The University Museum
The University of Tokyo

Bulletin No. 10

A SYSTEMATIC SURVEY OF THE MESOZOIC BIVALVIA FROM JAPAN

Itaru HAYAMI

東京都文京区本郷7－3－1
東京大学総合研究資料館

1975 TOKYO

The University Museum
The University of Tokyo

Bulletin No. 10

A SYSTEMATIC SURVEY OF THE MESOZOIC BIVALVIA FROM JAPAN

Itaru HAYAMI

1975 TOKYO

All communications pertaining to this Bulletin should be addressed to the Editorial Board, The University Museum, The University of Tokyo, 7-3-1, Hongo, Bunkyo-ku, Tokyo, Japan.

Issued December 20, 1975
Published by University of Tokyo Press

University Museum, University of Tokyo, Bulletin No. 10, 1975
249 pp., 3 figs., 10 plates

A Systematic Survey of the Mesozoic Bivalvia from Japan

Itaru HAYAMI

Department of Historical Geology and Palaeontology
The University Museum, The University of Tokyo

CONTENTS

I. INTRODUCTION

About 90 years ago Edmund von Mojsisovics (1888) described several species of *Daonella* and *Monotis* together with some ammonites from the Triassic strata of Sakawa basin of Shikoku and a few other areas as the first report on Mesozoic molluscan fossils from Japan. Since then, many paleontologists and stratigraphers have contributed to the description and classification of Japanese Mesozoic Bivalvia. Approximately 860 taxonomic names of species-group have been used in these studies, of which about 770 are regarded here as valid (see Table 1). The majority of them have been regarded as endemic species and subspecies, the known distribution of which is restricted to Japan and its adjacent areas. A number of characteristic genera and subgenera also were proposed through these studies, and they often seem to be important for the taxonomic and evolutionary considerations of this class from the international viewpoint.

Table 1. Number of specific and infraspecific names used for the description of Mesozoic Bivalvia from Japan and its adjacent areas

Taxonomic names	Triassic	Jurassic	Cretaceous	Total
specific names (valid)	176	234	338 - 3	748 - 3
specific names (invalid)	19	4	20	43
infraspecific names (valid as subspecies)	8	2	13	23
infraspecific names (invalid)	33	7	13	53
Total	236	247	384	867

More than 250 scientific papers were devoted to the description and classification of Mesozoic Bivalvia from Japan and its adjacent areas. They appeared in many periodicals from various societies and institutions. Unfortunately many of them have a restricted circulation and are sometimes hardly accessible even by domestic students. In recent years foreign paleontologists have frequently treated and discussed Japanese Mesozoic Bivalvia in their comparative or comprehensive taxonomic studies (e.g., Cox et al., 1969). However, some studies by Japanese authors were overlooked, and in some cases taxonomic positions and diagnostic characters of endemic taxa were misinterpreted. This inconvenience appears to have arisen from the want of communication between Japanese and foreign students, although it must be partly due to such unfavorable circumstance as insufficient description, inadequate illustration, our unfamiliar writing of foreign languages and taxonomic proposal on too poorly preserved material. Because taxonomy must be an international science, this status is deeply regrettable.

Although some of these describers were already retired or deceased, most of the type specimens are now fortunately kept at various institutions in Japan. About a half of them are registered and actually observable at the University Museum, University of Tokyo, to which I am now attached.

The main purpose of this study is to summarize the present status in the classification of fossil Bivalvia hitherto described from the Mesozoic of Japan and its adjacent areas (Saghalin, Kurile, Korea and Formosa) and to offer a handy manual for further investigation. The systematic catalogue in this article treats such basic information about every taxon as synonymy, references, primary type specimen (holotype, syntype, lectotype or neotype) and its repository, type locality, known vertical range and geographic distribution. Omitted are works such as faunal lists in stratigraphic papers with neither description nor illustration, picture books with no original illustration, guide books for excursions and various unscientific accounts. Specific and subspecific names are revised and modernized as far as possible, but proposals of new taxonomic names and new designation of lectotype specimen are avoided except in a few special cases. In the annotated list of genera and subgenera proposed on the Japanese materials are given their diagnostic characters and other basic information together with some comments on their taxonomic positions.

Illustrations are, of course, often as valuable as, or more informative than, verbal descriptions. It is, however, impossible to illustrate all the type specimens in a limited space, because they are too numerous. Only selected specimens of about 90 important species (including most of the type-species on which new genera or subgenera were proposed) are shown in the annexed plates. Most of them are original type specimens, but some are better preserved topotype specimens, the taxonomic identification of which is undoubted. Photographs were newly prepared (Plates 1–8) except for several reproduced from original illustrations (Plates 9, 10).

II. HISTORICAL REVIEW

i) STUDIES ON TRIASSIC BIVALVIA

Paleontological studies on Triassic Bivalvia from Japan were commenced by European scholars (Mojsisovics, 1888; Diener, 1915) with description of some species of *Daonella* and *Monotis* from Shikoku and Kitakami mountains together with ammonites. These works were followed by some Japanese paleontologists (Matsushita, 1926; Yabe and Shimizu, 1927; Yehara, 1927; Kobayashi, 1931, 1935), who reported the occurrence of some characteristic Triassic bivalves from Kitakami, Shikoku and west Honshu, and contributed to the age determination of various Mesozoic formations. The discovery of a peculiar trigoniid, *Minetrigonia*, from west Honshu (Saeki, 1925; Kobayashi and Katayama, 1938) is also worthy of note. Monographs of *Halobia* and *Daonella* from Japan were published by Kobayashi and Aoti (1943) and Kobayashi and Tokuyama (1959) respectively.

The development of descriptive studies on the Triassic bivalve faunas reached its climax in the 1950's. Prolific Carnian–Norian bivalves including *Trigonucula*, *Tosapecten* and *Sakawanella* as new genera, called Kochigatani fauna, were known to be widely distributed in the Kochigatani group and its correlatives along the Outer Zone of Southwest Japan and its eastern extension in Kwanto mountains (Kobayashi and Ichikawa, 1949a–c, 1950a–c; Ichikawa, 1949, 1950, 1951, 1954b–d; Tamura, 1959a, b; Ozawa and Hayami, 1969). Carnian bivalve faunas characterized by the common occurrence of *Tosapecten*, *Asoella*, *Minetrigonia*, *Palaeopharus*, *Cardinioides* and early representatives of *Oxytoma* and *Cardinia* were also known in the Inner Zone of Southwest Japan, especially from the Nabae group and its correlatives (Kobayashi and Ichikawa, 1951, 1952a; Nakazawa, 1952, 1954, 1955, 1956), lower part of the Nariwa group (Kobayashi and Ichikawa, 1952b; Nakano, 1957b) and Mine group (Amano, 1955; Tokuyama, 1958, 1959a, b, 1960a–c).

The superfamily Pteriacea are of special importance in Triassic paleontology and biostratigraphy for their significant adaptive radiation and wide geographical distribution. A comprehensive systematic study on *Claraia*, *Eumorphotis*, *Oxytoma*, *Monotis* and *Cassianella* was produced by Ichikawa (1958) on the basis of European type material. Upper Triassic biostratigraphic studies using various species and infraspecific taxa of *Monotis* (*Entomonotis*) were attempted by Ichikawa (1950) in Kitakami mountains, by Nakazawa (1963, 1964a) in west Honshu and Kitakami and also by Tamura (1965) in Kyushu. The Bakevelliidae are well represented in the Triassic of Japan, and their classification was discussed in some detail by Nakazawa (1954, 1959) and Tokuyama (1959a).

Special studies on the Myophoriidae were undertaken by Kambe (1951, 1957), Nakazawa (1960) and Tamura (1972). Skytian bivalves from Southwest Japan, including some cosmopolitan species, were collectively described by Nakazawa (1953, 1961, 1971) and those from limestone facies by various authors (Ozaki and Shikama, 1954; Ichikawa and

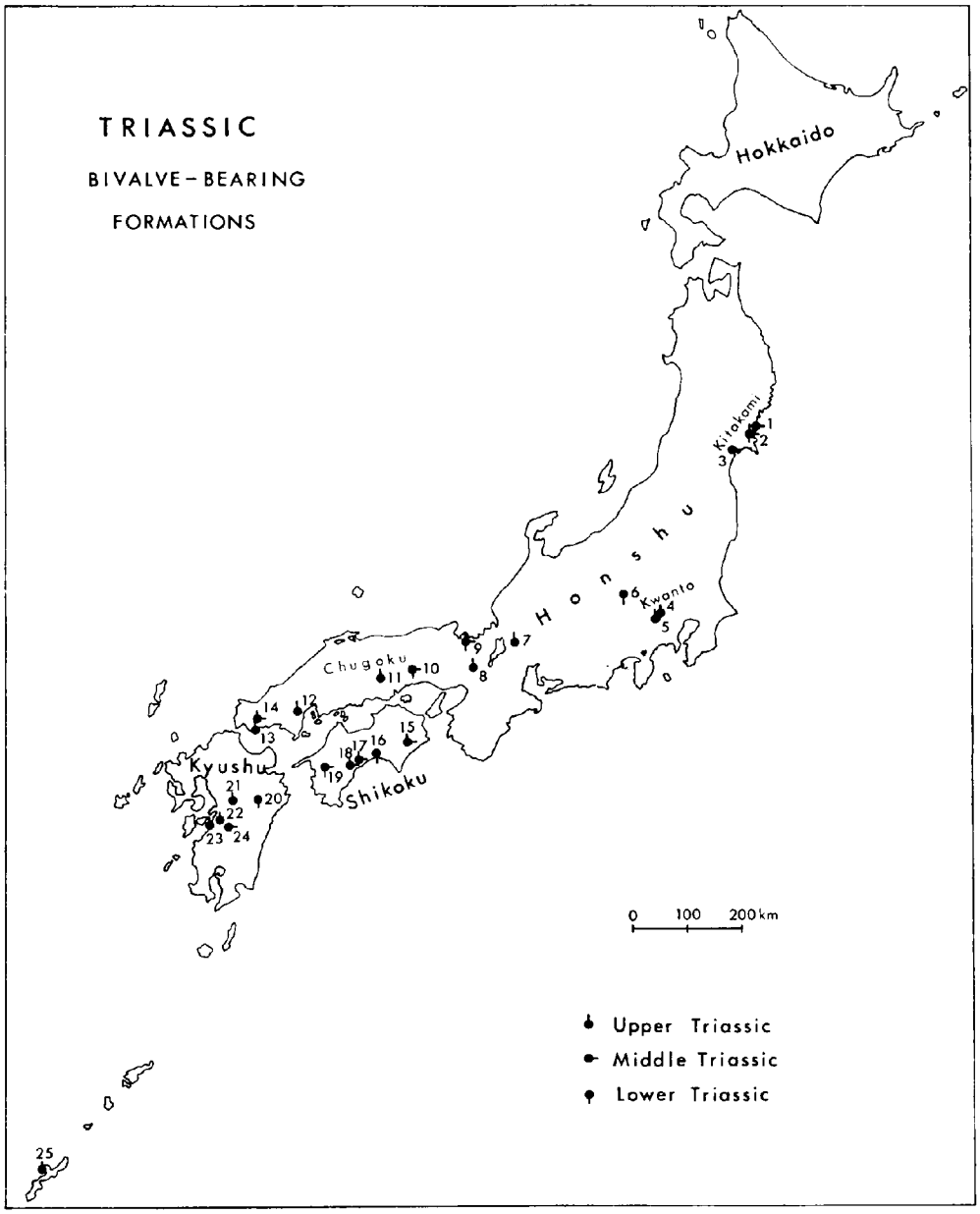

TRIASSIC
BIVALVE-BEARING
FORMATIONS
Hokkaido
Kitakami
Honshu
Kwanto
Chugoku
Kyushu
Shikoku
0 100 200km
Upper Triassic
Middle Triassic
Lower Triassic

Fig. 1

Fig. 1. Map showing the distribution of Triassic formations bearing fossil bivalves in Japan

1. Motoyoshi area in Miyagi Pref. (Low.–Mid. Triassic Inai group)
2. Shizukawa area in Miyagi Pref. (Low.–Mid. Triassic Inai group, Up. Triassic Saragai group)
3. Rifu area in Miyagi Pref. (Mid. Triassic Rifu group)
4. Ome area in Tokyo Pref. (Up. Triassic Kochigatani group)
5. Itsukaichi area in Tokyo Pref. (Triassic Arai formation, Up. Triassic Kochigatani group)
6. Sanchu area in Gumma Pref. (Low. Triassic Shionosawa limestone)
7. Ibuki area in Gifu Pref. (Up. Triassic Myogatani formation)
8. Western hills of Kyoto, Kyoto Pref. (partly Up. Triassic Tano formation)
9. Maizuru zone in Fukui, Kyoto and Hyogo Prefs. (Low.–Mid. Triassic Yakuno group, Triassic Shidaka group, Triassic Miharaiyama group, Up. Triassic Nabae group, Up. Triassic Heki formation)
10. Aita area in Okayama Pref. (Low.–Mid. Triassic Fukumoto group)
11. Nariwa area in Okayama Pref. (Up. Triassic Kyowa formation, Up. Triassic Nariwa group)
12. Miwa area in Yamaguchi Pref. (partly Up. Triassic Kuga group)
13. Asa area in Yamaguchi Pref. (Up. Triassic Mine group, Up. Triassic Kamosho formation)
14. Mine area in Yamaguchi Pref. (Mid. Triassic Atsu group, Up. Triassic Mine group)
15. Sakuradani area in Tokushima Pref. (Mid. Triassic Zohoin group, Up. Triassic Kochigatani group)
16. Nangoku area in Kochi Pref. (Low. Triassic Kurotaki formation)
17. Ino area in Kochi Pref. (Mid. Triassic Zohoin group, Up. Triassic Kochigatani group)
18. Sakawa area in Kochi Pref. (Mid. Triassic Zohoin group, Up. Triassic Kochigatani group)
19. Uonashi area in Ehime Pref. (Low. Triassic Taho formation, unnamed Mid. Triassic formation)
20. Takachiho area in Miyazaki Pref. (Low. Triassic Kamura formation)
21. Miyamadani area in Kumamoto Pref. (Up. Triassic Kochigatani group)
22. Sakamoto area in Kumamoto Pref. (Up. Triassic Kochigatani group)
23. Tanoura area in Kumamoto Pref. (Up. Triassic Kochigatani group)
24. Yamae area in Kumamoto Pref. (partly Mid? Triassic Konose group)
25. Motobu area in Okinawa Pref. (partly Up. Triassic Nakijin formation)

Yabe, 1955; Yabe, 1956; Kambe, 1963). Murata (1973) reported some bivalves of this stage also from Kitakami. In addition, Nakazawa (1964b) reported some Anisian bivalves from Shikoku. Mojsisovics' (1888) and Matsushita's (1926) classical works were revised by Ichikawa (1963) and Nakazawa (1971) respectively.

Recent progress of conodont biostratigraphy proved that the Chichibu terrain previously regarded as Upper Paleozoic is in part actually Triassic. Although recent descriptive studies are rather rare, occurrence of *Monotis* and some other characteristic Triassic bivalves were reported at various placed in this terrain, endorsing the age estimation.

About 190 specific and 40 infraspecific names have been applied for the classification of Japanese Triassic Bivalvia, but I feel some groups have been grossly oversplit. Most of the varieties and formae hitherto proposed do not seem to constitute distinct taxa and are therefore unnecessary. As pointed out by some Japanese and Russian authors (Kiparisova et al., 1966; etc.), the Triassic bivalve faunas from Japan, particularly Carnian and Norian ones, are intimately related to those of eastern Siberia, and further comparative studies may be needed to clarify the paleobiogeography. Generally speaking, Skytian, Carnian and Norian bivalves are well represented in Japan, but Anisian and Ladinian bivalves seem to be rare except for some species of *Daonella*. Rhaetian fauna has not been reported in Japan and its adjacent areas.

ii) STUDIES ON JURASSIC BIVALVIA

Paleontology on Jurassic Bivalvia from Japan was commenced by Yokoyama (1904) with description of six species from the Lower Jurassic Shizukawa group in Kitakami mountains. By the end of the Second World War, however, little had been attempted on the study of Jurassic bivalves except for several sporadic studies on a few species of trigoniids (Yehara, 1921, 1927), inoceramids (Kobayashi, 1926), cyrenoids (Kobayashi and Suzuki, 1937) and *Neoburmesia*, a peculiar pholadomyid (Yabe and Sato, 1942).

After the war, Kobayashi and his collaborators examined Jurassic trigoniids and described many species from various localities in Honshu and Shikoku under a new scheme of classification, which basically followed Cox' (1952) but included proposal of several new subfamilies and such characteristic genera as *Geratrigonia*, *Latitrigonia* and *Ibotrigonia* (Kobayashi and Kaseno, 1947; Kobayashi, 1954, 1956a, 1957a, c; Kobayashi and Mori, 1954, 1955; Kobayashi and Tamura, 1955, 1957). The stratigraphical significance of these trigoniids was summarized in the conclusive part of their serial study (Kobayashi, Mori and Tamura, 1959). Maeda and his collaborators carried out further studies on the Jurassic Trigoniidae, describing several new species from the Upper Jurassic of central Japan (Maeda, 1962a, c, d, 1963b; Maeda and Kawabe, 1963, 1966a; Maeda and Adachi, 1965).

On the other hand, the description of rich Upper Jurassic ordinary marine bivalves from the Torinosu group in the Outer Zone of Southwest Japan and from the Soma group (upper part) in Abukuma mountains of north Honshu was commenced by Kimura (1951, 1956) and fully accomplished by Tamura (1959c–f, 1960a–d). Limestones predominate in these groups, and *Somapecten*, *Somapteria*, *Somarctica* and *Neoburmesia* are characteristic elements of this fauna.

I engaged myself in the descriptive study on Jurassic marine and brackish-water bivalves from various sedimentary areas in the Inner Zone of Southwest Japan and Kitakami mountains, namely, Lower Jurassic Kuruma group and Upper Jurassic Tetori group (lower part) in Hida mountains, Lower Jurassic Shizukawa, Middle-Upper Jurassic Hashiura, Karakuwa, Ojika and some other groups in Kitakami mountains and Lower Jurassic Toyora group in west Honshu (Hayami, 1957a–e, 1958a–d, 1959a–h, 1961a, b, 1969; Hayami, Sugita and Nagumo, 1960). *Radulonectites*, *Crenotrapezium*, *Yokoyamaina*, *Kobayashites* and *Tetorimya* were proposed as new genera in the course of this faunal study. Classification of *Cardinia* and Jurassic inoceramids was discussed in some detail (Hayami, 1958e, 1960b), though it is already out of date. Hitherto obtained knowledge on the Jurassic bivalves from Japan was summarized in connection with Jurassic stratigraphy and paleogeography (Hayami, 1961c). The taxonomic position of Upper Jurassic neomiodontids, which had once been discussed by Suzuki and Oyama (1943), was recently restudied by Ohta (1973) toegther with some Neocomian species.

In spite of the narrowness of distributed areas, the Jurassic formations of Japan bear various bivalve faunas in accordance with the remarkable change of sedimentary facies and biogeographic provinces, and about 230 species have been distinguished. As noted before (Hayami, 1961c), Jurassic molluscan faunas of Japan seem to have been highly localized. Common elements are comparatively rare between different sedimentary areas but for some widely distributed Tethyan species in the Upper Jurassic Torinosu fauna

and a few cosmopolitan or Siberian elements in the Lower Jurassic. It is also worthy of note that some Tithonian marine species survived until Berriasian, as indicated by associated ammonites, and that a more significant faunal change can be expected in the midst of Neocomian rather than at the Jurassic-Cretaceous boundary.

iii) STUDIES ON CRETACEOUS BIVALVIA

Aside from Schmidt's (1873) description of some Upper Cretaceous mollusks from north Saghalin, Neumayr, Yokoyama and Jimbo are early pioneers in Cretaceous molluscan paleontology in the Japanese islands. Various kind of fossils were collectively treated in their monographs. Neumayr *in* Naumann and Neumayr (1890) described "*Cyrena naumanni*" and two allied neomiodontids from the Neocomian of Shikoku. "*Avicula haradae*" and some other bivalves from the Lower Cretaceous of Kwanto mountains, *Inoceramus naumanni* and some other important species from the Upper Cretaceous of Hokkaido, and "*Trigonia kikuchiana*" and a few other characteristic trigoniids from the Lower Cretaceous of Shikoku were reported by Yokoyama (1890, 1891). Jimbo's (1894) work dealt with several inoceramids and trigoniids from the Upper Cretaceous of Hokkaido. The illustrations in these classical monographs were mostly reproduced later with revised specific names and other taxonomic remarks (Hayami, Matsumoto and Asano, 1963; Matsumoto, Hayami and Asano, 1963; Matsumoto, 1963).

Yehara (1915, 1921, 1923a, b, 1927) greatly contributed to the description of Cretaceous trigoniids from Japan, especially from Hokkaido (Ikushumbetsu area), Kitakami (Miyako area), Shikoku (Sakawa and Monobegawa areas) and Kyushu (Amakusa islands). Some pachyodont bivalves from Kitakami and Hokkaido were described by Yehara (1920), Yabe and Nagao (1926) and Nagao (1932b, 1933). *Praecaprotina* Yabe and Nagao, 1926, is the first proposed Mesozoic bivalve genus on the basis of Japanese material.

During the 1920's and 1930's, ordinary Cretaceous bivalves were vigorously described by Yabe, Nagao and their collaborators: monographs on Upper Cretaceous species from south Saghalin and Hokkaido (Yabe and Nagao, 1925, 1928; Nagao, 1932a, 1938; Nagao and Otatume, 1938), from Amakusa islands of Kyushu (Nagao, 1930; Matsumoto, 1938) and on Lower Cretaceous species from Kwanto mountains (Yabe, Nagao and Shimizu, 1926) and from Miyako area of Kitakami (Nagao, 1934) are important contributions. Most of these papers dealt with gastropods together with bivalves.

On the other hand, *Trigonioides* and other non-marine molluscs mainly from the Inner Zone of Southwest Japan and south Korea were investigated by Kobayashi and Suzuki (1936, 1939) and Suzuki (1940, 1941, 1943), and finally summarized by Suzuki (1949). Various species of *Inoceramus* and allied fossils, which are of special importance in Upper Cretaceous biostratigraphy, were in part described by Yabe (1915) and Yehara (1924), and a monographic study including proposal of many new taxa and a classification system was published by Nagao and Matsumoto (1939, 1940).

Thus, many important Cretaceous bivalves from Japan were already described and named by the beginning of the Second World War. In many cases, however, proposal of new taxa was not accompanied by clear designation of type specimens, and variation was often disregarded. Hence a more modernized treatment and nomenclatorial revision became necessary after these works.

After the war, a great number of the studies have been devoted to the description

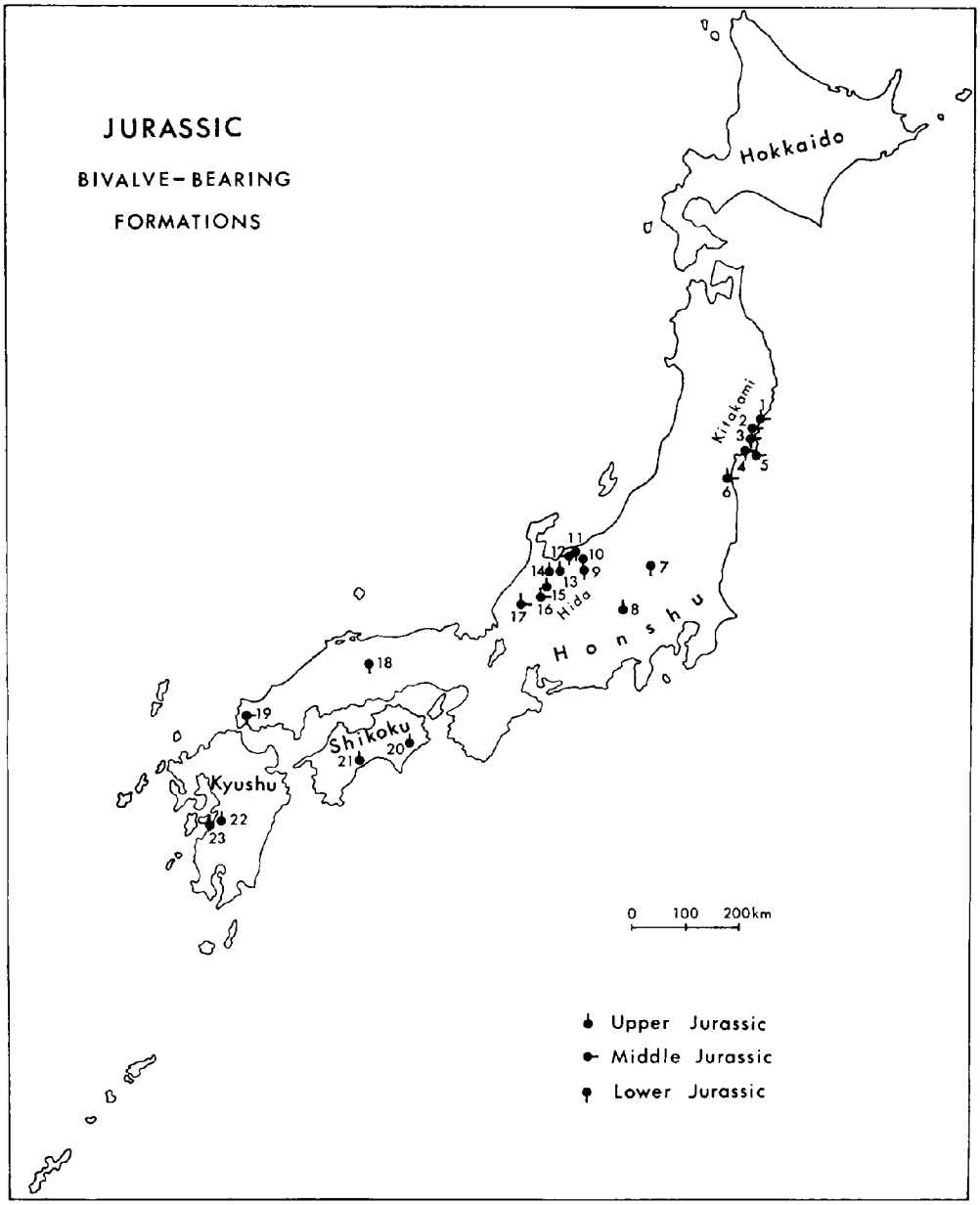

JURASSIC
BIVALVE-BEARING
FORMATIONS
Hokkaido
Honshu
Shikoku
Kyushu
Kitakami
Hida
0 100 200km
Upper Jurassic
Middle Jurassic
Lower Jurassic

Fig. 2

Fig. 2. Map showing the distribution of Jurassic formations bearing fossil bivalves in Japan

1. Karakuwa, Kesennuma and Oshima areas in Miyagi Pref. (Mid. Jurassic Karakuwa group, Up. Jurassic-Lowest Cretaceous Shishiori group)
2. Shizukawa area in Miyagi Pref. (Low. Jurassic Shizukawa group, Mid.–Up. Jurassic Hashiura group)
3. Hashiura area in Miyagi Pref. (Low. Jurassic Shizukawa group, Mid.–Up. Jurassic Hashiura group)
4. Mizunuma area in Miyagi Pref. (Low. Jurassic Shizukawa group, Mid.–Up. Jurassic Hashiura group)
5. Ojika area in Miyagi Pref. (Mid. Jurassic-Lowest Cretaceous Ojika group)
6. Soma area in Fukushima Pref. (Mid. Jurassic-Lowest Cretaceous Soma group)
7. Katashina area in Gumma Pref. (Low. Jurassic Iwamuro formation)
8. Minamimaki area in Nagano Pref. (Up. Jurassic Torinosu group)
9. Otari area in Nagano Pref. (Low. Jurassic Kuruma group)
10. Kotaki area in Niigata Pref. (Low. Jurassic Kuruma group)
11. Omi area in Niigata Pref. (Low. Jurassic Kuruma group)
12. Asahi area in Toyama Pref. (Low. Jurassic Kuruma group)
13. Arimine area in Toyama Pref. (Mid. Jurassic-Cretaceous Tetori group)
14. Yatsuo area in Toyama Pref. (Mid. Jurassic-Cretaceous Tetori group)
15. Furukawa area in Gifu Pref. (Mid. Jurassic-Cretaceous Tetori group)
16. Makito area in Gifu Pref. (Mid. Jurassic-Cretaceous Tetori group)
17. Izumi (Kuzuryu) area in Fukui Pref. (Mid. Jurassic-Cretaceous Tetori group)
18. Oosa area in Okayama Pref. (Low. Jurassic Yamaoku formation)
19. Toyoda area in Yamaguchi Pref. (Low.–Mid. Jurassic Toyora group)
20. Sakuradani area in Tokushima Pref. (Up. Jurassic Torinosu group)
21. Sakawa area in Kochi Pref. (Up. Jurassic Torinosu group)
22. Sakamoto area in Kumamoto Pref. (Up. Jurassic Torinosu group)
23. Tanoura area in Kumamoto Pref. (Up. Jurassic Torinosu group)

and classification of the Cretaceous Trigoniidae (Kobayashi, 1954, 1957c; Kobayashi and Amano, 1955; Kobayashi and Nakano, 1957, 1958; Nakano, 1957c, 1958a, b; etc.). The stratigraphic occurrence and systematics of the Japanese Cretaceous Trigoniidae were once summarized by Nakano (1960), but a number of subsequent descriptive and taxonomic studies were published on this group (Nakano, 1961a, c; Nakano and Numano, 1961; Maeda, 1962c; Maeda and Kitamura, 1964; Maeda and Kawabe, 1967a, b; Tamura and Tashiro, 1972; Tashiro, 1972).

Additional description and taxonomic refinement of some species of Cretaceous *Inoceramus* were attempted mainly by Matsumoto and his collaborators (Matsumoto 1957; Matsumoto and Ueda, 1962; Takai and Matsumoto, 1961; Matsumoto and Harada, 1965; Matsumoto and Noda, 1968; Noda, 1971, 1974). A peculiar noetiid, *Matsumotoa*, was established by Okada (1958) and subsequently restudied by Tamura, Tashiro and Motojima (1968). The unique morphology of *Trigonioides*, *Nippononaia*, *Plicatounio* and some other genera from the non-marine Cretaceous of East Asia has attracted attention of not only Japanese but also European and American paleontologists. Many species were described and disputed opinions were sometimes presented as to the classification and phylogenetical relationship (Cox, 1955; Kobayashi, 1956, 1968; Ota, 1959a–c, 1963; Maeda, 1962b, e, 1963a; Hayami and Ichikawa, 1965; Tamura, 1970; Yang, 1974). Special taxonomic studies were carried out on some Japanese Cretaceous species of *Acila* (Nagao and Huzioka, 1941), *Pholadomya* (Nagao, 1943), *Opis* (Ueda, 1963), corbulids (Ota, 1964), corbiculids (Ota, 1965), neomiodontids (Hayami and Nakai, 1965; Ohta, 1973), *Glycymeris* (Tashiro, 1971), *Anthonya* (Tamura and Packard, 1972) and *Meekia* (Tamura, 1973).

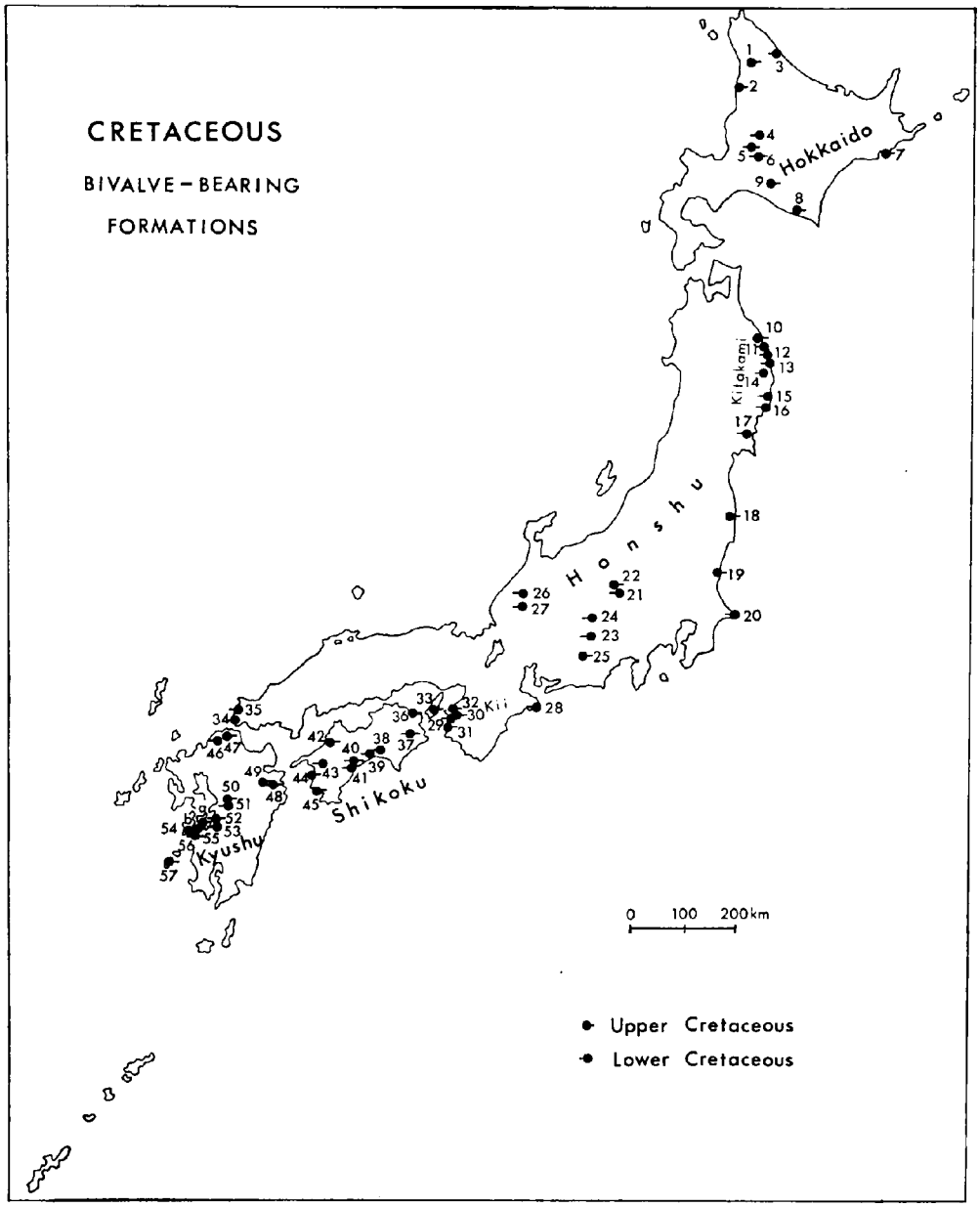

CRETACEOUS
BIVALVE-BEARING
FORMATIONS
Hokkaido
Honshu
Kii
Kitakami
Shikoku
Kyushu
0 100 200km
Upper Cretaceous
Lower Cretaceous

Fig. 3

Fig. 3. Map showing the distribution of Cretaceous formations bearing fossil bivalves in Japan

1. Nakagawa and Abeshinai areas in Teshio Prov., Hokkaido (Up. Cretaceous Middle Yezo group, Up. Cretaceous Upper Yezo group)
2. Haboro area in Teshio Prov., Hokkaido (Up. Cretaceous Upper Yezo group)
3. Esashi area in Kitami Prov., Hokkaido (Low. Cretaceous Horombetsu formation)
4. Sorachi area in Ishikari Prov., Hokkaido (Low. Cretaceous Lower Yezo group)
5. Ikushumbetsu area in Ishikari Prov., Hokkaido (Low.–Up. Cretaceous Middle Yezo group, Up. Cretaceous Upper Yezo group)
6. Yubari, Oyubari and Manji areas in Ishikari Prov., Hokkaido (Low.–Up. Cretaceous Middle Yezo group, Up. Cretaceous Upper Yezo group)
7. Akkeshi area in Kushiro Prov., Hokkaido (Up. Cretaceous Neumuro group)
8. Urakawa area in Hidaka Prov., Hokkaido (Up. Cretaceous Upper Yezo group)
9. Hobetsu and Hetonai areas in Iburi Prov. and Hiratori area in Hidaka area (Up. Cretaceous Upper Yezo group, Up. Cretaceous Hakobuchi group)
10. Kuji area in Iwate Pref. (Up. Cretaceous Kuji group)
11. Tanohata area in Iwate Pref. (Low. Cretaceous Miyako group)
12. Omoto area in Iwate Pref. (Low. Cretaceous Miyako group)
13. Miyako area in Iwate Pref. (Low. Cretaceous Miyako group)
14. Omine area in Iwate Pref. (Low. Cretaceous Kamihei group)
15. Ofunato area in Iwate Pref. (Low. Cretaceous Ofunato group)
16. Oshima area in Miyagi Pref. (Low. Cretaceous Oshima formation)
17. Hashiura area in Miyagi Pref. (Low. Cretaceous Jusanhama group)
18. Futaba area in Fukushima Pref. (Up. Cretaceous Futaba group)
19. Nakaminato area in Ibaraki Pref. (Up. Cretaceous Nakaminato group)
20. Choshi area in Chiba Pref. (Low. Cret. Choshi formation)
21. Sanchu area in Gumma and Nagano Prefs. (Low. Cretaceous Ishido and Sebayashi formations)
22. Nakagomi area in Nagano Pref. (Up. Cretaceous unnamed formation)
23. Toyama area in Nagano Pref. (Low. Cret. unnamed formation)
24. Takato area in Nagano Pref. (Low. Cretaceous Todai formation)
25. Misakubo area in Shizuoka Pref. (Up. Cretaceous Misakubo formation)
26. Shiramine area in Ishikawa Pref. (Jurassic-Cretaceous Tetori group)
27. Kitadani area in Fukui Pref. (Jurassic-Cretaceous Tetori group)
28. Shima area in Mie Pref. (Low. Cretaceous Matsuo group)
29. Yuasa area in Wakayama Pref. (Low. Cretaceous Yuasa, Arita, Izeki and Nishihiro formations
30. Kanaya area in Wakayama Pref. (Up. Cretaceous Kanaya and Toyajo formations)
31. Yura area in Wakayama Pref. (Up. Cretaceous Terazoma formation)
32. Izumi mountains in Osaka and Wakayama Prefs. (Up. Cretaceous Izumi group)
33. Awaji island in Hyogo Pref. (Up. Cretaceous Izumi group)
34. Shimonoseki area in Yamaguchi Pref. (Low. Cretaceous Yoshimo formation)
35. Takibe area in Yamaguchi Pref. (Low. Cretaceous Kwanmon group)
36. Hiketa area in Kagawa Pref. (Up. Cretaceous Izumi group)
37. Katsuuragawa area in Tokushima Pref. (Low. Cretaceous Tatsukawa, Hanoura and Hoji formations, Up. Cretaceous Tatsue formation)
38. Monobegawa area in Kochi Pref. (Low Cretaceous Hagino formation or Lower Monobegawa group)
39. Nangoku area in Kochi Pref. (Low. Cretaceous Lower Monobegawa group)
40. Sakawa and Ochi areas in Kochi Pref. (Low. Cretaceous Lower Monobegawa group,/Upper Cretaceous Miyanohara formation)
41. Susaki area in Kochi Pref. (Low. Cretaceous Doganaro formation)
42. Onsen area in Ehime Pref. (Up. Cretaceous Izumi group)
43. Kurosegawa area in Ehime Pref. (Low. Cretaceous Kikunotani formation)
44. Uwajima area in Ehime Pref. (Up. Cretaceous Uwajima group)

45. Johen area in Ehime Pref. (Up. Cretaceous Ippommatzu formation)
46. Kurate area in Fukuoka Pref. (Low. Cretaceous Kwanmon group)
47. Yahata area in Fukuoka Pref. (Low.–Up. Cretaceous Kwanmon group)
48. Nozu area in Oita Pref. (Low. Cretaceous Haidateyama formation, Up. Cretaceous Tano formation)
49. Onogawa area in Oita Pref. (Up. Cretaceous Onogawa group)
50. Mifune, Mashiki and Matsubase areas in Kumamoto Pref. (Up. Cretaceous Mifune group)
51. Tomochi area in Kumamoto Pref. (Low. Cretaceous Tomochi formation)
52. Yatsushiro area in Kumamoto Pref. (Low. Cretaceous Yatsushiro formation, Up. Cretaceous Miyaji formation
53. Sakamoto and Toyo areas in Kumamoto Pref. (Low. Cretaceous Kawaguchi, Hachiryuzan, Hinagu and Yatsushiro formations)
54. Amakusa islands and Uto peninsula in Kumamoto Pref. (Up. Cretaceous Himenoura group) 54a: Amakusa-kamishima, 54b: Amakusa-shimoshima
55. Gosyonoura (=Goshonoura) island in Kumamoto Pref. (Low.–Up. Cretaceous Gosyonoura group, Up. Cretaceous Himenoura group)
56. Shishijima and Nagashima islands, Kagoshima Pref. (Low.–Up. Cretaceous Gosyonoura group, Up. Cretaceous Himenoura group)
57. Shimo-koshiki island, Kagoshima Pref. (Up. Cretaceous Himenoura group)

In addition, a number of stratigraphers and paleontologists were engaged in the description of local bivalve faunas, through which many new species and genera were proposed. Some bivalves were described from various Cretaceous strata in south Shikoku (Amano, 1956, 1957b; Katto and Hattori, 1964; Hayami and Kawasawa, 1967), the Albian and Upper Cretaceous in Amakusa islands of Kyushu (Amano, 1956, 1957a, etc.), the Upper Cretaceous in Nakaminato and Futaba areas of north Honshu (Saito, 1962), the Lower Cretaceous in Kamaishi area of north Honshu (Nakazawa and Murata, 1966) and the Lower Cretaceous in Choshi area of Kwanto (Shikama and Suzuki, 1972.) The rich Campanian and Maestrichtian bivalve fauna from the Izumi group in Izumi mountains and Awaji island of central Japan seems to be important for the general consideration of bivalve systematics, since it bears such peculiar genera as *Pleurogrammatodon*, *Micronectes*, *Izumicardia* and *Izumia* (Ichikawa and Maeda, 1958a, b, 1963, 1966). In the same serial study, taxonomic refinement of some previously described species was attempted.

More than 130 Lower Cretaceous marine bivalves from Japan except for trigoniids and rudistids were comprehensively described and hitherto obtained knowledge about the bivalve faunas of this age was summarized by Hayami (1965a, b, 1966). In this study, two subfamilies, Pterinellinae and Eomiodontinae, a genus, *Costocyrena*, and several subgenera were newly proposed, and the classification of *Neithea* and the Neomiodontidae was discussed in some detail.

