LINNAEUS), 1771

Pl. VII (II), Fig. 24.

*Mitra (Cancilla) filaris*. KURODA, Cat. Shell-bearing Moll., Amami-Ôsima, p. 54, No. 631, 1928: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Imp. Geol. Surv. Jap., p. 38, No. 1262, 1931.

*Mitra filaris*. KÜSTER in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 5, Pt. 2, p. 63, Pl. 12, figs. 5, 6, 1841: TRYON, Man. Conch., 1 Ser., Vol. 4, p. 138, Pl. 40, figs. 174-176, 180, 1882.

One specimen lacking its apical portion; diameter, 12 mm.

Shell fusiformly cylindrical, umbilicate. Whorls almost flat, slightly shouldered at summit. Surface of each whorl ornamented by spiral ridges and longitudinal threads. Ridges sharp and

distinct, about 12 on body-whorl and 4 on penultimate; these are separated by wider interspaces provided with 3 or 4 irregular small spiral cords on lower whorls. Longitudinal threads fine and numerous, but very distinct, making by intersection of spirals, a series of small, granular, revolving bands. Aperture narrow, somewhat dilate in front; outer lip thin, slightly contracted at upper part, grooved within, and corresponding to external sculpture; columellar folds 5, oblique and distinct being weaker towards lower.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Raised Coral Reef.—S. of Sisitô; Reg. No. 37509.

Living: Southern Kyûsyû to Ryûkyû. The Philippines. Mauritius. Polynesia.

Geologic distribution: Post-Pliocene of Celebes.

**Mitra (Cancilla) flammea QUOY, 1832**

Pl. VII (II), Fig. 20.

*Mitra (Cancilla) flammea*. FISCHER, Paläont. von Timor, Vol. 15, p. 83, 1927.

*Mitra flammea*. KÜSTER in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 5, Pt. 2, p. 68, Pl. 12, figs. 16, 17, 1841: TRYON, Man. Conch., 1 Ser., Vol. 4, p. 140, Pl. 41, figs. 190-193, 195-197, 199, 200, 1882: MARTIN, Foss. von Java, Vol. 1, p. 76, Pl. 11, figs. 170, 171, 1906: TESCH, Paläont. von Timor, Vol. 5, p. 45, Pl. 79, fig. 96, 1915.

*Mitra interlirata*. REEVE, Conch. Icon., Vol. 2, Pl. 10, fig. 70, 1844.

Numerous fine specimens. The shell is longly fusiform in form, with spire shorter than aperture. Whorls about 9, slightly convex, beautifully sculptured with revolving cords and longitudinal threads. Interspaces wider than cords themselves, each of them being generally provided with a single thread on both penultimate and body-whorl. Columella straight, bearing 4, oblique and distinct folds.

Annexed are some of the measurements (in mm.):

	1	2	3	4	5
Height .....	39.5	39.0	29.0	25.8	25.6
Diameter .....	13.0	13.0	9.3	8.7	8.4
Length of aperture ..	24.5	23.0	17.0	16.0	15.3

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Byôritu Beds.—1000 m. NW. of Rinsuikwa: station 5; Reg. No. 53516. 900 m. NW. of Rinsuikwa: station 6; Reg. No. 53521. Nanseizan: station 11; Reg. No. 53518. Wangwa: station 24; Reg. No. 53515. Wangwa: station 35; Reg. No. 53524. Keiyukwa: station 50; Reg. No. 53520. Keiyukwa: station 52; Reg. No. 53517. 1200 m. SE. of Sankwakô: station 60; Reg. No. 53523. 900 m. SE. of Naikotô: station 66; Reg. No. 53519. Sikô; Reg. No. 48995. Sôkeisi; Reg. No. 53522.

Living: Southern Kyûsyû and Ryûkyû. The Philippines. Molucca. Polynesia. Sandwich Islands. Australia.

Geologic distribution: Pliocene of Java, Timor and Seran; Miocene of Java, Sumatra, Borneo and Nias.

**Mitra (Cancilla?) astenostomoides, n. sp.**

Pl. VII (II), Figs. 22a, 22b, 23a, 23b.

Two specimens.

Shell small, slender, spire exceeding body-whorl in length. Whorls  $8\frac{1}{2}$ , apical  $2\frac{1}{2}$  embryonal, smooth and globular; the rest slightly convex, separated by well impressed sutures. Surface granular by intersection of transverse ridges and numerous, somewhat oblique axial threads. Ridges rather sharp on top, 4 on each whorl of spire and 12 (including basal ridges) on body-whorl, separated by grooves which are nearly equal to or slightly broader than ribs themselves. Grooves on lower whorls, often provided with an intercalating thread. Columellar folds 4, oblique and distinct. Outer lip fractured in both specimens. The larger specimen which is somewhat pathologic in growth measures 17 mm. in height, and 5 mm. in diameter.

This species is characterized by its small and elongate shell with a tolerably long spire and is somewhat related to a certain species of *Astenostoma* in form. No similar species has hitherto been recorded from Japan as well as other Oriental regions both recent and fossil.

Fossil occurrence: Byōritu Beds.—510 m. SE. of Zyō-tūsyōwan: station 15; Reg. No. 53557. 940 m. NE. of Keiyukwa: station 55; Reg. No. 53556.

**Mitra (Cancilla) pruinosa REEVE, 1844**

Pl. VII (II), Fig. 26.

*Mitra pruinosa*. REEVE, Conch. Icon., Vol. 2, Pl. 22, fig. 11, 1844: SOWERBY, Thes. Conch., Vol. 4, p. 11, Pl. 376, fig. 565, 1880: TRYON, Man. Conch., 1 Ser., Vol. 4, p. 142, Pl. 41, fig. 215, 1882.

REEVE described this species as: "Shell ovately fusiform, spire acuminate, decussately engraved with longitudinal and transverse impressed lines; columella four plaited."

The two specimens which were examined agree well with REEVE's type figure, although they are somewhat water-worn and lack their nuclear whorls. The columellar folds are five in the Formosan fossils; this is the only difference noticed between this and the type. One of the specimens measures ca. 22 mm. in height, and 7 mm. in diameter.

Type locality: Unknown; Recent.

Fossil occurrence: Byōritu Beds.—400 m. SE. of Zyō-tūsyōwan: station 13; Reg. No. 53555. 700 m. SW. of Kōkwan: station 23; Reg. No. 53554.

Living: No authorities give the habitat of this species.

**Subgenus Chrysame H. and A. ADAMS, 1853****Mitra (Chrysame) rutila A. ADAMS, 1851**

Pl. VII (II), Fig. 21.

*Mitra rutila*. SOWERBY, Thes. Conch., Vol. 4, p. 19, No. 257, Pl. 353, fig. 221, 1881: TRYON, Man. Conch., 1 Ser., Vol. 4, p. 151, Pl. 44, fig. 299, 1882.



An imperfect specimen having only two lower whorls. It is 15 mm. broad, ca. 45 mm. high, and fusiform in shape with the whorls somewhat convex. The surface is sculptured by obsolete grooves, which are rather well marked on the basal part. The outer lip is thin and contracted in the middle. The inner lip has 4 oblique folds, of which the lowest is very weak and indistinct.

The specimen is not unlike an elongate variety of *M. scutulata* LAMARCK living in Southern Japan and farther south, but it is seemingly more elongated. In form, our fossil shell is almost similar to *M. rutila* A. ADAMS figured by SOWERBY, a living species from an unknown locality, and hence it is provisionally referred to that species.

Type locality: Unknown; Recent.

Fossil occurrence: Byôritu Beds.—Tyû-tûsyôwan: station 48; Reg. No. 53553.

Living: Unknown.

#### **Mitra** species indet.

A small, imperfect specimen, ovate in form. The surface with equal revolving cords (6 on the penultimate whorl) separated by interspaces which are generally narrower than the cords themselves. The entire surface is covered with fine incremental lines. The columella folds are 4 in number, oblique, and distinctly disposed. Diameter, about 4 mm.

Fossil occurrence: Byôritu Beds.—1200 m. SE. of Sankwakô: station 60; Reg. No. 53549.

### Genus **Vexillum** (BOLTEN) RÖDING, 1798

#### Subgenus **Pusia** SWAINSON, 1840

#### **Vexillum (Pusia) gembacanum** (MARTIN), 1887

*Mitra gembacana*. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 37, Pl. 2, fig. 6, 1928.

This small neat shell which has already been mentioned by Dr. YOKOYAMA from the Byôritu Beds of Taiwan is represented in our collection by many well preserved specimens.

The whorls are invariably somewhat shouldered or gradate, but the form of the shell and the number of longitudinal plicae seem to be variable to some extent.

Type locality: Java; Pliocene.

Fossil occurrence: Byôritu Beds.—Wangwa: station 14; Reg. No. 53543. 550 m. SE. of Zyô-tûsyôwan: station 16; Reg. No. 53545. 600 m. SE. of Zyô-tûsyôwan: station 17; Reg. No. 53547. Wangwa: station 23; Reg. No. 53546. Wangwa: station 40; Reg. No. 53544. Tyû-tûsyôwan: station 47; Reg. No. 53548. 1000 m. E. of Zyô-tûsyôwan: station 59; Reg. No. 53542. Western side of Syôgun-yama; Reg. No. 37347. E. of Gokô; Reg. No. 37425. 3000 m. E. of Zyô-tûsyôwan; Reg. No. 37369.

Geologic distribution: Pliocene of Java and Timor; Miocene of Java.

#### **Vexillum (Pusia) obeliscum** (REEVE), 1844

Pl. VII (II), Fig. 27.

*Vexillum (Costellaria) obeliscum*. YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 39, No. 1291, 1931: NOMURA and ZINBÔ, Sci. Rep. Tôhoku Imp. Univ. Ser. 2 (Geol.), Vol. 16, No. 2, p. 135, No. 116, 1934.

- Mitra obeliscus*. REEVE, Conch. Icon., Vol. 2, Pl. 15, fig. 107, 1844: MARTIN Foss. von Java, Vol. 1, p. 82, Pl. 12, figs. 182, 183, 1906: TESCH, Paläont. von Timor, Vol. 5, p. 49, Pl. 80, fig. 106, 1915.  
*Turricula obliques*. TRYON, Man. Conch., 1 Ser., Vol. 4, p. 179, Pl. 53, fig. 535, 1882: FISCHER, Paläont. von Timor, Vol. 15, p. 85, 1927.

Resembling the preceding in some respects, but is narrower in form, and has decidedly a greater number of longitudinal plicae; further the whorls are slightly more convex, having no distinct shoulder angle.

Type locality: The Philippines; Recent.

Fossil occurrence: Byôritu Beds.—700 m. SW. of Kôkwan: station 23; Reg. No. 53552.

Living: Western Honsyû. The Philippines. Viti Islands. Indo-Pacific.

Geologic distribution: Pleistocene of Kikai-zima; Post-Pliocene of Celebes; Pliocene of Java, Sumatra and Timor; Miocene of Java.

#### Family Fasciolaridae

#### Genus *Fusinus* RAFINESQUE, 1815

#### *Fusinus gracillinus* (ADAMS and REEVE), 1850

Pl. IX (IV), Fig. 6.

- Fusus gracillinum*. REEVE, Conch. Icon., Vol. 4, Pl. 18, fig. 69, 1848: KOBELT in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 3, Pt. 3b, p. 198, Pl. 64, fig. 1, 1881: TRYON, Man. Conch., 1 Ser., Vol. 3, p. 63, Pl. 38, fig. 159, 1881: PILSBRY, Cat. Mar. Moll. Jap., p. 27, 1895.

Two specimens, one nearly perfect and the other somewhat fragmental.

REEVE described this species as: "Shell very slender fusiform, spirally grooved and ridged throughout, whorls rounded, longitudinally plicately ribbed, ribs rather broad, keeled round the middle, fading toward the lip."

"*Fusus*" *gracillinus* figured by SOWERBY<sup>1)</sup> is apparently a distinct species. Height, 64 mm.; diameter, 13 mm.; length of canal, 31 mm.

Type locality: Eastern Sea.

Fossil occurrence: Byôritu Beds.—400 m. SE. of Zyô-tûsyôwan: station 13; Reg. No. 53577. Sikô; Reg. No. 48993.

Living: Japan. Eastern seas.

#### *Fusinus nodosoplicatus* (DUNKER), 1858-71

Pl. VIII (III), Fig. 9.

- Fusus nodosoplicatus*. YOKOYAMA, Jour. Fac. Sci. Imp. Univ. Tôkyô, Sec. 2, Vol. 1, Pt. 10, p. 412, Pl. 46, fig. 14, 1927.

Several specimens, some of them are fairly well preserved. A specimen collected from Wangwa measures 82.5 mm. in height, and 24 mm. in diameter.

1) SOWERBY: Thes. Conch., Vol. 4, p. 80, Pl. 411, fig. 62, 1880.

Whether this species is valid or only a variety of *F. tuberculatus* (LAMARCK) as suspected by TRYON,<sup>1)</sup> I am unable to decide at present. However, the specimens from the Byōritu Beds of Taiwan agree well with YOKOYAMA's figure as well as with the specimens collected from the Pleistocene deposits of Sinagawa in Tōkyō.

Type locality: Japan; Recent.

Fossil occurrence: Byōritu Beds.—1000 m. NW. of Rinsuikwa: station 5; Reg. No. 53559. 700 m. E. of Hakusyaton: station 5; Reg. No. 53564. Wangwa: station 6; Reg. No. 53560. 900 m. NW. of Rinsuikwa: station 6; Reg. No. 53411. 550 m. NW. of Rinsuikwa: station 7; Reg. No. 53561. 1900 m. NE. of Hakusyaton: station 10; Reg. No. 53558. 1450 m. W. of Hokkō: station 14; Reg. No. 53562. Wangwa: station 16; Reg. No. 53567. 550 m. SE. of Zyō-tūsyōwan: station 16; Reg. No. 53576. Wangwa: station 17; Reg. No. 53572. Wangwa: station 19; Reg. No. 53575. 700 m. NE. of Nanseizan: station 19; Reg. No. 53568. Wangwa: station 22; Reg. No. 53566. 700 m. SW. of Kōkwan: station 23; Reg. No. 53571. Wangwa: station 24; Reg. No. 53563. Wangwa: station 32; Reg. No. 53574. 700 m. SE. of Sankwakō: station 46; Reg. No. 53570. 940 m. NW. of Keiyukwa: station 55; Reg. No. 53573. 1550 m. E. of Sinpo: station 69; Reg. No. 53569. Between Kōsui and Zyuna; Reg. No. 37134. 600 m. E. of Hakusyaton; Reg. No. 37313.

Living: Central Honsyū to Ryūkyū.

Geologic distribution: Pleistocene of Central Honsyū.

### ***Fusinus laticanaliculatus* n. sp.**

Pl. VIII (III), Figs. 3a, 3b.

?*Siphonalia kelletoides*. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 39, Pl. 2, fig. 10, 1928 (except fig. 11).

Shell rather large, elongate fusiform; aperture together with canal slightly shorter than 2 times of spire. Test rather thin. Whorls 8, the apical 2 embryonal, globular and smooth, the rest flattened, or more or less concave above, subangulate around middle, and nearly vertical below. Surface ornamented by axial plicae and spiral cords. Plicae about 12 on penultimate whorl, rounded, prominent on angulate middle part of whorls, separated by shallow interspaces which are generally wider than plicae themselves. Spiral cords distinct, about 5 on upper slope, and 3 on lower vertical surface (one on angle) of each whorl; the latter larger than the former and provided with one or two interstitial threads in their intervals. Body-whorl large, with almost obsolete plicae and numerous distinct irregular spiral cords, of which 5 subequal ones are situated on surface above angle. Aperture large, longly oval in form; outer lip fractured, but apparently thin; inner lip smooth with a thin and broadly spread callous. Canal considerably curved, rather short, very widely open.

Three specimens. The largest specimen, height, 121 mm.; diameter, 40.8 mm.; length of canal and aperture, 80 mm.

This species is characterized by its rather short and widely open canal and is somewhat related to a species of *Hemifusus*.

Dr. YOKOYAMA gives two types of figures for his new species of *Siphonalia kelletoides* from the Byōritu Beds of Taiwan. The present species is nearly identical with his fig. 10 in

1) TRYON: Man. Conch., 1 Ser., Vol. 3, p. 54, 1881.

sculpture, but unfortunately that specimen lacks its aperture and canal, and I can not bring the two into an accurate comparison.

Fossil occurrence: Byôritu Beds.—Wangwa: station 15; Reg. No. 53580. Sikô; Reg. No. 49404.

### **Fusinus colus** (LINNAEUS), 1758

*Fusinus colus*. KURODA, Cat. Shell-bearing Moll. Amami-Ôsima, p. 53, No. 617, 1928.

*Fusus colus*. REEVE, Conch. Icon., Vol. 4, Pl. 3, fig. 11, 1847: KOBELT in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 3, Pt. 3b, p. 146, Pl. 30, fig. 3; Pl. 47, fig. 1, 1881: TRYON, Man. Conch., 1 Ser., Vol. 3, p. 52, Pl. 32, figs. 89-92, 95, 1881: SUGITANI, Cat. Luchu Shells, p. 21, 1926.

A rather large, apparently slender specimen with sharp tubercles at the shoulder. The specimen is closely related to *F. colus*, a well known living species from our southern seas in general aspects. Unfortunately it is fragmental. This is not *Fusus colus* LAMARCK from the Eocene of Paris basin.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Byôritu Beds.—Sikô; Reg. No. 53578.

Living: Southern Kyûsyû and Ryûkyû. Indian Ocean.

### Genus **Latirus** MONTFORT, 1810

#### Subgenus **Persternia** MÖRCH, 1852

### **Latirus (Persternia) coreanicus** (SMITH), 1879

*Latirus (Persternia) coreanicus*. NOMURA and ZINBÔ, Sci. Rep. Tôhoku Imp. Univ., Ser. 2 (Geol.), Vol. 16, No. 2, p. 135, No. 117, 1934.

*Fusus coreanicus*. SMITH, Proc. Zool. Soc., p. 204, Pl. 20, fig. 36, 1879: YOKOYAMA, Jour. Coll. Sci. Tôkyô Imp. Univ., Vol. 44, Art. 1, p. 52, Pl. 2, fig. 10, 1922.

One specimen lacking the aperture. It is a small shell with 7, rounded axial plicae, crossed by a few distinct revolving lines, and is perhaps referable to a varietal form of *L. coreanicus* by having fewer and more prominent ribs than the type.

Type locality: Tyôsen; Recent.

Fossil occurrence: Byôritu Beds.—1000 m. NW. of Rinsuikwa: station 5; Reg. No. 53579.

Living: South of Tyôsen and Ryûkyû. Ogasawara-zima.

Geologic distribution: Post-Pleistocene and Pliocene of Honsyû; Pleistocene of Kikai-zima.

### **Latirus (Persternia) species** indet.

One rather ill-preserved, small specimen, 15 mm. in height. The shell is nearly similar in form and sculpture to *Peristerina ustulata* var. *luchuana* PILSBRY,<sup>1)</sup> but is much smaller, and has more distinct columellar folds. It may be a new species.

Fossil occurrence: Byôritu Beds.—1200 m. SE. of Sankwakô: station 60; Reg. No. 53832.

1) PILSBRY: Proc. Acad. Nat. Sci. Philad., pp. 179, 390, Pl. 19, fig. 18, 1901.

**Latirus (?) minutisquamosus (REEVE) 1848**

Pl. VII (II), Fig. 35.

*Fusus minutisquamosus*. REEVE, Conch. Icon., Vol. 4, Pl. 20, fig. 80, 1848: TRYON, Man. Conch., 1 Ser., Vol. 3, p. 65, Pl. 39, fig. 166, 1881.

REEVE first described this neat shell as: "Shell somewhat elongately fusiform, canal rather short, whorls rounded, longitudinally rudely plicated ribbed, spirally finely ridge, ridges minutely scaled throughout."

Several specimens. The characteristic minutely squamate nature of the surface is well exposed in the Formosan fossils.

The generic position is still in question; TRYON thought that it may belong *Coralliophila*.

Type locality: Unknown; Recent.

Fossil occurrence: Byôritu Beds.—900 m. NW. of Rinsuikwa: station 6; Reg. No. 53419. 600 m. SE. of Zyô-tûsyôwan: station 19; Reg. No. 53420. 1200 m. E. Zyô-tûsyôwan: station 36; Reg. No. 53417. 1500 m. E. of Zyô-tûsyôwan: station 49; Reg. No. 53418.

Living: Exact locality unknown.

**Family Busyconidae****Genus Hemifusus SWAINSON, 1840****Hemifusus colosseus (LAMARCK), 1822**

*Hemifusus colosseus*. TRYON, Man. Conch., 1 Ser., Vol. 3, p. 111, Pl. 44, fig. 232, 1881: SUGITANI, Cat. Luchu Shells, p. 24, 1926: KURODA, Cat. Shell-bearing Moll. Amami-Ôsima, p. 58, No. 695, 1928: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 40, No. 1352, 1931.

*Fusus colosseus*. KIENER, Spec. Coq. viv., p. 50, Pl. 25, 1835-1857: REEVE, Conch. Icon., Vol. 4, Pl. 5, fig. 19, 1847.

*Pyrula colossea*. SOWERBY, Thes. Conch., Vol. 4, p. 102, Pl. 1, fig. 3, 1880: KOBELT in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 3, Pt. 3b, p. 40, Pl. 6, fig. 1, 1881:

*Hemifusus ternatanus*. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 38, Pl. 2, fig. 12, 1928 (not of GMELIN).

Several ill-preserved specimens, sufficient for specific determination. The tubercles or spines upon the shoulder of this species appear to be just an intermediate character between those of *H. ternatanus* and *H. tuba* of our seas.

Type locality: The Eastern sea.

Fossil occurrence: Byôritu Beds.—Wangwa: station 17; Reg. No. 53405. 1000 m. E. of Hakusyaton: station 20; Reg. No. 53403. Wangwa: station 37; Reg. No. 53404. Keiyukwa: station 50; Reg. No. 53402. 500 m. SW. of Dainankwa: Reg. No. 37377.

Living: Kyûsyû and Taiwan. China. The Philippines. Indian Ocean.

**Hemifusus protolacteus n. sp.**

Pl. VII (II), Figs. 39a, 39b.

Three specimens.

Shell small, angulate fusiform. Whorls 6 or 7, apical 2 embryonal, rather large, smooth and globular. Post-embryonal whorls strongly angulate around middle; area above angle flat and somewhat sloping, nearly vertical or slightly receding below. Surface longitudinally plicate and spirally striate. Plicae about 8 on a whorl, rounded, distinctly tuberculate at shoulder, interspaces somewhat broader; plicae on body-whorl do not extend below surface of one-third from upper. 5 spiral threads on upper flattened surface, one on angle and 4 below it; interspaces wider than threads; body-whorl with many unequal threads separated by unequal interspaces, some nearly periodically larger. Outer lip broken; aperture angulate-ovate in outline; inner lip smooth with thin callosity. Canal partly fractured, but may have been straight and open.

Height, ca. 30 mm.; diameter, ca. 11.5 mm.

This shell is distinguished from *H. lacteus*, a species found living in the Philippines as well as Japan, by its smaller size, larger embryonal whorls, narrower outline and markedly fewer tubercles on the last whorl. There are no *Hemifusus*, whose immature shell is closely related to this new one.

Fossil occurrence: Byôritu Beds.—900 m. NW. of Keiyukwa: station 33; Reg. No. 53421. 900 m. SE. of Naikotô: station 66; Reg. No. 53422.

### **Hemifusus pastinaca** (REEVE), 1848 ?

Pl. VII (II), Fig. 36.

Compare with

*Hemifusus pastinaca*. TRYON, Man. Conch., Vol. 3, p. 112, Pl. 44, fig. 234, 1881.

*Fusus pastinaca*. REEVE, Conch. Icon., Vol. 4, Pl. 16, fig. 64, 1848; KOBELT in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 3, Pt. 3b, p. 137, Pl. 45, fig. 4, 1881.

Two imperfect specimens.

Whorls intact, 7 in better specimen, apical 2 embryonal, smooth and globular; the rest shouldered around middle, surface above shoulder flat and sloping, below it nearly vertical. Surface of post-embryonal whorls ornamented by longitudinal plicae as well as spiral cords; plicae about 13 on a whorl, rather low and weak, separated by interspaces nearly equal to plicae in breadth; cords about 9 on each whorl, 4 on upper sloping surface. Inner lip smooth with a thin callosity. Outer lip and larger part of canal fractured. Diameter, ca. 21 mm.

Type locality: Of "*Fusus*" *pastinaca*, Australia; Recent. This extension in distribution of the Australian species is of geographic significance.

Fossil occurrence: Byôritu Beds.—Wangwa: station 15; Reg. No. 53416. E. of Goko; Reg. No. 37384.

Living: *H. pastinaca* has been recorded only from Australia.

### Family **Buccinidae**

Genus **Siphonalia** A. ADAMS, 1863

**Siphonalia spadicea** (REEVE), 1846

Pl. VII (II), Fig. 32.

*Siphonalia spadicea*. YOKOYAMA, Jour. Coll. Sci. Imp. Univ. Tokyo, Vol. 39, Art. 6, p. 53, Pl. 3, figs. 8-11, 1920.

Several fine specimens; they agree well with REEVE's type figure as well as the specimens collected from Japan proper. The largest specimen, 41 mm. in height, and 18 mm. in diameter.

Type locality: Japan; Recent.

Fossil occurrence: Byôritu Beds.—550 m. SE. of Zyô-tûsyôwan: station 14; Reg. No. 53590. Wangwa: station 24; Reg. No. 53589. 700 m. E. of Naikotô: station 31; Reg. No. 53589. Wangwa: station 33; Reg. No. 53588. Wangwa: station 35; Reg. No. 53592. 550 m. E. of Sankwakô: station 43; Reg. No. 53591. 700 m. SE. of Sankwakô: station 46; Reg. No. 53593. Sikô; Reg. No. 49414.

Living: Northern Honsyû to Inland Sea. Japan Sea.

Geologic distribution: Pleistocene, Pliocene and Miocene(?) of Honsyû.

### *Siphonalia stearnsii* PILSBRY, 1895

Pl. VII (II), Fig. 33.

*Siphonalia stearnsii*. PILSBRY, Cat. Mar. Moll. Jap., p. 29, Pl. 2, figs. 1, 2, 1895: MAKIYAMA, Mem. Coll. Sci. Kyôto Imp. Univ., Ser. B, Vol. 3, No. 1, Art. 1, p. 119, 1927: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 40, No. 1346, 1931.

Several well preserved specimens; they agree quite well with PILSBRY's type figure. The largest, 40 mm. in height, and 21.5 mm. in diameter.

The specimens from the Pliocene bed of Naganuma, Sagami province once figured by Dr. YOKOYAMA<sup>1)</sup> do not quite agree with the type as well as the Formosan fossils, they may possibly be referred to a varietal form or a distinct species.

Type locality: Japan; Recent.

Fossil occurrence: Byôritu Beds.—500 m. SW. of Dainankwa: station 5; Reg. No. 37353. Wangwa: station 6; Reg. No. 53414. 1100 m. SW. of Taikwa: station 11; Reg. No. 53598. Wangwa: station 33; Reg. No. 53415. Wangwa: station 39; Reg. No. 53599. 1520 m. E. of Sinpo: station 68; Reg. No. 53600.

Living: Central Honsyû to Sikoku.

Geologic distribution: Pleistocene, Pliocene and Miocene(?) of Honsyû.

### *Siphonalia cassidariaeformis* (REEVE), 1846

Pl. VII (II), Fig. 34.

*Siphonalia cassidariaeformis*. LISCHKE, Jap. Meeres-Conch., Vol. 1, p. 38, Pl. 4, figs. 1-10, 1869: TRYON, Man. Conch., Vol. 3, p. 135, Pl. 55, figs. 364-369, 1881: PILSBRY, Cat. Mar. Moll. Jap., p. 29, 1895: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 40, Nos. 1349, 1349a, 1349b, 1931: YAGURA, Cat. Moll. Hyôgo-ken, p. 41, No. 521, 1932.  
*Buccinum cassidariaeforme*. REEVE, Conch. Icon., Vol. 3, Pl. 2, fig. 11, 1846.  
*Neptunea (Siphonalia) cassidariaeformis*. KOBELT in MARTINI u. CHEMNITZ, Syst. Conch., Cab., Vol. 3, Pt. 3b, p. 86, Pl. 23, figs. 2-5, 1881.

1) YOKOYAMA: Jour. Coll. Sci. Imp. Univ. Tôkyô, Vol. 39, Art. 6, p. 54, Pl. 3, figs. 3, 4, 1920.

Several specimens, some of them are exceedingly well preserved.

This is one of the most common living species in Japan. It is variable in form and coloration. The Formosan fossils agree with figs. 8 and 9 given by LISCHKE, though much smaller in size. The largest, 38 mm. in height, and 19.6 mm. in diameter.

Type locality: Japan; Recent.

Fossil occurrence: Byôritu Beds.—Wangwa: station 6; Reg. No. 53597. 1100 m. SW. of Taikwa: station 11; Reg. No. 53594. 550 m. SE. of Zyô-tûsyôwan: station 16; Reg. No. 53595. 600 m. SE. of Zyô-tûsyôwan: station 17; Reg. No. 53596.

Living: Hokkaidô to Kyûsyû.

Geologic distribution: Post-Pleistocene, Pleistocene, Pliocene and Miocene of Honsyû; Pliocene of Sikoku.

Genus *Nassaria* LINK, 1807

*Nassaria monospina*, n. sp.

Pl. VII (II), Figs. 37a, 37b.

Shell small, somewhat rhombic-fusiform, consisting of  $6\frac{1}{2}$ , rather rapidly increasing whorls, earlier  $1\frac{1}{2}$  whorls are protoconch; the rest bluntly angulate or almost convex; last whorl nearly two-thirds length of shell, tapering quite abruptly into base. Surface of each whorl ornamented by about 10 longitudinal ribs, narrower than their interspaces; crossing these there are a few elevated irregular revolving cords which are somewhat granular. Aperture ovate; outer lip thickened by terminal rib which bears a short spine at shoulder, transversely lirate within; inner lip moderately calloused with a few (about 3) obsolete oblique folds. Canal short, narrowly open and slightly oblique.

Height, 12 mm.; diameter, 7.2 mm.

This small neat shell resembles somewhat "*Hindsia*" *teschi* FISCHER<sup>1)</sup> from the Pliocene of Timor in form, but specifically differs from that species by its smaller shell with the short spine. The dentition or folds of the inner lip are seemingly more distinct and more in number in FISCHER's species. The form of the present species is somewhat related to a young individual of a certain *Murex*.

Several species of *Nassaria* were figured by TRYON in his Manual of Conchology, but none of them have spines at the shoulder of the terminal rib as the present species does. The genus *Nassaria* (= *Hindsia*) is sometimes referred to *Bursidae*.

Fossil occurrence: Byôritu Beds.—400 m. SE. of Zyô-tûsyôwan: station 13; Reg. No. 53459. Wangwa: station 33; Reg. No. 53482. 1520 m. E. of Sinpo: station 68; Reg. No. 53498.

Genus *Latrunculus* GRAY, 1847

(= *Eburna*; ? *Babylonia*)

*Latrunculus canaliculatus* (SCHUMACHER), 1817

Pl. VIII (III), Fig. 8.

*Eburna canaliculata*. SOWERBY, Thes. Conch., Vol. 3, p. 69, Pl. 215, figs. 2, ?3, 1866.

*Dispaceus canaliculatus*. MARTIN, Foss. von Java, Vol. 1, p. 101, Pl. 11, figs. 224-227, 1906.

*Eburna spirata*. TRYON, Man. Conch., 1 Ser., Vol. 3, p. 212, 1881 (pars.).

1) FISCHER: Paläont. von Timor, Vol. 15, p. 64, Pl. 213, fig. 33, 1927.



One ill-preserved specimen. Although several allied recent forms have been reported from eastern tropic regions, the one described by SCHUMACHER under the above specific name answers our Formosan fossil.

Type locality: Indian Ocean.

Fossil occurrence: Byôritu Beds.—Sikô; Reg. No. 53583.

Living: The Philippines. Indian Ocean. Red Sea.

Geologic distribution: Pliocene of Java and Sumatra; Miocene of Java.

### ***Latrunculus formosus* (SOWERBY), 1866**

*Latrunculus formosae*. YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 41, No. 1372, 1931.

*Eburna formosae*. SOWERBY, Thes. Conch., Vol. 3, p. 72, Pl. 291, figs. 17, 18, 1866: KOBELT in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 3, Pt. 3, p. 11, Pl. 72, fig. 7, 1883.

*Eburna formosa*. TRYON, Man. Conch., 1 Ser., Vol. 3, p. 211, Pl. 82, fig. 475, 1881.

One fragmental specimen with narrowly canaliculated sutures.

Type locality: Taiwan; Recent.

Fossil occurrence: Byôritu Beds.—500 m. E. of Sankwakô: station 41; Reg. No. 53582.

Living: Taiwan.

### ***Latrunculus lamarcki*, n. sp.**

Pl. VIII (III), Fig. 28.

Shell large, ovate in form, smooth, except for numerous, fine, growth lines. Whorls 9, convex, separated by impressed but not channeled sutures; spire conical, its apex acute; shoulder of each whorl roundedly angulate; Aperture ovate, somewhat widening below; columellar callous thick and heavy; outer lip regularly convex, but more or less flattened above. Umbilicus widely open, bounded behind by a broad and flexuously sculptured ridge; outer side of ridge, with a smooth cord running parallel to it.

Length, 67 mm.; diameter, ca. 42 mm.

The form of this species closely resembles that of *L. japonicus* (REEVE), but the umbilicus of the former is much wider than the latter; moreover the callous of the inner lip is heavier, and embryonal whorls are apparently smaller.

*Latrunculus formosus* (SOWERBY) is perhaps another similar species to the present fossil, but that shell has a much more distinctly angulate shoulder with narrowly channelled sutures.

Fossil occurrence: Byôritu Beds.—Wangwa: station 24; Reg. No. 53584. Sôkeisi; Reg. No. 53586. The upper course of Sairyôkyô; Reg. No. 53585.

### **Genus *Metula* H. and A. ADAMS, 1853**

#### ***Metula mitrella* (ADAMS and REEVE), 1850**

Pl. VIII (III), Fig. 1.

*Metula mitrella*. TRYON, Man. Conch., 1 Ser., Vol. 3, p. 152, Pl. 72, fig. 239, 1881.

Two well preserved specimens. This is a rather small and somewhat cylindrical shell, its surface is very beautifully cancellated. The revolving and axial threads are nearly equal in size except one revolving thread close to the lower suture which is slightly larger than the others. The aperture is long and distinctly sinuate behind.

*Metula hindsii* figured by MARTIN,<sup>1)</sup> and by TESCH<sup>2)</sup> are apparently closely allied to the Formosan fossil, though they are much smaller. The specimens measure:

1. . . . . Length, 32 mm.; diameter, 9 mm.
2. . . . . Length, 25 mm.; diameter, 8 mm.

Type locality: China; Recent.

Fossil occurrence: Byôritu Beds.—Sikô; Reg. No. 49416.

Living: China Sea, at the depth of 10 fathoms.

#### Genus *Cantharus* (BOLTEN) RÖDING, 1798

#### *Cantharus wangwaensis*, n. sp.

Pl. VIII (III), Figs. 18a, 18b.

Shell resembling *C. cecillei* (PHILIPPI) in general aspects, very stout, somewhat rhombic-subfusiform. Whorls about 6, subangulate, and rather rapidly increasing; body-whorl nearly two-thirds total shell-length, distinctly shouldered above, and gradually narrowing below. Surface ornamented by longitudinal plicae and spiral cords. Plicae prominent, about 10 on each whorl, but on body-whorl they do not extend below middle, and tend to become obsolete towards base; interspaces nearly equal to plicae themselves in breadth on whorls of spire, but vary on body-whorl. Spiral cords subequal, prominent, 5 on each whorl of spire, 13 on body-whorl, separated by nearly equal interspaces. Entire surface also sculptured by fine revolving threads as well as longitudinal growth lines. Aperture ovate; outer lip thickened by terminal plicae, transversely dentate within; inner lip smooth with a moderate callosity; canal short, widely open and slightly curved. Umbilicus small and shallow.

Height, 34 mm.; diameter, 21 mm.

This species is closely related to *C. cecillei* (PHILIPPI) of our seas, from which it is easily distinguished by its angulate shoulder. *Cantharus totomiensis* MAKIYAMA<sup>3)</sup> may be the most related species, though specifically distinct in details.

A specimen quite similar to this fossil was once found living from our coast, though the exact locality is unknown.

Fossil occurrence: Byôritu Beds.—900 m. NW. of Rinsuikwa: station 6; Reg. No. 53408. 510 m. SE. of Zyô-tûsyôwan: station 15; Reg. No. 53407. Wangwa: station 19; Reg. No. 53581. Wangwa: station 23; Reg. No. 53410. 1200 m. SE. of Sankwakô: station 60; Reg. No. 53409.

Living: Japan.

1) MARTIN: Tiefb. von Java, p. 106, Pl. 8, fig. 143, 1887.

2) TESCH: Paläont. von Timor, Vol. 5, p. 53, Pl. 81, fig. 115, 1915.

3) MAKIYAMA: Mem. Coll. Sci. Kyôto Imp. Univ., Ser. B, Vol. 1, No. 1, Art. 1, p. 114, Pl. 5, figs. 21, 22, 1927.

Genus *Pollia* SOWERBY, 1834

*Pollia obliquicostata* (REEVE), 1846

Pl. VIII (III), Fig. 10.

*Cantharus obliquicostatus*. TRYON, Man. Conch., Vol. 3, p. 161, Pl. 74, figs. 277, 278, 1881.

*Buccinum obliquicostatum*. REEVE, Conch. Icon., Vol. 3, Pl. 12, figs. 91a, b., 1846.

Two specimens. The axial ribs in the Formosan fossils are rather slightly oblique, and are more marked on the spire than on the last whorl. The specimens measure:

1. . . . . Height, 11.2 mm.; diameter, 5.2 mm.
2. . . . . „, ca. 11.4 mm.; „, 5.5 mm.

Type locality: The Philippines; Recent.

Fossil occurrence: Byôritu Beds.—Wangwa: station 14; Reg. No. 53461.

Living: The Philippines.

Family Nassariidae

Genus *Nassarius* DUMÉRIL, 1806

Subgenus *Alectrion* MONTFORT, 1810

*Nassarius (Alectrion) canaliculatus* (LAMARCK), 1822

*Nassarius canaliculata*. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 41, Pl. 3, fig. 1, 1928.

Several excellently preserved specimens. The Formosan fossils differ from the living *N. canaliculatus* figured by REEVE, and by TRYON, in that the lower whorls invariably have no axial plicae and are evidently smooth. This difference may perhaps require a new name for the fossil specimens, but I treat it provisionally as variation. The largest specimen in our possession measure 30 mm. in height, and 16 mm. in diameter.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Byôritu Beds.—Sikô; Reg. Nos. 48984, 52945.

Living: The Philippines. Indian Ocean.

Geologic distribution: Pliocene of Ryûkyû; Post-Pliocene of Celebes; Pliocene of Java, Timor and Seran; Miocene of Nias and the Philippines.

*Nassarius (Alectrion) pictus* (DUNKER), 1846

Pl. VIII (III), Fig. 32.

*Nassarius pictus*. SUGITANI, Cat. Luchu Shells, p. 25, 1926: KURODA, Cat. Shell-bearing Moll., Amami-Ôsima, p. 60, No. 734, 1928: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 42, No. 1421, 1931.

*Nassa picta*. REEVE, Conch. Icon., Vol. 8, Pl. 2, fig. 9, 1853.

One specimen lacking its apical whorls. Height, ca. 21 mm.; diameter, 12 mm.

This is an ovate, rather thick-shelled species and its surface is longitudinally closely ribbed upon the upper whorls. The suture is somewhat step-like with crenulations at the

shoulder. The base is spirally furrowed and striated. Several species were included here by TRYON.<sup>1)</sup> *N. balteatus* (LISCHKE) from our seas is a nearly similar species.

Type locality: The Philippines; Recent.

Fossil occurrence: Byôritu Beds.—Sikô; Reg. No. 52985.

Living: Southern Kyûsyû to Taiwan. The Philippines.

Geologic distribution: Post-Pliocene of Java.