About 350 specific and 20 infraspecific names have thus been applied in these descriptive studies. Some of them, especially the early described species and varieties, need further examination in the light of modern taxonomic principles and nomenclature, and many studies are still in progress. The occurrence of marine Cretaceous bivalves is restricted to Northeast Japan and the Outer Zone of Southwest Japan, whereas nonmarine bivalves are found primarily in the Inner Zone of Southwest Japan. This contrast may indicate the paleogeography in this period. Upper Aptian and lower Albian marine bivalves as well as other fossils from the calcareous sediments of the Miyako

group in north Honshu are especially abundant and well preserved (Nagao, 1934; Hayami, 1965a, b, 1966; etc.). Some of them are closely allied, if not strictly identical, to Tethyan and European (particularly Lower Greensand) species. Several pachyodont species of this stage strongly remind us of the Urgonian fauna in the Mediterranean region. On the contrary, the Upper Cretaceous bivalve characterized by the abundant occurrence of *Inoceramus* in fine-grained sediments and by trigoniids and other thick-shelled species in coarse-grained ones contain some elements of northern Pacific faunal province.

iv) OTHER STUDIES ON MESOZOIC BIVALVIA FROM JAPAN

Almost all the works mentioned above are concerned with description of local bivalve faunas or classification of some particular taxonomic groups. The ontogeny of some species, though only post-neanic transformation, and the phylogeny of a few families, such as the Trigoniidae and the Inoceramidae, were studied on the basis of Japanese material. The stratigraphic applications and biogeographic significances were discussed in some of these papers.

Although unfavorable states of preservation and other limitations often prevent us from promoting more advanced studies, especially quantitative treatment of fossils, some analytical studies have been attempted in recent years. The Jurassic paleobiogeography was clarified to some extent by using similarity indices between local bivalve faunas; as a result, several faunal provinces were recognized in early and late Jurassic times (Hayami, 1961c, 1962a). Tokuyama (1960b) and Tamura (1961b) discussed the bio-facies and litho-facies of the Carnian Mine group and the Upper Jurassic Torinosu group respectively on the basis of the distribution and assemblages of bivalve faunas. Bernard and Munier-Chalmas' dentition formula, which seems to be quite useful for the consideration of the classification and phylogeny of Mesozoic heterodont bivalves, was reviewed and discussed (Hayami, 1962b). Kobayashi (1956b) and some others extended the use of this expression to the Trigonioididae. Hayami and Nakano (1968), though provisionally, discussed the application of numerical taxonomy in paleontology, taking the Trigoniidae as an example.

Mesozoic Bivalvia comprise many characteristic extinct genera and families, some of which are quite different from any known Cenozoic and Recent ones in the shell morphology, mode of occurrence and probably also in mode of life. Some students are now interested in their functional morphology. Of these extinct bivalves, such thin-shelled groups as the Posidoniidae, Halobiidae, Monotidae and Inoceramidae are particularly unique and interesting for their peculiar morphology, episodic and exclusive occurrence and wide geographic distribution. Studies on the mode of life of these distinguished bivalves were briefly reviewed, and nekto- or pseudo-planktic mode of life was suggested for some genera (Hayami, 1969b), though the documentation was insufficient. Matsumoto and Noda (1968) also suggested planktic mode of life for some species of *Inoceramus* on the occasion of describing a new species. Tanabe (1973) examined the morphological transformation, particularly the appearance of divergent ribs on the surface, through the ontogeny and phylogeny in the stock of *Inoceramus naumanni* from the Santonian–Campanian of Hokkaido. As the result of his biometrical study, it was concluded that the increase of shell thickness (more precisely, thickness of prismatic calcite

layer) to the shell size is negatively allometric before the first appearance of divergent ribs and thereafter becomes positively allometric. He interpreted this phenomenon as indicating the possibility of the evolution of the mode of life from pseudo-planktic to benthonic. As to the Trigoniidae, the living position of *Nipponitrigonia* and *Pterotrigonia* was inferred by Nakano (1970c) from their shell morphology and mode of occurrence in the Cretaceous strata of Shikoku. But little has been published about the ecology of other Mesozoic bivalves on the basis of Japanese materials.

III. PRINCIPLES OF CLASSIFICATION

The development of descriptive studies on Mesozoic Bivalvia from Japan and its adjacent areas, as enumerated in Table 2, reached its climax in the late 1950's and the early 1960's. Although some faunules, especially Upper Cretaceous ones, still remain undescribed, the majority of common species seem to have been described and named. I dare to say that we have almost completed the first stage of the systematic research. This stage ought to be followed by comparative studies for phylogenetic classification from international viewpoint and furthermore by detailed evolutionary studies at the population level, as usual in the development of systematics. Mayr (1963) rightly pointed out that the replacement of typological thinking by population thinking is one of the greatest conceptual revolution in the history of systematic zoology. It is so with the classification of fossils.

Among various fossil invertebrates the Bivalvia are often advantageous for the study of population systematics owing to the abundant occurrence, relatively simple morpho-

Table 2. Number of descriptive works on Mesozoic Bivalvia from Japan and its adjacent areas (number of newly proposed specific and infraspecific names in parentheses)

Date	Triassic	Jurassic	Cretaceous	Total
1870-1874	0	0	1 (1)	1 (1)
1875-1879	0	0	0	0
1880-1884	0	0	0	0
1885-1889	1 (2)	0	0	1 (2)
1890-1894	0	0	4 (13)	4 (13)
1895-1899	0	0	1 (1)	1 (1)
1900-1904	0	1 (5)	0	1 (5)
1905-1909	0	0	0	0
1910-1914	0	0	1 (4)	1 (4)
1915-1919	1 (0)	0	2 (6)	3 (6)
1920-1924	0	1 (2)	5 (11)	5 (13)
1925-1929	4 (10)	2 (3)	8 (38)	12 (51)
1930-1934	1 (1)	0	5 (35)	6 (36)
1935-1939	4 (8)	1 (4)	7 (37)	12 (49)
1940-1944	3 (7)	2 (1)	7 (15)	11 (23)
1945-1949	4 (28)	1 (1)	0	5 (29)
1950-1954	17 (64)	5 (15)	3 (5)	25 (84)
1955-1959	14 (36)	32 (140)	29 (68)	74 (244)
1960-1964	11 (21)	12 (38)	29 (33)	51 (92)
1965-1969	3 (0)	4 (6)	16 (60)	23 (66)
1970-1974	4 (2)	2 (0)	16 (18)	21 (20)
Total	67 (179)	63 (215)	134 (345)	257 (739)

logical structure, convenient size for mensuration and a great store of knowledge about the ecology and physiology of living species. Indeed, as concisely reviewed by Newell and Kauffman (1968), many outstanding studies on fossil bivalves seem to have much contributed to the spread of population concept and related techniques in paleontology.

Most of Mesozoic bivalves from Japan had been described and named merely on the basis of individual morphology, before population systematics became popular among the paleontologists. As the present revision progressed, it was often felt that early described species were too much oversplit. On the other hand, systematic ordering of fossil Bivalvia as well as diagostic characters of all the genera and subgenera was comprehensively accomplished with the monumental publication of "*Genera of the Bivalvia: a systematic and bibliographic catalogue*" (Vokes, 1967) and "*Treatise on invertebrate paleontology, Part N*" (Cox et al., 1969, 1971), which provided great facility for a revisory work of this sort. I feel, therefore, that there is much room for improvement as the classification of these Japanese material, convincing that now is the convenient time to make a revised catalogue.

Owing to poorly preserved material and other fatal limitations in fossils, however, I often found great difficulty in obtaining solid taxonomic conclusions. Early proposals of new species were commonly not accompanied by any clear designation of type specimens, and exact localities and horizons of syntype specimens were rarely precisely recorded. In many cases topotype specimens, even if the locality is more or less clear, are not easily collectable. Quantitative studies on intrapopulational and geographic variations can hardly be pursued owing to strong secondary deformation and too small sample size except for a few special cases.

Nevertheless, the switch-over of the species concept from typological to biological in recent years, I believe, enables us to improve the classification at the species level. Many early proposed species and varieties can be reexamined in the light of modern taxonomic principles and nomenclature, taking variation, ontogeny, geographic and stratigraphic distribution and mode of occurrence as well as morphology into consideration. In revising taxonomic names of specific and infraspecific taxa, I attach importance to the relation of sympatry and allopatry as one of non-morphological criteria. Population biologists generally share the opinion that two populations cannot live sympatrically unless they are reproductively isolated. Although post-mortem transportation may disturb the original assemblage of species to some extent, this agreement should be taken into consideration also in the classification of fossils. For instance, we may well wonder whether taxonomic distinction is appropriate, when many closely related "taxa" were reported to occur from a single fossil bed. Although the revision can by no means be made automatically, more than 40 specific names are here regarded as junior synonyms, since oversplitting is obvious. More than 60 varietal names have been used for the classification of Japanese Mesozoic Bivalvia (mostly Triassic or Cretaceous forms). All of them were proposed before 1961 and, therefore, are available as taxonomic names of species-group according to the International Code of Zoological Nomenclature (Article 17). Some recent authors have automatically regarded them as subspecies. Examining the type localities and distribution of these varieties, however, these names were commonly given to some extreme specimens derived from the same fossil population. Apparent range of variation in shape often seems to be exaggerated by ontogenetical

development and secondary deformation. In such cases taxonomic distinction appears to be biologically meaningless, and the varietal names should be regarded as junior synonyms. Only in a few cases when geographic or chronological segregation is assumed, the "varieties" may be regarded as representing subspecies or distinct species.

In the present study I regard many proposed specific and infraspecific names as invalid in accordance with the above-mentioned principle. It must be, however, emphasized that such taxonomic decisions are possible only in the cases when the original specimens are well preserved or were well described with necessary information about the occurrence. Most of the early collections had poor locality data, and other criteria than morphology are often hardly applicable. Taxonomic decision is especially difficult, when a taxon is represented only by one or a few poorly preserved specimens. Therefore, there are many ambiguous cases as to the validity of hitherto proposed taxonomic names. As suggested by many authors, some Mesozoic bivalves from Japan are hardly distinguishable from the species proposed on the Tethyan, European and American materials, even if slight morphological or chronological differences may exist. Specific discrimination or identification between the materials from such distant regions often cannot be concluded on a firm basis, because of the different state of preservation and the deficiency of reliable information about the faunas from the midway areas. In many doubtful cases I was compelled to follow tentatively the classification adopted in previous works, but remarks on the possibility of different classification, if any, are added.

As to the classification of subgeneric and higher taxa I intend to take the middle path, avoiding both extreme lumping and splitting. The systematic ordering adopted in the present revision is nearly the same as that of *The Treatise*, but necessary amendments are presented about the taxonomic position and ranking of some genera and subgenera, if they have been misinterpreted or regarded as ambiguous.

IV. SYSTEMATIC CATALOGUE

This revised catalogue includes all the Mesozoic Bivalvia hitherto described from Japan and its adjacent areas (Saghalin, Kurile, Korea and Formosa). The following format and abbreviations are adopted.

Taxonomic names.—Revised taxonomic names are written in bold-faced letters. A question mark placed after a generic name indicates that the generic reference is doubtful. "cf." after a name of indeterminable species indicates the occurrence of comparable specimen(s) with the next coming taxon. "aff." means the occurrence of not identical but morphologically similar specimens(s). Both of these expressions are used primarily for indicating the relation to foreign species. Comparable specimen(s) with domestic taxa are listed in synonymies with the prefix "compare".

Synonymies.—An attempt has been made to provide complete synonymies which appeared in descriptive works. Omitted are the synonyms on the materials from other countries and those appeared in faunal lists without description, citations in comparative studies, picture books with no original illustration, guide books on local faunas and various unscientific accounts. For brevity, references are designated only by author name and year in the text. The full reference including the title of periodical and number of volume (series or section in brackets and number or part in parentheses) will be found in the bibliography. The author name of original publication, if it is the same as the author name of the taxon, is not repeated. "*sic*" indicates the exact spelling of taxonomic name which is incorrect. Typographical errors are corrected with brief annotations.

Type.—Only information about primary type-specimen(s) is indicated. The categories of types, namely, holotype (by original designation or by monotypy), syntype, lectotype or neotype, are distinguished. Information about the valid designation of lectotype (if any) and the depository, register number and locality of type-specimen(s) are also added. Type-specimens of the taxa proposed for foreign materials are not treated here. If only one of the syntype specimens was illustrated in the original description, it is usually designated here as the lectotype; in other cases, however, new designation of lectotype is generally avoided here, because such a procedure should be desirably accompanied by particular investigation on the taxon. The place names of type localities are modernized in accordance with the present administrative division. The information about the categories of type-specimens and depositories given in "Catalogue of type-specimens of fossils in Japan" (Hanzawa, Asano and Takai, 1961 ed.) is not always correct as to the Mesozoic Bivalvia; hence some disagreement will be found.

Depository.—The following abbreviations are used for the indication of the institutions where the type-specimens are actually (or said to be) preserved.

GMH: Department of Geology and Mineralogy, Faculty of Science, Hokkaido University, Sapporo

IGPS: Institute of Geology and Palaeontology, Faculty of Science, Tohoku University, Sendai

GIUM: Department of Earth Sciences, Faculty of Science, Ibaraki University, Mito
UMUT: University Museum, the University of Tokyo, Tokyo
(specimens transferred from Geological Institute, Faculty of Science, the University of Tokyo)
CU: Geological Institute, Faculty of Science, Chiba University, Chiba
GSJ: Geological Survey of Japan, Kawasaki
GYU: Department of Geosciences, Faculty of Education, Yokohama National University, Yokohama
UK: Geological and Mineralogical Institute, Faculty of Science, Kyoto University (the University of Kyoto), Kyoto
OCU: Department of Geosciences, Faculty of Science, Osaka City University, Osaka
OMN: Osaka Museum of Natural History, Osaka
IGSH: Institute of Geology and Mineralogy, Faculty of Science, Hiroshima University, Hiroshima
GF: Department of Geology, Fukuoka University of Education, Munakata
GK: Department of Geology, Faculty of Science, Kyushu University, Fukuoka
KU: Department of Geology, Faculty of Science, Kumamoto University, Kumamoto
KE: Department of Geosciences, Faculty of Education, Kumamoto University, Kumamoto

Age.—Vertical range of each taxon in Japan and its adjacent regions is indicated primarily by means of international (Tethyan) stage names. Because fossil bivalves often are not accompanied by ammonites and any other index fossils, the age of fossil beds is not necessarily determinable with reliable evidences. The range of some taxa, especially non-marine and brackish-water species, is inevitably shown more roughly.

Distribution.—Stratigraphic and geographic distribution of each taxon is indicated by the names of strata and areas. Distribution in other countries is only briefly noted. The data were derived mainly from previous descriptive studies cited in the above synonymies but partly supplemented by other undescribed materials here examined. Occurrence of comparable specimens is not considered. The geographic position of Mesozoic areas in question is indicated in the annexed index maps (Figs. 1–3).

Class BIVALVIA Linné, 1758
Subclass PALAEOTAXODONTA Korobkov, 1954
Order NUCULOIDA Dall, 1889
Superfamily NUCULACEA Gray, 1824
Family NUCULIDAE Gray, 1824
Genus ***Trigonucula*** Ichikawa, 1949

MM5242
-1-1

Trigonucula sakawana Ichikawa [Pl. 1, Fig. 1]

1949. *Trigonucula sakawana* Ichikawa, p. 268, pl. 10, figs. 1–3.—1949. *Trigonucula sakawana* var. *tokombensis* Ichikawa, p. 269, pl. 10, figs. 4, 5.—1949. *Trigonucula sakawana* var. *lata* Ichikawa, p. 269, pl. 10, fig. 6.—1954b. *Trigonucula sakawana* var. *inequilatera* Ichikawa, p. 183, pl. 17, fig. 7.—1954c. *Trigonucula sakawana* Ichikawa: Ichikawa, p. 46.

Type.—Holotype (UMUT MM5242) from Umenokidani, Sakawa, Kochi Pref. Holotype of *Trigonucula sakawana* var. *tokombensis* (UMUT MM5244) from Kasayadani, Sakawa, Kochi Pref. Holotype of *Trigonucula sakawana* var. *lata* (UMUT MM5245)

from Kuromagari, Sakawa, Kochi Pref. Holotype of *Trigonucula sakawana* var. *inequilatera* (UMUT MM5438) from north of M-valley, Iwai, Hinode, Tokyo Pref.
Age and distribution.—Carnian. Kochigatani group (lower part) in Sakawa, Sakuradani and Itsukaichi areas.

Genus ***Nuculopsis*** Girty, 1911

Subgenus ***Palaeonucula*** Quenstedt, 1930

Nuculopsis (Palaeonucula) sp. aff. **N. (P.) expansa** (Wissmann)

1954c. *Nuculopsis* (*Palaeonucula*) aff. *expansa* (Wissmann): Ichikawa, p. 45, pl. 1, fig. 4.

Age and distribution.—Carnian. Kochigatani group (lower part) in Sakuradani area.

Nuculopsis (Palaeonucula) makitoensis Hayami

1959f. *Nuculopsis* (*Palaeonucula*) *makitoensis* Hayami, p. 143, pl. 12, figs. 4–6. (erroneously spelled *mitaraiensis* in p. 143)

Type.—Holotype (UMUT MM3141) from Mitarai, Shokawa, Gifu Pref.
Age and distribution.—Callovian. Tetori group (Mitarai formation) in Makito area.

Nuculopsis (Palaeonucula) ishidoensis (Yabe and Nagao)

1926. *Nucula ishidoensis* Yabe and Nagao, *in* Yabe, Nagao and Shimizu, p. 41, pl. 13, figs. 46, 47.—1965a. *Nuculopsis* (*Palaeonucula*) *ishidoensis* (Yabe and Nagao): Hayami, p. 234. —compare 1965. *Nuculopsis* (*Palaeonucula*) sp. cf. *N.* (*P.*) *ishidoensis* (Yabe and Nagao): Matsumoto, Hayami and Hashimoto, p. 8, pl. 1, fig. 8.—1972. *Nuculopsis* (*Palaeonucula*) *ishidoensis* (Yabe and Nagao): Shikama and Suzuki, pl. 4, figs. 5, 6.

Type.—Syntype (IGPS no. 7125) from Ishido, Ohinata, Nagano Pref.
Age and distribution.—Upper Neocomian or Aptian. Ishido formation in Sanchu area and Choshi formation in Choshi area.

Genus ***Nucula*** Lamarck, 1799

Subgenus ***Nucula*** Lamarck, 1799

Nucula (Nucula) radiatocostata Nagao

1932a. *Nucula radiatocostata* Nagao, p. 27, pl. 5, fig. 12.

Type.—Holotype by monotypy (GMH? not registered) from Oku-kawakami, Suzuya river area, south Saghalin.
Age and distribution.—Upper Cretaceous in Suzuya river area.

Subgenus ***Lamellinucula*** Schenck, 1944

Nucula (Lamellinucula) sp. aff. **N. (L.) pectinata** Sowerby

1957. *Nucula* (*Lamellinucula*) sp. aff. *pectinata* Sowerby: Amano, p. 54, pl. 1, figs. 20, 21.

Age and distribution.—Santonian–Campanian. Himenoura group in Shimokoshiki island.

Nucula (Lamellinucula) nakaminatoensis Saito

1962. *Nucula* (*Lamellinucula*) *nakaminatoensis* Saito, p. 59, pl. 1, figs. 4, 5.

Type.—Syntype (GIUM nos. 4061, 4062) from Isoai, Nakaminato, Ibaraki Pref.
Age and distribution.—Campanian. Nakaminato formation in Nakaminato area.

Subgenus ***Leionucula*** Quenstedt, 1930

Nucula (Leionucula) formosa Nagao

1930. *Nucula formosa* Nagao, p. 14, pl. 2, fig. 2.—1932a. *Nucula formosa* Nagao: Nago, p. 26, pl. 5. figs. 2, 3.—1938. *Nucula formosa* Nagao: Nagao, p. 119, pl. 14, fig. 3.

Type.—Holotype (GMH? not registered) from Kojima, Himedo (Amakusa), Kumamoto Pref.

Age and distribution.—Santonian–Campanian. Himenoura group in Amakusa island, and Upper Yezo group in Teshio area of Hokkaido and Suzuya river area of Saghalin.

Nucula (Leionucula) shichiensis (Ichikawa and Maeda)

1958b. *Leionucula shichiensis* Ichikawa and Maeda, p. 76, pl. 3, figs. 3, 4.

Type.—Holotype (OCU MM168) from north of Hansanji, Seidan (Awaji), Hyogo Pref.

Age and distribution.—Campanian–Maestrichtian. Izumi group (Shimonada siltstone and Minato shale) in Awaji island.

Nucula (Leionucula) azenotanensis (Ichikawa and Maeda)

1958b. *Leionucula azenotanensis* Ichikawa and Maeda, p. 77, pl. 3, figs. 5–8.

Type.—Holotype (OCU MM170) from Kamatani, Sennan, Osaka Pref.

Age and distribution.—Campanian–Maestrichtian. Izumi group (Azenotani shale and Kitaama sandstone and shale) in Izumi mountains and Awaji island.

Subgenus uncertain

Nucula izumensis Ichikawa and Maeda

1958b. *Nucula izumensis* Ichikawa and Maeda, p. 75, pl. 3, figs. 1, 2.

Type.—Holotype (OCU MM165) from Azenotani, Sennan, Osaka Pref.

Age and distribution.—Campanian–Maestrichtian. Izumi group (Azenotani shale and Shimonada siltstone) in Izumi mountains and Awaji island.

Nucula? iwayai Ichikawa

1949. "*Nucula*" *iwayai* Ichikawa, p. 269, pl. 10, fig. 7.

Type.—Holotype (UMUT MM5246) from Otago, Sakawa. Kochi Pref.

Age and distribution.—Carnian. Kochigatani group (lower part) in Sakawa area.

Genus ***Acila*** Adams and Adams, 1858

Subgenus ***Truncacila*** Grant and Gale, 1931

Acila (Truncacila) hokkaidoensis (Nagao)

1932a. *Nucula* (*Acila*) *hokkaidoensis* Nagao, p. 28, pl. 5, figs. 17, 18.—1938. *Nucula* (*Acila*) *hokkaidoensis* Nagao: Nagao, p. 37, pl. 1, fig. 1.—1941. *Acila* (*Truncacila*) *hokkaidoensis* (Nagao): Nagao and Huzioka, p. 118.—1958b. *Acila* (*Truncacila*) *hokkaidoensis* (Nagao): Ichikawa and Maeda, p. 79, pl. 3, figs. 9–11, 14. 1962. *Acila* (*Truncacila*) *hokkaidoensis* Nagao: Saito, p. 59, pl. 1, fig. 1.

Type.—Holotype (IGPS no. 6421) from Shibunnai, Abeshinai, Teshio Prov., Hokkaido.

Age and distribution.—Turonian–Campanian. Middle Yezo group and Upper Yezo group in various areas of north and central Hokkaido, Izumi group (Azenotani shale, Minato shale and Shimonada siltstone) in Izumi mountains and Awaji island, and Futaba group (Ashizawa formation) in Futaba area.

Superfamily NUCULANACEA Adams and Adams, 1858

Family MALLETIIDAE Adams and Adams, 1858

Genus ***Palaeoneilo*** Hall and Whitfield, 1869

Palaeoneilo sakuradaniensis Ichikawa

1954c. *Palaeoneilo sakuradaniensis* Ichikawa, p. 42, pl. 1, figs. 1, 2.—1954b. *Palaeoneilo sakuradaniensis* Ichikawa: Ichikawa, p. 180, pl. 17, figs. 4, 5.

Type.—Holotype (UMUT MM5445) from Usugatani, Kaminaka, Tokushima Pref.

Age and distribution.—Carnian. Kochigatani group (lower part) in Sakuradani and Itsukaichi areas.

Palaeoneilo fujinohira Ichikawa

1954c. *Palaeoneilo fujinohira* Ichikawa, p. 43, pl. 1, figs. 5–7.

Type.—Holotype (UMUT MM5464a) from Koyanomizo, Kaminaka, Tokushima Pref.

Age and distribution.—Carnian. Kochigatani group (lower part) in Sakuradani area.

Palaeoneilo telliniformis Kobayashi and Ichikawa

1949. *Palaeoneilo telliniformis* Kobayashi and Ichikawa, *in* Ichikawa, p. 271, pl. 10, fig. 8.

Type.—Holotype (UMUT MM5247) from Umenokidani, Sakawa, Kochi Pref.

Afe and distribution.—Carnian. Kochigatani group (lower part) in Sakawa area.

Palaeoneilo iwaiensis Ichikawa

1954b. *Palaeoneilo iwaiensis* Ichikawa, p. 181, pl. 17, figs. 1–3.

Type.—Holotype (UMUT MM5441a) from Iwai, Hinode, Tokyo Pref.

Age and distribution.—Carnian. Kochigatani group (lower part) in Itsukaichi area.

Palaeoneilo sp. cf. **P. elliptica** (Goldfuss)

1961. *Palaeoneilo* sp. cf. *elliptica* Goldfuss *in* Kiparisova: Nakazawa, p. 272, pl. 14, figs. 13–18.

Age and distribution.—Skytian. Yakuno group (Oro and Narawara formations) in Maizuru zone.

Palaeoneilo sp. cf. **P. oviformis** (Eck)

1961. *Palaeoneilo* sp. cf. *P.* (?) *oviformis* (Eck): Nakazawa, p. 273, pl. 14, figs. 16 (pars), 25–27.

Age and distribution.—Skytian. Fukumoto group and Yakuno group (Honodani formation) in Maizuru zone.

Palaeoneilo sp. cf. **P. elliptica praecursor** (Frech)

1961. *Palaeoneilo* sp. cf. *elliptica praecursor* (Frech): Nakazawa, p. 274, pl. 14, fig. 22.

Age and distribution.—Skytian. Yakuno group (Oro formation) in Maizuru zone.

Genus ***Malletia*** des Moulins, 1832

Malletia higoensis Hayami

1965a. *Malletia* (*Neilo*?) *higoensis* Hayami, p. 233, pl. 27, figs. 3–5.

Type.—Holotype (GK H6196) from southwest of Kohara, Toyo, Kumamoto Pref.

Age and distribution.—Albian. Yatsushiro formation in Yatsushiro area.

Family NUCULANIDAE Adams and Adams, 1858

Genus *Nuculana* Link, 1807

Subgenus *Nuculana* Link, 1807

Nuculana (Nuculana) sambonsugii Nagao

1938. *Nuculana sambonsugii* Nagao, p. 120, pl. 14, fig. 10.

Type.—Holotype by monotypy (GMH no. 8232) from Urakawa, Hidaka Prov., Hokkaido.

Age and distribution.—Coniacian–Campanian. Upper Yezo group in Urakawa area.

Subgenus *Dacryomya* Agassiz, 1840

Nuculana (Dacryomya) nogamii nogamii Nakazawa

1961. *Nuculana (Dacryomya) nogamii* Nakazawa, p. 269, pl. 13, figs. 23–27.

Type.—Holotype (UK JM10460a) from Kamiouchi, Fukuchiyama, Kyoto Pref.

Age and distribution.—Skytian–Anisian. Yakuno group (Oro and Hirobatake formations) in Maizuru zone.

Nuculana (Dacryomya) nogamii yakunoensis Nakazawa

1961. *Nuculana (Dacryomya) nogamii yakunoensis* Nakazawa, p. 270, pl. 14, figs. 1–3, (?) 4.

Type.—Holotype (UK JM10715) from north of Kamiyakuno station, Yakuno, Kyoto Pref.

Age and distribution.—Skytian. Yakuno group (Oro formation) in Maizuru zone.

Nuculana (Dacryomya) toriyamae Hayami

1959h. *Nuculana (Dacryomya) toriyamae* Hayami, p. 41, pl. 5, figs. 2, 3.

Type.—Holotype (UMUT MM3352) from Higashinakayama, Toyoda, Yamaguchi Pref.

Age and distribution.—Sinemurian. Toyora group (Higashinagano formation) in Toyoda area.

Nuculana (Dacryomya) konishii Hayami

1961a. *Nuculana (Dacryomya) konishii* Hayami, p. 114, pl. 16, fig. 1.

Type.—Holotype (UMUT MM3675) from Ochiai, Oosa, Okayama Pref.

Age and distribution.—Toarcian (or thereabout). Yamaoku formation (Y_2 beds) in Osakabe area.

Nuculana (Dacryomya) stenodolichos Kimura

1956. *Nuculana (Dacromya) stenodolichos* Kimura [*sic*], p. 83, pl. 1, fig. 1.—1959d. *Nuculana (Dacryomya) stenodolichos* Kimura: Tamura, p. 57, pl. 6, figs. 17–19.—1959f. *Nuculana (Dacryomya) stenodolichos* Kimura: Tamura, p. 174, pl. 19, fig. 40.—1960d. *Nuculana (Dacryomya) stenodolichos* Kimura: Tamura, p. 231.

Type.—Holotype (UMUT MM7154) from Kambaradani, Sakawa, Kochi Pref.

Age and distribution.—Upper Jurassic (especially Kimmeridgian—Tithonian). Torinosu group in Sakawa and Sakamoto areas, and Soma group (Nakanosawa formation) in Soma area.

Nuculana (Dacryomya) minutula Kimura

1956. *Nuculana (Dacromya) minutula* Kimura [*sic*], p. 83, pl. 1, fig. 2.—1960d. *Nuculana (Dacryomya) minutula* Kimura: Tamura, p. 232.

Type.—Holotype (UMUT MM7157) from Habunokawa, Sakawa, Kochi Pref.

Age and distribution.—Upper Jurassic. Torinosu group in Sakawa area.

Subgenus ***Praesaccella*** Cox, 1940

Nuculana (Praesaccella) erinoensis Kimura

1956. *Nuculana (Rollieria?) erinoensis* Kimura, p. 84, pl. 1, figs. 3, 4.—1959d. *Nuculana (Praesaccella) erinoensis* Kimura: Tamura, p. 56, text-fig. 2, pl. 6, figs. 3–6.—1960d. *Nuculana (Praesaccella) erinoensis* Kimura: Tamura, p. 232.

Type.—Holotype (UMUT MM7153) from Erinono, Sakawa, Kochi Pref.

Age and distribution.—Upper Jurassic. Torinosu group in Sakawa and Sakamoto areas.

Nuculana (Praesaccella) yatsushiroensis Tamura

1959d. *Nuculana (Praesaccella) yatsushiroensis* Tamura, p. 57, pl. 6, figs. 7, 8.—1960d. *Nuculana (Praesaccella) yatsushiroensis* Tamura: Tamura, p. 232.—compare 1960. *Nuculana (Praesaccella)* sp. ex gr. *yatsushiroensis* Tamura: Hayami, Sugita and Nagumo, p. 88, pl. 8, fig. 2.

Type.—Holotype (UMUT MM3020) from Kozaki, Sakamoto, Kumamoto Pref.

Age and distribution.—Upper Jurassic. Torinosu group in Sakamoto, Sakawa and Sakuradani areas.

Subgenus uncertain

Nuculana sanchuensis Yabe and Nagao

1926. *Nuculana sanchuensis* Yabe and Nagao, *in* Yabe, Nagao and Shimizu, p. 42, pl. 12, figs. 21–23.—1965a. *Nuculana* (s. l.) *sanchuensis* Yabe and Nagao: Hayami, p. 235.—compare 1972. *Nuculana sanchuensis* Yabe and Nagao: Shikama and Suzuki, pl. 4, fig. 3.

Type.—Syntype (IGPS no. 7115) from Ishido, Ohinata, Nagano Pref.

Age and distribution.—Upper Neocomian–Albian. Ishido formation in Sanchu area, Hanoura formation in Katsuuragawa area, Arita formation in Yuasa area, and Yatsushiro formation in Yatsushiro area.

Genus ***Mesosaccella*** Chavan, 1946

Mesosaccella insignis (Nagao)

1934. *Nuculana insignis* Nagao, p. 189, pl. 29, figs. 10–12.—1965a. *Mesosaccella insignis* (Nagao): Hayami, p. 189, pl. 27, fig. 1.

Type.—Holotype (GMH no. 6773) from Aketo, Tanohata, Iwate Pref.

Age and distribution.—Aptian–Albian. Miyako group (Hiraiga and Aketo formations) in Tanohata and Omoto areas.

Mesosaccella? taiwanensis Hayami

1965. *Mesosaccella* (?) *taiwanensis* Hayami, *in* Matsumoto, Hayami and Hashimoto, p. 7, pl. 1, figs. 5–7.

Type.—Holotype (CPC no. 1) from a core of Pk-2 well, Peikan, west Formosa.

Age and distribution.—Aptian. Unnamed buried Cretaceous formation in west Formosa.

Genus ***Jupiteria*** Bellardi, 1875

Subgenus ***Ezonuculana*** Nagao, 1938

Jupiteria (Ezonuculana) mactraeformis (Nagao) [Pl. 9, Fig. 1]

1932a. *Nuculana mactraesormis* Nagao, p. 30, pl. 5, figs. 4–6, 8, 9, 16. (typographical error of *mactraeformis*)—1938. *Nuculana* (*Ezonuculana*) *mactraeformis* Nagao: Nagao, p. 122, pl. 14, figs. 4–8.—1958b. *Jupiteria* (*Ezonuculana*) *mactraeformis* (Nagao): Ichikawa and Maeda, p. 87, pl. 5, figs. 1–3.—1962. *Nuculana* (*Ezonuculana*) *mactraeformis* Nagao: Saito, p. 60, pl. 1, fig. 13.

Type.—Syntype (GMH nos. 4552, 4574, 4576) from Abeshinai, Nakagawa, Teshio Prov., Hokkaido.

Age and distribution.—Coniacian–Campanian. Upper Yezo group in Abeshinai, Urakawa, Kawakami and Keton areas, Izumi group (Azenotani shale and Shichi shale) in Izumi mountains and Awaji island, Futaba group (Ashizawa formation) in Futaba area, and Nakaminato formation in Nakaminato area.

Genus ***Yoldia*** Möller, 1842

Yoldia? hakobutsensis Nagao and Otatume

1938. *Yoldia hakobutsensis* Nagao and Otatume, p. 37, pl. 1, figs. 2–6.

Type.—Holotype (GMH no. 5940) from Osachinai, Hiratori, Hidaka Prov., Hokkaido.

Age and distribution.—Campanian–Maestrichtian. Hakobuchi group in Hidaka and Iburi areas.

Genus ***Portlandia*** Mörch, 1857

Portlandia cuneistriata Ichikawa and Maeda

1958b. *Portlandia cuneistriata* Ichikawa and Maeda, p. 82, pl. 4, figs. 1–3, 12, 13.

Type.—Holotype (OCU MM174) from Haraikawa, Nandan (Awaji), Hyogo Pref.

Age and distribution.—Maestrichtian. Izumi group (Shimonada siltstone) in Awaji island.

Portlandia furcata Ichikawa and Maeda

1958b. *Portlandia furcata* Ichikawa and Maeda, p. 83, pl. 4, figs. 7–9.

Type.—Holotype (OCU MM182) from Azenotani, Sennan, Osaka Pref.

Age and distribution.—Campanian. Izumi group (Azenotani shale) in Izumi mountains.

Portlandia izumensis Ichikawa and Maeda

1958b. *Portlandia* (s. l.) *izumensis* Ichikawa and Maeda p. 84, pl. 4, figs. 4–6.

Type.—Holotype (OCU MM185) from Anaga, Seidan (Awaji), Hyogo Pref.

Age and distribution.—Campanian. Izumi group (Azenotani shale and Shichi shale) in Izumi mountains and Awaji island.

Portlandia obliquistriata (Amano)

1957a. *Neilonella obliquistriata* Amano, p. 55, pl. 1, figs. 30–33.

Type.—Holotype (UMUT KML 0073) from Ukimizu, Shimokoshiki, Kagoshima Pref.

Age and distribution.—Santonian–Campanian. Himenoura group in Shimokoshiki island.

Subclass CRYPTODONTA Neumayr, 1884
Order SOLEMYOIDA Dall, 1889
Superfamily SOLEMYACEA Adams and Adams, 1857
Family SOLEMYIIDAE Adams and Adams, 1857
Genus ***Solemya*** Lamarck, 1818
Subgenus uncertain

MM 3138 -1-2

Solemya suprajurensis Hayami [Pl. 1, Fig. 2]

1959f. *Solemya suprajurensis* Hayami, p. 141, pl. 12, fig. 1.

Type.—Holotype (UMUT MM3138) from Mitarai, Shokawa, Gifu Pref.

Age and distribution.—Callovian. Tetori group (Mitarai formation) in Makito area.

Solemya kobayashii Tamura

1960d. *Solemya kobayashii* Tamura, p. 231, pl. 2, figs. 4, 5.

Type.—Holotype (UMUT MM3615) from Iwasa, Sakawa, Kochi Pref.

Age and distribution.—Upper Jurassic. Torinosu group in Sakawa area.

Solemya angusticaudata Nagao

1932a. *Solemya angusticaudata* Nagao, p. 25, pl. 5, fig. 7.—1938. *Solemya* cf. *angusticaudata* Nagao: Nagao and Otatume, p. 36, pl. 1, fig. 11.

Type.—Holotype by monotypy (GMH no. 4568) from the upper course of the Ikushumbetsu, Mikasa, Ishikari Prov., Hokkaido.

Age and distribution.—Coniacian–Maestrichtian. Upper Yezo group in Ikushumbetsu area, and Hakobuchi group in Hetonai area.

Solemya sp.

1938. *Solemya* cf. *angusticaudata* Nagao: Nagao, p. 118, pl. 14, figs. 1, 2.

Age and distribution.—Albian (or thereabout). Lower Yezo group in Ikushumbetsu area.

Solemya murotoensis Kobayashi

1956. *Solemya angusticaudata* Nagao: Katto and Ozaki, p. 2, figs. 1, 2.—1957b. *Solemya* (*Acharax?*) *murotoensis* Kobayashi, p. 356, text-fig. 1, pl. 3, figs. 17, 18.

Type.—Holotype (Kochi Univ. not registered) from Sakamoto, Muroto, Kochi Pref.

Age and distribution.—Probably Palaeogene (not Cretaceous as formerly interpreted). Muroto formation in Muroto area.

Subclass PTERIOMORPHIA Beurlen, 1944
Order ARCOIDA Stoliczka, 1871
Superfamily ARCACEA Lamarck, 1809
Family PARALLELODONTIDAE Dall, 1898
Subfamily PARALLELODONTINAE Dall, 1898
Genus ***Parallelodon*** Meek and Worthen, 1866
Subgenus ***Cosmetodon*** Branson, 1942

Paralleldon (Cosmetodon) niranohamensis Hayami

1958c. *Parallelodon niranohamensis* Hayami, p. 100, text-fig. 1, pl. 7, figs. 1–4.—1959a. *Parallelodon niranohamensis* Hayami: Hayami, p. 68, pl. 7, figs. 1, 2.

Type.—Holotype (UMUT MM2871) from Hosoura, Shizukawa, Miyagi Pref.

Age and distribution.—Hettangian. Shizukawa group (Niranohama formation) in Shizukawa and Mizunuma areas.

Parallelodon (Cosmetodon) infraliassicus Hayami

1959h. *Parallelodon infraliassicus* Hayami, p. 42, pl. 5, figs. 4–6.—1959h. *Parallelodon* cf. *infraliassicus* Hayami: Hayami, p. 44, pl. 5, fig. 7.

Type.—Holotype (UMUT MM3355) from Higashinagano, Toyoda, Yamaguchi Pref.

Age and distribution.—Sinemurian. Toyora group (Higashinagano formajtion) in Toyoda area.

Parallelodon (Comestodon) inflatus Tamura

1959d. *Parallelodon inflatus* Tamura, p. 53, pl. 6, figs. 9, 10.—compare 1959f. *Parallelodon* aff. *inflatus* Tamura: Tamura, p. 172, pl. 19, figs. 12–15.

Type.—Holotype (UMUT MM3023) from Tsurubami, Sakamoto, Kumamoto Pref.

Age and distribution.—Upper Jurassic. Torinosu group in Sakamoto area.

Paralleldon (Cosmetodon) koikensis Tamura

1959f. *Parallelodon koikensis* Tamura, p. 169, pl. 19, figs. 9–11.—1960d. *Parallelodon koikensis* Tamura: Tamura, p. 232.

Type.—Holotype (UMUT MM3193) from Tatenosawa, Kashima, Fukushima Pref.

Age and distribution.—Upper Jurassic (especially Kimmeridgian). Soma group (Nakanosawa formation) in Soma area, and Torinosu group in Sakuradani and Sakawa areas.

Parallelodon (Cosmetodon) kesennumensis Hayami

1960. *Parallelodon kesennumensis* Hayami, *in* Hayami, Sugita and Nagumo, p. 89, pl. 8, figs. 3, 4.

Type.—Holotype (UMUT MM 3636) from Wakagihama (Oshima), Kesennuma, Miyagi Pref.

Age and distribution.—Tithonian. Shishiori group (Kogoshio formation) in Oshima area.

Parallelodon (Cosmetodon) nipponicus (Nagao)

1934. *Grammatodon nipponica* Nagao [*sic*], p. 190, pl. 28, fig. 3.—1965a. *Parallelodon*

nipponicus (Nagao): Hayami, p. 236, pl. 27, figs. 6, 7.—1969. *Parallelodon nipponicus* (Nagao): Hatai, Kotaka and Noda, p. 31.

Type.—Holotype by monotypy (GMH no. 6787) from Hiraiga, Tanohata, Iwate Pref.

Age and distribution.—Aptian–Albian. Miyako group (Hiraiga formation) in Tanohata area, Haidateyama formation in Nozu area, Yatsushiro formation in Yatsushiro area, and Arita formation in Yuasa area.

Subgenus ***Palaeocucullaea*** Tokuyama, 1960

Parallelodon (Palaeocucullaea) monobensis Nakazawa [Pl. a, Fig. 3]

1955. *Parallelodon monobensis* Nakazawa, p. 255, pl. 15, fig. 17, pl. 16, figs. 1–3.—1960c. *Parallelodon (Palaeocucullaea) monobensis* Nakazawa: Tokuyama, p. 206, pl. 12, figs. 1–6.

Type.—Holotype (UK JM10310) from Monobe, Ayabe, Kyoto Pref.

Age and distribution.—Carnian. Nabae group (N3 formation) and Heki formation in Maizuru zone, and Mine group (Hirabara formation) in Mine area.

Parallelodon (Palaeocucullaea?) subnavicellus Hayami

1959h. *Parallelodon (?) subnavicellus* Hayami, p. 44, pl. 5, fig. 8.

Type.—Holotype (UMUT MM3360) from Higashinagano, Toyoda, Yamaguchi Pref.

Age and distribution.—Sinemurian. Toyora group (Higashinagano formation) in Toyoda area.

Subgenus ***Torinosucatella*** Tamura, 1959

Parallelodon (Torinosucatella) kobayashii (Tamura) [Pl. 1, Figs. 4, 5]

1959d. *Catella (Torinosucatella) kobayashii* Tamura, p. 55, text-fig. 1, pl. 6, figs. 11–16.—1959f. *Catella (Torinosucatella) kobayashii* Tamura: Tamura, p. 173, pl. 19, figs. 7, 8.—1960d. *Catella (Torinosucatella) kobayashii* Tamura: Tamura, p. 232.—1960. *Parallelodon (Torinosucatella) kobayashii* (Tamura): Hayami, Sugita and Nagumo, p. 90, pl. 8, fig. 5.

Type.—Holotype (UMUT MM3024) from Tsurubami, Sakamoto, Kumamoto Pref.

Age and distribution.—Upper Jurassic (especially Kimmeridgian and Tithonian). Torinosu group in Sakamoto and Sakuradani areas, Soma group (Nakanosawa formation) in Soma area, and Shishiori group (Kogoshio formation) in Oshima area.

Subfamily uncertain

Parallelodon? infrequens Kobayashi and Ichikawa

1950c. *"Parallelodon" infrequens* Kobayashi and Ichikawa, p. 239, pl. 4, fig. 12.

Type.—Holotype (UMUT MM5164) from Shimoyama, Sakawa, Kochi Pref.

Age and distribution.—Carnian. Kochigatani group (lower part) in Sakawa area.

Subfamily GRAMMATODONTINAE Branson, 1942

Genus ***Grammatodon*** Meek and Hayden, 1861

Subgenus ***Grammatodon*** Meek and Hayden, 1861

Grammatodon (Grammatodon) toyorensis Hayami

1959h. *Grammatodon toyorensis* Hayami, p. 45, pl. 5, figs. 9–12.

Type.—Holotype (UMUT MM3361) from Higashinagano, Toyoda, Yamaguchi Pref.

Age and distribution.—Sinemurian. Toyora group (Higashinagano formation) in Toyoda area.

Grammatodon (Grammatodon) takiensis Kimura

1956. *Grammatodon takiensis* Kimura, p. 84, pl. 1, figs. 5, 6.—1959d. *Grammatodon takiensis* Kimura: Tamura, p. 54, pl. 6, figs. 1, 2.—1959f. *Grammatodon takiensis* Kimura: Tamura, p. 172, pl. 19, figs. 4–6.—1969d. *Grammatodon takiensis* Kimura: Tamura, p. 232.—1960. *Grammatodon* (s. s.) *takiensis* Kimura: Hayami, Sugita and Nagumo, p. 91, pl. 8, figs. 6, 7.

Type.—Holotype (UMUT MM7158) from Nioigataki, Sakawa, Kochi Pref.

Age and distribution.—Upper Jurassic–Berriasian. Torinosu group in Sakawa, Sakamoto and Sakuradani areas, Soma group (Nakanosawa and Koyamada formations) in Soma area, and Isokusa formation in Oshima area.

Subgenus ***Indogrammatodon*** Cox, 1937

Grammatodon (Indogrammatodon) nakanoi Hayami

1958c. *Grammatodon* (*Indogrammatodon?*) *nakanoi* Hayami, p. 104, pl. 7, figs. 5, 6.

Type.—Holotype (UMUT MM2878) from Hosoura, Shizukawa, Miyagi Pref.

Age and distribution.—Hettangian. Shizukawa group (Niranohama formation) in Shizukawa area.

Grammatodon (Indogrammatodon) densistriatus Tamura

1959f. *Grammatodon* (*Indogrammatodon*) *densistriatus* Tamura, p. 173, pl. 19, figs. 4–6.

Type.—Holotype (UMUT MM3202) from Yamashita, Kashima, Fukushima Pref.

Age and distribution—Kimmeridgian. Soma group (Nakanosawa formation) in Soma. area.

Grammatodon (Indogrammatodon) awajianus (Ichikawa and Maeda)

1958a. *Indogrammatodon awajianus* Ichikawa and Maeda, p. 71, pl. 2, figs. 3, 4.—1958b. *Indogrammatodon awajianus* Ichikawa and Maeda: Ichikawa and Maeda, p. 90.

Type.—Holotype (OCU MM156) from Kuroiwa, Nandan (Awaji), Hyogo Pref.

Age and distribution.—Maestrichtian. Izumi group (Shimonada siltstone) in Awaji island.

Subgenus ***Nanonavis*** Stewart, 1930

Grammatodon (Nanonavis) yokoyamai Yabe and Nagao

1890. *Cucullaea* cf. *striatella* Michelin: Yokoyama, p. 199, pl. 25, fig. 13.—1926. *Grammatodon yokoyamai* Yabe and Nagao, *in* Yabe, Nagao and Shimizu, p. 44, pl. 12, fig. 12, 13, 25.—1963. *Nanonavis yokoyamai* (Yabe and Nagao): Matsumoto, Hayami and Asano, p. 32, pl. 51, fig. 13.—1965a. *Nanonavis* (*Nanonavis*) *yokoyamai* (Yabe and Nagao): Hayami, p. 238, pl. 27, figs. 8–13.—1965a. *Nanonavis* (*Nanonavis*) sp. cf. *N.* (*N.*) *yokoyamai* (Yabe and Nagao): Hayami, p. 241, pl. 27, fig. 14.—1972. *Nanonavis* (*Nanonavis*) *yokoyamai* (Yabe and Nagao): Shikama and Suzuki, pl. 4, fig. 7.

Type.—Lectotype designated by Hayami (1965a, p. 238) (IGPS no. 22555) from Ishido, Ohinata, Nagano Pref.

Age and distribution.—Upper Neocomian–Albian. Ishido formation in Sanchu area, Yatsushiro formation in Yatsushiro area, Hanoura formation in Katsuuragawa area, Oshima formation in Oshima area, Arita formation in Yuasa area, Miyako group (Hiraiga formation) in Tanohata area, Ofunato group in Ofunato area, and Choshi formation in Choshi area.

Grammatodon (Nanonavis) sachalinensis sachalinensis (Schmidt)

1873. *Cucullaea sachalinensis* Schmidt, p. 24, pl. 5, fig. 5, pl. 8, figs. 6, 7.—1890. *Cucullaea* cf. *sachalinensis* Schmidt: Yokoyama, p. 176, pl. 18, fig. 8.—1927. *Grammatodon sachalinensis* (Schmidt): Yabe, pl. 7, fig. 3.—1932a. *Grammatodon sachalinensis* (Schmidt): Nagao, p. 31, pl. 6, figs. 1–5.—1938. *Parallelodon (Nanonavis) sachalinensis* (Schmidt): Nagao and Otatume, p. 38, pl. 2, fig. 2.—1957a. *Grammatodon sachalinensis* Schmidt: Amano, p. 56, pl. 2, figs. 9–11.—1962. *Nanonavis sachalinensis* (Schmidt): Saito, p. 61, pl. 1, fig. 16.—1963. *Nanonavis sachalinensis* (Schmidt): Matsumoto, Hayami and Asano, p. 29, pl. 44, fig. 8.

Type.—Lectotype designated by Ichikawa and Maeda (1958a, p. 67) (depository unknown) from Saghalin.

Age and distribution.—Coniacian–Maestrichtian. Upper Yezo group and Hakobuchi group in various areas of north and central Hokkaido, comparable strata in Saghalin, Himenoura group in Shimokoshiki island, and Futaba group (Ashizawa formation) in Futaba area.

Grammatodon (Nanonavis) sachalinensis brevis (Ichikawa and Maeda)

1958a. *Nanonavis sachalinensis brevis* Ichikawa and Maeda, p. 67, pl. 2, figs. 1, 2.—1958b. *Nanonavis sachalinensis brevis* Ichikawa and Maeda: Ichikawa and Maeda, p. 90.

Type.—Holotype (OCU MM150) from Hansanji, Seidan (Awaji), Hyogo Pref.

Age and distribution.—Campanian. Izumi group (Minato shale, Shichi shale and Azenotani shale) in Awaji island and Izumi mountains.

Genus ***Pleurogrammatodon*** Ichikawa and Maeda, 1958

Pleurogrammatodon splendens Ichikawa and Maeda [Pl. 9, Figs. 7a, b]

1958a. *Pleurogrammatodon splendens* Ichikawa and Maeda, p. 64, pl. 1, figs. 1, 2.—1958b. *Pleurogrammatodon splendens* Ichikawa and Maeda: Ichikawa and Maeda, p. 89.

Type.—Holotype (OCU MM145) from Yamamoto, Nandan (Awaji), Hyogo Pref.

Age and distribution.—Campanian–Maestrichtian. Izumi group (Shimonada siltstone and Azenotani shale) in Awaji island and Izumi mountains.

Pleurogrammatodon elongatus (Nagao and Otatume)

1938. *Parallelodon (Nanonavis) elongatus* Nagao and Otatume, p. 39, pl. 2, fig. 1. (erroneously spelled "*elongatsu*" in p. 39)

Type.—Holotype by monotypy (GMH not registered) from Kiusu, Shimohobetsu, Iburi Prov., Hokkaido.

Age and distribution.—Campanian or Maestrichtian. Hakobuchi group in Hobetsu area.

Family CUCULLAEIDAE Stewart, 1930

Genus ***Cucullaea*** Lamarck, 1801

Subgenus ***Idonearca*** Conrad, 1862

Cucullaea (Idonearca) mabuchii Hayami

1958c. *Cucullaea* (s. l.) *mabuchii* Hayami, p. 102, text-fig. 2, pl. 7, figs. 7–10.

Type.—Holotype (UMUT MM2874) from Hosoura, Shizukawa, Miyagi Pref.

Age and distribution.—Hettangian. Shizukawa group (Niranohama formation) in Shizukawa area.

Cucullaea (Idonearca) sp. aff. **C. (I.) aalensis** Quenstedt

1959c. *Cucullaea* (s. l.) sp. ex gr. *aalensis* Quenstedt: Hayami, p. 55, pl. 5, fig. 1.

Age and distribution.—Bajocian. Hashiura group (Aratozaki formation) in Shizukawa area.

Cucullaea (Idonearca) acuticarinata Nagao

1934. *Cucullaea acuticarinata* Nagao, p. 192, pl. 24, figs. 10–14, pl. 30, fig. 5.—1965a. *Cucullaea acuticarinata* Nagao: Hayami, p. 242, pl. 27, fig. 15, pl. 28, figs. 1–10.—compare 1965. *Cucullaea* sp. aff. *C. acuticarinata* Nagao: Matsumoto, Hayami and Hashimoto, p. 8, pl. 1, fig. 9.

Type.—Holotype (GMH no. 6756) from Hiraiga, Tanohata, Iwate Pref.

Age and distribution.—Aptian–Albian. Miyako group (Hiraiga and Aketo formations) in Tanohata area.

Cucullaea (Idonearca) fujii Hayami

compare 1957b. *Cucullaea* aff. *acuticarinata* Nagao: Amano, p. 81, pl. 1, figs. 4, 5.—1965a. *Cucullaea fujii* Hayami, p. 246, pl. 28, figs. 14, 15.

Type.—Holotype (GK H6216) from Tamarimizu, Nozu, Oita Pref.

Age and distribution.—Aptian–Albian. Haidateyama formation in Nozu area.

Cucullaea (Idonearca) transversa Nagao

1934. *Cucullaea transversa* Nagao, p. 193, pl. 25, figs. 1, 3–6.—1965a. *Cucullaea transversa* Nagao: Hayami, p. 245, pl. 28, figs. 11–13.—1972. *Cucullaea transversa* Nagao: Shikama and Suzuki, pl. 4, fig. 8.

Type.—Holotype (GMH no. 6797) from Hiraiga, Tanohata, Iwate Pref.

Age and distribution.—Aptian–Albian. Miyako group (Hiraiga and Aketo formations) in Tanohata area, and Choshi formation in Choshi area.

Cucullaea (Idonearca) ezoensis ezoensis Yabe and Nagao

1928. *Cucullaea ezoensis* Yabe and Nagao, p. 81, pl. 16, figs. 1–3.

Type.—Holotype (IGPS no. 22611) from Futamatanosawa, Miruto, Ishikari Prov., Hokkaido.

Age and distribution.—Cenomanian–Turonian. Middle Yezo group (Mikasa sandstone) in Miruto and Ikushumbetsu areas.

Cucullaea (Idonearca) ezoensis amaxensis Matsumoto

1938. *Cucullaea ezoensis* Yabe and Nagao var. *amaxensis* Matsumoto, p. 13, pl. 1, fig. 1.—1956. *Cucullaea ezoensis* var. *amaxensis* Matsumoto: Amano, p. 68.

Type.—**Lectotype** here designated (Matsumoto, 1938, pl. 1, fig. 1. UMUT MM7745) from Kobunenosako, Gosyonoura, Kumamoto Pref.

Age and distribution.—Cenomanian. Gosyonoura group in Gosyonoura and Shishijima islands.

Cucullaea (Idonearca) sp. aff. **C. (I.) truncata** Gabb

1928. *Cucullaea* aff. *truncata* Gabb: Yabe and Nagao, p. 82, pl. 17, figs. 1, 2.

Age and distribution.—Cenomanian–Turonian. Middle Yezo group (Mikasa sandstone) in Ikushumbetsu area.

Cucullaea (Idonearca) delicatostriata Yabe and Nagao

1925. *Cucullaea delicatostriata* Yabe and Nagao, p. 113, pl. 28, fig. 1.
Type.—**Lectotype** here designated (Yabe and Nagao, 1925, pl. 28, fig. 1. IGPS no. 8555) from south of Cape Khoi, near Alexandrovsk, north Saghalin.
Age and distribution.—Cenomanian–Turonian. Werblud group ("Cape Khoi beds") in Alexandrovsk area.

Family ARCIDAE Lamarck, 1809

Genus ***Arca*** Linné, 1758

Subgenus ***Eonavicula*** Arkell, 1929

Arca (Eonavicula) shinanoensis Yabe and Nagao

1926. *Arca shinanoensis* Yabe and Nagao, *in* Yabe, Nagao and Shimizu, p. 42, pl. 13, figs. 33–35.
Type.—Syntype (IGPS no. 22521) from Bomekizawa, Ohinata, Nagano Pref. and from Shiroi, Ueno, Gumma Pref.
Age and distribution.—Neocomian. Shiroi formation in Sanchu area.

Arca (Eonavicula) prolata Amano

1957b. *Arca prolata* Amano, p. 80, pl. 1, figs. 1–3.—1965a. *Eonavicula prolata* (Amano): Hayami, p. 249.
Type.—Holotype (UMUT KML0017) from Hagino, Kahoku, Kochi Pref.
Age and distribution.—Aptian. Hagino formation in Monobegawa area.

Family NOETIIDAE Stewart, 1930

[Genus ***Matsumotoa*** Okada, 1958

Matsumotoa unisulcata unisulcata (Amano)

1938. *Navicula* sp.: Matsumoto, p. 14, pl. 1, figs. 2, 3.—1956. *Breviarca unisulcata* Amano, p. 66, pl. 1, figs. 6–8.—1968. *Matsumotoa unisulcata* (Amano): Tamura, Tashiro and Motojima, p. 36, text-fig. 1, pl. 1, figs. 1–5.
Type.—Holotype (KU not registered) from Shishijima, Azuma, Kagoshima Pref.
Age and distribution.—Cenomanian. Gosyonoura group in Shishijima and Gosyonoura islands.

Matsumotoa unisulcata densestriata Tamura and Tashiro

1968. *Matsumotoa unisulcata densestriata* Tamura and Tashiro, *in* Tamura, Tashiro and Motojima, p. 36, text-fig. 1, pl. 1, figs. 6–9.
Type.—Holotype (KE 1727) from Itoishi, Mifune, Kumamoto Pref.
Age and distribution.—Cenomanian–Turonian. Mifune group in Mifune area.

Matsumotoa japonica Okada [Pl. 1, Figs. 6, 7]

1958. *Matsumotoa japonica* Okada, p. 42, text-figs. 2–5, pl. 10, figs. 1–5, pl. 11, figs. 6–12.—1968. *Matsumotoa japonica* (Okada): Tamura, Tashiro and Motojima, p. 36, text-fig. 1, pl. 1, figs. 10–18.
Type.—Holotype (GK H6027) from Tsuzumugi, Mifune, Kumamoto Pref.
Age and distribution.—Cenomanian–Turonian. Mifune group in Mifune area, and Gosyonoura group in Gosyonoura island.

Family LIMOPSIDAE Dall, 1895

Genus ***Limopsis*** Sassi, 1827

Limopsis kogata (Ichikawa and Maeda)

1958b. *Glycymeris kogata* Ichikawa and Maeda, p. 90, pl. 5, figs. 4–7, 10.—1971. *Limopsis kogata* (Ichikawa and Maeda): Tashiro, p. 237, pl. 28, figs. 31–34.

Type.—Holotype (OCU MM206) from Kamikunugidani, Nandan (Awaji), Hyogo Pref.

Age and distribution.—Campanian–Maestrichtian. Izumi group (Shimonada siltstone and Kitaama sandstone and shale) in Awaji island, and Himenoura group in Amakusa islands.

Limopsis shimonadensis (Ichikawa and Maeda)

1958b. *Glycymeris shimonadensis* Ichikawa and Maeda, p. 92, pl. 5, figs. 8, 9.

Type.—Holotype (OCU MM225) from Kamikunugidani, Nandan (Awaji), Hyogo Pref.

Age and distribution.—Maestrichtian. Izumi group (Shimonada siltstone) in Awaji island.

Remarks.—This is possibly conspecific with *Limopsis kogata* (Ichikawa and Maeda).

Family GLYCYMERIDIDAE Newton, 1922

Genus ***Glycymeris*** da Costa, 1778

Subgenus ***Hanaia*** Hayami, 1965

Glycymeris (Hanaia) densilineata Nagao [Pl. 1, Figs. 9, 10]

1934. *Glycymeris densilineata* Nagao, p. 195, pl. 32, figs. 8, 9.—1965a. *Glycymeris (Hanaia) densilineata* Nagao: Hayami, p. 251, pl. 29, figs. 1–15.—1971. *Glycymeris (Hanaia) densilineata* Nagao: Tashiro, p. 234, text-fig. 5c, pl. 28, figs. 22, 23.

Type.—Holotype (GMH no. 6759) from Hiraiga, Tanohata, Iwate Pref.

Age and distribution.—Aptian–Albian. Miyako group (Tanohata, Hiraiga and Aketo formations) in Tanohata, Omoto and Miyako areas.

Subgenus ***Glycymerita*** Finlay and Marwick, 1937

Glycymeris (Glycymerita) hokkaidoensis (Yabe and Nagao)

1928. *Pectunculus hokkaidoensis* Yabe and Nagao, p. 82, pl. 17, fig. 22.—1971. *Glycymeris (Hanaia) hokkaidoensis* (Yabe and Nagao): Tashiro, p. 235, pl. 28, fig. 16.

Type.—Holotype by monotypy (IGPS no. 22613) from Ponhorokabetsu, Yubari, Ishikari Prov., Hokkaido.

Age and distribution.—Cenomanian–Turonian. Middle Yezo group (Mikasa sandstone) in Yubari area, and Saku formation in Abeshinai area.

Glycymeris (Glycymerita) multicostata Nagao

1932a. *Glycymeris hokkaidoensis* var. *multicostata* Nagao, p. 34, pl. 5, figs. 10, 11.—1971. *Glycymeris (Glycymerita) multicostata* Nagao: Tashiro, p. 232, pl. 27, figs. 28–32.

Type.—Syntype (GMH not registered) from the junction of the River Abeshinai and its tributary Sakai-gawa, Nakagawa, Teshio Prov., Hokkaido.

Age and distribution.—Coniacian–Campanian. Upper Yezo group in Abeshinai area.

Glycymeris (Glycymerita) amakusensis Nagao

1930. *Glycimeris amakusensis* Nagao [*sic*], p. 15, pl. 2, figs. 4–7.—compare 1956. *Glycymeris*

aff. *amakusensis* Nagao: Amano, p. 68, pl. 1, figs. 22–25.—1962. *Glycymeris multicostata* Nagao: Saito, p. 62, pl. 1, figs. 2, 3, 11.—1971. *Glycymeris* (*Glycymerita*) *amakusensis* Nagao: Tashiro, p. 226, text-fig. 2, pl. 27, figs. 1–16.

Type.—Syntype (GMH not registered) from Wadanohana, Pyugatake (Amakusa-kamishima), Kumamoto Pref.

Age and distribution.—Coniacian–Santonian. Himenoura group in Amakusa islands, Gosyonoura island and Uto area, and Futaba group (Ashizawa formation) in Futaba area.

Glycymeris (Glycymerita) solida Nagao

1930. *Glycimeris amakusensis* var. *solida* Nagao, p. 16, pl. 3, figs. 13, 14 [*sic*].—1971. *Glycymeris* (*Hanaia*) *solida* Nagao: Tashiro, p. 233, text-fig. 5, pl. 28, figs. 1–8.

Type.—Syntype (GMH not registered) from Gosyonoura, Kumamoto Pref.

Age and distribution.—Albian (?)–Cenomanian. Gosyonoura group in Gosyonoura and Shishijima islands.

Glycymeris (Glycymerita) sachalinensis (Yabe and Nagao)

1925. *Pectunculus sachalinensis* Yabe and Nagao, p. 112, pl. 29, figs. 7, 8.—1927. *Pectunculus sachalinensis* Yabe and Nagao: Yabe, pl. 5, fig. 8.

Type.—Syntype (IGPS no. 8554) from south of Cape Khoi, near Alexandrovsk, north Saghalin.

Age and distribution.—Cenomanian–Turonian. Werblud group ("Cape Khoi beds") in Alexandrovsk area.

Glycymeris (Glycymerita) japonica Tashiro

1971. *Glycymeris* (*Glycymerita*) *japonica* Tashiro, p. 228, text-fig. 3, pl. 27, figs. 17–22.

Type.—Holotype (KE 1786) from Hongo, Kawaura (Amakusa-shimoshima), Kumamoto Pref.

Age and distribution.—Campanian (or thereabout). Himenoura group (upper part) in Amakusa islands.

Glycymeris (Glycymerita) himenourensis Tashiro

1971. *Glycymeris* (*Glycymerita*) *himenourensis* Tashiro, p. 229, text-fig. 4, pl. 27, figs. 23–27.

Type.—Holotype (KE 1779) from Kugushima, Ryugatake (Amakusa-kamishima), Kumamoto Pref.

Age and distribution.—Santonian. Himenoura group in Amakusa islands.

Glycymeris (Glycymerita) matsumotoi Tashiro

1971. *Glycymeris* (*Hanaia*) *matsumotoi* Tashiro, p. 233, pl. 28, text-fig. 5D, figs, 17–21.

Type.—Holotype (KE 1870) from Tani, Yatsushiro, Kumamoto Pref.

Age and distribution.—Cenomanian. Miyaji formation in Yatsushiro area.

Glycymeris (Glycymerita) katsurazawensis Tashiro

1971. *Glycymeris* (*Hanaia*) *katsurazawensis* Tashiro, p. 235, text-fig. 5E, pl. 25, figs. 9–15.

Type.—Holotype (KE 1854) from south of Katsurazawa dam, Mikasa, Ishikari Prov., Hokkaido.

Age and distribution.—Turonian. Middle Yezo group (Mikasa sandstone) in Ikushumbetsu area.

Glycymeris (Glycymerita?) haipensis Hayami

1965a. *Glycymeris* (*Glycymerita?*) *haipensis* Hayami, p. 254, pl. 29, figs. 16, 17.—1971. *Glycymeris* (*Hanaia*) *haipensis* Hayami: Tashiro, p. 234, text-fig. 5A.

Type.—Holotype (GK H6226) from Haipe, Tanohata, Iwate Pref.

Age and distribution.—Aptian. Miyako group (Hiraiga formation) in Tanohata and Omoto areas.

Subgenus ***Pseudoveletuceta*** Tashiro, 1971

Glycymeris (Pseudoveletuceta) mifunensis Tashiro [Pl. 1, Fig. 8]

1971. *Glycymeris* (*Pseudoveletuceta*) *mifunensis* Tashiro, p. 236, text-fig. 6, pl. 28, figs. 24–30.

Type.—Holotype (KE 1774) from Asanoyabu, Mifune, Kumamoto Pref.

Age and distribution.—Cenomanian–Turonian. Mifune group in Mifune area.

Genus ***Trigonarca*** Conrad, 1862

Trigonarca? sp.

1925. *Trigonarca* sp. cf. *T. tumida* Whiteaves: Yabe and Nagao, p. 114, pl. 28, figs. 2, 3.

Age and distribution.—Cenomanian–Turonian. Werblud group ("Cape Khoi beds") in Alexandrovsk area, and (?) Middle Yezo group in Ikushumbetsu area.

Trigonarca? obsoleta Yabe and Nagao

1926. *Trigonarca* (*?*) *obsoleta* Yabe and Nagao, *in* Yabe, Nagao and Shimizu, p. 43, pl. 12, fig. 24.—1965a. *Trigonarca obsoleta* Yabe and Nagao: Hayami, p. 247.

Type.—Holotype by monotypy (IGPS no. 22538) from Ishido, Ohinata, Nagano Pref.

Age and distribution.—Upper Neocomian or Aptian. Ishido formation in Sanchu area.

Trigonarca? obliquata Amano

1957b. *Trigonarca* (*?*) *obliquata* Amano, p. 82, pl. 1, figs. 6–8.—compare 1965a. *Trigonarca* sp. cf. *T. obliquata* Amano: Hayami, p. 248, pl. 28, fig. 17.

Type.—Holotype (UMUT KML0019) from Hagino, Kahoku, Kochi Pref.

Age and distribution.—Aptian. Monobegawa group (Hagino formation) in Monobegawa area.

Order MYTILOIDA Férussac, 1822

Superfamily MYTILACEA Rafinesque, 1815

Family MYTILIDAE Rafinesque, 1815

Subfamily MYTILINAE Rafinesque, 1815

Genus ***Mytilus*** Linné, 1758

Subgenus ***Falcimytilus*** Cox, 1937

Mytilus (Falcimytilus) nasai Kobayashi and Ichikawa

1950a. *Mytilus* (*Falcimytilus*) *nasai* Kobayashi and Ichikawa, p. 208, pl. 1, figs. 2, 3.—1950a. *Mytilus* (*Falcimytilus*) *nasai* var. *nagaides* Kobayashi and Ichikawa, p. 209, pl. 1, fig. 4.—1950a. *Mytilus* (*Falcimytilus*) *nasai* var. *hirataides* Kobayashi and Ichikawa, p. 209, pl. 1, fig. 5.—1954c. *Mytilus* (*Falcimytilus*) *nasai* Kobayashi and Ichikawa: Ichikawa, p. 46, pl. 1, fig. 11.—1954c. *Mytilus* (*Falcimytilus*) *nasai* var. *nagaides* Kobayashi and

Ichikawa: Ichikawa, p. 47, pl. 1, fig. 10.—compare 1956. *Mytilus* (*Falcimytilus*) cf. *nasai* Kobayashi and Ichikawa: Nakazawa, p. 235, pl. 1, fig. 10.—1959b. *Mytilus* (*Falcimytilus*) *nasai* var. *nagaides* Kobayashi and Ichikawa: Tamura, p. 220, pl. 2, figs. 13, 14.—1959b. *Mytilus* (*Falcimytilus*) *nasai* var. *hirataides* Kobayashi and Ichikawa: Tamura, p. 221, pl. 2, fig. 15.

Type.—Holotype (UMUT MM5134) from Kashiwai, Sakawa, Kochi Pref. Holotype of *Mytilus nasai* var. *nagaides* (UMUT MM5135) from the same locality Holotype of *Mytilus nasai* var. *hirataides* (UMUT MM5136) from Oowada Horiake, Sakawa, Kochi Pref.

Age and distribution.—Carnian. Kochigatani group (lower part) in Sakawa, Sakuradani and Sakamoto areas.

Mytilus (Falcimytilus?) tenuiformis Kobayashi and Ichikawa

1950a. *Mytilus tenuiformis* Kobayashi and Ichikawa, p. 207, pl. 1, fig. 7.—1950a. *Mytilus tenuiformis* var. *punctatus* Kobayashi and Ichikawa, p. 208, pl. 1, fig. 8.—compare 1956. *Mytilus* cf. *tenuiformis* Kobayashi and Ichikawa: Nakazawa, p. 234, pl. 1, fig. 7.—compare 1956. *Mytilus tenuiformis* var. *punctatus* Kobayashi and Ichikawa: Nakazawa, p. 234, pl. 1, fig. 8.—compare 1956. *Mytilus* aff. *tenuiformis* var. *punctatus* Kobayashi and Ichikawa: Nakazawa, p. 234, pl. 1, fig. 9.

Type.—Holotype (UMUT MM5139) from Kashiwai, Sakawa, Kochi Pref. Holotype of *Mytilus tenuiformis* var. *punctatus* (UMUT MM5140) from Okunominetani, Sakawa, Kochi Pref.

Age and distribution.—Carnian. Kochigatani group (lower part) in Sakawa area.

Mytilus (Falcimytilus) hirabarensis Tokuyama

1960c. *Mytilus* (*Falcimytilus*) *hirabarensis* Tokuyama, p. 210, pl. 13, fig. 9.

Type.—Holotype (UMUT MM4590) from Okubata, Mine, Yamaguchi Pref.

Age and distribution.—Carnian. Mine group (Hirabara formation) in Mine area.

Mytilus (Falcimytilus) heranirus Hayami

1958a. *Mytilus* (*Falcimytilus*) *heranirus* Hayami, p. 160, pl. 24, figs. 3, 4.—compare 1958a. *Mytilus* (*Falcimytilus*) *heranirus* Hayami subsp.: Hayami, p. 160, pl. 24, fig. 5.

Type.—Holotype (UMUT MM2723) from Kuruma, Otari, Nagano Pref.

Age and distribution.—Pliensbachian (or thereabout). Kuruma group (Tsuchizawa formation) in Otari area.

Mytilus (Falcimytilus) stricapillatus Hayami

1958a. *Mytilus* (*Falcimytilus*) *stricapillatus* Hayami, p. 159, pl. 23, figs. 8–11.—1958a. *Mytilus* (*Falcimytilus*) *stricapillatus* Hayami subsp.: Hayami, p. 159, pl. 24, figs. 1, 2.

Type.—Holotype (UMUT MM2726) from Shinatani, Omi (Agero), Niigata Pref.

Age and distribution.—Pliensbachian–Toarchian. Kuruma group (Shinatani, Negoya and Tsuchizawa formations) in Omi, Asahi and Otari areas.

Subgenus uncertain

Mytilus punctus Ichikawa

1954b. *Mytilus* (?) *punctus* Ichikawa, p. 50, pl. 7, figs. 9–10.

Type.—Holotype (UMUT MM5424) from Arai, Hinode, Tokyo Pref.

Age and distribution.—Triassic (precisely unknown). Arai formation in Itsukaichi area.

Remarks.—The relationship between the following *Mytilus chohi* and the present species should be further studied, because they may be actually conspecific.

Mytilus chohi Ichikawa

1954b. *Mytilus* (?) *chohi* Ichikawa, p. 48, pl. 7, figs. 11, 12.

Type.—Holotype (UMUT MM5419) from "M-valley" near Iwai, Hinode, Tokyo Pref.

Age and distribution.—Triassic (precisely unknown). Arai formation in Itsukaichi area.

Genus ***Lycettia*** Cox, 1937

Lycettia sp. cf. **L. lanceolata** (Sowerby)

1958. *Dreissensia* cf. *lanceolata* (Sowerby): Amano and Furuzawa, p. 23, text-figs. 1, 2.

Age and distribution.—Albian (?)–Cenomanian. Gosyonoura group in Shishijima island, and Middle Yezo group (Mikasa sandstone) in Ikushumbetsu area.

Genus ***Arcomytilus*** Agassiz, 1842

Arcomytilus dairensis Kobayashi and Hayami

1958a. *Arcomytilus dairensis* Kobayashi and Hayami, *in* Hayami, p. 158, pl. 23, figs. 5, 6.

Type.—Holotype (UMUT MM2734) from the River Daira, Asahi, Toyama Pref.

Age and distribution.—Pliensbachian or Toarcian. Kuruma group (Shinatani formation?) in Asahi area.

Arcomytilus laitmairensis (de Loriol)

1960b. *Brachidontes* (*Arcomytilus*) *laitmairensis* (de Loriol): Tamura, p. 277, pl. 32, figs. 3, 4.—1960d. *Brachidontes* (*Arcomytilus*) *laitmairensis* (de Loriol): Tamura, p. 232, pl. 2, fig. 7.

Age and distribution.—Upper Jurassic (especially Kimmeridgian). Soma group (Nakanosawa formation) in Soma area, and Torinosu group in Sakawa area. This species was originally described from Alps and also reported from the Bathonian–Kimmeridgian of England, France, Somaliland and Cutch.

Genus ***Brachidontes*** Swainson, 1840

Brachidontes nankoi Ichikawa and Maeda

1958b. *Brachidontes nankoi* Ichikawa and Maeda, p. 95, pl. 6, fig. 1.

Type.—Holotype (OCU MM232) from Chikusa, Sumoto (Awaji), Hyogo Pref.

Age and distribution.—Campanian. Izumi group (Shichi shale) in Awaji island, Himenoura group in Amakusa islands, and Kuji group in Nodatamagawa area.

Genus ***Limnoperna*** Rochebrune, 1882

Limnoperna? sengokuensis Hase

1960. *Limnoperna* (?) *sengokuensis* Hase, p. 318, pl. 36, figs. 23–29.

Type.—Holotype (IGSH HA161) from Sengoku, Miyata, Fukuoka Pref.

Age and distribution.—Lower Cretaceous (precisely unknown). Kwanmon group (Sengoku and Wakamiya formations) in Miyata and Toyonishi areas.

Subfamily MODIOLINAE Keen, 1958

Genus ***Modiolus*** Lamarck, 1799

Modiolus paronaiformis (Kobayashi and Ichikawa)

1950a. *Volsella paronaiformis* Kobayashi and Ichikawa, p. 210, pl. 1, fig. 1.—compare 1956. *Volsella* aff. *paronaiformis* Kobayashi and Ichikawa: Nakazawa, p. 236, pl. 1, figs. 16, 17.

Type.—Holotype (UMUT MM5133) from Umenokidani, Sakawa, Kochi Pref.

Age and distribution.—Carnian. Kochigatani group (lower part) in Sakawa area.

Modiolus nagatoensis Tokuyama

1960a. *Modiolus nagatoensis* Tokuyama, p. 36, pl. 4, fig. 14.

Type.—Holotype (UMUT MM4561) from Higaeribara, Mine, Yamaguchi Pref.

Age and distribution.—Carnian (or lower Norian). Mine group (Aso formation) in Mine area.

Remarks.—This species seems to be closely related, if not identical, to *Modiolus paronaiformis*.

Modiolus okubatensis Tokuyama

1960c. *Modiolus okubatensis* Tokuyama, p. 210, pl. 13, figs. 6–8.

Type.—Holotype (UMUT MM4587) from Hirabarazaka, Mine, Yamaguchi Pref.

Age and distribution.—Carnian. Mine group (Hirabara formation) in Mine area.

Modiolus bakevelloides (Hayami) [Pl. 1, Fig. 12]

1958a. *Volsella bakevelloides* Hayami, p. 156, pl. 23, figs. 1–3.—1958d. *Modiolus bakevelloides* (Hayami): Hayami, pl. 28, fig. 4.

Type.—Holotype (UMUT MM2719) from Niranohama, Utatsu, Miyagi Pref.

Age and distribution.—Hettangian. Shizukawa group (Niranohama formation) in Shizukawa area.

Modiolus magatama Hayami

1959h. *Modiolus magatama* Hayami, p. 46, pl. 5, fig. 13.

Type.—Holotype (UMUT MM3366) from Higashinagano, Toyoda, Yamaguchi Pref.

Age and distribution.—Sinemurian. Toyora group (Higashinagano formation) in Toyoda area.

Modiolus sp. cf. **M. bipartitus** Sowerby

1960b. *Modiolus* cf. *bipartitus* J. Sowerby: Tamura, p. 276, pl. 32, figs. 19, 20.

Age and distribution.—Kimmeridgian. Soma group (Nakanosawa formation) in Soma area.

Modiolus maedae Hayami

1959f. *Modiolus maedae* Hayami, p. 145, pl. 12, figs. 8–10.

Type.—Holotype (UMUT MM3145) from Mitarai, Shokawa, Gifu Pref.

Age and distribution.—Callovian. Tetori group (Mitarai formation) in Makito area.

Modiolus falcatus Amano

1957b. *Modiolus falcatus* Amano, p. 91, pl. 2, figs. 3–8.—1965a. *Modiolus falcatus* Amano: Hayami, p. 255, pl. 30, figs. 1, 2.

Type.—Holotype (UMUT KML0058) from Hagino, Kahoku, Kochi Pref.

Age and distribution.—Upper Neocomian–Aptian. Monobegawa group (Hagino formation) in Monobegawa area, Arita formation in Yuasa area, and Miyako group (Hiraiga formation) in Tonohata area.

Modiolus sp. aff. **M. subsimplex** d'Orbigny

1965a. *Modiolus* sp. aff. *M. subsimplex* d'Orbigny: Hayami, p. 256, pl. 30, fig. 3.

Age and distribution.—Upper Neocomian–Aptian. Arita formation in Yuasa area.

Modiolus ezoensis Yabe and Nagao

1928. *Modiolus ezoensis* Yabe and Nagao, p. 89, pl. 17, fig. 11.

Type.—Holotype by monotypy (IGPS no. 22627) from Washinosawa, Horomui, Ishikari Prov., Hokkaido.

Age and distribution.—Cenomanian–Turonian(?). Middle Yezo group (?) in Horomui area.

Modiolus shimonadensis Ichikawa and Maeda

1958b. *Modiolus shimonadensis* Ichikawa and Maeda, p. 93, pl. 6, fig. 2.

Type.—Holotype (OCU MM231) from Haraikawa, Nandan (Awaji), Hyogo Pref.

Age and distribution.—Maestrichtian. Izumi group (Shimonada siltstone) in Awaji island.

Genus ***Inoperna*** Conrad, 1875

Inoperna plicata (Sowerby) [Pl. 1, Fig. 11]

MM3264
—1—11

1960b. *Modiolus* (*Inoperna*) *plicatus* J. Sowerby: Tamura, p. 276, pl. 32, figs. 5–8.

Age and distribution.—Kimmeridgian. Soma group (Nakanosawa formation) in Soma area. This species has been reported from the Middle and Upper Jurassic of various areas in European and Tethyan regions.

Genus ***Amygdalum*** Megerle von Mühlfeld, 1811

Amygdalum ishidoense (Yabe and Nagao)

1926. *Modiola* (?) *ishidoensis* Yabe and Nagao, *in* Yabe, Nagao and Shimizu, p. 63, pl. 13, fig. 42.—1934. *Gervillia?* sp.: Nagao, p. 201, pl. 24, fig. 2.—1965a. *Amygdalum ishidoense* (Yabe and Nagao): Hayami, p. 257, pl. 30, figs. 4–10.—compare 1965. *Amygdalum* sp. aff. *A. ishidoense* (Yabe and Nagao): Matsumoto, Hayami and Hashimoto, p. 9, pl. 1, fig. 12.

Type.—Holotype by monotypy (IGPS no. 8750) from Ishido, Ohinata, Nagano Pref.

Age and distribution.—Upper Neocomian–Aptian. Ishido formation in Sanchu area, and Miyako group (Hiraiga formation) in Tanohata area.

Genus ***Lecompteus*** van de Poel, 1959

Lecompteus sp. cf. **L. guerangeri** (d'Orbigny)

1965a. *Lecompteus* sp. cf. *L. guerangeri* (d'Orbigny): Hayami, p. 259, pl. 30, figs. 11, 12.

Age and distribution.—Aptian. Miyako group (Hiraiga formation) in Omoto area.

Subfamily CRENELLINAE Adams and Adams, 1857

Genus ***Crenella*** Brown, 1827

Crenella gyliakina Matsumoto

1938. *Crenella gyliakina* Matsumoto, p. 16, pl. 1, figs. 9–11.

Type.—Holotype (UMUT MM 7747) from Ikushumbetsu, Mikasa, Ishikari Prov., Hokkaido.

Age and distribution.—Cenomanian–Turonian. Middle Yezo group (Mikasa sandstone) in Ikushumbetsu area, and Gosyonoura group in Gosyonoura island.

Superfamily PINNACEA Leach, 1819

Family PINNIDAE Leach, 1819

Genus ***Pinna*** Linné, 1758

Subgenus ***Pinna*** Linné, 1758

Pinna (Pinna) muikadaniensis Nakazawa

1961. *Pinna muikadaniensis* Nakazawa, p. 267, pl. 13, figs. 14–17.

Type.—Syntype (UK JM10711–10714) from Muikadani, Oe, and Kamiochi, Fukuchiyama, Kyoto Pref.

Age and distribution.—Skytian. Yakuno group (Oro formation) in Maizuru zone.

Pinna (Pinna) sp.

1955. *Pinna* sp. cf. *P.* aff. *lima* Böhm in Reed: Nakazawa, p. 252, pl. 14, figs. 8–10.

Age and distribution.—Carnian. Nabae group (N2 and N3 formation) and Heki formation in Maizuru zone.

Pinna (Pinna) sp. cf. **P. (P.) mitis** Philips

1960b. *Pinna* cf. *mitis* Philips: Tamura, p. 278, pl. 32, figs. 12–14.

Age and distribution.—Kimmeridgian. Soma group (Nakanosawa formation) in Soma area.

Pinna (Pinna) sp. aff. **P. (P.) sandsfootensis** Arkell

1959f. *Pinna* sp. ex gr. *sandsfootensis* Arkell: Hayami, p. 147, pl. 12, figs. 12, 13.

Age and distribution.—Callovian. Tetori group (Mitarai formation) in Makito area.

Pinna (Pinna) sp. cf. **P. (P.) robinaldina** d'Oribgny

1957b. *Pinna* sp.: Amano, p. 85, pl. 1, figs. 10–13.—1965a. *Pinna* sp. cf. *P. robinaldina* d'Orbigny: Hayami, p. 281, pl. 39, figs. 2, 3.—compare 1972. *Pinna* sp. cf. *P. robinaldina* d'Orbigny: Shikama and Suzuki, pl. 4, fig. 11.

Age and distribution.—Upper Neocomian–Aptian. Monobegawa group (Hagino formation) in Monobegawa area, Ishido formation in Sanchu area, and Hinagu formation in Sakamoto area.

Pinna (Pinna) saitoi Nagao

1932a. *Pinna* aff. *breveri* Gabb: Nagao, p. 35, pl. 5, fig. 1.—1938. *Pinna saitoi* Nagao, p. 125, pl. 15, figs. 9, 10.

Type.—**Lectotype** here designated (Nagao, 1938, pl. 15, fig. 9. GMH no. 8230) from Ponhorokabetsu, Yubari, Ishikari Prov., Hokkaido.

Age and distribution.—Middle Yezo group (Mikasa sandstone) in Yubari area, and Upper Yezo group in Abeshinai area.

Subgenus ***Plesiopinna*** Amano, 1956

Pinna (Plesiopinna) atriniformis (Amano) [Pl. 1, Fig. 13]

1956. *Plesiopinna atriniformis* Amano, p. 71, pl. 1, figs. 1–5.

Type.—Holotype (KU not registered) from Shishijima, Azuma, Kagoshima Pref.

Age and distribution.—Albian (?)–Cenomanian. Gosyonoura group in Shishijima island.

Genus ***Atrina*** Gray, 1842

Atrina heiensis Hayami

1965a. *Atrina heiensis* Hayami, p. 283, pl. 40, fig. 7.

Type.—Holotype (GK H6262) from Raga, Tanohata, Iwate Pref.

Age and distribution.—Aptian (or lower Albian). Miyako group (Hiraiga formation) in Tanohata area.

Order PTERIOIDA Newell, 1965

Suborder PTERIINA Newell, 1965

Superfamily AMBONYCHIACEA Miller, 1877

Family MYALINIDAE Frech, 1891

Genus ***Promyalina*** Kittl, 1904

Promyalina minuta Nakazawa

1961. *Promyalina minuta* Nakazawa, p. 265, pl. 13, fig. 10.

Type.—Holotype (UK JM10707) from Katsuradani (Hirobatake), Oe, Kyoto Pref.