### Subgenus *Zeuxis* H. and A. ADAMS. 1853

#### *Nassarius (Zeuxis) caelatus* (A. ADAMS), 1851

*Nassa caelata*. REEVE, Conch. Icon., Vol. 8, Pl. 20, fig. 133, 1853.

*Nassa (Hima) verbeeki*. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 40, Pl. 2, figs. 9, 13, 1928.

Several thousand specimens. Compared with the recent specimens of *N. caelatus* collected from Japan, the Formosan fossil does not differ much, hence I prefer to retain ADAMS' name.

*N. verbeeki* (MARTIN),<sup>2)</sup> *N. crenulatus* of DICKERSON<sup>3)</sup> and *N. dispar* also of DICKERSON<sup>4)</sup> are closely allied species; the distinction between the species is not always easy. However, I prefer to distinguish it from *N. siquijorensis* A. ADAMS.

Annexed are some of the measurements (in mm.) for the specimens collected by Mr. ANDÔ from 700 m. E. of Hakusyaton.

	1	2	3	4	5	6	7
Height .....	22.5	21.0	20.0	19.0	18.5	15.0	14.0
Diameter .....	11.0	11.0	10.5	9.0	9.0	9.0	7.5

Type locality: The Philippines; Recent.

Fossil occurrence: Byôritu Beds.—Hakusyaton: station 1; Reg. No. 52912. 700 m. E. of Hakusyaton: station 3; Reg. No. 52911. 1000 m. NW. of Rinsuikwa: station 5; Reg. No. 52931. Wangwa: station 5; Reg. No. No. 52597. 900 m. NW. of Rinsuikwa: station 6; Reg. No. 52930. Wangwa: station 6; Reg. No. 52901. E. of Goko: station 8; Reg. No. 37327. Nanseizan: station 11; Reg. No. 52935. 400 m. SE. of Zyô-tûsyôwan: station 13; Reg. No. 52918. Bôsiho: station 13; Reg. No. 52937. 500 m. SE. of Zyô-tûsyôwan: station 14; Reg. No. 52916. 1450 m. W. of Hokkô: station 14; Reg. No. 52940. Wangwa: station 14; Reg. No. 52600. 510 m. SE. of Zyô-tûsyôwan: station 15; Reg. No. 52917. Wangwa: station 15; Reg. Nos. 52598, 754212. 550 m. SE. of Zyô-tûsyôwan: station 16; Reg. No. 52914. Wangwa: station 16; Reg. No. 52903. 600 m. SE. of Zyô-tûsyôwan: station 17; Reg. No. 52915. 700 m. NE. of Nanseizan: station 19; Reg. No. 52936. 1000 m. E. of Hakusyaton: station 20; Reg. No. 52908. Wangwa: station 21; Reg. No. 52909. Wangwa: station 23; Reg. No. 52907. Kozantyo: station 24; Reg. No. 52938. Wangwa: station 24; Reg. No. 52902. 1000 m. E. of Hakusyaton: station 25; Reg. No. 52910. Wangwa: station 26; Reg. No. 54208. 700 m. SE. of Hakusyaton: station 27; Reg. No. 52913. 550 m. SE. of Naikotô: station 28; Reg. No. 52933. Wangwa: station 28; Reg. No. 52904. 700 m.

1) TRYON: Man. Conch., 1 Ser., Vol. 7, p. 35, 1882.

2) MARTIN: Foss. von Java, Vol. 1, p. 110, Pl. 17, figs. 247-255, 1906.

3) DICKERSON: Rev. Philip. Paleont., Pl. 3, fig. 12, 1922.

4) DICKERSON: ibid., Pl. 3, figs. 14a, 14b, 1922.

E. of Naikotô: station 31; Reg. No. 52934. 900 m. NW. of Keiyukwa: station 33; Reg. No. 52922. Wangwa: station 33; Reg. No. 52943. Wangwa: station 35; Reg. No. 52906. Wangwa: station 37; Reg. No. 52905. Wangwa: station 38; Reg. No. 52599. 300 m. E. of Sankwakô: station 39; Reg. No. 52926. Wangwa: station 40; Reg. No. 52942. 500 m. E. of Sankwakô: station 41; Reg. No. 52924. 550 m. E. of Sankwakô: station 43; Reg. No. 52923. 300 m. S. of Sankwakô: station 44; Reg. No. 52927. Keiyukwa: station 52; Reg. No. 52919. 920 m. NW. of Keiyukwa: station 54; Reg. No. 52920. 940 m. NW. of Keiyukwa: station 55; Reg. No. 52921. 1200 m. SE. of Sankwakô: station 60; Reg. No. 52925. 900 m. SE. of Naikotô: station 66; Reg. No. 52932. 1520 m. E. of Sinpo: station 68; Reg. No. 52928. 1550 m. E. of Sinpo: station 69; Reg. No. 52929. Sikô; Reg. Nos. 48992, 52941. 300 m. E. of Hakusyaton; Reg. No. 37394. Between Kôsui and Zyuna; Reg. No. 37323. Western side of Syôgun-yama; Reg. No. 37326. Hakusyaton; Reg. No. 52939. S. of Bôsiho; Reg. No. 37309.

Raised Coral Reef.—S. of Sisitô; Reg. No. 37471.

Living: Central Honsyû to Ryûkyû. Japan Sea. The Philippines.

Geologic distribution: Pliocene of Honsyû, Sikoku and Ryûkyû. Neogene of Java (?) and the Philippines (?)

Subgenus *Niotha* H. and A. ADAMS, 1853

*Nassarius (Niotha) gemmulatus* (LAMARCK), 1822

*Nassa (Niotha) gemmulata*. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 40, Pl. 2, fig. 8, 1928.

Several thousand, beautifully preserved specimens.

The species is characterized by its large and globose shell with granular sculpture; it is canaliculated along the suture.

*N. quadrasi* figured by DICKERSON<sup>1)</sup> from the Vigo Miocene of the Philippines is seemingly nearly identical.

Annexed are some of the measurements (in mm.) for the specimens collected by S. ANDÔ from Wangwa, st. 1:

	1	2	3	4	5	6	7	8	9
Height .....	26.5	26.0	24.0	24.0	21.0	21.0	19.0	19.0	11.5
Diameter .....	14.0	15.0	13.5	12.0	11.0	12.0	11.5	11.0	6.0

Type locality: The Philippines; Recent.

Fossil occurrence: Byôritu Beds.—Hakusyaton: station 1; Reg. No. 52523. Wangwa: station 1; Reg. No. 52506. 700 m. E. of Hakusyaton: station 3; Reg. No. 52521. Wangwa: station 4; Reg. No. 53565. 1000 m. E. of Hakusyaton: station 4; Reg. No. 52524. 300 m. E. of Zyô-tûsyôwan: station 4; Reg. No. 37349. 400 m. N. of Kozantyô: station 5; Reg. No. 52554. Wangwa: station 5; Reg. No. 52513. 900 m. NW. of Rinsuikwa: station 6; Reg. No. 52544. Wangwa: station 6; Reg. No. 52504. 600 m. NE. of Hakusyaton: station 7; Reg. No. 52528. Wangwa: station 7; Reg. No. 52511. Wangwa: station 9; Reg. No. 52501. Wangwa: station 10; Reg. No. 52503. 1100 m. SW. of Taikwa: station 11; Reg. No. 52553. Nanseizan: station

1) DICKERSON: Rev. Philip. Paleont., Pl. 3, fig. 16, 1922.

11; Reg. No. 52556. Wangwa: station 11; Reg. No. 52518. 800 m. NE. of Hakusyaton: station 12; Reg. No. 53500. Wangwa: station 12; Reg. Nos. 52516, 54203. Bôsiho: station 13; Reg. No. 52542. Wangwa: station 13; Reg. No. 54204. 1450 m. W. of Hokkô: station 14; Reg. No. 52558. 500 m. SE. of Zyô-tûsyôwan: station 14; Reg. No. 52535. Wangwa: station 14; Reg. Nos. 52509, 54201. 510 m. SE. of Zyô-tûsyôwan: station 15; Reg. No. 52534. Wangwa: station 15; Reg. No. 52512. 550 m. SE. of Zyô-tûsyôwan: station 16; Reg. No. 52536. Wangwa: station 16; Reg. Nos. 52514, 54202. 600 m. SE. of Zyô-tûsyôwan: station 17; Reg. No. 52538. Wangwa: station 17; Reg. No. 52517. 700 m. NE. of Nanseizan: station 19; Reg. No. 52557. Wangwa: station 19; Reg. No. 52508. 1000 m. E. of Hakusyaton: station 20; Reg. No. 52527. Wangwa: station 21; Reg. No. 52505. 700 m. SW. of Kôkwan: station 23; Reg. No. 52543. Wangwa: station 23; Reg. No. 52502. Kozantô: station 24; Reg. No. 52555. Wangwa: station 24; Reg. No. 52519. 1000 m. E. of Hakusyaton: station 25; Reg. No. 52522. Wangwa: station 25; Reg. No. 52515. 700 m. SE. of Hakusyaton: station 27; Reg. No. 52529. 550 m. SE. of Naikotô: station 28; Reg. No. 52547. 1000 m. SE. of Naikotô: station 30; Reg. No. 52546. 700 m. E. of Naikotô: station 31; Reg. No. 52545. 1000 m. SE. of Hakusyaton: station 32; Reg. No. 52526. Keiyukwa: station 33; Reg. No. 52532. Wangwa: station 33; Reg. No. 52510. Wangwa: station 34; Reg. No. 52507. Wangwa: station 35; Reg. No. 52944. 1200 m. E. of Zyô-tûsyôwan: station 36; Reg. No. 52537. 300 m. E. of Sankwakô: station 39; Reg. Nos. 52549, 52552. Wangwa: station 40; Reg. No. 52520. 550 m. E. of Sankwakô: station 43; Reg. No. 52551. Keiyukwa: station 50; Reg. No. 52530. Keiyukwa: station 52; Reg. No. 52531. 940 m. NW. of Keiyukwa: station 55; Reg. No. 52533. 1200 m. SE. of Sankwakô: station 60; Reg. No. 52550. 900 m. SE. of Naikotô: station 66; Reg. No. 52548. 500 m. E. of Sinpo: station 67; Reg. No. 52539. 1520 m. E. of Sinpo: station 68; Reg. No. 52540. 1550 m. E. of Sinpo: station 69; Reg. No. 52541. Sikô; Reg. Nos. 52559, 48997. Hakusyaton; Reg. No. 52525. 300 m. E. of Hakusyaton; Reg. No. 37391. S. Bôsiho; Reg. No. 37339. Western side of Syôgun-yama; Reg. No. 37389. Between Kôsui and Zyuna; Reg. No. 37312. E. of Goko; Reg. No. 37328.

Living: Central Honsyû to Taiwan. Japan Sea. The Philippines. Sunda Straits. Australia.

Geologic distribution: Pleistocene and Pliocene of Honsyû; Pliocene of Java, Sumatra and Seran; ?Miocene of the Philippines.

#### Subgenus *Hinia* LEACH, 1848<sup>1)</sup>

#### *Nassarius (Hinia) eximius* (H. and A. ADAMS), 1872

Pl. VIII (III), Fig. 33.

*Nassa eximia*. TRYON, Man. Conch., 1 Ser., Vol. 4, p. 48, Pl. 15, fig. 257, 1882.

*Nassarius eximius*. YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 42, No. 1430, 1931.

Four specimens; the largest, ca. 8 mm. in height, and 3.5 mm. in diameter.

It is a small *Nassarius*, longitudinally closely ribbed and spirally striated. In sculpture, this shell resembles *N. dominulus* (TAP.-CAN.), a species very commonly found living in Japan,

1) KURODA: The Venus, Vol. 4, No. 4, p. 260, 1934.

but is smaller and narrower. *N. luteolus* (SMITH) and *N. plebeculus* (GOULD) from Southern Japan are perhaps also similar species.

Type locality: Pacific Islands; Recent.

Fossil occurrence: Byôritu Beds.—700 m. E. of Hakusyaton: station 3; Reg. No. 52987. Wangwa: station 23; Reg. No. 52986.

Living: Ogasawara-zima. South Sea. Vita Island. New Hebrides.

### *Nassarius (Hinia) festivus* (POWYS), 1835

*Nassarius festivus*. YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 42, No. 1426, 1931; NOMURA, Sci. Rep. Tôhoku Imp. Univ. Ser. 2 (Geol.), Vol. 15, No. 2, p. 115, No. 349, 1932; YAGURA, Cat. Moll. Hyôgo-ken, p. 43, 1932; KURODA, Cat. Moll. Hukui-ken, p. 43, No. 174, 1933.

*Nassa festiva*. REEVE, Conch. Icon., Vol. 8, Pl. 18, fig. 117, 1853; LISCHKE, Jap. Meeres-Conch., Vol. 2, p. 53, 1871; DUNKER, Index Mar. Moll. Jap., p. 37, 1882; TRYON, Man. Conch., 1 Ser., Vol. 4, p. 46, Pl. 14, figs. 239-241 (not 242), 1882; PILSBRY, Cat. Mar. Moll. Jap., p. 35, 1895.

*Nassa lirata*. DUNKER, Moll. Jap., p. 7, Pl. 1, fig. 20, 1861.

A single fractured specimen. "*Nassa*" *festiva* mentioned by Dr. YOKOYAMA<sup>1)</sup> from the Upper Musasino Formation of the Kwantô region is a quite distinct species judging from his figure; his species seems to represent *N. dominulus* (TAP.-CAN.), better known under the name of *N. acutidentatus* (SMITH).

REEVE gives the localities of *N. festivus* as Panama and St. Elena, but are doubted by TRYON; it is perhaps an Oriental species.

Type locality: Oriental Sea.

Fossil occurrence: Byôritu Beds.—The upper course of Sairyôkyô; Reg. No. 53725.

Living: Widely distributed in Japan from Hokkaidô to Kyûsyû. Japan Sea. China.

Geologic distribution: Post-Pliocene, Pleistocene and Pliocene of Honsyû; Pliocene of Sikoku.

### *Nassarius* spp. (?) indet.

Several imperfect specimens of small *Nassarius* are found in the collection. I am not certain whether they belong to an adult species or are young individuals of a certain large species.

Fossil occurrence: Byôritu Beds.—Wangwa: station 8; Reg. No. 53891. Wangwa: station 18; Reg. No. 53890. 700 m. SW. of Kôkwan: station 23; Reg. No. 53893. Wangwa: station 37; Reg. No. 53889. Tyû-tûsyôwan: station 47; Reg. No. 53892.

### Genus *Cyllene* GRAY, 1833

#### *Cyllene pulchella* ADAMS and REEVE, 1850

Pl. VIII (III), Fig. 4.

*Cyllene pulchella*. SOWERBY, Thes. Conch., Vol. 3, p. 79, No. 12, Pl. 217, figs. 24, 25, 1866; TRYON, Man. Conch., 1 Ser., Vol. 3, p. 224, Pl. 84, figs. 567-571, 1881.

1) YOKOYAMA: Jour. Coll. Sci. Tôkyô Imp. Univ., Vol. 39, Art. 6, p. 97, Pl. 3, fig. 6, 1920.

Two well preserved specimens nearly equal in size; 7.5 mm. in diameter, 15 mm. in height.

Shell small, ovately conical, spire much shorter than body-whorl; body-whorl slightly shouldered above, convex below. Upper half of shell surface finely latticed by intersection of both spiral and longitudinal threads, but is nearly smooth on surface below shoulder of body-whorl except for obsolete spiral grooves. Base rather distinctly spirally furrowed. Aperture narrow, inner side of outer lip crenulated.

According to TRYON, *C. grayi* REEVE, *C. glabrata* A. ADAMS and *C. guillaini* PETIT are synonyms; anyhow, they are hardly distinguishable from each other even by the excellent figures given by SOWERBY.

Type locality: Borneo; Recent.

Fossil occurrence: Byôritu Beds.—Wangwa: station 6; Reg. No. 53920.

Living: Japan. Borneo.

### *Cyllene lugubris* ADAMS and REEVE, 1850

Pl. VIII (III), Fig. 3.

*Cyllene lugubris*. SOWERBY, Thes. Conch., Vol. 3, p. 78, No. 5, Pl. 217, figs. 7, 8, 9, 1866: TRYON, Man. Conch., 1 Ser., Vol. 3, p. 224, Pl. 84, figs. 561-563, 1881.

Many specimens. Similar in form with preceding except for coarser and more distinct longitudinal plicae. Spiral grooves on body-whorl more or less variable, quite distinct in some and obsolete in others.

TRYON unites this with *C. fuscata* A. ADAMS and *C. pallida* A. ADAMS; it is also apparently closely related to *C. oweni* GRAY.

Type locality: Sooloo Islands; Recent.

Fossil occurrence: Byôritu Beds.—Wangwa: station 6; Reg. No. 53919. Nanseizan: station 11; Reg. No. 53912. 400 m. SE. of Zyô-tûsyôwan: station 13; Reg. No. 53914. Wangwa: station 15; Reg. No. 53917. Wangwa: station 17; Reg. No. 53916. 1000 m. E. of Hakusyaton: station 25; Reg. No. 53915. 500 m. E. of Sankwakô: station 41; Reg. No. 53918.

Living: Japan. Singapore. Malacca. Sooloo Islands. W. Africa(?).

### *Cyllene concinna* SOLANDER, 1850

*Cyllene concinna*. SOWERBY, Thes. Conch., Vol. 3, p. 79, No. 14, Pl. 217, figs. 29, 30, 1866: TRYON, Man. Conch., 1 Ser., Vol. 3, p. 224, Pl. 84, fig. 572, 1881: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 42, No. 1399, 1931.

One imperfect specimen, 6 mm. in diameter and about 10 mm. in height, if perfect.

This shell is smaller and narrower than the preceding two species, with the surface nearly smooth except for a few basal threads.

Type locality: Unknown. (Oriental Sea?).

Fossil occurrence: Byôritu Beds.—Wangwa: station 6; Reg. No. 53921.

Living: Yaku-sima, Southern Kyûsyû.



Family Pyrenidae

Genus *Pyrene* (BOLTEN) RÖDING, 1798

Subgenus *Mitrella* RISSO, 1826

*Pyrene* (*Mitrella*) *baculus* (REEVE), 1859

Pl. VII (II), Fig. 30.

*Columbella baculus*. REEVE, Conch. Icon., Vol. 11, Pl. 25, fig. 157, 1859: TRYON, Man. Conch., 1 Ser., Vol. 5, p. 143, Pl. 52, fig. 74, 1883.

*Astyris baculus*. KURODA, Cat. Shell-bearing Moll. Amami-Ôsima, p. 62, No. 762, 1928.

Several specimens, though mostly small. The largest, 18.8 mm. in height, and 8 mm. in diameter.

Shell smooth, ovately fusiform, rather coarsely sulcate below angulate periphery. Whorls 9, flattened, apex acute, sutures subchanneled. Aperture narrow with a short and recurved canal below. Outer lip thickened.

Type locality: China Sea.

Fossil occurrence: Byôritu Beds.—Wangwa: station 14; Reg. No. 53899. 700 m. NE. of Nanseizan: station 19; Reg. No. 53897. Wangwa: station 23; Reg. No. 53898. Wangwa: station 24; Reg. No. 53896. Sikô; Reg. No. 48973.

Living: China seas. Australia.

*Pyrene* (*Mitrella*) *niveomarginata* (SMITH), 1879

Pl. VII (II), Fig. 29.

*Columbella* (*Atilia*) *niveomarginata*. SMITH, Proc. Zool. Soc., p. 207, Pl. 20, fig. 41, 1879: PILSBRY, Cat. Mar. Moll. Jap., p. 38, 1895: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 43, No. 1462, 1931.

*Mitrella niveomarginata*. YAGURA, Cat. Moll. Hyôgo-ken, p. 43, No. 559, 1932.

*Columbella niveomarginata*. TRYON, Man. Conch., 1 Ser., Vol. 5, p. 146, Pl. 52, fig. 91, 1883.

Three imperfect specimens resembling closely the named species in form.

Type locality: Japan; Recent.

Fossil occurrence: Byôritu Beds.—900 m. NW. of Rinsuikwa: station 6; Reg. No. 53900. 500 m. SE. of Zyô-tûsyôwan: station 14; Reg. No. 53928. On road S. of Bôsiho; Reg. No. 37550.

Living: Western Honsyû and Kyûsyû.

*Pyrene* (*Mitrella*) *yabei* n. sp.

Pl. VII (II), Figs. 28a, 28b.

Shell small, subfusiform, whorls about 8, apical ones smooth and rounded, the rest slightly convex or nearly straight in lateral outline, separated by well defined, marginate sutures. Surface longitudinally plicate; plicae about 15 on each whorl and tend to become obsolete on body-whorl. Interspaces between plicae nearly equal to, or slightly wider than plicae them-

selves, quite smooth. Base suddenly narrowed by angulate periphery and spirally, rather coarsely striated at causal portion. Aperture narrow, rather angular and slightly sinuous above; inner lip smooth. Outer lip seemingly thick and dentate within according to the small preserved part. Height, 8.5 mm.: diameter, 3 mm.

This species appears to be related to "*Columbella (Atilia) lischkei* SMITH,<sup>1)</sup> a species found living in Japan and "*Columbella (Atilia) smithi* YOKOYAMA,<sup>2)</sup> a Pleistocene fossil species from the Kwantô region, but it differs from both in details of form and sculpture.

Fossil occurrence: Byôritu Beds.—700 m. E. of Hakusyaton: station 3; Reg. No. 53930. Wangwa: station 6; Reg. No. 48975. Wangwa: station 8; Reg. No. 53935. Bôsiho: station 13; Reg. No. 53931. 400 m. SE. of Zyô-tûsyôwan: station 13; Reg. No. 53937. Wangwa: station 14; Reg. No. 53939. Wangwa: station 15; Reg. No. 53933. Wangwa: station 17; Reg. No. 53934. Wangwa: station 18; Reg. No. 53932. Wangwa: station 19; Reg. No. 53936. Wangwa: station 24; Reg. No. 53942. 1000 m. E. of Hakusyaton: station 25; Reg. No. 53938. Wangwa: station 40; Reg. No. 53940. 500 m. E. of Sankwakô: station 43; Reg. No. 53941. The upper course of Sairyôkyô; Reg. No. 53943. Western side of Syôgun-yama; Reg. No. 37373.

#### Genus *Anachis* H. and A. ADAMS, 1853

##### Subgenus *Zafra* A. ADAMS, 1860

##### *Anachis (Zafra)* species indet.

A small partly water-worn specimen, 2.7 mm. in height and 1.1 mm. in diameter. It resembles "*Columbella pumilla* DUNKER<sup>3)</sup> in form, but the longitudinal plicae are apparently more numerous.

Fossil occurrence: Byôritu Beds.—Wangwa: station 15; Reg. No. 53929.

#### Genus *Columbella* LAMARCK, 1799

##### Subgenus *Euplica* DALL, 1889

##### *Columbella (Euplica) versicolor* SOWERBY, 1832

Pl. VII (II), Fig. 31.

*Columbella (Euplica) versicolor*. KURODA, Cat. Shell-bearing Moll. Amami-Ôsima, p. 61, No. 749, 1928: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 43, No. 1443, 1931: YAGURA, Cat. Moll. Hyôgo-ken, p. 43, No. 548, 1932.

*Euplica versicolor*. SUGITANI, Cat. Luchu Shells, p. 26, 1926.

*Columbella versicolor*. SOWERBY, Thes. Conch., Vol. 1, p. 117, Pl. 73, figs. 41-46, 1847: REEVE, Conch. Icon., Vol. 11, Pl. 11, fig. 51, 1858: TRYON, Man. Conch., 1 Ser., Vol. 5, p. 110, Pl. 45, figs. 84-96, 1888.

*Columbella scripta* (= *versicolor* Sow.). PILSBRY, Cat. Mar. Moll. Jap., pp. 38, 169, 1895. (non *C. scripta* LINNAEUS).

This is a very common and one of the most abundant forms in the recent fauna along our coasts, ranging from Central Honsyû to Taiwan, but its fossil occurrence in Taiwan is very

1) SMITH: Proc. Zool. Soc., p. 207, Pl. 20, fig. 42, 1879.

2) YOKOYAMA: Jour. Coll. Sci. Imp. Univ. Tôkyô, Vol. 44, Art. 1, p. 60, P. 2, fig. 24, 1922.

3) DUNKER: Moll. Jap., p. 6, Pl. 1, fig. 4, 1861.

scanty and is represented in the collection by only a single specimen. Dimensions: Height, 14.2 mm., diameter, 8.8 mm.

Type locality: The Philippines; Recent.

Fossil occurrence: Byôritu Beds.—Sikô; Reg. No. 48981.

Living: Central Honsyû to Ryûkyû. Japan Sea. The Philippines. New Guinea. Viti, Galpagos and Sandwich Islands.

Geologic distribution: Post-Pleistocene of Honsyû.

### Family Muricidae

Genus *Murex* LINNAEUS, 1758

Subgenus *Murex* s. s.

#### *Murex (Murex) tribulus* LINNAEUS, 1758

*Murex tribulus*. TRYON, Man. Conch., 1 Ser., Vol. 2, p. 77, Pl. 9, figs. 107, 109, 1880.

*Murex ternispina*. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 42, Pl. 3, fig. 2, 1928.

Several well preserved immature specimens. The largest is about 55 mm. in height. *M. ternispina* LAMARCK and *M. verbeeki* MARTIN,<sup>1)</sup> are apparently identical.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Byôritu Beds.—700 m. E. of Hakusyaton: station 3; Reg. No. 51137. 900 m. NW. of Rinsuikwa: station 6; Reg. No. 51138. Wangwa: station 9; Reg. No. 51143. Wangwa: station 10; Reg. No. 51145. 500 m. SE. of Zyô-tûsyôwan: station 14; Reg. No. 51142. Wangwa: station 19; Reg. Nos. 51404, 51140. 1000 m. E. of Hakusyaton: station 20; Reg. No. 51139. Kozantyô: station 24; Reg. No. 51147. Wangwa: station 28; Reg. No. 51144. 300 m. E. of Sankwakô: station 39; Reg. No. 51146. Wangwa: station 40; Reg. No. 51154. 550 m. E. of Sankwakô: station 43; Reg. No. 51155. 1000 m. E. of Zyô-tûsyôwan: station 59; Reg. No. 51141. 1580 m. E. of Sinpo: station 69; Reg. No. 51153. 300 m. E. of Hakusyaton; Reg. No. 37523. Sikô; Reg. Nos. 49405, 51136.

Living: Central Honsyû to Ryûkyû. China. The Philippines. Indian Ocean.

Geologic distribution: Post-Pliocene of Celebes and Java; Miocene of Java.

#### *Murex (Murex) rarispina* LAMARCK, 1822

Pl. VIII (III), Fig. 7.

*Murex rarispina*. REEVE, Conch. Icon., Vol. 3, Pl. 21, fig. 86, 1845: KÜSTER u. KOBELT in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 3, Pt. 2, p. 70, Pl. 25, fig. 4, 1878 (?Pl. 9, fig. 1): TRYON, Man. Conch., 1 Ser., Vol. 2, p. 79, Pl. 10, fig. 115; Pl. 11, fig. 119, 1880.

The shell resembles the preceding in general features, but the spines are decidedly fewer in number and shorter, the nodule between each varix is more prominent and the spire apparently a little more elevated.

1) MARTIN: Foss. von Java, Vol. 1, p. 123, Pl. 19, figs. 278-280, 1906.

This species is most closely related to *M. bantamensis* MARTIN<sup>1)</sup> from the Neogene deposits of Java; the two may perhaps prove to be identical by future study.

Type locality: Indian Ocean.

Fossil occurrence: Byôritu Beds.—700 m. E. of Hakusyaton: station 3; Reg. No. 51151. Wangwa: station 14; Reg. No. 51150. Wangwa: station 23; Reg. No. 51149. Wangwa: station 24; Reg. No. 53895. Kozantyô: station 24; Reg. No. 51148. 1520 m. E. of Sinpo: station 68; Reg. No. 51152.

Living: Indian Ocean.

#### Subgenus *Chicoreus* MONTFORT, 1810

#### *Murex (Chicoreus) sinensis* REEVE, 1845

Pl. VIII (III), Fig. 11.

*Chicoreus sinensis*. YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 44, No. 1491, 1931.

*Murex sinensis*. REEVE, Conch. Icon., Vol. 3, Pl. 6, fig. 25, 1845; LISCHKE, Jap. Meeres-Conch., Vol. 1, p. 43, 1869; PILSBRY, Cat. Mar. Moll. Jap., p. 41, 1895.

*Murex elongatus*. TRYON, Man. Conch., 1 Ser., Vol. 2, p. 95, 1880 (pars.).

Several well preserved specimens. The largest, 45 mm. in height. Among several forms belonging to *Chicoreus* that have been reported from the tropic and subtropic regions of Asia, *C. brevifrons* (LAMARCK) from the Red Sea is most akin to the present species.

Type locality: China; Recent.

Fossil occurrence: Byôritu Beds.—Wangwa: station 14; Reg. No. 51156. 510 m. SE. of Zyô-tûsyôwan: station 15; Reg. No. 51159. Wangwa: station 40; Reg. No. 51157. Keiyukwa: station 50; Reg. No. 51158.

Living: Central Honsyû to Ryûkyû. China.

#### *Murex* (?) species indet.

Two mould specimens. The preserved impression of a varix on each whorl resembles a certain form of *Muricidae*.

Fossil occurrence: Byôritu Beds.—Wangwa: station 1; Reg. No. 54205. 1000 m. E. of Hakusyaton: station 4; Reg. No. 54206.

#### Genus *Rapana* SCHUMACHER, 1817

#### *Rapana bezoar* (LINNAEUS), 1767

Pl. VIII (III), Fig. 17.

*Rapana bezoar*. LISCHKE, Jap. Meeres-Conch., Vol. 1, p. 51, 1869 (pars.); TRYON, Man. Conch., 1 Ser., Vol. 2, p. 202, 1880 (pars.); YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 46, No. 1562, 1931; YAGURA, Cat. Moll. Hyôgo-ken, p. 45, No. 579, 1932.

1) MARTIN: Foss. von Java, Vol. 1, p. 126, Pl. 19, figs. 290-291, 1906.

*Purpura bezoar*. KIENER, Spec. Coq. viv., p. 64, Pl. 17, fig. 49, 1835-1857.

*Pyruia bezoar*. REEVE, Conch. Icon., Vol. 4, Pl. 4, fig. 15 b only, 1847.

Several specimens. The largest, 49 mm. in height, and about 38 mm. in diameter.

It is closely related to *R. thomasiana* CROSSE, a common living and fossil species in Japan proper. However, the shell is generally smaller in size and possesses coarser transverse ridges and prominently developed foliations upon the last whorl.

What Dr. YOKOYAMA reports as small fragments of *R. thomasiana* from the Byôritu Beds of Taiwan may be this species.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Byôritu Beds.—Wangwa: station 3; Reg. No. 53513. Wangwa: station 6; Reg. No. 52991. 900 m. NW. of Rinsuikwa: station 6; Reg. No. 53484. 500 m. SE. of Zyô-tûsyôwan: station 14; Reg. No. 52993. 550 m. SE. of Zyô-tûsyôwan: station 16; Reg. No. 52990. Wangwa: station 17; Reg. No. 52994. Wangwa: station 22; Reg. No. 52995. Wangwa: station 23; Reg. No. 53504. Kôsui: station 61; Reg. No. 52992.

Living: Western Honsyû, and Inland Sea to Kyûsyû. Japan Sea. China. The Philippines. Indian Ocean.

#### Genus *Trophon* MONTFORT, 1810

##### *Trophon*? species indet.

An imperfect specimen lacking its canal and outer lip. Whorls 8, angulate at about two-thirds of height of whorl from lower suture, smooth except for almost obsolete spirals. Longitudinal plicae rather distinct, lamellar and nearly vertical, weaker on surface above angle than elsewhere. Canal apparently recurved. It is somewhat related to *Boreotrophon nipponicus* (YOKOYAMA)<sup>1)</sup> from the Pliocene of Kosiba, south of Yokohama, but is not accurately identical with that species.

Fossil occurrence: Byôritu Beds.—Wangwa: station 24; Reg. No. 54213.

#### Genus *Typhis* MONTFORT, 1810

##### *Typhis duplicatus* SOWERBY, 1870

Pl. VIII (III), Fig. 5.

*Typhis duplicatus*. SOWERBY in REEVE, Conch. Icon., Vol. 19, Pl. 2, figs. 8 a, b, 1874: SOWERBY, Thes. Conch., Vol. 4, app. Monog. *Typhis*, No. 15, figs. 29, 30, 1880.

Several fine specimens. The largest, 15 mm. in height, and 9.2 mm. in diameter. TRYON unites this species with *T. arcuatus* HINDS which is found both living and fossil in Japan; in fact the two are closely related.

Type locality: China Sea.

1) YOKOYAMA: Jour. Coll. Sci. Imp. Univ. Tôkyô, Vol. 39, Art. 6, p. 61, pl. 3, figs. 13, 14, 1920.

Fossil occurrence: Byôritu Beds.—Bôsiho: station 13; Reg. No. 53977. 500 m. SE. of Zyô-tûsyôwan: station 14; Reg. No. 53975. Wangwa: station 23; Reg. No. 53978. Wangwa: station 24; Reg. No. 53974. 1550 m. E. of Sinpo: station 68; Reg. No. 53976.

Living: China Sea.

### Genus *Thais* (BOLTEN) RÖDING, 1798

#### *Thais luteostoma* (DILLWYN), 1817

Pl. VIII (III), Fig. 34.

*Thais luteostoma*. SUGITANI, Cat. Luchu Shells, p. 27, 1926: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 45, No. 1529, 1931: NOMURA, Sci. Rep. Tôhoku Imp. Univ. Ser. 2 (Geol.), Vol. 15, No. 2, p. 118, No. 369, 1932: YAGURA, Cat. Moll. Hyôgo-ken, p. 45, No. 575, 1932.

*Thais (Mancinella) luteostoma*. KURODA, Cat. Moll. Hukui-ken, p. 188, No. 148, 1933.

*Purpura luteostoma*. REEVE, Conch. Icon., Vol. 3, Pl. 8, fig. 35, 1846: KÜSTER in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 3, Pt. 1, p. 107, Pl. 19, figs. 7, 8, 1858: DUNKER, Moll. Jap., p. 5, 1861: SCHRENCK, Reis. u. Forsch. Amur-Lande, p. 390, 1869: LISCHKE, Jap. Meeres-Conch., Vol. 1, p. 54, 1869: LISCHKE, ibid., Vol. 2, p. 39, 1871: TRYON, Man. Conch., 1 Ser., Vol. 2, p. 166, Pl. 49, figs. 77, 78, 81, 1880: DUNKER, Ind. Moll. Mar. Jap., p. 39, 1882: PILSBRY, Cat. Mar. Moll. Jap., p. 44, 1895.

Numerous specimens, although from one locality. The tubercles on the shoulder vary greatly in their strength, some being sharper and more prominent than the others.

Type locality: China?; Recent.

Fossil occurrence: Byôritu Beds.—Wangwa: station 31; Reg. No. 53911.

Living: Widely distributed in Japan from North to South including Taiwan. Tyôsen. China. Indian Ocean.

Geologic distribution: Post-Pleistocene of Honsyû; Pliocene of Java.

#### *Thais problematica* (BAKER), 1891<sup>1)</sup>

Pl. VIII (III), Fig. 35.

*Thais tumulosa problematica*. SUGITANI, Cat. Luchu Shells, p. 27, 1926: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 45, No. 1531, 1931: YAGURA, Cat. Moll. Hyôgo-ken, p. 45, No. 577, 1932.

*Purpura alveolata*. PILSBRY, Cat. Mar. Moll. Jap., p. 44, 1895 (pars.).

*Purpura tumulosa*. LISCHKE, Jap. Meeres-Conch., Vol. 1, p. 54, Pl. 5, figs. 12-16, 1869: LISCHKE, ibid., Vol. 2, p. 39, 1871 (non REEVE).

A single small specimen, 22 mm. in height, and 13 mm. in diameter. The original blackish color is rather well preserved upon the rounded tubercles. This species may perhaps be rightly called *T. clavigera* (KÜSTER).

Type locality: Japan?; Recent.

Fossil occurrence: Byôritu Beds.—Wangwa: station 5; Reg. No. 53910.

Living: Northern Honsyû to Ryûkyû.

1) PILSBRY: Proc. Acad. Nat. Sci. Philad., p. 388, 1901.

Genus *Lataxiena* JOUSSEAUME, 1883*Lataxiena luliana* (MARTIN), 1887

Pl. VIII (III), Fig. 27a, 27b.

*Polia luliana*. MARTIN, Tiefb. auf Java, Vol. 3, p. 105, Pl. 6, fig. 106, 1887.*Tritonidea luliana*. TESCH, Foss. von Timor, Vol. 5, p. 55, Pl. 131, fig. 120, 1915.

Several well preserved specimens. The form and sculpture of the Formosan specimens are quite identical with the specimens from Timor figured by TESCH than the type given by MARTIN, although invariably slightly smaller in size. Annexed are some of the measurements (in mm.):

	1	2	3	4	5	6
Height .....	20.7	19.0	17.0	16.0	14.4	13.5
Diameter .....	10.0	9.5	8.4	8.3	8.5	7.0

Type locality: Java; Neogene.

Fossil occurrence: Byôritu Beds.—700 m. E. of Hakusyaton: station 3; Reg. No. 53428. Wangwa: station 10; Reg. No. 53431. Nanseizan: station 11; Reg. No. 53440. 400 m. SE. of Zyô-tûsyôwan: station 13; Reg. No. 53436. 500 m. SE. of Zyô-tûsyôwan: station 14; Reg. No. 53427. Wangwa: station 14; Reg. No. 53432. 550 m. SE. of Zyô-tûsyôwan: station 16; Reg. No. 53441. 700 m. NE. of Nanseizan: station 19; Reg. No. 53446. Wangwa: station 19; Reg. No. 53442. 1000 m. E. of Hakusyaton: station 20; Reg. No. 53447. Kozantyô: station 24; Reg. No. 53439. Wangwa: station 24; Reg. No. 53441. 1000 m. E. of Hakusyaton: station 25; Reg. No. 53425. 700 m. SW. of Kôkwan: station 27; Reg. No. 53430. 550 m. S. of Naikotô: station 28; Reg. No. 53451. 900 m. NW. of Keiyukwa: station 33; Reg. No. 53443. Wangwa: station 32; Reg. No. 53429. Wangwa: station 33; Reg. No. 53444. Wangwa: station 35; Reg. No. 53438. 1200 m. E. of Zyô-tûsyôwan: station 36; Reg. No. 53424. 300 m. E. of Sankwakô: station 39; Reg. No. 53445. 500 m. E. of Sankwakô: station 41; Reg. No. 53434. 550 m. E. of Sankwakô: station 43; Reg. No. 53437. 940 m. NW. of Keiyukwa: station 55; Reg. No. 53433. 1200 m. SE. of Sankwakô: station 60; Reg. No. 53448. 900 m. SE. of Naikotô: station 66; Reg. No. 53450. 1520 m. E. of Sinpo: station 68; Reg. No. 53426. 1550 m. E. of Sinpo: station 69; Reg. No. 53435. 300 m. E. of Hakusyaton; Reg. No. 37329. 300 m. E. of Zyô-tûsyôwan; Reg. No. 37378.

Geologic distribution: Pliocene of Timor; Miocene of Java and Sumatra.

*Lataxiena fimbriata* (HINDS), 1844

Pl. VIII (III), Fig. 12.

*Trophon fimbriatus*. TRYON, Man. Conch., 1 Ser., Vol. 2, p. 149, Pl. 33, fig. 355, 1880.*Lataxiena luculenta*. YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 44, No. 1515, 1931.*Murex luculentus*. REEVE, Conch. Icon., Vol. 3, Pl. 28, fig. 127, 1845.*Trophon luculentus*. DUNKER, Ind. Moll. Mar. Jap., p. 9, Pl. 1, figs. 3, 4, 1882; PILSBRY, Cat. Mar. Moll. Jap., p. 40, 1895.

A single specimen whose shoulder varices are partly worn.

Shell ovate fusiform, apex acute. Whorls 9, apical 3 embryonal, smooth and convex; post-embryonal ones distinctly angulate around middle, surface above angle flat, vertical below.

Body-whorl about two-thirds of total shell-height and shallowly umbilicate in front. Surface longitudinally plicate and spirally ridged. Plicae about 10 on a whorl, narrow and rather indistinct, somewhat tuberculate at shoulder. Ridges few, rather irregular in strength, one on angle and one below it are prominent; 2 smaller ridges on sloping area above body-whorl angle, and 8 distinct ones on surface below it, and provided with smaller ones in each interval of upper ones. Entire surface rather coarsely fimbriated by longitudinal lameller ridges especially marked on body-whorl. Aperture ovate; outer lip transversely dentate within; inner lip smooth. Canal short, recurved being widely open. Height, 29.5 mm.; diameter, 27.4 mm.

Type locality: Strait of Macassar; Recent.

Fossil occurrence: Byōritu Beds.—Wangwa: station 10; Reg. No. 53452.

Living: Sikoku and Taiwan. Straits of Macassar.

#### Family Coralliophilidae

Genus *Coralliophila* H. and A. ADAMS, 1853

#### *Coralliophila pilsbryi*, n. sp.

Pl. VIII (III), Figs. 13a, 13b.

Shell resembling *Coralliophila stearnsi* PILSBRY in general features, but somewhat smaller, body-whorl, relatively less broader, aperture proportionally narrower, spiral cords more nearly equal in size and sculptured in a somewhat different way. Height, 19 mm.; diameter, 11.8 mm.

Fossil occurrence: Byōritu Beds.—Bōsiho: station 13; Reg. No. 53453.

Genus *Latiaxis* SWAINSON, 1840

#### *Latiaxis yabei*, n. sp.

Pl. VIII (III), Figs. 30a, 30b, 31a, 31b.

Shell rather small, fusiform, umbilicate; spire longly conical in lateral view, and slightly longer than one-third of total shell-height. Whorls 8, the first 2 globular, forming a smooth embryonal conch, the third also globular, and sculptured with numerous, fine longitudinal threads only, the rest angular at about one-fourth of whorl-length from the lower suture; area above angle convexly sloping, below it receding. Surface sculptured by longitudinal plicae and spiral threads. Plicae about 10 on each whorl, rather low and weak, separated by shallow interspaces nearly equal to plicae themselves; plicae on lower two whorls rather obsolete and do not extend below middle part of body-whorl. Spiral threads subequal, minutely squamate with interspaces narrower, about 10 on upper sloping area and 3-4 on remaining part of penultimate whorl. Aperture angularly ovate; outer lip thin, lirate within; inner lip smooth; anterior canal moderate and recurved. Umbilicus rather shallow and narrow.

There are several specimens in the collection. The dimensions (in mm.) of two specimens are:

	1	2
Height .....	31.0	25.5
Diameter .....	21.6	13.7



This species somewhat resembles *R. idola* JONAS<sup>1)</sup> which said to be living in China, the Philippines and Australia, but our shell has invariably much narrower umbilicus than that species.

Fossil occurrence: Byôritu Beds.—Wangwa: station 24; Reg. No. 53456. 1200 m. E. of Zyô-tûsyôwan: station 36; Reg. No. 53454. 900 m. SE. of Naikotô: station 66; Reg. No. 53455. E. of Goko; Reg. Nos. 37383, 37370.

### Family Bursidae

Genus *Bursa* (BOLTEN) RÖDING, 1798

Subgenus *Gyrineum* LINK, 1807

#### *Bursa* (*Gyrineum*) *subgranosa* (BECK), 1832-41

*Ranella subgranosa*. REEVE, Conch. Icon., Vol. 2, Pl. 1, fig. 1, 1844.

*Ranella* (*Bursa*) *subgranosa*. TESCH, Paläont. von Timor, Vol. 5, p. 70, Pl. 82, fig. 152, 1915: FISCHER, Paläont. von Timor, Vol. 15, p. 65, 1927: DICKERSON, Rev. Philippine Paleont., Pl. 4, figs. 13a, 13b, 1922.

*Gyrineum scelestum*. YOKOYAMA, Imp. Geol. Surv., Rep. No. 101, p. 44, Pl. 3, figs. 5, 6, 1928.

Numerous well preserved specimens. The largest one about 60 mm. in height. This may perhaps be only a varietal form of *B. rana* (L.), a species found living from Western Honshû and farther southward in Japan. *G. scelestum* YOKOYAMA, above cited, is certainly identical with the present species; the canal of the former is not as long as suspected by Dr. YOKOYAMA.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Byôritu Beds.—300 m. E. of Hakusyaton: station 1; Reg. No. 37390. 700 m. E. of Hakusyaton: station 3; Reg. Nos. 51164, 51189. 1000 m. E. of Hakusyaton: station 4; Reg. No. 51167. 300 m. E. of Zyô-tûsyôwan: station 4; Reg. No. 37341. 500 m. SW. of Dainankwa: station 5; Reg. No. 37340. Wangwa: station 5; Reg. No. 51165. Between Kôsui and Zyuna: station 6; Reg. No. 37354. Wangwa: station 6; Reg. No. 51170. 900 m. NW. of Rinsuikwa: station 6; Reg. No. 52996. 600 m. E. of Hakusyaton: station 7; Reg. No. 51166. E. of Goko: station 8; Reg. No. 37315. Nanseizan: station 11; Reg. No. 51192. Wangwa: station 12; Reg. No. 51176. Bôsiho: station 13; Reg. No. 51179. 400 m. SE. of Zyô-tûsyôwan: station 13; Reg. No. 51174. Wangwa: station 13; Reg. No. 51182. 1450 m. W. of Hokkô: station 14; Reg. No. 51193. 500 m. SE. of Zyô-tûsyôwan: station 14; Reg. No. 51169. Wangwa: station 14; Reg. Nos. 51162, 51190. 510 m. SE. of Zyô-tûsyôwan: station 15; Reg. No. 51187. Wangwa: station 15; Reg. No. 51400. 550 m. SE. of Zyô-tûsyôwan: station 16; Reg. No. 51195. Wangwa: station 16; Reg. Nos. 51172, 51175. 600 m. SE. of Zyô-tûsyôwan: station 17; Reg. No. 51194. Wangwa: station 17; Reg. No. 51181. 700 m. NE. of Nanseizan: station 19; Reg. No. 51184. Wangwa: station 19; Reg. Nos. 51168, 51403. Wangwa: station 21; Reg. No. 51186. Wangwa: station 23; Reg. No. 51163. Wangwa: station 24; Reg. No. 53501. 1000 m. E. of Hakusyaton: station 25; Reg. No. 51161. Wangwa: station 25; Reg. No. 51399. 700 m. SE. of Hakusyaton: station 27; Reg. No. 51178. 700 m. E. of Naikotô: station 29; Reg. No. 51188. 1000 m. SE. of Naikotô: station 30; Reg. No. 51198. 1000 m. SE. of Hakusyaton: station 82; Reg. No. 53503. Wangwa: station 33; Reg. No. 53502. Keiyukwa: station 33; Reg. No. 53260. Wangwa: station 35; Reg. No. 51200. 1200 m. E. of Zyô-fûsyôwan: station 36; Reg. No. 53412. 300 m. E. of

1) TRYON: Man. Conch., 1 Ser., Vol. 2, p. 203, Pl. 64, figs. 342, 343, 1880.

Sankwakô: station 39; Reg. No. 51196. Wangwa: station 40; Reg. No. 51177. 500 m. E. of Sankwakô: station 41; Reg. No. 51173. 550 m. E. of Sankwakô: station 43; Reg. No. 51199. 300 m. S. of Sankwakô: station 44; Reg. No. 51197. Keiyukwa: station 50; Reg. No. 51191. 940 m. NW. of Keiyukwa: station 55; Reg. No. 51171. 1200 m. SE. of Sankwakô: station 60; Reg. No. 51183. 900 m. SE. of Naikotô: station 66; Reg. No. 51183. 1500 m. E. of Sinpo: station 69; Reg. No. 51180.

Living: Western Honsyû and Kyûsyû. Tyôsen. China. The Philippines. Indian Ocean.

Geologic distribution: Post-Pliocene of New Guinea; Pliocene of Java, Timor and Seran; Miocene of Java and the Philippines.

### Family Cymatiidae

Genus *Cymatium* (BOLTEN) RÖDING, 1798

*Cymatium vespaceum* (LAMARCK), 1822

Pl. VIII (III), Fig. 36.

*Cymatium vespaceum*. KURODA, Cat. Shell-bearing Moll. Amami-Ôsima, p. 36, No. 560, 1928.

*Tritonium vespaceus*. PILSBRY, Cat. Mar. Moll. Jap., p. 47, 1895.

*Triton (Simpulum) vespaceus*. TESCH, Paläont. von Timor, Vol. 5, p. 67, Pl. 82, fig. 147, 1915.

*Triton vespaceus*. REEVE, Conch. Icon., Vol. 2 Pl. 15, figs. 61a, b, 1844: TRYON, Man. Conch., 1 Ser., Vol. 3, p. 22, Pl. 12, figs. 94-100, 1881: KÜSTER u. KOBELT in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 3, Pt. 2, p. 179, Pl. 52, fig. 3, 1878.

One small, somewhat imperfect specimen, 15 mm. in diameter, and about 30 mm. in height. According to TRYON, *C. thersites* (REEVE)<sup>1)</sup> is a typical full grown specimen of the present species.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Byôritu Beds.—900 m. SE. of Naikotô: station 66; Reg. No. 51401.

Living: Ryûkyû. Polynesia. Indian Ocean. Australia. Sandwich Islands. West Indies(?).

Geologic distribution: Pliocene of Timor.

### *Cymatium sinense* (REEVE), 1844

Pl. VIII (III), Fig. 22.

*Cymatium (Monoplex) sinense*. YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 35, No. 1133, 1931.

*Triton sinensis*. REEVE, Conch. Icon., Vol. 2, Pl. 6, fig. 18, 1844: TRYON, Man. Conch., 1 Ser., Vol. 3, p. 20, Pl. 11, fig. 85, 1881: KÜSTER u. KOBELT in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 3, Pt. 2, p. 215, Pl. 60, figs. 5, 6, 1878.

One specimen, it agrees closely in form and sculpture with the description given by REEVE, except for the canal which is, unfortunately, not perfectly preserved. Diameter, ca. 12 mm.

1) REEVE: Conch. Icon., Vol. 2, Pl. 13, fig. 48, 1844.

Type locality: China; Recent.

Fossil occurrence: Byôritu Beds.—400 m. SE. of Zyô-tûsyôwan: station 13; Reg. No. 51402.

Living: Western Honsyû. China.

### **Cymatium parthenopeum** (SALIS), 1773

*Cymatium (Septa) parthenopeum*. YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 35, No. 1138, 1931.

*Tritonium parthenopes*. DUNKER, Ind. Moll. Mar. Jap., pp. 28, 256, 1882.

*Triton (Simpulum) costatus*. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 43, Pl. 3, fig. 9, 1928.

A small, perfect specimen. This species is widely distributed in the tropic and subtropic regions along both Pacific and Atlantic coasts. *C. olearium* (LINNAEUS)<sup>1)</sup> and *C. costatum* (BORN) are synonyms.

Type locality: Mediterranean Sea.

Fossil occurrence: Byôritu Beds.—Sôkeisi; Reg. No. 52997.

Living: Central Honsyû to Ryûkyû. Japan Sea. Indo-Pacific. Mediterranean Sea. Atlantic.

Geologic distribution: Post-Pleistocene of Central Honsyû.

### **Cymatium andoi** n. sp.

Pl. VIII (III), Figs. 21a, 21b.

Shell rather small, ovate fusiform, consisting of about 6 moderately convex whorls, separated by well impressed sutures. Surface marked by prominent, alternately large and small spiral ridges, 6 on penultimate, and about 15 on ultimate whorl, crossed by longitudinal threads making surface somewhat crenulate. Interspaces nearly equal to those of ridges in breadth on upper whorls, and wider on body-whorl. Aperture longly ovate; outer lip thickened by a terminal varix behind, transversely dentate within; inner lip almost free from callous deposits, obliquely corrugate; canal partly broken, but it is seemingly short and oblique.

A single specimen. Height, 28 mm.; diameter, 21.8 mm.

This is a very unique species, and no allied species have been reported either as recent or fossil from Japan and eastern Asia. It somewhat resembles in form a member of the genus *Gelagna* SCHANFUSS, 1869.

Fossil occurrence: Byôritu Beds.—Wangwa: station 14; Reg. No. 53973.

### Genus **Distorsio** (BOLTEN) RÖDING, 1798

#### **Distorsio reticulata** (LINK), 1807

*Distorsio reticulata*. KURODA, Cat. Shell-bearing Moll. Amami-Ôsima, p. 49, 1928: NOMURA and ZINBÔ, Sci. Rep. Tôhoku Imp. Univ., Ser. 2 (Geol.), Vol. 16, No. 2, p. 136, No. 136, 1934.

1) LINNAEUS: Syst. Nat. Ed., Vol. 12, p. 1217 (not Ed., 10).

*Persona (Distortrix) reticulata*. TESCH, Paläont. von Timor, Vol. 5, p. 69, Pl. 82, fig. 151, 1915: FISCHER, Paläont. von Timor, Vol. 15, p. 65, 1927.

*Distortrix reticulata*. SUGITANI, Cat. Luchu Shells, p. 18, 1926.

*Distortio cancellianus*. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 44, Pl. 3, fig. 8, 1928.

Two well preserved specimens. The larger one 49 mm. in height, and 39 mm. in diameter.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Byôritu Beds.—400 m. SE. of Zyô-tûsyôwan: station 13; Reg. No. 51160. Sikô; Reg. No. 49415.

Living: Western Honsyû to Ryûkyû. China. The Philippines. Indian Ocean. West Indies and South America(?).

Geologic distribution: Pleistocene of Kikai-zima; Post-Pliocene of New Guinea; Pliocene of Java, Timor, Seran and Sumatra; Miocene of Java and Sumatra.

#### Family Cassididae

#### Genus *Phalium* LINK, 1807

#### Subgenus *Phalium* s. s.

#### *Phalium (Phalium) areolum* (LINNAEUS), 1758

Pl. VIII (III), Fig. 38.

*Phalium areolum*. KURODA, Cat. Shell-bearing Moll. Amami-Ôsima, p. 50, No. 577, 1928: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 36, No. 1173: YAGURA, Cat. Moll. Hyôgo-ken, p. 38, No. 474, 1932.

*Cassis areola*. REEVE, Conch. Icon., Vol. 5, Pl. 9, fig. 24, 1848: KÜSTER in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 3, p. 33, Pl. 49, figs. 5, 6, 1857: TRYON, Man. Conch., 1 Ser., Vol. 7, p. 276, Pl. 6, fig. 84, 1885.

Several specimens, mostly ill-preserved. The largest ca. 57 mm. in height.

This shell is closely related to *P. strigatum* (GMELIN), a common living species in Japan. But it is distinguished from that species in the shell is less higher and consequently it is more globose in outline. In the full grown specimen, the spiral grooves of the body-whorl are indistinct on its upper part, while in the young, they are uniformly marked all over it.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Byôritu Beds.—Wanga: station 6; Reg. No. 53128. Wangwa: station 13; Reg. No. 53136. 500 m. SE. of Zyô-tûsyôwan: station 14; Reg. No. 53139. Bôsiho: station 14; Reg. No. 53138. Wangwa: station 14; Reg. No. 53137. 550 m. SE. of Zyô-tûsyôwan: station 16; Reg. No. 53140. 500 m. E. of Sankwakô: station 41; Reg. No. 53135. Sikô; Reg. No. 53141.

Raised Coral Reef.—S. of Sisitô; Reg. No. 37467.

Living: Central Honsyû to Ryûkyû. Japan Sea. The Philippines. Indian Ocean.

**Phalium (Phalium) cancellianum**, n. sp.

Pl. VIII (III), Figs. 25a, 25b.

Shell small, oblong-oval, with a single varix on each mature whorl; test thick and solid; spire short, conical, apex acute. Whorls 8, granular, cancellate, apical 3 (or  $2\frac{1}{2}$ ) embryonal, globular and smooth, the fourth also globular, the rest somewhat shouldered above, regularly convex below and marked with longitudinal ribs crossed by incised spiral grooves; the former about 30, and the latter 17 in number on body-whorl. Aperture narrow, elongate, somewhat tapering above; outer lip thickened by terminal varix, coarsely lirate within; inner lip has more or less punctate-corrugations at the lower part.

Type: Height, 30.4 mm. diameter, 18.6 mm. length of aperture 24.2 mm.

This new species has a great resemblance in form and sculpture to the preceding, but is distinguished from that species by having a smaller shell, more prominently cancellated sculpture and with a different ornamentation of the lower part of the inner lip.

Fossil occurrence: Byôritu Beds.—700 m. E. of Hakusyaton: station 3; Reg. No. 53144. Wangwa: station 15; Reg. No. 53146. Wangwa: station 16; Reg. No. 53142. Wangwa: station 26; Reg. No. 53145.

**Phalium (Phalium) decussatum** (LINNAEUS), 1758

Pl. VIII (III), Fig. 24.

*Cassis decussata*. REEVE, Conch. Icon., Vol. 5, Pl. 2, fig. 4, 1848: TRYON, Man. Conch., 1 Ser., Vol. 7, p. 277, Pl. 7, figs. 87, 88, 1885.

Shell small, consisting of 7 whorls, separated by somewhat marginated sutures. Spire short and conical, straight in outline. Last whorl roundly shouldered, area above it somewhat concave. Surface of spire ornamented by numerous fine vertical riblets crossed by a few spiral grooves. Last whorl also with vertical riblets and spiral grooves, but the former entirely obsolete on surface below shoulder, while the latter, on the contrary, becoming gradually distinct towards base. Inner lip with many oblique folds; outer lip fractured. A single varix behind inner lip showing a tendency of spination at the upper end. Height, about 31 mm. It is nearly identical with the named species in form and sculpture and perhaps represents an immature individual, but is slightly questionable due to being imperfectly preserved.

Type locality: Unknown; Recent.

Fossil occurrence: Byôritu Beds.—Wangwa: station 39; Reg. No. 53143.

Living: Unknown, ?tropic seas in Asia.

Geologic distribution: Pliocene of Java (?).

Subgenus **Semicassis** MÖRCH, 1852**Phalium (Semicassis) japonicum** (REEVE), 1848

*Cassis japonica*. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 46, Pl. 3, fig. 3, 1928.

This shell which has already been mentioned and figured by Dr. YOKOYAMA in the above cited work is represented in our collection by a few fine specimens as well as several fragments. The largest and finest specimen, 47 mm. in height, and 32 mm. in diameter.

Leaving aside the European *P. saburon* (ADANSON) from the present consideration, the Oriental forms, namely, *P. pilum* (REEVE), *P. japonicum* (REEVE), *P. pfeifferi* (HIDALGS), and *P. bisulcatum* (SCHUB. and WAGN.), are closely related to each other and are perhaps conspecific as maintained by TRYON and may prove to be so by future study; if so then, the name *pilum* is prior to *japonicum*.

Type locality: Japan; Recent.

Fossil occurrence: Byōritu Beds.—1600 m. N. of Sikwakō: station 10; Reg. No. 53130. Wangwa: station 12; Reg. No. 53124. 700 m. SW. of Kōkwan: station 23; Reg. No. 53127. Wangwa: station 24; Reg. No. 53123. 1000 m. E. of Hakusyaton: station 25; Reg. No. 53122. 1660 m. E. of Sinpo: station 56; Reg. No. 53125. Hakusyaton; Reg. No. 53126. Sikō; Reg. No. 48989.

Living: Central Honsyū to Kyūsyū. Japan Sea. China.

Geologic distribution: Pliocene of Honsyū; Pliocene of Java, Timor and Seran; Miocene of Java.

#### Genus *Morum* (BOLTEN), RÖDING, 1798

##### *Morum subcancellatum*, n. sp.

Pl. VIII (III), Figs. 23a, 23b.

Shell small, elongate-ovate; spire short, conical, body-whorl very large. Whorls 7, apical two embryonal, smooth and globular; the rest shouldered, longitudinally ribbed and spirally ridged; ribs 11 on body-whorl (including terminal one), rounded, separated by interspaces two times wider; ridges regular, equidistant, 11 on body-whorl; tuberculated at crossing points of ribs, especially spiny on shoulder of whorls. Suture impressed, distinct by submarginal cord. Aperture narrow, slightly oblique; outer lip reflected, coarsely dentate, or undulated, corresponding to spiral ridges of outer surface; inner lip with thin callosity and rather irregularly corrugate. Canal short, widely open being truncated at sinuated base. Height, 39 mm.; diameter, 24 mm.; length of aperture, 34 mm.

A single specimen. It is closely related to *M. cancellatum* (Sow.)<sup>1)</sup> from the China Sea. But the present species is distinguished from SOWERBY'S species in having fewer and broader ribs, and by having narrower callosity with less corrugations on the lower part of the inner lip.

Fossil occurrence: Byōritu Beds.—Sikō; Reg. No. 48972.

#### Family *Tonnidae*

##### Genus *Tonna* BRÜNNICH, 1772

##### *Tonna zonata* (GREEN), 1830

Pl. VIII (III), Fig. 29.

*Dolium zonatum*. REEVE, Conch. Icon., Vol. 5, Pl. 7, figs. 12a, b, 1849: KÜSTER in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 3, p. 75, Pl. 57, fig. 2; Pl. 63, fig. 3, 1857: LISCHKE, Jap. Meeres-Conch., Vol.

1) TRYON: Man. Conch., 1 Ser., Vol. 7, p. 282, Pl. 10, fig. 21, 1885.

1, p. 66, 1869: LISCHKE, *ibid.*, Vol. 2, p. 58, 1871: DUNKER, *Ind. Moll. Mar. Jap.*, p. 57, 1882: TRYON, *Man. Conch.*, 1 Ser., Vol. 7, p. 263, Pl. 3, fig. 17, 1885: PILSBRY, *Cat. Mar. Moll. Jap.*, p. 49, 1895: MARTIN, *Foss. von Java*, Vol. 1, p. 159, Pl. 25, figs. 368, 369, 1906.

*Dolium crenulatum*. PHILIPPI, *Abbild*, Vol. 3, Pt. 2, p. 1, No. 1, Pl. 1, fig. 1, 1851.

Several rather small specimens. A perfect one 59 mm. in height, and about 32 mm. in diameter. Interspaces between ribs provided with small riblet which is divided into three on upper part of body-whorl and penultimate. Growth lines rather coarse and distinct, somewhat latticed, especially in interspaces.

Is this *T. olearium* LINNAEUS (not of BRUGIÈRE)?

Type locality: The Eastern Sea.

Fossil occurrence: Byôritu Beds.—550 m. NW. of Rinsuikwa: station 7; Reg. No. 53131. Wangwa: station 19; Reg. No. 53132. Wangwa: station 37; Reg. No. 53133. Sikô; Reg. No. 49407.

Living: Central Honsyû to Kyûsyû. China.

Geologic distribution: Pliocene of Java, Sumatra and Seran.

### ***Tonna melanostoma* (JAY), 1839**

Pl. X (V), Figs. 29a, 29b.

*Tonna melanostoma*. SUGITANI, *Cat. Luchu Shells*, p. 19, 1926: KURODA, *Cat. Shell-bearing Moll. Amami-Ôsima*, p. 51, No. 585, 1928.

*Dolium melanostoma*. REEVE, *Conch. Icon.*, Vol. 5, Pl. 2, fig. 2, 1848: KÜSTER in MARTINI u. CHEMNITZ, *Syst. Conch. Cab.*, Vol. 3, p. 67, Pl. 59, 1857: TRYON, *Man. Conch.*, 1 Ser., Vol. 7, p. 261, Pl. 1, figs. 4, 5, 1885.

A very large, deformed mould, similar in size and sculpture with the named species.

Type locality: Friendly Islands; Recent.

Fossil occurrence: Kaizan Beds.—Ari-san; Reg. No. 52999.

Living: Southern Kyûsyû and Ryûkyû. Friendly Islands. Hawaiian Islands. Southern Pacific.

### ***Tonna luteostoma* (KÜSTER) 1857**

*Dolium luteostoma*. YOKOYAMA, *Jour. Coll. Sci. Imp. Univ. Tôkyô*, Vol. 39, Art. 6, p. 66, Pl. 4, fig. 2, 1920.

Fragmental specimens.

Type locality: Indian Ocean.

Fossil occurrence: Byôritu Beds.—700 m. SW. of Kôkwan: station 23; Reg. No. 53134. 580 m. E. of Zyô-tûsyôwan: station 58; Reg. No. 53129.

Living: Widely distributed in Japan from North to South. Indian Ocean.

Geologic distribution: Post-Pleistocene, Pleistocene and Pliocene of Central Honsyû. Pliocene of Sikoku. Pleistocene of Kikai-zima.

## Family Ficidae

Genus *Ficus* (BOLTEN) RÖDING, 1798*Ficus ficoides* (LAMARCK), 1822

*Ficus ficoides*. SUGITANI, Cat. Luchu Shells, p. 19, 1926; YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 36, No. 1197, 1931; YAGURA, Cat. Moll. Hyôgo-ken, p. 38, No. 484, 1932; KURODA, Cat. Moll. Hukui-ken, p. 187, No. 143, 1933.

Three imperfect specimens, all lacking the lower parts of the body-whorl. The surface sculpture consists of fine growth lines and spiral threads; their intersections being cancellated. The spirals are irregular in strength, periodically with relatively large ones.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Byôritu Beds.—1000 m. E. of Hakusyaton: station 6; Reg. No. 53000. 1000 m. SE. of Hakusyaton: station 32; Reg. No. 53870.

Living: Central Honsyû to Taiwan. Japan Sea. Indian Ocean. West coast of Africa.

Geologic distribution: Pleistocene of Central Honsyû. Pliocene of Seran; Miocene of Java and the Philippines; Neogene of Europe.

## Family Cypraeidae

Genus *Cypraea* LINNEAUS, 1758*Cypraea arabica* LINNEAUS, 1758

Pl. IX (IV), Fig. 2.

*Cypraea arabica*. KIENER, Spec. Coq. viv., p. 105, Pl. 17, fig. 1, 1835-1857; REEVE, Conch. Icon., Vol. 3, Pl. 1, fig. 2, 1845; LISCHKE, Jap. Meeres-Conch., Vol. 1, p. 69, 1869; LISCHKE, *ibid.*, Vol. 2, pp. 66, 167, 1871; SOWERBY, Thes. Conch., Vol. 4, p. 15, Pl. 10, figs. 59-61, 1880; WEINKAUFF in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 5, Pt. 2, p. 51, Pl. 16, figs. 3-6, 1881; DUNKER, Ind. Moll. Mar. Jap., p. 98, 1882; TRYON, Man. Conch., 1 Ser., Vol. 7, p. 174, Pl. 8, figs. 18, 19, 23, 24, 1885; PILSBRY, Cat. Mar. Moll. Jap., pp. 50, 172, 1895; SUGITANI, Cat. Luchu Shells, p. 16, 1926; KURODA, Cat. Shell-bearing Moll., Amami-Ôsima, p. 44, No. 497, 1928; YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 33, No. 1067, 1931.

Two rather well preserved specimens. Shell solid, ovately subcylindrical in form, thickly margined by callous deposits. Ventral surface flattish with narrow and slightly arcuate aperture. Teeth rather small. The larger one, height, 38.7 mm., lateral diameter, 25 mm., dorso-ventral diameter, 19 mm.

Type locality: Indian Ocean.

Fossil occurrence: Raised Coral Reef.—S. of Kontei; Reg. No. 37469.

Living: Central Honsyû to Taiwan. Indo-Pacific. Red Sea. Madagascar.

Geologic distribution: Post-Pliocene of Java.

*Cypraea caput-serpentis* LINNAEUS, 1758

Pl. IX (IV), Fig. 3.

*Cypraea caput-serpentis*. KIENER, Spec. Coq. viv., p. 112, Pl. 49, figs. 1, 1a, 1b, 1835-1857; REEVE, Conch. Icon., Vol. 3, Pl. 11, fig. 44, 1845; LISCHKE, Jap. Meeres-Conch., Vol. 1, p. 70, 1869; LISCHKE, *ibid.*, Vol. 2, pp.



64, 167, 1871: SOWERBY, Thes. Conch., Vol. 4, p. 16, Pl. 12, figs. 72, 73, 1880: WEINKAUFF in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 5, Pt. 3, p. 21, Pl. 5, figs. 20, 21, 1881: DUNKER, Ind. Moll. Mar. Jap., p. 99, 1882: TRYON, Man. Conch., 1 Ser., Vol. 7, p. 173, Pl. 6, figs. 98-100; Pl. 23, fig. 59, 1885: PILSBRY, Cat. Mar. Moll. Jap., p. 50, 1895: SUGITANI, Cat. Luchu Shells, p. 16, 1926: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 33, No. 1069, 1931: NOMURA and ZINBÔ, Sci. Rep. Tôhoku Imp. Univ., Ser. 2 (Geol.), Vol. 16, No. 2, p. 140, No. 144, 1934.  
*Pustularia caput-serpentis*. YAGURA, Cat. Moll. Hyôgo-ken, p. 36, No. 448, 1932: KURODA, Cat. Moll. Hukui-ken, p. 187, No. 128, 1933.

This is a very common shell in the recent fauna of Southern Japan, but is represented in the collection by only a single specimen. Height, 33.8 mm.; lateral diameter, 25 mm.; dorso-ventral diameter, 17 mm.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Raised Coral Reef.—S. of Kontei; Reg. No. 37470.

Living: Central Honsyû to Taiwan Japan Sea. China. Indo-Pacific. Red. Sea. Australia.

Geologic distribution: Pleistocene of Kikai-zima.

### *Cypraea caurica* LINNAEUS, 1758

Pl. IX (IV), Fig. 8.

*Cypraea caurica*. KIENER, Spec. Coq. viv., Vol. 1, p. 54, Pl. 10, figs. 2, 3, 1835-1857: REEVE, Conch. Icon., Vol. 3, Pl. 11, fig. 46, 1845: LISCHKE, Jap. Meeres-Conch., Vol. 1, p. 71, 1869: WEINKAUFF in MARTINI u. CHEMNITZ, Syst. Conch., Cab., Vol. 5, Pt. 3, p. 12, Pl. 3, figs. 4, 5, ?13, 14, 1881: DUNKER, Ind. Moll. Mar. Jap., p. 100, 1882: TRYON, Man. Conch., 1 Ser., Vol. 7, p. 171, Pl. 5, figs. 88, 89, 90, 1885: PILSBRY, Cat. Mar. Moll. Jap., p. 50, 1895: SUGITANI, Cat. Luchu Shells, p. 16, 1926: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 33, No. 1079, 1931.

*Erronea caurica*. KURODA, Cat. Shell-bearing Moll. Amami-Ôsima, p. 45, No. 508, 1928.

A single specimen. Length, 37 mm.; lateral diameter, 22.5 mm.; dorso-ventral diameter, 17 mm.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Raised Coral Reef.—S. of Kontei; Reg. No. 37474.

Living: Southern Kyûsyû to Taiwan. Indian and Pacific Islands. E. coast of Africa.

### *Cypraea cincta* MARTIN, 1906

Pl. IX (IV), Figs. 5a, 5b, 6a, 6b.

*Cypraea cincta*. MARTIN, Foss. von Java, Vol. 1, p. 172, Pl. 28, figs. 399-402, 1906.

Three rather ill-preserved specimens. They are identical with the figures given by MARTIN for the specimens from Sedan.

Type locality: Java; Miocene.

Fossil occurrence: Byôritu Beds.—Rokuzyûkei; Reg. No. 25256.

Geologic distribution: Miocene of Java.

**Cypraea felina** GMELIN, 1792

*Cypraea felina*. KIENER, Spec. Coq. viv., p. 96, Pl. 33, fig. 3, 1835-1857: REEVE, Conch. Icon., Vol. 3, Pl. 19, fig. 105, 1846: LISCHKE, Jap. Meeres-Conch., Vol. 1, p. 71, 1769: LISCHKE, *ibid.*, Vol. 2, p. 63, 1871: SOWERBY, Thes. Conch., Vol. 4, p. 9, Pl. 323, figs. 392, 394, 395, 1880: WEINKAUFF in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 5, Pt. 3, p. 11, Pl. 3, figs. 2, 3, 1881: DUNKER, Ind. Moll. Mar. Jap., p. 98, 1882: TRYON, Man. Conch., 1 Ser., Vol. 7, p. 169, Pl. 4, figs. 52, 55, 59, 60, 1885: PILSBRY, Cat. Mar. Moll. Jap., p. 50, 1895: KURODA, Cat. Shell-bearing Moll. Amami-Ōsima, p. 45, No. 513, 1928.

*Eronea felina*. YAGURA, Cat. Moll. Hyōgo-ken, p. 36, No. 455, 1932.

Two, rather ill-preserved specimens are identified with *C. felina* with some doubt.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Ryūkyū Limestone.—Hanpeizan; Reg. No. 37429.

Living: Western Honsyū to Ryūkyū. Japan Sea. Indo-Pacific. Red Sea. Australia.

**Cypraea mappa** LINNAEUS, 1758

Pl. IX (IV), Fig. 10.

*Cypraea mappa*. KIENER, Spec. Coq. viv., p. 9, Pl. 20, figs. 1, 2, 1835-1857: REEVE, Conch. Icon., Vol. 3, Pl. 6, fig. 18, 1845: SOWERBY, Thes. Conch., Vol. 4, p. 15, Pl. 5, figs. 24-28, 1880: WEINKAUFF in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 5, Pt. 3, p. 73, Pl. 22, figs. 1-4, 1881: TRYON, Man. Conch., 1 Ser., Vol. 7, p. 174, Pl. 7, figs. 12-14; Pl. 8, fig. 17, 1885: SUGITANI, Cat. Luchu Shells, p. 16, 1926: KURODA, Cat. Shell-bearing Moll. Amami-Ōsima, p. 44, No. 496, 1928: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 33, No. 1066, 1931.

A single mould; the form and teeth are quite similar in the named one. Height, ca. 63.5 mm.; lateral diameter, 47.5 mm.; dorso-ventral diameter, 38 mm.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Ryūkyū Limestone.—Kotobuki-yama; Reg. No. 38208.

Living: Ryūkyū and Taiwan. Indo-Pacific. Red Sea.

**Cypraea miliaris** GMELIN, 1792

Pl. IX (IV), Figs. 4a, 4b.

*Cypraea miliaris*. REEVE, Conch. Icon., Vol. 3, Pl. 10, fig. 36, 1845: SOWERBY, Thes. Conch., Vol. 4, p. 36, Pl. 308, fig. 109, 1880: WEINKAUFF in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 5, Pt. 3, p. 110, Pl. 33, figs. 9, 12, 1881: DUNKER, Ind. Moll. Mar. Jap., p. 99, 1882: TRYON, Man. Conch., 1 Ser., Vol. 7, p. 192, Pl. 17, fig. 18, 1885: PILSBRY, Cat. Mar. Moll. Jap., p. 51, 1895: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 34, No. 1090, 1931.

*Pustularia miliaris*. YAGURA, Cat. Moll. Hyōgo-ken, p. 36, No. 447, 1932.

Three specimens. This species is characterized by its small sized shell, ovate outline, swollen behind, and flattened in front. The teeth are rather large, and elongated, about 16 on the right side and 12 on the left. The surface is entirely smooth except for coarse crenulation on both sides of the shell. The largest specimen, 32 mm. in height, 20 mm. in the lateral diameter, and 16 mm. in the dorso-ventral diameter.

*C. guttata* GRAY, *C. lamarcki* GRAY and *C. eburnea* BARNES are similar species.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Byōritu Beds.—400 m. SE. of Zyō-tūsyōwan: station 13; Reg. No. 53507. Wangwa: station 16; Reg. No. 53505. 1000 m. E. of Hakusyaton: station 25; Reg. No. 53506.

Living: Central Honsyū and Inland Sea. Molucca.

### *Cypraea talpa* LINNAEUS, 1758

Pl. IX (IV), Fig. 1.

*Cypraea talpa*. KIENER, Spec. Coq. viv., p. 79, Pl. 12, fig. 2, 1835-1857: REEVE, Conch. Icon., Vol. 3, Pl. 2, fig. 51, 1845: SOWERBY, Thes. Conch., Vol. 4, p. 6, Pl. 12, figs. 74, 75, 76, 1880: WEINKAUFF in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 5, Pt. 3, p. 18, Pl. 4, figs. 5, 6; Pl. 7, figs. 6, 7, 1881: TRYON, Man. Conch., 1 Ser., Vol. 7, p. 167, Pl. 3, figs. 31-33, 1885: SUGITANI, Cat. Luchu Shells, p. 16, 1926: KURODA, Cat. Shell-bearing Moll. Amami-Ōsima, p. 44, No. 490, 1928: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 33, No. 1060, 1931.

One small specimen. It is probably an immature specimen of *C. talpa* judged by its form and dentition. The spire is slightly exposed as is the usual case of an immature *Cypraea*. Height, 45 mm.; lateral diameter, 25 mm.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Raised Coral Reef.—S. of Kontei; Reg. No. 37475.

Living: Central Honsyū to Taiwan. Indo-Pacific. Red Sea.

### *Cypraea testudinaria* LINNAEUS, 1758

Pl. IX (IV), Fig. 7.

*Cypraea testudinaria*. KIENER, Spec. Coq. viv., p. 78, Pls. 15, 16, fig. 1, 1835-1857: REEVE, Conch. Icon., Vol. 3, figs. 9a, b, 1845: LISCHKE, Jap. Meeres-Conch., Vol. 3, p. 4, Pl. 13, figs. 83, 84, 1880: WEINKAUFF in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 5, Pt. 3, p. 16, Pl. 4, figs. 3, 4, 1881: DUNKER, Ind. Moll. Mar. Jap., p. 97, 1882: TRYON, Man. Conch., 1 Ser., Vol. 7, p. 165, Pl. 1, figs. 9, 10, 1885: PILSBRY, Cat. Mar. Moll. Jap., p. 50, 1895: SUGITANI, Cat. Luchu Shells, p. 16, 1926: KURODA, Cat. Shell-bearing Moll. Amami-Ōsima, p. 44, No. 495, 1928: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 33, No. 1058, 1931.

A single mould. The shell is large and subcylindrical in form bearing many, rather small teeth in front.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Ryūkyū Limestone.—Hanpeizan; Reg. No. 37450.

Living: Kyūsyū to Taiwan. The Philippines. Mauritius, Ambonia, New Caledonia. Viti and Samoa Islands. Indian Ocean.

### *Cypraea onyx* LINNAEUS, 1758

Pl. IX (IV), Figs. 9a, 9b.

*Cypraea onyx*. TRYON, Man. Conch., 1 Ser., Vol. 7, p. 183, Pl. 13, figs. 77, 80, 81, 1885: PILSBRY, Cat. Mar. Moll. Jap., p. 51, 1895.

Two small specimens. One of them retains the peculiar blackish color on the base and sides. Height, 27 mm.; lateral diameter, 16.5 mm.; dorso-ventral diameter, 18.5 mm.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Byôritu Beds.—Wangwa: station 24; Reg. No. 53508.

Ryûkyû Limestone:—Hanpeizan; Reg. No. 53509.

Living: Central Honsyû to Kyûsyû. The Philippines. Indo-Pacific.

Geologic distribution: Miocene of Nias.

### *Cypraea* species indet. (1)

A fragment of a thickly margined *Cypraea* with obsolete teeth. It seems to be very characteristic, but is indeterminable.

Fossil occurrence: Byôritu Beds.—Sikô; Reg. No. 53510.

### *Cypraea* species indet. (2)

A mould showing a rather highly exposed spire. It seems to be an immature individual of a large *Cypraea*, but the specific identification is at present in question.

Fossil occurrence: Byôritu Beds.—Wangwa: station 12; Reg. No. 53511.

## Genus *Pustularia* SWAINSON, 1840

### *Pustularia cicercula* (LINNAEUS), 1758

Pl. IX (IV), Figs. 11a, 11b.

*Pustularia cicercula*. KURODA, Cat. Shell-bearing Moll. Amami-Ôsima, p. 45, No. 518, 1928; YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 34, No. 1099, 1931.

*Cypraea (Pustularia) cicercula*. SUGITANI, Cat. Luchu Shells, p. 17, 1926.