Age and distribution.—Skytian. Yakuno group (Hirobatake formation) in Maizuru zone.

Superfamily PTERIACEA Gray, 1847

Family PTERIIDAE Gray, 1847

Subfamily PTERIINAE Gray, 1847

Genus ***Pteria*** Scopoli, 1777

Pteria ussurica yabei Nakazawa

1954. *Gervilleia* cf. *exporrecta* (Lepsius): Ozaki and Shikama, p. 44, figs. 1–3.—1956. *Bakevellia ussurica* var. *rostrata* Yabe, p. 288, pl. 17, figs. 1–9 (non fig. 10).—1959. *Pteria ussurica yabei* Nakazawa, p. 198, text-fig. 2, pl. 3, figs. 1–3.—1963. *Pteria ussurica* (Kiparisova) *yabei* Nakazawa: Kambe, p. 42, text-fig. 7, pl. 4, figs. 17–30, pl. 5, figs. 1–8.—1971. *Pteria ussurica yabei* Nakazawa: Nakazawa, p. 114, pl. 23, figs. 1, 2.

Type.—Holotype (UK JM10628a) from Shionosawa, Ueno, Gumma Pref.

Age and distribution.—Skytian. Shionosawa limestone in Sanchu area, Kamura formation in Takachiho area, and Kurotaki formation in Nangoku area.

Pteria? mugikawensis Tokuyama

1959b. "*Pteria*" *mugikawensis* Tokuyama, p. 11, pl. 1, fig. 18.

Type.—Holotype (UMUT MM4515) from north of Omine station, Mine, Yamaguchi Pref.

Age and distribution.—Carnian. Mine group (Hirabara formation) in Mine area.

Pteria sp. aff. **P. murchisoni** (Geinitz)

1961. *Pteria* aff. *murchisoni* (Geinitz): Nakazawa, p. 264, pl. 13, figs. 8, 9.

Age and distribution.—Skytian. Yakuno group (Ichio formation) in Maizuru zone.

Pteria kitakamiensis Hayami

1904. *Gervillia trigona* Yokoyama, p. 12, pl. 2, fig. 8 (non fig. 7).—1958a. *Pteria* (s. l.) *kitakamiensis* Hayami, p. 163, pl. 24, figs. 10, 11.

Type.—Holotype (UMUT MM2737) from Niranohama, Utatsu, Miyagi Pref.
Age and distribution.—Hettangian. Shizukawa group (Niranohama formation) in Shizukawa area.

Pteria masatanii Tamura [Pl. 1, Fig. 14]

MM3236 -1-14

1960a. *Pteria masatanii* Tamura, p. 224, pl. 26, figs. 19, 20.
Type.—Holotype (UMUT MM3236) from Tatenosawa, Kashima, Fukushima Pref.
Age and distribution.—Kimmeridgian. Soma group (Nakanosawa formation) in Soma area.

Genus ***Pteroperna*** Morris and Lycett, 1853

Pteroperna lingulata Tamura

1960a. *Pteroperna lingulata* Tamura, p. 226, pl. 26, figs. 16–18.
Type.—Holotype (UMUT MM3248) from Tatenosawa, Kashima, Fukushima Pref.
Age and distribution.—Kimmeridgian. Soma group (Nakanosawa formation) in Soma area.

Pteroperna pauciradiata Tamura [Pl. 1, Fig. 15]

MM3246 -1-15

1960a. *Pteroperna pauciradiata* Tamura, p. 226, pl. 26, figs. 1, 2.
Type.—Holotype (UMUT MM3246) from Tatenosawa, Kashima, Fukushima Pref.
Age and distribution.—Kimmeridgian. Soma group (Nakanosawa formation) in Soma area.

Genus ***Somapteria*** Tamura, 1960

MM3242 -1-16

Somapteria koikensis Tamura [Pl. 1, Fig. 16]

1960a. *Somapteria koikensis* Tamura, p. 225, text-figs. 1, 2, pl. 26, figs. 3–8.
Type.—Holotype (UMUT MM3242) from Koike, Kashima, Fukushima Pref.
Age and distribution.—Kimmeridgian. Soma group (Nakanosawa formation) in Soma area.

Genus ***Pinctada*** Röding, 1798

Subgenus ***Eopinctada*** Tamura, 1961

MM3704 -2-2

Pinctada (Eopinctada) matsumotoi Tamura [Pl. 2, Fig. 2]

1961. *Pinctada (Eopinctada) matsumotoi* Tamura, p. 150, text-fig. 2, pl. 22, figs. 1–4.
Type.—Holotype (UMUT MM3704) from Kamiumeki, Mifune, Kumamoto Pref.
Age and distribituion.—Cenomanian–Turonian. Mifune group in Mifune area.

Subfamily PTERINELLINAE Hayami, 1965

Genus ***Pterinella*** Toula, 1882

Pterinella shinoharai Hayami [Pl. 2, Fig. 1]

1965a. *Pterinella shinoharai* Hayami, p. 265, text-fig. 2, pl. 31, figs. 1–3, pl. 32, figs. 1–6, pl. 33, figs. 1, 2, pl. 34, figs. 1, 2, pl. 35, figs. 1, 2.
Type.—Holotype (GK H6235) from Nekodani, Yatsushiro, Kumamoto Pref.
Age and distribution.—Upper Neocomian–Albian. Yatsushiro formation in Yatsushiro area, Hanoura formation in Katsuuragawa area, and Arita formation in Yuasa area.

Family BAKEVELLIIDAE King, 1850

Genus ***Bakevellia*** King, 1848

Subgenus ***Neobakevellia*** Nakazawa, 1959

Bakevellia (Neobakevellia) rostrata Yabe

compare 1926. *Gervilleia* cf. *exporrecta* (Leps.): Matushita, p. 421, pl. 8, fig. 10.—1956. *Bakevellia ussurica* Kiparisova var. *rostrata* Yabe, p. 288, pl. 17, fig. 10 (non figs. 1–9).—1959. *Bakevellia* (*Neobakevellia*) *rostrata* Yabe: Nakazawa, p. 197, pl. 3, fig. 4.—compare 1971. *Bakevellia* (*Neobakevellia*) cf. *rostrata* Yabe: Nakazawa, p. 116, pl. 23, figs. 3–5.

Type.—Lectotype designated by Nakazawa (1959, p. 197) (Tokyo University of Education, not registered) from Shionosawa, Ueno, Gumma Pref.

Age and distribution.—Skytian. Shionosawa limestone in Sanchu area.

Bakevellia (Neobakevellia) tsuzuradaniensis Nakazawa

1959. *Bakevellia* (*Neobakevellia*) *tsuzuradaniensis* Nakazawa, p. 200, text-fig. 4, pl. 1, figs. 10–12.

Type.—Holotype (UK JM10527) from Okuyama, Oe, Kyoto Pref.

Age and distribution.—Skytian. Yakuno group (Narawara, Hirobatake and Honodani formations) in Maizuru zone.

Bakevellia (Neobakevellia) kambei kambei Nakazawa

1959. *Bakevellia* (*Maizuria*) *kambei* Nakazawa, p. 204, text-fig. 7, pl. 4, figs. 1–12.—compare 1959. *Bakevellia* (*Maizuria*) *kambei* n. subsp.?: Nakazawa, p. 207, pl. 4, fig. 15.

Type.—Holotype (UK JM10582) from Hosokubi, Oya, Hyogo Pref.

Age and distribution.—Skytian (?). Miharaiyama group (Gannosudani formation) and Shidaka group in Maizuru zone. Some authors have regarded these formations as Upper Triassic.

Bakevellia (Neobakevellia) kambei dannensis Nakazawa

1959. *Bakevellia* (*Maizuria*) *kambei dannensis* Nakazawa, p. 206, pl. 2, figs. 13, 14.

Type.—Holotype (UK JM10607) from Dan, Aita, Okayama Pref.

Age and distribution.—Skytian. Fukumoto group in Maizuru zone (western part.).

Bakevellia (Neobakevellia) narawarensis Nakazawa

1959. *Bakevellia* (*Maizuria*) *narawarensis* Nakazawa, p. 207, pl. 2, figs. 16–21.

Type.—Holotype (UK JM10558a) from Okuyama, Oe, Kyoto Pref.

Age and distribution.—Skytian. Yakuno group (Narawara formation) in Maizuru zone.

Bakevellia (Neobakevellia) okuyamensis Nakazawa

1959. *Bakevellia* (*Maizuria*) *okuyamensis* Nakazawa, p. 202, text-figs. 5, 6, pl. 1, figs. 13–21.—compare 1959. *Bakevellia* (*Maizuria*) cf. *okuyamensis* Nakazawa: Nakazawa, p. 203, pl. 1, figs. 22, 23.

Type.—Holotype (UK JM10530a) from Okuyama, Oe, Kyoto Pref.

Age and distribution.—Skytian. Yakuno group (Narawara, Hirobatake and Honodani formations) and Shidaka group in Maizuru zone.

Bakevellia (Neobakevellia) matsushitai Nakazawa

1954. *Bakevellia matsushitai* Nakazawa, p. 214, pl. 3, figs. 1–5, 8.—1954. *Bakevellia* cf. *matsushitai* Nakazawa: Nakazawa, p. 215, pl. 3, figs. 6, 7.

Type.—Holotype (UK JM10060) from Kongoin, Maizuru, Kyoto Pref.
Age and distribution.—Nabae group (N2 formation) in Maizuru zone.

Bakevellia (Neobakevellia) monobensis Nakazawa

1954. *Bakevellia monobensis* Nakazawa, p. 217, pl. 4, figs. 5–9, pl. 5, figs. 1–2.
Type.—Holotype (UK JM10089a) from Monobe, Ayabe, Kyoto Pref.
Age and distribution.—Carnian. Nabae group (N3 formation) in Maizuru zone.

Bakevellia (Neobakevellia) oyogiensis Nakazawa

1954. *Bakevellia oyogiensis* Nakazawa, p. 216, pl. 3, fig. 9, pl. 4, figs. 1–4.
Type.—Holotype (UK JM10067) from Miuchi, Ayabe, Kyoto Pref.
Age and distribution.—Carnian. Nabae group (N2 and N3 formations) in Maizuru zone.

Bakevellia (Neobakevellia?) araiensis (Ichikawa)

1954a. "*Gervillia*" *araiensis* Ichikawa, p. 51, pl. 7, fig. 14.—1954a. "*Gervillia*" cf. *araiensis* Ichikawa: Ichikawa, p. 52, pl. 7, fig. 15.
Type.—Holotype (UMUT MM5417) from Arai, Hinode, Tokyo Pref.
Age and distribution.—Triassic (precisely unknown). Arai formation in Itsukaichi area.

Bakevellia (Neobakevellia) trigona (Yokoyama) [Pl. 2, Fig. 3]

1904. *Gervillia trigona* Yokoyama, p. 12, pl. 2, fig. 7 (non fig. 8).—1957a. *Bakevellia trigona* (Yokoyama): Hayami, p. 51, pl. 2, figs. 1–5.—compare 1959a. *Bakevellia* cf. *trigona* (Yokoyama): Hayami, p. 69, pl. 7, fig. 3.
Type.—Lectotype designated by Hayami (1957a, p. 51) (UMUT MM7175) from Hosoura, Shizukawa, Miyagi Pref.
Age and distribution.—Hettangian. Shizukawa group (Niranohama formation) in Shizukawa and Hashiura areas.

Bakevellia (Neobakevellia) magnissima Hayami

1957a. *Bakevellia magnissima* Hayami, p. 52, pl. 2, figs. 6–10, pl. 3, fig. 1.
Type.—Holotype (UMUT MM2655) from Shinatani, Omi (Agero), Niigata Pref.
Age and distribution.—Pliensbachian–Toarcian. Kuruma group (Shinatani fromation) in Omi area, Iwamuro formation in Katashina area, and Yamaoku formation in Osakabe area.

Bakevellia (Neobakevellia) otariensis Hayami

1957a. *Bakevellia otariensis* Hayami, p. 53, pl. 3, figs. 2–5.
Type.—Holotype (UMUT MM2660) from Kuruma, Otari, Nagano Pref.
Age and distribution.—Pliensbachian (or thereabout). Kuruma group (Tsuchizawa formation) in Otari area.

Bakevellia (Neobakevellia) negoyensis Hayami

1957a. *Bakevellia negoyensis* Hayami, p. 54, pl. 3, fig. 6.
Type.—Holotype (UMUT MM2664) from Aisawadani, Omi. Niigata Pref.
Age and distribution.—Pliensbachian (or thereabout). Kuruma group (Negoya formation) in Omi area.

Bakevellia (Neobakevellia) ohishiensis Hayami

1957a. *Bakevellia ohishiensis* Hayami, p. 56, pl. 3, figs. 11, 12.

Type.—Holotype (UMUT MM2667) from Ohishi, Itoigawa (Kotaki), Niigata Pref.
Age and distribution.—Lower Jurassic (Pliensbachian or earlier). Kuruma group (Kitamatadani formation) in Kotaki area.

Bakevellia (Neobakevellia?) cassianelloides Kobayashi and Hayami

1957a. *Bakevellia* (s. l.) *cassianelloides* Kobayashi and Hayami, in Hayami, p. 57, pl. 3, figs. 7–9.

Type.—Holotype (UMUT MM2669) form Kuruma, Otari, Nagano Pref.
Age and distribution.—Pliensbachian (or thereabout). Kuruma group (Tsuchizawa formation) in Otari area.

Bakevellia (Neobakevellia) shinanoensis (Yabe and Nagao)

1926. *Gervillia shinanoensis* Yabe and Nagao, *in* Yabe, Nagao and Shimizu, p. 59, pl. 14, figs. 17, 18.—1955. *Bekevellia shinanoensis* (Yabe and Nagao): Yamagiwa, p. 50, pl. 2, fig. 2.

Type.—Syntype (IGPS no. 22507) from Kagikake and Bomeki, Ohinata, Nagano Pref.
Age and distribution.—Neocomian. Shiroi formation (now regarded as the lower part of Ishido formation) in Sanchu area, and Ryoseki group in Shima area.

Bakevellia (Neobakevellia) ominensis Nakazawa and Murata

1966. *Bakevellia* (*Neobakevellia*) *ominensis* Nakazawa and Murata, p. 309, pl. 3, figs. 1–7.

Type.—Holotype (UK JM11131) from Obirakizawa, Omine, Iwate Pref.
Age and distribution.—Neocomian. Kamihei group in Kamaishi area.

Bakevellia (Neobakevellia?) tadai Nakazawa and Murata

1966. *Bakevellia* (*Neobakevellia?*) *tadai* Nakazawa and Murata, p. 310, pl. 3, fig. 8.

Type.—Holotype (UK JM11142) from Obirakizawa, Omine, Iwate Pref.
Age and distribution.—Neocomian. Kamihei group in Kamaishi area.

Bakevellia (Neobakevellia?) pseudorostrata (Nagao)

1934. *Gervillia pseudorostrata* Nagao, p. 199, pl. 31, figs. 6–9.—1965a. *Bakevellia pseudorostrata* (Nagao): Hayami, p. 273, pl. 37, figs. 3–6.—1965a. *Bakevellia iwatensis* Hayami, p. 275, pl. 35, figs. 7, 8.

Type.—Lectotype designated by Hayami (1965a, p. 273) (GMH no. 6758) from Moshi, Iwaizumi (Omoto), Iwate Pref. Holotype of *Bakevellia iwatensis* (GK H6249) from Hiraiga, Tanohata, Iwate Pref.
Age and distribution.—Aptian–Albian. Miyako group (Tanohata and Hiraiga formations) in Tanohata and Omoto areas, and Yatsushiro formation in Sakamoto area.

Subgenus ***Bakevelloides*** Tokuyama, 1959

Bakevellia (Bakevelloides) hekiensis (Kobayashi and Ichikawa) [Pl. 2, Fig. 4]

1952a. "*Gervillia*" *hekiensis* Kobayashi and Ichikawa, p. 76, pl. 2, figs. 4–6.—1954. *Bakevellia hekiensis* (Kobayashi and Ichikawa): Nakazawa, p. 218, pl. 5, figs. 3–8, pl. 6, figs. 1–3.—1957b. "*Aguileria*" *hekiensis* (Kobayashi and Ichikawa): Nakano, p. 64, pl. 9, figs. 2, 3.—1959a. *Bakevelloides hekiensis* (Kobayashi and Ichikawa): Tokuyama, p. 149, text-fig., pl. 16, figs. 1–7.

Type.—Holotype (UMUT MM5387) from Heki, Yakuno, Kyoto Pref.
Age and distribution.—Carnian. Heki formation and Nabae group (N3 formation) in

Maizuru zone, Kyowa formation in Nariwa area, and Mine group (Hirabara formation) in Mine area.

Bakevellia (Bakevelloides) subhekiensis Nakazawa

1954. *Bakevellia subhekiensis* Nakazawa, p. 219, pl. 6, figs. 4–7.

Type.—Holotype (UK JM10108) from Nabae, Takahama, Fukui Pref.

Age and distribution.—Carnian. Nabae group (N1 formation) in Maizuru zone.

Bakevellia (Bakevelloides?) saekii (Kobayashi and Ichikawa)

1952a. *"Gervillia" saekii* Kobayashi and Ichikawa, p. 75, pl. 2, fig. 3.—compare 1952b. *"Gervillia"* cf. *saekii* Kobayashi and Ichikawa: Kobayashi and Ichikawa, p. 267, pl. 10, figs. 9, 10.

Type.—Holotype (UMUT MM5379) from Heki, Yakuno, Kyoto Pref.

Age and distribution.—Carnian. Heki formationin Maizuru zone.

Subgenus ***Yoshimopsis*** Ohta, 1974

Bakevellia (Yoshimopsis) nagatoensis (Ohta) [Pl. 9, Fig. 2]

1939. *Gervillia shinanoensis* Yabe and Nagao: Kobayashi and Suzuki, p. 217, pl. 13, figs. 20–22, pl. 14, figs. 16–19.—1974. *Bakevelloides* (*Yoshimopsis*) *nagatoensis* Ohta, p. 81, text-figs. 1–4, pl. 1, figs. 1–11.

Type.—Holotype (GF Y423) from Yoshimo, Shimonoseki, Yamaguchi Pref.

Age and distribution.—Neocomian. Toyonishi group (Yoshimo formation) in Shimonoseki area, and Kawaguchi formation in Tanoura area.

Genus ***Gervillaria*** Cox, 1954

Gervillaria haradae (Yokoyama)

1890. *Avicula Haradae* Yokoyama, p. 199, pl. 25, fig. 12.—1926. *Gervillia haradae* (Yokoyama): Yabe, Nagao and Shimizu, p. 58, pl. 13, figs. 1–3, 7, pl. 14, fig. 2.—1934. *Gervillia* cf. *haradae* (Yokoyama): Nagao, p. 199, pl. 31, fig. 13.—1957b. *Bakevellia* sp.: Amano, p. 86, pl. 1, figs. 14, 15.—1963. *Gervillaria haradae* (Yokoyama): Matsumoto, Hayami and Asano, p. 32, pl. 51, fig. 12.—1965a. *Gervillaria haradae* (Yokoyama): Hayami, p. 269, pl. 35, figs. 3–6, pl. 36, fig. 1, pl. 37, fig. 2.

Type.—Lectotype designated by Hayami *in* Matsumoto, Hayami and Asano (1963, p. 32) from Kagahara, Nakazato, Gumma Pref.

Age and distribution.—Upper Neocomian–Albian. Ishido formation in Sanchu area, Yatsushiro formation in Yatsushiro area, and Miyako group (Hiraiga formation) in Tanohata area.

Gervillaria miyakoensis (Nagao)

1934. *Gervillia miyakoensis* Nagao, p. 197, pl. 31, figs. 1, 2, pl. 32, fig. 7.—1965a. *Gervillaria miyakoensis* (Nagao): Hayami, p. 271, pl. 36, figs. 2–4, pl. 37, fig. 1.

Type.—Lectotype designated by Hayami (1965a, p. 271) (GMH no. 6777) from Raga, Tanohata, Iwate Pref.

Age and distribution.—Aptian–Albian. Miyako group (Aketo and Hiraiga formations) in Tanohata area.

Genus ***Aguilerella*** Chavan, 1951

Aguilerella quadrata (Nakazawa and Murata)

1966. *Cuneigervillia quadrata* Nakazawa and Murata, p. 311, pl. 3, figs. 9–11.
Type.—Holotype (UK JM11143) from Obirakizawa, Omine, Iwate Pref.
Age and distribution.—Neocomian. Kamihei group in Kamaishi area.

Genus ***Gervillia*** Defrance, 1820

Subgenus ***Cultriopsis*** Cossmann, 1904

Gervillia (Cultriopsis) hosonaga (Kobayashi and Ichikawa)

1954a. *Cultriopsis (Angustella?) hosonaga* Kobayashi and Ichikawa, *in* Ichikawa, p. 55, pl. 7, fig. 1.
Type.—Holotype (UMUT MM5415) from Arai, Hinode, Tokyo Pref.
Age and distribution.—Triassic (precisely unknown). Arai formation in Itsukaichi area.

Gervillia (Cultriopsis) shizukawensis Hayami

1957b. *Gervillia (Cultriopsis) shizukawensis* Hayami, p. 97, pl. 6, fig. 1.
Type.—Holotype (UMUT MM2672) form Haragoe, Kahoku, Miyagi Pref.
Age and distribution.—Hettangian. Shizukawa group (Niranohama formation) in Mizunuma area.

Subgenus ***Gervillia*** Defrance, 1820

Gervillia (Gervillia) tatenosawensis Tamura

1960a. *Gervillia tatenosawensis* Tamura, p. 227, text-fig. 3, pl. 26, figs. 9–14.—1960d. *Gervillia tatenosawensis* Tamura: Tamura, p. 233, pl. 2, fig. 6.
Type.—Holotype (UMUT MM3255) from Tatenosawa, Kashima, Fukushima Pref.
Age and distribution.—Kimmeridgian. Soma group (Nakanosawa formation) in Soma area, and Torinosu group (Kurisaka formation) in Sakuradani area.

Gervillia (Gervillia) takiensis Tamura

1960d. *Gervillia takiensis* Tamura, p. 233, pl. 2, figs. 1–3.
Type.—Holotype (UMUT MM3613) from Nioigataki, Sakawa, Kochi Pref.
Age and distribution.—Upper Jurassic. Torinosu group in Sakawa and Sakuradani areas.

Gervillia (Gervillia) forbesiana d'Orbigny

1926. *Gervillia forbesiana* d'Orbigny: Yabe, Nagao and Shimizu, p. 57, pl. 12, figs. 36, 37, pl. 14, figs. 8, 9.—1927. *Gervillia forbesiana* d'Orbigny: Yabe, pl. 5, fig. 5.—1934. *Gervillia forbesiana* d'Orbigny: Nagao, p. 197, pl. 24, fig. 8, pl. 25, figs. 8–10.—1951. *Gervilliopsis forbesiana* (d'Orbigny): Shinohara, p. 26, pl. 11, fig. 2.—1965a. *Gervillia (Gervillia) forbesiana* d'Orbigny: Hayami, p. 276, pl. 37, figs. 7, 8, pl. 38, figs. 1–5.—1972. *Gervillia (Gervillia) forbesiana* d'Orbigny: Shikama and Suzuki, pl. 4, fig. 13.
Age and distribution.—Upper Neocomian–Albian. Ishido formation in Sanchu area, Miyako group (Hiraiga formation) in Tanohata and Omoto areas, Yatsushiro formation in Yatsushiro area, Arita formation in Yuasa area, Oshima formation in Oshima area, Ofunato group (Funagawara formation) in Ofunato area, Hanoura formation in Katsuuragawa area, and Choshi formation in Choshi area. This species seems to be common in the Aptian–Albian of England and France.

Gervillia (Gervillia) metaforbesiana Amano and Matsumoto

1956. *Gervillia metaforbesiana* Amano and Matsumoto, in Amano, p. 72, pl. 1, figs. 14, 15.
Type.—Holotype (KU not registered) from Shishijima, Azuma, Kagoshima Pref.

Age and distribution.—Albian(?)–Cenomanian. Gosyonoura group in Shishijima island.
Remarks.—This species seems to be closely related to, if not identical with, *Gervillia* (*Gervillia*) *forbesiana*.

Genus ***Kobayashites*** Hayami, 1959

Kobayashites hemicylindricus Hayami [Pl. 2, Fig. 6]

1959e. *Kobayashites hemicylindricus* Hayami, p. 139, text-fig. 1, pl. 14, figs. 6–10.
Type.—Holotype (UMUT MM3130) from Shizuhama, Shizukawa, Miyagi Pref.
Age and distribution.—Bajocian. Hashiura group (Aratozaki formation) in Shizukawa area, and Ojika group (Tsukinoura formation) in Ojika area.

Genus ***Pseudoptera*** Meek, 1873

Pseudoptera sp. aff. **P. viana** Stephenson

1966. *Pseudoptera* sp. aff. *P. viana* Stephenson: Nakazawa and Murata, p. 313, pl. 4, fig. 2.
Age and distribution.—Neocomian. Kamihei group in Kamaishi area.

Pseudoptera? elongata (Nakazawa and Murata)

1966. *Waagenoperna elongata* Nakazawa and Murata, p. 312, pl. 4, fig. 1.
Type.—Holotype (IGPS no. 85764) from Kanayama-zawa, Omine, Iwate Pref.
Age and distribution.—Neocomian. Kamihei group in Kamaishi area.

Pseudoptera acuticarinata (Nagao)

1932a. *Gervillia* (*Pseudoptera*) *acuticarinata* Nagao, p. 37, pl. 5, figs. 13–15.
Type.—Syntype (GMH not registered) from Pombetsu, Mikasa, Ishikari Prov., Hokkaido.
Age and distribution.—Cenomanian–Turonian. Middle Yezo group (Mikasa sandstone) in Ikushumbetsu area.

Family CASSIANELLIDAE Ichikawa, 1958

Genus ***Cassianella*** Beyrich, 1862

Cassianella? dubia Kobayashi and Ichikawa

1949b. "*Cassianella*" *dubia* Kobayashi and Ichikawa, p. 184, pl. 6, fig. 10.
Type.—Holotype (UMUT MM5219) from Umenokidani, Sakawa, Kochi Pref.
Age and distribution.—Carnian. Kochigatani group (lower part) in Sakawa area.

Family ISOGNOMONIDAE Woodring, 1925

Genus ***Waagenoperna*** Tokuyama, 1959

Waagenoperna triangularis (Kobayashi and Ichikawa) [Pl. 2, Fig. 5]

1952b. *Edentula* (?) *triangularis* Kobayashi and Ichikawa, p. 268, text-figs. 1, 2.—1959. *Waagenoperna triangularis* (Kobayashi and Ichikawa): Tokuyama, p. 153, pl. 16, figs. 8–15.
Type.—Holotype (UMUT MM5399b) from Jito, Kawakami, Okayama Pref.
Age and distribution.—Carnian–Norian. Nariwa group in Nariwa area, and Mine group (Aso formation) in Mine area.

Waagenoperna ozawai (Kobayashi)

1935. *Edentula ozawai* Kobayashi, p. 30, pl. 7, figs. 3–6.

Type.—Syntype (UMUT MM5521, 4222–4224) from Shirogawara, Mine, Yamaguchi Pref.
Age and distribution.—Ladinian or Carnian. Atsu group (upper part) in Mine area.

Genus ***Isognomon*** Lightfoot, 1786

Subgenus ***Isognomon*** Lightfoot, 1786

Isognomon (Isognomon) rikuzenicus (Yokoyama)

1904. *Perna rikuzenica* Yokoyama, p. 13, pl. 1, fig. 1.—1957b. *Isognomon rikuzenicus* (Yokoyama): Hayami, p. 99, pl. 7, figs. 3–8.—compare 1957b. *Isognomon* cf. *rikuzenicus* (Yokoyama): Hayami, p. 100, pl. 7, figs. 1, 2.—compare 1959e. *Isognomon* sp. ex gr. *rikuzenicus* (Yokoyama): Hayami, p. 140.

Type.—Holotype by monotypy (UMUT MM7176) from Niranohama, Utatsu, Miyagi Pref.
Age and distribution.—Hettangian–Toarcian. Shizukawa group (Niranohama and Hosoura formations) in Shizukawa area.

Isognomon (Isognomon) sanchuensis (Yabe and Nagao)

1926. *Perna sanchuensis* Yabe and Nagao, *in* Yabe, Nagao and Shimizu, p. 57, pl. 12, figs. 1–4.—1965a. *Isognomon* (*Isognomon*) *sanchuensis* (Yabe and Nagao): Hayami, p. 278.

Type.—Lectotype designated by Hayami (1965a, p. 278) (IGPS no. 22457) from Hachimanzawa, Nakazato, Gumma Pref.
Age and distribution.—Aptian–Albian. Sebayashi formation (not Shiroi formation as formerly interpreted) in Sanchu area.

Isognomon (Isognomon) choshiensis Hayami

1965a. *Isognomon* (*Isognomon*) *choshiensis* Hayami, p. 279, pl. 39, fig. 1.

Type.—Holotype (GK H6255) from Ashikajima, Choshi, Chiba Pref.
Age and distribution.—Aptian. Choshi formation in Choshi area.

Isognomon (Isognomon) ichikawai Hayami

1965a. *Isognomon* (*Melina*) *ichikawai* Hayami, p. 280, pl. 38, figs. 8, 9.

Type.—Holotype (GK H6257) from Ishido, Ohinata, Nagano Pref.
Age and distribution.—Upper Neocomian or Aptian. Ishido formation in Sanchu area.

Subgenus ***Mytiloperna*** von Ihering, 1903

Isognomon (Mytiloperna) ageroensis Hayami

1957b. *Isognomon* (*Mytiloperna*) *ageroensis* Hayami, p. 101, pl. 6, figs. 4–8.

Type.—Holotype (UMUT MM2680) from Shinatani, Omi (Agero), Niigata Pref.
Age and distribution.—Pliensbachian–Toarcian. Kuruma group (Shinatani formation) in Omi area.

Family INOCERAMIDAE Giebel, 1852

Genus ***Pseudomytiloides*** Koschelkina, 1957

Pseudomytiloides lunaris (Hayami)

1960b. *Parainoceramus lunaris* Hayami, p. 295, pl. 15, fig. 1.

Type.—Holotype (UMUT MM3582) from Sakuraguchidani, Toyoda, Yamaguchi Pref.

Age and distribution.—Pliensbachian. Toyora group (Nishinakayama formation) in Toyoda area.

Remarks.—As pointed out by Speden (1970), this may be actually conspecific with *Pseudomytiloides matsumotoi*, but subsequently obtained topotype specimens are slightly different from the sample of *P. matsumotoi* from higher beds in the more lunar-shaped outline.

Pseudomytiloides matsumotoi (Hayami)

1960b. *Parainoceramus matsumotoi* Hayami, p. 296, pl. 15, figs. 2–8.—1960b. *Parainoceramus* cf. *matsumotoi* Hayami: Hayami, p. 297, pl. 15, fig. 9.—1960b. *Parainoceramus* sp. ex gr. *matsumotoi* Hayami: Hayami, p. 298, pl. 15, fig. 10.

Type.—Holotype (UMUT MM3584) from Ishimachi, Toyoda, Yamaguchi Pref.

Age and distribution.—Toarcian. Toyora group (Nishinakayama formation) in Toyora area.

Remarks.—This species is, if not conspecific with, very closely related to *Pseudomytiloides dubius* (Sowerby) from the upper Lias of western Europe.

Genus ***Inoceramus*** Sowerby, 1814

Subgenus ***Mytiloceramus*** Rollier, 1914

Inoceramus (Mytiloceramus) karakuwensis Hayami

1960b. *Inoceramus* (*Mytiloceramus*) *karakuwensis* Hayami, p. 299, pl. 15, fig. 17.

Type.—Holotype (UMUT MM3597) from Tsunakizaka, Kesennuma, Miyagi Pref.

Age and distribution.—Bajocian. Karakuwa group (Tsunakizaka formation) in Kesennuma area.

Subgenus ***Retroceramus*** Koschelkina, 1957

Inoceramus (Retroceramus) sp. cf. **I. (R.) lucifer** von Eichwald

1960b. *Inoceramus* cf. *lucifer* von Eichwald: Hayami, p. 304, pl. 16, fig. 1.

Age and distribution.—Bajocian. Karakuwa group (Tsunakizaka formation) in Kesennuma area.

Inoceramus (Retroceramus) utanoensis Kobayashi

1926. *Inoceramus utanoensis* Kobayashi, p. 7, pl. 11, figs. 1, 2.—1960b. *Inoceramus utanoensis* Kobayashi: Hayami, p. 305, pl. 16, figs. 3–5.

Type.—Lectotype designated by Hayami (1960b, p. 305) (UMUT 9081) from Utano, Kikukawa, Yamaguchi Pref.

Age and distribution.—Bathonian (or thereabout). Toyora group (Utano formation) in Toyoda area.

Inoceramus (Retroceramus) ogurai Kobayashi

1926. *Inoceramus Ogurai* Kobayashi, p. 7, pl. 11, fig. 3.—1960b. *Inoceramus ogurai* Kobayashi: Hayami, p. 306, pl. 16, fig. 2.

Type.—Holotype by monotypy (UMUT MM9086) from Utano, Kikukawa, Yamaguchi Pref.

Age and distribution.—Bathonian (or thereabout). Toyora group (Utano formation) in Toyoda area.

Subgenus ***Mytiloides*** Brongniart, 1822

Inoceramus (Mytiloides) morii Hayami

1959c. *Inoceramus* (s. l.) *morii* Hayami, p. 59, pl. 5, figs. 12–14.—1960b. *Inoceramus morii* Hayami: Hayami, p. 300, pl. 15, figs. 11, 12.

Type.—Holotype (UMUT MM2953) from Akaiwazaki (Hosoura), Shizukawa, Miyagi Pref.

Age and distribution.—Bajocian. Hashiura group (Aratozaki formation) in Shizukawa area.

Inoceramus (Mytiloides) sp. aff. **I. (M.) fuscus** Quenstedt

1960b. *Inoceramus* sp. ex gr. *fuscus* Quenstedt: Hayami, p. 301, pl. 15, fig. 13.

Age and distribution.—Bajocian. Toyora group (Utano formation) in Toyoda area.

Inoceramus (Mytiloides) hashiurensis Hayami

1960b. *Inoceramus hashiurensis* Hayami, p. 303, pl. 15, fig. 16.

Type.—Holotype (UMUT MM3602) from Kuromorizawa, Kitakami (Hashiura), Miyagi Pref.

Age and distribution.—Middle Jurassic (precisely unknown). Hashiura group (Arato formation) in Hashiura area.

Inoceramus (Mytiloides) hamadae Hayami

1960b. *Inoceramus hamadae* Hayami, p. 302, pl. 15, fig. 14.

Type.—Holotype (UMUT MM3601) from Shimoyama, Izumi, Fukui Pref.

Age and distribution.—Callovian. Tetori group (Kaizara formation) in Izumi area.

Inoceramus (Mytiloides) sp.

1960b. *Inocermus* cf. *nitescens* Arkell: Hayami, p. 302, pl. 15, fig. 15.

Age and distribution.—Oxfordian. Tetori group (Nagano shale corresponding to Yambarazaka formation) in Izumi area.

Remarks.—Typical specimens of *Inoceramus nitescens* from the Corallian of England have widely spaced concentric rings which seem to be undeveloped in this Japanese species.

Inoceramus (Mytiloides) sp. aff. **I. (M.) galoi** Boehm

1960b. *Inoceramus* sp. ex gr. *galoi* Boehm: Hayami, p. 307, pl. 16, fig. 6.

Age and distribution.—Oxfordian (or thereabout). Hashiura group (Arato formation) in Hashiura area.

Subgenus ***Birostrina*** Sowerby, 1821

Inoceramus (Birostrina) concentricus nipponicus Nagao and Matsumoto

1939. *Inoceramus concentricus* var. *nipponicus* Nagao and Matsumoto, p. 267, pl. 24, fig. 2, pl. 25, figs. 1–6.—1959a. *Inoceramus concentricus nipponicus* Nagao and Matsumoto: Matsumoto, pl. 11, fig. a.—1971. *Inoceramus concentricus nipponicus* Nagao and Matsumoto: Noda, p. 28, pl. 1, figs. 1, 2.

Type.—Syntype (IGPS not registered) from Naibuchi, south Saghalin, syntype (GMH no. 7167a) from Yubarigawa, Ishikari Prov., Hokkaido, syntype (IGPS no. 58017) from Naibuchi, south Saghalin, syntype (GMH no. 5965) from Hobetsugawa, Iburi Prov., Hokkaido, syntype (UMUT I-687) from the middle course of the Obirashibe, Teshio Prov., Hokkaido.

Age and distribution.—Cenomanian. Middle Yezo group in various areas of Hokkaido and Saghalin, and Tano formation in Notsu area.

Inoceramus (Birostrina) concentricus costatus Nagao and Matsumoto

1939. *Inoceramus concentricus* var. *constatus* Nagao and Matsumoto, p. 270, pl. 24, figs. 1, 4, 5, pl. 27, fig. 2.—1966. *Inoceramus* sp. cf. *teshioensis* Nagao and Matsumoto: Tamura and Tashiro, p. 31, pl. 1, figs. 8, 9.—1966. *Inoceramus* B sp.: Tamura and Tashiro, p. 31, pl. 1, fig. 10.—1966. *Inoceramus* sp. cf. *incertus* Jimbo: Tamura and Tashiro, pl. 1, figs. 11–13.—1974. *Inoceramus concentricus costatus* Nagao and Matsumoto: Tamura *in* Tamura and Matsumura, p. 49, pl. 1, figs. 1–7.

Type.—Lectotype (UMUT I-690) from the Ikushumbetsu, Mikasa, Ishikari Prov., Hokkaido.

Age and distribution.—Cenomanian–Turonian. Middle Yezo group (Mikasa sandstone and its correlatives) in various areas of Hokkaido and south Saghalin, and Mifune group (lower formation) in Mifune area.

Inoceramus (Birostrina) concentricus subsulcatus Wiltshire

1964. *Inoceramus concentricus subsulcatus* Wiltshire: Matsumoto and Harada, p. 94, pl. 9, fig. 3.

Age and distrioution.—Albian. Middle Yezo group (Member L2) in Yubari area. This subspecies has been known from England.

Subgenus ***Inoceramus*** Sowerby, 1814

MM9076 −2−η

Inoceramus (Inoceramus) maedae Hayami [Pl. 2, Fig. 7]

1960b. *Inoceramus maedae* Hayami, p. 308, text-fig. 2, pl. 17, figs. 1–3.—1960b. *Inoceramus maedae* Hayami var. a.: Hayami, p. 311, pl. 16, fig. 7, pl. 18, fig. 2.—1960b. *Inoceramus maedae* Hayami var. b.: Hayami, p. 311, pl. 18, fig. 1.

Type.—Holotype (UMUT MM9076) from Mitarai, Shokawa, Gifu Pref.

Age and distribution.—Callovian. Tetori group (Mitarai formation) in Makito area.

Inoceramus (Inoceramus) anglicus Woods

1964. *Inoceramus anglicus* Woods: Matsumoto and Harada, p. 94, pl. 9, figs. 1, 2.

Age and distribution.—Albian. Middle Yezo group (Member L2) in Yubari area. This species has been known from England.

Inoceramus (Inoceramus) sp. aff. **I. (I.) crippsi** Mantell

1928. *Inoceramus* aff. *crippsi* Mantell: Yabe and Nagao, p. 83, pl. 16, figs. 11, 12.—1940. *Inoceramus* sp. aff. *I. cripsii* Mantell [*sic*]: Nagao and Matsumoto, p. 7, pl. 2, figs. 3, 6, 7.

Age and distribution.—Cenomanian. Middle Yezo group (mainly Mikasa sandstone) in Yubari, Ikushumbetsu and Obirashibe areas.

Inoceramus (Inoceramus) yabei Nagao and Matsumoto

1939. *Inoceramus yabei* Nagao and Matsumoto, pl. 34, figs. 5–7 (illustration only).—1940. *Inoceramus yabei* Nagao and Matsumoto, p. 1, pl. 1, fig. 1 (non pl. 1, figs. 2–6).—compare 1940. *Inoceramus* sp. a aff. *I. yabei* Nagao and Matsumoto: Nagao and Matsumoto, p. 6, pl. 2, figs. 1, 2.—compare 1940. *Inoceramus* sp. b aff. *I. yabei* Nagao and Matsumoto, p. 10, pl. 2, figs. 4, 5.

Type.—Lectotype designated by Matsumoto and Harada (1964, p. 96) (IGPS no. 22685) from Ikushumbetsu, Mikasa, Ishikari Prov., Hokkaido.
Age and distribution.—Cenomanian. Middle Yezo group (Mikasa sandstone and its correlatives) in Ikushumbetsu, Yubari, Obirashibe, Oyubari, Hobetsu and Naibuchi areas.

Inoceramus (Inoceramus) hobetsensis Nagao and Matsumoto

1925. *Inoceramus* cf. *percostatus* Müller: Yabe and Nagao, p. 115, pl. 28, figs. 7, 8, pl. 29, fig. 10.—1935. *Inoceramus hobetsensis* Nagao and Matsumoto: Nagao, p. 198, pl. 1 (nom. nud.).—1939. *Inoceramus hobetsensis* (Nagao and Otatume MS) Nagao and Matsumoto, p. 281, pl. 28, fig. 3, pl. 29, figs. 1, 3–6, pl. 30, figs. 2, 3.—1939. *Inoceramus hobetsensis* var. *nonsulcatus* Nagao and Matsumoto, p. 282, pl. 27, fig. 3, pl. 28, fig. 4, pl. 31, fig. 1.—1959a. *Inoceramus hobetsensis* Nagao and Matsumoto: Matsumoto, pl. 11, fig. b.—1969. *Inoceramus hobetsensis* Nagao and Matsumoto: Noda, p. 4, pl. 1, figs. 1, 2.—1971. *Inoceramus hobetsensis* Nagao and Matsumoto: Noda, p. 26, pl. 1, figs. 3–7.

Type.—Syntype (GMH no. 442) from unknown locality, syntype (UMUT I-793) from Obirashibe, Ishikari Prov., Hokkaido, syntype (UMUT I-813) from unknown locality, syntype (IGPS nos. 8057, 37285) from unknown locality, syntype (GMH no. 7143) from Hakkinsawa, Oyubari, Ishikari Prov.
Age and distribution.—Turonian. Middle Yezo group (upper part) in various areas of Hokkaido and Saghalin, and Onogawa group (Ryozen formation) in Onogawa area.

Inoceramus (Inoceramus) teshioensis Nagao and Matsumoto

1939. *Inoceramus teshioensis* Nagao and Matsumoto, p. 274, pl. 24, figs. 6, 7, 9, pl. 26, figs. 5–7.—1940. *Inoceramus yabei* Nagao and Matsumoto, p. 1 (pars), pl. 1, figs. 2–6 (non pl. 1, fig. 1.)—1969. *Inoceramus teshioensis* Nagao and Matsumoto: Noda, pl. 1, figs. 2–4.—1971. *Inoceramus teshioensis* Nagao and Matsumoto: Noda, p. 28, pl. 2, figs. 1–3.