*Cypraea cicercula*. REEVE, Conch. Icon., Vol. 3, Pl. 21, fig. 116, 1845; KIENER, Spec. Coq. viv., p. 156, Pl. 50, figs. 3, 4, 1835-1857; SOWERBY, Thes. Conch., Vol. 4, p. 41, No. 142, Pl. 322, figs. 343-346, 1880; WEINKAUFF in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 5, Pt. 1, p. 140, Pl. 37, figs. 1, 2, 1881; DUNKER, Ind. Moll. Mar. Jap., p. 100, 1882; TRYON, Man. Conch., 1 Ser., Vol. 7, p. 197, Pl. 20, figs. 55-58, 61, 62, 1885.

*Cypraea (Epona) cicercula*. PILSBRY, Cat. Mar. Moll. Jap., p. 173, 1895.

A single, well preserved specimen. Length, 38 mm.; lateral diameter, 11.5 mm.; dorso-ventral diameter, 10 mm.

The specimen, not only coincides with the figures and descriptions given in the works cited above, but also perfectly agrees with recent specimens collected from Ryûkyû.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Raised Coral Reef.—S. of Sisitô; Reg. No. 37398.

Living: Southern Kyûsyû and Ryûkyû. Mauritius. Isle Anna. Borneo. New Caledonia.

Genus *Volva* (BOLTEN) RÖDING, 1798*Volva volva* (LINNAEUS), 1758

Pl. IX (IV), Figs. 12a, 12b.

*Volva volva*. YAGURA, Cat. Moll. Hyôgo-ken, p. 37, No. 460, 1931: KURODA, Cat. Moll. Hukui-ken, p. 186, No. 125, 1933.

*Sulcocypraea (Volva) volva*. YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Imp. Geol. Surv. Jap., p. 34, No. 1120, 1931.

*Ovulum volva*. SOWERBY, Thes. Conch., Vol. 2, p. 482, No. 48, Pl. 99, figs. 6-8, 1855: REEVE, Conch. Icon., Vol. 15, Pl. 9, fig. 41, 1865.

*Ovula volva*. WEINKAUFF in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 5, Pt. 3, p. 196, Pl. 50, figs. 4, 5, 1881: KIENER, Spec. Coq. viv., p. 26, Pl. 4, fig. 1, 1835-1857: TRYON, Man. Conch., 1 Ser., Vol. 7, p. 525, Pl. 4, figs. 94, 95, 1885.

Three specimens from two localities. They quite agree with the recent specimens from Japan, although somewhat fractured at both extremities in both specimens.

Type locality: The Eastern Sea.

Fossil occurrence: Byôritu Beds.—Wangwa: station 33; Reg. No. 53401. Sikô; Reg. No. 48980.

Living: Central Honsyû to Kyûsyû. Japan Sea. China. The Philippines.

Genus *Erato* RISSO, 1826*Erato callosa* ADAMS and REEVE, 1850

*Erato callosa*. REEVE, Conch. Icon., Vol. 15, Pl. 1, fig. 2, 1865: YOKOYAMA, Jour. Coll. Sci. Tôkyô Imp. Univ., Vol. 44, Art. 1, p. 69, Pl. 3, fig. 11, 1922.

A single specimen exactly identical with *E. callosa* which is considered by some as a variety of *E. lachryma* GRAY.

Type locality: China; Recent.

Fossil occurrence: Byôritu Beds.—550 m. E. of Sankwakô: station 43; Reg. No. 53926.

Living: Northern Honsyû to Ryûkyû. China Sea.

Geologic distribution: Post-Pleistocene, Pleistocene and Pliocene of Honsyû.

Family *Strombidae*Genus *Strombus* LINNAEUS, 1758*Strombus taiwanicus* n. sp.

Pl. VIII (III), Figs. 15a, 15b, 16a, 16b.

Shell resembling *S. japonicus* REEVE in general aspects, but smaller and relatively narrower and being less concave in the upper slope of its whorls; the angle of the shoulder more rounded and the sculpture much more distinct, and somewhat finer. The revolving ridges on the upper half of the body-whorl in this species are invariably divided into two or three equal or unequal parts, though it is a rare case in *S. japonicus*.

*S. taiwanicus* is most closely related to *S. swainsoni* REEVE, from which our shell is distinguished by having more marked spiral grooves on the body-whorl and a much higher spire.

In deep revolving grooves on the body-whorl, this new species apparently closely resembles *S. deformis* GRAY of Australia.

Annexed are some of the measurements (in mm.):

	1	2	3	4	5	6
Height .....	51.0	48.5	48.0	40.5	32.0	28.0
Diameter .....	22.5	22.7	23.5	20.8	12.5	10.5

Fossil occurrence: Byōritu Beds.—700 m. E. of Hakusyatō: station 3; Reg. No. 53148. 1000 m. E. of Hakusyatō: station 4; Reg. No. 53161. Wangwa: station 4; Reg. No. 53156. 1000 m. NW. of Rinsuikwa: station 6; Reg. No. 53163. 900 m. NW. of Rinsuikwa: station 6; Reg. No. 53171. Wangwa: station 6; Reg. No. 53152. Wangwa: station 9; Reg. No. 53172. 1100 m. SW. of Rinsuikwa: station 11; Reg. No. 53174. Wangwa: station 12; Reg. No. 53158. Bōsiho: station 13; Reg. No. 53175. 400 m. SE. of Zyō-tūsyōwan: station 13; Reg. No. 53170. Wangwa: station 13; Reg. Nos. 53164, 53149. 1450 m. W. of Hokkō: station 14; Reg. No. 53181. Wangwa: station 14; Reg. No. 53187. 500 m. S. of Zyō-tūsyōwan: station 14; Reg. No. 53165. 550 m. SE. of Zyō-tūsyōwan: station 16; Reg. No. 53166. Wangwa: station 16; Reg. No. 53186. 600 m. SE. of Zyō-tūsyōwan: station 17; Reg. No. 53180. Wangwa: station 17; Reg. No. 53155. Wangwa: station 18; Reg. No. 53154. Wangwa: station 19; Reg. No. 53160. 1000 m. E. of Hakusyatō: station 20; Reg. No. 53163. Wangwa: station 22; Reg. No. 53157. Wangwa: station 23; Reg. No. 53151. 1000 m. E. of Hakusyatō: station 25; Reg. No. 53147. Wangwa: station 25; Reg. No. 53150. Wangwa: station 32; Reg. No. 53183. Wangwa: station 35; Reg. No. 53182. 1100 m. E. of Zyō-tūsyōwan: station 37; Reg. No. 53167. Wangwa: station 40; Reg. No. 53153. Tyū-tūsyōwan: station 47; Reg. No. 53173. Keiyukwa: station 50; Reg. No. 53176. 940 m. NW. of Keiyukwa: station 55; Reg. No. 53169. 1200 m. SE. of Sankwakō: station 60; Reg. No. 53178. 900 m. SE. of Naikotō: station 66; Reg. No. 53177. 1520 m. E. of Sinpo: station 68; Reg. No. 53179. 1550 m. E. of Sinpo: station 69; Reg. No. 53186. Hakusyatō; Reg. No. 53159. Sikō; Reg. Nos. 53184, 48991.

### *Strombus bivaricosus*, n. sp.

Pl. VIII (III), Figs. 14a, 14b.

Shell small, fusiform. Whorls 10, apical  $3\frac{1}{2}$  embryonal, smooth and rounded. Post-embryonal whorls bluntly shouldered at two-thirds of height of whorl, separated by submarginated, impressed sutures with 2 varices on each lower 4 whorls. Sculpture consists of longitudinal plicae as well as revolving threads. Plicae numerous, about 22 on shoulder of last whorl (excluding varices) vanishing on surface below periphery; interspaces somewhat wider than plicae. Threads subequal, (often with smaller ones between), about 7 on a whorl of spire, over 40 in number on last whorl; points of intersection of plicae and threads minutely beaded, especially distinct on spire whorls. Body-whorl 2 times longer than spire; aperture narrow and fusiform. Outer lip thickened by a terminal varix, but not expanded, transversely lirate within; inner lip smooth with a rather thin callosity; canal short, substraight and truncate at base.

Two specimens; the larger one, 21.5 mm. in height, 8.5 mm. in diameter, and 12.9 mm. in length of aperture.

This species is characterized by its small shell, beaded surface, and with two varities on the lower whorls. No allied form has been reported from eastern Asia except *S. sondensis* MARTIN,<sup>1)</sup> a Neogene species from Java.

Fossil occurrence: Byôritu Beds.—1000 m. SE. of Hakusyaton: station 32; Reg. No. 53162. 1550 m. E. of Sinpo: station 69; Reg. No. 53512.

### ***Strombus dentatus* LINNAEUS, 1758**

*Strombus dentatus*. REEVE, Conch. Icon., Vol. 6, Pl. 9, fig. 17, 1850: TRYON, Man. Conch., 1 Ser., Vol. 7, p. 118, Pl. 6, figs. 68, 70; Pl. 7, figs. 67-72, 1885: SUGITANI, Cat. Luchu Shells, p. 13, 1926: KURODA, Cat. Shell-bearing Moll. Amami-Ôsima, p. 41, No. 445, 1928: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 31, No. 982, 1931.

A single, fractured specimen. TRYON states that, "the difference between this species and *S. urceus* is so slight, and there is so much variation in the shells, that it is very doubtful whether their separation can be maintained." If the two are surely identical, the name *urceus* should be used. Our sole representative, however, has many narrow axial plicae on the surface with a denticulate inner lip, and agrees perfectly with the named one.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Byôritu Beds.—1000 m. E. of Hakusyaton: station 25; Reg. No. 53189.

Living: Southern Kyûsyû and Ryûkyû. The Philippines. New Caledonia. Viti Island. Maurites. Red Sea.

Geologic distribution: Pliocene of Java.

### ***Strombus luhuanus* LINNAEUS, 1758**

Pl. IX (IV), Fig. 23.

*Strombus luhuanus*. NOMURA and NIINO, Sci. Rep. Tôhoku Imp. Univ. Ser. 2 (Geol.), Vol. 15, No. 3, p. 192, Pl. 11, fig. 14, 1932.

A single, perfect specimen; the spire is somewhat more depressed than those of the usual recent specimens.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Byôritu Beds.—Sikô; Reg. No. 49403.

Living: Central Honsyû to Ryûkyû. China. The Philippines. Pacific Islands. New Guinea. Australia.

Geologic distribution: Post-Pleistocene and Miocene of Central Honsyû; Pleistocene of the Philippines(?); Post-Pliocene of Celebes and Timor.

### ***Strombus succinctus* LINNAEUS, 1758**

*Strombus succinctus*. REEVE, Conch. Icon., Vol. 6, Pl. 17, fig. 43, 1851: TRYON, Man. Conch., 1 Ser., Vol. 7, p. 116, Pl. 6, figs. 56, 57, 1885: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 31, No. 980, 1931.

1) MARTIN: Foss. von Java, Vol. 1, p. 319, Pl. 45, figs. 739, 740, 1906.

A single specimen lacking the larger part of the body-whorl. The identification is somewhat doubtful due to the imperfect state of preservation.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Byôritu Beds.—Sôkeisi; Reg. No. 54209.

Living: Western Honsyû. The Philippines. Indian Ocean.

#### **Strombus** species indet.

A single mould having coarse spiral ridges like *S. taiwanicus* mentioned in the preceding, but the spire is much shorter.

Fossil occurrence: Byôritu Beds.—Wangwa: station (?); Reg. No. 53188.

#### Genus **Tibia** (BOLTEN) RÖDING, 1798

##### **Tibia fusus** (LINNAEUS), 1758

Pl. IX (IV), Figs. 19, 20.

*Rostellaria fusus*. REEVE, Conch. Icon., Vol. 6, Pl. 2, figs. 5, 7, 1857: TRYON, Man. Conch., 1 Ser., Vol. 7, p. 128, Pl. 10, fig. 17; Pl. 11, fig. 21, 1885: DICKERSON, Rev. Philip. Paleont., Pl. 5, figs. 1a, 1b, 1922: YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 104, p. 13, Pl. 7, fig. 1, 1929.

*Rostellaria* sp. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 5, Pl. 4, fig. 2, 1928.

REEVE described this interesting species as: "Shell very slenderly fusiform, spire very much acuminate, the first few whorls convex and longitudinally very closely ribbed, the rest smooth, concavely slanting round the upper part, then rounded, last whorl grooved at the base, columella arched, callous, canal slender, very long, aperture rather small, lip five to six toothed, teeth prominent, lip callous at the upper part, very shortly canaliculately produced and curled."

Several fragmental specimens. Compared with recent specimens collected from Taiwan, the present fossil shows slight evolutionary or ecological change, having invariably a greater number of decorated upper whorls than those of the recent.

Type locality: China; Recent.

Fossil occurrence: Byôritu Beds.—900 m. NW. of Rinsuikwa: station 6; Reg. No. 53197. 1500 m. E. of Sinpo: station 67; Reg. No. 53193. Wangwa: station 40; Reg. No. 53196. 500 m. E. of Sankwakô: station 41; Reg. No. 53194. Keiyukwa: station 50; Reg. No. 53195. E. of Goko; Reg. No. 37351.

Living: Taiwan. China.

Geologic distribution: Pliocene of Sikoku; Miocene of the Philippines.

##### **Tibia formosana** (YOKOYAMA), 1923

*Rostellaria (Rimella) spinifera* var. *formosana*. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 50, Pl. 4, fig. 9, 1928.

Several specimens. Judging from the figures of "*Rostellaria*" given by REEVE, the present species stands between "*Rostellaria crispata* SOWERBY and "*Rostellaria cancellata*



LAMARCK (= *R. spinifera* MARTIN). The long anterior sinus in the present species is quite identical with that of *R. cancellata*, but the short canal and slight sinuation on the lower part of the outer lip reminds one of *R. crispata*, although the two living forms differ from the Formosan fossil by having invariably shorter spires.

The species of this genus are said to be tolerably variable, hence the specific or sub-specific value of *T. formosana* is doubtful.

Type locality: Taiwan; Pliocene.

Fossil occurrence: Byôritu Beds.—Wangwa: station 8; Reg. No. 53199. 550 m. SE. of Zyô-tûsyôwan: station 14; Reg. No. 53198. Wangwa: station 16; Reg. No. 53191. 1000 m. E. of Hakusyaton: station 25; Reg. No. 53192. 300 m. E. of Sankwakô: station 39; Reg. No. 53190. Western side of Syôgun-yama; Reg. No. 37337. 300 m. E. of Zyô-tûsyôwan; Reg. No. 53198.

#### Genus *Cerithium* BRUGTIÈRE, 1789

##### *Cerithium kochi* PHILIPPI, 1848

*Cerithium kochi*. PHILIPPI, *Abbild u. Beschr.*, Vol. 3, *Cerithium*, p. 2, Pl. 1, fig. 3, 1851.

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

Several specimens. One of rather perfect specimens, 25.3 mm. in height, and 8 mm. in diameter.

It is a small and an elongate-turreted shell having the surface granular by the intersection of longitudinal ribs and spiral cords. The latter are regularly arranged as alternately large and small, while the former often form a varix.

Type locality: E. coast of Africa; Recent.

Fossil occurrence: Byôritu Beds.—600 m. SE. of Zyô-tûsyôwan: station 17; Reg. No. 53469. 700 m. NE. of Nanseizan: station 19; Reg. No. 53468. 300 m. E. of Zyô-tûsyôwan; Reg. Nos. 37541, 37568.

Raised Coral Reef.—S. of Sisitô; Reg. No. 37395.

Living: Central Honsyû to Taiwan. Japan Sea. E. coast of Africa.

Geologic distribution: Post-Pleistocene and Pleistocene of Honsyû.

##### *Cerithium sinense* (GMELIN), 1792

Pl. IX (IV), Fig. 13.

*Cerithium (Vertagus) sinense*. KOBELT in MARTINI u. CHEMNITZ, *Syst. Conch. Cab.*, Vol. 1, Pt. 26, p. 20, Pl. 4, figs. 2-8, 1898.

*Clava sinensis*. PILSBRY, *Cat. Mar. Moll. Jap.*, p. 56, 1895; SUGITANI, *Cat. Luchu Shells*, p. 11, 1926; KURODA, *Cat. Shell-bearing Moll. Amami-Ôsima*, p. 36, No. 386, 1928; YOKOYAMA, *Cat. Mar. Fresh-W. and Land Shells Jap.*, *Min. Mus. Imp. Geol. Surv. Jap.*, p. 28, No. 898, 1931.

*Vertagus chinensis*. DUNKER, *Ind. Moll. Mar. Jap.*, p. 107, 1882.

*Cerithium obeliscus*. KIENER, *Spec. Coq. viv.*, p. 15, Pl. 5, fig. 1, 1835-1857; SOWERBY, *Thes. Conch.*, Vol. 2, p. 851, Pl. 177, figs. 30-32, 1855.

*Cerithium (Vertagus) obeliscus*. TRYON, Man. Conch., 1 Ser., Vol. 9, p. 146, Pl. 27, figs. 39, 40, 1887: MARTIN, Foss. von Java, Vol. 1, p. 206, 1906.

*Vertagus obeliscus*. REEVE, Conch. Icon., Vol. 15, Pl. 2, fig. 7, 1865.

A single specimen, it is rather small and short in form, 28 mm. in height, and 11.5 mm. in diameter.

The locality: The Far East; Recent.

Fossil occurrence: Raised Coral Reef.—S. of Sisitô; Reg. No. 37486.

Living: Southern Kyûsyû to Taiwan. Pacific Islands. Indian Ocean.

Geologic distribution: Pliocene of Java.

#### Genus *Gourmya* FISCHER, 1884

#### *Gourmya corallia* (KIENER) 1841-2

Pl. IX (IV), Figs. 19, 20.

*Cerithium corallium*. KIENER, Spec. Coq. viv., p. 32, Pl. 8, fig. 3, 1835-1857: SOWERBY, Thes. Conch., Vol. 2, p. 863, Pl. 179, fig. 63, 1855: REEVE, Conch. Icon., Vol. 15, Pl. 5, fig. 29, 1865: TRYON, Man. Conch., 1 Ser., Vol. 9, p. 125, Pl. 21, fig. 36; Pl. 24, fig. 46, 1887: KOBELT in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 1, Pt. 26, p. 218, Pl. 319, figs. 1, 2, 1898: SUGITANI, Cat. Luchu Shells, p. 11, 1926: KURODA, Cat. Shell-bearing Moll. Amami-Ôsima, p. 37, 1928: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 29, No. 910, 1931.

*Cerithium* (s. str.) *corallium*. MARTIN, Foss. von Java, Vol. 1, p. 201, Pl. 31, fig. 461, 1906.

Several small specimens from a single locality.

Shell rather long, medium in size, surface finely granular by intersection of longitudinal ribs and spiral cords. Main cords three in number on a whorl, provided with a few fine and smooth threads between their intervals. Longitudinal rib often tends to varix. Whorls 9-10, separated by well defined sutures: height, about 25.5 mm., diameter, about 16.5 mm.

Fossil occurrence: Raised Coral Reef.—S. of Sisitô; Reg. No. 37399.

Living: Southern Kyûsyû and Ryûkyû. The Philippines. Indian Ocean.

Geologic distribution: Pliocene of Sumatra; Miocene of Java.

#### *Gourmya carbonaria* (PHILIPPI) 1848

Pl. IX (IV), Fig. 18.

*Cerithium carbonarium*. TRYON, Man. Conch., 1 Ser., Vol. 9, p. 133, Pl. 24, fig. 24 only, 1887: KOBELT in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 1, Pt. 26, p. 276, Pl. 47, figs. 3, 4, 1898: PILSBRY, Cat. Mar. Moll. Jap., p. 56, 1895.

*Cerithium bronii*. SOWERBY, Thes. Conch., Vol. 2, p. 869, Pl. 182, fig. 175, 1855: REEVE, Conch. Icon., Vol. 15, Pl. 5, fig. 26, 1865.

Several fine specimens.

This species is characterized by the two revolving series of granules on each whorl of the spire (4 on the last whorl). The original blackish color of the tubercles is still fairly well preserved.

*Cerithium carbonarium* of REEVE<sup>1)</sup> is a distinct species.

Annexed are some of the measurements (in mm.):

	1	2	3
Height .....	28.5	26.7	25
Diameter .....	ca. 15.0	ca. 14.3	14

Type locality: The Far East; Recent.

Fossil occurrence: Byôritu Beds.—Wangwa: station 31; Reg. No. 53472.

Living: Southern Japan. China.

### Gourmya satoi (YOKOYAMA), 1928

*Cerithium satoi*. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 51, Pl. 3, fig. 7, 1928.

Several fine specimens, especially from Sikô. The shell grows larger than the type first described by Dr. YOKOYAMA; some of them measure (in mm.):

	1	2	3	4	5
Height .....	14.2	14.1	14.0	13.1	12.5
Diameter .....	5.2	5.2	5.0	4.1	4.0

Type locality: Taiwan; Pliocene.

Fossil occurrence: Byôritu Beds.—Sikô; Reg. Nos. 48970, 53481. The upper course of Sairyôkyô; Reg. No. 53481.

Geologic distribution: Known only from the Pliocene of Taiwan.

### Genus *Trochocerithium* SACCO, 1897

#### *Trochocerithium shikoense* (YOKOYAMA), 1928

*Cerithiopsis*(?) *shikoensis*. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 55, Pl. 4, fig. 10, 1928.

A single specimen; height, 6.5 mm., diameter, 3 mm. This species certainly belongs to the group of "*Cerithium*" *excelsum* YOKOYAMA,<sup>1)</sup> which according to Mr. KURODA is a member of *Trochocerithium*.

Type locality: Taiwan; Pliocene.

Fossil occurrence: Byôritu Beds.—Keiyukwa: station 50; Reg. No. 53478.

Geologic distribution: Known only from the Pliocene of Taiwan.

### Genus *Bittium* GRAY, 1847

#### *Bittium alutaceum* (GOULD), 1861

Pl. IX (IV), Figs. 15, 16.

*Bittium alutaceum*. TRYON, Man. Conch., 1 Ser., Vol. 9, p. 154, Pl. 30, fig. 10, 1887.

1) REEVE: Conch. Icon., Vol. 15, Pl. 9, fig. 59, 1865.

2) YOKOYAMA: Jour. Fac. Sci. Imp. Univ. Tôkyô, Sec. 2, Vol. 2, Pt. 7, p. 346, Pl. 67, fig. 8, 1928.

Three specimens. Shell small, turreted with rather distinct longitudinal folds, crossed by three spiral threads forming a series of granular rows. Suture distinctly marked, rather widely excavated. One of them, 6 mm. in height, and 2 mm. in diameter.

Type locality: China Sea.

Fossil occurrence: Byôritu Beds.—Wangwa: station 40; Reg. No. 53946.

Living: China Sea.

### Family Potamididae

Genus *Telescopium* MONTFORT, 1840

#### *Telescopium telescopium* (LINNAEUS), 1758

Pl. IX (IV), Figs. 21, 22.

*Telescopium telescopium*. MARTIN, Foss. von Java, Vol. 1, p. 220, Pl. 33, fig. 509, 1906; TESCH, Paläont. von Timor, Vol. 8, p. 58, Pl. 132, fig. 191, 1920; YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 29, No. 940, 1931.

*Potamides (Telescopium) telescopium*. TRYON, Man. Conch., 1 Ser., Vol. 9, p. 161, Pl. 33, fig. 56, 1887; PILSBRY, Cat. Mar. Moll. Jap., p. 57, 1895.

*Telescopium fuscum*. REEVE, Conch. Icon., Vol. 15, Pl. 1, figs. 1a, b, 1865.

Several rather ill-preserved specimens; the characteristic features of the species are still retained.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Byôritu Beds.—W. of Sanzyûkei: station 43 (TORII); Reg. No. 53457. N. of Sakityô: station 52 (TORII); Reg. No. 53458.

Raised Coral Reef.—S. of Sisitô; Reg. No. 37447.

Living: Japan. Taiwan. The Philippines. Malay Archipelago.

Geologic distribution: Post-Pliocene of Celebes, New Guinea; Pliocene of Timor; Miocene of Java and Borneo.

Genus *Cerithidea* SWAINSON, 1880

#### *Cerithidea cingulata* (GMELIN), 1791

*Potamides (Tympanotonos) fluviatilis*. YOKOYAMA, Jour. Coll. Sci. Imp. Univ. Tôkyô, Vol. 39, Art. 6, p. 68, Pl. 4, fig. 14, 1920; YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 53, 1928.

Several, more or less imperfect specimens. The form and sculpture of the Formosan fossils fit those of Japanese living ones. Some Javan fossil species of "*Potamides*" described by MARTIN are certainly related to the present species in sculpture.

Type locality: The Eastern Sea(?).

Fossil occurrence: Byôritu Beds.—1600 m. N. of Sikwakô: station 10; Reg. No. 53464. Wangwa: station 17; Reg. No. 53464. Kôsirin: station 35 (TORII); Reg. No. 53462. W. of Sanzyûkei: station 47 (TORII); Reg. No. 53466. Wanzaki: station 55 (TORII); Reg. No. 53467. The upper course of Sairyôkyô; Reg. No. 53465.

Raised Coral Reef.—S. of Sisitô; Reg. No. 37405.

Living: Widely distributed in Japan from North to South. The Philippines. Indian Ocean.

Geologic distribution: Post-Pleistocene, Pleistocene, Pliocene and Miocene of Honsyû.

### **Cerithidea morchii** A. ADAMS, 1855

*Cerithidea morchii*. REEVE, Conch. Icon., Vol. 15, Pl. 3, fig. 18, 1866: TRYON, Man. Conch., 1 Ser., Vol. 9, p. 163, Pl. 33, fig. 1887: SUGITANI, Cat. Luchu Shells, p. 12, 1926: KURODA, Cat. Shell-bearing Moll. Amami-Ôsima, p. 38, No. 408, 1928: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 29, No. 930, 1931.

*Cerithium (Cerithidea) moerchii*. KOBELT in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 1, Pt. 26, p. 154, Pl. 26, fig. 3, 1898.

A single imperfect specimen.

*C. decollata* (LINNAEUS), *C. rhizoporara* (A. ADAMS) and *C. morchii* are closely related to each other, and are sometimes confounded, especially in fossil specimens. Diameter, ca. 18 mm.

Type locality: The Philippines; Recent.

Fossil occurrence: Byôritu Beds.—Wangwa: station 17; Reg. No. 53471.

Living: Southern Kyûsyû and Ryûkyû. The Philippines.

### Genus **Terebralia** SWAINSON, 1840

#### **Terebralia caledonica** (JOUSSEAUME), 1884

*Potamides (Tympantonus) caledonicus*. TRYON, Man. Conch., 1 Ser., Vol. 9, p. 160, Pl. 32, figs. 43, 44, 1887.

Several specimens, mostly imperfect.

Shell large, whorls flat; surface sculptured by many longitudinal ribs crossed by 3 spiral grooves on each whorl; suture deep, well marked; base of full grown specimen flattish with many revolving ridges and grooves; columella with a single fold, oblique and strong; outer lip with a few strong tubercular teeth within.

Although the shell is narrower, and has more distinct axial ribs than those of *T. palustris* (LINNAEUS), it may perhaps prove to be only a varietal form, or at least a subspecies of LINNAEUS's species by future study.

*Potamides* sp.<sup>1)</sup> once figured by DICKERSON from the Pleistocene of the Philippines is nearly the same.

Type locality: New Caledonia; Recent.

Fossil occurrence: Raised Coral Reef.—S. of Sisitô; Reg. No. 37446.

Living: New Caledonia.

1) DICKERSON: Rev. Philip. Paleont., Pl. 15, fig. 4, 1922.

**Terebralia sulcata** (BORN), 1778

Pl. IX (IV), Fig. 23.

*Potamides (Terebralia) sulcatus*. TRYON, Man. Conch., 1 Ser., Vol. 9, p. 160, Pl. 32, figs. 46-47, 1887: MARTIN, Tiefb. auf Java, Vol. 3, p. 146, 1887: MARTIN, Foss. von Java, Vol. 1, p. 211, 1906: TESCH, Paläont. von Timor, Vol. 8, p. 56, Pl. 131, fig. 182, 1920.

*Pyrazus sulcatus*. REEVE, Conch. Icon., Vol. 15, Pl. 1, figs. 1a, b, c, 1865.

*Cerithium sulcatum*. SOWERBY, Thes. Conch., Vol. 2, p. 883, Pl. 185, fig. 262, 1855: KIENER, Spec. Coq. viv., p. 89, Pl. 27, fig. 2, 1835-57.

*Cerithium (Pyrazus) sulcatum*. KOBELT in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 1, Pt. 26, p. 40, Pl. 8, figs. 7, 8, 1898.

Although the peculiarly coiled outer lip which is the characteristic feature of this species is unfortunately unrepresented, the other respects are quite similar to the named species. The number of spiral grooves is 4 on the penultimate whorl.

A single specimen. Height, ca. 40 mm.; diameter, ca. 18.5 mm.

Type locality: Oriental Sea.

Fossil occurrence: Raised Coral Reef.—S. of Sisitô; Reg. No. 53479.

Living: China. The Philippines. Indo-Pacific.

Geologic distribution: Post-Pliocene of Timor(?); Pliocene of Java(?), Timor and Sumatra; Miocene of Java.

**Terebralia semitrisulcata** (BOLTEN), 1798

Pl. IX (IV), Fig. 24.

*Potamides (Terebralia) semitrisulcata*. TRYON, Man. Conch., 1 Ser., Vol. 9, p. 160, Pl. 32, fig. 45, 1887.

*Tympanotomus (Terebralia) semitrisulcata*. YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 29, No. 935, 1931.

*Cerithium semitrisulcatum*. SOWERBY, Thes. Conch., Vol. 2, p. 884, Pl. 185, fig. 263, 1855.

*Pyrazus semitrisulcatus*. REEVE, Conch. Icon., Vol. 15, Pl. 1, fig. 4, 1865.

*Cerithium semistriatum*. KOBELT in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 1, Pt. 26, p. 37, Pl. 8, figs. 3, 4, 1898.

*Cerithium sulcatum* var. KIENER, Spec. Coq. viv., p. 89, Pl. 27, fig. 1, 1835-1857.

A single imperfect specimen. Height, 43 mm.; diameter, ca. 18.5 mm. It has five revolving grooves on the penultimate whorl.

Type locality: Australia(?); Recent.

Fossil occurrence: Byôritu Beds.—Wanzaki: station 55 (TORII); Reg. No. 53470.

Living: Ryûkyû. Pacific Islands. Java. Australia.

Genus **Batillaria** BENSON, 1842**Batillaria zonalis** (BRUGUIÈRE), 1792

Pl. IX (IV), Fig. 17.

*Lampania zonalis*. LISCHKE, Jap. Meeres-Conch., Vol. 1, p. 73, Pl. 6, figs. 15, 16, 1869.

?*Potamides murayamai*. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 53, Pl. 4, figs. 5, 6, 1928.

Several well preserved specimens. They are quite identical with a certain living varietal form from Japan. A perfect specimen collected from Sikô, 33.5 mm. in height, and 12 mm. in diameter with tuberculate whorls.

"*Lampania*" *australis* figured by REEVE<sup>1)</sup> is perhaps the same.

Type locality: Australia; Recent.

Fossil occurrence: Byôritu Beds.—Kôsirin: station 35 (TORII); Reg. No. 53475. E. of Sanzyûkei: station 47 (TORII); Reg. No. 53473. N. of Sakityô: station 52 (TORII); Reg. No. 53476. Wanzaki: station 55 (TORII); Reg. No. 53474. The upper course of Sairyôkyô; Reg. No. 53477. Sikô; Reg. No. 49410.

Raised Coral Reef.—S. of Sisiô; Reg. No. 37480.

Living: Widely distributed in Japan. China. Australia.

Geologic distribution: Post-Pleistocene, Pleistocene and Pliocene of Honsyû; Neogene of Java.

#### Family **Triphoridae**

Genus **Triphora** BLAINVILLE, 1828

Subgenus **Viriola** JOUSSEAUME, 1884

**Triphora (Viriola) corrugata** (HINDS) 1843

Pl. IX (IV), Fig. 14.

*Triforis corrugatus*. TRYON, Man. Conch., 1 Ser., Vol. 9, p. 189, Pl. 39, fig. 59, 1887.

Two imperfect specimens closely similar to the named species in sculpture, but the number of whorls is seemingly fewer. *T. malayana* (FISCHER)<sup>2)</sup> is said to be related to the present species.

Type locality: New Guinea; Recent.

Fossil occurrence: Byôritu Beds.—Wangwa: station 23; Reg. No. 53945. 700 m. SE of Kôkwan: station 23; Reg. No. 53972.

Living: New Guinea.

#### Family **Thiaridae**

Genus **Melanoides** OLIVER, 1807

**Melanoides obliquegranosa** (SMITH), 1878

*Melanoides obliquegranosa*. KURODA, The Venus, Vol. 1, No. 5, p. 187, No. 10, Pl. 4, fig. 7, 1929.

*Melania submandiunensis*. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 59, Pl. 5, figs. 2-5, 1928.

Several well preserved specimens; the largest, about 25 mm. in height. *M. submandiunensis* YOKOYAMA, cited above is apparently identical.

1) REEVE: Conch. Icon., Vol. 15, Pl. 1, fig. 4, 1866.

2) FISCHER: Paläont. von Timor, Vol. 15, p. 54, Pl. 112, fig. 21, 1927.

Type locality: Taiwan(?); Recent.

Fossil occurrence: Byôritu Beds.—Sikô; Reg. No. 53865. The upper course of Sairyô-kyô; Reg. No. 53866.

Living: Ryûkyû and Taiwan.

### **Melanoides tuberculata (MÜLLER), 1774**

Pl. IX (IV), Fig. 47.

*Melanoides tuberculata*. KURODA, The Venus, Vol. 1, No. 5, p. 186, No. 1, Pl. 4, figs. 1, 2, 1929.

*Melania tuberculata*. REEVE, Conch. Icon., Vol. 12, Pl. 13, fig. 87, 1859: BROT in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 1, Pt. 24, p. 247, Pl. 26, figs. 11, 11 a-h, 1874.

A single specimen lacking the apex. The preserved whorls are only four, but it is characterized by its finely lattice-sculpture.

Type locality: Indo-Pacific?; Recent.

Fossil occurrence: Byôritu Beds.—Wangwa: station 18; Reg. No. 53867.

Living: Ryûkyû and Taiwan. The Philippines. Indian and Pacific Islands. Egypt.

Geologic distribution: Post-Pliocene of Java and Celebes; Pliocene and Miocene of Java.

### **Melanoides grossula (YOKOYAMA), 1928**

*Melania grossula*. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 61, Pl. 5, fig. 8, 1928.

A single specimen. Height (preserved portion), 14 mm.; diameter, ca. 6 mm.

Type locality: Taiwan; Pliocene.

Fossil occurrence: Byôritu Beds.—Kozantyo: station 24; Reg. No. 53864.

Geologic distribution: Known only from the Pliocene of Taiwan.

### **"Melania" saigoï YOKOYAMA, 1928**

*Melania saigoï*. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 60, Pl. 5, fig. 10, 1928.

A single specimen. The generic position of this species is still doubtful; it is perhaps not a member of *Thiaridae*. Dr. YOKOYAMA compared it with *M. authurii* BROT, from the South Sea, but that species is apparently quite distinct in form and sculpture.

Type locality: Taiwan; Pliocene.

Fossil occurrence: Byôritu Beds.—550 m. SE. of Zyô-tûsyôwan: station 16; Reg. No. 53927.

Geologic distribution: Known only from the Pliocene of Taiwan.



Family **Rissoinidae**Genus **Rissoina** d'ORBIGNY, 1840Subgenus **Rissoina**, s. s.**Rissoina (Rissoina) formosana** n. sp.

Pl. IX (IV), Figs. 48a, 48b.

Shell small, rather elongated, highly conic, apical angle about 24°. Whorls about 8, moderately convex, regularly tapering from last whorl. Test rather thick. Sculpture of many rounded, obliquely longitudinal, more or less sinuous ribs which increase their number towards the lower, about 30 or more upon penultimate whorl, not extending to basal part below periphery. Interspaces wider than ribs in upper few whorls, but much narrower in the lower ones, crossed by numerous, fine, subequal spiral threads. Suture deeply impressed, very distinct. Base rounded with many, rather marked spiral threads. Aperture semi-oval; outer lip thickened and sinuous, produced outwardly; columellar margin slightly concave, with a shallow, but distinct basal furrow. Height, 5.5 mm.; diameter, 2.1 mm.

Similar in form to *R. zeltnerioides* YOKOYAMA<sup>1)</sup> from the Pleistocene deposits of Yokosuka, but differs from that species in being spirally finely striated over the surface.

Fossil occurrence: Byôritu Beds.—400 m. SE. of Zyô-tûsyôwan: station 13; Reg. No. 53944.

Family **Turritellidae**Genus **Turritella** LAMARCK, 1799**Turritella filiola** YOKOYAMA, 1928

*Turritella filiola*. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 57, Pl. 4, fig. 7, 1928.

Numerous specimens. This is a small and rather slender shell having minutely beaded revolving ridges on the upper whorls; the number and strength of these ridges seem to be somewhat variable. *T. fascialis* MENKE from Japan and China is a closely related species.

Type locality: Taiwan; Pliocene.

Fossil occurrence: Byôritu Beds.—Hakusyaton: station 1; Reg. No. 52333. 700 m. E. of Hakusyaton: station 3; Reg. No. 52329. Wangwa: station 5; Reg. No. 52324. 1000 m. NW. of Rinsuikwa: station 5; Reg. No. 52589. 900 m. NW. of Rinsuikwa: station 6; Reg. No. 52299. Wangwa: station 6; Reg. No. 52317. Wangwa: station 8; Reg. No. 53887. Wangwa: station 11; Reg. No. 52321. 800 m. NE. of Hakusyaton: station 12; Reg. No. 52313. Wangwa: station 12; Reg. No. 52588. 400 m. SE. of Zyô-tûsyôwan: station 13; Reg. No. 52331. Bôsiho: station 13; Reg. No. 52304. Wangwa: station 13; Reg. No. 52326. 500 m. SE. of Zyô-tûsyôwan: station 14; Reg. No. 52328. 1450 m. W. Hokkô: station 14; Reg. No. 52311. Wangwa: station 14; Reg. No. 52315. Wangwa: station 15; Reg. No. 52590. 510 m. SE. of Zyô-tûsyôwan: station 15; Reg. No. 52312. Wangwa: station 17; Reg. No. 52325. Wangwa: station 18; Reg. No. 53888. Wangwa: station 19; Reg. No. 52585. 700 m. SE. of Nanseizan: station 19; Reg. Nos. 52303,

1) YOKOYAMA: Jour. Coll. Sci. Imp. Univ. Tôkyô, Vol. 39, Art. 6, p. 73, Pl. 4, fig. 20, 1920.

52300. 1000 m. E. of Hakusyaton: station 20; Reg. No. 52320. Wangwa: station 21; Reg. No. 52314. Wangwa: station 23; Reg. No. 52455. Wangwa: station 24; Reg. No. 52316. 1000 m. E. of Hakusyaton: station 25; Reg. No. 52330. 700 m. SE. of Hakusyaton: station 27; Reg. No. 52332. Wangwa: station 28; Reg. No. 52587. 900 m. NW. of Keiyukwa: station 33; Reg. No. 52456. Wangwa: station 35; Reg. No. 52322. 1200 m. E. of Zyô-tûsyôwan: station 36; Reg. No. 52327. Wangwa: station 38; Reg. No. 52593. Sankwakô: station 38; Reg. No. 52307. 300 m. E. of Sankwakô: station 39; Reg. No. 52305. Wangwa: station 39; Reg. No. 52592. Wangwa: station 40; Reg. No. 52323. 500 m. E. of Sankwakô: station 41; Reg. No. 52309. 500 m. E. of Sankwakô: station 43; Reg. No. 52310. Tyû-tûsyôwan: station 47; Reg. No. 52318. Tyû-tûsyôwan: station 48; Reg. No. 52319. Keiyukwa: station 52; Reg. No. 52457. 1200 m. E. of SE. of Sankwakô: station 60; Reg. No. 52308. 1550 m. E. of Sinpo: station 69; Reg. Nos. 52302, 52306. On road S. of Bôsiho; Reg. No. 37413. The upper course of Sairyôkyô; Reg. No. 52586. Sikô; Reg. Nos. 48978, 52591.

Geologic distribution: Pliocene of Ryûkyû.

### **Turritella terebra** (LINNAEUS), 1758

*Turritella terebra*. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 56, Pl. 4, fig. 3, 1928.

*Turritella bacillum*. YOKOYAMA, *ibid.*, p. 56, Pl. 4, fig. 1, 1928.

The *Turritella* now under consideration, has been treated as two distinct species under the name of *T. terebra* (LIN.) and *T. bacillum* KIEN. Having examined fossil as well as recent specimens from Taiwan, the convexity of the whorl on which the distinction of the two species is based seems to be variable, although the number of main revolving ribs is rather constant, being six.

*T. archimedis* DILLWYN, *T. spectrum* REEVE, *T. cerea* REEVE, and *T. crocea* KIENER are synonyms.

The alliance of *T. terebra* and *T. bacillum*, was first pointed out by TRYON.<sup>1)</sup>

A few specimens were examined. The largest which was collected from S. of Sisitô measures 27 mm. in diameter.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Byôritu Beds.—1450 m. W. of Hokkô: station 14; Reg. No. 52298. Kwandenkei; Reg. No. 8072. Sôkeisi; Reg. No. 52594.

Raised Coral Reef.—S. of Sisitô; Reg. No. 37457.

Living: Kyûsyû and Taiwan. China. Singapore. Java. The Philippines. Indian Ocean.

Geologic distribution: Post-Pliocene of Java and Celebes; Miocene of Java and Sumatra.

### **Turritella kityoensis**, n. sp.

Pl. IX (IV), Figs. 45a, 45b.

A single specimen lacking the apical portion, preserved whorls 9 in number.

1) TRYON: Man. Conch., 1 Ser., Vol. 8, p. 196, 1886.

Shell small, high-turrete; whorls many, strongly angulated at about one-third of height of whorl; surface above angle nearly flat and sloping, below it receding. Sculpture consisting of unequal, rather sharp spiral cords; 5 on a whorl, middle one which forms angle is strongest; interspaces rather wide and concave, provided with small threads between, but in upper surface of lower whorls, there intervenes a finer one of the third cycle. Incremental lines obsolete. Aperture quadratic; base flat and quite smooth.

Approximate dimensions: Height, ca. 15.5 mm.; diameter, 4.2 mm.

This species is somewhat related to *T. vittulata* ADAMS and REEVE from the China Sea in general outline, but differs from that species in detail sculpture.

Fossil occurrence: Byôritu Beds.—N. of Kityô; Reg. No. 53110.

### ***Turritella millepunctata*, n. sp.**

Pl. IX (IV), Figs. 44.

Two imperfect specimens.

Shell turrete. Whorls many, apical two embryonal, smooth and globular; the rest strongly angulated near lower suture. Spirally ridged and longitudinally striated; ridges or cords unequal, 3 on sloping surface above angle stronger than others. Of the three ridges, the lowest one which forms the angle is strongest. Several unequal threads also on ribs and in their interspaces; those are distinctly crenulated by the intersection of incremental lines. Aperture fractured. The preserved portion of a smaller specimen, 20.2 mm. in height, and 6.2 mm. in diameter.

Similar to *Turritella cingulifera* SOWERBY in sculpture, but the whorls of the present species are decidedly angular.

Fossil occurrence: Byôritu Beds.—1550 m. E. of Sinpo: station 69; Reg. No. 53111.

### ***Turritella* species indet.**

Only fragmental specimens, differing from any of the preceding ones by sculpture. Indeterminable.

Fossil occurrence: Byôritu Beds.—On road S. of Bôsiho; Reg. No. 52489. 1000 m. E. of Hakusyaton: station 4; Reg. No. 53112. Waŋgwa: station 18; Reg. No. 53485.

## **Family Mathildidae**

Genus **Mathilda** SEMPER, 1865

**Mathilda sinensis** FISCHER, 1867

Pl. IX (IV), Fig. 42.

*Mathilda sinensis*. TRYON, Man. Conch., Vol. 8, p. 211, Pl. 65, fig. 39 (erroneously printed as fig. 19), 1886.

A single specimen lacking its upper whorls. Height, ca. 16 mm.; diameter, 5 mm.

Of the four revolving ribs (or cords), the one which forms the shoulder of a whorl is the strongest.

Type locality: China; Recent.

Fossil occurrence: Byôritu Beds.—700 m. SW. of Kôkwan: station 23; Reg. No. 53738.

Living: Isle of Chusan, China Sea.

### Family Vermiculariidae

Genus *Lemintina* RISSO, 1826<sup>1)</sup>

*Lemintina javana* (MARTIN), 1880

Pl. VIII (III), Fig. 39.

*Vermetus javanus*. MARTIN, Tertiärsch., p. 77, Pl. 14, fig. 13, 1880: MARTIN, Tiefb. auf Java, p. 170, 1887: MARTIN, Foss. von Java, p. 223, Pl. 34, figs. 513-516, 1906: TESCH, Paläont. von Timor, Vol. 8, p. 59, Pl. 132, fig. 192, 1920.

Shell rather small, often attached to a foreign shell, loosely coiled. Whorl circular in cross-sections when free. Surface sculptured with axial series of tubercles by the intersection of narrow, longitudinal cords and slightly raised revolving plicae. Longitudinal cords rather irregular, some being discontinuous and often associated with smaller interstitial cords; interspaces between cords generally much wider than the cords themselves. No internal septa were found, and hence it is a member of *Lemintina*.<sup>2)</sup>

Diameter of an aperture of the largest specimen is 7 mm.

Type locality: Java; Miocene.

Fossil occurrence: Byôritu Beds.—Wangwa: station 1; Reg. No. 53753. 700 m. E. of Hakusyaton: station 3; Reg. No. 53755. E. of Hakusyaton: station 4; Reg. No. 53745. 1000 m. E. of Hakusyaton: station 4; Reg. No. 53743. Wangwa: station 7; Reg. No. 53750. Wangwa: station 9; Reg. No. 53751. Wangwa: station 11; Reg. No. 53741. Wangwa: station 13; Reg. No. 53752. 400 m. S. of Zyô-tûsyôwan: station 13; Reg. No. 53742. Wangwa: station 14; Reg. No. 53744. Wangwa: station 16; Reg. No. 53748. Wangwa: station 19; Reg. No. 53756. Wangwa: station 23; Reg. No. 53746. Wangwa: station 24; Reg. No. 53754. Wangwa: station 25; Reg. No. 53724. Wangwa: station 32; Reg. No. 53749. 300 m. E. of Sankwakô: station 39; Reg. No. 53747. 300 m. E. of Hakusyaton; Reg. No. 37430. 600 m. E. of Hakusyaton; Reg. No. 37432. E. of Goko; Reg. No. 37431.

Geologic distribution: Pliocene and Miocene of Java; Pliocene of Timor.

*Lemintina* (?) species indet.

Fragments of a tubular shell, uncoiled and apparently smooth.

Fossil occurrence: Byôritu Beds.—Wangwa: station 12; Reg. No. 53758.

Genus *Siliquaria* LAMARCK, 1799

*Siliquaria cumingii* MÖRCH, 1860

Pl. VIII (III), Fig. 37.

*Siliquaria cumingii*. SOWERBY in REEVE, Conch. Icon., Vol. 20, Pl. 1, fig. 2 (erroneously printed on plate as fig. 3 instead fig. 2b), 1878: TRYON, Man. Conch., 1 Ser., Vol. 8, p. 190, Pl. 57, fig. 19; Pl. 58, fig. 21,

1) KURODA: The Venus, Vol. 4, No. 1, appendix p. 49, 1933.

2) *Serpulus* MONTFORT, 1910 seems to be prior to *Lemintina*.

1886: PILSBRY, Cat. Mar. Moll. Jap., p. 60, 1895: SUGITANI, Cat. Luchu Shells, p. 13, 1926: KURODA, Cat. Shell-bearing Moll. Amami-Ōsima, p. 40, No. 434, 1928: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 31, No. 963, 1931: YAGURA, Cat. Moll. Hyōgo-ken, p. 33, No. 405, 1932: NOMURA, Sci. Rep. Tōhoku Imp. Univ. Sendai, Ser. 2 (Geol.), Vol. 15, No. 2, P. 109, No. 304, 1932: NOMURA and ZINBŌ, *ibid.*, Vol. 16, No. 2, p. 143, No. 162, 1934.

Fragmental specimens characterized by their fissured, and loosely coiled tubes.

Type locality: The Philippines; Recent.

Fossil occurrence: Byōritu Beds.—Wangwa: station 11; Reg. No. 53757; Wangwa: station 23; Reg. No. 53925.

Living: Central Honsyū to Ryūkyū. Japan Sea. The Philippines.

Geologic distribution: Post-Pleistocene of Honsyū; Pleistocene of Kikai-zima.

### Family Litiopidae

Genus *Diala* A. ADAMS, 1862

*Diala angustifera* n. sp.

Pl. IX (IV), Figs. 49a, 49b.

Shell small, narrow and turrete. Whorls about 8, apical two embryonal, the succeeding few ones convex, the rest angulate at about one-third the height of whorl from lower suture, surface above angle sloping and slightly convex, receding below. Each lower whorl sometimes provided with a revolving thread above the angle, biangular in aspect. Surface smooth except for numerous, fine spiral striae which can be seen under a lens. Periphery rounded. Base narrowed, convex, sculptured by indistinct spiral threads. Aperture ovate; outer lip thin and smooth within; inner lip with a thin callosity.

There are numerous specimens found in the collection. Annexed are some of the measurements (in mm.):

	1	2	3	4	5
Height .....	5.3	5.1	4.5	4.1	4.0
Diameter .....	2.0	2.0	1.8	1.7	1.6

This species somewhat resembles "*Rissoa (Cingula) plebeja* YOKOYAMA<sup>1)</sup> in general features, but the Formosan fossil has invariably more angular whorls.

Fossil occurrence: Byōritu Beds.—700 m. E. of Hakusyaton: station 3; Reg. No. 53948. 900 m. NW. of Rinsuikwa: station 6; Reg. No. 53956. 1100 m. NE. of Hakusyaton: station 9; Reg. No. 53959. 1900 m. NE. of Hakusyaton: station 10; Reg. No. 53952. 950 m. SW. of Taikwa: station 10; Reg. No. 53958. Wangwa: station 10; Reg. No. 53962. 1100 m. SW. of Taikwa: station 11; Reg. No. 53963. 400 m. SE. of Zyō-tūsyōwan: station 13; Reg. No. 53949. Wangwa: station 14; Reg. No. 53975. 500 m. SE. of Zyō-tūsyōwan: station 14; Reg. No. 53966. Wangwa: station 15; Reg. No. 53971. Wangwa: station 18; Reg. No. 53970. Wangwa: station 19; Reg. No. 53967. 1000 m. E. of Hakusyaton: station 20; Reg. No. 53955. Wangwa: station 21; Reg. No. 53950. Wangwa: station 23; Reg. No. 53969. Wangwa: station 24; Reg. No. 53953.

1) YOKOYAMA: Jour. Coll. Sci. Imp. Univ. Tōkyō, Vol. 44, Art. 1, p. 79, Pl. 4, fig. 3, 1922.

1000 m. E. of Hakusyaton: station 25; Reg. No. 53954. Wangwa: station 28; Reg. No. 53951. 400 m. NW. of Keiyukwa: station 33; Reg. No. 53961. 1520 m. E. of Sinpo: station 68; Reg. No. 53968. 1550 m. E. of Sinpo: station 69; Reg. No. 53965. The upper course of Sairyôkyô; Reg. No. 53960. On road S. of Bôsiho; Reg. No. 37414.

### Family Architectonicidae

Genus *Architectonica* (BOLTEN) RÖDING, 1798

*Architectonica perspectiva* (LINNAEUS), 1758

Pl. IX (IV), Fig. 41.

*Architectonica perspectiva*. SUGITANI, Cat. Luchu Shells, p. 34, 1926: KURODA, Cat. Shell-bearing Moll. Amami-Ôsima, p. 81, No. 1057, 1928: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 54, No. 1878, 1931: NOMURA and ZINBÔ, Sci. Rep. Tôhoku Imp. Univ., Ser. 2 (Geol.), Vol. 16, No. 2, p. 144, No. 164, 1934.

*Solarium perspectivum*. KIENER, Spec. Coq. viv., p. 3, Pl. 1, fig. 1, 1835-1857: REEVE, Conch. Icon., Vol. 15, Pl. 2, figs. 11 a, b, 1864: SOWERBY, Thes. Conch., Vol. 3, p. 228, Pl. 4, figs. 36, 37, 38, 1866: LISCHKE, Jap. Meeres-Conch., Vol. 1, p. 97, 1869: LISCHKE, *ibid.*, Vol. 2, p. 73, 1871: DUNKER, Ind. Moll. Mar. Jap., p. 92, 1882: PILSBRY, Cat. Mar. Moll. Jap., p. 65, 1895: MARTIN, Foss. von Java, Vol. 1, p. 246, Pl. 37, figs. 594-597, 1906: TESCH, Paläont. von Timor, Vol. 8, p. 65, Pl. 132, fig. 200, 1920.

This large and beautiful living species is represented in the collection by several well preserved specimens. According to TRYON, *A. trochlearis*, *A. formosa*, *A. zonata* and *A. incisa* are synonyms. The largest specimen, 17.5 mm. in height, and 40.6 mm. in diameter.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Byôritu Beds.—700 m. E. of Hakusyaton: station 3; Reg. No. 53703. 1000 m. E. of Hakusyaton: station 4; Reg. No. 53715. 400 m. SE. of Zyô-tûsyôwan: station 13; Reg. No. 53491. Wangwa: station 14; Reg. No. 53496. Wangwa: station 15; Reg. No. 53489. 700 m. NE. of Nanseizan: station 19; Reg. No. 53492. Wangwa: station 19; Reg. No. 53494. 1000 m. E. of Hakusyaton: station 20; Reg. No. 53487. Wangwa: station 21; Reg. No. 53495. 700 m. SW. of Kôkwan: station 23; Reg. No. 53859. Wangwa: station 33; Reg. No. 53493. 1200 m. E. of Zyô-tûsyôwan: station 36; Reg. No. 53488. 1520 m. E. of Sinpo: station 68; Reg. No. 53490. Sikô; Reg. Nos. 48988, 53486.

Living: Southern Kyûsyû to Taiwan. China. Indo-Pacific. Australia.

Geologic distribution: Pleistocene of Kikai-zima; Pliocene of Sikoku(?); Post-Pliocene and Pliocene of Timor; Pliocene of Sumatra; Pliocene and Miocene of Java; Neogene of New-Guinea.

### *Architectonica maxima* (PHILIPPI), 1848

Pl. IX (IV), Fig. 40.

*Architectonica maxima*. SUGITANI, Cat. Luchu Shells, p. 34, 1926: ?KURODA, Cat. Shell-bearing Moll. Amami-Ôsima, p. 81, No. 1058, 1928: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 54, No. 1870, 1931.

*Solarium maximum*. PHILIPPI in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 2, Pt. 6, p. 6, Pl. 1, figs. 3, 4, 1853: REEVE, Conch. Icon., Vol. 15, Pl. 1, fig. 4, 1864: SOWERBY, Thes. Conch., Vol. 3, p. 229, Pl. 1, figs. 5, 6, 1866: TRYON, Man. Conch., 1 Ser., Vol. 9, p. 9, Pl. 3, figs. 31-34, 1887: PILSBRY, Cat. Mar. Moll.

Jap., p. 65, 1895: MARTIN, Foss. von Java, Vol. 1, p. 247, Pl. 37, figs. 598, 599, 1906: TESCH, Paläont. von Timor, Vol. 8, p. 66, Pl. 132, fig. 201, 1920.

*Solarium perspectivum*. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 62, Pl. 5, fig. 7, 1928. (non LINNAEUS).

Several well preserved specimens.

Although the shell is closely related to the preceding, the surface sculpture is somewhat less coarse.

"*Solarium*" *perspectivum* of YOKOYAMA from the Byôritu Beds of Taiwan certainly belongs here from the consideration of his accompanying figures. *A. taylori* (HANLEY) is said to be a synonym of *A. maxima*. The largest specimen, 19 mm. in height, and 44 mm. in diameter.

Type locality: Indian Ocean.

Fossil occurrence: Byôritu Beds.—Wangwa: station 13; Reg. No. 53710. Wangwa: station 14; Reg. No. 53497. Wangwa: station 17; Reg. No. 53707. Wangwa: station 24; Reg. No. 53713. 1000 m. E. of Hakusyaton: station 25; Reg. No. 53701. 900 m. NW. of Keiyukwa: station 33; Reg. No. 53711. 1200 m. E. of Zyô-tûsyôwan: station 36; Reg. No. 53705. Wangwa: station 40; Reg. No. 53704. Keiyukwa: station 50; Reg. No. 53712. 1000 m. E. of Zyô-tûsyôwan: station 59; Reg. No. 53709. 1200 m. SE. of Sankwakô: station 60; Reg. No. 53708. 1520 m. E. of Sinpo: station 68; Reg. No. 53714. Hakusyaton; Reg. No. 53702.

Ryûkyû Limeston.—Hanpeizan; Reg. No. 53706.

Living: Western Honsyû to Taiwan. The Philippines. Indian Ocean.

Geologic distribution: Pliocene of Timor, Sumatra and Seran; Pliocene and Miocene of Java.

#### Genus *Heliacus* d'ORBIGNY, 1842

#### *Heliacus dorsuosus* (HINDS), 1844

Pl. X (V), Figs. 39a, 39b.

*Heliacus dorsuosus*. SUGITANI, Cat. Luchu Shells, p. 34, 1926: KURODA, Cat. Shell-bearing Moll. Amami-Ôsima, p. 82, No. 1065, 1928: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 54, No. 1886, 1931.

*Torinia dorsuosa*. SOWERBY, Thes. Conch., Vol. 3, p. 238, Pl. 5, figs. 73, 74, 1886: TRYON, Man. Conch., 1 Ser., Vol. 9, p. 17, Pl. 5, figs. 80, 81, 1887: PILSBRY, Cat. Mar. Moll. Jap., p. 65, 1895.

*Solarium dorsuosum*. PHILIPPI in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 2, p. 37, 1853: DUNKER, Ind. Moll. Mar. Jap., p. 92, 1882.

Two well preserved specimens of nearly equal size. The body-whorl is sculptured by about 10 revolving series of decussated ribs, of which two peripheral ones are stronger. Height, 2.4 mm.; diameter, 6.3 mm.

Type locality: Pacific Island; Recent.

Fossil occurrence: Byôritu Beds.—Wangwa: station 5; Reg. No. 53720. Wangwa: station 15; Reg. No. 53719.

Living: Central Honsyû to Ryûkyû. Pacific Islands.

**Heliacus asperus** (HINDS). 1844

Pl. X (V), Figs. 2a, 2b.

*Torinia aspera*. TRYON, Man. Conch., 1 Ser., Vol. 9, p. 21, Pl. 6, figs. 7, 8, 1887.*Solarium asperum*. PHILIPPI in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 2, Pt. 6, p. 22, Pl. 3, fig. 12, 1853; SOWERBY, Thes. Conch., Vol. 3, p. 241, Pl. 5, figs. 77, 78, 1866.

Three rather well preserved specimens.

The shell somewhat resembles *Architectonica maxima* in form, but the sculpture is finer, the base more convex, the umbilicus exceedingly larger and the umbilical crenulations are indistinct. The shell does not attain as large a size as *A. maxima*. The largest specimen, 3.7 mm. in height, and 10 mm. in diameter.

Type locality: Straits of Macassar.

Fossil occurrence: Byôritu Beds.—Wangwa: station 6; Reg. No. 53722. Bôsiho: station 13; Reg. No. 53723. 510 m. SE. of Zyô-tûsyôwan: station 15; Reg. No. 53721.

Living: Indo-Pacific.

**Heliacus taiwanicus** (YOKOYAMA), 1928*Gibbula* (?) *taiwanicus*. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 66, Pl. 6, fig. 3, 1928.

Several specimens. The shell apparently belongs to *Heliacus* and not *Gibbula*. The largest specimen in our collection is slightly larger than the type, and measures 15 mm. in diameter.

Type locality: Taiwan; Pliocene.

Fossil occurrence: Byôritu Beds.—Wangwa: station 26; Reg. No. 53716. Sôkeisi; Reg. No. 53781. The upper course of Sairyôkyô; Reg. No. 53717.

Geologic distribution: Known only from the Pliocene of Taiwan.

Family **Hipponycidae**Genus **Hipponyx** DEFRANCE, 1819**Hipponyx danieli** CROSSE, 1858

Pl. IX (IV), Figs. 38a, 38b.

*Hipponyx danieli*. TRYON, Man. Conch., 1 Ser., Vol. 8, p. 136, Pl. 41, figs. 21, 22, 1886.

Two specimens.

Suborbicular in outline and rather thin-shelled species with the surface radially as well as concentrically finely striated. The beak is high and mammilar, being coiled at end. The generic position is still in question, it has somewhat the aspect of *Capulus*.

Type locality: New Caledonia; Recent.

Fossil occurrence: Byôritu Beds.—Wangwa: station 24; Reg. No. 53759. S. of Bôsiho; Reg. No. 34709.

Living: New Caledonia.



Family **Calyptraeidae**Genus **Calyptraea** LAMARCK, 1799**Calyptraea taiwanensis** n. sp.

Pl. IX (IV), Figs. 39a, 39b.

Shell small, depressed, spirally coiled, nearly orbicular in outline. Test thin. Spire conical being slightly raised from the rest of shell (base), situated subterminal; apex mammilar. Surface ornamented by very fine concentric growth lines and with a few prominent lamellar ridges. Interior umbilicated; appendage very thin and fragile, subterminal having a small hollowed ridge near the umbilicus.

A single specimen. Diameter, 5.5 mm.; height, 1.5 mm.

*Calyptraea* is a rare genus in the oriental regions. Only two species have been described from Japan and the Philippines, they are: *C. yokoyamai* KURODA<sup>1)</sup> (= *C. mammilaris* of YOKOYAMA, not of BRODERIP) from Central Honsyû and *C. pellucida* REEVE<sup>2)</sup> from the Philippines.

The Formosan fossil may be distinguished from the two above mentioned forms by having a flatter shell, a more terminal apex, with a somewhat different internal appendage.

Fossil occurrence: Byôritu Beds.—500 m. E. of Sankwakô: station 41; Reg. N. 53802.

Genus **Crepidula** LAMARCK, 1799Subgenus **Syphopatella** LESSON, 1831(= **Ergaea** H. and A. ADAMS, 1854)**Crepidula (Syphopatella) walshi** REEVE, 1859

Pl. IX (IV), Figs. 28a, 28b.

*Syphopatella walshi*. KURODA, Cat. Moll. Hukui-ken, p. 186, No. 114, 1933.

*Crepidula walshi*. REEVE, Conch. Icon., Vol. 11, Pl. 3, figs. 17a, b, 1859.

*Crepidula orbella*. YOKOYAMA, Jour. Coll. Sci. Imp. Univ. Tôkyô, Vol. 39, Art. 6, p. 76, Pl. 4, figs. 22, 23, 1920.

Several well preserved specimens. One of the specimens measures 22 mm. in greater diameter. According to TRYON, *Crepidula plana* ADAMS and REEVE (non SAY) and *Crepidula scabies* REEVE are synonyms; further *Crepidula chinensis* GRAY suspected by him is also possibly identical, it represents a rather free growth of this species. It is true, that the shell is torelably variable in regard to its form.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Byôritu Beds.—700 m. E. of Hakusyaton: station 3; Reg. No. 53735. Wangwa: station 6; Reg. No. 53737. Wangwa: station 19; Reg. No. 53736.

Living: Central and Western Honsyû. Japan Sea. China. Singapore. Ceylon.

Geologic distribution: Post-Pleistocene and Pliocene of Honsyû.

1) KURODA: The Venus, Vol. 1, No. 3, p. 94, 1929.

2) TRYON: Man. Conch., 1 Ser., Vol. 8, p. 120, Pl. 34, figs. 60, 61, 1886.

Family **Xenophoridae**Genus **Xenophora** FISCHER, 1808**Xenophora exuta** (REEVE), 1843

Pl. X (V), Figs. 35a, 35b.

*Phorus exutus*. REEVE, Conch. Icon., Vol. 1, Pl. 2, fig. 7, 1843.*Xenophora exuta*. YOKOYAMA, Jour. Fac. Sci. Imp. Univ. Tôkyô, Sec. 2, Vol. 2, Pt. 4, p. 176, Pl. 47, fig. 10, 1927.

Several specimens, though mostly somewhat broken due to the thin and fragile nature of the shell. The upper few whorls agglutinate sands and fragments of shells, and may likely be confounded with *X. calculifera* REEVE in young stage.

Type locality: China; Recent.

Fossil occurrence: Byôritu Beds.—700 m. E. of Hakusyaton: station 3; Reg. No. 53726. 500 m. SE. of Zyô-tûsyôwan: station 14; Reg. No. 53734. Wangwa: station 15; Reg. No. 53732. Wangwa: station 17; Reg. No. 53728. 1000 m. E. of Hakusyaton: station 20; Reg. No. 53729. 1000 m. E. of Hakusyaton: station 25; Reg. No. 53730. 550 m. E. of Sankwakô: station 43; Reg. No. 53733. Tyû-tûsyôwan: station 47; Reg. No. 53727. Sikô; Reg. Nos. 49419, 53731. 300 m. E. of Hakusyaton; Reg. No. 37412.

Living: Central Honsyû to Kyûsyû. Ogasawara-zima. Japan Sea. China.

Geologic distribution: Pliocene and Miocene(?) of Honsyû; Pliocene of Sikoku.

Family **Naticidae**Genus **Natica** SCOPOLI, 1777Subgenus **Natica**, s. s.**Natica (Natica) ala-papilionis** (BOLTEN), 1788

*Natica ala-papilionis*. REEVE, Conch. Icon., Vol. 9, Pl. 14, fig. 60, 1855: KURODA, Cat. Shell-bearing Moll. Amami-Ôsima, p. 43, No. 468, 1928: NOMURA and ZINEÔ, Sci. Rep. Tôhoku Imp. Univ. Ser. 2 (Geol.), Vol. 16, No. 2, p. 145, No. 170, 1934.

*Natica colliei*. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 63, Pl. 4, fig. 1, 1928. (not of RECLUZ).

Several specimens; one of them faintly retains its original coloration. *N. colliei* of YOKOYAMA (non RECLUZ) is perhaps identical with this species; the former shows also a close similarity with *N. marochiensis* GMELIN from which, this shell is often indistinguishable among fossil specimens.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Byôritu Beds.—900 m. NW. of Rinsuikwa: station 6; Reg. No. 52292. 500 m. SE. of Zyô-tûsyôwan: station 14; Reg. No. 52262. 510 m. SE. of Zyô-tûsyôwan: station 15; Reg. No. 52268. 1000 m. E. of Hakusyaton: station 25; Reg. No. 52265. Wangwa: station 33; Reg. No. 52946. 300 m. E. of Sankwakô: station 39; Reg. No. 52952. Wangwa: station 40; Reg. No. 52266. 900 m. SE. of Naikotô: station 66; Reg. No. 52950.

Living: Southern Kyûsyû to Taiwan. The Philippines. Indian Ocean.

Geologic distribution: Pleistocene of Kikai-zima; Pliocene of Java, Sumatra, Timor and Seran; Miocene of the Philippines(?).

***Natica (Natica) solida* BLAINVILLE, 1827**

Pl. IX (IV), Figs. 37a, 37b.

*Natica solida*. REEVE, Conch. Icon., Vol. 9, Pl. 16, fig. 71, 1855: TRYON, Man. Conch., 1 Ser., Vol. 8, p. 45, Pl. 20, fig. 98, 1886: SUGITANI, Cat. Luchu Shells, p. 15, 1926: KURODA, Cat. Shell-bearing Moll. Amami-Ōsima, p. 43, No. 473, 1928.

Several small specimens. Shell thick, solid, callous heavy, covering umbilicus and leaving a narrow but deep groove at the lower. Surface marked by fine growth lines crossed by microscopic revolving ones; spire rather acutely conical, and more or less elevated from upper margin of body-whorl.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Byōritu Beds.—Wangwa: station 8; Reg. No. 53923. 700 m. NE. of Nanseizan: station 19; Reg. No. 52269. 1000 m. E. of Hakusyaton: station 25; Reg. Nos. 53922, ?53924. Wangwa: station 40; Reg. No. 52275. Sikō; Reg. No. 48983. E. of Goko; Reg. No. 37542.

Living: Southern Kyūsyū and Ryūkyū. Pacific Islands. Singapore. The Philippines.

Geologic distribution: Pliocene of Java(?).

***Natica (Natica) zebra* LAMARCK, 1822**

Pl. IX (IV), Figs. 25a, 25b.

*Natica zebra*. PHILIPPI in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 2, Pt. 1, p. 18, Pl. 2, figs. 13, 14, 1852: REEVE, Conch. Icon., Vol. 9, Pl. 12, fig. 53, 1855: TRYON, Man. Conch. 1 Ser., Vol. 8, p. 16, Pl. 2, fig. 32, 1886: MARTIN, Foss. von Java, Vol. 1, p. 258, Pl. 38, fig. 615, 1906: SUGITANI, Cat. Luchu Shells, p. 15, 1926: KURODA, Cat. Shell-bearing Moll. Amami-Ōsima, p. 42, No. 467, 1928.

Although the coloration which is the characteristic feature of this species is entirely faded in the fossil specimens, the form and umbilical feature is quite identical with the named species. The Formosan fossils, however, are mostly small; the figured specimen measures 22 mm. in length and height. *N. lineata* LAMARCK figured by MARTIN<sup>1)</sup> is a similar species.

Type locality: The Philippines; Recent.

Fossil occurrence: Byōritu Beds.—1000 m. NW. of Rinsuikwa: station 5; Reg. No. 52256. 900 m. NW. of Rinsuikwa: station 6; Reg. No. 52263. Wangwa: station 6; Reg. No. 52257. Keiyukwa: station 25; Reg. No. 52955. 300 m. E. of Sankwakō: station 35; Reg. No. 52296. Keiyukwa: station 50; Reg. No. 52258. Hakusyaton; Reg. No. 52260. Between Kōsui and Zyuna; Reg. No. 37434.

Living: Kyūsyū and Ryūkyū. The Philippines. Molucca.

Geologic distribution: Pliocene of Java and Seran; Miocene of Java and Borneo.

1) MARTIN: Foss. von Java, Vol. 1, p. 257, Pl. 38, figs. 613, 614, 1906.

**Natica (Natica) rufa** BORN, 1778

Pl. IX (IV), Figs. 29a, 29b, 29c.

*Natica rufa*. PHILIPPI in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 2, Pt. 1, p. 14, Pl. 2, figs. 1, 2, 1852: REEVE, Conch. Icon., Vol. 9, Pl. 16, fig. 70, 1855: TRYON, Man. Conch., Vol. 8, p. 29, Pl. 9, figs. 62, 63, 1886: MARTIN, Foss. von Java, Vol. 1, p. 260, Pl. 39, figs. 621-623, 1906: TESCH, Paläont. von Timor, Vol. 8, p. 69, Pl. 133, fig. 208, 1920: FISCHER, Paläont. von Timor, Vol. 15, p. 46, Pl. 212, fig. 6, 1927.

Several well preserved specimens. The largest in the collection attains 41 mm. in length, and 32 mm. in height (figured).

Shell moderate in size rather solid, obliquely subglobose; spire short; whorls 6, separated by well defined sutures; last whorl rather rapidly enlarging, more or less flattened above, regularly convex below. Surface sculptured by numerous, fine growth lines which are markedly plicated on area close to suture and down to a short distance from it; aperture subovate, almost straight on inner side, regularly arcuate on outer side, slightly angulated above and rounded below; umbilicus large with a small ridge entering it; callous rather narrow, reflected upon body-whorl above umbilicus. Operculum subovate and concentrically, spirally striated.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Byôritu Beds.—Wangwa: station 4; Reg. No. 52957. 400 m. SE. of Zyô-tûsyôwan: station 6; Reg. No. 52289. Nanseizan: station 11; Reg. Nos. 52278, 52953. 500 m. SE. of Zyô-tûsyôwan: station 14; Reg. No. 52279. 510 m. SE. of Zyô-tûsyôwan: station 15; Reg. No. 52272. 550 m. SE. of Zyô-tûsyôwan: station 16; Reg. No. 52264. Wangwa: station 19; Reg. No. 52267. 700 m. NE. of Nanseizan: station 19; Reg. No. 52958. Wangwa: station 21; Reg. No. 52289. 1000 m. E. of Hakusyaton: station 25; Reg. Nos 52270, 52951. Sankwakô: station 38; Reg. No. 52293. Wangwa: station 38; Reg. No. 52959. 300 m. E. of Sankwakô: station 39; Reg. No. 52961. 500 m. E. of Sankwakô: station 41; Reg. No. 52947. 900 m. SE. of Naikotô: station 66; Reg. No. 52949.

Living: Southern Japan. Taiwan. China. Singapore. The Philippines. Mauritius. Indian Ocean. Red Sea.

Geologic distribution: Pliocene of Java, Sumatra, Timor, New Guinea and Seran; Miocene of Java, Sumatra, Borneo and ?the Philippines.

**Natica (Natica) vitellus** (LINNAEUS), 1758

Pl. IX (IV), Figs. 33a, 33b.

*Natica vitellus*. PHILIPPI in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 2, Pt. 1, p. 12, Pl. 1, figs. 10, 11, 1852: REEVE, Conch. Icon., Vol. 9, Pl. 10, fig. 39, 1855: TRYON, Man. Conch. 1 Ser., Vol. 9, p. 29, Pl. 8, fig. 60, 1886: PILSBRY, Cat. Mar. Moll. Jap., p. 176, 1895: MARTIN, Foss. von Java, Vol. 1, p. 261, Pl. 39, figs. 624, 625, 1906: TESCH, Paläont. von Timor, Vol. 8, p. 70, Pl. 132, fig. 207, 1920: FISCHER, Paläont. von Timor, Vol. 15, p. 45, 1927: SUGITANI, Cat. Luchu Shells, p. 15, 1927: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 32, No. 1023, 1931.  
? *Natica adamsiana*. YOKOYAMA, Jour. Fac. Sci. Imp. Univ. Tôkyô, Sec. 2, Vol. 2, Pt. 7, p. 346, Pl. 67, fig. 9, 1928 (non DUNKER).

Several well preserved small specimens. One of them, 17.5 mm. in length, and 16 mm. in height.

This closely resembles *Natica rufa*, mentioned above with which it is sometimes confused, but this species has a more widely reflected callous over the umbilicus. *N. globosa* and *N. chinensis* are also related to the present species. The Formosan specimens, however, show rather closer affinity to the Javan fossil figured by MARTIN than to the recent specimens figured by REEVE, and by others.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Byôritu Beds.—Wangwa: station 6; Reg. No. 52259. 900 m. NE. of Rinsuikwa: station 6; Reg. No. 52294. 500 m. SE. of Zyô-tûsyôwan: station 14; Reg. No. 52261. 300 m. E. of Zyô-tûsyôwan; Reg. No. 37304. Wangwa: station 19; Reg. No. 52948. Wangwa: station 23; Reg. No. 52954.

Living: Western Honsyû to Taiwan. China. Singapore. The Philippines. Indian Ocean.

Geologic distribution: Pliocene of Kyûsyû; Pliocene of Java, Seran and Timor; Miocene of Java, Nias and the Philippines(?).

#### Subgenus *Tectonatica* SACCO, 1890

#### *Natica* (*Tectonatica*?) *andoi*, n. sp.

Pl. IX (IV), Figs. 35a, 35b, 35c, 36a, 36b, 36c.

Shell rather small, more or less obliquely subglobose; test rather solid. Whorls 6 in number, ventricose, regularly convex, smooth except for fine growth lines; spire short, hardly elevated from upper margin of last volution; umbilicus moderate, and filled entirely with a rounded callous; aperture semilunar, slightly narrowed above; outer lip gently curving; inner lip substraight with a reflected callous above.

Approximate dimensions (in mm.):

	1	2
Length .....	19.0	17.0
Diameter .....	19.0	17.5

*Natica andoi* n. sp. is similar in outline to *N. clausa* BRODERIP and SOWERBY from the boreal seas, it differs from that species by having a more depressed spire. *N. janthostoma* DESHAYES, a common living and fossil species in Japan also differs from the present by having a slightly higher shell and by the last whorl being obscurely shouldered. *N. lineata* LAMARCK from tropic Asia is also related to the Formosan fossils, and at first I was tempted to treat the present fossils as a variety of that species, but I am now convinced that they are quite distinct by their umbilical characters.

Fossil occurrence: Byôritu Beds.—Wangwa: station 24; Reg. No. 52295.

#### Genus *Polinices* MONTFORT, 1810

#### Subgenus *Polinices*, s. s.

#### *Polinices* (*Polinices*) *columnalis* (RECLUZ), 1850

*Polinices columnalis*. KURODA, Cat. Shell-bearing Moll. Amami-Ôsima, p. 43, No. 485, 1928; NOMURA and ZINBÔ, Sci. Rep. Tôhoku Imp. Univ. Ser. 2 (Geol.), Vol. 16, No. 2, p. 146, No. 173, 1934.

*Natica columnalis*. REEVE, Conch. Icon., Vol. 9, Pl. 5, fig. 19, 1855: TRYON, Man. Conch., 1 Ser., Vol. 8, p. 47, Pl. 20, fig. 4, 1886.

*Polinices sagamiensis*. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 63, Pl. 6, fig. 2, 1928.

Several, rather small specimens.

Shell depressed, globose, much broader than high, ventricose, consisting of about five whorls which are quite smooth except for the growth lines. Spire very small and hardly elevated from upper margin of body-whorl. Aperture large, almost semilunar in outline. Umbilicus large and striated, a heavy, rounded, flat-topped collous projects into it leaving a wide umbilical hollow. The largest specimen collected from Wangwa measures about 55 mm. in length.

MARTIN<sup>1)</sup> considers, this species is only a color variety of *P. powisianus* (RECLUZ); in fact, the two are closely related to each other, however, the spire is apparently less elevated in the present species, I therefore, treat them as distinct species. What MARTIN figured as *Natica* (*Polinices*) *powisiana* from the Pliocene of Java<sup>2)</sup> shows rather closer affinity to *P. columnalis* than to *P. powisiana* figured by REEVE.

*P. sagamiensis* PILSBRY,<sup>3)</sup> a living species of Central and Western Honsyû, is perhaps only a local variation of *P. powisiana* or *P. columnalis* as formerly considered by that author; the size of the umbilical lobe is greatly variable as can be seen in *Polinices didyma* and other allied forms.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Byôritu Beds.—Wangwa: station 6; Reg. No. 52274. 600 m. SE. of Taikwa: station 9; Reg. No. 52285. 1100 m. SW. of Taikwa: station 11; Reg. No. 52965. 400 m. SE. of Zyô-tûsyôwan: station 13; Reg. No. 52271. Wangwa: station 13; Reg. No. 52288. 1440 m. W. of Hokkô: station 14; Reg. No. 52273. Wangwa: station 15; Reg. No. 52968. Wangwa: station 16; Reg. No. 52970. Wangwa: station 24; Reg. No. 52291. Wangwa: station 33; Reg. No. 52967. Wangwa: station 40; Reg. No. 52290. Sikô; Reg. No. 48994. On road S. of Bôsiho; Reg. No. 37553. Keiyukwa: station 50; Reg. No. 52969. Sôkeisi; Reg. No. 52966.

Raised Coral Reef.—S. of Sisitô; Reg. No. 37487.

Living: Ryûkyû. The Philippines. Mauritius.

Geologic distribution: Pleistocene of Kikai-zima; Neogene of Java(?).

### ***Polinices* (*Polinices*) *mamilla* (LINNAEUS), 1758**

Pl. IX (IV), Figs. 31a, 31b.

*Polinices mamilla*. SUGITANI, Cat. Luchu Shells, p. 15, 1926: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 32, No. 1035, 1931.

*Polinices mammilla*. KURODA, Cat. Shell-bearing Moll. Amami-Ôsima, p. 43, No. 481, 1928.

*Natica mamilla*. PHILIPPI in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 2, Pt. 1, p. 31, Pl. 4, figs. 7, 8, 1852: REEVE, Conch. Icon., Vol. 9, Pl. 7, fig. 27, 1855: TRYON, Man. Conch., 1 Ser., Vol. 8, p. 49, Pl. 16, figs. 46, 48; Pl. 15, fig. 43; Pl. 17, figs. 65, 69, 1886: TESCH, Paläont. von Timor, Vol. 8, p. 71, Pl. 133, fig. 209, 210, 1920: DICKERSON, Rev. Philip. Paleont., Pl. 4, fig. 5, 1922.