Type.—Syntype (UMUT I-721) from Abeshinai, Teshio Prov., Hokkaido, syntype (GMH no. 5961) from Kamihobetsu, Iburi Prov., Hokkaido, syntype (IGPS no. 22643) from Horomui, Ishikari Prov., Hokkaido, syntype (UMUT I-720a, b) from Obirashibe, Teshio Prov. Hokkaido.
Age and distribution.—Turonian. Middle Yezo group (Saku formation and its correlatives) in various areas of Hokkaido, and Onogawa group (Ryozen formation) in Onogawa area.

Inoceramus (Inoceramus) tenuistriatus Nagao and Matsumoto

1939. *Inoceramus tenuistriatus* Nagao and Matsumoto, p. 272, pl. 24, fig. 8, pl. 26, figs. 1–4.

Type.—Syntype (UMUT I-700, I-701, GMH nos. 7192, 7187, 7185, IGPS nos. 22751, 22769) from Pombetsu, Mikasa, Ishikari Prov., Hokkaido.
Age and distribution.—Turonian. Middle Yezo group (upper part) and Upper Yezo group (lower part) in Ikushumbetsu and some other areas of Hokkaido.

Inoceramus (Inoceramus) incertus Jimbo

1894. *Inoceramus incertus* Jimbo, p. 43, pl. 8, fig. 7.—1940. *Inoceramus incertus* Jimbo: Nagao and Matsumoto, p. 10, pl. 3, figs. 1–5, pl. 10, fig. 2.—1940. *Inoceramus incertus* var. *yubariensis* Nagao and Matsumoto, p. 11, pl. 6, fig. 1.—1963. *Inoceramus incertus* Jimbo: Matsumoto, p. 45, pl. 67, fig. 7.

Type.—Syntype (UMUT MM7535=I-152) from the Pombetsu, Mikasa, Ishikari

Prov., Hokkaido. Jimbo's original figure was synthetized from more than three fragmentary specimens (see Matsumoto, 1963, p. 45).

Age and distribution.—Turonian. Middle Yezo group (upper part) in Ikushumbetsu area.

Inoceramus (Inoceramus) angulosus Jimbo

1894. *Inoceramus angulosus* Jimbo, p. 43, pl. 8, fig. 6.—1963. *Inoceramus angulosus* Jimbo: Matsumoto, p. 45, pl. 67, fig. 6.

Type.—Holotype by monotypy (UMUT MM7534=I-150) from Ponhorokabetsu, Yubari, Ishikari Prov., Hokkaido.

Age and distribution.—Turonian (or thereabout). Middle Yezo group (Mikasa sandstone) in Yubari area.

Inoceramus (Inoceramus) iburiensis Nagao and Matsumoto

1939. *Inoceramus iburiensis* Nagao and Matsumoto, p. 291, pl. 31, figs. 1, 2, pl. 32, fig. 2. —? 1939. *Inoceramus* sp. nov.? (*Inoceramus mukawaensis* Otatume MS): Nagao and Matsumoto, p. 293, pl. 32, figs. 1, 3.

Type.—Syntype (GMH nos. 5968, 7207, 7260, IGPS no. 57829) from Obirashibe, Teshio Prov., Hokkaido.

Age and distribution.—Turonian. Middle Yezo group (upper part) in various areas of Hokkaido and Saghalin.

Inoceramus (Inoceramus) uwajimensis Yehara

1924. *Inoceramus uwajimensis* Yehara, p. 36, pl. 3, figs. 1, 2, pl. 4, fig. 2 (non figs. 1, 3).—1939. *Inoceramus uwajimensis* Yehara: Nagao and Matsumoto, p. 286, pl. 34, figs. 1, 3, 4, 6, pl. 35, figs. 1–3.—1939. *Inoceramus uwajimensis* var. *yeharai* Nagao and Matsumoto, p. 287, pl. 34, figs. 2, 5, pl. 35, fig. 4.—1959a. *Inoceramus uwajimensis* Yehara: Matsumoto, pl. 11, fig. c.—1961. *Inoceramus* cf. *uwajimensis* Yehara: Takai and Matsumoto, p. 273, pl. 11, figs. 2–4.—1962. *Inoceramus uwajimensis* Yehara: Saito, p. 65, pl. 1, figs. 14, 17.—1962. *Inoceramus yeharai* Nagao and Matsumoto: Saito, p. 66, pl. 1, figs. 19, 20. —1969. *Inoceramus uwajimensis* Yehara: Noda, pl. 1, fig. 5.—1969. *Inoceramus uwajimensis yeharai* Nagao and Matsumoto: Noda, pl. 1, fig. 6.—1971. *Inoceramus uwajimensis* (Yehara): Noda, p. 26, pl. 2, fig. 4.—1971. *Inoceramus* sp. cf. *I. uwajimensis* (Yehara): Noda, p. 27, pl. 2, figs. 6, 7.—1972. *Inoceramus uwajimensis* (Yehara): Kanie, p. 21, pl. 3, figs. 4, 5.

Type.—Lectotype designated by Matsumoto *in* Takai and Matsumoto (1961, p. 273) (UK not registered) from Furushiroyama, Uwajima, Ehime Pref.

Age and distribution.—Coniacian. Upper Yezo group (lower part) in various areas of Hokkaido, Futaba group (Ashizawa formation) in Futaba area, Uwajima group (Furushiroyama formation) in Uwajima area, Onogawa group (Shibakita and Inukai formations) in Onogawa area, and Himenoura group (lower part) in Amakusa islands.

Inoceramus (Inoceramus) mihoensis Matsumoto

1940. *Inoceramus* sp. aff. *I. yabei* nov.: Nagao and Matsumoto, p. 1 (pars), pl. 2, fig. 8.—1957. *Inoceramus mihoensis* Matsumoto, p. 65, pl. 21, figs, 1–4.—1959a. *Inoceramus mihoensis* Matsumoto: Matsumoto, pl. 11, fig. d.—1969. *Inoceramus mihoensis* Matsumoto: Noda, pl. 2, fig. 1.—1971. *Inoceramus mihoensis* Matsumoto: Noda, p. 29, pl. 3, figs. 1, 2.

Type.—Holotype (GK H358) from Miho, Naibuchi, south Saghalin.

Age and distribution.—Coniacian. Upper Yezo group in various areas of south Saghalin and Hokkaido, and Onogawa group (Inukai and Yoshino formations) in Onogawa area.

Inoceramus (Inoceramus) amakusensis Nagao and Matsumoto

1940. *Inoceramus amakusensis* Nagao and Matsumoto, p. 13, pl. 3, fig. 6, pl. 4, figs. 1, 3, 4, pl. 5, fig. 1.—1959a. *Inoceramus amakusensis* Nagao and Matsumoto: Matsumoto, pl. 11, fig. e.—1962. *Inoceramus amakusensis* Nagao and Matsumoto: Matsumoto and Ueda, p. 161, text-fig. 12, pl. 22, figs. 1–3.—1969. *Inoceramus amakusensis* Nagao and Matsumoto: Noda, pl. 2, fig. 5.—compare 1970. *Inoceramus* sp. cf. *I. amakusensis* Nagao and Matsumoto: Morozumi, p. 21, pl. 2, fig. 1, pl. 3, figs. 1–4, pl. 4, fig. 1.—1971. *Inoceramus amakusensis* Nagao and Matsumoto: Noda, p. 30, pl. 3, fig. 8.

Type.—Lectotype designated by Matsumoto and Ueda (1962, p. 161) (UMUT I-960) from Hinoshima, Ryugatake (Amakusa-kamishima), Kumamoto Pref.

Age and distribution.—Santonian. Himenoura group in Amakusa islands, Upper Yezo group in various areas of Hokkaido, and Onogawa group (Amabe formation) in Onogawa area.

Inoceramus (Inoceramus) pedalionoides Nagao and Matsumoto

1939. *Inoceramus pedalionoides* Nagao and Matsumoto, p. 277, pl. 26, figs. 8, 9.

Type.—Syntype (IGPS no. 22720) from Pombetsu, Mikasa, Ishikari Prov., Hokkaido, syntype (GMH no. 5969) from a tributary of the Pankemoyuparo, Ishikari Prov., Hokkaido.

Age and distribution.—Turonian (or thereabout). Upper Yezo group (lowest part) in Ikushumbetsu area, and Middle Yezo group (upper part) in various areas of Hokkaido.

Inoceramus (Inoceramus) hetonaianus Matsumoto

1952. *Inoceramus hetonaianus* Matsumoto, *in* Tanaka, Matsumoto and Mayeda, p. 72, text-fig. 2.—1959a. *Inoceramus hetonaianus* Matsumoto: Matsumoto, pl. 11, fig. k.

Type.—Syntype (GK H629–H631, 634a–e, 638a–f) from Hokkaido (not precisely reported).

Age and distribution.—Maestrichtian. Hakobuchi group (upper part) in Hokkaido, and (?) Izumi group (upper part) in Awaji island.

Subgenus ***Sphenoceramus*** Böhm, 1915

Inoceramus (Sphenoceramus) yokoyamai Nagao and Matsumoto

1940. *Inoceramus yokoyamai* Nagao and Matsumoto, p. 44, pl. 16, fig. 2, pl. 20, fig. 2, pl. 21, fig. 2.—1969. *Inoceramus yokoyamai* Nagao and Matsumoto: Noda, pl. 2, fig. 2.

Type.—Syntype (IGPS no. 7124) from Kawakami, south Saghalin, syntype (GMH no. 376a) from Abeshinai, Nakagawa, Teshio Prov., Hokkaido.

Age and distribution.—Upper Yezo group in Naibuchi, Abeshinai, Iburi and Hidaka areas, and Onogawa group (Tsuru formation) in Onogawa area.

Inoceramus (Sphenoceramus) orientalis orientalis Sokolow

1894. *Inoceramus digitatus* Sowerby: Jimbo, p. 43, pl. 8, fig. 8 (non figs. 9, 10).—1914. *Inoceramus orientalis* Sokolow: Nagao and Matsumoto, p. 37, pl. 16, figs. 4, 5, pl. 17, figs. 3, 7, pl. 18, figs. 1–4.—1959a. *Inoceramus orientalis* Sokolow: Matsumoto, pl. 11, fig. i.—1962. *Inoceramus orientalis orientalis* Sokolow: Matsumoto and Ueda, p. 167, pl. 25, fig. 2.—1963. *Inoceramus orientalis orientalis* Sokolow: Matsumoto, p. 46, pl. 67, fig. 8.

Type.—Lectotype designated by Matsumoto and Ueda (1962, p. 167) from the Amba, north Saghalin.

Age and distribution.—Campanian. Upper Yezo group in various areas of Saghalin and Hokkaido, and Hakobuchi group in Hetonai area.

Inoceramus (Sphenoceramus) orientalis nagaoi Matsumoto and Ueda

1894. *Inoceramus* aff. *lobatus* Münster: Jimbo, p. 44, pl. 8, fig. 11.—1940. *Inoceramus orientalis* var. *ambiguus* Nagao and Matsumoto, p. 37, pl. 15, figs. 3, 4, pl. 17, figs. 1, 2. (non *Inoceramus ambiguus* von Eichwald, 1865)—1960. *Inoceramus orientalis* var. *ambiguus* Nagao and Matsumoto: Amano, p. 9, pl. 1, figs. 1–3, 6, 8, 10.—1962. *Inoceramus orientalis nagaoi* Matsumoto and Ueda, p. 167, pl. 23, figs. 1–5.—1963. *Inoceramus orientalis nagaoi* Matsumoto and Ueda: Matsumoto, p. 46, pl. 67, fig. 11.

Type.—Lectotype designated by Matsumoto and Ueda (1962, p. 167) (GMH no. 3808) from Osachinai, Hiratori, Hidaka Prov., Hokkaido.

Age and distribution.—Santonian–Campanian. Upper Yezo group in various areas of Hokkaido and Saghalin, and Himenoura group in Amakusa islands.

Inoceramus (Sphenoceramus) naumanni Yokoyama

1890. *Inoceramus Naumanni* Yokoyama, p. 174, pl. 17, figs. 3–5.—1940. *Inoceramus naumanni* Yokoyama: Nagao and Matsumoto, p. 31, pl. 13, fig. 4, pl. 14, figs. 1–10, pl. 15, figs. 1, 2, pl. 17, fig. 6.—1959a. *Inoceramus naumanni* Yokoyama: Matsumoto, pl. 11, fig. h.—1963. *Inoceramus naumanni* Yokoyama: Matsumoto, Hayami and Asano, p. 28, pl. 44, figs. 3–5.—1969. *Inoceramus naumanni* Yokoyama: Noda, pl. 2, figs. 3, 4.—1971. *Inoceramus naumanni* (Yokoyama): Noda, p. 30, pl. 3, figs. 3–6.—1973. *Inoceramus* (*Sphenoceramus*) *naumanni naumanni* Yokoyama: Tanabe, p. 180, pl. 27, figs. 1–5, pl. 28, figs. 1–4, 7–9.

Type.—Lectotype designated by Matsumoto *in* Matsumoto, Hayami and Asano (1963, p. 28) from Urakawa, Hidaka Prov., Hokkaido.

Age and distribution.—Coniacian–Santonian. Upper Yezo group in various areas of Hokkaido and Saghalin, Onogawa group (Tsuru formation) in Onogawa area, and Himenoura group in Amakusa islands.

Inoceramus (Sphenoceramus) schmidti Michael

1873. *Inoceramus digitatus* Sowerby: Schmidt, p. 25, pl. 5, fig. 10, pl. 6, figs. 1, 2, 4, 6, pl. 7, figs. 1, 3, 5–10, pl. 8, fig. 14 (non pl. 6, fig. 7).—1873. *Inoceramus digitatus* var. *irregulari-costata* Schmidt, p. 31, pl. 8, fig. 15.—1873. *Inoceramus digitatus* var. *decussata* Schmidt, p. 31, pl. 7, fig. 4.—1894. *Inoceramus digitatus* Sowerby: Jimbo, p. 43, pl. 8, fig. 10 (non figs. 8, 9).—1899. *Inoceramus schmidti* Michael, p. 160, pl. 5, fig. 1, pl. 6, figs. 1, 3–5.—1914. *Inoceramus schmidti* Michael: Sokolow, p. 67, pl. 1, fig. 1, pl. 2, figs. 1, 2, pl. 3, figs. 1, 2.—1915. *Inoceramus schmidti* Michael: Yabe, p. 23, pl. 1, figs. 10, 11.—1940. *Inoceramus schmidti* Michael: Nagao and Matsumoto, p. 41, pl. 8, fig. 5, pl. 17, figs. 4, 5, pl. 19, figs. 1–4, pl. 20, fig. 1.—1959a. *Inoceramus schmidti* Michael: Matsumoto, pl. 11, fig. j.—1963. *Inoceramus schmidti* Michael: Matsumoto, p. 46, pl. 67, fig. 10.—1973. *Inoceramus* (*Sphenoceramus*) *naumanni schmidti* Michael: Tanabe, p. 180, pl. 27, fig. 6, pl. 28, figs. 5, 6, 10–18.

Type.—Syntype from Cape Jonquière near Alexandrovsk, north Saghalin.

Age and distribution.—Campanian. Hakobuchi group in various areas of Hokkaido,

Ryugase group in various areas of Saghalin, and Sotoizumi group (Toyajo formation) in Kanaya area.

Inoceramus (Sphenoceramus) sachalinensis Sokolow

1873. *Inoceramus digitatus* Sowerby: Schmidt, p. 25 (pars), pl. 6, fig. 7 (only).—1894. *Inoceramus digitatus* Sowerby: Jimbo, p. 43, pl. 8, fig. 9 (non figs. 8, 10).—1914. *Inoceramus sachalinensis* Sokolow, p. 71, pl. 1, fig. 2, pl. 2, figs. 3, 4, pl. 3, figs. 3, 4, pl. 4, fig. 1.—1927. *Inoceramus sachalinensis* Sokolow: Yabe, pl. 7, fig. 2.—1940. *Inoceramus sachalinensis* Sokolow: Nagao and Matsumoto, p. 45, pl. 15, fig. 5, pl. 16, fig. 1, pl. 20, figs. 3, 4, pl. 21, figs. 1, 4, pl. 22, fig. 1.—1963. *Inoceramus sachalinensis* Sokolow: Matsumoto, p. 46, pl. 67, fig. 9.

Age and distribution.—Campanian. Ryugase group in various areas of Saghalin, and Upper Yezo group and Hakobuchi group in various areas of Hokkaido.

Inoceramus (Sphenoceramus) elegans elegans Sokolow

1914. *Inoceramus elegans* Sokolow, p. 74, pl. 1, figs. 3, 4.—1940. *Inoceramus pseudosulcatus* var. *elegans* Sokolow: Nagao and Matsumoto, p. 49, pl. 22, fig. 3.

Type.—Lectotype designated by Matsumoto *in* Takai and Matsumoto (1961, p. 276) from Alexandrovsk, north Saghalin.

Age and distribution.—Santonian–Campanian. Upper Yezo group (upper part) and Hakobuchi group (lower part) in various areas of Hokkaido and Saghalin.

Inoceramus (Sphenoceramus) elegans pseudosulcatus Nagao and Matsumoto

1940. *Inoceramus pseudosulcatus* Nagao and Matsumoto, p. 48, pl. 21, fig. 3, pl. 22, fig. 2.—1961. *Inoceramus elegans pseudosulcatus* Nagao and Matsumoto: Takai and Matsumoto, p. 275, pl. 12, figs. 1, 2.

Type.—Lectotype (GMH no. 5988a) designated by Matsumoto *in* Takai and Matsumoto (1961, p. 276) from Horokakuriki, Yubari, Ishikari Prov., Hokkaido.

Age and distribution.—Campanian. Hakobuchi group (lower part) in Yubari, Hetonai, Urakawa and some other areas of Hokkaido, and Himenoura group (upper part) in Nagashima area.

Subgenus ***Cataceramus*** Cox, 1969

Inoceramus (Cataceramus) ezoensis Yokoyama

1890. *Inoceramus* sp.: Yokoyama, p. 175, pl. 18, figs. 6, 7.—1915. *Inoceramus ezoensis* Yokoyama, *in* Yabe, p. 23, pl. 4, fig. 1.—1940. *Inoceramus ezoensis* Yokoyama: Nagao and Matsumoto, p. 16, pl. 7, fig. 1, pl. 10, fig. 3, pl. 11, fig. 3.—compare 1940. *Inoceramus ezoensis* var. *vanuxemiformis* Nagao and Matsumoto, p. 17, pl. 10, fig. 4, pl. 11, fig. 2.—1963. *Inoceramus ezoensis* Yokoyama: Matsumoto, Hayami and Asano, p. 29, pl. 44, figs. 6, 7.—compare 1970. *Inoceramus* cf. *I. ezoensis* Yokoyama: Morozumi, p. 22, pl. 4, figs. 2, 3.

Type.—Syntype from Urakawa, Hidaka Prov., Hokkaido. Syntype of *Inoceramus ezoensis* var. *vanuxemiformis* (UMUT I-985) from the upper course of Bannosawa, Ishikari Prov. Hokkaido, and syntype of the same variety (GMH no. 7251) from Hetonai, Iburi Prov., Hokkaido.

Age and distribution.—Santonian. Upper Yezo group in various areas of Hokkaido.

Inoceramus (Cataceramus) japonicus Nagao and Matsumoto

1940. *Inoceramus japonicus* (Sasa MS) Nagao and Matsumoto, p. 24, pl. 5, fig. 2, pl. 6, figs. 2, 3, pl. 7, figs. 2, 3, pl. 8, figs. 1–4, pl. 9, figs. 1, 2.—1959a. *Inoceramus japonicus* Nagao and Matsumoto: Matsumoto, p. 86, pl. 11, fig. f.—1962. *Inoceramus japonicus* Nagao and Matsumoto: Matsumoto and Ueda, p. 165, pl. 22, fig. 4, pl. 24, fig. 1.

Type.—Lectotype designated by Matsumoto and Ueda (1962, p. 165) (UMUT I-1013) from Kunitan, Kuji, Iwate Pref.

Age and distribution.—Santonian. Kuji group (Kunitan formation) in Kuji area, Upper Yezo group in various areas of Hokkaido and Saghalin, and Himenoura group in Amakusa islands.

Inoceramus (Cataceramus) balticus toyajoanus Nagao and Matsumoto

1915. *Inoceramus* cf. *regularis* d'Orbigny: Yabe, p. 22, pl. 3, fig. 3.—1924. *Inoceramus* cf. *regularis* d'Orbigny: Yehara, p. 38, pl. 2, fig. 5.—1927. *Inoceramus* cf. *regularis* d'Orbigny: Yabe, pl. 7, fig. 1.—1940. *Inoceramus balticus* Böhm: Nagao and Matsumoto, p. 18, pl. 10, fig. 1, pl. 13, fig. 1.—1940. *Inoceramus balticus* var. *toyajoanus* Nagao and Matsumoto, p. 20, pl. 9, fig. 3.—1957a. *Inoceramus balticus* Böhm: Amano, p. 57, pl. 2, figs. 2–5, 7.—1961. *Inoceramus* cf. *balticus toyajoanus* Nagao and Matsumoto: Takai and Matsumoto, p. 274, pl. 11, fig. 1, pl. 12, fig. 3.—1962. *Inoceramus balticus toyajoanus* Nagao and Matsumoto: Matsumoto and Ueda, p. 164, pl. 23, figs. 6, 7.—1962. *Inoceramus balticus toyajoanus* Nagao and Matsumoto: Nagai, Nakano, Yoshida and Ohtsuka, p. 96, pl. 1, fig. 1.

Type.—Lectotype designated by Matsumoto *in* Takai and Matsumoto (1961, p. 274) (IGPS no. 4539) from Toyajo, Kanaya, Wakayama Pref.

Age and distribution.—Campanian. Sotoizumi group (Toyajo formation) in Kanaya area, Izumi group in Matsuyama area, and Awaji island, and Himenoura group in Amakusa and Koshikijima islands.

Subgenus uncertain

Inoceramus fukadae Hayami

1960b. *Inoceramus* (s. l.) *fukadae* Hayami, p. 313, text-fig. 3, pl. 16, fig. 10.

Type.—Holotype (UMUT MM3605) from Kodaijima, Ishinomaki, Miyagi Pref.

Age and distribution.—Bajocian. Ojika group (Kodaijima formation) in Ojika area.

Inoceramus furukawensis Hayami

1960b. *Inoceramus furukawensis* Hayami, p. 311, pl. 16, fig. 8.

Type.—Holotype (UMUT MM3604) from Wakidani, Kawai, Gifu Pref.

Age and distribution.—Oxfordian (or thereabout). Tetori group (Sugisaki sandstone) in Furukawa area.

Inoceramus pilvoensis Sokolow

1914. *Inoceramus pilvoensis* Sokolow, p. 39, 77, pl. 5, figs. 3–5.—1940. *Inoceramus pilvoensis* Sokolow: Nagao and Matsumoto, p. 55, pl. 22, fig. 5.

Age and distribution.—Upper Cretaceous (precise age and distribution unknown).

Inoceramus kusiroensis Nagao and Matsumoto

1940. *Inoceramus kusiroensis* Nagao and Matsumoto, p. 56, pl. 22, fig. 4.

Type.—Holotype (GMH no. 7271) from Otamura, Kushiro Prov., Hokkaido.

Age and distribution.—Maestrichtian. Nemuro group (Monshizu formation) in Akkeshi area, and Hakobuchi group (upper part) in Hetonai area.

Inoceramus shikotanensis Nagao and Matsumoto

1940. *Inoceramus shikotanensis* (Inai MS) Nagao and Matsumoto, p. 28, pl. 11, fig. 1, pl. 12, figs. 1, 3, 4.—1959a. *Inoceramus shikotanensis* Nagao and Matsumoto: Matsumoto, pl. 11, fig. g.—compare 1962. *Inoceramus* cf. *shikotanensis* Nagao and Matsumoto: Saito, p. 67, pl. 2, figs. 1, 2.

Type.—Syntype (GMH no. 7265) from Hetonai, Iburi Prov., Hokkaido, syntype (UMUT I-664) from Awaji, Hyogo Pref., syntype (GMH no. 7257a) from Shikotan, Kurile islands.

Age and distribution.—Maestrichtian. Hakobuchi group (upper part) in Hetonai area, Nemuro group in Shikotan island, and Izumi group in Awaji island.

Inoceramus teraokai Matsumoto and Noda

1968. *Inoceramus teraokai* Matsumoto and Noda, p. 319, pl. 32, figs. 1–5.—1971. *Inoceramus teraokai* Matsumoto and Noda: Noda, p. 28, pl. 2, figs. 1–3.

Type.—Holotype (GK H6833) from Yamaji, Usuki, Oita Pref.

Age and distribution.—Turonian. Tano formation in Notsu area.

Inoceramus yuasai Noda

1962. *Inoceramus* sp.: Nagai, Nakano, Yoshida and Ohtsuka, p. 3, pl. 1, fig. 2.—1974. *Inoceramus yuasai* Noda, p. 242, pl. 34, figs. 1–10.

Type.—Holotype (GK H6823) from Nakanokawa, Ipponmatsu, Ehime Pref.

Age and distribution.—Campanian (or thereabout). Shimantogawa group (Misho formation) in Johen area.

Inoceramus sp. cf. **I. cycloides** Wegner

1970. *Inoceramus* sp. cf. *I. cycloides* Wegner: Morozumi, p. 22, pl. 4, fig. 4.

Age and distribution.—Santonian (or thereabout). Hidakagawa group (Terasoma formation) in Yura area.

Family uncertain

Inoceramus? kudoi Hayami

1960b. *Inoceramus* (s. l.) *kudoi* Hayami, p. 312, pl. 16, fig. 9, pl. 18, figs. 3, 4.

Type.—Holotype (UMUT MM9088) from Hosoura, Shizukawa, Miyagi Pref.

Age and distribution.—Toarcian–Bajocian. Shizukawa group (Hosoura formation) in Shizukawa area.

Inoceramus? naganoensis Hayami

1960b. *Inoceramus* (?) *naganoensis* Hayami, p. 315, pl. 18, fig. 6.

Type.—Holotype (UMUT MM3611) from Nagano, Izumi, Fukui Pref.

Age and distribution.—Oxfordian (or thereabout). Tetori group ("Nagano formation") in Izumi area.

Inoceramus? awajiensis Matsumoto

1952. *Inoceramus awajiensis* Matsumoto, *in* Tanaka, Matsumoto and Mayeda, p. 72, text-fig. 1.

Type.—Syntype (GK H641–H651) from Awaji island (not precisely reported).

Age and distribution.—Campanian–Maestrichtian. Izumi group (Shimonada siltstone) in Awaji island.

Superfamily PECTINACEA Rafinesque, 1815
Family AVICULOPECTINIDAE Meek ahd Hayden, 1864
Subfamily AVICULOPECTININAE Meek and Hayden, 1864
Genus ***Claraia*** Bittner, 1901

Claraia pulchella (Nakazawa)

1953. *Pseudomonotis* (*Claraia*) *pulchella* Nakazawa, p. 264, pl. 3, figs. 1–7.

Type.—Holotype (UK JM10047A-a) from Chigono, Yakuno, Kyoto Pref.

Age and distribution.—Skytian. Yakuno group (undivided) in Maizuru zone.

Claraia sp. aff. **C. decidens** (Bittner)

1953. *Pseudomonotis* (*Claraia*) sp. aff. *decidens* Bittner: Nakazawa, p. 265, pl. 3, figs. 8, 9.

Age and distribution.—Skytian. Yakuno group (Narawara formation) in Maizuru zone.

Genus ***Eumorphotis*** Bittner, 1901

Eumorphotis multiformis (Bittner)

1926. *Pseudomonotis* (*Eumorphotis*) *multiformis* Bittner var.: Matsushita, p. 421, pl. 8, fig. 6.—compare 1953. *Eumorphotis* sp. aff. *multiformis* Bittner: Nakazawa, p. 267, pl. 3, fig. 10.—1954. *Eumorphotis multiformis* (Bittner): Ozaki and Shikama, p. 43, pl. 19, figs. 1–6.—1955. *Eumorphotis multiformis shionosawensis* Ichikawa and Yabe, p. 6, pl. 2, figs. 1–15.—1956. *Pecten* spp. A and B.: Yabe, p. 290, pl. 17, figs. 1,1 12.—1963. *Eumorphotis multiformis* (Bittner): Kambe, p. 38, pl. 1, figs. 1–11, pl. 2, figs. 1–7.—1963. *Eumorphotis multiformis shionosawensis* Ichikawa and Yabe: Kambe, p. 40, pl. 2, fig. 8.—1971. *Eumorphotis multiformis* (Bittner): Nakazawa, p. 117, pl. 23, figs. 7–12.

Type.—Holotype of *Eumorphotis multiformis shionosawensis* (UMUT MM5401) from Shionosawa, Ueno, Gumma Pref.

Age and distribution.—Skytian. Kurotaki formation in Nangoku area, Shionosawa limestone in Sanchu area, and Kamura formation in Takachiho area. This species has been known from the Skytian of Ussuri.

Eumorphotis sp. aff. **E. maritima** Kiparisova

1961. *Eumorphotis* aff. *maritima* Kiparisova: Nakazawa, p. 259, pl. 12, figs. 25–28.

Age and distribution.—Skytian. Fukumoto group (Kusano formation) in Fukumoto area.

Eumorphotis sp. aff. **E. tenuistriata** (Bittner)

1961. *Eumorphotis* aff. *tenuistriata* (Bittner): Nakazawa, p. 260, pl. 12, fig. 29.

Age and distribution.—Skytian. Fukumoto group (Kusano formation) in Fukumoto area.

Genus ***Asoella*** Tokuyama, 1959

Asoella confertoradiata (Tokuyama) [Pl. 2, Figs. 8, 9]

1939. *Pseudomonotis* sp. aff. *P. spitzbergensis:* Katayama, pl. 8, fig. 1.—1959b. *Eumorphotis* (*Asoella*) *confertoradiata* Tokuyama, p. 4, text-fig. 1, pl. 1, figs. 1–6, 12.

Type.—Holotype (UMUT MM4498) from Higaeribara, Mine, Yamaguchi Pref.

Age and distribution.—Carnian (or lower Norian). Mine group (Aso formation) in Mine area.

Asoella laevigata (Tokuyama)

1959b. *Eumorphotis* (*Asoella*) *laevigata* Tokuyama, p. 5, text-fig. 2, pl. 1, figs. 7–10.
Type.—Holotype (UMUT MM4505) from Higaeribara, Mine, Yamaguchi Pref.
Age and distribution.—Carnian (or lower Norian). Mine group (Aso formation) in Mine area.

Asoella nakatsukensis (Tokuyama)

1959b. *Eumorphotis* (*Asoella*) *nakatsukensis* Tokuyama, p. 6, pl. 1, figs. 11, 13, 14.
Type.—Holotype (UMUT MM4510) from Morimoto, Asa, Yamaguchi Pref.
Age and distribution.—Carnian. Mine group (Nakatsuka formation) in Asa area.

Genus ***Leptochondria*** Bittner, 1891

Leptochondria minima (Kiparisova)

1928. *Pseudomonotis* cf. *iwanowi* Bittner: Yehara, p. 170, pl. 16, figs. 13, 14.—1961. *Leptochondria? minima* (Kiparisova): Nakazawa, p. 260, pl. 12, figs. 16, 17.—1963. *Eopecten minimus* (Kiparisova): Kambe, p. 47, pl. 5, figs. 17–21.—1971. *Leptochondria minima* (Kiparisova): Nakazawa, p. 119, pl. 23, figs. 13, 14.
Type.—Holotype from Ussuri.
Age and distribution.—Skytian. Yakuno group (Narawara formation) in Maizuru zone, Kamura formation in Takachiho area, and Taho formation in Uonashi area.

Leptochondria? sp. aff. **L. virgalensis** (Wittenburg)

1961. *Leptochondria* (?) aff. *virgalensis* Wittenburg: Nakazawa, p. 261, pl. 12, fig. 18.
Age and distribution.—Skytian. Yakuno group (Oro formation) in Maizuru zone.

Leptochondria? okuyamensis Nakazawa

1961. *Leptochondria* (?) *okuyamensis* Nakazawa, p. 262, pl. 12, figs. 19–21.
Type.—Holotype (UK JM10663) from Miyagatake, Fukuchiyama, Kyoto Pref.
Age and distribution.—Skytian. Yakuno group (Hirobatake formation) in Maizuru zone.

Leptochondria? sp. cf. **L. bittneri** (Kiparisova)

1961. *Leptochondria* (?) cf. *bittneri* (Kiparisova): Nakazawa, p. 262, pl. 12, figs. 22–24.
Age and distribution.—Skytian. Yakuno group (Narawara formation) in Maizuru zone.

Leptochondria? hataii Murata

1973. *Leptochondria? hataii* Murata, p. 273, pl. 29, figs. 1–13.
Type.—Holotype (IGPS no. 92661) from Hikado, Motoyoshi, Miyagi Pref.
Age and distribution.—Skytian. Inai group (Osawa and Fukkoshi formations) in Motoyoshi area.

Subfamily STREBLOCHONDRIINAE Newell, 1938

Genus ***Streblochondria*** Newell, 1938

Streblochondria matsushitai Nakazawa

1926. *Posidonia* nov. sp.: Matsushita, pl. 8, fig. 4.—1926. *Pecten* (*Entolium*) *discites* Schlotheim: Matsushita, pl. 8, fig. 3.—1926. *Pecten* (*Entolium*) *discites* var. *microtis* Bittner: Matsushita, pl. 8, fig. 7.—1926. *Pleuronectites* nov. sp.: Matsushita, pl. 8, figs. 2, 5.—1926. *Lima* (*Plagiostoma*) nov. sp.: Matsushita, pl. 8, fig. 13.—1971. "*Streblochondria*" *matsushitai* Nakazawa, p. 122, text-fig. 2, pl. 23, figs. 20, 21, pl. 24, figs. 1–9, 11.—compare 1971. *Streblochondria* cf. *matsushitai* Nakazawa, p. 124, pl. 24, fig. 10.
Type.—Holotype (UK JM11237) from Kurotaki, Nangoku, Kochi Pref.

Age and distribution.—Skytian. Kurotaki formation in Nangoku area, and Kamura formation in Takachiho area.

Family uncertain

Eumorphotis? sp. aff. **E.? spitzbergensis** (Boehm)

1949c. *Pseudomonotis* (*Eumorphotis*) aff. *spitzbergensis* (Boehm): Kobayashi and Ichikawa, p. 247, pl. 10, figs. 9–11.

Age and distribution.—Carnian. Kochigatani group (lower part) in Sakawa area.

Family OXYTOMIDAE Ichikawa, 1958

Genus ***Oxytoma*** Meek, 1864

Subgenus ***Oxytoma*** Meek, 1864

Oxytoma (Oxytoma) mojsisovicsi Teller [Pl. 3, Fig. 1]

MM5101 -3-1

1927. *Oxytoma mojsisovicsi* Teller: Yehara, p. 32, pl. 4, figs. 9, 10.—1927. *Pseudomonotis zitteli* Teller: Yehara, p. 30, pl. 4, figs. 7, 8.—1950b. *Oxytoma zitteli* (Teller): Kobayashi and Ichikawa, p. 220, pl. 2, figs. 3–6.—1950b. *Oxytoma subzitteli* Kobayashi and Ichikawa, p. 221, pl. 2, figs. 7, 8.—1950b. *Oxytoma yeharai* Kobayashi and Ichikawa, p. 222, pl. 2, figs. 1, 2, pl. 3, fig. 13.—1957b. *Oxytoma subzitteli* Kobayashi and Ichikawa: Nakano, p. 64, pl. 9, fig. 1.—1959b. *Oxytoma zitteli* (Teller): Tokuyama, p. 7, pl. 1, figs. 19–21.—1959b. *Oxytoma subzitteli* Kobayashi and Ichikawa: Tokuyama, p. 8, pl. 1, figs. 23, 24.—1963. *Oxytoma* cf. *subzitteli* Kobayashi and Ichikawa: Nakazawa, p. 54, pl. 2, figs. 10–12.—1964a. *Oxytoma* cf. *subzitteli* Kobayashi and Ichikawa: Nakazawa, p. 36, pl. 5, figs. 6–8.—1969. *Oxytoma* (*Oxytoma*) *mojsisovicsi* Teller: Ozawa and Hayami, p. 34, pl. 3, figs. 6–11.

Type.—Holotype of *Oxytoma subzitteli* (UMUT MM5109) and holotype of *Oxytoma yeharai* (UMUT MM5101) from Umenokidani, Sakawa, Kochi Pref.

Age and distribution.—Carnian–Norian. Kochigatani group (lower part) in Sakawa and Ome areas, Kyowa formation in Nariwa area, Mine group (Hirabara formation) in Mine area, and Saragai group in Shizukawa area. This species is also widely distributed in eastern Siberia.

Oxytoma (Oxytoma) kashiwaiensis Kobayashi and Ichikawa

1950b. *Oxytoma kashiwaiensis* Kobayashi and Ichikawa, p. 223, pl. 3, figs. 1–3.—1950b. *Oxytoma pulchra* Kobayashi and Ichikawa, p. 224, pl. 3, fig. 4.—1950b. *Oxytoma sedaka* Kobayashi and Ichikawa, p. 225, pl. 3, figs. 8–12.—1954c. *Oxytoma pulchra* Kobayashi and Ichikawa: Ichikawa, p. 49, pl. 2, figs. 6–11, (?) 12.—1956. *Oxytoma pulchra* Kobayashi and Ichikawa: Nakazawa, p. 246, pl. 4, fig. 16.—1959b. *Oxytoma pulchrum* Kobayashi and Ichikawa [*sic*]: Tokuyama, p. 9, pl. 1, fig. 22.

Type.—Holotype (UMUT MM5116) from Kashiwai, Sakawa, Kochi Pref. Holotypes of *Oxytoma pulchra* (UMUT MM5119) and *Oxytoma sedaka* (UMUT MM5123) from the same locality.

Age and distribution.—Carnian. Kochigatani group (lower part) in Sakawa and Sakuradani areas, Nabae group (N3 formation) in Maizuru zone, and Mine group (Hirabara formation) in Mine area.

Oxytoma (Oxytoma) atsuensis Tokuyama

1959b. *Oxytoma atsuense* Tokuyama [*sic*], p. 7, pl. 1, fig. 25.

Type.—Holotype (UMUT MM4522) from Shirogawara, Mine, Yamaguchi Pref.
Age and distribution.—Carnian (or upper Ladinian). Atsu group in Mine area.

Oxytoma (Oxytoma) multistriata Tokuyama

1959b. *Oxytoma multistriatum* Tokuyama [*sic*], p. 10, pl. 1, figs. 26, 27.

Type.—Holotype (UMUT MM4523) from Higaeribara, Mine, Yamaguchi Pref.
Age and distribution.—Carnian (or lower Norian). Mine group (Aso formation) in Mine area.

Oxytoma (Oxytoma) inequivalvis (Sowerby)

1959c. *Oxytoma* cf. *inequivalve* (Sowerby) [*sic*]: Hayami, p. 57, pl. 5, figs. 6–11.—1959h. *Oxytoma inequivalve* (Sowerby) [*sic*]: Hayami, p. 50, pl. 5, figs. 18, 19, pl. 7, fig. 17.

Age and distribution.—Sinemurian—Bajocian. Hashiura group (Aratozaki formation) in Shizukawa area, and Toyora group (Higashinagano formation) in Toyoda area. This species seems to be cosmopolitan.
Remarks.—The Japanese specimens of *O.* (*O.*) *inequivalvis* are generally much smaller than European ones.

Oxytoma (Oxytoma) kobayashii Hayami

1959h. *Oxytoma kobayashii* Hayami, p. 49, pl. 5, figs. 15–17.

Type.—Holotype (UMUT MM3372) from Higashinakayama, Kikukawa, Yamaguchi Pref.
Age and distribution.—Sinemurian (or Pliensbachian). Toyora group (Higashinagano formation) in Toyoda area.

Oxytoma (Oxytoma) tetoriensis Hayami

1959f. *Oxytoma tetoriense* Hayami [*sic*], p. 148, pl. 12, figs. 14, 15.

Type.—Holotype (UMUT MM3155) from Mitarai, Shokawa, Gifu Pref.
Age and distribution.—Callovian. Tetori group (Mitarai formation) in Makito area.

Subgenus ***Palmoxytoma*** Cox, 1961

Oxytoma (Palmoxytoma) sp. cf. **O. (P.) cygnipes** (Young and Bird)

1959h. *Oxytoma* cf. *cygnipes* (Young and Bird): Hayami, p. 48, pl. 5, fig. 14.

Age and distributiom.—Sinemurian. Toyora group (Higashinagano formation) in Toyoda area.

Genus ***Meleagrinella*** Whitfield, 1885

Meleagrinella japonica Hayami

1959h. *Meleagrinella japonica* Hayami, p. 47, pl. 5, figs. 20–22.

Type.—Holotype (UMUT MM3368) from Higashinagano, Toyoda, Yamaguchi Pref.
Age and distribution.—Sinemurian. Toyora group (Higashinagano formation) in Toyoda area.

Meleagrinella okayamensis Hayami

1961a. *Meleagrinella okayamensis* Hayami, p. 115, pl. 16, figs. 2, 3.

Type.—Holotype (UMUT MM3676) from Ochiai, Oosa, Okayama Pref.
Age and distribution.—Toarcian (or thereabout). Yamaoku formation in Osakabe area.

Family uncertain

Oxytoma? dieneri Kobayashi and Ichikawa

1950b. *"Oxytoma" dieneri* Kobayashi and Ichikawa, p. 226, pl. 2, fig. 9.

Type.—Holotype (UMUT MM5112) from Togo, Sakawa, Kochi Pref.

Age and distribution.—Carnian. Kochigatani group (lower part) in Sakawa area.

Family POSIDONIIDAE French, 1909

Genus ***Bositra*** de Gregorio, 1886

Bositra japonica (Kobayashi and Hukasawa)

1940. *Posidonia japonica* Kobayashi and Hukasawa, p. 517, figs. 1, 2.

Type.—Syntype (UMUT MM5035) from Biwazaki, Utatsu, Miyaki Pref.

Age and distribution.—Anisian? Inai group (horizon uncertain) in Shizukawa area.

Bositra sp. cf. **B. ornati** (Quenstedt)

1961c. *Posidonia* sp. ex gr. *ornati* Quenstedt: Hayami, p. 286, pl. 14, fig. 6.

Age and distribution.—Bajocian. Toyora group (Utano formation) in Toyoda area.

Genus ***Daonella*** Mojsisovics, 1874

Daonella sakawana Mojsisovics

1888. *Daonella Sakawana* Mojsisovics, p. 174, pl. 2, fig. 4 (non fig. 5).—1915. *Daonella sakawana* Mojsisovics: Diener, p. 25, pl. 4, figs. 3, 4.—1959. *Daonella sakawana* Mojsisovics: Kobayashi and Tokuyama, p. 17, pl. 2, fig. 8.—1963. *Daonella sakawana* Mojsisovics: Ichikawa, p. 10, pl. 18, fig. 4.

Type.—Lectotype restricted by Yabe and Shimizu (1927, p. 124) and designated by Ichikawa (1963, p. 10), which is to be preserved in Wien but now missing, from Zohoin, Sakawa, Kochi Pref. Plaster cast of the lectotype (UMUT MM5002).

Age and distribution.—Ladinian. Zohoin group in Sakawa area.