1) MARTIN: Foss. von Java, Vol. 1, p. 264, 1906.

2) MARTIN: l.c., p. 263, Pl. 39, figs. 633-637.

3) PILSBRY: Proc. Acad. Nat. Sci. Philad., p. 23, Pl. 4, fig. 37, 1904.

A single, small specimen, about 27 mm. in height, and 23 mm. in length.

Shell conically ovate in outline, spire small and acute with a polished surface except for fine growth striae. Body-whorl large, slopingly flat above and convex below. Callous strongly heavy and broad by which the umbilicus is entirely closed.

Type locality: Oriental sea.

Fossil occurrence: Raised Coral Reef.—S. of Sisitô; Reg. No. 37402.

Living: Central Honsyû to Taiwan. East Indies. The Philippines. Caroline Islands. New Caledonia. Central Polynesia.

Geologic distribution: Post-Pliocene of Java, Celebes and Billiton; Pliocene of Java, Sumatra and Timor; Miocene of Java and the Philippines.

### **Polinices (Polinices) melanostoma (Gmelin), 1792**

Pl. IX (IV), Fig. 32.

*Polinices melanostoma*. PILSBRY, Cat. Mar. Moll. Jap., p. 72, 1895: SUGITANI, Cat. Luchu Shells, p. 15, 1926: KURODA, Cat. Shell-bearing Moll., Amami-Ôsima, p. 43, No. 477, 1928: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 32, No. 1032, 1931: NOMURA and ZINBÔ, Sci. Rep. Tôhoku Imp. Univ., Ser. 2 (Geol.), Vol. 16, No. 2, p. 145, No. 171, 1934.

*Natica melanostoma*. PHILIPPI in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 2, Pt. 1, p. 30, Pl. 4, figs. 5, 6, 15, 16, 1852: REEVE, Conch. Icon., Vol. 9, Pl. 8, fig. 30, 1855: TRYON, Man. Conch., 1 Ser., Vol. 8, p. 50, Pl. 21, figs. 13-18; Pl. 22, fig. 21, 1886: MARTIN, Foss. von Java, Vol. 1, p. 266, Pl. 39, fig. 642, 1906: TESCH, Paläont. von Timor, Vol. 8, p. 72, Pl. 133, fig. 212, 1920: FISCHER, Paläont. von Timor, Vol. 15, p. 47, 1927.

Several small specimens. According to TRYON, *P. zanzebarica* (RECLUZ), *P. melanostomoides* (QUOY), *P. fibrosa* (SOULEYET) and *P. succinoides* (REEVE) are only varieties; in fact, they are hardly distinguishable from each other when color markings are faded. *Sigaretus (Eunaticina) oblongus* of YOKOYAMA<sup>1)</sup> (non REEVE) from the Upper Musasino Formation of Kadusa is apparently similar to the present fossil, though not quite identical.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Byôritu Beds.—Wangwa: station 6; Reg. No. 52989. 1100 m. SW. of Taikwa: station 11; Reg. No. 52972. Wangwa: station 11; Reg. No. 52971. 510 m. SE. of Zyôtusyôwan: station 15; Reg. No. 52974. Wangwa: station 16; Reg. No. 52973.

Living: Central Honsyû to Taiwan. The Philippines. Caroline Islands. Indian Ocean. Madagascar. Red Sea.

Geologic distribution: Pleistocene of Kikai-zima; Post-Pliocene of Celebes; Pliocene of Java, Timor, Sumatra and Seran; Miocene of Java.

### **Polinices (Polinices?) filus (REEVE), 1855**

Pl. IX (IV), Fig. 34.

*Polinices filus*. YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 32, No. 1034, 1931.

*Natica filosa*. REEVE, Conch. Icon., Vol. 9, Pl. 17, fig. 72, 1855.

1) YOKOYAMA: Jour. Coll. Sci. Imp. Univ. Tôkyô, Vol. 44, Art. 1, p. 85, Pl. 4, fig. 11; Pl. 5, fig. 9, 1922.

REEVE described this shell as: "Shell rather narrowly umbilicated, comparatively ovate, inflated, *Sigaretus*-shaped, spire short, acuminate, whorls slantingly convex, arcuately longitudinally striated, decussated with minute, waved, spiral, impressed striae, last whorl large, inflated, aperture large, columella rather broadly reflected; whitish encircled with two broad, diluted, rust brown bands, columella purple-black."

A single, small specimen lacking the spire, but agrees with the above description. According to REEVE, the habitat of this species is unknown, but TRYON gives it as Australia.

This is *Natica filosa* REEVE, but not *Natica filosa* of PHILIPPI.

Type locality: Not known to the writer.

Fossil occurrence: Byôritu Beds.—700 m. NE. of Nanseizan: station 19; Reg. No. 52981.

Living: Central Honsyû. Australia.

Geologic distribution: Post-Pliocene of Celebes.

#### Subgenus *Neverita* RISSO, 1826

#### *Polinices (Neverita) didyma* (BOLTEN), 1798

*Polinices ampla*. YOKOYAMA, Jour. Coll. Sci. Imp. Univ. Tôkyô, Vol. 39, Art. 6, p. 78, Pl. 5, figs. 5, 6, 1920, and several other subsequent papers.

Several, rather small specimens. The largest which was collected from the vicinity of Hakusyatou measures 25 mm. in length. The Formosan fossils differ from those of Japan proper, in being invariably a little more depressed. This depressed form was once named by RECLUZ as *Natica petiveriana* to which the present form certainly belongs.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Byôritu Beds.—700 m. E. of Hakusyatou: station 3; Reg. No. 52284. 900 m. NW. of Rinsuikwa: station 6; Reg. No. 52283. 550 m. NW. of Rinsuikwa: station 7; Reg. No. 52280. Bôsiho: station 13; Reg. No. 52276. 500 m. SE. of Zyô-tûsyôwan: station 14; Reg. No. 52286. 1450 m. W. of Hokkô: station 14; Reg. No. 52277. Wangwa: station 17; Reg. No. 52962. 1000 m. E. of Hakusyatou: station 20; Reg. No. 52281. 1000 m. E. of Hakusyatou: station 25; Reg. No. 522282. Wangwa: station 28; Reg. No. 52956. 300 m. E. of Sankwakô: station 39; Reg. No. 52960. Keiyukwa: station 50; Reg. No. 52963. 1520 m. E. of Sinpo: station 68; Reg. No. 53816. Between Kôsui and Zyuna; Reg. No. 37584. Western side of Syôgun-yama; Reg. No. 37544. N. of Kityô; Reg. No. 52964.

Living: Widely distributed in Japan from Hokkaidô to Taiwan. Tyôsen. China. Mauritius. Indian Ocean. Australia.

Geologic distribution: Post-Pleistocene, Pleistocene, Pliocene and Miocene of Honsyû; Pliocene of Sikoku and Kyûsyû; Pliocene of Java and Sumatra; Miocene of Java.

#### *Polinices (Neverita)* species indet.

Several small specimens resembling an immature individual of *P. didyma* (BOLTEN) in form, but has a smaller umbilical lobe which is apparently not grooved.



Fossil occurrence: Byôritu Beds.—900 m. NW. of Keiyukwa: station 33; Reg. No. 52458.  
300 m. E. of Sankwakô: station 39; Reg. No. 52979.

Genus **Eunaticina** FISCHER, 1885

**Eunaticina papilla** (GMELIN), 1792

Pl. IX (IV), Figs. 27a, 27b.

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

A single specimen, 19 mm. in height.

Type locality: The Philippines?; Recent.

Fossil occurrence: Byôritu Beds.—1100 m. SW. of Taikwa: station 11; Reg. No. 52978.  
Sikô; Reg. No. 49411.

Living: Widely distributed in Japan from North to South. Japan Sea. Tyôsen. The Philippines. Moluccas.

Geologic distribution: Post-Pleistocene, Pleistocene, Pliocene and Miocene of Honsyû;  
Post-Pliocene, Pliocene and Miocene of Java; Pliocene of Timor.

Genus **Sinum** (BOLTEN) RÖDING, 1798

**Sinum neritoideum** (LINNAEUS), 1758

Pl. IX (IV), Figs. 26a, 26b.

*Sinum neritoideum*. YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 32, No. 1048, 1931.

*Sigaretus neritoideus*. REEVE, Conch. Icon., Vol. 15, Pl. 1, fig. 5, 1864; WEINKAUFF in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 6, Pt. 1, p. 18, Pl. 3, figs. 7-11, 1883; TRYON, Man. Conch., 1 Ser., Vol. 8, p. 55, Pl. 22, fig. 35; Pl. 23, figs. 38-40, 1886; SOWERBY, Thes. Conch., Vol. 5, p. 40, Pl. 441, fig. 1; Pl. 2, figs. 16, 17, 1887.

Shell depressed, globose and ear-shaped, sculptured by incised grooves and alternating flat ridges; they are decussated by rather coarse, irregular concentric lines of growth. Base more or less concave and with no spiral grooves. Larger part of umbilicus closed. Diameter, 31 mm.

Among the several allied forms which have been reported from the tropic and subtropic regions of Asia, *S. latifasciatum* (ADAMS and REEVE), *S. insculptum* (ADAMS and REEVE), *S. javanicum* (GRAY) and *S. leachii* (PHILIPPI) are synonyms according to TRYON.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Byôritu Beds.—1000 m. E. of Hakusyaton: station 4; Reg. No. 52984.  
550 m. SE. of Zyô-tûsyôwan: station 16; Reg. No. 52982. Wangwa: station 24; Reg. No. 52988.  
Wangwa: station 40; Reg. No. 52983. Sikô; Reg. No. 49412.

Living: Western Honsyû. The Philippines. Malaccas.

Family **Patellidae**Genus **Cellana** H. ADAMS, 1869**Cellana toreuma** (REEVE), 1855

Pl. X (V), Fig. 34.

- Cellana toreuma*. KURODA, Cat. Shell-bearing Moll. Amami-Ōsima, p. 22, No. 222, 1928: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 17, No. 493, 1931: YAGURA, Cat. Moll. Hyōgo-ken, p. 22, No. 261, 1932.
- Helicioniscus toreuma*. PILSBRY, Cat. Mar. Moll. Jap., p. 113, 1895: SUGITANI, Cat. Luchu Shells, p. 2, 1926.
- Patella toreuma*. REEVE, Conch. Icon., Vol. 8, Pl. 27, fig. 69, 1855: LISCHKE, Jap. Meeres-Conch., Vol. 1, p. 109, Pl. 8, figs. 12-15, 1869: LISCHKE, *ibid.*, Vol. 2, p. 102, 1871: DUNKER, Ind. Moll. Mar. Jap., p. 159, 1882: PILSBRY in TRYON, Man. Conch., 1 Ser., Vol. 13, p. 135, Pl. 13, figs. 50-53, 1891.
- Patella amusitata*. REEVE, Conch. Icon., Vol. 8, Pl. 30, fig. 83, 1855: LISCHKE, Jap. Meeres-Conch., Vol. 1, p. 109, 1869: LISCHKE, *ibid.*, Vol. 2, p. 100, Pl. 6, figs. 7-10, 1871: DUNKER, Ind. Moll. Mar. Jap., p. 156, 1882.

A single specimen. Shell depressed, longly oval in outline, test rather thin. Surface ornamented with many, unequal radiating threads, more or less beaded. Height, 6 mm.; length, ca. 23 mm.; width, ca. 16 mm.

Type locality: The Oriental Sea.<sup>1)</sup>

Fossil occurrence: Byōritu Beds.—Sikō; Reg. No. 54207.

Living: Widely distributed in Japan from North to South. Ogasawara-zima. The Philippines.

Geologic distribution: Post-Pleistocene of Honsyū.

Family **Turbinidae**Genus **Turbo** (LINNAEUS) LAMARCK, 1799Subgenus **Turbo**, s. s.**Turbo (Turbo) petholatus** LINNAEUS, 1758

Pl. X (V), Fig. 31.

- Turbo petholatus*. PHILIPPI in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 2, Pt. 2, p. 7, Pl. 2, figs. 1-16; Pl. 3, figs. 1-4, 1846: REEVE, Conch. Icon., Vol. 4, Pl. 3, fig. 12, 1848: SOWERBY, Thes. Conch., Vol. 5, p. 191, No. 4, Pl. 5, figs. 46, 47, 1887: TRYON, Man. Conch., 1 Ser., Vol. 10, p. 193, Pl. 40, fig. 14, 1888: PILSBRY, Cat. Mar. Moll. Jap., pp. 88, 179, 1895: TESCH, Paläont. von Timor, Vol. 8, p. 77, Pl. 134, fig. 221, 1920: SUGITANI, Cat. Luchu Shells, p. 5, 1926: KURODA, Cat. Shell-bearing Moll. Amami-Ōsima, p. 28, No. 293, 1928: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 21, No. 622, 1931.

A small, but beautifully preserved specimen with its operculum nearly in natural coloration. Shell rather small, ovate in outline, no umbilicus. Surface entirely smooth and polished except for numerous fine growth lines and microscopic revolving threads. Height, 27 mm.; diameter, 23 mm.

*T. reevi* PHILIPPI (= *T. variabilis* REEVE) and *T. caledonicus* FISCHER may be synonyms.

1) REEVE gives the locality of "*Patella*" *toreuma* as Monterey, California, but this is certainly a mistake.

Type locality: The Eastern Sea.

Fossil occurrence: Byôritu Beds.—Sikô; Reg. No. 49409.

Living: Inland Sea to Taiwan. The Philippines. New Caledonia. Indian Ocean. Red Sea.

Geologic distribution: Post-Pliocene of Timor and Celebes; Pliocene and Miocene of Java.

### **Turbo (Turbo) argyrostomus** LINNAEUS, 1758

*Turbo argyrostomus* var. *margaritacea*. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 65, Pl. 5, fig. 11, 1928.

A tolerably variable species in surface sculpture. The varietal name "*margaritacea*" may perhaps be considered unnecessary, although our sole representative is quite identical with that variety.

Type locality: Indian Ocean.

Fossil occurrence: Raised Coral Reef.—S. of Sisitô; Reg. No. 37417.

Living: Southern Kyûsyû and Ryûkyû. China. The Philippines. Pacific Islands. Indian Ocean.

### **Turbo (Turbo) ticaonicus** REEVE, 1843

*Turbo ticaonicus*. REEVE, Conch. Icon., Vol. 13, Pl. 5, fig. 23, 1848.

Two small specimens, moulds; they are somewhat questionably referred to the named species.

Type locality: The Philippines; Recent.

Fossil occurrence: Ryûkyû Limestone.—Hanpeizan; Reg. Nos. 37367, 37368.

Living: Taiwan. The Philippines. Pacific Islands. Indian Ocean.

Geologic distribution: Pliocene of Timor and Java.

### **Turbo (Turbo) regenfussi** DESHAYES, 1843

Pl. X (V), Figs. 30a, 30b.

*Turbo regenfussi*. PHILIPPI in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 2, Pt. 2, p. 88, Pl. 4, figs. 3, 4, 1846: PILSBRY in TRYON, Man. Conch., 1 Ser., Vol. 10, p. 193, Pl. 48, fig. 40, 1888.

A single well preserved specimen still retaining the original color bands. Shell quite smooth save for lines of growth. Last whorl large and ventricose having a revolving series of tubular bands at the shoulder, surface above angle flat and sloping, below it rounded. Imperforate. Height, 60 mm.; diameter, 51.5 mm.

Type locality: Indian Ocean.

Fossil occurrence: Raised Coral Reef.—S. of Sisitô; Reg. No. 37407.

Living: Indian Ocean.

Subgenus **Lunella** (BOLTEN) RÖDING, 1798**Turbo (Lunella) granulatus** GMELIN, 1788

*Turbo (Marmorostoma) granulatus*. YOKOYAMA, Jour. Coll. Sci. Tôkyô Imp. Univ., Vol. 44, Art. 1, p. 107, Pl. 5, fig. 10, 1922.

Several well preserved specimens. This species may prove to be a mere variety of *T. coronatus* GMELIN, from which it is hardly distinguished.

Type locality: Indian Ocean.

Fossil occurrence: Byôritu Beds.—Wangwa: station 5; Reg. No. 53835. Wangwa: station 31; Reg. No. 53834.

Living: Northern Honsyû to Taiwan. Japan Sea. China. Indian Ocean.

Geologic distribution: Post-Pleistocene and Pleistocene of Honsyû.

“**Turbo**” species indet.

A single imperfect mould, about, 48 mm. in height and 41 mm. in diameter. Its specific determination is impossible, although it may perhaps be a member of *Turbo*.

Fossil occurrence: Byôritu Beds.—The upper course of Sairyôkyô; Reg. No. 53840.

Genus **Astraea** (BOLTEN) RÖDING, 1798**Astraea pseudomodesta** n. sp.

Pl. X (V), Figs. 1a, 1b, 1c.

Shell resembling *A. modesta* in general respects, rather small, conically turbinated. Test medium in thickness. Whorls 8, apical two embryonal, very small and depressed, the rest angulate at one-third of height of whorl, surface above angle convexly sloping, below it nearly vertical. Suture distinct, impressed, but not canaliculated. Surface radially plicate near suture, and spirally threaded, beaded all over, and with revolving series of spines as those of *A. modesta*. Base nearly flat, ornamented by rather coarse radial incremental lines as well as spiral threads; the latter rather small, unequal and about 18 in number, somewhat alternately large and small. Aperture transversely oval, smooth and pearly within; columella short and well curved; callous very thin, covering the umbilical region and a part of base. Quite imperforate.

A single specimen. Height, 27 mm.; diameter 29 mm.

It may be distinguished from *A. modesta* (REEVE) from Japan, by its smaller size, and much finer surface sculpture which is especially well exposed on the base.

Fossil occurrence: Byôritu Beds.—Sikô; Reg. No. 48987.

Genus **Collonista** IREDAL, 1918**Collonista laeta** (MONTROUZIER), 1863

Pl. X (V), Figs. 25a, 25b.

*Collonista laeta*. KURODA, Cat. Shell-bearing Moll. Amami-Ôsima, p. 29, No. 299, 1928: NOMURA and ZINBÔ, Sci. Rep. Tôhoku Imp. Univ., Ser. 2 (Geol.), Vol. 16, No. 2, p. 147, No. 177, 1934.

*Leptothyra laeta*. PILSBRY in TRYON, Man. Conch., 1 Ser., Vol. 10, p. 258, Pl. 63, figs. 29, 30, 1888.

A single specimen. Shell subglobose, surface spirally unequally lirate. Upper whorls as well as base minutely beaded; interior of outer lip transversely dentate. Umbilicus narrow and curved, surrounded behind by a granular ridge.

The shell agrees very well with the description given by PILSBRY, in the work cited above, although the figure of the species shown in that work is rather poor.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Raised Coral Reef.—S. of Sisitô; Reg. No. 37483.

Living: Southern Kyûsyû. New Caledonia. Viti and Solomon Islands. Australia.

Geologic distribution: Pleistocene of Kikai-zima.

#### Genus *Liotia* GRAY, 1847

#### *Liotia hanzawai* n. sp.

Pl. X (V), Figs. 43a, 43b, 43c, 44a, 44b.

Shell small, discoidal, consisting of 4, angular whorls; surface above angle flat, below it vertical. Sculptured by radiating ribs numbering about 16 on upper surface of last whorl; interspaces smooth, generally wider than ribs themselves. Periphery biangulated by revolving cords which are connected by longitudinal ribs. Base convex, obsoletely ribbed in outer half, and distinctly crenulated in the interior part bordering a rather small and deep umbilicus. Dimensions: Height, 2 mm., diameter, 3.5 mm.

This species somewhat resembles *L. discoidea* REEVE<sup>1)</sup> from the Philippines but it may be distinguished from the latter by having a slightly more elevated spire.

Fossil occurrence: Byôritu Beds.—On road S. of Bôsiho: station 7; Reg. No. 37416. Bôsiho: station 13 (HANZAWA); Reg. No. 53863.

#### *Liotia* species indet. (1)

A single imperfect specimen, 6.2 mm. in height. The shell is small, solid and globose in form being somewhat related to *L. semiclathuratula* SCHRENCK,<sup>2)</sup> but the sculpture is not perfectly identical.

Fossil occurrence: Byôritu Beds.—On road S. of Bôsiho: station 7 (HANZAWA); Reg. No. 53858.

#### *Liotia* (?) species indet. (2)

A small imperfect specimen, somewhat similarly sculptured with *L. australis* (KIENER).<sup>3)</sup> Diameter, ca. 3.2 mm.

Fossil occurrence: Byôritu Beds.—The upper course of Sairyôkyô; Reg. No. 53863.

1) REEVE: Conch. Icon., Vol. 1, *Delphinula*, fig. 15, a, 1843.

2) SCHRENCK: Moll. Amurl-Lande, p. 370, Pl. 16, figs. 16-25, 1867.

3) KIENER: Spec. Coq. viv., *Delphinula*, p. 8, Pl. 4, fig. 7, 1835-1857.

## Family Cyclostrematidae

Genus Cyclostrema MARRYATT, 1818

## "Cyclostrema" eburneforme, n. sp.

Pl. X (V), Figs. 38a, 38b, 38c.

Shell resembling *C. eburnea* in some respects, very small and sublenticular, being narrowly umbilicated. Whorls 4, distinctly angulated near lower suture; surface above angle flattened, below it vertical; suture well defined being neither canaliculated nor marginated. Surface sculptured with radial, somewhat curved plicae, about 25, on upper surface of body-whorl, separated by slightly wider interspaces which are spirally, minutely striated. Periphery angulated by a corded carina. Base convex, ornamented with 20, radial plicae as well as striated interspaces. Aperture nearly circular. Dimensions: Height, 1.8 mm., diameter, 4.1 mm.

This shell may be distinguished from *C. eburnea* NEVILL<sup>2)</sup> of Bengal Bay, by its continuous radial plicae and non-marginated suture; farther the peripheral carina in NEVILL's species is said to be bordered by an impressed line, above and below, but in our's it is absent.

Fossil occurrence: Byôritu Beds.—700 m. NE. of Nanseizan: station 19; Reg. No. 53861.

## "Cyclostrema" sulcatum A. ADAMS, 1850

Pl. X (V), Figs. 40a, 40b.

*Cyclostrema sulcatum*. PILSBRY, Cat. Mar. Moll. Jap., p. 103, 1895: NOMURA and ZINEÔ, Sci. Rep. Tôhoku Imp. Univ. Sendai, Ser. 2, (Geol.), Vol. 16, No. 2, p. 148, No. 186, 1934.

*Cyclostrema sulcata*. SOWERBY, Thes. Conch., Vol. 3, p. 250, No. 7, Pl. 255, figs. 11, 12, 1866: SOWERBY in REEVE, Conch. Icon., Vol. 19, Pl. 1, fig. 3, 1874: PILSBRY in TRYON, Man. Conch., 1 Ser., Vol. 10, p. 94, Pl. 32, figs. 77, 78, 1888.

A single specimen, 3 mm. in diameter.

Type locality: Japan; Recent.

Fossil occurrence: Byôritu Beds.—Nanseizan: station 11; Reg. No. 53860.

Living: Japan. China Sea. The Philippines.

Geologic distribution: Pleistocene of Kikai-zima and Honşyû(?).

## "Cyclostrema" species indet.

A small and thin shelled species, somewhat water-worn. It is depressed, flatly convex with the surface spirally striate. The base is plano-convex being provided with obsolete fine threads. The umbilicus widely perforate.

Fossil occurrence: Byôritu Beds.—S. of Bôsiho: station 7; Reg. No. 37437.

1) TRYON: Man. Conch., 1 Ser., Vol. 10, p. 89, Pl. 31, figs. 29, 30, 1888.

Family **Trochidae**Genus **Trochus** LINNAEUS, 1758Subgenus **Trochus**, s. s.**Trochus (Trochus) incrassatus** LAMARK, 1822

Pl. X (V), Fig. 14.

*Trochus incrassatus*. PHILIPPI in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 2, Pt. 3, p. 109, Pl. 18, fig. 3, 1851: REEVE, Conch. Icon., Vol. 13, Pl. 13, fig. 77, 1861: PILSBRY in TRYON, Man. Conch., 1 Ser., Vol. 11, p. 26, Pl. 6, figs. 48-50; 1889: SUGITANI, Cat. Luchu Shells, p. 3, 1926: KURODA, Cat. Shell-bearing Moll. Amami-Ōsima, p. 24, No. 248, 1928: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 18, No. 528, 1931.

Seven well preserved specimens. They are quite identical with the type of *T. incrassatus*, having five spiral series of grains on each whorl, and with the upper-most one being the largest. The test is thick and heavy; the lateral outline of the spire is slightly convex. The largest specimen, 32 mm. in height, and 38.3 mm. in diameter.

Type locality: Indian Ocean.

Fossil occurrence: Raised Coral Reef.—S. of Kontei; Reg. No. 37595. N. of Kaikō; Reg. No. 53809.

Living: Southern Kyūsyū to Taiwan. Sandwich Islands. Viti Island. Indian Ocean.

**Trochus (Trochus) calcaratus** SOUVERBIE, 1875

Pl. X (V), Fig. 16.

*Trochus calcaratus*. PILSBRY in TRYON, Man. Conch., 1 Ser., Vol. 11, p. 30, Pl. 2, fig. 15; Pl. 8, figs. 83, 84, 1889: KURODA, Cat. Shell-bearing Moll. Amami-Ōsima, p. 24, No. 249, 1928: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 18, No. 541, 1931.

A single well preserved specimen, 20.7 mm. in height, and 22.1 mm. in diameter. It is slightly less higher than the type figured by TRYON, but the difference may be regarded as mere variation.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Raised Coral Reef.—N. of Kaikō; Reg. No. 53803.

Living: Southern Kyūsyū and Ryūkyū. The Philippines. New Caledonia.

Subgenus **Pyramidea** SWAINSON, 1840**Trochus (Pyramidea) niloticus** LINNAEUS, 1767

Pl. X (V), Fig. 46.

*Trochus niloticus*. PHILIPPI in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 2, Pt. 3, p. 32, Pl. 1, fig. 1; Pl. 8, fig. 1, 1851: DUNKER, Ind. Moll. Mar. Jap., p. 137, 1882: PILSBRY in TRYON, Man. Conch., 1 Ser., Vol. 11, p. 17, Pl. 1, figs. 5-8, 1889: SUGITANI, Cat. Luchu Shells, p. 3, 1926.

*Pyramidea nilotica*. KURODA, Cat. Shell-bearing Moll., Amami-Ōsima, p. 25, No. 251, 1928.

A single, large specimen, 120 mm. in diameter. The shell is locally called "Takase-gai, and is used for making buttons.

*T. maxima* (KOCH) PHILIPPI is a synonym.

Type locality: Indian Ocean.

Fossil occurrence: Raised Coral Reef.—S. of Kontei; Reg. No. 52998.

Living: Kyûsyû to Taiwan. Pacific Islands. Indian Ocean. Australia.

Geologic distribution: Pliocene of Sumatra.

#### Genus *Monodonta* LAMARCK, 1799

#### *Monodonta labio* (LINNAEUS), 1858

*Monodonta labio*. YOKOYAMA, Jour. Coll. Sci. Imp. Univ. Tôkyô, Vol. 45, Art. 1, p. 34, Pl. 2, fig. 8, 1924.

Several well preserved specimens, though rather small.

*M. confusa* TAP.-CAN.<sup>1)</sup> may be an immature form of the present species.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Byôritu Beds.—Wangwa: station 5; Reg. No. 53805. Wangwa: station 31; Reg. No. 53804.

Living: Widely distributed in Japan from North to South. China. Pacific Islands. The Philippines. Indian Ocean.

Geologic distribution: Post-Pleistocene of Honsyû; Pliocene of Java.

#### Genus *Turcica* H. and A. ADAMS, 1854

#### *Turcica elisa* (GOULD), 1849

Pl. X (V), Fig. 15.

*Turcica elisa*. PILSBRY in TRYON, Man. Conch., 1 Ser., Vol. 11, p. 417, Pl. 67, figs. 67, 68, 69, 74, 1889.

*Trochus elisus*. GOULD, Proc. Bost. Soc. Nat. Hist., Vol. 3, p. 92, 1849.

Several fine specimens. The largest specimen in our possession, 15 mm. in diameter, and hence it is larger than those of the types given by GOULD and by TRYON.

Like *T. imperialis* A. ADAMS in some respects, but the sculpture is coarser, and has a toothed columella. TRYON classed it under the section of *Perrinia* H. and A. ADAMS.

Type locality: China Sea.

Fossil occurrence: Byôritu Beds.—700 m. E. of Hakusyatou: station 3; Reg. No. 53810. Wangwa: station 7; Reg. No. 53807. Wangwa: station 8; Reg. No. 53815. Wangwa: station 9; Reg. No. 53816. Wangwa: station 16; Reg. No. 53817. 100 m. E. of Hakusyatou: station 25; Reg. No. 53808. Wangwa: station 25; Reg. No. 53811. Wangwa: station 33; Reg. No. 53814.

1) TRYON: Man. Conch., 1 Ser., Vol. 11, p. 87, Pl. 22, fig. 37, (as a variety of *M. labio*), 1889.



500 m. SE. of Naikotô: station 28; Reg. No. 53818. Keiyukwa: station 50; Reg. No. 53813.  
940 m. NW. of Keiyukwa: station 55; Reg. No. 53812. Western side of Syôgun-yama; Reg. No.  
37424. 300 m. E. of Hakusyatou; Reg. No. 37426. E. of Goko; Reg. No. 37438.

Living: China Sea. Singapore.

Genus **Tegula** LESSON, 1834

Subgenus **Chlorostoma** SWAINSON, 1840

**Tegula (Chlorostoma) pfeifferi** (PHILIPPI), 1846

- Tegula (Chlorostoma) pfeifferi*. YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 19, No. 570, 1931: YAGURA, Cat. Moll. Hyôgo-ken, p. 24, No. 303, 1932: NOMURA, Sci. Rep. Tôhoku Imp. Univ. Ser. 2 (Geol.), Vol. 15, No. 2, p. 98, No. 223, 1932.  
*Chlorostoma pfeifferi*. DUNKER, Ind. Moll. Mar. Jap., p. 144, 1882: PILSBRY in TRYON, Man. Conch., 1 Ser., Vol. 11, p. 169, Pl. 26, figs. 13-15, 1889: PILSBRY, Cat. Mar. Moll. Jap., p. 95, 1895.  
*Trochus pfeifferi*. PHILIPPI in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 2, Pt. 3, p. 152, Pl. 25, fig. 2, 1851: LISCHKE, Jap. Meeres-Conch., Vol. 1, p. 98, 1869.

The typical form of this species is defined by TRYON as:

"The typical *C. pfeifferi* is strictly conical, with nearly straight lateral outline; the whorls are obsoletely longitudinally plicated; the base is slightly concave, and radiately striated or streaked with white."

A single specimen, 17.7 mm. in height, and 17 mm. in diameter, coincides, almost exactly with the above description, although smaller and somewhat imperfect in its preservation.

According to LISCHKE, *Chlorostoma achates* GOULD and *Chlorostoma nordmanni* (SCHRENCK) are synonyms.

Type locality: Japan?; Recent.

Fossil occurrence: Byôritu Beds.—Wangwa: station 31; Reg. No. 53806.

Living: Northern to Western Japan.

Geologic distribution: Post-Pleistocene of Honsyû.

Genus **Umbonium** LINK, 1807

Subgenus **Umbonium**, s. s.

**Umbonium (Umbonium) vestarium** (LINNAEUS), 1758

Pl. X (V), Figs. 26a, 26b.

*Umbonium vestarium*. PILSBRY in TRYON, Man. Conch., 1 Ser., Vol. 11, p. 450, Pl. 58, fig. 1-8, 1889.

Several specimens of *Umbonium* having slightly convex whorls and with smooth surfaces. They agree with *U. vestarium* (LINNAEUS) in general respects, though smaller. The largest specimen, 5 mm. in diameter.

Type locality: Indian Ocean.

Fossil occurrence: Byôritu Beds.—700 m. SW. of Kôkwan: station 23; Reg. No. 53826. Bôsiho: station 24; Reg. No. 53827. Western side of Syôgun-yama; Reg. No. 37419.

Living: Singapore. The Philippines. Indian Ocean.

Geologic distribution: Pliocene of Java.

Subgenus *Suchium* MAKIYAMA, 1924

*Umbonium* (*Suchium*) *moniliferum* (LAMARCK), 1822

Pl. X (V), Fig. 12.

*Umbonium moniliferum*. PILSBRY in TRYON, Man. Conch., 1 Ser., Vol. 11, p. 456, Pl. 58, figs. 22, 23, 29, 30, 31, 1889.

*Umbonium costatum*. YOKOYAMA, Imp. Geol. Surv. Jap., Rep. No. 101, p. 69, 1928.

Several specimens sculptured almost identically with the named species. According to Mr. KURODA, *U. costatum* (VAL.), *U. superbum* (GOULD), and *U. suturale* (LAM.) are only local varieties, and are referred to *U. moniliferum*.

In regard to the fossil species of the Japanese *Umbonium*, the reader is referred to the interesting papers by Dr. MAKIYAMA,<sup>1)</sup> and by K. SUZUKI.<sup>2)</sup>

Type locality: Japan; Recent.

Fossil occurrence: Byôritu Beds.—700 m. E. of Hakusyaton: station 3; Reg. No. 53822. 1900 m. NE. of Hakusyaton: station 10; Reg. No. 53824. 1600 m. N. of Sikwakô: station 10; Reg. No. 53820. 650 m. SE. of Zyô-tûsyôwan: station 18; Reg. No. 53810. Wangwa: station 26; Reg. No. 53825. Kôsui: station 61; Reg. No. 53823. Sôkeisi; Reg. No. 53821. On road S. of Bôsiho; Reg. No. 37404.

Living: Widely distributed in Japan, from Hokkaidô to Taiwan.

Geologic distribution: Post-Pleistocene, Pleistocene and Pliocene of Honsyû.

*Umbonium* (*Suchium*) *equistriatum* n. sp.

Pl. X (V), Figs. 3a, 3b, 4, 5, 6, 7, 8, 9, 10, 11.

Shell resembling *U. moniliferum* in general respects, small, depressed-conical in form. Whorls about six, apical one embryonal, smooth and rounded, post-embryonal ones a trifle convex and ornamented with spiral threads, 8 or 9 on body-whorl above periphery, separated by almost equidistant grooves. No subsutural bands or tubercular cords. Base flattish and entirely smooth with a closed umbilicus, and a circular callous, which is not very heavy.

This species is distinguishable from *U. moniliferum* in the shell being smaller, the spiral threads are more in number, and has no subsutural band or tubercles.

There are several specimens found in our collection, though from a single locality. Unfortunately all the specimens are more or less deformed; the approximate dimensions of two specimens are (in mm.):

1) MAKIYAMA: Jap. Jour. Geol. and Geogr., Vol. 3, No. 3-4, pp. 119-130, Pl. 20, 1924.

2) SUZUKI: Jour. Geol. Soc. Tôkyô, Vol. 41, No. 485, p. 67, 1934. (in Japanese).

	1	2
Height .....	8.0	7.4
Diameter .....	11.5	6.3

Fossil occurrence: Byôritu Beds.—Sinsui; Reg. No. 37415.

Genus **Ethalia** A. ADAMS, 1853

**Ethalia pulchella** (A. ADAMS), 1853

Pl. X (V), Figs. 24a, 24b.

*Ethalia pulchella*. PILSBRY in TRYON, Man. Conch., 1 Ser., Vol. 11, p. 460, Pl. 59, figs. 59-63, 1889.

Several well preserved specimens. The diagnosis given by TRYON is: "Shell sublenticular, obtusely angulated, umbilicate, smooth, shining.....; spire a little prominent, apex a little arcuate, whitish; base around the umbilicus rather broadly, perspective, radiately corrugated and angulate; aperture subrhomboidal, very oblique, throat pearly; peristome straight, obtuse, whitish, basal margin arcuate, columellar margin expanded in a rosy, tongue-shaped callous, partly covering the umbilicus."

The color marking as preserved in our fossil specimens consists of longitudinal oblique threads. The largest specimen measures 8.2 mm. in diameter, and 4.8 mm. in height being slightly larger than the subsequent type measured by MARTENS in his Systematic Conchylien Cabinet.

Type locality: The Philippines?; Recent.

Fossil occurrence: Byôritu Beds.—1000 m. E. of Hakusyaton: station 25; Reg. No. 53830. 1200 m. SE. of Sankwakô: station 60; Reg. No. 53831. Western side of Syôgun-yama; Reg. No. 53828.

Living: The Philippines. Owen Is., Marqui Archipelago.

Genus **Monilea** SWAINSON, 1840

**Monilea lentiginosa** A. ADAMS, 1851

Pl. X (V), Figs. 23a, 23b.

*Monilea lentiginosa*. PILSBRY in TRYON, Man. Conch., 1 Ser., Vol. 11, p. 248, Pl. 41, figs. 8-10; Pl. 60, figs. 23, 24, 1889.

Five specimens: A perfect one, 9.8 mm. in height, and 13 mm. in diameter.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Byôritu Beds.—SW. of Kôryô; Reg. No. 53833.

Raised Coral Reef.—S. of Sisitô; Reg. No. 37479.

Living: The Philippines. Singapore. Australia.

Genus *Calliostoma* SWAINSON, 1840*Calliostoma cecillei* (PHILIPPI), 1849

Pl. X (V), Fig. 13.

- Calliostoma cecillei*. PILSBRY in TRYON, Man. Conch., 1 Ser., Vol. 11, p. 342, Pl. 67, fig. 64, 1889.
- Trochus cecillei*. PHILIPPI in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 2, Pt. 3, p. 291, Pl. 43, fig. 2, 1851.
- Calliostoma unicum*. TRYON, Man. Conch., 1 Ser., Vol. 11, p. 341, Pl. 16, figs. 10, 5, 1889; PILSBRY, Cat. Mar. Moll. Jap., p. 99, 1895; YOKOYAMA, Jour. Coll. Sci. Imp. Univ. Tôkyô, Vol. 45, Art. 2, p. 13, 1923; YOKOYAMA, Jour. Fac. Sci. Imp. Univ. Tôkyô, Sec. 2, Vol. 1, Pt. 9, p. 346, Pl. 51, fig. 13, 1926; MAKIYAMA, Mem. Coll. Sci. Kyôto Imp. Univ., Ser. B, Vol. 3, No. 1, Art. 1, p. 60, 1927; YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 20, No. 596, 1931; YAGURA, Cat. Moll. Hyôgo-ken, p. 25, No. 314, 1932; NOMURA, Sci. Rep. Tôhoku Imp. Univ. Ser. 2 (Geol.), Vol. 15, No. 2, p. 99, No. 232, 1932.
- Trochus unicus*. DUNKER, Moll. Jap., p. 23, Pl. 3, fig. 3, 1861; LISCHKE, Jap. Meeres-Conch., Vol. 3, p. 64, 1874.
- Ziglyphinus unicus*. REEVE, Conch. Icon., Vol. 14, Pl. 2, fig. 8, 1863.

The Japanese form hitherto known under the name of *C. unicum* (DUNKER) certainly belongs to PHILIPPI's species; the Formosan specimen seems to have a more granulate surface than the usual type of *unicum* of Japan, but the difference is regarded as local variation, the two forms are surely linked to one another by intermediate forms. Height, 19.2 mm.; diameter, 20 mm.

Type locality: Taiwan; Recent.

Fossil occurrence: Byôritu Beds.—Wangwa: station 14; Reg. No. 53829.

Living: Northern Honsyû to Taiwan.

Geologic distribution: Post-Pleistocene, and Pliocene of Honsyû.

*Calliostoma semigranatum* n. sp.

Pl. X (V), Figs. 17a, 17b.

Shell small, perforate; spire conical, outline almost straight. Whorls 8, separated by broad and subchanneled sutures. Sculpture: lower whorl with four, unequal cord-like lirae, the upper-most one obsoletely beaded, the rest smooth, the second from the upper smallest and the lowest largest: 3 lirae on upper whorl, all finely and closely beaded; entire surface ornamented by rather distinct lines of growth, more marked in interspaces than on lirae. Periphery biangulate by smooth lirae. Base rather flat, with many distinct incremental lines as well as 8, subequal, rather low spiral cords, separated by narrower interspaces, the inner-most one being beaded. Aperture angular; outer lip lirate within; columella very short and smooth terminating in a tooth-like process. Umbilicus rather narrow, semilunar in form, encircled behind by a smooth ridge.