Daonella kotoi Mojsisovics [Pl. 2, Fig. 10]

MM5001 - 2 / 0

1888. *Daonella Kotoi* Mojsisovics, p. 174, pl. 2, fig. 3.—1959. *Daonella kotoi* Mojsisovics: Kobayashi and Tokuyama, p. 16, pl. 2, figs. 3–6, pl. 3, fig. 1, pl. 4, figs. 2, 3.—1959. *Daonella kotoi* Mojsisovics var.: Kobayashi and Tokuyama, p. 17, pl. 2, fig. 7.—1963. *Daonella kotoi* Mojsisovics: Ichikawa, p. 10, pl. 18, fig. 3.

Type.—Holotype by monotypy, which is to be preserved in Wien but now missing, from Zohoin, Sakawa, Kochi Pref. Plaster cast of the holotype (UMUT MM5001).

Age and distribution.—Ladinian. Zohoin group in Sakawa area.

Daonella densisulcata Yabe and Shimizu

compare 1888. *Daonella Sakawana* Mojsisovics, p. 174, pl. 2, fig. 5 (non fig. 4).—1927. *Daonella densisulcata* Yabe and Shimizu, p. 124, 134, pl. 11, fig. 13, pl. 12, figs. 8, 9.—1927. *Daonella densisulcata* var. *subquadrata* Yabe and Shimizu, p. 122, pl. 12, fig. 9.—1959. *Daonella densisulcata* Yabe and Shimizu: Kobayashi and Tokuyama, p. 20.—1959. *Daonella subquadrata subquadrata* Yabe and Shimizu: Kobayashi and Tokuyama, p. 19, pl. 1, figs. 6, 7, pl. 2, figs. 9, 10.—1959. *Daonella subquadrata zohoinensis* Kobayashi and Tokuyama, p. 19, pl. 1, figs. 12, 13, pl. 2, fig. 9, pl. 3, fig. 5.—1959. *Daonella subquadrata symmetrica* Kobayashi and Tokuyama, p. 19, pl. 1, figs. 8–11.—compare 1963. *Daonella* cf. *densisulcata* Yabe and Shimizu: Ichikawa, p. 10, pl. 18, fig. 5.

Type.—Syntype (IGPS not registered) from northeast of the Rifu station, Rifu, Miyagi

Pref. Holotype by monotypy of *Daonella densisulcata* var. *subquadrata* (IGPS not registered) from the same locality. Holotypes of *Daonella subquadrata zohoinensis* (UMUT MM3510) and *Daonella subquadrata symmetrica* (UMUT MM3525) from Zohoin, Sakawa, Kochi Pref.

Age and distribution.—Ladinian. Rifu formation in Rifu area, and Zohoin group in Sakawa area.

Daonella multistriata Yabe and Shimizu

1927. *Daonella kotoi* var. *multistriata* Yabe and Shimizu, p. 123, pl. 11, figs. 12, 14, pl. 13, fig. 11.—1959. *Daonella multistriata* Yabe and Shimizu: Kobayashi and Tokuyama, p. 20, pl. 3, fig. 7.

Type.—Syntype (IGPS not registered) from several localities near the Rifu station, Rifu, Miyagi Pref.

Age and distribution.—Ladinian. Rifu formation in Rifu area.

Daonella alta Yabe and Shimizu

1927. *Daonella kotoi* var. *alta* Yabe and Shimizu, p. 122, pl. 12, fig. 10.—compare 1931. *Daonella* cf. *kotoi* var. *alta* Yabe and Shimizu: Kobayashi, p. 257, pl. 25, figs. 1, 13.—1959. *Daonella alta* Yabe and Shimizu: Kobayashi and Tokuyama, p. 13, pl. 1, figs. 4, 5.

Type.—Holotype by monotypy (IGPS not registered) from Zohoin, Sakawa, Kochi Pref.

Age and distribution.—Ladinian. Zohoin group in Sakawa area.

Daonella indica Bittner

1959. *Daonella indica* Bittner: Kobayashi and Tokuyama, p. 14, pl. 1, figs. 1, 2. pl. 2, figs. 1, 2, pl. 3, figs. 3, 4, 11, 12, pl. 4, fig. 1.

Age and distribution.—Ladinian. Zohoin group in Sakawa, Ino and Sakuradani areas. This species has been known from Himalayas, south China, Timor, Alps and many other areas of Tethys region.

Daonella yoshimurai Kobayashi

1935. *Daonella yoshimurai* Kobayashi, p. 30, pl. 7, fig. 7.—1959. *Daonella yoshimurai* Kobayashi: Kobayashi and Tokuyama, p. 22, pl. 3, fig. 2.

Type.—Holotype (UMUT MM5520) from Shirogawara, Mine, Yamaguchi Pref.

Age and distribution.—Carnian (or upper Ladinian). Atsu group in Mine area.

Daonella tenuistriata Kobayashi and Tokuyama

1959. *Daonella tenuistriata* Kobayashi and Tokuyama, p. 13, pl. 3, fig. 10.

Type.—Holotype (UMUT MM3473) from Zohoin, Sakawa, Kochi Pref.

Age and distribution.—Ladinian. Zohoin group in Sakawa area.

Daonella iwayai Kobayashi and Tokuyama

1959. *Daonella iwayai* Kobayashi and Tokuyama, p. 15, pl. 2, fig. 15, pl. 3, figs. 8, 9, pl. 4, fig. 4.

Type.—Holotype (UMUT MM3497) from Usugatani, Kaminaka, Tokushima Pref.

Age and distribution.—Ladinian. Zohoin group in Sakuradani, Ino and Sakawa areas.

Daonella pectinoides Kobayashi and Tokuyama

1959. *Daonella pectinoides* Kobayashi and Tokuyama, p. 20, pl. 2, fig. 12, pl. 3, fig. 6.

Type.—Holotype (UMUT MM3532) from Zohoin, Sakawa, Kochi Pref.
Age and distribution.—Ladinian. Zohoin group in Sakawa area.
Remarks.—This is possibly conspecific with *Daonella iwayai.*

Daonella asymmetrica Kobayashi and Tokuyama

1959. *Daonella asymmetrica* Kobayashi and Tokuyama, p. 22, pl. 2, fig. 13.
Type.—Holotype (UMUT MM3534) from Zohoin, Sakawa, Kochi Pref.
Age and distribution.—Ladinian. Zohoin group in Sakawa area.

Daonella hiratai Kobayashi and Tokuyama

1959. *Daonella hiratai* Kobayashi and Tokuyama, p. 22, pl. 2, fig. 14.
Type.—Holotype (UMUT MM3535) from Zohoin, Sakawa, Kochi Pref.
Age and distribution.—Ladinian. Zohoin group in Sakawa area.
Remarks.—This species seems to have been proposed on a deformed specimen of *Daonella densisulcata.*

Daonella sp. cf. **D. spitiensis** Bittner

1959. *Daonella* cf. *spitiensis* Bittner: Kobayashi and Tokuyama, p. 15, pl. 1, fig. 3.
Age and distribution.—Ladinian. Zohoin group in Sakawa area.

Genus ***Halobia*** Bronn, 1830

Halobia styriaca (Mojsisovics)

1970. *Halobia styriaca* (Mojsisovics): Kobayashi and Ishibashi, p. 244, pl. 26, figs. 1–10.
Age and distribution.—Carnian. Nakijin formation in Motobu area, Okinawa Pref. This species has been known from various areas of Tethys region.

Halobia molukkana Wanner

1931. *Halobia molukkana* Wanner: Kobayashi, p. 231.—1943. *Halobia molukkana* Wanner: Kobayashi and Aoti, p. 248, pl. 25, figs. 1–4, 5 (?), 15 (?).—1954b. *Halobia molukkana* Wanner: Ichikawa, p. 186, pl. 17, figs. 16, 17 (?).—1959b. *Halobia molukkana* Wanner: Tamura, p. 221, pl. 2, fig. 12.
Age and distribution.—Carnian. Kochigatani group (lower part) in Sakawa, Tanoura, Itsukaichi and Ino areas. This species has been known from Rotti and Timor.

Halobia kawadai Yehara

1927. *Halobia kawadai* Yehara, p. 31, pl. 3, figs. 5, 6.—1943. *Halobia kawadai* Yehara: Kobayashi and Aoti, p. 245, pl. 24, figs. 1–3, 4 (?), pl. 25, figs. 8, 9.—1954c. *Halobia kawadai* Yehara: Ichikawa, p. 54, pl. 1, fig. 3.—1955. *Halobia kawadai* Yehara: Nakazawa, p. 243, pl. 13, fig. 1.—compare 1955. *Halobia* cf. *kawadai* Yehara: Nakazawa, p. 244, pl. 13, fig. 2.—1959b. *Halobia kawadai* Yehara: Tamura, p. 221, pl. 2, fig. 11.—1959b. *Halobia kawadai* Yehara: Tokuyama, p. 16, pl. 1, figs. 30, 31.
Type.—Syntype (UK? not registered) from Shimoyama, Sakawa, Kochi Pref.
Age and distribution.—Carnian. Kochigatani group (lower part) in Sakawa, Sakuradani and Sakamoto areas, Nabae group (N3 formation) in Maizuru zone, and Mine group (Hirabara formation) in Mine area.

Halobia sedaka Kobayashi and Aoti

1943. *Halobia sedaka* Kobayashi and Aoti, p. 247, pl. 25, fig. 7.—compare 1967. *Halobia* sp. aff. *sedaka* Kobayashi and Aoti: Nakazawa and Nogami, p. 19, pl. 1, fig. 11.

Type.—Holotype (UMUT MM5051) from Kasayadani, Sakawa, Kochi Pref.
Age and distribution.—Carnian. Kochigatani group (lower part) in Sakawa area.

Halobia obsoleta Kobayashi and Aoti

1943. *Halobia obsoleta* Kobayashi and Aoti, p. 248, pl. 24, figs. 8–11.—1954c. *Halobia obsoleta* Kobayashi and Aoti: Ichikawa, p. 55.—1955. *Halobia obsoleta* Kobayashi and Aoti: Nakazawa, p. 244, pl. 13, fig. 3.

Type.—Holotype (UMUT MM5043) from Shimoyama, Sakawa, Kochi Pref.
Age and distribution.—Carnian. Kochigatani group (lower part) in Sakawa and Sakuradani areas, and Nabae group (N3 formation) in Maizuru zone.

Halobia multilineata Kobayashi and Aoti

1943. *Halobia multilineata* Kobayashi and Aoti, p. 249, pl. 25, fig. 6.

Type.—Holotype (UMUT MM5050) from Nakajima, Sakawa, Kochi Pref.
Age and distribution.—Carnian. Kochigatani group (lower part) in Sakawa area.

Halobia alta Kobayashi and Aoti

1943. *Halobia alta* Kobayashi and Aoti, p. 249, pl. 24, figs. 5, 6.

Type.—Holotype (UMUT MM5040) from Tokombo, Sakawa, Kochi Pref.
Age and distribution.—Carnian. Kochigatani group (lower part) in Sakawa area.

Halobia longissima Kobayashi and Aoti

1943. *Halobia longissima* Kobayashi and Aoti, p. 251, pl. 24, fig. 7.

Type.—Holotype (UMUT MM5041) from Shimoyama, Sakawa, Kochi Pref.
Age and distribution.—Carnian. Kochigatani group (lower part) in Sakawa area.

Halobia aotii Kobayashi and Ichikawa

1943. *Halobia multistriata* Kobayashi and Aoti, p. 250, pl. 24, figs. 12, 13, pl. 25, figs. 10–14. (non *Halobia kwaluana* var. *multistriata* Volz, 1899)—1949b. *Halobia aotii* Kobayashi and Ichikawa, p. 185.—compare 1955. *Halobia* cf. *aotii* Kobayashi and Ichikawa: Nakazawa, p. 246, pl. 13, fig. 11.—1959b. *Halobia aotii* Kobayashi and Ichikawa: Tokuyama, p. 17, pl. 1, fig. 33.

Type.—Holotype (UMUT MM5054) from Aisaka, Asa, Yamaguchi Pref.
Age and distribution.—Carnian. Mine group in Asa area.

Halobia kashiwaiensis Kobayashi and Ichikawa

1949b. *Halobia kashiwaiensis* Kobayashi and Ichikawa, p. 185, pl. 6, fig. 11.—1959b. *Halobia kashiwaiensis* Kobayashi and Ichikawa: Tokuyama, p. 16, pl. 1, fig. 32.

Type.—Holotype (UMUT MM5220) from Kashiwai, Sakawa, Kochi Pref.
Age and distribution.—Carnian. Kochigatani group (lower part) in Sakawa area, and Mine group (Hirabara formation) in Mine area.

Halobia atsuensis Tokuyama

1959b. *Halobia atsuensis* Tokuyama, p. 14, pl. 1, fig. 28.

Type.—Holotype (UMUT MM 4525) from Shirogawara, Mine Yamaguchi Pref.
Age and distribution.—Carnian (or upper Ladinian). Atsu group in Mine area.

Halobia subsedaka Tokuyama

1959b. *Halobia subsedaka* Tokuyama, p. 15, pl. 1, fig. 29.

Type.—Holotype (UMUT MM4526) from Shirogawara, Mine, Yamaguchi Pref.
Age and distribution.—Carnian (or upper Ladinian). Atsu group in Mine area.

Halobia sp. cf. **H. austriaca** Mojsisovics

1954b. *Halobia* aff. *austriaca* Mojsisovics: Ichikawa, p. 187, pl. 17, fig. 15.—1955. *Halobia* cf. *austriaca* Mojsisovics: Nakazawa, p. 247, pl. 13, fig. 9.

Age and distribution.—Carnian. Kochigatani group (lower part) in Itsukaichi area, and Nabae group (N3 formation) in Maizuru zone.

Halobia sp. aff. **H. fallax** Mojsisovics

1964. *Halobia* sp. aff. *fallax* Mojsisovics: Nakazawa, p. 35, pl. 5, figs. 9, 10.

Age and distribution.—Norian. Saragai group in Shizukawa area.

Halobia sp. cf. **H. obruchevi** Kiparisova

1964. *Halobia* sp. cf. *obruchevi* Kiparisova: Nakazawa, p. 35, pl. 5, figs. 11, 12 (?).

Age and distribution.—Norian. Saragai group in Shizukawa area.

Halobia sp. aff. **H. superbescens** Kittl

1967. *Halobia* sp. aff. *superbescens* Kittl: Nakazawa and Nogami, p. 18, pl. 1, figs. 6–8.

Age and distribution.—Carnian (or Norian). "Tano formation" in western hills of Kyoto.

Halobia sp. aff. **H. disperseinsecta** Kittl

1967. *Halobia* sp. aff. *disperseinsecta* Kittl: Nakazawa and Nogami, p. 20, pl. 1, fig. 10.

Age and distribution.—Carnian (or Norian). "Tano formation" in western hills of Kyoto.

Halobia sp. cf. **H. talauana** Wanner

1967. *Halobia* sp. cf. *talauana* Wanner: Nakazawa and Nogami, p. 18, pl. 1, figs. 1–5.

Age and distribution.—Carnian (or Norian). "Tano formation" in western hills of Kyoto.

Genus ***Didymotis*** Gerhardt, 1897

Didymotis akamatsui (Yehara)

1924. *Inoceramus akamatsui* Yehara, p. 37, pl. 2, figs. 2–4.—1940. *Inoceramus* (*Sergipia?*) *akamatsui* Yehara: Nagao and Matsumoto, p. 54, pl. 13, figs. 3, 5, pl. 22, fig. 6.

Type.—Syntype (UK? not registered) from Furushiroyama, Uwajima, Ehime Pref.
Age and distribution.—Coniacian. Uwajima group (Furushiroyama formation) in Uwajima area, Onogawa group in Onogawa area, Futaba group in Futaba area, and Upper Yezo group in various areas of Hokkaido.
Remarks.—The generic reference of this species to *Didymotis* was already suggested by Imlay (1955, p. 549).

Family MONOTIDAE Fischer, 1887

Genus ***Monotis*** Bronn, 1830

Subgenus ***Entomonotis*** Marwick, 1935

Monotis (Entomonotis) scutiformis (Teller)

1961. *Monotis* (*Entomonotis*) *typica* (Kiparisova): Hase, p. 80, pl. 12, figs. 1–11.—1964a. *Monotis* (*Entomonotis*) *typica* (Kiparisova): Nakazawa, p. 31, pl. 3, figs. 4–8, pl. 4, figs. 1, 2.—compare 1964a. *Monotis* (*Entomonotis*) sp. aff. *scutiformis* (Teller): Nakazawa, p.

33, pl. 5, figs. 1, 2.—compare 1965. *Monotis* (*Entomonotis*) cf. *typica* (Kiparisova): Tamura, p. 50, pl. 1, figs. 1, 2.

Age and distribution.—Norian. Saragai group in Shizukawa area, and Kuga group in Miwa area. This species has been known from eastern Siberia.

Remarks.—Many authors have regarded *Monotis* (*Entomonotis*) *scutiformis* var. *typica* as a distinct species, but I agree here with Kiparisova et al. (1966) in considering that the name was given to the specimens in the range of variation of *M.* (*E.*) *scutiformis.*

Monotis (Entomonotis) jakutica (Teller)

1963. *Monotis* (*Entomonotis*) *yakutica* (Teller) [*sic*]: Nakazawa, p. 51, pl. 1, figs. 15–27.—compare 1963. *Monotis* (*Entomonotis*) aff. *sublaevis* (Teller): Nakazawa, p. 50, pl. 1, figs. 9, 10.—1965. *Monotis* (*Entomonotis*) *yakutica* (Teller) [*sic*]: Tamura, p. 52, pl. 2, figs. 13–15.

Age and distribution.—Norian. Nariwa group in Nariwa area, and Kochigatani group (upper part) in Miyamadani (Kuriki) area. This species has been known from eastern Siberia.

Monotis (Entomonotis) ochotica (Keyserling)

1888. *Pseudomonotis ochotica* (Keyserling) Teller: Mojsisovics, p. 175, pl. 2, figs. 6–8.—1915. *Pseudomonotis ochotica* Keyserling: Diener, p. 26, pl. 4, fig. 7.—1915. *Pseudomonotis ochotica* Keyserling var. *densistriata* Teller: Diener, p. 27, pl. 4, fig. 5.—1915. *Pseudomonotis ochotica* Keyserling var. *eurachis* Teller: Diener, p. 29, pl. 3, fig. 3, pl. 4, figs. 6, 8.—1927. *Pseudomonotis ochotica* (Keyserling): Yehara, p. 29, pl. 4, figs. 1–3.—1927. *Pseudomonotis ochotica* var. *eurachis* Teller: Yehara, p. 29, pl. 4, figs. 4, 5.—1927. *Pseudomonotis subcircularis* Gabb: Yehara, p. 30, pl. 4, fig. 6.—1935. *Pseudomonotis ochotica* var. *densistriata* Teller: Kobayashi, p. 27, pl. 7, fig. 11.—1935. *Pseudomonotis ochotica* var. *eurachis* Teller: Kobayashi, p. 27, pl. 7, fig. 11.—1935. *Pseudomonotis ochotica* var. *pachypleura* Teller: Kobayashi, p. 27, pl. 7, fig. 10.—1944. *Pseudomonotis ochotica* (Keyserling): Takagi, p. 197, fig. 2.—1949c. *Entomonotis ochotica* (Keyserling): Kobayashi and Ichikawa, p. 249, pl. 9, fig. 1.—1949c. *Entomonotis ochotica* var. *densistriata* (Teller): Kobayashi and Ichikawa, p. 253, pl. 9, fig. 15.—1949c. *Entomonotis ochotica* var. *eurachis* (Teller): Kobayashi and Ichikawa, p. 252, pl. 9, figs. 2–4.—1949c. *Entomonotis pachypleura* (Teller): Kobayashi and Ichikawa, p. 256, pl. 9, fig. 10.—1949c. *Entomonotis ambigua* (Teller): Kobayashi and Ichikawa, p. 255, pl. 9, figs. 9, 13.—1954c. *Entomonotis ochotica* (Keyserling): Ichikawa, p. 51.—1954c. *Entomonotis ochotica* var. *densistriata* (Teller): Ichikawa, p. 51.—1954c. *Entomonotis ochotica* var. *eurachis* Ichikawa, p. 51—1963. *Monotis* (*Entomonotis*) *ochotica ochotica* (Keyserling): Ichikawa, p. 11, pl. 18, fig. 8.—1963. *Monotis* (*Entomonotis*) *ochotica eurachis* (Teller): Ichikawa, p. 11, pl. 18, fig. 6.—1963. *Monotis* (*Entomonotis*) *ochotica densistriata* (Teller): Ichikawa, p. 11, pl. 18, fig. 7.—1963. *Monotis* (*Entomonotis*) *ochotica* (Keyserling): Nakazawa, p. 52.—1963. *Monotis* (*Entomonotis*) *ochotica sparsicostata* (Teller): Nakazawa, p. 52, pl. 2, figs. 1–4.—1963. *Monotis* (*Entomonotis*) *ochotica jitoensis* Nakazawa, p. 52, pl. 2, figs. 5–7.—1964a. *Monotis* (*Entomonotis*) *ochotica densistriata* (Teller): Nakazawa, p. 34, pl. 5, figs. 3–5.—1965. *Monotis* (*Entomonotis*) *ochotica ochotica* (Keyserling): Tamura, p. 50, pl. 1, figs. 10–12.—1965. *Monotis* (*Entomonotis*) *ochotica desnsistriata* (Teller): Tamura, p. 50, pl. 1, figs. 3–9.—1965. *Monotis* (*Entomonotis*) *ochotica eurachis* (Teller): Tamura, p. 51, pl. 1, figs. 14, 15, pl. 2, fig. 1.—1965. *Monotis* (*Entomonotis*) *ochotica sparsicosta* (Teller): Tamura, p. 51, pl. 1, fig. 13.—1965. *Monotis* (*Entomonotis*) *ambigua* (Teller): Tamura, p. 51, pl. 2, figs. 7, 8.—1965. *Monotis* (*Entomonotis*) *pachypleura* (Teller): Tamura, p. 52, pl. 2, figs. 4–6.

Age and distribution.—Norian. Kochigatani group (upper part) in Sakawa, Sakuradani, Miyamadani (Kuriki) and Ome areas, Saragai group in Shizukawa and Kesennuma areas, Nariwa group in Nariwa area, and Myogatani formation in Ibuki area. This species has been known also from east Siberia, Canada, New Zealand, New Caledonia and many other areas in circum-Pacific region.

Remarks.—The infraspecific classification of *Monotis ochotica* complex is one of the most interesting but troublesome problems in the systematics of Japanese Mesozoic Bivalvia. Teller *in* Mojsisovics (1886) proposed a number of varietal names under "*Pseudomonotis*" *ochotica* on the basis of Siberian specimens, namely, *densistriata, eurachis, pachypleura, ambigua, sparsicostata*, etc. Many subsequent authors used those names in the classification of Japanese materials, sometimes as subspecific or even specific, merely on the basis of morphological resemblance between individuals. In order to recognize the taxonomic validity of those varietal names further studies are needed especially on the intra- and interpopulational variation as well as the stratigraphic and geographic distribution. Since Kiparisova et al. (1966) examined many specimens from the type area and still regarded those names as infrasubspecific, almost all the names of this complex given to Japanese materials are tentatively treated as synonymous.

Monotis (Entomonotis) sublaevis (Teller)

1963. *Monotis (Entomonotis) sublaevis* (Teller): Nakazawa, p. 49, pl. 1, figs. 7, 8.

Age and distribution.—Norian. Nariwa group in Nariwa area. This species has been known from east Siberia.

Monotis (Entomonotis) subcycloidea (Kobayashi)

1935. *Pseudomonotis subcycloidea* Kobayashi, p. 29, pl. 7, fig. 1.

Type.—Holotype by monotypy (UMUT? not registered) from Kamosho, Asa, Yamaguchi Pref.

Age and distribution.—Norian. Kamosho formation in Asa area.

Monotis (Entomonotis) tenuicostata (Kobayashi and Ichikawa)

1949c. *Entomonotis tenuicostata* Kobayashi and Ichikawa, p. 259, pl. 9, figs. 6, 7.—1949c. *Entomonotis tenuicostata* var. *mabara* Kobayashi and Ichikawa, p. 260, pl. 9, fig. 8.—compare 1963. *Monotis (Entomonotis)* aff. *tenuicostata* Kobayashi and Ichikawa: Nakazawa, p. 50, pl. 1, figs. 11–14.—1965. *Monotis (Entomonotis) tenuicostata* Kobayashi and Ichikawa: Tamura, p. 53, pl. 2, figs. 16–22.

Type.—Holotype (UMUT MM5276) from Kasayadani, Sakawa, Kochi Pref.

Age and distribution.—Norian. Kochigatani group (upper part) in Sakawa, Miyamadani (Kuriki) and Sakamoto area.

Monotis (Entomonotis) iwaiensis (Ichikawa)

1951. *Entomonotis iwaiensis* Ichikawa, p. 46, text-figs. 1, 2.—compare 1964a. *Monotis (Entomonotis)* sp. aff. *iwaiensis* Ichikawa: Nakazawa, p. 33, pl. 4, figs. 9–11.

Type.—Holotype (UMUT MM5369) from M-valley (Iwai), Hinode, Tokyo Pref.

Age and distribution.—Norian. Kochigatani group (upper part) in Itsukaichi area.

Monotis (Entomonotis) multistriata (Kobayashi and Ichikawa)

1949c. *Entomonotis multistriata* Kobayashi and Ichikawa, p. 255, pl. 9, figs. 11, 14.—1965. *Monotis (Entomonotis) multistriata* Kobayashi and Ichikawa: Tamura, p. 52, pl. 2, figs. 9–12.

Type.—Holotype (UMUT MM5273) from Umenokidani, Sakawa, Kochi Pref.
Age and distribution.—Norian. Kochigatani group (upper part) in Sakawa, Sakuradani and Miyamadani (Kuriki) areas.

Monotis (Entomonotis) zabaikalica (Kiparisova)

1939. *Entomonotis kurosawai* Sakaguti, p. 229, pl. 15, figs. 1–6.—1949c. *Entomonotis zabaikalica* (Kiparisova): Kobayashi and Ichikawa, p. 257, pl. 10, figs. 12–18.—1949c. *Entomonotis zabaikalica* var. *intermedia* Kobayashi and Ichikawa, p. 258, pl. 10, figs. 19, 20.—1954c. *Entomonotis zabaikalica* (Kiparisova): Ichikawa, p. 51.—1954c. *Entomonotis zabaikalica* var. *intermedia* Kobayashi and Ichikawa: Ichikawa, p. 52.—1965. *Monotis (Entomonotis) zabaikalica* (Kiparisova): Tamura, p. 52, pl. 2, figs. 2, 3, 23.

Type.—Holotype of *Entomonotis kurosawai* from northeast of Hosoura, Utatsu, Miyagi Pref. Holotype of *Entomonotis zabaikalica* var. *intermedia* (UMUT MM5260) from Inotani, Sakawa, Kochi Pref.
Age and distribution.—Norian. Kochigatani group (upper part) in Sakawa, Sakuradani and Miyamadani (Kuriki) areas, and Saragai group in Shizukawa area. This species is widely distributed in east Siberia.

Monotis (Entomonotis) mukaihatensis Hase

1961. *Monotis (Entomonotis) mukaihatensis* Hase, p. 83, pl. 12, figs. 12–18.

Type.—Holotype (IGSH HA311) from Mukaihata, Miwa, Yamaguchi Pref.
Age and distribution.—Norian. Kuga group in Miwa area.
Remarks.—This species is possibly conspecific with *Monotis (Entomonotis) zabaikalica.*

Genus ***Otapiria*** Marwick, 1935

Otapiria dubia (Ichikawa)

1954c. *Pleuromysidia dubia* Ichikawa, p. 52, pl. 1, figs. 13, 14, pl. 2, figs. 1–5.—1959b. *Pleuromysidia dubia* Ichikawa: Tamura, p. 222, pl. 2, figs. 25, 26.

Type.—Holotype (UMUT MM5475) from Fujinohira, Kaminaka, Tokushima Pref.
Age and distribution.—Carnian. Kochigatani group (lower part) in Sakuradani and Sakamoto areas.

Otapiria kanmerai (Tamura)

1959b. "*Pleuromysidia*" *kanmerai* Tamura, p. 222, pl. 2, fig. 27.

Type.—Holotype (GK F319) from Mameguri, Sakamoto, Kumamoto Pref.
Age and distribution.—Carnian. Kochigatani group (lower part) in Sakamoto area.

Family ENTOLIIDAE Korobkov, 1960

Genus ***Entolium*** Meek, 1865

Entolium sp. cf. **E. discites** (Schlotheim)

1961. *Entolium* cf. *discites* (Schlotheim): Nakazawa, p. 254, pl. 12, figs. 1–6.—1963. *Entolium discites* (Schlotheim): Kambe, p. 45, pl. 5, figs. 12, 13.

Age and distribution.—Skytian. Yakuno group (Oro formation) and Shidaka group in Maizuru zone, and Kamura formation in Takachiho area.

Entolium sp. cf. **E. microtis** (Bittner)

1961. *Entolium* cf. *microtis* (Bittner): Nakazawa, p. 255, pl. 12, fig. 7.—1964b. *Entolium* sp. cf. *microtis* (Bittner): Nakazawa, p. 14, pl. 1, figs. 7, 8.

Age and distrubution.—Skytian–Anisian. Yakuno group (Hirobatake and Oro formations) in Maizuru zone, and unnamed strata in Uonashi area.

Entolium sp. cf. **E. calvum** (Goldfuss)

1959h. *Entolium* cf. *calvum* (Goldfuss): Hayami, p. 57, pl. 6, figs. 6–9.

Age and distribution.—Sinemurian. Toyora group (Higashinagano formation) in Toyoda area.

Entolium sp. cf. **E. lunare** (Roemer)

1959h. *Entolium* cf. *lunare* (Roemer): Hayami, p. 59, pl. 6, fig. 11.

Age and distribution.—Sinemurian. Toyora group (Higashinagano formation) in Toyoda area.

Entolium sp. cf. **E. disciforme** (Schübler)

1959c. *Entolium* cf. *disciforme* (Schübler): Hayami, p. 63, pl. 5, fig. 19.

Age and distribution.—Bajocian. Hashiura group (Aratozaki formation) in Shizukawa area.

MM3166 −3−2

Entolium inequivalve Hayami [Pl. 3, Fig. 2]

1959g. *Entolium inequivalve* Hayami, p. 154, text-fig., pl. 13, figs. 3–8.

Type.—Holotype (UMUT MM3166) from Mitarai, Shokawa, Gifu Pref.

Age and distribution.—Callovian. Tetori group (Mitarai formation) in Makito area.

Entolium japonicum Kurata and Kimura

1951. *Entolium japonicum* Kurata and Kimura, *in* Kimura, p. 345, pl. 1, figs. 16, 17.—1960d. *Entolium japonicum* Kurata and Kimura: Tamura, p. 236.

Type.—Holotype (UMUT MM7102) from Mimikire, Sakawa, Kochi Pref.

Age and distribution.—Upper Jurassic. Torinosu group in Sakawa area.

Entolium yatsujiense Kurata and Kimura

1951. *Entolium yatsujiense* Kurata and Kimura, *in* Kimura, p. 346, pl. 1, fig. 18.—1959d. *Entolium yatsujiense* Kurata and Kimura: Tamura, p. 60, pl. 6, fig. 30.—1959f. *Entolium yatsujiense* Kurata and Kimura: Tamura, p. 176, pl. 19, fig. 41.—1960d. *Entolium yatsujiense* Kurata and Kimura: Tamura, p. 236.

Type.—Holotype (UMUT MM7105) from Yatsuji, Sakawa, Kochi Pref.

Age and distribution.—Upper Jurassic. Torinosu group in Sakawa, Sakamoto and Tanoura areas, and Soma group (Nakanosawa formation) in Soma area.

Entolium kimurai Tamura

1959d. *Entolium kimurai* Tamura, p. 60, pl. 6, figs. 23–29.—1959f. *Entolium kimurai* Tamura: Tamura, p. 176, pl. 19, fig. 27.—1960d. *Entolium kimurai* Tamura: Tamura, p. 236.—1960. *Entolium kimurai* Tamura: Hayami, Sugita and Nagumo, p. 93, pl. 8, fig. 14.

Type.—Holotype (UMUT MM3041) from Tsurubami, Sakamoto, Kumamoto Pref.

Age and distribution.—Upper Jurassic–Berriassian. Torinosu group in Sakamoto, Sakawa, Sakuradani area, Soma group (Koyamada formation) in Soma area, and Shishiori group (Kogoshio formation) in Oshima area.

Entolium sanchuense Hayami

1965a. *Entolium sanchuense* Hayami, p. 315, pl. 45, figs. 12, 13, pl. 52, fig. 5.
Type.—Holotype (GK H6291) from south of Kagahara, Nakazato, Gumma Pref.
Age and distribution.—Upper Neocomian—Aptian. Ishido formation in Sanchu area.

Entolium? yatsushiroense Hayami

1965a. *Entolium* (?) *yatsushiroense* Hayami, p. 316, pl. 48, fig. 6.
Type.—Holotype (GK H6294) from Shimofukami, Sakamoto, Kumamoto Pref.
Age and distribution.—Albian. Yatsushiro formation in Sakamoto area.

Entolium sp. cf. **E. obovatum** (Stoliczka)

1928. *Pecten* (*Syncyclonema*) cf. *obovatus* Stoliczka: Yabe and Nagao, p. 87, pl. 17, figs. 3–6.—1938. *Pecten* (*Syncyclonema?*) aff. *obovatus* Stoliczka: Nagao, p. 128, pl. 16, figs. 1, 2.
Age and distribution.—Cenomanian–Turonian. Middle Yezo group in Ikushumbetsu area.

Genus ***Somapecten*** Kimura, 1951

MM7120 -3-5

Somapecten kamimanensis Kimura [Pl. 3, Figs. 3, 4]

1951. *Somapecten kamimanensis* Kimura, p. 347, pl. 1, figs. 19, 20.—1959d. *Somapecten kamimanensis* Kimura: Tamura, p. 62, text-fig. 3, pl. 6, figs. 50–55.—1959f. *Somapecten kamimanensis* Kimura: Tamura, p. 176, pl. 19, fig. 29.—1960d. *Somapecten kamimanensis* Kimura: Tamura, p. 237.

MM7119 -3-4

Type.—Holotype (UMUT MM7119) from Yasukurazawa, Kashima, Fukushima Pref.
Age and distribution.—Upper Jurassic (especially Kimmeridgian). Soma group (Nakanosawa formation) in Soma area, and Torinosu group in Sakamoto, Sakawa and Sakuradani areas.

Family PECTINIDAE Rafinesque, 1815

Subfamily PECTININAE Rafinesque, 1815

Genus ***Tosapecten*** Kobayashi and Ichikawa, 1949

MM5029 -3-7

Tosapecten suzukii suzukii (Kobayashi) [Pl 3, Fig. 7]

1931. *Pecten* (*Velopecten*) *suzukii* Kobayashi, p. 258, pl. 25, figs. 16–18.—1935. *Pecten fujimotoi* Kobayashi, p. 31, pl. 7, figs. 8, 9.—1949a. *Tosapecten suzukii* (Kobayashi): Kobayashi and Ichikawa, p. 167, pl. 5, figs. 9–12.—1949a. *Tosapecten suzukii* forma *hirogariformis* Kobayashi and Ichikawa, p. 168, pl. 5, fig. 13.—1949a. *Tosapecten suzukii* forma *regularis* Kobayashi and Ichikawa, p. 168, pl. 5, fig. 14.—1949a. *Tosapecten suzukii* var. *fujimotoi* (Kobayashi): Kobayashi and Ichikawa, p. 169, pl. 5, fig. 16.—1949a. *Tosapecten suzukii* var. *paucicostatus* Kobayashi and Ichikawa, p. 169, pl. 5, fig. 16.—1949a. *Tosapecten suzukii* var. *inflatus* Kobayashi and Ichikawa, p. 169, pl. 5, figs. 17, 18.—compare 1952. *Tosapecten* sp. cf. *suzukii* (Kobayashi): Nakazawa, p. 101, pl. 9, fig. 1.—1954d. *Tosapecten suzukii* (Kobayashi): Ichikawa, p. 54, pl. 3, figs. 4, 5.—1959a. *Tosapecten suzukii* (Kobayashi): Tamura, p. 222, pl. 2, figs. 16, 17.

Type.—Holotype (UMUT MM5029) from Shimoyama, Sakawa, Kochi Pref. Syntype of *Pecten fujimotoi* (UMUT MM5032) from the same locality and Kamosho, Asa, Yamaguchi Pref. Holotype of *Tosapecten suzukii* var. *paucicostatus* (UMUT 5202) from Tokombo, Sakawa, Kochi Pref. Holotype of *Tosapecten suzukii* var. *inflatus* (UMUT MM5203) from Kuromagari, Sakawa, Kochi Pref.

Age and distribution.—Carnian–Norian. Kochigatani group (lower part) in Sakawa, Sakuradani and Tanoura areas, and Kamosho formation in Asa area. This subspecies has been reported also from eastern Siberia.

Tosapecten suzukii okadai Nakazawa

1952. *Tosapecten okadai* Nakazawa, p. 100, pl. 7, figs. 3, 4.—1960a. *Tosapecten suzukii okadai* Nakazawa: Tokuyama, p. 29, text-figs. 2–7, pl. 4, figs. 15–17.

Type.—Holotype (UK JM10009) from Nishimitsumatsu, Takahama, Fukui Pref.

Age and distribution.—Carnian–(?)Norian. Nabae group (N3 formation) in Maizuru zone, and Mine group (Also formation) in Mine area.

Tosapecten suzukii nabaensis Nakazawa

1952. *Tosapecten nabaensis* Nakazawa, p. 98, pl. 8, figs. 1, 2, 5.—1952. *Tosapecten nabaensis* forma *distincticostatus* Nakazawa, p. 100, pl. 8, figs. 6–8.—compare 1963. *Tosapecten* cf. *suzukii nabaensis* Nakazawa: Nakazawa, p. 55, pl. 2, figs. 15, 16.

Type.—Holotype (UK JM10002a) from Nabae, Takahama, Fukui Pref.

Age and distribution.—Carnian. Nabae group (N3 formation) in Maizuru zone.

Tosapecten pseudohiemalis Kobayashi and Ichikawa

1949a. *Tosapecten pseudohiemalis* Kobayashi and Ichikawa, p. 169, pl. 5, fig. 19.—1949a. *Tosapecten pseudohiemalis* var. *mabarus* Kobayashi and Ichikawa, p. 170, pl. 5, fig. 20.—1959b. *Tosapecten pseudohiemalis* Kobayashi and Ichikawa: Tamura, p. 223, pl. 2, figs. 18–20.

Type.—Holotype (UMUT MM5204) from Umenokidani, Sakawa, Kochi Pref. Holotype of *Tosapecten pseudohiemalis* var. *mabarus* (UMUT MM5205) from Otago, Sakawa, Kochi Pref.

Age and distribution.—Carnian. Kochigatani group (lower part) in Sakawa and Sakamoto areas. This species is also known from eastern Siberia.

Tosapecten teradensis Nakazawa

1952. *Tosapecten teradensis* Nakazawa, p. 100, pl. 7, figs. 7–9.

Type.—Holotype (UK JM10011b) from Terada, Maizuru, Kyoto Pref.

Age and distribution.—Carnian. Nabae group (N3 formation) in Maizuru zone.

Genus ***Neithea*** Drouet, 1825*

Subgenus ***Neithea*** Drouet, 1825

Neithea (Neithea) atava (Römer)

1965a. *Neithea* (*Neithea*) *kanmerai* Hayami, p. 305, text-fig. 4, pl. 43, figs. 1–5, pl. 52, fig. 3.—1973. *Neithea* (*Neithea*) *atava* (Römer): Dhondt, p. 41.

---

* As the result of Dhondt's (1973) important systematic study and also my own observation on many European specimens of *Neithea* at the British Museum (Nat. Hist.) and some other institutions in western Europe, it becomes clear that some of the specific names applied before (Hayami, 1965a) for Japanese sepcimens must be revised. Since the circumstances are somewhat complicated, only the revised names are given in this catalogue with brief notes for the reason of alteration, and the full account will be described and discussed on another occasion. Particular thanks are due to Dr. N. J. Morris of the British Museum (Nat. Hist.) and Dr. Annie Dhondt of the Royal Institute of Natural Science of Belgium for this revision.

Type.—Holotype of *Neithea* (*Neithea*) *kanmerai* (GK H6132) from Kohara, Toyo, Kumamoto Pref.

Age and distribution.—Upper Neocomian–Aptian. Hinagu formation in Sakamoto area, Arita formation in Yuasa area, Hanoura formation in Katsuuragawa area and Ishido formation in Sanchu area. This species is widely distributed in the Neocomian Aptian (particularly Hauterivian and Barremian) of Germany, France and Switzerland and also known from Tanzania and Trinidad.

Remarks.—As noted before (Hayami, 1965a, p. 308), there were some different opinions among European authors about the actual nature of *Pecten atavus* Römer, 1839. In 1965, I followed Woods' (1902) interpretation in which this specific name should be applied for another unrelated small species with highly unequal auricles [now regarded as *Neithea* (*Neithella*) *notabilis* (Münster)], and proposed a new specific name, *Neithea* (*Neithea*) *kanmerai*, on the basis of the Japanese large specimens in question. As pointed out by Dhondt (1973), however, Woods' interpretation of *Pecten atavus* is certainly erroneous, and *N.* (*N.*) *kanmerai* is scarcely different from the European specimens of true *N.* (*N.*) *atava* in every essential character. Although Römer's original specimen has not been observed by any recent authors, I agree here with Dhondt in regarding *N.* (*N.*) *kanmerai* as synonymous with *N.* (*N.*) *atava*.

Neithea (Neithea) ficalhoi (Choffat)

1934. *Pecten* (*Neithea*) *morrisi* Pictet and Renevier: Nagao, p. 206, pl. 26, figs. 2–6.—1965a. *Neithea* (*Neithea*) *ficalhoi* (Choffat): Hayami, p. 302, text-fig. 4, pl. 42, figs. 5–16.—1973. *Neithea* (*Neithea*) *alpina* (d'Orbigny): Dhondt, p. 15 (pars).

Age and distribution.—Aptian. Miyako group (Tanohata and Hiraiga formation) in Tanohata and Miyako areas. This species was originally described from the Aptian (?) of Angola.

Remarks.—It may be possible, as treated by Dhondt (1973), to regard *Janira ficalhoi* Choffat *in* Choffat, and Loriol, 1888, as a junior synonym of *Janira alpina* d'Orbigny, 1847, because the mode of radial ribbing is quite similar, although the occurence of the latter species is almost restricted to the Upper Cretaceous in western Europe. Further comparison among the African, European and Japanese specimens seems to be necessary to clarify the evolutionary relationship.

Neithea (Neithea) syriaca (Conrad)

1957b. *Pecten* (*Neithea*) cf. *morrisi* (Pictet and Renevier): Amano, p. 88, pl. 1, figs. 17, 18, 20–25, 27–29.—1965a. *Neithea* (*Neithea*) *amanoi* Hayami, p. 299, text-fig. 4, pl. 41, figs. 8–10, pl. 42, figs. 1–4.—1972. *Neithea* (*Neithea*) *amanoi* Hayami: Shikama and Suzuki, pl. 4, fig. 15.—1973. *Neithea* (*Neithea*) *syriaca* (Conrad): Dhondt, p. 37.