Several well preserved specimens. Annexed are some of the measurements (in mm.):

	1	2	3
Height .....	9.0	8.0	2.5
Diameter .....	7.7	7.1	5.0

Although there are several forms of *Calliostoma* resembling this new species in form, none of them are identical.

Fossil occurrence: Byôritu Beds.—Nanseizan: station 11; Reg. No. 53837. Wangwa: station 15; Reg. No. 53838. 700 m. NE. of Nanseizan: station 19; Reg. No. 53839. Wangwa: station 40; Reg. No. 53836.

Genus **Teinostoma** H. and A. ADAMS, 1853

**Teinostoma andoi** n. sp.

Pl. X (V), Figs. 45a, 45b, 45c.

Shell resembling *T. morlieri* JOUSSEAUME in form, very small, discoidal, consisting of 5, rather rapidly increasing convex whorls; spire short, depressed; suture distinct, subchannelled, slightly margined and more apparent in body whorl; flattened next to suture then convex. Surface with fine growth lines and microscopic spiral striae; the latter marked only in whorls of spire. Periphery well rounded. Base nearly flat, or more or less convex, being sculptured with growth lines only; umbilicus closed by heavy callous deposits leaving a narrow and slightly depressed area. Dimension: Height, 1.8 mm.; diameter, 3.5 mm.

This small and neat shell is characterized by its revolving lines on the surface that are limited only on the spire whorls; it is a good distinguishing character from *T. morlieri* JOUSSEAUME<sup>1)</sup> and *T. punctatum* JOUSSEAUME.<sup>2)</sup>

Fossil occurrence: Byôritu Beds.—700 m. SW. of Kôkwan: station 23; Reg. No. 53857.

Genus **Solariella** S. WOOD, 1842

**Solariella formosana**, n. sp.

Pl. X (V), Figs. 42a, 42b, 42c.

Shell small, umbilicate, turbinate conical; test rather thin. Whorls about 5, apical ones lost, sharply angulate slightly above middle, flattened, or more or less concave above angle, and almost vertical below. Sculpture of a rather prominent spiral ridge at shoulder of each whorl, both above and below; penultimate whorl with a single spiral cord; body-whorl with 2 (one is obsolete) on upper flat surface and 3 on lower vertical surface between shoulder and periphery; in the latter, each provided with a smaller cord in their interspaces. Entire surface marked by longitudinal threads (or riblets), minutely subgranular in appearance. Periphery rounded. Base slightly convex with 7 nearly equal spiral cords, separated by grooves which are narrower than cords themselves. Umbilicus deep, moderately wide, with its upper margin as well as inner wall crenulate. Aperture fractured, but may be nearly circular with a thin outer lip. A single specimen; height, ca. 4 mm.; diameter, 4.5 mm.

*S. philippensis* (WATSON)<sup>3)</sup> from Australia resembles the present species in form, but differs from that species in having a coarser sculpture.

Fossil occurrence: Byôritu Beds.—1000 m. SE. of Hakusyatou: station 32; Reg. No. 54214.

1) PILSBRY in TRYON: Man. Conch., 1 Ser., Vol. 10, p. 104, Pl. 34, figs. 50, 51, 1888.

2) PILSBRY in TRYON: *ibid.*, p. 104, Pl. 34, figs. 48, 49, 1888.

3) WATSON: Challenger Rep. Gastr., Vol. 15, p. 73, Pl. 6, fig. 10, 1886, (not of YOKOYAMA, 1922).

Family **Neritidae**Genus **Nerita** LINNAEUS, 1758**Nerita undata** LINNAEUS, 1758

Pl. X (V), Fig. 21.

*Nerita undata*. TRYON, Man. Conch., 1 Ser., Vol. 10, p. 28, Pl. 5, figs. 86-95; Pl. 6, figs. 96-3; Pl. 7, fig. 30 1888.

Four well preserved specimens. This is a very variable species and it possess many synonyms. The Formosan fossils, as a whole, agree with *N. funiculata* REEVE<sup>1)</sup> a variety of *N. undata* L. The largest in the collection, 30 mm. in height, and 32 mm. in diameter.

Type locality: Indo-Pacific; Recent.

Fossil occurrence: Raised Coral Reef.—S. of Sisitô; Reg. No. 37400.

Living: Southern Kyûsyû to Taiwan. East Indies. The Philippines. Pacific Islands. Indian Ocean.

Geologic distribution: Miocene of Java and ?the Philippines.

**Nerita chamaeleon** LINNAEUS, 1758

Pl. X (V), Fig. 18.

*Nerita chamaeleon*. WATSON, Challenger Gastr., Vol. 15, p. 679, 1886: TRYON, Man. Conch., 1 Ser., Vol. 10, p. 20, Pl. 2, figs. 31-39; Pl. 6, fig. 4; Pl. 9, fig. 66, 1888: MARTENS in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 2, Pt. 11, p. 19, Pl. 2, figs. 13-16; Pl. 5, figs. 5-15, 1889: TESCH, Paläont. von Timor, Vol. 8, p. 73, Pl. 15, fig. 213, 1920: SUGITANI, Cat. Luchu Shells, p. 6, 1926: FISCHER, Paläont. von Timor, Vol. 15, p. 42, 1927: KURODA, Cat. Shell-bearing Moll. Amami-Ôsima, p. 30, No. 317, 1928: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 22, No. 657, 1931.

Two perfect and one imperfect specimens. This is one of the most well known Indo-Pacific living species having many synonyms due to its extensive variation of color markings. Height, 29 mm.; diameter, 20 mm.

Type locality: Indian Ocean.

Fossil occurrence: Byôritu Beds.—Wangwa: station 31; Reg. No. 53883.

Living: Southern Kyûsyû to Taiwan. East Indies to Polynesia. E. coasts of Africa.

Geologic distribution: Pliocene of Java, Timor and Seran (as *N. chamaeleon* var. *squamulata*).

**Nerita planospira** ANTON, 1839

Pl. X (V), Fig. 20.

*Nerita planospira*. TRYON, Man. Conch., 1 Ser., Vol. 10, p. 21, Pl. 3, fig. 48, 1888: MARTENS in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 2, Pt. 11, p. 23, Pl. 4, figs. 4-7, 1889: PILSBRY, Cat. Mar. Moll. Jap., p. 88, 1895.

*Nerita atro-purpurea*. REEVE, Conch. Icon., Vol. 9, Pl. 8, fig. 38 a, b, 1855.

1) REEVE: Conch. Icon., Vol. 9, Pl. 2, fig. 9, 1855.

One well preserved specimen. It has a flattened spire with rather small revolving ridges which are somewhat alternately large and small especially towards the lower half of the outer lip. Height, 19.4 mm.; diameter, 24 mm.

Type locality: The Philippines; Recent.

Fossil occurrence: Raised Coral Reef.—S. of Sisitô; Reg. No. 37477.

Living: Japan. Polynesia. Indian Ocean. Australia.

### ***Nerita plicata* LINNAEUS, 1758**

Pl. X (V), Fig. 19.

*Nerita plicata*. REEVE, Conch. Icon., Vol. 9, Pl. 9, fig. 42 a, b, c, d, 1855: TRYON, Man. Conch., 1 Ser., Vol. 10, p. 27, Pl. 5, figs. 81–83, 1888: MARTENS in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 2, Pt. 11, p. 63, Pl. 10, figs. 6–10, 1889: SUGITANI, Cat. Luchu Shells, p. 7, 1926: KURODA, Cat. Shell-bearing Moll. Amami-Ôsima, p. 31, 1928: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 22, No. 666, 1931.

One well preserved specimen. Height, 21.5 mm.; diameter, 21 mm. REEVE gives the locality as "West Indies," but this is most probably a mistake; it may be an Indo-Pacific species.

Type locality: Indo-Pacific (?); Recent.

Fossil occurrence: Raised Coral Reef.—S. of Kontei; Reg. No. 37401.

Living: Southern Kyûsû to Taiwan. Caroline Islands. Indian Ocean. Sandwich Island. Polynesia.

Geologic distribution: Miocene of Java.

### Genus ***Theodoxus* MONTFORT, 1810**

#### Subgenus ***Clithon* MONTFORT, 1810**

### ***Theodoxus (Clithon) sowerbianus* (RECLUZ), 1842**

Pl. X (V), Fig. 22.

*Theodoxus sowerbianus*. KURODA, Cat. Shell-bearing Moll. Amami-Ôsima, p. 30, No. 312, 1928: YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 22, No. 675, 1931: YAGURA, Cat. Moll. Hyôgo-ken, p. 27, No. 336, 1932.

*Theodoxus sowerbyanus*. SUGITANI, Cat. Luchu Shells, p. 7, 1926.

*Neritina sowerbiana*. MARTENS in MARTINI u. CHEMNITZ, Syst. Conch. Cab., Vol. 2, Pt. 10, p. 171, Pl. 18, figs. 1–4, 10, 1879: TRYON, Man. Conch., 1 Ser., Vol. 10, p. 67, Pl. 24, fig. 45; Pl. 25, figs. 46–51, 1888: PILSBRY, Cat. Mar. Moll. Jap., p. 88, 1895.

*Neritina sowerbiana*. SOWERBY, Thes. Conch., Vol. 2, No. 70, p. 528, Pl. 109, figs. 5–8, 1855.

*Neritina sowerbii*. REEVE, Conch. Icon., Vol. 9, Pl. 20, fig. 89 a–d, 1855.

Two specimens; they are almost in natural coloration. The largest one which is figured measures 8 mm. in diameter and height.

Type locality: The Philippines; Recent.

Fossil occurrence: Byôritu Beds.—500 m. SE. of Zyô-tûsyôwan: station 14; Reg. No. 53884. 940 m. NW. of Keiyukwa: station 55; Reg. No. 53885.

Living: Widely distributed in Japan from Hokkaidô to Taiwan. China. Siam. The Philippines.

Geologic distribution: Post-Pleistocene of Honsyû.

#### Family Fissurellidae

Genus *Fissuridea* SWAINSON, 1840

*Fissuridea crucifera* (PILSBRY), 1890

Pl. X (V), Figs. 50a, 50b.

*Glyphis crucifera*. PILSBRY in TRYON, Man. Conch., 1 Ser., Vol. 12, p. 225, Pl. 32, figs. 27-30, 1890.

A single specimen. Height, 6 mm.; length, 18.5 mm.; width, 10.5 mm.

According to PILSBRY, this is *F. cruciata* KRAUSSE 1848, but not *F. cruciata* GOULD, 1846. This species may approach to *F. singaporensis* REEVE from Singapore. *Fissuridea ticaonica* (REEVE) is a much higher shell than the present one, though the sculpture is nearly similar.

Type locality: Natal; Recent.

Fossil occurrence: Byôritu Beds.—Sikô; Reg. No. 48999.

Living: Natal.

#### Family Epitonidae

Genus *Epitonium* (BOLTEN) RÖDING, 1798

*Epitonium neglectum* (ADAMS and REEVE), 1850

Pl. IX (IV), Fig. 46.

*Epitonium neglectum*. YOSIMURA, The Venus, Vol. 2, No. 1, p. 13, text-fig. 1, 1930.

*Scalaria neglecta*. SOWERBY in REEVE, Conch. Icon., Vol. 19, Pl. 1, fig. 1, 1874; TRYON, Man. Conch., 1 Ser., Vol. 9, p. 55, Pl. 11, figs. 34, 35, 1887.

One well preserved specimen. Height, 14 mm.; diameter, 8 mm. The lamellar ribs on the shoulder are less erect than the figures given by TRYON.

Type locality: China; Recent.

Fossil occurrence: Byôritu Beds.—Sikô; Reg. No. 49418.

Living: Japan Sea. China. Sea.

#### *Epitonium pulcherrimum* (SOWERBY),

*Scala pulcherrima*. YOKOYAMA, Jour. Fac. Sci. Imp. Univ. Tôkyô, Sec. 2, Vol. 1, Pt. 10, p. 416, Pl. 47, fig. 5, 1927.

A small imperfect specimen, longitudinally costate and spirally striate like that of *S. pulcherrima* figured by Dr. M. YOKOYAMA in the work, above cited.

Type locality: The Philippines; Recent.

Fossil occurrence: Byôritu Beds.—1000 m. E. of Hakusyaton: station 25; Reg. No. 53947.



Living: Western Japan. The Philippines.

Geologic distribution: Pleistocene of Honsyû.

Family **Strombiformidae**

Genus **Melanella** BOWDICH, 1822

**Melanella candida** (MARRATT), 1880

Pl. X (V), Figs. 48a, 48b.

*Eulima candida*. TRYON, Man. Conch., 1 Ser., Vol. 8, p. 266, Pl. 68, figs. 91, 92, 1886.

TRYON gives the description as: "Whorls numerous, short, somewhat rounded, the varices impressed forming a continuous oblique line not reaching the apex".

Four rather well preserved specimens. In two specimens, the impressed varices are situated on the left side of each whorl and are referred to a varietal form. One of the typical form measures ca. 29 mm. in height, and 11.5 mm. in diameter.

"*Eulima* (s. str.)" *martini* figured by FISCHER<sup>1)</sup> from Timor is an allied species.

Type locality: Taiwan; Recent.

Fossil occurrence: Byôritu Beds.—400 m. SE. of Zyô-tûsyôwan: station 13; Reg. No. 53762. 300 m. E. of Sankwakô: station 39; Reg. No. 53763.

Living: Known only from the type locality.

**Melanella tortuosa** (ADAMS et REEVE), 1850

Pl. X (V), Figs. 47a, 47b.

*Eulima tortuosa*. SOWERBY, Thes. Conch., Vol. 2, p. 795, Pl. 169, fig. 14, 1855: REEVE, Conch. Icon., Vol. 15, Pl. 2, fig. 12, 1865: TRYON, Man. Conch., 1 Ser., Vol. 8, p. 271, Pl. 68, fig. 23, 1886.

SOWERBY described this species as: "Tortuous, acuminate; whorls twelve to fourteen, flattened, with oblique varices; aperture small, white, opaque, obscurely beneath the suture".

Several well preserved specimens. The largest, length, 13 mm.; diameter, 3.5 mm.

Type locality: China; Recent.

Fossil occurrence: Byôritu Beds.—700 m. E. of Hakusyaton: station 3; Reg. No. 53764. 500 m. SE. of Zyô-tûsyôwan: station 14; Reg. No. 53894. 500 m. E. of Sankwakô: station 41; Reg. No. 53765.

Living: China Sea.

Genus **Niso** RISSO, 1826

**Niso brunnea** (SOWERBY), 1834

Pl. X (V), Fig. 28.

*Niso brunnea*. SOWERBY, Thes. Conch., Vol. 2, p. 801, Pl. 170, fig. 3, 1855: REEVE, Conch. Icon., Vol. 15, Pl. 1, fig. 9, 1866: DUNKER, Ind. Moll. Mar. Jap., p. 90, 1882: TRYON, Man. Conch., 1 Ser., Vol. 8, p. 288, Pl. 71, fig. 25, 1886: PILSBRY, Cat. Mar. Moll. Jap., p. 79, 1895.

1) FISCHER: Paläont. von Timor, Vol. 15, p. 51, Pl. 212, fig. 17, 1927.

Two well preserved specimens. A specimen measures 11.5 mm. in height, and 5 mm. in diameter; it still posses the original color markings, though faint. *N. interrupta* of YOKOYAMA<sup>1)</sup> (non SOWERBY) may perhaps belong to a certain varietal form of the present species; SOWERBY's type originally described was from Central America.

Type locality: China; Recent.

Fossil occurrence: Byôritu Beds.—550 m. SE. of Zyô-tûsyôwan: station 16; Reg. No. 53760. 1000 m. E. of Hakusyatou: station 20; Reg. No. 53761.

Living: Kyûsyû. China.

### Family Pyramidellidae

#### Genus *Pyramidella* LAMARCK, 1799

##### Subgenus *Pyramidella*, s. s.

#### *Pyramidella* (*Pyramidella*) *teres* (A. ADAMS), 1855

Pl. X (V), Fig. 27.

*Pyramidella teres*. TESCH, Paläont. von Timor, Vol. 8, p. 63, Pl. 82, fig. 196, 1920.

*Obeliscus teres*. SOWERBY, Thes. Conch., Vol. 2, p. 807, Pl. 171, figs. 31, 32, 1855.

*Pyramidella sulcata*. REEVE, Conch. Icon., Vol. 15, Pl. 2, fig. 12, 1865: TRYON, Man. Conch., 1 Ser., Vol. 8, p. 301, Pl. 72, figs. 79-83, 1886: SUGITANI, Cat. Luchu Shells, p. 33, 1926.

*Pyramidella (Longchaeus) sulcata*. YOKOYAMA, Cat. Mar. Fresh-W. and Land Shells Jap., Min. Mus. Imp. Geol. Surv. Jap., p. 52, 1931.

*Pyramidella (Longchaeus) sulcata*. PILSBRY, Cat. Mar. Moll. Jap., p. 80, 1895.

*Longchaeus sulcata*. KURODA, Cat. Shell-bearing Moll. Amami-Ôsima, p. 79, No. 1024, 1928.

*Obeliscus sulcatus*. SOWERBY, Thes. Conch., Vol. 2, p. 807, Pl. 171, fig. 34, 1855.

A single specimen lacking its apex and outer lip. It is quite identical with figure 70 in TRYON's work, cited above, under the name of *P. prattii* BERNARDI which he considered to be a synonym.

Type localiy: Tropical Pacific; Recent.

Fossil occurrence: Byôritu Beds.—700 m. SW. of Kôkwan: station 23; Reg. No. 53796.

Living: Southern Kyûsyû and Ryûkyû. Pacific and Indian Oceans. Australia.

Geologic distribution: Post-Pliocene of Celebes; Pliocene of Timor.

##### Subgenus *Pharcidella* DALL, 1889

#### *Pyramidella* (*Pharcidella* ?) species indet.

A single small, slender specimen, 5 whorls preserved. Whorls nearly straight in lateral view, separated by well impressed sutures; surface marked by obsolete axial ribs as in some species of *Turbonilla*. It is perhaps a new species, but since its upper whorls as well as the aperture are fractured naming is left until better specimens are obtained. Preserved portion measures: height, 4 mm., diameter, 1.5 mm.

Fossil occurrence: Byôritu Beds.—The upper course of Sairyôkyô; Reg. No. 53984.

1) YOKOYAMA: Jour. Fac. Sci. Imp. Univ. Tôkyô, Sec. 2, Vol. 1, Pt. 9, p. 367, Pl. 42, fig. 5, 1926.

**"Pyramidella" longicostifera, n. sp.**

Pl. X (V), Figs. 41a, 41b.

Shell small, slender. Post-nuclear whorls many, flattened, distinctly shouldered at summit. Sculpture of longitudinal oblique ribs, 22 on each whorl. Interspaces nearly two times wider than ribs, with two revolving series of punctate grooves, the upper situated slightly above the middle, the lower close to lower suture and almost disappear in upper whorls. Periphery rounded, passing gradually into convex, smooth base. Aperture narrow, rather irregularly angular; outer lip thin, transversely lirate within; columella with two distinct oblique folds, of which the lower is slightly smaller, and more oblique than the upper. An imperfect specimen lacking its apical whorls was examined. The preserved portion consists of 7 whorls, 7 mm. in length, and 2.6 mm. in diameter.

The longitudinal ribs and transverse punctate grooves are the characteristic features of this species. No allied species of *Pyramidella* have been reported from Japan and other Oriental regions; thus the generic reference is somewhat questionable.

Fossil occurrence: Byôritu Beds.—1200 m. E. of Zyô-tûsyôwan: station 36; Reg. No. 53986.

Genus **Turbonilla** RISSO, 1826Subgenus **Pyrgisculus** MONTEROSATO, 1884**Turbonilla (Pyrgisculus) hanzawai, n. sp.**

Pl. X (V), Figs. 32, 33.

Shell small, elongate conic; test thin. Nuclear whorls decollated or much worn. Post-nuclear whorls 5, distinctly sloping, shouldered above, gently convex below, marked by narrow, oblique axial ribs, of which about 30 occur upon last whorl, and 25 on penultimate whorl. Intercoastal spaces generally much wider than ribs themselves, but sometimes they are nearly equal; these are crossed by subequal, rather regularly spaced raised threads numbering about 7, both on penultimate whorl and one above it. Periphery of last whorl well rounded, and passes gradually into base. Base convex, rather elongated, ornamented by a few, very fine spiral threads as well as the continuation of axial ribs, the latter are partly obsoleted. Aperture oval, slightly effuse anteriorly; posterior angle rather acute; outer lip thin and smooth within; columella slender and curved with indistinct fold; parietal wall covered with a thin callous deposit leaving a narrow umbilicus behind.

Below are some of the measurements (in mm.):

	1	2	3	4	5
Height .....	ca. 6.0	5.2	4.5	4.3	3.0
Diameter .....	2.2	2.0	2.0	2.3	1.3

This species somewhat resembles *T. (Pyrgisculus) candidissima* DALL and BARTSCH<sup>1)</sup> from Japan, from which, however, it differs in possession of fewer whorls and in the greater number of axial ribs which are oblique to the right.

Fossil occurrence: Byôritu Beds.—The upper course of Sairyôkyô; Reg. No. 53979.

1) DALL and BARTSCH: Proc. U.S. Nat. Mus., Vol. 30, p. 342, Pl. 17, fig. 3, 1906.

Subgenus *Turbonilla* s. s.***Turbonilla (Turbonilla) bosihoensis*, n. sp.**

Pl. X (V), Figs. 37a, 37b.

Shell small, regularly conic; test rather solid. Nuclear whorls standing obliquely on edge at summit. Post-nuclear whorls 6, flattened or a little convex with 18 strong vertical axial ribs on body-whorl, separated by much narrower interspaces. Suture well marked, impressed. Periphery subangulate, base rounded, without basal threads or axial ribs. Aperture small, subovate in outline, Columella fractured at its lower portion.

A single specimen; height, 5 mm., diameter, 2 mm.

This species somewhat resembles *T. (Chemnitzia) sematana* YOKOYAMA<sup>1)</sup> from the Upper Musasino Formation of Kadusa, but differs from the latter in that the shell is flatter.

*T. (Chemnitzia) acosmia* DALL and BARTSCH<sup>2)</sup> from Japanese waters, is larger in size with a greater number of axial ribs, and has less rapidly enlarging whorls.

Fossil occurrence: Byôritu Beds.—S. of Bôsiho: station 7; Reg. No. 37555.

***Turbonilla (Turbonilla) byorituana*, n. sp.**

Pl. X (V), Figs. 36a, 36b.

Shell small, narrow and slender. Nuclear whorls rather large, high, helicoid, axis perpendicular to succeeding whorls. Post-nuclear whorls 8, flattened above, rounded at middle, separated by impressed sutures. Surface axially ribbed. Ribs rather strong, rounded, almost vertical or very slightly flexuous, 12 on body-whorl; interspaces nearly equal to ribs themselves in breadth, smooth. Periphery subangulate by obsolete carina. Base flat, smooth, having neither longitudinal ribs nor basal threads. Aperture small, ovately subquadangular. Columella with an indistinct fold at its insertion.

One specimen; height, 4.8 mm., diameter, 1 mm.

This species somewhat resembles *T. (Chemnitzia) dunkeri* CLESSIN figured by DALL and BARTSCH,<sup>3)</sup> but is easily distinguished from that species by having much fewer axial ribs.

Fossil occurrence: Byôritu Beds.—On road S. of Bôsiho; Reg. No. 37563.

Subgenus *Strioturbonilla* SACCO, 1892***Turbonilla (Strioturbonilla ?)* species indet.**

An elongate, small, imperfect specimen having rounded whorls. Surface marked by longitudinal ribs (about 15) crossed by rather coarse spiral threads; it is related to a certain species of *Strioturbonilla*. Preserved whorls are only three.

Fossil occurrence: Byôritu Beds.—Wangwa: station 18; Reg. No. 53985.

1) YOKOYAMA: Jour. Coll. Sci. Imp. Univ. Tôkyô, Vol. 44, Art. 1, p. 103, Pl. 4, fig. 41, 1922.

2) DALL and BARTSCH: Proc. U. S. Nat. Mus., Vol. 30, p. 339, Pl. 20, fig. 4, 1906.

3) DALL and BARTSCH: *ibid.*, p. 336, Pl. 20, fig. 3, 1906.

Genus *Odostomia* FLEMING, 1828

Subgenus *Odostomia* s. s.

*Odostomia (Odostomia) limpida* DALL and BARTSCH, 1906

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

Three specimens. Shell small, slender, elongate-conic in form with 5, almost flat post-nuclear whorls. Surface smooth and shining; sutures well impressed. Periphery of last whorl rather markedly angulate and passes into slightly convex base.

What Dr. YOKOYAMA figured as *O. limpida* from the Upper Musasino Formation of Simôsa<sup>1)</sup> differs from the type figure given by the above authors in having broader whorls with a less distinct peripheral angle. Height, 4.8 mm., diameter, 1.6 mm.

Type locality: Japan; Recent.

Fossil occurrence: Byôritu Beds.—700 m. E. of Hakusyatou: station 3; Reg. No. 53980. Wangwa: station 14; Reg. No. 53981. Wangwa: station 21; Reg. No. 53982.

Living: Central Honsyû to Kyûsyû.

Geologic distribution: Pleistocene of Honsyû.

*Odostomia (Odostomia) venustaeformis*, n. sp.

Pl. X (V), Figs. 49a, 49b.

Shell resembling *O. venusta* YOKOYAMA in general features, small, elongate-conic, smooth and shining; test thin. Spire conical, rather short, about half the length of body-whorl. Nuclear whorls at least two in number, somewhat planorboid, about half a revolution immersed, axis almost at right angles to post-nuclear whorls. Post-nuclear whorls 5, moderately convex, strongly shouldered at summit, area above shoulder very narrow. Suture well impressed. Periphery of last whorl rounded; base evenly convex. Aperture moderately large, longly oval in shape, acute behind, produced and rounded in front; outer lip evenly thin, broadly arcuate; columella strongly curved, provided with a strong fold at its insertion. Surface perfectly smooth except for fine growth lines which can be seen under a lens.

A single specimen; height, 4 mm., diameter, 1.8 mm.

This species differs from *O. venusta* YOKOYAMA<sup>2)</sup> in the columellar fold being weaker and situated higher from the base of aperture.

Fossil occurrence: Byôritu Beds.—950 m. SW. of Taikwa: station 10; Reg. No. 53983.

1) YOKOYAMA: Jour. Coll. Sci. Imp. Univ. Tôkyô, Vol. 44, Art. 1, p. 96, Pl. 41, fig. 1, 1922.

2) YOKOYAMA: *ibid.*, p. 97, Pl. 4, fig. 30, 1922.

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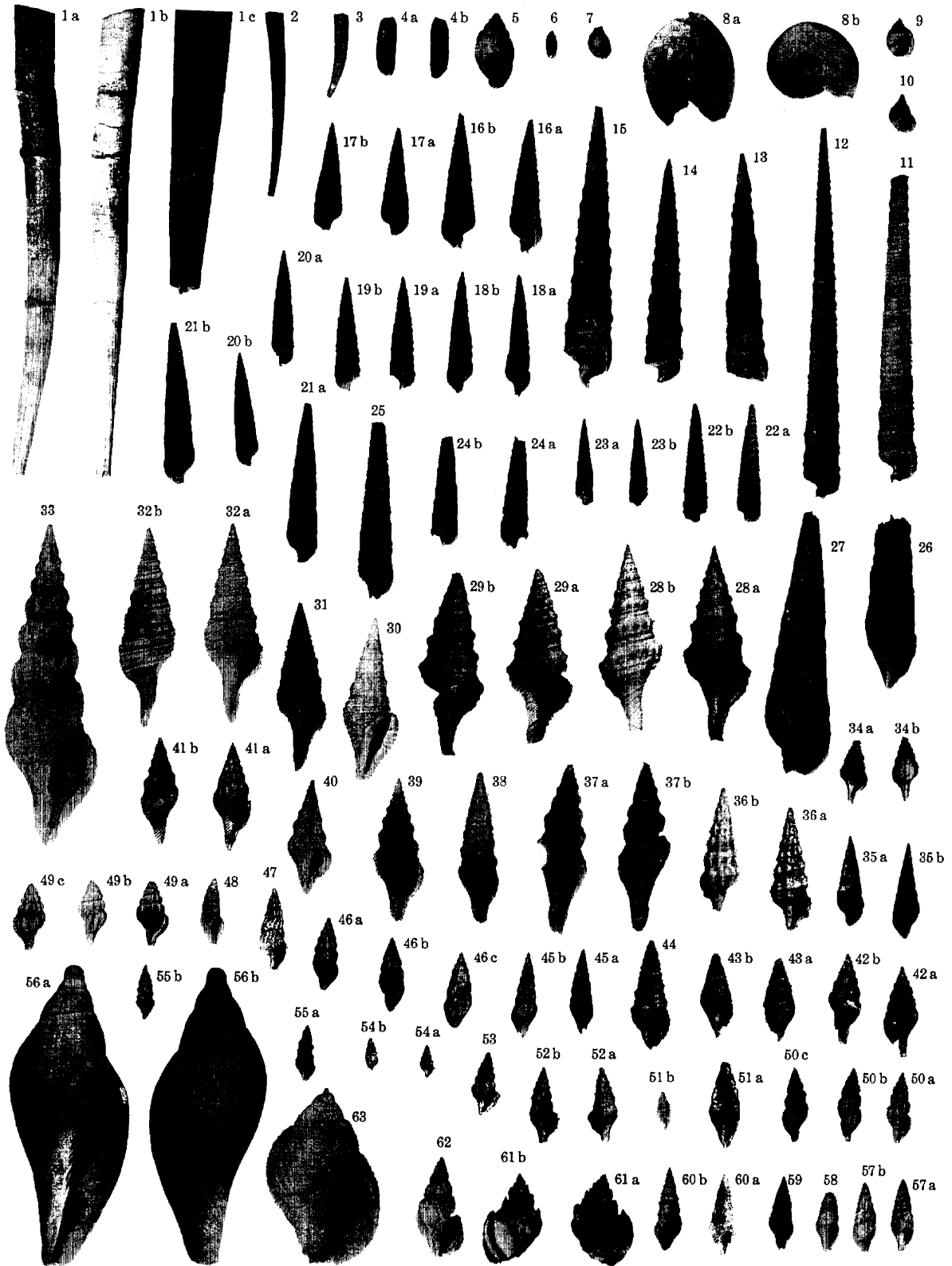
## PLATE VI (I)

All figures in natural size, unless otherwise stated.

- Figs. 1a, b, c. *Dentalium (Fissidentalium) byorituense* n. sp., holotype, from Wangwa; station 8 (ANDÔ)<sup>1)</sup>; Byôritu Beds. Fig. 1a, side view; fig. 1b, ventral view; fig. 1c, dorsal view showing apical slit, × 2.
- Fig. 2. *Dentalium (Rhabdus) philippinarum* SOWERBY, from Wangwa, station 15 (ANDÔ); Byôritu Beds. × 2.
- Fig. 3. *Cadulus wangwaensis* n. sp., holotype, from Wangwa, station 18 (ANDÔ); Byôritu Beds. × 2.
- Figs. 4a, b. *Cylichna koryusyoensis* n. sp., from Wangwa, station 23 (ANDÔ); Byôritu Beds. × 2.
- Fig. 5. *Acteon siebaldi* (REEVE), from 700 m. NE. of Nanseizan, station 19 (ANDÔ); Byôritu Beds. × 2.
- Fig. 6. *Acteocina fusiformis* (A. ADAMS), from Wangwa, station 18 (ANDÔ); Byôritu Beds. × ca. 2.
- Fig. 7. *Retusa (Pyrunculus) pyriformis* (A. ADAMS), from Nanseizan, station 11 (ANDÔ); Byôritu Beds. × 2.
- Figs. 8a, b. *Hydatina physis* (LINNAEUS), from Sikô; Byôritu Beds.
- Fig. 9. *Ringicula arctata* GOULD, from 900 m. NW. of Keiyukwa, station 33 (ANDÔ); Byôritu Beds. × 2.
- Fig. 10. *Ringicula caron* HINDS, from 400 m. SE. of Zyô-tûsyôwan, station 13 (ANDÔ); Byôritu Beds. × 2.
- Figs. 11, 12. *Terebra triseriata* GRAY, from Sikô; Byôritu Beds.
- Figs. 13, 14. *Terebra cumingii* DESHAYES, from 1000 m. E. of Hakusyaton, station 25 (ANDÔ); Byôritu Beds.
- Fig. 15. *Terebra cumingii* DESHAYES, from Wangwa, station 14 (ANDÔ); Byôritu Beds.
- Figs. 16a, b. *Terebra t-makiyamai* n. sp., holotype, from 1450 m. W. of Hokkô, station 14 (ANDÔ); Byôritu Beds.
- Figs. 17a, b. *Terebra t-makiyamai* n. sp., paratype, from 1520 m. E. of Sinpo, station 68 (ANDÔ); Byôritu Beds.
- Figs. 18a, b. *Terebra reticostaeformis* n. sp., holotype, from 900 m. W. of Rinsuikwa, station 6 (ANDÔ); Byôritu Beds.
- Figs. 19a, b. *Terebra reticostaeformis* n. sp., paratype, from the same locality as those shown in figs. 18a, b; Byôritu Beds.
- Figs. 20a, b. *Terebra orthocostulata* n. sp., holotype, from 700 m. E. of Hakusyaton, station 3 (ANDÔ); Byôritu Beds.
- Figs. 21a, b. *Terebra orthocostulata* n. sp., paratype, from 500 m. E. of Zyô-tûsyôwan, station 14 (ANDÔ); Byôritu Beds.
- Figs. 22a, b. *Terebra pereoa* n. sp., holotype, from 700 m. E. of Hakusyaton, station 3 (ANDÔ); Byôritu Beds.
- Figs. 23a, b. *Terebra pereoa* n. sp., paratype, from the same locality as those shown in figs. 22a, b; Byôritu Beds.
- Figs. 24a, b. *Terebra prototextilis* n. sp., from Wangwa, station 15 (ANDÔ); Byôritu Beds.
- Fig. 25. *Terebra torquata* ADAMS and REEVE, from 800 m. NE. of Hakusyaton, station 12 (ANDÔ); Byôritu Beds.
- Fig. 26. *Terebra evoluta* DESHAYES, from 510 m. SE. of Zyô-tûsyôwan, station 15 (ANDÔ); Byôritu Beds.
- Fig. 27. *Terebra dussumieri* KIENER, from Wangwa, station 40 (ANDÔ); Byôritu Beds.
- Figs. 28a, b. *Turricula byorituensis* n. sp., holotype, from Sikô; Byôritu Beds.
- Figs. 29a, b. *Turricula byorituensis* n. sp., paratype, from Sikô; Byôritu Beds.
- Fig. 30. *Clavus (Brachytoma) suturalis* (GRAY), from S. of Sisitô; Raised Coral Reef.
- Fig. 31. *Turris (Turris) polytropa* (HELBLING), from Wangwa, station 24 (ANDÔ); Byôritu Beds.
- Figs. 32a, b. *Turris (Turris) tigrinaeformis* n. sp., from 300 m. E. of Sankwakô; station 39 (ANDÔ); Byôritu Beds.

1) Name of collector at the particular locality.

- Fig. 33. *Clavus (Brachytoma) flavidulus* (LAMARCK), from Sikô; Byôritu Beds.
- Figs. 34a, b. *Clavus (Brachytoma) turriculoides* n. sp., holotype, from 1200 m. E. of Zyô-tûsyôwan, station 36 (ANDÔ); Byôritu Beds.
- Figs. 35a, b. *Astenostoma vertebrata* (SMITH), from 600 m. SE. of Zyô-tûsyôwan, station 17 (ANDÔ); Byôritu Beds.
- Figs. 36a, b. *Lienardia (Etrema) sintikuensis* n. sp., holotype, from 700 m. E. of Hakusyaton, station 3 (ANDÔ); Byôritu Beds. × 2.
- Figs. 37a, b. *Turricula wangwaensis* n. sp., from Wangwa, station 24 (ANDÔ); Byôritu Beds.
- Fig. 38. *Clavus (Brachytoma) pseudoprincipalis* (YOKOYAMA), from Wangwa, station 24 (ANDÔ); Byôritu Beds.
- Fig. 39. *Clavus (Brachytoma) nodiliratus* (SMITH), from 1450 m. W. of Hokkô, station 14 (ANDÔ); Byôritu Beds.
- Fig. 40. *Clavus (Clavus?) tijibaliungensis* (MARTIN), from Kozantyô, station 24 (ANDÔ); Byôritu Beds.
- Figs. 41a, b. *Clavus (Brachytoma) pernodiliratus* n. sp., holotype, from 1520 m. E. of Sinpo, station 16 (ANDÔ); Byôritu Beds.
- Figs. 42a, b. *Clavus (Brachytoma) pernodiliratus* n. sp., paratype, from Wangwa, station 6 (ANDÔ); Byôritu Beds.
- Figs. 43a, b. *Astenostoma perepionica* n. sp., holotype, from 1100 m. NE. of Hakusyaton, station 9 (ANDÔ); Byôritu Beds. × 2.
- Fig. 44. *Astenostoma epionica* (FISCHER), from 1000 m. E. of Hakusyaton, station 20 (ANDÔ); Byôritu Beds. × ca. 2.
- Figs. 45a, b. *Clavus (Clavus?) rinsuikwaensis* n. sp., holotype, from 900 m. NW. of Rinsuikwa, station 6 (ANDÔ); Byôritu Beds.
- Figs. 46a, b, c. *Clavus (Cymatosyrinx) pseudohumilis* n. sp., holotype, from Wangwa, station 35 (ANDÔ); Byôritu Beds.
- Fig. 47. *Clavus (Cymatosyrinx) pseudohumilis* n. sp., paratype (varietal form), from Nanseizan, station 48 (ANDÔ); Byôritu Beds.
- Fig. 48. *Clavus (Cymatosyrinx) pseudohumilis* n. sp., paratype (varietal form), from 700 m. E. of Naikotô, station 31 (ANDÔ); Byôritu Beds.
- Figs. 49a, b, c. *Clavus (Brachytoma) crassitestulatus* n. sp., holotype, from 400 m. SE. of Zyô-tûsyôwan, station 13 (ANDÔ); Byôritu Beds.
- Figs. 50a, b, c. *Daphnella subzonataeformis* n. sp., holotype, from Sikô; Byôritu Beds.
- Figs. 51a, b. *Mangelia (Mangelia) pyramis* (HINDS), from 900 m. NW. of Rinsuikwa, station 6 (ANDÔ); Byôritu Beds. Fig. 51a, × 2.
- Figs. 52a, b. *Lienardia (Lienardia) hayasakai* n. sp., holotype, from 400 m. SE. of Zyô-tûsyôwan, station 13 (ANDÔ); Byôritu Beds. × 2.
- Fig. 53. *Lienardia (Lienardia) gainesi* (PILSBRY), from 500 m. SE. of Zyô-tûsyôwan, station 14 (ANDÔ); Byôritu Beds. × 2.
- Figs. 54a, b. *Lienardia (Lienardia) keiyukwana* n. sp., holotype, from Keiyukwa, station 52 (ANDÔ); Byôritu Beds. × 2.
- Figs. 55a, b. "*Mangelia*" *bosikoensis* n. sp., holotype, from Bôsiho, station 7 (HANZAWA); Byôritu Beds. × 2.
- Figs. 56a, b. *Voluta sikoensis* n. sp., holotype, from Sikô; Byôritu Beds.
- Figs. 57a, b. *Clavus (Cymatosyrinx) hanzawai* n. sp., holotype, from Wangwa, station 18 (ANDÔ); Byôritu Beds. × 2.
- Figs. 58, 59. *Clavatula serana* FISCHER, from Keiyukwa, station 50 (ANDÔ); Byôritu Beds.
- Figs. 60a, b. *Clavatula taiwanensis* n. sp., holotype, from 1450 m. W. of Hokkô, station 14 (ANDÔ); Byôritu Beds.
- Figs. 61a, b. *Cancellaria (Trigonostoma) taiwanensis* n. sp., holotype, from Sikô; Byôritu Beds.
- Fig. 62. *Cancellaria (Cancellaria) macrospira* ADAMS and REEVE, from 900 m. SE. of Naikotô, station 66 (ANDÔ); Byôritu Beds.
- Fig. 63. *Cancellaria (Cancellaria) reeveana* CROSSE, from Wangwa, station 33 (ANDÔ); Byôritu Beds.

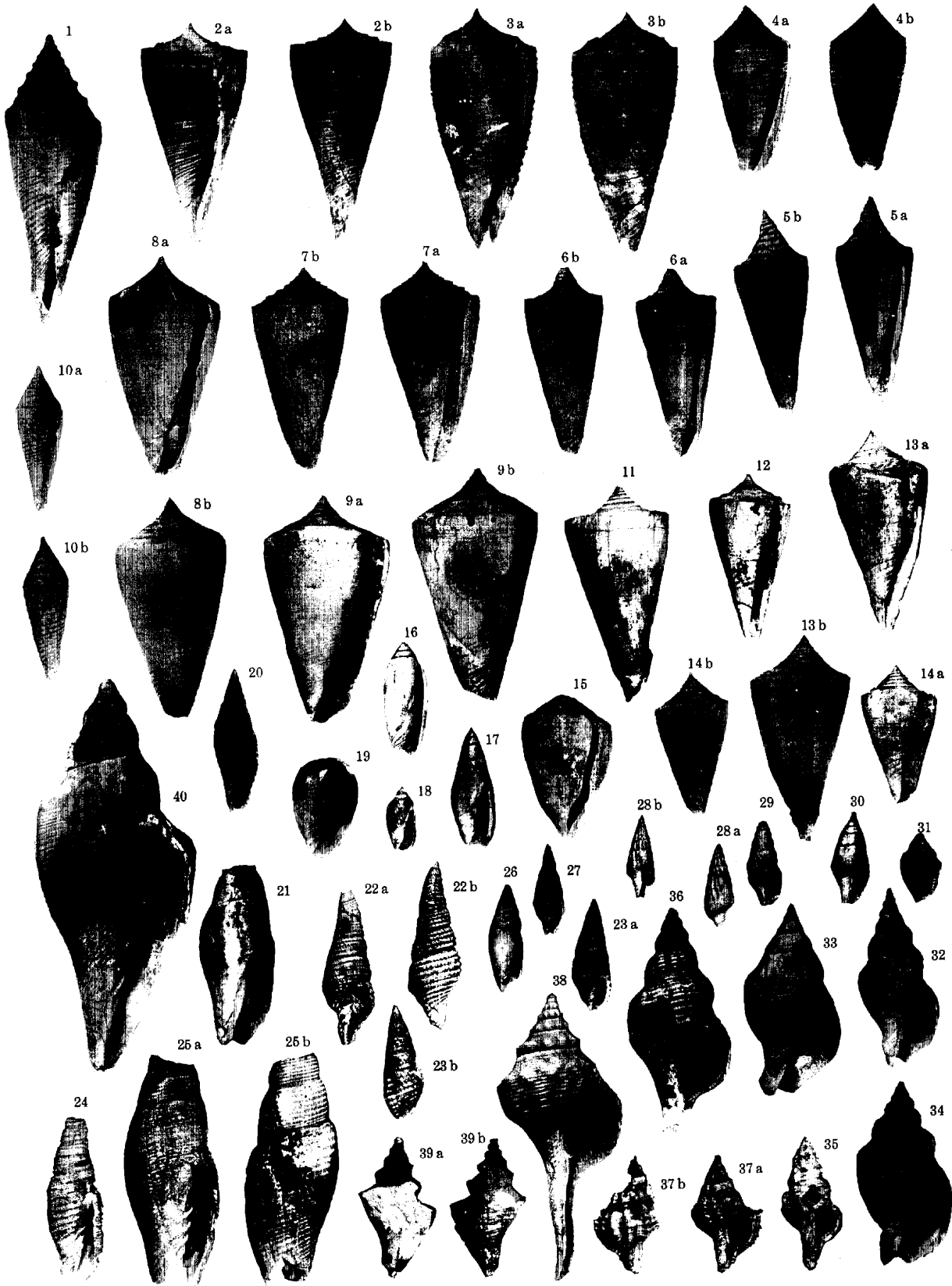


*Kumagai photo.*

PLATE VII (II)

All figures in natural size, unless otherwise stated.

- Fig. 1. *Conus d'orbignyi* (ANDOUIN), from Sikô; Byôritu Beds.
- Figs. 2a, b. *Conus significatus* n. sp., holotype, from Wangwa, station 24 (ANDÔ); Byôritu Beds.
- Figs. 3a, b. *Conus pseudosulcatus* n. sp., holotype, from Wangwa, station 34 (ANDÔ); Byôritu Beds.
- Figs. 4a, b. *Conus ornatissimus* MARTIN, from 1200 m. SE. of Sankwakô, station 60 (ANDÔ); Byôritu Beds.
- Figs. 5a, b. *Conus yabei* n. sp., holotype, from 400 m. SE. of Zyô-tûsyôwan, station 13 (ANDÔ); Byôritu Beds.
- Figs. 6a, b. *Conus yabei* n. sp., paratype, from the same locality as those shown in figs. 5 a, b; Byôritu Beds.
- Figs. 7a, b. *Conus bonus* n. sp., holotype, from Wangwa, station 24 (ANDÔ); Byôritu Beds.
- Figs. 8a, b, 9a, b. *Conus odengensis* MARTIN, from 400 m. SE. of Zyô-tûsyôwan, station 13 (ANDÔ); Byôritu Beds.
- Figs. 10a, b. *Conus aculeiformis* REEVE, from 510 m. SE. of Zyô-tûsyôwan, station 15 (ANDÔ); Byôritu Beds.
- Figs. 11, 12. *Conus ngavianus* MARTIN, from Wangwa, station 24 (ANDÔ); Byôritu Beds.
- Figs. 13a, b, 14a, b. *Conus djarianensis* MARTIN, from 400 m. SE. of Zyô-tûsyôwan, station 13 (ANDÔ); Byôritu Beds.
- Fig. 15. *Conus coronatus* GMELIN, from S. of Sisitô; Raised Coral Reef.
- Fig. 16. *Oliva ispidula* (LINNAEUS), from S. of Sisitô; Raised Coral Reef.
- Fig. 17. *Olivella pulicaria* (MARRATT), from 700 m. E. of Hakusyaton, station 3 (ANDÔ); Byôritu Beds. × 2.
- Fig. 18. *Olivella spretoides* YOKOYAMA, from 900 m. NW. of Keiyukwa, station 33 (ANDÔ); Byôritu Beds. × 2.
- Fig. 19. *Persicula bernardii* (LARGILLIER), from 300 m. E. of Sankwakô, station 39 (ANDÔ); Byôritu Beds.
- Fig. 20. *Mitra (Cancilla) flammea* QUOY, from Sikô; Byôritu Beds.
- Fig. 21. *Mitra (Chrysame) rutila* A. ADAMS, from Tyû-tûsyôwan, station 48 (ANDÔ); Byôritu Beds.
- Figs. 22a, b. *Mitra (Cancilla) astenostomoides* n. sp., holotype, from 940 m. NE. of Keiyukwa, station 55 (ANDÔ); Byôritu Beds. × 2.
- Figs. 23a, b. *Mitra (Cancilla) astenostomoides* n. sp., paratype, from 510 m. SE. of Zyô-tûsyôwan, station 15 (ANDÔ); Byôritu Beds. × 2.
- Fig. 24. *Mitra (Cancilla) filaris* (LINNAEUS), from S. of Sisitô; Raised Coral Reef.
- Fig. 25a, b. *Mitra (Scabricola) yokoyamai* n. sp., holotype, from Wangwa, station 33 (ANDÔ); Byôritu Beds.
- Fig. 26. *Mitra (Cancilla) pruinoso* REEVE, from 700 m. SW. of Kôkwan, station 23 (ANDÔ); Byôritu Beds.
- Fig. 27. *Vexillum (Pusia) obeliscum* (REEVE), from 700 m. SW. of Kôkwan, station 23 (ANDÔ); Byôritu Beds. × 2.
- Figs. 28a, b. *Pyrene (Mitrella) yabei* n. sp., from 700 m. E. of Hakusyaton, station 3 (ANDÔ); Byôritu Beds. × 2.
- Fig. 29. *Pyrene (Mitrella) niveomarginata* (SMITH), from 500 m. SE. of Zyô-tûsyôwan; station 14 (ANDÔ); Byôritu Beds. × 2.
- Fig. 30. *Pyrene (Mitrella?) baculus* (REEVE), from Sikô; Byôritu Beds.
- Fig. 31. *Columbella (Euplica) versicolor* SOWERBY, from Sikô; Byôritu Beds.
- Fig. 32. *Siphonalia spadicea* (REEVE), from Sikô; Byôritu Beds.
- Fig. 33. *Siphonalia shearnsi* PILSBRY, from Wangwa, station 6 (ANDÔ); Byôritu Beds.
- Fig. 34. *Siphonalia cassidariaeformis* (REEVE), from 1100 m. SW. of Taikwa, station 11 (ANDÔ); Byôritu Beds.
- Fig. 35. "*Latirus*" *minutisquamosus* (REEVE), from 1200 m. E. of Zyô-tûsyôwan, station 36 (ANDÔ); Byôritu Beds. × 2.
- Fig. 36. *Hemifusus pastinaca* (REEVE), from Wangwa, station 15 (ANDÔ); Byôritu Beds. Lower part of the canal broken.
- Figs. 37a, b. *Nassaria monospina* n. sp., holotype, from 400 m. SE. of Zyô-tûsyôwan, station 13 (ANDÔ); Byôritu Beds. × 2.
- Fig. 38. *Tudicla cumingii* (JONAS), from Sikô; Byôritu Beds.
- Figs. 39a, b. *Hemifusus protolacteus* n. sp., holotype, from 900 m. SE. of Naikotô, station 66 (ANDÔ); Byôritu Beds.
- Fig. 40. *Fulgolaria rupestris* (GMELIN), from 700 m. E. of Hakusyaton, station 3 (ANDÔ); Byôritu Beds.

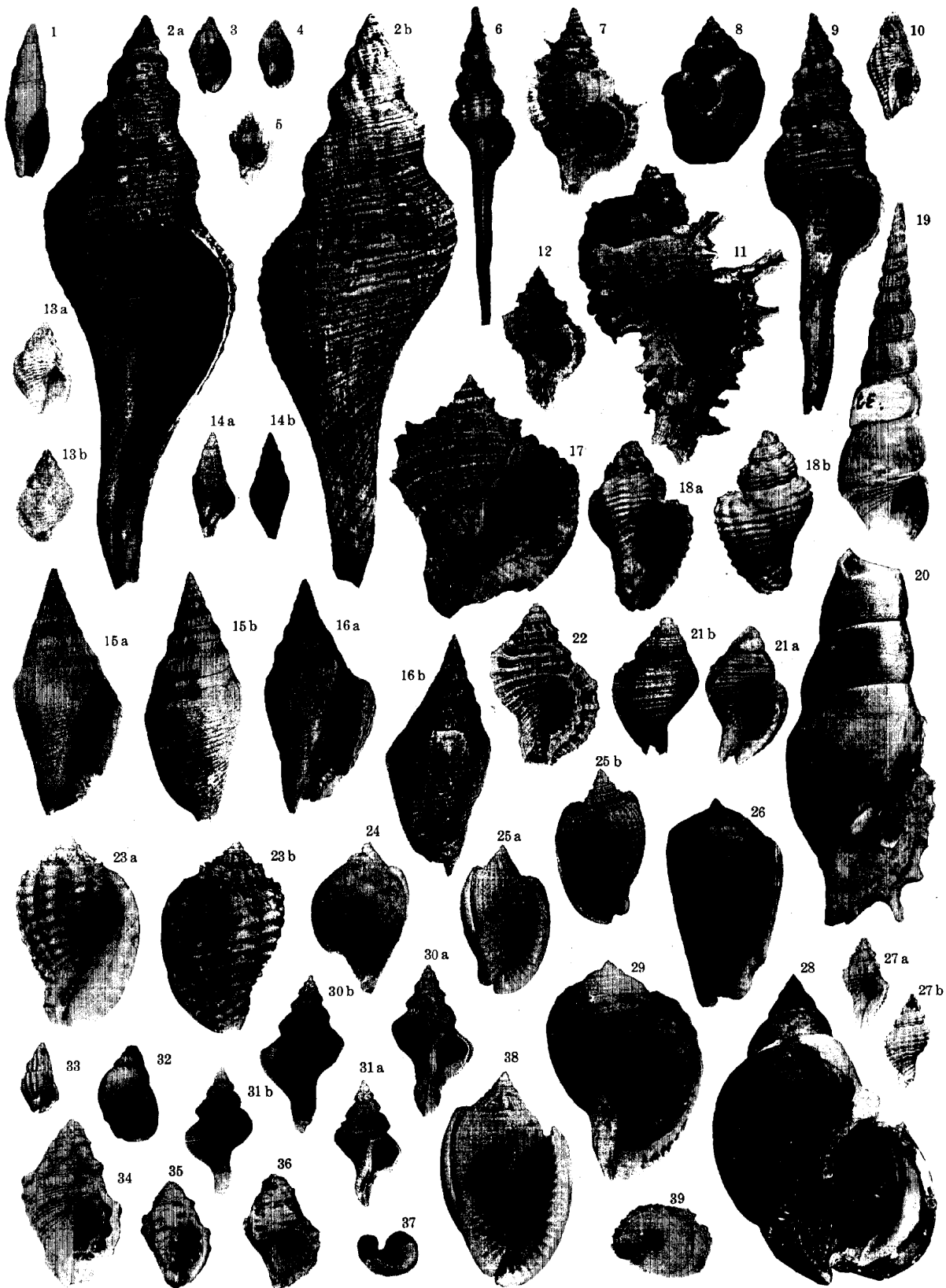


Kumagai photo.

## PLATE VIII (III)

All figures in natural size, unless otherwise stated.

- Fig. 1. *Metula mitrella* ADAMS and REEVE, from Sikô; Byôritu Beds.
- Figs. 2a, b. *Fusinus laticanaliculatus* n. sp., holotype, from Sikô; Byôritu Beds.
- Fig. 3. *Cyllene lugubris* ADAMS and REEVE, from Wangwa, station 6 (ANDÔ); Byôritu Beds.
- Fig. 4. *Cyllene pulchella* ADAMS and REEVE, from Wangwa, station 6 (ANDÔ); Byôritu Beds.
- Fig. 5. *Typhis duplicatus* SOWERBY, from Wangwa, station 23 (ANDÔ); Byôritu Beds.
- Fig. 6. *Fusinus gracillimus* (ADAMS and REEVE), from Sikô; Byôritu Beds.
- Fig. 7. *Murex (Murex) rarispina* LAMARCK, from Wangwa, station 14 (ANDÔ); Byôritu Beds. Lower part of the canal broken.
- Fig. 8. *Latrunculus canaliculatus* (SCHUMACHER), from Sikô; Byôritu Beds.
- Fig. 9. *Fusinus nodosoplicatus* (DUNKER), from Wangwa, station 19 (ANDÔ); Byôritu Beds.
- Fig. 10. *Pollia obliquicostata* (REEVE), from Wangwa, station 14 (ANDÔ); Byôritu Beds. × 2.
- Fig. 11. *Murex (Chicoreus) sinensis* REEVE, from Wangwa, station 14 (ANDÔ); Byôritu Beds.
- Fig. 12. *Lataxiena fimbriata* (HINDS), from Wangwa, station 10 (ANDÔ); Byôritu Beds.
- Figs. 13a, b. *Coralliophila pilsbryi* n. sp., holotype, from Bôsiho, station 13 (ANDÔ); Byôritu Beds.
- Figs. 14a, b. *Strombus bivaricosus* n. sp., holotype, from 1000 m. SE. of Hakusyaton, station 32 (ANDÔ); Byôritu Beds.
- Figs. 15a, b. *Strombus taiwanicus* n. sp., holotype, from 1000 m. E. of Hakusyaton, station 20 (ANDÔ); Byôritu Beds.
- Figs. 16a, b. *Strombus taiwanicus* n. sp., paratype, from the same locality as those shown in figs. 15a, b; Byôritu Beds.
- Fig. 17. *Rapana bezoar* (LINNAEUS), from 550 m. SE. of Zyô-tûsyôwan, station 16 (ANDÔ); Byôritu Beds.
- Figs. 18a, b. *Cantharus wangwaensis* n. sp., holotype, from Wangwa, station 19 (ANDÔ); Byôritu Beds.
- Fig. 19. *Tibia fusus* (LINNAEUS), from E. of Goko, station 20 (ANDÔ); Byôritu Beds.
- Fig. 20. *Tibia fusus* (LINNAEUS), from Keiyukwa, station 50 (ANDÔ); Byôritu Beds.
- Figs. 21a, b. *Cymatium andoi* n. sp., holotype, from Wangwa, station 14 (ANDÔ); Byôritu Beds.
- Fig. 22. *Cymatium sinense* (REEVE), from 400 m. SE. of Zyô-tûsyôwan, station 13 (ANDÔ); Byôritu Beds. Lower part of the canal broken.
- Figs. 23a, b. *Morum subcancellatum* n. sp., holotype, from Sikô; Byôritu Beds.
- Figs. 24. *Phalium (Phalium) decussatum* (LINNAEUS), from Wangwa, station 39 (ANDÔ); Byôritu Beds.
- Fig. 25. *Phalium (Phalium) cancellianum* n. sp., holotype, from Wangwa, station 15 (ANDÔ); Byôritu Beds.
- Fig. 26. *Strombus lukuanus* LINNAEUS, from Sikô; Byôritu Beds.
- Figs. 27a, b. *Lataxiena luliana* (MARTIN), from Wangwa, station 10 (ANDÔ); Byôritu Beds.
- Fig. 28. *Latrunculus lamarcki* n. sp., holotype, from Wangwa, station 24 (ANDÔ); Byôritu Beds.
- Fig. 29. *Tonna zonata* (GREEN), from Sikô; Byôritu Beds.
- Figs. 30a, b. *Lataxis yabei* n. sp., holotype, from E. of Goko, station 8 (HANZAWA); Byôritu Beds.
- Figs. 31a, b. *Lataxis yabei* n. sp., paratype, from the same locality as those shown in figs. 30a, b; Byôritu Beds.
- Fig. 32. *Nassarius (Alectrion) pictus* (DUNKER), from Sikô; Byôritu Beds.
- Fig. 33. *Nassarius (Hinia) exmius* (H. and A. ADAMS), from Wangwa, station 23 (ANDÔ); Byôritu Beds.
- Fig. 34. *Thais luteostoma* (DILLWYN), from Wangwa, station 31 (ANDÔ); Byôritu Beds.
- Fig. 35. *Thais problematica* (BAKER), from Wangwa, station 5 (ANDÔ); Byôritu Beds.
- Fig. 36. *Cymatium vespaceum* (LAMARCK), from 900 m. SE. of Naikotô, station 66 (ANDÔ); Byôritu Beds.
- Fig. 37. *Siliquaria cumingii* MÖRCH, from Wangwa, station 11 (ANDÔ); Byôritu Beds.
- Fig. 38. *Phalium (Phalium) areolum* (LINNAEUS), from Bôsiho, station 13 (ANDÔ); Byôritu Beds.
- Fig. 39. *Lemintina javana* (MARTIN), from Wangwa, station 19 (ANDÔ); Byôritu Beds.



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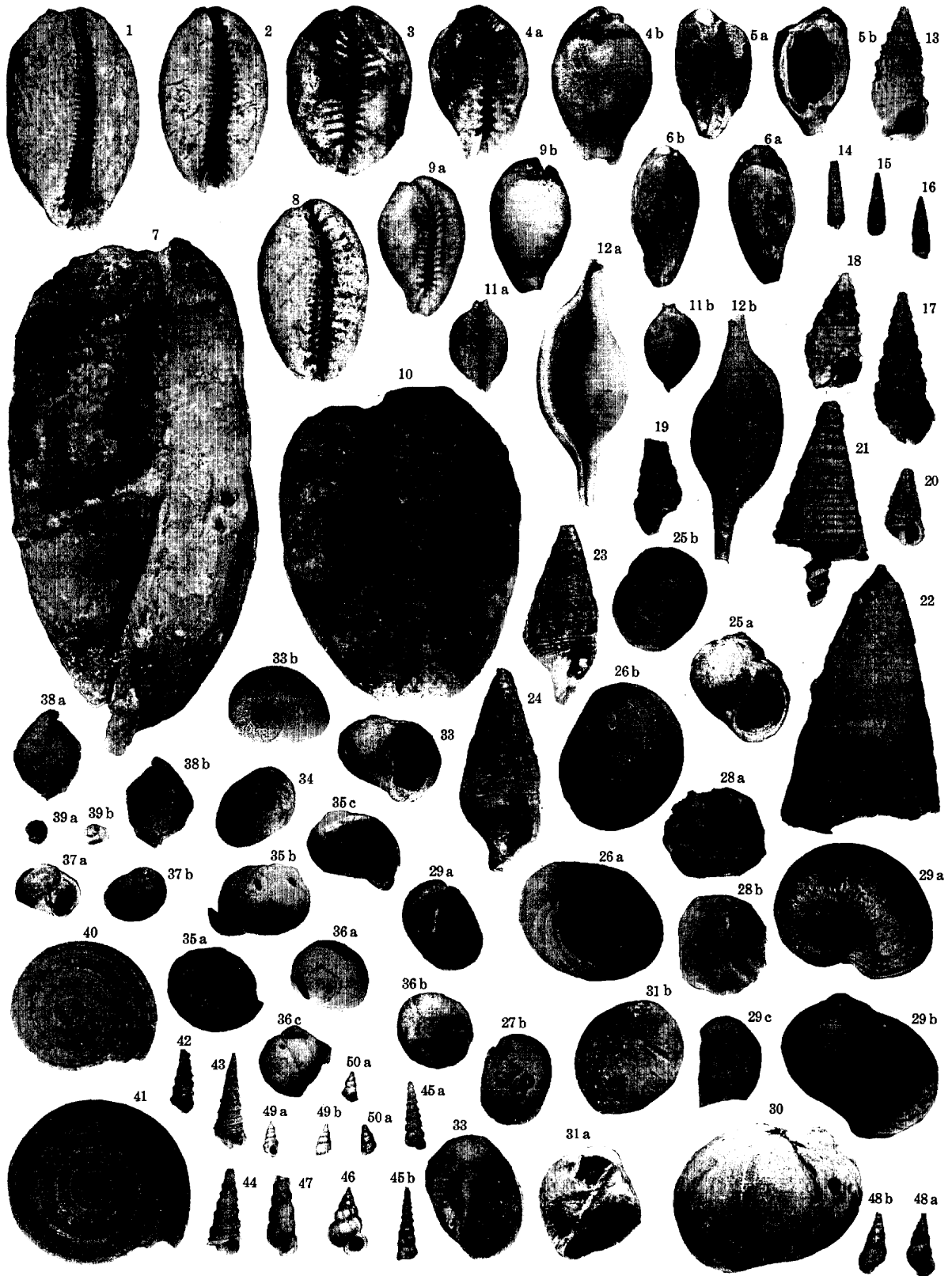
## PLATE IX (IV)

All figures in natural size, unless otherwise stated.

- Fig. 1. *Cypraea talpa* LINNAEUS, from Kontei; Raised Coral Reef.
- Fig. 2. *Cypraea arabica* LINNAEUS, from Kontei; Raised Coral Reef.
- Fig. 3. *Cypraea caput-serpentis* LINNAEUS, from Kontei; Raised Coral Reef.
- Fig. 4. *Cypraea miliaris* GMELIN, from Kotobuki-yama; Ryûkyû Limestone.
- Figs. 5a, b, 6a, b. *Cypraea cincta* MARTIN, from Rokuzyûkei; Byôritu Beds.
- Fig. 7. *Cypraea testudinaria* LINNAEUS, from Hanpeizan; Ryûkyû Limestone.
- Fig. 8. *Cypraea caurica* LINNAEUS, from Kotobuki-yama; Ryûkyû Limestone.
- Figs. 9a, b. *Cypraea onyx* LINNAEUS, from Wangwa, station 24 (ANDÔ); Byôritu Beds.
- Fig. 10. *Cypraea mappa* LINNAEUS, from Kotobuki-yama; Ryûkyû Limestone.
- Figs. 11a, b. *Pustularia cicercula* (LINNAEUS), from S. of Sisitô; Raised Coral Reef.
- Figs. 12a, b. *Volva volva* (LINNAEUS), from Sikô; Byôritu Beds.
- Fig. 13. *Cerithium sinense* (GMELIN), from S. of Sisitô; Raised Coral Reef.
- Fig. 14. *Triphora (Viriola) corrugata* (HINDS), from Wangwa, station 23 (ANDÔ); Byôritu Beds. × 2.
- Figs. 15, 16. *Bittium alutaceum* (GOULD), from Wangwa, station 40 (ANDÔ); Byôritu Beds. × 2.
- Fig. 17. *Batillaria zonalis* (BRUGUIÈRE), from Sikô; Byôritu Beds.
- Fig. 18. *Gourmya carbonaria* (PHILIPPI), from Wangwa, station 31 (ANDÔ); Byôritu Beds.
- Figs. 19, 20. *Gourmya coralia* (KIENER), from S. of Sisitô; Raised Coral Reef.
- Fig. 21. *Telescopium telescopium* (LINNAEUS), from Kityô, station 52 (TORII); Byôritu Beds.
- Fig. 22. *Telescopium telescopium* (LINNAEUS), from Sanzyûkei, station 47 (TORII); Byôritu Beds.
- Fig. 23. *Terebralia sulcata* (BORN), from S. of Sisitô; Raised Coral Reef.
- Fig. 24. *Terebralia semitrisulcata* (BOLTEN), from Wanzaki, station 55 (TORII); Byôritu Beds.
- Figs. 25a, b. *Natica (Natica) zebra* LAMARCK, from Hakusyaton; station 1 (ANDÔ); Byôritu Beds.
- Figs. 26a, b. *Sinum neritoideum* (LINNAEUS), from Sikô; Byôritu Beds.
- Figs. 27a, b. *Eunaticina papilla* (GMELIN), from Sikô; Byôritu Beds.
- Figs. 28a, b. *Crepidula (Siphopatella) walshi* REEVE, from 700 m. E. of Hakusyaton, station 3 (ANDÔ); Byôritu Beds.
- Figs. 29a, b, c. 30. *Natica (Natica) rufa* BORN, from 1000 m. E. of Hakusyaton, station 25 (ANDÔ); Byôritu Beds.
- Figs. 31a, b. *Polinices (Polinices) mamilla* (LINNAEUS), from S. of Sisitô; Raised Coral Reef.
- Fig. 32. *Polinices (Polinices) melanostoma* (GMELIN), from Wangwa, station 11 (ANDÔ); Byôritu Beds. × 2.



- Figs. 33a, b. *Natica (Natica) vitellus* LINNAEUS, from 500 m. SE. of Zyô-tûsyôwan, station 14 (ANDÔ); Byôritu Beds.
- Fig. 34. *Polinices (Polinices?) filosus* (REEVE), from 700 m. NE. of Nanseizan, station 19 (ANDÔ); Byôritu Beds.
- Figs. 35a, b, c. *Natica (Tectonatica?) andoi* n. sp., holotype, from Wangwa, station 24 (ANDÔ); Byôritu Beds.
- Figs. 36a, b, c. *Natica (Tectonatica?) andoi* n. sp., paratype, from the same locality as those shown in figs. 35a, b, c; Byôritu Beds.
- Figs. 37a, b. *Natica (Natica) solida* BLAINVILLE, from E. of Goko, station 8 (ANDÔ); Byôritu Beds.
- Figs. 38a, b. *Hipponyx danieli* CROSSE, from Wangwa, station 6 (ANDÔ); Byôritu Beds.
- Figs. 39a, b. *Calyptraea taiwanensis* n. sp., holotype, from 500 m. E. of Sankwakô, station 41 (ANDÔ); Byôritu Beds.
- Fig. 40. *Architectonica maxima* (PHILIPPI), from 1000 m. E. of Zyô-tûsyôwan, station 59 (ANDÔ); Byôritu Beds.
- Fig. 41. *Architectonica perspectiva* (LINNAEUS), from Sikô; Byôritu Beds.
- Fig. 42. *Mathilda sinensis* FISCHER, from 700 m. SW. Kôkwan, station 23 (ANDÔ); Byôritu Beds.
- Fig. 43. *Turritella millepunctata* n. sp., holotype, from 1550 m. E. of Sinpo, station 69 (ANDÔ); Byôritu Beds.
- Fig. 44. *Turritella millepunctata* n. sp., paratype, from the same locality as that shown in fig. 43; Byôritu Beds.
- Figs. 45a, b. *Turritella kityoensis* n. sp., holotype, from Kityô; Byôritu Beds.
- Fig. 46. *Epitonium neglectum* (ADAMS and REEVE), from Sikô; Byôritu Beds.
- Fig. 47. *Melanoides tuberculata* (MÜLLER), from Wangwa, station 18 (ANDÔ); Byôritu Beds.
- Figs. 48a, b. *Rissoina (Rissoina) formosana* n. sp., from 400 m. SE. of Zyô-tûsyôwan, station 13 (ANDÔ); Byôritu Beds. × 2.
- Figs. 49a, b. *Diala angustifera* n. sp., holotype, from S. of Bôsiho, station 7 (HANZAWA); Byôritu Beds. × ca. 2.
- Figs. 50a, b. *Diala angustifera* n. sp., paratype, from the same locality as those shown in figs. 49a, b; Byôritu Beds. × ca. 2.



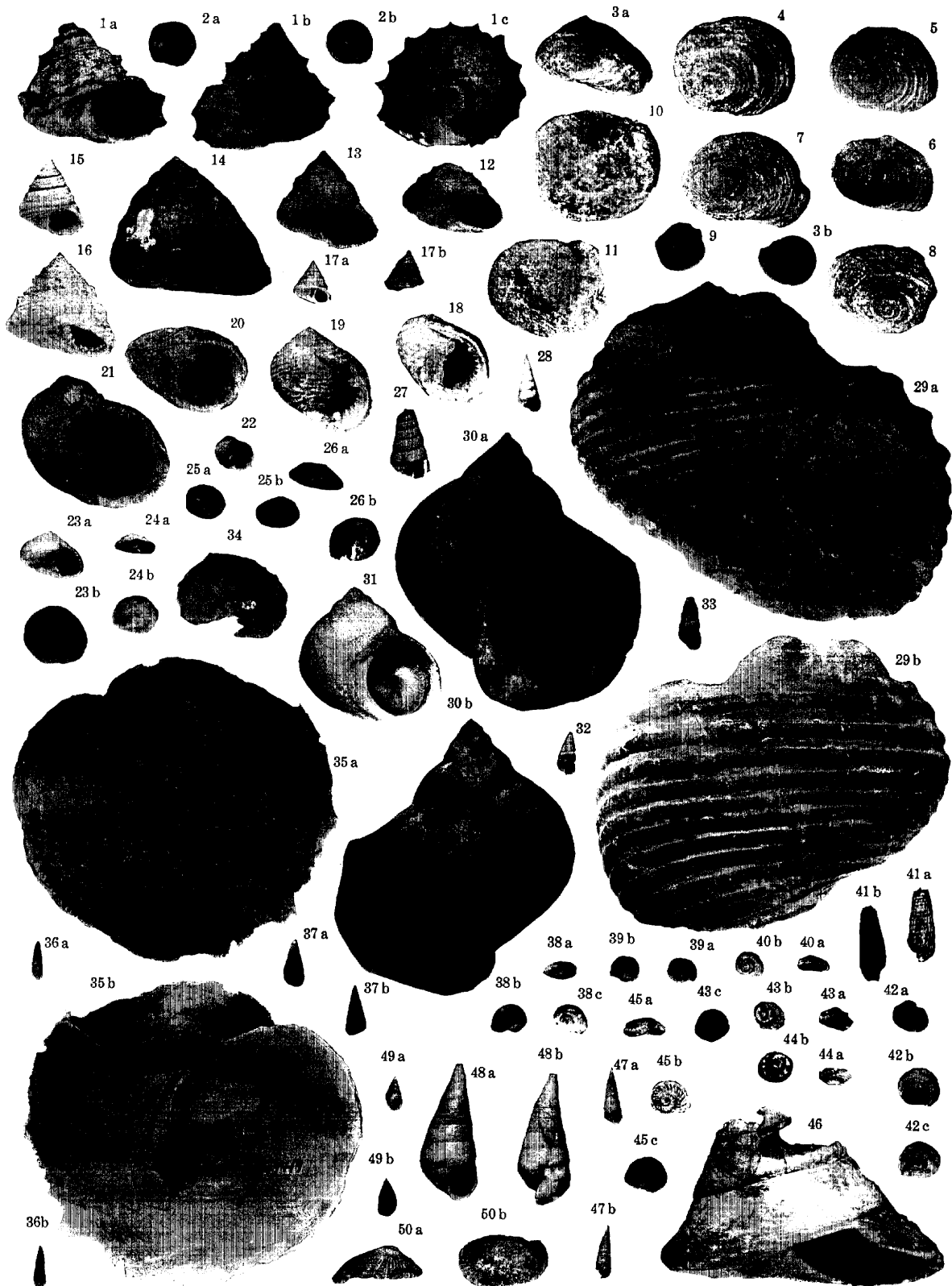
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## PLATE X (V)

All figures in natural size, unless otherwise stated.

- Figs. 1a, b, c. *Astraea pseudomodesta* n. sp., from Sikô; Byôritu Beds.
- Figs. 2a, b. *Heliacus asperus* (HINDS), from Wangwa, station 6 (ANDÔ); Byôritu Beds.
- Figs. 3a, b. *Umbonium (Suchium) equestratum* n. sp., holotype, from Sinsui; Byôritu Beds.  
Fig. 3a,  $\times 2$ .
- Figs. 4, to 11. *Umbonium (Suchium) equestratum* n. sp., paratype, from the same locality as those shown in figs. 3a, b; Byôritu Beds. Figs. 4 to 9, upper view; figs. 10, 11, basal view.  $\times 2$  (except for fig. 9).
- Fig. 12. *Umbonium (Suchium) moniliferum* (LAMARCK), from 1900 m. NE. of Hakusyaton, station 10 (ANDÔ); Byôritu Beds.
- Fig. 13. *Calliostoma cecillei* PHILIPPI, from Wangwa, station 14 (ANDÔ); Byôritu Beds.
- Fig. 14. *Trochus (Trochus) incrassatus* LAMARCK, from S. of Kontei; Raised Coral Reef.
- Fig. 15. *Turcica elisa* (GOULD), from E. of Goko; Byôritu Beds.
- Fig. 16. *Trochus (Trochus) calcaratus* SOUVERBIE, from N. of Kaikô; Raised Coral Reef.
- Figs. 17a, b. *Calliostoma semigranatum* n. sp., holotype, from Wangwa, station 15 (ANDÔ); Byôritu Beds.
- Figs. 18. *Nerita chamaeleon* LINNAEUS, from Wangwa, station 31 (ANDÔ); Byôritu Beds.
- Fig. 19. *Nerita plicata* LINNAEUS, from Kontei; Raised Coral Reef.
- Fig. 20. *Nerita planospira* ANTON, from S. of Sisitô; Raised Coral Reef.
- Fig. 21. *Nerita undata* LINNAEUS, from S. of Sisitô; Raised Coral Reef.
- Fig. 22. *Theodoxus sowerbianus* (RECLUZ), from 940 m. NW. of Keiyukwa, station 55 (ANDÔ); Byôritu Beds.
- Figs. 23a, b. *Monilea lentiginosa* A. ADAMS, from S. of Sisitô; Raised Coral Reef.
- Figs. 24a, b. *Ethalia pulchella* A. ADAMS, from 1200 m. SE. of Sankwakô, station 60 (ANDÔ); Byôritu Beds.
- Figs. 25a, b. *Collonista laeta* (MONTROUZIER), from S. of Sisitô; Raised Coral Reef.  $\times 2$ .
- Figs. 26a, b. *Umbonium (Umbonium) vestarium* (LINNAEUS), from 700 m. SW. of Kôkwan, station 23 (ANDÔ); Byôritu Beds.  $\times 2$ .
- Fig. 27. *Pyramidella (Pyramidella) teres* (A. ADAMS), from 700 m. SW. of Kôkwan, station 23 (ANDÔ); Byôritu Beds.
- Fig. 28. *Niso brunnea* (SOWERBY), from 1000 m. E. of Hakusyaton, station 20 (ANDÔ); Byôritu Beds.
- Figs. 29a, b. *Tonna melanostoma* (JAY), from Arisan; Kaizan Beds.  $\times \frac{1}{2}$ .
- Figs. 30a, b. *Turbo (Turbo) regenfusi* DESHAYES, from S. of Sisitô; Raised Coral Reef.
- Fig. 31. *Turbo (Turbo) petholatus* LINNAEUS, from Sikô; Byôritu Beds.
- Fig. 32. *Turbonilla (Pyrgisculus) hanzawai* n. sp., holotype, from the upper course of Sairyôkyô; Byôritu Beds.  $\times 2$ .

- Fig. 33. *Turbonilla (Pyrgisculus) hanzawai* n. sp., paratype, from the same locality as that shown in fig. 32; Byôritu Beds.  $\times 2$ .
- Fig. 34. *Cellana toreuma* (REEVE), from Sikô; Byôritu Beds.
- Fig. 35. *Xenophora exuta* (REEVE), from Sikô; Byôritu Beds.
- Figs. 36a, b. *Turbonilla (Turbonilla) byorituana* n. sp., holotype, from S. of Bôsiho, station 7 (HANZAWA); Byôritu Beds.  $\times 2$ .
- Figs. 37a, b. *Turbonilla (Turbonilla) bosihoensis* n. sp., holotype, from S. of Bôsiho, station 7, (HANZAWA); Byôritu Beds.  $\times 2$ .
- Figs. 38a, b, c. "*Cyclostrema*" *eburneforme* n. sp., holotype, from 700 m. NE. of Nanseizan, station 19 (ANDÔ); Byôritu Beds.  $\times 2$ .
- Figs. 39a, b. *Heliacus dorsuosus* (HINDS), from Wangwa, station 5 (ANDÔ); Byôritu Beds.
- Figs. 40a, b. "*Cyclostrema*" *sulcatum* A. ADAMS, from Nanseizan, station 11 (ANDÔ); Byôritu Beds.  $\times 2$ .
- Figs. 41a, b. "*Pyramidella*" *longicostifera* n. sp., holotype, from 1200 m. E. of Zyô-tûsyôwan, station 36 (ANDÔ); Byôritu Beds.  $\times 2$ .
- Figs. 42a, b, c. *Solariella formosana* n. sp., holotype, from 1000 m. SE. of Hakusyaton, station 32 (ANDÔ); Byôritu Beds.  $\times 2$ .
- Figs. 43a, b, c. *Liotia hanzawai* n. sp., holotype, from S. of Bôsiho, station 7 (HANZAWA); Byôritu Beds.  $\times 2$ .
- Figs. 44a, b. *Liotia hanzawai* n. sp., paratype, from the same locality as those shown in figs. 42a, b, c; Byôritu Beds.  $\times 2$ .
- Figs. 45a, b, c. *Teinostoma andoi* n. sp., holotype, from 700 m. SW. of Kôkwan, station 23 (ANDÔ); Byôritu Beds.  $\times 2$ .
- Fig. 46. *Trochus (Pyramidea) niloticus* LINNAEUS, from Kontei; Raised Coral Reef.  $\times 1/2$ .
- Figs. 47a, b. *Melanella tortuosa* (ADAMS and REEVE), from 500 m. E. of Sankwakô, station 41 (ANDÔ); Byôritu Beds.
- Figs. 48a, b. *Melanella candida* (MARRATT), from 300 m. E. of Sankwakô, station 39 (ANDÔ); Byôritu Beds.
- Figs. 49a, b. *Odostomia (Odostomia) venustaeformis* n. sp., holotype, from 950 m. SW. of Tai-kwa, station 10 (ANDÔ); Byôritu Beds.  $\times 2$ .
- Figs. 50a, b. *Fissuridea crucifera* (PILSBRY), from Sikô; Byôritu Beds.



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