Type.—Holotype of *Neithea* (*Neithea*) *amanoi* (GK H6267) from Hagino, Kahoku, Kochi Pref.

Age and distribution.—Aptian. Hagino formation in Monobegawa area and Choshi formation in Choshi area. This species is widely distributed in the Aptian and Albian of Lebanon, Angola, Madagascar and western Europe.

Remarks.—Dhondt (1973, p. 37) regarded Amano's specimens as belonging to *Neithea* (*Neithea*) *syriaca* (Conrad, 1852), whereas *Neithea* (*Neithea*) *amanoi* Hayami, 1965, which was based on the material from the same locality as Amano's, was compared by

her (p. 29) with *Neithea* (*Neithea*) *coquandi* (Peron, 1877) from the Albian–Cenomanian of western Europe. So far as I observed many specimens of *N.* (*N.*) *syriaca* [=*N.* (*N.*) *morrisi*] from Lebanon and western Europe, no essential difference could be found between *N.* (*N.*) *amanoi* and that species. Although one of the four intercalary secondary ribs becomes more frequently indistinct in the Japanese form, it may be assigned to geographic variation. This form clearly differs from *N.* (*N.*) *coquandi* in the more uniform and generally weaker ribs and much smaller size.

Neithea (Neithea) matsumotoi Hayami

1965a. *Neithea* (*Neithea*) *matsumotoi* Hayami, p. 297, text-fig. 4, pl. 41, figs. 1–7.—compare 1965. *Neithea* sp.: Matsumoto, Hayami and Hashimoto, p. 10, pl. 1, fig. 13.—1967. *Neithea* (*Neithea*) *matsumotoi* Hayami: Hayami and Kawasawa, p. 76, pl. 9, fig. 2.

Type.—Holotype (GK H6126) from Miyaji, Yatsushiro, Kumamoto Pref.

Age and distribution.—Albian. Yatsushiro formation in Yatsushiro area, Haidateyama formation in Nozu area and Shimantogawa group (Doganaro formation) in Susaki area.

Remarks.—As discussed by Dhondt (1973, p. 46), the present species is apparently similar to *Neithea* (*Neithea*) *sexcostata* (Woodward, 1833) from the Cenomanian–Maesttrichtian of northwest Europe in the surface ornamentation of right valve. So far as I examined many specimens of *N.* (*N.*) *sexcostata* from the Chalk of England and Scania, however, *N.* (*N.*) *matsumotoi* is different from the European species in the larger apical angle, weaker convexity of right valve and weaker radial ribs on the left valve.

Neithea (Neithea) nipponica Hayami

1934. *Pecten* (*Neithea*) sp.: Nagao, p. 209, pl. 29, figs. 8, 9.—1965a. *Neithea* (*Neithea*) *nipponica* Hayami, p. 296, text-fig. 4, pl. 40, figs. 1–6, pl. 52, figs. 1, 2.—1973. *Neithea* (*Neithea*) *quinquecostata* (Sowerby): Dhondt, p. 32 (pars).

Type.—Holotype (GK H6263) from Raga, Tanohata, Iwate Pref.

Age and distribution.—Aptian–Albian. Miyako group (Aketo formation and upper part of Hiraiga formation) in Tanohata area.

Remarks.—Dhondt (1973, p. 34) discussed the taxonomic position of this species and regarded it as synonymous with *Neithea* (*Neithea*) *quinquecostata* (Sowerby, 1814). As the result of my observation of a number of specimens (including the lectotype) of the European species from the Cenomanian of England, it was found that *N.* (*N.*) *nipponica* is characterized by the more rounded (less polygonal) outline of left valve, less angulated anterior and posterior extremity of right valve and thinner test than *N.* (*N.*) *quinquecostata*. It is unlikely they are conspecific. However, it is interesting to see that the difference is not so striking between our specimens and some of the material from the Aptian and Albian of England preserved under the name of *N.* (*N.*) *quinquecostata* in the British Museum (Nat. Hist.).

Neithea (Neithea) kochiensis Hayami

1967. *Neithea* (*Neithella?*) *kochiensis* Hayami, *in* Hayami and Kawasawa, p. 76, pl. 9, fig. 1.

Type.—Holotype (GK H6808) from Kakureyashiki, Susaki, Kochi Pref.

Age and distribution.—Albian (or thereabout). Shimantogawa group (Doganaro formation) in Susaki area.

Subgenus ***Neithella*** Hayami, 1965

Neithea (Neithella) notabilis (Münster *in* Goldfuss)

1926. *Pecten* (*Neithea*) cf. *atavus* Römer: Yabe, Nagao and Shimizu, p. 61, pl. 13, figs. 18, 19.—1965a. *Neithea* (*Neithella*) sp. cf. *N.* (*N.*) *atava* (Römer): Hayami, p. 307, text-fig. 4, pl. 44, figs. 1–4, pl. 52, fig. 4.—1972. *Neithea* (*Neithella*) sp. cf. *N.* (*N.*) *atava* Römer: Shikama and Suzuki, pl. 4, fig. 14.—1973. *Neithea* (*Neithella*) *notabilis* (Münster *in* Goldfuss): Dhondt, p. 67.

Age and distribution.—Upper Neocomian–Aptian. Ishido formation in Sanchu area, Miyako group (Hiraiga formation) in Tanohata area and Choshi formation in Choshi area.

Remarks.—Yabe and Nagao *in* Yabe, Nagao and Shimizu (1926) and Hayami (1965a) followed Woods' misinterpretation of *Pecten atavus* Römer, 1839. Here I agree with Dhondt (1973, p. 67) in regarding these Japanese specimens as referable to *Neithea* (*Neithella*) *notabilis* instead of *N.* (*Neithea*) *atava*.

Genus uncertain

Neithea? aketoensis Hayami

1965a. *Neithea* (s. l.) *aketoensis* Hayami, p. 309, pl. 43, fig. 6.

Type.—Holotype (GK H6284) from northeast of Raga, Tanohata, Iwate Pref.

Age and distribution.—Albian. Miyako group (Aketo formation) in Tanohata area.

Neithea sp.

1957b. *Pecten* (*Neithea*) aff. *quadricostatus* Sowerby: Amano, p. 89, pl. 2, fig. 1.

Age and distribution.—Aptian. Hagino formation in Monobegawa area.

Subfamily CHLAMYDINAE Korobkov, 1960

Genus ***Chlamys*** Röding, 1798

MM5187
– 3 – 8

Chlamys mojsisovicsi Kobayashi and Ichikawa [Pl. 3, Fig. 8]

1949a. *Chlamys mojsisovicsi* Kobayashi and Ichikawa, p. 165, pl. 5, figs. 1–5.—1949a. *Chlamys mojsisovicsi* var. *toyamai* Kobayashi and Ichikawa, p. 166, pl. 5, figs. 6–8.—1952. *Chlamys mojsisovicsi* Kobayashi and Ichikawa: Nakazawa, p. 101, pl. 9, figs. 3–6.—1954d. *Chlamys mojsisovicsi* Kobayashi and Ichikawa: Ichikawa, p. 53, pl. 3, figs. 1–3.—1960a. *Chlamys mojsisovicsi* Kobayashi and Ichikawa: Tokuyama, p. 31, pl. 4, figs. 11–13.

Type.—Holotype (UMUT MM5187) from Kasayadani, Sakawa, Kochi Pref. Holotype of *Chlamys mojsisovicsi* var. *toyamai* (UMUT MM5191) from the same locality.

Age and distribution.—Carnian–(?) Norian. Kochigatani group (lower part) in Sakawa and Sakuradani area, Nabae group (N3 formation in Maizuru zone, and Mine group (Aso formation) in Mine area. This species occurs also in east Siberia.

Chlamys textoria (Schlotheim)

1959h. *Chlamys textoria* (Schlotheim): Hayami, p. 52, pl. 5, figs. 23–26.

Age and distribution.—Sinemurian. Toyora group (Higashinagano formation) in Toyoda area. This species seems to be cosmopolitan.

Chlamys kurumensis Kobayashi and Hayami

1957e. *Chlamys kurumensis* Kobayashi and Hayami, *in* Hayami, p. 119, pl. 20, fig. 1.—compare 1957e. *Chlamys* cf. *kurumensis* Kobayashi and Hayami: Hayami, p. 120, pl. 20, fig. 2.

Type.—Holotype (UMUT MM2697) from Kamikawara, Otari, Nagano Pref.
Age and distribution.—Lower Jurassic (precisely unknown) Kuruma group in Otari area.

Chlamys kotakiensis Takai and Hayami

1957e. *Chlamys kotakiensis* Takai and Hayami, *in* Hayami, p. 121, pl. 20, figs. 3–5.
Type.—Holotype (UMUT MM2700) from Ohishi, Itoigawa (Kotaki), Niigata Pref.
Age and distribution.—Lower Jurassic (not younger than Pliensbachian). Kuruma group (Kitamatadani formation) in Kotaki and Asahi areas.

Chlamys awazuensis Hayami

1961b. *Chlamys awazuensis* Hayami, p. 120, pl. 16, fig. 6.
Type.—Holotype (UMUT MM3681) from Awazu, Soma, Fukushima Pref.
Age and distribution.—Bajocian (or Bathonian). Soma group (Awazu formation) in Soma area.

Chlamys kobayashii Hayami

1959d. *Chlamys kobayashii* Hayami, p. 133, pl. 14, figs. 1, 2.
Type.—Holotype (UMUT MM3124) from Tsukinoura, Ishinomaki, Miyagi Pref.
Age and distribution.—Bajocian. Ojika group (Tsukinoura formation) in Ojika area, and Karakuwa group (Kosaba formation) in Karakuwa area.

Chlamys mitaraiensis Hayami

1959g. *Chlamys mitaraiensis* Hayami, p. 151, pl. 12, figs. 17–20.
Type.—Holotype (UMUT MM3160) from Mitarai, Shokawa, Gifu Pref.
Age and distribution.—Callovian. Tetori group (Mitarai formation) in Makito area.

Chlamys iboibo Kurata and Kimura

1951. *Chlamys iboibo* Kurata and Kimura, *in* Kimura, p. 339, pl. 1, figs. 2–4.—1959d. *Chlamys* (*Chlamys*) *iboibo* Kurata and Kimura: Tamura, p. 57, pl. 6, fig. 38.—1960d. *Chlamys iboibo* Kurata and Kimura: Tamura, p. 234.
Type.—Holotype (UMUT MM7091) from Mimikire, Sakawa, Kochi Pref.
Age and distribution.—Upper Jurassic. Torinosu group in Sakawa and Tanoura areas.

Chlamys camptonectoides Tamura

1959f. *Chlamys camptonectoides* Tamura, p. 175, pl. 19, figs. 16, 17.
Type.—Holotype (UMUT MM3212) from Koike, Kashima, Fukushima Pref.
Age and distribution.—Kimmeridgian. Soma group (Nakanosawa formation) in Soma area.

Chlamys robinaldina (d'Orbigny)

1965a. *Chlamys robinaldina* (d'Orbigny): Hayami, p. 310, pl. 44, figs. 5–7.
Age and distribution.—Aptian. Miyako group (Hiraiga formation) in Tanohata area. This species has been known from western Europe.

Chlamys sp. cf. **C. subacuta** (Lamarck)

1965a. *Chlamys* sp. cf. *C. subacuta* (Lamarck): Hayami, p. 312, pl. 45, fig. 1.
Age and distribution.—Albian. Miyako group (Aketo formation) in Tanohata area.

Chlamys shikokuensis Amano

1957b. *Chlamys shikokuensis* Amano, p. 90, pl. 2, fig. 2.—1965a. *Chlamys* (?) *shikokuensis* Amano: Hayami, p. 312, pl. 44, fig. 8.

Type.—Holotype (UMUT KML0019) from Hagino, Kahoku, Kochi Pref.

Age and distribution.—Upper Neocomian–Aptian. Hagino formation in Monobegawa area, and Lower Monobegawa group in Nangoku area.

Chlamys? sp. cf. **C? kryshtofowichi** (Kiparisova)

1963. *Chlamys* (?) *kryshtofowichi* (Kiparisova): Kambe, p. 46, pl. 5, figs. 15, 16.

Age and distribution.—Skytian. Kamura formation in Takachiho area.

Genus ***Aequipecten*** Fischer, 1886

Aequipecten? toyorensis Hayami

1959h. "*Aequipecten*" *toyorensis* Hayami, p. 55, pl. 6, figs. 1–5.

Type.—Holotype (UMUT MM3384) from Higashinagano, Toyoda, Yamaguchi Pref.

Age and distribution.—Sinemurian. Toyora group (Higashinagano formation) in Toyoda area.

Aequipecten? vulgaris Kimura

1951. *Aequipecten vulgaris* Kimura, p. 342, pl. 1, figs. 5, 6.—1959d. "*Aequipecten*" *vulgaris* Kimura: Tamura, p. 58, pl. 6, figs. 40, 41.—1959f. "*Aequipecten*" *vulgaris* Kimura: Tamura, p. 175, pl. 19, fig. 22.—1960d. "*Aequipecten*" *vulgaris* Kimura: Tamura, p. 235.

Type.—Holotype (UMUT MM7114) from Arinoki, Sakawa, Kochi Pref.

Age and distribution.—Upper Jurassic. Torinosu group in Sakawa, Sakamoto and Sakuradani areas, and Soma group (Nakanosawa formation) in Soma area.

Aequipecten? kotsubu (Kimura)

1951. *Neithea kotsubu* Kimura, p. 343, pl. 1, figs. 8, 9.—1959d. "*Aequipecten*" *kotsubu* (Kimura): Tamura, p. 58, pl. 6, figs. 33, 34.—1959f. "*Aequipecten*" *kotsubu* (Kimura): Tamura, p. 175.—1960d. "*Aequipecten*" *kotsubu* (Kimura): Tamura, p. 235.

Type.—Holotype (UMUT MM7109) from Nagatake, Kamo, Kochi Pref.

Age and distribution.—Upper Jurassic. Torinosu group in Sakawa, Sakamoto and Sakuradani areas, and Soma group (Nakanosawa formation) in Soma area.

Genus ***Radulopecten*** Rollier, 1911

Radulopecten nagatakensis (Kurata and Kimura)

1951. *Chlamys nagatakensis* Kurata and Kimura, *in* Kimura, p. 338, pl. 1, fig. 1.—1959d. *Chlamys* (*Radulopecten*) *nagatakensis* Kurata and Kimura: Tamura, p. 58, pl. 6, figs. 31, 32.—1960d. *Chlamys* (*Radulopecten*) *nagatakensis* Kurata and Kimura: Tamura, p. 235.

Type.—Holotype (UMUT MM7090) from Nagatake, Kamo, Kochi Pref.

Age and distribution.—Upper Jurassic. Torinosu group in Sakawa and Tanoura area.

Radulopecten ogawensis (Kimura)

1951. *Aequipecten ogawensis* Kimura, p. 343, pl. 1, fig. 7.—1959d. *Chlamys* (*Radulopecten*) *ogawensis* (Kimura): Tamura, p. 58, pl. 6, fig. 37.—1959f. *Chlamys* (*Radulopecten*) *ogawensis* (Kimura): Tamura, p. 175, pl. 19, figs. 23–26.

Type.—Holotype (UMUT MM7129) from Nioigataki, Sakawa, Kochi Pref.

Age and distribution.—Upper Jurassic. Torinosu group in Sakawa and Sakamoto areas, and Soma group (Nakanosawa formation) in Soma area.

Genus ***Prohinnites*** Gillet, 1922

Prohinnites sp. cf. **P. favrinus** (Pictet and Roux)

1965a. *Prohinnites* sp. cf. *P. favrinus* (Pictet and Roux): Hayami, p. 313, pl. 44, fig. 9.

Age and distribution.—Aptian. Miyako group (Tanohata formation) in Tanohata area.

Subfamily uncertain

Genus ***Pleuronectites*** Schlotheim, 1820

Pleuronectites hirabarensis Amano

1939. *Syncyclonema* sp.: Katayama, pl. 8, fig. 10.—1955. *Pleuronectites hirabarensis* Amano, p. 25, pl. 5, figs. 1–7.

Type.—Holotype (not registered) from Hirabara, Mine, Yamaguchi Pref.

Age and distribution.—Carnian. Mine group (Hirabara formation) in Mine area.

Pleuronectites sp. aff. **P. laevigatus** (Schlotheim)

1964b. *Pleuronectites* sp. aff. *laevigatus* (Schlotheim): Nakazawa, p. 14, pl. 2, figs. 6, 7.

Age and distribution.—Anisian. Unnamed strata in Uonashi area.

Genus ***Radulonectites*** Hayami, 1957

Radulonectites japonicus Hayami [Pl. 3, Figs. 9, 10]

1957d. *Radulonectites japonicus* Hayami, p. 90, pl. 16, figs. 1–7.—1957d. *Radulonectites japonicus* var. *convexus* Hayami, p. 92, pl. 16, fig. 8.

Type.—Holotype (UMUT MM2689) from lower course of Tsuchizawa, Otari, Nagano Pref. Holotype of *Radulonectites japonicus* var. *convexus* (UMUT MM2696) from middle course of Tsuchizawa.

Age and distribution.—Pliensbachian (or thereabout). Kuruma group (Tsuchizawa formation) in Otari area.

Genus ***Camptonectes*** Agassiz, 1864

Subgenus ***Camptonectes*** Agassiz, 1864

Camptonectes (Camptonectes) triadicus Nakazawa

1952. *Camptonectes triadicus* Nakazawa, p. 96, pl. 7, figs. 1, 2.

Type.—Holotype (UK JM10001) from Kongoin, Maizuru, Kyoto Pref.

Age and distribution.—Carnian. Nabae group (N2 formation) in Maizuru zone.

Camptonectes (Camptonectes) inexpectatus Hayami

1959a. *Camptonectes* (s. s.) *inexpectatus* Hayami, p. 70, pl. 7, figs. 4, 5.

Type.—Holotype (UMUT MM2927) from Futamataji, Ishinomaki (Mizunuma), Miyagi Pref.

Age and distribution.—Hettangian. Shizukawa group (Niranohama formation) in Mizunuma area.

Camptonectes (Camptonectes) sp. cf. **C. (C.) auritus** (Schlotheim)

1959c. *Camptonectes* cf. *auritus* (Schlotheim): Hayami, p. 60, pl. 5, figs. 16–18.

Age and distribution.—Bajocian. Hashiura group (Aratozaki formation) in Shizukawa area.

Camptonectes (Camptonectes) sp. aff. **C. (C.) browni** Cox

1959d. *Camptonectes* sp. aff. *browni* Cox: Tamura, p. 59, pl. 6, fig. 42.

Age and distribution.—Upper Jurassic. Torinosu group in Sakamoto area.

Genus uncertain

Camptonectes? oishii Kobayashi and Hayami

1957e. "*Camptonectes*" *oishii* Kobayashi and Hayami, *in* Hayami, p. 122, pl. 20, figs. 7–10.

Type.—Holotype (UMUT MM2705) from Kuruma, Otari, Nagano Pref.

Age and distribution.—Pliensbachian (or thereabout). Kuruma group (Tsuchizawa formation) in Otari area, and Kuruma group (Kitamatadani formation) in Kotaki area.

Camptonectes? subflabelliformis Hayami

1957e. "*Camptonectes*" *subflabelliformis* Hayami, p. 123, pl. 20, figs. 11, 12.

Type.—Holotype (UMUT MM2709) from west of Odokoro, Itoigawa, Niigata Pref.

Age and distribution.—Lower Jurassic (precisely unknown). Kuruma group (undivided) in Kotaki area.

Camptonectes? torinosuensis Kurata and Kimura

1951. *Camptonectes torinosuensis* Kurata and Kimura, *in* Kimura, p. 340, pl. 1, figs. 10, 11.—compare 1951. *Camptonectes* cf. *torinosuensis* Kurata and Kimura: Kimura, p. 341, pl. 1, fig. 12.—1960d. *Camptonectes torinosuensis* Kurata and Kimura: Tamura, p. 235.

Type.—Holotype (UMUT MM7095) from Mimikire, Sakawa, Kochi Pref.

Age and distribution.—Upper Jurassic. Torinosu group in Sakawa and Sakuradani areas.

Camptonectes? mimikirensis Kurata and Kimura

1951. *Camptonectes* (?) *mimikirensis* Kurata and Kimura, *in* Kimura, p. 341, pl. 1, fig. 13.—1960d. *Camptonectes* (?) *mimikirensis* Kurata and Kimura: Tamura, p. 235.

Type.—Holotype (UMUT MM7100) from Mimikire, Sakawa, Kochi Pref.

Age and distribution.—Upper Jurassic. Torinosu group in Sakawa area.

Genus ***Eburneopecten*** Conrad, 1865

Eburneopecten? miyakoensis (Nagao)

1934. *Pecten* (*Camptonectes*) *miyakoensis* Nagao, p. 209, pl. 31, figs. 11, 12.—1965a. *Pectinella miyakoensis* (Nagao): Hayami, p. 318, pl. 45, figs. 2–11, pl. 52, fig. 5.—1969. *Pectinella miyakoensis* (Nagao): Hatai, Kotaka and Noda, p. 31.

Type.—Lectotype designated by Hayami (1965a, p. 318) (GMH no. 6784) from Hiraiga, Tanohata, Iwate Pref.

Age and distribution.—Aptian–Albian. Miyako group (Hiraiga and Aketo formations) in Tanohata area.

Remarks.—As suggested by Speden (1967), this species may belong to an unnamed genus.

Genus ***Micronectes*** Ichikawa and Maeda, 1958

Micronectes bellaturus Ichikawa and Maeda [Pl. 9, Fig. 3]

1958b. *Micronectes bellaturus* Ichikawa and Maeda, p. 98, pl. 5, figs. 13–17.

Type.—Holotype (OCU MM237) from Azenotani, Sennan, Osaka Pref.

Age and distribution.—Campanian. Izumi group (Azenotani shale, Minato shale and Shichi shale) in Izumi mountains and Awaji island.

Age and distribution.—Upper Jurassic. Torinosu group in Sakawa and Sakamoto areas, and Soma group (Nakanosawa formation) in Soma area.

Genus ***Prohinnites*** Gillet, 1922

Prohinnites sp. cf. **P. favrinus** (Pictet and Roux)

1965a. *Prohinnites* sp. cf. *P. favrinus* (Pictet and Roux): Hayami, p. 313, pl. 44, fig. 9.

Age and distribution.—Aptian. Miyako group (Tanohata formation) in Tanohata area.

Subfamily uncertain

Genus ***Pleuronectites*** Schlotheim, 1820

Pleuronectites hirabarensis Amano

1939. *Syncyclonema* sp.: Katayama, pl. 8, fig. 10.—1955. *Pleuronectites hirabarensis* Amano, p. 25, pl. 5, figs. 1–7.

Type.—Holotype (not registered) from Hirabara, Mine, Yamaguchi Pref.

Age and distribution.—Carnian. Mine group (Hirabara formation) in Mine area.

Pleuronectites sp. aff. **P. laevigatus** (Schlotheim)

1964b. *Pleuronectites* sp. aff. *laevigatus* (Schlotheim): Nakazawa, p. 14, pl. 2, figs. 6, 7.

Age and distribution.—Anisian. Unnamed strata in Uonashi area.

Genus ***Radulonectites*** Hayami, 1957

Radulonectites japonicus Hayami [Pl. 3, Figs. 9, 10]

1957d. *Radulonectites japonicus* Hayami, p. 90, pl. 16, figs. 1–7.—1957d. *Radulonectites japonicus* var. *convexus* Hayami, p. 92, pl. 16, fig. 8.

Type.—Holotype (UMUT MM2689) from lower course of Tsuchizawa, Otari, Nagano Pref. Holotype of *Radulonectites japonicus* var. *convexus* (UMUT MM2696) from middle course of Tsuchizawa.

Age and distribution.—Pliensbachian (or thereabout). Kuruma group (Tsuchizawa formation) in Otari area.

Genus ***Camptonectes*** Agassiz, 1864

Subgenus ***Camptonectes*** Agassiz, 1864

Camptonectes (Camptonectes) triadicus Nakazawa

1952. *Camptonectes triadicus* Nakazawa, p. 96, pl. 7, figs. 1, 2.

Type.—Holotype (UK JM10001) from Kongoin, Maizuru, Kyoto Pref.

Age and distribution.—Carnian. Nabae group (N2 formation) in Maizuru zone.

Camptonectes (Camptonectes) inexpectatus Hayami

1959a. *Camptonectes* (s. s.) *inexpectatus* Hayami, p. 70, pl. 7, figs. 4, 5.

Type.—Holotype (UMUT MM2927) from Futamataji, Ishinomaki (Mizunuma), Miyagi Pref.

Age and distribution.—Hettangian. Shizukawa group (Niranohama formation) in Mizunuma area.

Camptonectes (Camptonectes) sp. cf. **C. (C.) auritus** (Schlotheim)

1959c. *Camptonectes* cf. *auritus* (Schlotheim): Hayami, p. 60, pl. 5, figs. 16–18.

Age and distribution.—Bajocian. Hashiura group (Aratozaki formation) in Shizukawa area.

Camptonectes (Camptonectes) sp. aff. **C. (C.) browni** Cox

1959d. *Camptonectes* sp. aff. *browni* Cox: Tamura, p. 59, pl. 6, fig. 42.

Age and distribution.—Upper Jurassic. Torinosu group in Sakamoto area.

Genus uncertain

Camptonectes? oishii Kobayashi and Hayami

1957e. "*Camptonectes*" *oishii* Kobayashi and Hayami, *in* Hayami, p. 122, pl. 20, figs. 7–10.

Type.—Holotype (UMUT MM2705) from Kuruma, Otari, Nagano Pref.

Age and distribution.—Pliensbachian (or thereabout). Kuruma group (Tsuchizawa formation) in Otari area, and Kuruma group (Kitamatadani formation) in Kotaki area.

Camptonectes? subflabelliformis Hayami

1957e. "*Camptonectes*" *subflabelliformis* Hayami, p. 123, pl. 20, figs. 11, 12.

Type.—Holotype (UMUT MM2709) from west of Odokoro, Itoigawa, Niigata Pref.

Age and distribution.—Lower Jurassic (precisely unknown). Kuruma group (undivided) in Kotaki area.

Camptonectes? torinosuensis Kurata and Kimura

1951. *Camptonectes torinosuensis* Kurata and Kimura, *in* Kimura, p. 340, pl. 1, figs. 10, 11.—compare 1951. *Camptonectes* cf. *torinosuensis* Kurata and Kimura: Kimura, p. 341, pl. 1, fig. 12.—1960d. *Camptonectes torinosuensis* Kurata and Kimura: Tamura, p. 235.

Type.—Holotype (UMUT MM7095) from Mimikire, Sakawa, Kochi Pref.

Age and distribution.—Upper Jurassic. Torinosu group in Sakawa and Sakuradani areas.

Camptonectes? mimikirensis Kurata and Kimura

1951. *Camptonectes* (?) *mimikirensis* Kurata and Kimura, *in* Kimura, p. 341, pl. 1, fig. 13.—1960d. *Camptonectes* (?) *mimikirensis* Kurata and Kimura: Tamura, p. 235.

Type.—Holotype (UMUT MM7100) from Mimikire, Sakawa, Kochi Pref.

Age and distribution.—Upper Jurassic. Torinosu group in Sakawa area.

Genus ***Eburneopecten*** Conrad, 1865

Eburneopecten? miyakoensis (Nagao)

1934. *Pecten* (*Camptonectes*) *miyakoensis* Nagao, p. 209, pl. 31, figs. 11, 12.—1965a. *Pectinella miyakoensis* (Nagao): Hayami, p. 318, pl. 45, figs. 2–11, pl. 52, fig. 5.—1969. *Pectinella miyakoensis* (Nagao): Hatai, Kotaka and Noda, p. 31.

Type.—Lectotype designated by Hayami (1965a, p. 318) (GMH no. 6784) from Hiraiga, Tanohata, Iwate Pref.

Age and distribution.—Aptian–Albian. Miyako group (Hiraiga and Aketo formations) in Tanohata area.

Remarks.—As suggested by Speden (1967), this species may belong to an unnamed genus.

Genus ***Micronectes*** Ichikawa and Maeda, 1958

Micronectes bellaturus Ichikawa and Maeda [Pl. 9, Fig. 3]

1958b. *Micronectes bellaturus* Ichikawa and Maeda, p. 98, pl. 5, figs. 13–17.

Type.—Holotype (OCU MM237) from Azenotani, Sennan, Osaka Pref.

Age and distribution.—Campanian. Izumi group (Azenotani shale, Minato shale and Shichi shale) in Izumi mountains and Awaji island.

Genus ***Eopecten*** Douvillé, 1897

Eopecten? infrequens (Kobayashi and Ichikawa)

1949a. "*Velata*" *infrequens* Kobayashi and Ichikawa, p. 163, pl. 5, fig. 21.

Type.—Holotype (UMUT MM5208) from Kanaidani, Sakawa, Kochi Pref.

Age and distribution.—Norian. Kochigatani group (upper part) in Sakawa area.

Eopecten? sumeriensis (Kobayashi and Ichikawa)

1949a. "*Velata*" *sumeriensis* Kobayashi and Ichikawa, p. 164, pl. 5, fig. 22.—compare 1949a. "*Velata*" cf. *sumeriensis* Kobayashi and Ichikawa: Kobayashi and Ichikawa, p. 164, pl. 5, fig. 23.

Type.—Holotype (UMUT MM5210) from Sumeri, Sakawa, Kochi Pref.

Age and distribution.—Carnian. Kochigatani group (lower part) in Sakawa area.

Eopecten maizurensis (Nakazawa)

1952. *Velata maizurensis* Nakazawa, p. 97, pl. 7, figs. 3–6.—1954. *Velata maizurensis* Nakazawa: Nakazawa, p. 221, pl. 5, fig. 9.

Type.—Holotype (UK JM10022a) from Shinmichi, Maizuru, Kyoto Pref.

Age and distribution.—Carnian. Nabae group (N2 and N4 formations) and Heki formation in Maizuru zone.

Eopecten punctus (Kimura)

1951. *Velata puncta* Kimura, p. 348, pl. 1, fig. 21.—1959f. *Eopecten punctus* (Kimura): Tamura, p. 175, pl. 19, figs. 18–21.—1960d. *Eopecten punctus* (Kimura): Tamura, p. 236.

Type.—Holotype (UMUT MM7125) from Mimikire, Sakawa, Kochi Pref.

Age and distribution.—Upper Jurassic. Torinosu group in Sakawa area, and Soma group (Nakanosawa formation) in Soma area.

Eopecten kurisakensis Tamura

1960d. *Eopecten kurisakensis* Tamura, p. 235, pl. 2, fig. 18.

Type.—Holotype (UMUT MM3627) from Kurisaka, Kaminaka, Tokushima Pref.

Age and distribution.—Kimmeridgian. Torinosu group (Kurisaka formation) in Sakuradani area.

Family uncertain

"Pecten" sp. aff. **"P." sojalis** Wittenburg

1961. "*Pecten*" aff. *sojalis* Wittenburg: Nakazawa, p. 258, pl. 12, fig. 15.

Age and distribution.—Skytian. Yakuno group (Hirobatake formation) in Maizuru zone.

"Pecten" sp. aff. **"P." amuricus** Bittner

1961. "*Pecten*" aff. *amuricus* Bittner: Nakazawa, p. 259, pl. 12, fig. 14.

Age and distribution.—Skytian or Anisian. Fukumoto group in Aita area.

Family PROPEAMUSSIIDAE Abbott, 1954

Genus ***Propeamussium*** de Gregorio, 1884

Propeamussium cowperi yubarense (Yabe and Nagao)

1928. *Pecten* (*Propeamussium*) *cowperi* var. *yubarensis* Yabe and Nagao, p. 88, pl. 16, figs. 17–19.—1932a. *Pecten* (*Propeamussium*) *cowperi* var. *yubarensis* Yabe and Nagao: Nagao, p. 38, pl. 6, figs. 7, 8, 12, 13.—1938. *Pecten* (*Propeamussium*) *cooperi* var. *yubarensis* Yabe

and Nagao [*sic*]: Nagao, p. 129, pl. 16, fig. 3.—compare 1956. *Pecten* (*Propeamisium*) *cowperi* var. *yubarensis* Yabe and Nagao [*sic*]: Amano, p. 73, pl. 1, fig. 12.

Type.—Syntype (IGPS no. 22599) from Pankemo-yubari, Oyubari, Ishikari Prov., Hokkaido.

Age and distribution.—Cenomanian–Santonian. Middle Yezo group and Upper Yezo group in various areas of Hokkaido.

Propeamussium awajense Ichikawa and Maeda

1958b. *Propeamussium awajense* Ichikawa and Maeda, p. 101, pl. 5, figs. 11, 12.

Type.—Holotype (OCU MM234) from Hansanji, Seidan (Awaji), Hyogo Pref.

Age and distribution.—Campanian. Izumi group (Shichi shale and Minato shale) in Awaji island.

Genus ***Parvamussium*** Sacco, 1897

Parvamussium habunokawense (Kimura)

1951. *Propeamussium habunokawensis* Kimura [*sic*], p. 344, pl. 1, figs. 14, 15.—1959d. *Variamussium habunokawense* (Kimura): Tamura, p. 60, pl. 6, figs. 20–22.—1960d. *Variamussium habunokawense* (Kimura): Tamura, p. 236.—1960. *Variamussium* cf. *habunokawense* (Kimura): Hayami, Sugita and Nagumo, p. 92, pl. 8, figs. 11–13.

Type.—Holotype (UMUT MM7117a) from Habunokawa, Sakawa, Kochi Pref.

Age and distribution.—Upper Jurassic—Berriasian. Torinosu group in Sakawa, Tanoura and Sakuradani areas, and Isokusa formation in Oshima area.

Parvamussium kimurai (Hayami)

1965a. *Variamussium kimurai* Hayami, p. 320, pl. 46, figs. 1–4.

Type.—Holotype (GK H6301) from Okuminotani, Nangoku, Kochi Pref.

Age and distribution.—Neocomian (probably upper). Lower Monobegawa group in Nangoku area, and Arita formation in Yuasa area.

Parvamussium hinagense Tamura

1973a. *Parvamussium hinagense* Tamura, p. 122, pl. 17, figs. 1–4.

Type.—Holotype (KE not registered) from Imaizumi, Sakamoto, Kumamoto Pref.

Age and distribution.—Aptian or thereabout. Hinagu formation in Sakamoto area.

Family PLICATULIDAE Watson, 1930

Genus ***Plicatula*** Lamarck, 1801

Plicatula hekiensis Nakazawa

1955. *Plicatula hekiensis* Nakazawa, p. 251, pl. 14, figs. 3–7.—1960a. *Plicatula hekiensis* Nakazawa: Tokuyama, p. 36, pl. 4, figs. 6–9.

Type.—Holotype (UK JM10246a) from Heki, Yakuno, Kyoto Pref.

Age and distribution.—Carnian–(?) Norian. Heki formation and Nabae group (N3 formation) in Maizuru zone, and Mine group (Aso formation) in Mine area.

Plicatula praenipponica Hayami

1959h. *Plicatula praenipponica* Hayami, p. 61, pl. 6, figs. 17–19.

Type.—Holotype (UMUT MM3406) from Higashinagano, Toyoda, Yamaguchi Pref.

Age and distribution.—Sinemurian. Toyora group (Higashinagano formation) in Toyoda area.

Plicatula subcircularis Hayami

1959h. *Plicatula subcircularis* Hayami, p. 60, pl. 6, figs. 14–16.

Type.—Holotype (UMUT MM3401) from Higashinagano, Toyoda, Yamaguchi Pref.

Age and distribution.—Sinemurian. Toyora group (Higashinagano formation) in Toyoda area.

Plicatula dichotomocosta Tamura

1959f. *Plicatula dichotomocosta* Tamura, p. 179, pl. 19, figs. 35–37.—compare 1960d. *Plicatula* sp. aff. *dichotomocosta* Tamura: Tamura, p. 237, pl. 2, fig. 13.

Type.—Holotype (UMUT MM3234) from Minahara, Kashima, Fukushima Pref.

Age and distribution.—Kimmeridgian. Soma group (Nakanosawa formation) in Soma area.

Plicatula yatsujiensis Tamura

1960d. *Plicatula yatsujiensis* Tamura, p. 237, pl. 2, figs. 9–12.

Type.—Holotype (UMUT MM3621) from Nishikaraiwa, Sakawa, Kochi Pref.

Age and distribution.—Upper Jurassic. Torinosu group in Sakawa and Sakuradani area.

Plicatula kiiensis Hayami

1965a. *Plicatula kiiensis* Hayami, p. 323, pl. 46, figs. 6–8.—1968. *Plicatula kiiensis* Hayami: Matsumoto, Kanmera and Sakamoto, p. 146, pl. 2, figs. 7, 8.

Type.—Holotype (GK H6590) from Kumai, Yuasa, Wakayama Pref.

Age and distribution.—Upper Neocomian–Aptian. Arita formation in Uuasa area, Hinagu formation in Yatsushiro area, and Tomochi formation in Tomochi area.

Plicatula hanaii Hayami

1965a. *Plicatula hanaii* Hayami, p. 322, pl. 47, figs. 1–3.

Type.—Holotype (GK H6311) from Koikorobe, Tanohata, Iwate Pref.

Age and distribution.—Aptian. Miyako group (Tanohata and Hiraiga formations) in Tanohata area.

Family SPONDYLIDAE Gray, 1826

Genus ***Spondylus*** Linné, 1758

Subgenus ***Spondylus*** Linné, 1758

Spondylus (Spondylus) decoratus Nagao [Pl. 3, Figs. 11, 12]

1934. *Spondylus decoratus* Nagao, p. 210, pl. 27, figs. 2, 5–7.—1934. *Spondylus* sp. aff. *decoratus* Nagao: Nagao, p. 211, pl. 27, fig. 8.—1965a. *Spondylus decoratus* Nagao: Hayami, p. 324, pl. 47, figs. 4–9, pl. 52, fig. 6.—compare 1972. *Spondylus* sp. aff. *S. decoratus* Nagao: Shikama and Suzuki, pl. 5, fig. 1.

Type.—Lectotype designated by Hayami (1965a, p. 324) (GMH no. 6818) from Hideshima (Sakiyama), Miyako, Iwate Pref.

Age and distribution.—Aptian. Miyako group (Tanohata and Hiraiga formations) in Miyako, Omoto and Tanohata areas.

Spondylus (Spondylus) amanoi Hayami, nom. nov.

1958. *Spondylus japonicus* Amano and Marui, p. 27, pl. 2, figs. 1, 2. (non *Spondylus japonicus* Kuroda, 1932)

Type.—Holotype (UMUT not registered) from Hatsutanizawa, Nakagomi (Uchiyama), Nagano Pref., as originally designated by Amano and Marui (1958).
Age and distribution.—Upper Cretaceous (precisely unknown). Unnamed formation in Nakagomi area.

Superfamily ANOMIACEA Rafinesque, 1815
Family ANOMIIDAE Rafinesque, 1815
Genus ***Anomia*** Linné, 1758

Anomia? subovalis Nagao

1938. *Anomia subovalis* Nagao, p. 130, pl. 16, figs. 12–17.

Type.—Holotype (GMH no. 8228) from Takinosawa, Kawakami south Saghalin.
Age and distribution.—Coniacian–Santonian. Upper Yezo group in Kawakami and Abeshinai areas.

Genus ***Placunopsis*** Morris and Lycett, 1853

Placunopsis pseudotruncata (Yabe and Nagao)

1926. *Anomia pseudotruncata* Yabe and Nagao, *in* Yabe, Nagao and Shimizu, p. 62, pl. 12, figs. 26, 27, pl. 13, figs. 26, 27, 36, 37.—compare 1939. *Anomia pseudotruncata* Yabe and Nagao: Kobayashi and Suzuki, p. 219, pl. 13, fig. 19.—compare 1965a. *Monia* sp. cf. *M. pseudotruncata* (Yabe and Nagao): Hayami, p. 335, pl. 48, fig. 1.

Type.—Syntype (IGPS no. 22522) from Bomeki, Ohinata, Nagano Pref.
Age and distribution.—Neocomian. Shiroi formation in Sanchu area.

Placunopsis aptiana (Hayami)

1965a. *Monia aptiana* Hayami, p. 335, pl. 47, figs. 10, 11.

Type.—Holotype (GK H6326) from Hiraiga, Tanohata, Iwate Pref.
Age and distribution.—Aptian. Miyako group (Hiraiga formation) in Tanohata area.

Placunopsis sp. aff. **P. linensis** (Whiteaves)

1938. *Anomia linensis* Whiteaves: Matsumoto, p. 14, text-fig. 3, pl. 1, fig. 4.

Age and distribution.—Albian (?)–Cenomanian. Gosyonoura group in Gosyonoura island.

Superfamily LIMACEA Rafinesque, 1815
Family LIMIDAE Rafihesque, 1815
Genus ***Mysidioptera*** Salomon, 1895

Mysidioptera circularis Nakazawa

1961. *Mysidioptera circularis* Nakazawa, p. 263, pl. 13, figs. 1–7.

Type.—Holotype (UK JM10699) from Muikadani, Oe, Kyoto Pref.
Age and distribution.—Skytian. Yakuno group (Oro formation) in Maizuru zone.

Mysidioptera ominensis Tokuyama

1960c. *Mysidioptera ominensis* Tokuyama, p. 208, pl. 13, figs. 10, 11.

Type.—Holotype (UMUT MM4591) from Omine, Mine, Yamaguchi Pref.
Age and distribution.—Carnian. Mine group (Hirabara formation) in Mine area.

Genus ***Plagiostoma*** Sowerby, 1814

Plagiostoma higaeribarense Tokuyama

1960a. *Plagiostoma higaeribarense* Tokuyama, p. 34, pl. 4, figs. 1, 2.—1960a. *Plagiostoma higaeribarense* var. *yuguchiense* Tokuyama, p. 35, pl. 4, fig. 3.
Type.—Holotype (UMUT MM4548) from Higaeribara, Mine, Yamaguchi Pref.
Age and distribution.—Carnian (or Norian).—Mine group (Aso formation) in Mine Area.

Plagiostoma? kuromagariense (Kobayashi and Ichikawa)

1949b. *Lima* (*Plagiostoma?*) *kuromagariensis* Kobayashi and Ichikawa, p. 179, pl. 6, fig. 18.
Type.—Holotype (UMUT MM5218) from Kuromagari, Sakawa, Kochi Pref.
Age and distribution.—Carnian. Kochigatani group (lower part) in Sakawa area.

Plagiostoma kobayashii Hayami

1959h. *Plagiostoma kobayashii* Hayami, p. 63, pl. 6, figs. 21–23.
Type.—Holotype (UMUT MM3411) from Higashinagano, Toyoda, Yamaguchi Pref.
Age and distribution.—Sinemurian. Toyora group (Higashinagano formation) in Toyoda area.

Plagiostoma matsumotoi Hayami

1959h. *Plagiostoma matsumotoi* Hayami, p. 64, pl. 6, figs. 24, 25, pl. 7, figs. 1–3.
Type.—Holotype (UMUT MM3414) from Higashinagano, Toyoda, Yamaguchi Pref.
Age and distribution.—Sinemurian. Toyora group (Higashinagano formation) in Toyoda area.

Plagiostoma sp. aff. **P. subcardiiforme** (Greppin)

1961b. *Plagiostoma* sp. ex gr. *subcardiiforme* (Greppin): Hayami, p. 119, pl. 16, fig. 7.
Age and distribution.—Bathonian (or thereabout). Soma group (Yamagami formation) in Soma area.

Plagiostoma enormicosta (Tamura)

1959f. *Lima* (*Plagiostoma*) *enormicosta* Tamura, p. 177, pl. 19, figs. 32–34.—1960d. *Lima* (*Plagiostoma*) *enormicosta* Tamura: Tamura, p. 238, pl. 2, fig. 8.
Type.—Holotype (UMUT MM3228) from Nakanosawa, Soma, Fukushima Pref.
Age and distribution.—Upper Jurassic (especially Kimmeridgian). Soma group (Nakanosawa formation) in Soma area, and Torinosu group in Sakawa area.

Plagiostoma sanrikuense Hayami

1965a. *Plagiostoma* (*Plagiostoma*) *sanrikuense* Hayami, p. 326, pl. 48, fig. 2.
Type.—Holotype (GK H6315) from Hiraiga, Tanohata, Iwate Pref.
Age and distribution.—Aptian. Miyako group (Hiraiga formation) in Tanohata area.

Genus ***Acesta*** Adams and Adams, 1858

Acesta goliathiformis (Hayami)

1965a. *Plagiostoma* (*Acesta*) *goliathiforme* Hayami, p. 327, pl. 48, figs. 3, 4.
Type.—Holotype (GK H6316) from Hiraiga, Tanohata, Iwate Pref.
Age and distribution.—Aptian. Miyako group (Hiraiga formation) in Tanohata area.

Genus ***Antiquilima*** Cox, 1943

Antiquilima nagatoensis Hayami [Pl. 4, Fig. 1]

1959h. *Antiquilima nagatoensis* Hayami, p. 66, pl. 7, fig. 4.
Type.—Holotype (UMUT MM3421) from Higashinagano, Toyoda, Yamaguchi Pref.
Age and distribution.—Sinemurian. Toyora group (Higashinagano formation) in Toyoda area.

Antiquilima ultima Hayami

1965a. *Antiquilima ultima* Hayami, p. 329, pl. 49, fig. 6.
Type.—Holotype (GK H6318) from Oshima (Moshi), Iwaizumi, Iwate Pref.
Age and distribution.—Aptian. Miyako group (Hiraiga formation) in Omoto area.

Genus ***Pseudolimea*** Arkell, 1932

Pseudolimea naumanni (Kobayashi and Ichikawa)

1939. *Lima naumanni lata* Katayama, p. 135 (nom. nud.).—1939. *Lima naumanni obliqua* Katayama, p. 135, pl. 8, fig. 6 (nom. nud.).—1949b. *Lima naumanni* Kobayashi and Ichikawa, p. 177, pl. 6, figs. 13–15.—1949b. *Lima naumanni* var. *obliqua* Kobayashi and Ichikawa, p. 178, pl. 6, figs. 16, 17.—1952. *Lima* (*Pseudolimea?*) *naumanni* Kobayashi and Ichikawa: Nakazawa, p. 102, pl. 9, figs. 7, 8, pl. 10, fig. 3.—1954d. *Pseudolimea? naumanni* (Kobayashi and Ichikawa): Ichikawa, p. 55, pl. 3, fig. 12.—1954d. *Pseudolimea? naumanni* var. *obliqua* (Kobayashi and Ichikawa): Ichikawa, p. 56, pl. 3, fig. 11.—1969. *Pseudolimea naumanni* (Kobayashi and Ichikawa): Ozawa and Hayami, p. 37, pl. 3, fig. 13.

Type.—Holotype (UMUT MM5211) from Togo, Sakawa, Kochi Pref. Holotype of *Lima naumanni* var. *obliqua* (UMUT MM 5214) from the same locality.
Age and distribution.—Carnian. Kochigatani group (lower part) in Sakawa, Sakuradani and Ome areas, and Nabae group (N3 formation) in Maizuru zone. This species occurs also in eastern Siberia.

Pseudolimea yataensis yataensis (Nakazawa)

1952. *Lima yataensis* Nakazawa, p. 102, text-fig. 3, pl. 9, figs. 9, 10, pl. 10, figs. 1, 2, 6.—compare 1957b. *Lima* sp. cf. *L. yataensis* Nakazawa: Nakano, p. 64, pl. 9, fig. 4.
Type.—Holotype (UK JM10032) from Miuchi, Maizuru, Kyoto Pref.
Age and distribution.—Carnian. Nabae group (N3 formation) in Maizuru zone.

Pseudolimea yataensis kuredaniensis (Nakazawa)

1952. *Lima yataensis* var. *kuredaniensis* Nakazawa, p. 103, pl. 10, figs. 4, 5, 7.
Type.—Holotype (UK JM10039b) from Kuredani (Kichisaka), Maizuru, Kyoto Pref.
Age and distribution.—Carnian. Nabae group (N2 formation) in Maizuru zone.

Genus ***Ctenoides*** Mörch, 1853

Ctenoides tosanus (Kurata and Kimura)

1951. *Lima* (*Ctenoides*) *tosana* Kurata and Kimura, *in* Kimura, p. 349, pl. 1, fig. 22.—1959d. *Lima* (*Ctenoides*) *tosana* Kurata and Kimura: Tamura, p. 62, pl. 6, figs. 44–47.—1959f. *Lima* (*Ctenoides*) *tosana* Kurata and Kimura: Tamura, p. 177.—1960d. *Lima* (*Ctenoides*) *tosana* Kimura: Tamura, p. 238.
Type.—Holotype (UMUT MM7126) from Mimikire, Sakawa, Kochi Pref.
Age and distribution.—Upper Jurassic. Torinosu group in Sakawa, Sakamoto and Sakuradani areas, and Soma group (Nakanosawa formation) in Soma area.

Ctenoides subrapa (Nagao)

1934. *Lima* (*Ctenoides?*) *subrapa* Nagao, p. 212, pl. 30, figs. 9, 10.—1965a. *Ctenoides subrapa* (Nagao): Hayami, p. 330, pl. 48, fig. 5, pl. 52, fig. 7.

Type.—Lectotype designated by Hayami (1965a, p. 331) (GMH no. 6774 or 6989) from Hiraiga, Tanohata, Iwate Pref.

Age and distribution.—Aptian–Albian. Miyako group (Hiraiga and Aketo formations) in Tanohata area.

Genus ***Ctenostreon*** Eichwald, 1862

Ctenostreon japonicum Hayami

1959h. *Ctenostreon japonicum* Hayami, p. 67, pl. 7, figs. 5, 6.

Type.—Holotype (UMUT MM3424) from Higashinagano, Toyoda, Yamaguchi Pref.

Age and distribution.—Sinemurian. Toyora group (Higashinagano formation) in Toyoda area.

Ctenostreon proboscideum (Sowerby)

1959f. *Ctenostreon proboscideum* (J. Sowerby): Tamura, p. 177, pl. 19, fig. 38.—compare 1959c. *Ctenostreon* sp. ex gr. *proboscideum* (Sowerby): Hayami, p. 177, pl. 19, fig. 38.

Age and distribution.—Kimmeridgian. Soma group (Nakanosawa formation) in Soma area. This species seems to be cosmopolitan.

Ctenostreon ojikense Hayami

1959d. *Ctenostreon ojikense* Hayami, p. 135, pl. 14, fig. 3.

Type.—Holotype (UMUT MM3126) from Tsukinoura, Ishinomaki, Miyagi Pref.

Age and distribution.—Bajocian. Ojika group (Tsukinoura formation) in Ojika area.

Genus ***Limatula*** Wood, 1839

Limatula? asoensis Tokuyama

1960a. *Limatula asoensis* Tokuyama, p. 33, pl. 4, figs. 4, 5.

Type.—Holotype (UMUT MM4551) from Mishime, Mine, Yamaguchi Pref.

Age and distribution.—Carnian (or Norian). Mine group (Aso formation) in Mine area.

Limatula? iwayae Hayami

1959g. *Limatula iwayae* Hayami, p. 157, pl. 13, figs. 9, 10.

Type.—Holotype (UMUT 3173) from Mitarai, Shokawa, Gifu Pref.

Age and distribution.—Callovian. Tetori group (Mitarai formation) in Makito area.

Limatula? akiyamae Hayami

1960. *Limatula akiyamae* Hayami, *in* Hayami, Sugita and Nagumo, p. 93, pl. 8, fig. 15.

Type.—Holotype (UMUT MM3647) from Nagasaki, Kesennuma (Oshima), Miyagi Pref.

Age and distribution—Berriasian. Isokusa formation in Oshima area.

Limatula? reticulata Tamura

1959d. *Limatula reticulata* Tamura, p. 62, text-fig. 4, pl. 6, fig. 43.

Type.—Holotype (UMUT MM3064) from Tsurubami, Sakamoto, Kumamoto Pref.

Age and distribution.—Upper Jurassic. Torinosu group in Sakamoto area.

Limatula ishidoensis (Yabe and Nagao)

1926. *Lima* (*Limatula*) *ishidoensis* Yabe and Nagao, *in* Yabe, Nagao and Shimizu, p. 60, pl. 14, figs. 7, 16.—1965a. *Limatula ishidoensis* (Yabe and Nagao): Hayami, p. 332, pl. 49, fig. 5.

Type.—Lectotype (IGPS no. 22539) designated by Hayami (1965a, p. 332) from Ishido, Ohinata, Nagano Pref.

Age and distribution.—Upper Neocomian—Aptian. Ishido formation in Sanchu area.

Limatula nagaoi Hayami

1934. *Lima* (*Limatula*) *ishidoensis* Yabe and Nagao: Nagao, p. 213, pl. 27, figs. 9, 10.—1965a. *Limatula nagaoi* Hayami, p. 333, pl. 49, figs. 1–4.—1972. *Limatula nagaoi* Hayami: Shikama and Suzuki, pl. 5, fig. 4.

Type.—Holotype (GK H6321) from Hiraiga, Tanohata, Iwate Pref.

Age and distribution.—Aptian–Albian. Miyako group (Hiraiga, Tanohata and Aketo formations) in Tanohata area, and Choshi formation in Choshi area.

Limatula sp. cf. **L. tombeckiana** (d'Orbigny)

1965a. *Limatula* sp. cf. *L. tombeckiana* (d'Orbigny): Hayami, p. 332, pl. 52, fig. 8.

Age and distribution.—Aptian. Miyako group (Tanohata formation) in Tanohata area.

Limatula sp.

1962. *Promantellum gaultina* (Woods) [*sic*]: Saito, p. 68, pl. 2, figs. 13, 14.

Age and distribution.—Coniacian. Futaba group (Ashizawa formation) in Futaba area.

Suborder OSTREINA Férussac, 1822

Superfamily OSTREACEA Rafinesque, 1815

Family OSTREIDAE Rafinesque, 1815

Subfamily GRYPHAEINAE Vyalov, 1936

Genus ***Catinula*** Rollier, 1911

Catinula? oshimensis (Hayami)

1965a. *Gryphaea* (s. l.) *oshimensis* Hayami, p. 348, pl. 51, figs. 3–7, pl. 52, fig. 9.—1969. *Gryphaea oshimensis* Hayami: Hatai, Kotaka and Noda, p. 32, pl. 1, fig. 10.

Type.—Holotype (GK H6346) from Yokonuma, Kesennuma (Oshima), Miyagi Pref.

Age and distribution.—Upper Neocomian–Aptian. Oshima formation in Oshima area, and Miyako group (Tanohata formation) in Tanohata area.

Genus ***Liostrea*** Douvillé, 1904

Liostrea shiraiwensis Tokuyama

1960c. *Liostrea* (*Catinula*) *shiraiwensis* Tokuyama, p. 209, pl. 12, figs. 8–12.

Type.—Holotype (UMUT MM4575) from Shiraiwa, Mine, Yamaguchi Pref.

Age and distribution.—Carnian. Mine group (Hirabara formation) in Mine area.

Liostrea toyorensis Hayami

1959h. *Liostrea toyorensis* Hayami, p. 68, pl. 7, figs. 7, 8.

Type.—Holotype (UMUT MM3428) from Higashinagano, Toyoda, Yamaguchi Pref.

Age and distribution.—Sinemurian. Toyora group (Higashinagano formation) in Toyoda area.

Liostrea sp. cf. **L. stoliczkai** Cox

1960d. *Liostrea* (*Catinula*) cf. *stoliczkai* Cox: Tamura, p. 238, pl. 2, figs. 26, 27.

Age and distribution.—Upper Jurassic. Torinosu group in Sakawa and Sakuradani areas.

Subfamily EXOGYRINAE Vyalov, 1936

Genus ***Nanogyra*** Beurlen, 1958

Nanogyra kumensis (Tamura)

1959c. *Exogyra kumensis* Tamura, p. 27, pl. 5, figs. 29–31.—1960c. *Exogyra kumensis* Tamura: Tamura, p. 286.—1960d. *Exogyra kumensis* Tamura: Tamura, p. 240.

Type.—Holotype (UMUT MM3003) from Tsurubami, Sakamoto, Kumamoto Pref.

Age and distribution.—Upper Jurassic. Torinosu group in Sakamoto, Sakawa and Sakuradani areas, and Soma group (Nakanosawa formation) in Soma area.

Genus ***Amphidonte*** Fischer de Waldheim, 1829

Subgenus ***Amphidonte*** Fischer de Waldheim, 1829

Amphidonte (Amphidonte) subhaliotoidea (Nagao) [Pl. 14, Fig. 2]

1934. *Exogyra subhaliotoidea* Nagao, p. 203, pl. 30, figs. 1–4.—1965a. *Amphidonta* (*Amphidonta*) *subhaliotoidea* (Nagao) [*sic*]: Hayami, p. 343, pl. 50, figs. 6–9, pl. 51, figs. 1, 2.—1967. *Amphidonte* (*Amphidonte*) *subhaliotoidea* (Nagao): Hayami and Kawasawa, p. 78, pl. 9, fig. 5.—1972. *Amphidonte* (*Amphidonte*) *subhaliotoidea* (Nagao): Shikama and Suzuki, pl. 5, figs. 10–14.

Type.—Holotype (GMH no. 6622) from Hideshima, Miyako, Iwate Pref.

Age and distribution.—Aptian–Albian. Miyako group (Hiraiga, Tanohata and Aketo formations) in Miyako and Tanohata areas, Shimantogawa group (Doganaro formation) in Susaki area, and Choshi formation in Choshi area.

Subgenus ***Ceratostreon*** Bayle, 1878

Amphidonte (Ceratostreon) yabei (Nagao)

1934. *Exogyra yabei* Nagao, p. 202, pl. 25, fig. 7, pl. 26, fig. 1, pl. 27, fig. 1, pl. 28, figs. 1, 2, pl. 29, figs. 1, 14.—1965a. *Amphidonta* (*Ceratostreon*) *yabei* (Nagao) [*sic*]: Hayami, p. 345, pl. 49, fig. 12, pl. 50, figs. 3–5.—1972. *Amphidonte* (*Ceratostreon*) *yabei* (Nagao): Shikama and Suzuki, pl. 5, fig. 9.

Type.—Lectotype (GMH not registered) designated by Hayami (1965a, p. 345) from Moshi, Iwaizumi, Iwate Pref.

Age and distribution.—Aptian. Miyako group (Hiraiga and Tanohata formations) in Omoto and Tanohata areas, and Choshi formation in Choshi area.

Subfamily PYCNODONTEINAE Stenzel, 1959

Genus ***Pycnodonte*** Fischer de Waldheim, 1835

Pycnodonte? sp.

1965a. *Gryphaeostrea* sp. ex gr. *G. vesicularis* (Lamarck): Hayami, p. 337, pl. 51, fig. 8.

Age and distribution.—Aptian. Miyako group (Hiraiga formation) in Tanohata area.

Subfamily LOPHINAE Vyalov, 1936

Genus ***Lopha*** Röding, 1798

Subgenus ***Actinostreon*** Bayle, 1878

Lopha (Actinostreon) sazanami Hayami

1959h. *Lopha sazanami* Hayami, p. 69, pl. 7, figs. 9, 11.

Type.—Holotype (UMUT MM3432) from Higashinagano, Toyoda, Yamaguchi Pref.

Age and distribution.—Sinemurian. Toyora group (Higashinagano formation) in Toyoda area.

Lopha (Actinostreon) sp. cf. **L. (A.) marshii** (Sowerby)

1960d. *Lopha* cf. *marshii* J. Sowerby: Tamura, p. 239, pl. 2, fig. 19.

Age and distribution.—Upper Jurassic. Torinosu group in Sakawa and Sakuradani areas.

Lopha (Actinostreon) gregarea (Sowerby)

1960d. *Lopha gregarea* (J. Sowerby): Tamura, p. 239, pl. 2, fig. 24.

Age and distribution.—Upper Jurassic. Torinosu group in Sakawa area. This species has been known from western Europe, India and many other areas of the Tethyan province.

Lopha (Actinostreon) nagaoi Hayami

1965a. *Lopha (Lopha) nagaoi* Hayami, p. 338, pl. 49, figs. 8–11, pl. 50, figs. 1, 2.—1972. *Lopha (Lopha) nagaoi* Hayami: Shikama and Suzuki, pl. 5, fig. 8.

Type.—Holotype (GK H6330) from Koikorobe, Tanohata, Iwate Pref.

Age and distribution.—Aptian. Miyako group (Tanohata and Hiraiga formations) in Tanohata and Omoto areas, and Choshi formation in Choshi area.

Genus ***Rastellum*** Faujas-Saint-Fond, 1799 (? 1802)

Subgenus ***Arctostrea*** Pervinquière, 1910

Rastellum (Arctostrea) sp. cf. **R. (A.) erucum** (Defrance)

1960d. *Lopha* cf. *eruca* (Defrance): Tamura, p. 239, pl. 2, figs. 20–23.

Age and distribution.—Upper Jurassic. Torinosu group in Sakawa and Sakuradani areas.

Rastellum (Arctostrea) carinatum (Lamarck)

1890. *Alectryonia* cf. *carinata* Lamarck: Yokoyama, p. 198.—1926. *Ostrea diluviana* Linné: Yabe, Nagao and Shimizu, p. 62, pl. 13, figs. 4–6.—1927. *Ostrea diluviana* Linné: Yabe, pl. 15, fig. 4.—1934. *Ostrea diluviana* Linné: Nagao, p. 201.—1965a. *Lopha (Arctostrea) carinata* (Lamarck): Hayami, p. 340, pl. 49, fig. 13.—1972. *Lopha (Arctostrea) carinata* (Lamarck): Shikama and Suzuki, pl. 5, fig. 5.

Age and distribution.—Upper Neocomian–Albian. Miyako group (Hiraiga formation) in Tanohata area, Ishido formation and "Kawarazawa formation" in Sanchu area, Oshima formation in Oshima area, Yatsushiro formation in Sakamoto area, and Choshi formation in Choshi area. This species seems to be cosmopolitan.

Subfamily OSTREINAE Rafinesque, 1815

Genus ***Crassostrea*** Sacco, 1897

Crassostrea yoshimoensis (Kobayashi and Suzuki)

1939. *Ostrea (Crassostrea) yoshimoensis* Kobayashi and Suzuki, p. 218, pl. 14, figs. 17, 18.

Type.—Syntype (UMUT MM7916, MM7917) from Yoshimo, Shimonoseki, Yamaguchi Pref.
Age and distribution.—Neocomian. Toyonishi group (Yoshimo formation) in Shimonoseki area.

Crassostrea ryosekiensis (Kobayashi and Suzuki)

1939. *Ostrea ryosekiensis* Kobayashi and Suzuki, p. 218, pl. 13, figs. 14–16.

Type.—Syntype (UMUT MM7913–MM7915) from Yoshimo, Shimonoseki, Yamaguchi Pref.
Age and distribution.—Neocomian. Toyonishi group (Yoshimo formation) in Shimonoseki area.

Genus ***Ostrea*** Linné, 1758

Ostrea? sp. aff. **O.? cunabula** Seeley

1965a. *Liostrea* sp. ex gr. *L. cunabula* (Seeley): Hayami, p. 336, pl. 49, fig. 7.

Age and distribution.—Aptian. Miyako group (Tanohata formation) in Tanohata area.

Subclass PALAEOHETERODONTA Newell, 1965
Order UNIONOIDA Stoliczka, 1871
Superfamily UNIONACEA Fleming, 1828
Family UNIONIDAE Fleming, 1828
Genus ***Paranodonta*** Kobayashi and Suzuki, 1936

Paranodonta otai Kobayashi and Suzuki [Pl. 9, Fig. 6]

MM7921 -9-6

1936. *Paranodonta ôtai* Kobayashi and Suzuki, p. 253, pl. 27, figs. 7–10.

Type.—Holotype (UMUT MM7921) from Rikimaru, Wakamiya Fukuoka Pref.
Age and distribution.—Lower Cretaceous (precisely unknown). Kwanmon group (Wakino formation) in Kurate area.

Genus ***Plicatounio*** Kobayashi and Suzuki, 1936
Subgenus ***Plicatounio*** Kobayashi and Suzuki, 1936

Plicatounio (Plicatounio) naktongensis naktongensis Kobayashi and Suzuki [Pl. 9, Figs. 4, 5]

MM7928 -9-4,5

1936. *Plicatounio naktongensis* Kobayashi and Suzuki, p. 252, pl. 28, figs. 1–4, 6–8.—1956. *Plicatounio naktongensis* Kobayashi and Suzuki: Kobayashi, p. 80, pl. 5, fig. 3.—1959a. *Plicatounio naktongensis* Kobayashi and Suzuki: Ota, p. 15, pl. 4, figs. 4–8.—compare 1960. *Plicatounio* aff. *naktongensis naktongensis* Kobayashi and Suzuki: Hase, p. 313, pl. 39, fig. 1.—1963. *Plicatounio* (*Plicatounio*) *naktongensis* Kobayashi and Suzuki: Ota, p. 507, text-fig. 1.

Type.—Holotype (Geol. Surv. of Korea; cast UMUT MM7928) from Ryohori, Kinyomen, Keisho-nan-do, south Korea.
Age and distribution.—Lower Cretaceous (precisely unknown). Naktong group in Kinyomen and Sinsyu areas, and Kwanmon group (Wakino formation) in Miyata area.

Plicatounio (Plicatounio) naktongensis multiplicatus (Suzuki)

1940. *Trigonioides kodairai multiplicatus* Suzuki, p. 229, pl. 24, figs. 1–5, text-fig. 18–20.—

1959a. *Plicatounio naktongensis multiplicatus* (Suzuki): Ota, pl. 3, figs. 9–11.
Type.—Holotype (probably destroyed during the 2nd World War) from Hyakuando, Hokuanmen, Keisyo-hoku-do, south Korea.
Age and distribution.—Upper Lower Cretaceous and/or lower Upper Cretaceous (precisely unknown). Shiragi group (Taikyu formation) in Eisen area, and Kwanmon group (Wakino formation) in Kurate area.

Plicatounio (Plicatounio) triangularis Kobayashi and Suzuki

1936. *Plicatounio triangularis* Kobayashi and Suzuki, p. 252, pl. 28, fig. 5.
Type.—Holotype (UMUT MM7931) from Rikimaru, Wakamiya, Fukuoka Pref.
Age and distribution.—Lower Cretaceous (precisely unknown). Kwanmon group (Wakino formation) in Kurate area.

Plicatounio (Plicatounio) kobayashii Maeda

1962b. *Plicatounio kobayashii* Maeda, p. 347, pl. 53, figs. 1–4.—1962b. *Plicatounio tetoriensis* Maeda, p. 348, pl. 53, figs. 5–7.
Type.—Holotype (CU R61102702) from the north of Sugiyama, Kitadani, Fukui Pref. Holotype of *Plicatounio tetoriensis* (CU R61102501) from the same locality.
Age and distribution.—Lower Cretaceous (precisely unknown). Tetori group (Kitadani formation) in Kitadani area.

Subgenus ***Kwanmonia*** Ota, 1963

Plicatounio (Kwanmonia) kwanmonensis Ota

1959a. "*Plicatounio*" *kwanmonensis* Ota, p. 17, pl. 3, figs. 1–3.—1963. *Plicatounio* (*Kwanmonia*) *kwanmonensis* Ota: Ota, p. 504, text-fig. 2.
Type.—Holotype (GF W1. S. 5100) from Sengoku, Miyata, Fukuoka Pref.
Age and distribution.—Lower Cretaceous (precisely unknown). Kwanmon group (Wakino subgroup) in Kurate area.

Genus ***Unio*** Philipsson, 1788

Unio? ogamigoensis Kobayashi and Suzuki

1937. *Unio ogamigoensis* Kobayashi and Suzuki, p. 41, pl. 4, fig. 16.
Type.—Holotype (UMUT MM7001) from Ogamigo. Shokawa, Gifu Pref.
Age and distribution.—Upper Jurassic (or Lower Cretaceous) (precisely unknown). Tetori group (horizon uncertain) in Makito area.

Genus ***Shistodesmus*** Simpson, 1900

Shistodesmus? antiqus Suzuki

1943. *Schistodesmus antiqus* Suzuki, p. 216, pl. 17, figs. 1–9, pl. 18, figs. 1–13.
Type.—Holotype (probably destroyed during the 2nd World War; not registered) from Butsumôdô, Gyokusô-men, Keisyônan-do, south Korea.
Age and distribution.—Lower Cretaceous (precisely unknown). Naktong group (Kinbu formation) in Keisyo-nan-do (Gyeongsang nam-do).

Family uncertain

Genus ***Nakamuranaia*** Suzuki, 1943

"**Nakamuranaia chingshanensis** (Grabau)"

1923. *Leptesthes chingshanense* Grabau, p. 147, text-fig. 1.—1936. "*Unio*" cf. *menkei* Dunker: Kobayashi and Suzuki, p. 252, pl. 27, figs. 5, 6.—1936. *Cristaria?* sp. aff. "*Leptesthes*" *chingshanensis* Grabau: Kobayashi and Suzuki, p. 254, pl. 29, figs. 11, 12.—1936. *Corbicula* (*Leptesthes?*) *coreanica* Kobayashi and Suzuki, p. 255, pl. 29, figs. 1–10.—1936. "*Unio*" sp. gen. and sp. indet.: Kobayashi and Suzuki, p. 255, pl. 28, fig. 9.—1943. *Nakamuranaia chingshanensis* (Grabau): Suzuki, p. 213, pl. 19, figs. 1–6.—1962b. *Nakamuranaia chingshanensis* (Grabau): Maeda, p. 349, pl. 53, figs. 8–14.

Type.—The type locality is Laiyang valley, Shantung, north China. Holotype of *Corbicula* (*Leptesthes?*) *coreanica* (UMUT MM7935) from Shinshu near Taikyu (Daegu), south Korea.

Age and distribution.—Lower Cretaceous (precisely unknown). Naktong group (Kinbu formation) in various areas in Keisyo-nan-do and Keisyo-hoku-do, south Korea, basal part of Chingshan series in Shantung Prov., north China, and Tetori group (Kitadani formation) in Kitadani area.

Remarks.—The affinity and systematic position of this species as well as the nature of the genus *Nakamuranaia* are now studied by Yang on the material from south Korea (Mr. Yang's oral communication).

Family TRIGONIOIDIDAE Cox, 1952

Genus ***Nippononaia*** Suzuki, 1941

Nippononaia ryosekiana (Suzuki) [Pl. 4, Figs. 3, 4]

MM7000 −4,−3,4

1941. *Unio* (*Nippononaia*) *ryosekiana* Suzuki [*sic*], p. 412, text-figs. 1–3.—1965. *Nippononaia ryosekiana* (Suzuki): Hayami and Ichikawa, p. 147, text-fig. 2, pl. 17, figs. 1–8.

Type.—Holotype (UMUT MM7000) from unknown locality ("Katsuuragawa area or Sanchu area", as originally described).

Age and distribution.—Aptian or Albian. Sebayashi formation in Sanchu area.

Nippononaia tetoriensis Maeda

1962e. *Nippononaia tetoriensis* Maeda, p. 245, pl. 38, figs. 1–14.

Type.—Holotype (CU R. 61801) from Yanagidani, Shiramine, Ishikawa Pref.

Age and distribution.—Lower Cretaceous (precisely unknown). Tetori group (Kuwajima formation) in Shiramine area.

Genus ***Trigonioides*** Kobayashi and Suzuki, 1936

Subgenus ***Wakinoa*** Ota, 1963

Trigonioides (Wakinoa) wakinoensis wakinoensis (Ota)

1959c. "*Nippononaia*" *wakinoensis* Ota, p. 107, pl. 11, figs. 1–7, 11.—1960. "*Nippononaia*" *wakinoensis wakinoensis* Ota: Hase, p. 315, pl. 37, figs. 1–4.—1963. *Trigonioides* (*Wakinoa*) *wakinoensis wakinoensis* Ota: Ota, p. 504, text-fig. 3.—1974. *Wakinoa wakinoensis* (Ota): Yang, p. 402, pl. 55, figs. 9–14.

Type.—Holotype (GF register number not confirmed) from Rikimaru, Miyata, Fukuoka Pref.

Age and distribution.—Lower Cretaceous (precisely unknown). Kwanmon group (Wakino formation) in Kurate area.

Trigonioides (Wakinoa) wakinoensis intermedius (Hase)

1960. "*Nippononaia*" *wakinoensis intermedia* Hase, p. 316, pl. 37, figs. 5–9.

Type.—Holotype (IGSH HA136) from Kanda-misaki, Kantama, Yamaguchi Pref.
Age and distribution.—Lower Cretaceous (precisely unknown). Kwanmon group (Wakamiya formation) in Takibe area.

Trigonioides (Wakinoa?) obsoletus (Hase)

1960. *"Nippononaia" (?) obsoleta* Hase, p. 317, pl. 37, figs. 10, 11, pl. 38, fig. 1.

Type.—Holotype (IGSH HA166) from Okochi-Jiyoshi, Nishiichi, Yamaguchi Pref.
Age and distribution.—Upper Cretaceous (precisely unknown). Kwanmon group (Shiohama formation) in Takibe area.

Trigonioides (Wakinoa) sengokuensis (Ota)

1959c. *"Nippononaia" sengokuensis* Ota, p. 108, pl. 11, figs. 8–10.—1963. *Trigonioides (Wakinoa) sengokuensis* Ota: Ota, p. 505, text-fig. 4.

Type.—Holotype (GF register number not confirmed) from Rikimaru, Miyata, Fukuoka Pref.
Age and distribution.—Lower Cretaceous (precisely unknown). Kwanmon group (Wakino formation) in Kurate area.

Trigonioides (Wakinoa) tetoriensis Maeda

1963a. *Trigonioides tetoriensis* Maeda, p. 81, text-fig. 1, pl. 12, figs. 1–9.—1963a. *Trigonioides kitadaniensis* Maeda, p. 83, pl. 12, figs. 10–16.—1970. *Wakinoa tetoriensis* (Maeda): Tamura, p. 41, text-fig. 3, pl. 1, figs. 9–14, pl. 2, figs. 1, 2.

Type.—Holotype (CU R61121702) from the north of Sugiyama, Kitadani, Fukui Pref. Holotype of *Trigonioides kitadaniensis* (CU R61121716) from the same locality.
Age and distribution.—Lower Cretaceous. Tetori group (Kitadani formation) in Kitadani area.

Subgenus ***Trigonioides*** Kobayashi and Suzuki, 1936

Trigonioides (Trigonioides) kodairai Kobayashi and Suzuki [Pl. 4, Figs. 5, 6]

1936. *Trigonioides kodairai* Kobayashi and Suzuki, p. 249, pl. 27, figs. 1–4, (?) pl. 29, fig. 13.—1943. *Trigonioides kodairai* Kobayashi and Suzuki: Suzuki, p. 209, pl. 16, figs. 7–9. —? 1955. *Trigonioides kodairai* Kobayashi and Suzuki: Cox, p. 347, text-fig.—1956. *Trigonioides kodairai* Kobayashi and Suzuki: Kobayashi, p. 82, pl. 5, fig. 6.—1970. *Trigonioides kodairai* Kobayashi and Suzuki: Tamura, p. 46.—1974. *Trigonioides (Trigonioides) kodairai* Kobayashi and Suzuki: Yang, p. 396, text-figs. 2, 4, pl. 54, figs. 1–11, pl. 55, figs. 1–4.

Type.—Holotype (Geological Survey of Korea?, now missing) from Ryohori, Kinyomen, Keisyo-nan-do, south Korea.
Age and distribution.—Lower Cretaceous (precisely unknown). Naktong group (Kinbu and Shinshu formations) in Keisyo-nan-do and Keishyo-hoku-do, and Talatzu series (upper sandstone formation) in Kanto-syo, Manchuria.

Trigonioides (Trigonioides) paucisulcatus Suzuki

1940. *Trigonioides kodairai paucisulcatus* Suzuki, p. 228, pl. 24, figs. 1–4.—1959b. *Trigonioides paucisulcatus paucisulcatus* Suzuki: Ota, p. 103, pl. 10, fig. 16.—1970. *Trigonioides paucisulcatus* Suzuki: Tamura, p. 46.

Type.—Holotype (probably destroyed during the 2nd World War) from Hyakuando, Kokuanmen, Keishyo-hoku-do, south Korea.

Age and distribution.—Upper Cretaceous (precisely unknown). Shiragi group (Taikyu formation) in Eisen area.

Subgenus ***Kumamotoa*** Yang, 1974

Trigonioides (Kumamotoa) suzukii Ota

1959b. *Trigonioides paucisulcatus suzukii* Ota, p. 102, pl. 11, figs. 12-20.—1963. *Trigonioides (Trigonioides) paucisulcatus suzukii* Ota: Ota, p. 507, text-fig. 5.—1970. *Trigonioides suzukii* Ota: Tamura, p. 46, text-fig. 4.—1974. *Trigonioides (Kumamotoa) suzukii* Ota: Yang, p. 402, pl. 55, fig. 8.

Type.—Holotype (GF register number not confirmed) from Hata, Yahata, Fukuoka Pref.

Age and distribution.—Lower Cretaceous (precisely unknown). Kwanmon group (Wakino formation) in Yahata area.

Trigonioides (Kumamotoa) matsumotoi Kobayashi and Suzuki

1938. *Trigonioides kobayashii* Matsumoto, p. 14, pl. 2, fig. 2, text-fig. 19. (non *Trigonioides kobayashi* Hoffet, 1937)—1940. *Trigonioides matsumotoi* Kobayashi and Suzuki, p. 78.—1959b. *Trigonioides matsumotoi* Kobayashi and Suzuki: Ota, p. 102, pl. 10, figs. 1–15.—1963. *Trigonioides (Trigonioides) matsumotoi* Kobayashi and Suzuki: Ota, p. 507, text-fig. 6.—1970. *Trigonioides matsumotoi* Kobayashi and Suzuki: Tamura, p. 47, pl. 1, figs. 15–18, pl. 2, figs. 3, 4.—1974. *Trigonioides (Kumamotoa) matsumotoi* Kobayashi and Suzuki: Yang, p. 402, pl. 55, fig. 7.

Type.—**Lectotype** here designated (Matsumoto, 1938, pl. 2, fig. 2) (UMUT MM7846) from Kyodomari, Gosyonoura, Kumamoto Pref.

Age and distribution.—Cenomanian. Gosyonoura group in Gosyonoura island.

Remarks.—According to the International code of zoological nomenclature, Article 58 (10), *Trigonioides kobayashii* Matsumoto, 1938, is regarded as a homonym of *Trigonioides kobayashi* Hoffet, 1937. Therefore, Kobayashi and Suzuki's (1940) new name, *Trigonioides matsumotoi*, should be regarded as valid.

Trigonioides (Kumamotoa) mifunensis Tamura [Pl. 4, Figs. 7, 8]

1970. *Trigonioides mifunensis* Tamura, p. 47, text-figs. 2, 5, pl. 1, figs. 1–8, pl. 2, figs. 5–10.—1974. *Trigonioides (Kumamotoa) mifunensis* Tamura: Yang, p. 402, pl. 55, figs. 5, 6.

Type.—Holotype (KE 1941) from Tashiro, Kosa, Kumamoto Pref.

Age and distribution.—Cenomanian. Mifune group (basal part) in Mifune area.

Family PACHYCARDIIDAE Cox, 1961

Genus ***Cardinioides*** Kobayashi and Ichikawa,

Cardinioides japonicus Kobayashi and Ichikawa

1952a. *Cardinioides japonicus* Kobayashi and Ichikawa, p. 66, pl. 1, fig. 10.—1952a. *Cardinioides japonicus* var. *elongatus* Kobayashi and Ichikawa, p. 67, pl. 1, figs. 8, 9.—1952a. *Cardinioides subtrigonalis* Kobayashi and Ichikawa, p. 67, pl. 1, figs. 6, 7.—1952a. *Cardinioides* cf. *subtrigonalis* Kobayashi and Ichikawa: Kobayashi and Ichikawa, p. 68, pl. 2, fig. 2.—1952a. *Cardinioides splendidus* Kobayashi and Ichikawa, p. 68, pl. 2, fig. 1.—1956. *Cardinioides japonicus* Kobayashi and Ichikawa: Nakazawa, p. 232, pl. 1, fig. 2.—compare 1956. *Cardinioides* cf. *subtriangularis* Kobayashi and Ichikawa (error of *subtrigonalis*): Nakazawa, p. 232.—compare 1956. *Cardinioides* cf. *splendis* Kobayashi and Ichikawa (error of *splendidus*): Nakazawa, p. 232, pl. 1, fig. 3.

Type.—Holotype (UMUT 5371) from west of Heki, Yakuno, Kyoto Pref. Holotype of *Cardinioides subtrigonalis* (UMUT MM5411), holotype of *Cardinioides splendidus* (UMUT MM5375) and holotype of *Cardinioides japonicus* var. *elongatus* (UMUT MM5374) from the same locality.
Age and distribution.—Carnian. Heki formation and Nabae group (N3 formation) in Maizuru zone.

Cardinioides varidus Hayami [Pl. 4, Fig. 9]

1957c. *Cardinioides varidus* Hayami, p. 70, pl. 12, figs. 1–6.

Type.—Holotype (UMUT MM2637) from Tsuchizawa, Otari, Nagano Pref.
Age and distribution.—Pliensbachian (or thereabout). Kuruma group (Tsuchizawa formation) in Otari area.

Cardinioides ovatus Hayami

1957c. *Cardinioides ovatus* Hayami, p. 71, pl. 12, figs. 7–12.

Type.—Holotype (UMUT MM2643) from Ohishi, Itoigawa (Kotaki), Niigata Pref.
Age and distribution.—Lower Jurassic (not younger than Pliensbachian). Kuruma group (Kitamatadani formation) in Kotaki area.

Genus ***Trigonodus*** Sandberger, 1864

Trigonodus? hashimotoi Ichikawa

1954d. *Trigonodus? hashimotoi* Ichikawa, p. 59, pl. 3, figs. 8–10.

Type.—Holotype (UMUT MM5484) from Usugatani, Kaminaka, Tokushima Pref.
Age and distribution.—Carnian. Kochigatani group (lower part) in Sakuradani area.

Family uncertain

Genus ***Unionites*** Wissmann, 1841

Unionites fassaensis (Wissmann)

1926. *Anodontophora fassaensis* Wissmann: Matsushita, p. 422, pl. 8, fig. 11.—1926. *Myophoria* aff. *laevigata* Alberti: Matsushita, pl. 8, fig. 14.—1956. *Anodontophora fassaensis* (Wissmann): Yabe, p. 286, pl. 16, figs. 8–11.—compare 1961. *Anodontophora* cf. *fassaensis bittneri* French: Nakazawa, p. 268, pl. 13, figs. 19–21.—1963. *Anodontophora fassaensis* (Wissmann): Kambe, p. 50, pl. 5, figs. 28–32, pl. 6, figs. 1, 2.—1963. *Anodontophora* cf. *fassaensis* (Wissmann): Kambe, p. 52, pl. 6, figs. 3–5.—1971. *Unionites fassaensis* (Wissmann): Nakazawa, p. 127, pl. 25, figs. 1–4.

Age and distribution.—Skytian. Kurotaki formation in Nangoku area, Shionosawa limestone in Sanchu area, and Kamura formation in Takachiho area. This species has been known from Alps.

Unionites canalensis (Catullo)

1926. *Anodontophora canalensis* Catullo: Matsushita, p. 422, pl. 8, fig. 12.—1954. *Anodontophora canalensis* Catullo: Ozaki and Shikama, p. 44, figs. 4, 5.—1956. *Anodontophora canalensis* Catullo: Yabe, p. 287, pl. 16, fig. 12.—1956. *Anodontophora canalensis* var. *bittneri* Ichikawa and Yabe, *in* Yabe, p. 284, pl. 16, figs. 1–7.—1963. *Anodontophora canalensis* Catullo: Kambe, p. 48, pl. 5, figs. 24, 25.—1963. *Anodontophora canalensis* var. *bittneri* Ichikawa and Yabe: Kambe, p. 49, pl. 5, fig. 27.—1963. *Anodontophora* cf. *canalensis* Catullo: Kambe, p. 49, pl. 5, fig. 26.—1971. *Unionites canalensis* (Catullo): Nakazawa, p. 126, pl. 24, figs. 14, 15.

Age and distribution.—Skytian. Kurotaki formation in Nangoku area, Shionosawa limestone in Sanchu area, and Kamura formation in Takachiho area.

Unionites trigonus (Nakazawa)

1964b. *Anodontophora trigona* Nakazawa, p. 16, pl. 2, figs. 1–3.

Type.—Holotype (UK JM11069) from Uonashi, Kurosegawa, Ehime Pref.

Age and distribution.—Anisian. Unnamed formation in Uonashi area.

Unionites kochigataniensis (Kobayashi and Ichikawa)

1950c. *Anodontophora kochigataniensis* Kobayashi and Ichikawa, p. 231, pl. 4, figs. 1–4. —1950c. *Anodontophora kochigataniensis* var. *hiratai* Kobayashi and Ichikawa, p. 232, pl. 4, fig. 5.—compare 1960a. *Anodontophora* aff. *kochigataniensis* Kobayashi and Ichikawa: Tokuyama, p. 37, pl. 4, fig. 10.

Type.—Holotype (UMUT MM5152) from Nezukamiishi, Sakawa, Kochi Pref. Holotype of *Anodontophora kochigataniensis* var. *hiratai* (UMUT MM5156) from Kanaidani, Sakawa, Kochi Pref.

Age and distribution.—Carnian. Kochigatani group (lower part) in Sakawa area.

Unionites carinatus (Kobayashi and Ichikawa)

1950c. *Anodontophora carinata* Kobayashi and Ichikawa, p. 233, pl. 4, fig. 6.

Type.—Holotype (UMUT MM5157) from Togo, Sakawa, Kochi Pref.

Age and distribution.—Carnian. Kochigatani group (lower part) in Sakawa area.

Unionites? sp.

1956. *Anodontophora* (?) cf. *trapezoidalis* Mansuy: Nakazawa, p. 240, pl. 3, figs. 6, 7.

Age and distribution.—Carnian. Nabae group (N3 formation) in Maizuru zone.

Unionites? sp.

1956. *Anodontophora* (?) aff. *minima* Mansuy: Nakazawa, p. 241, pl. 3, fig. 8.

Age and distribution.—Carnian. Nabae group (N3 formation) in Maizuru zone.

Unionites? sp.

1956. *Anodontophora* (?) aff. *manmuensis* Reed: Nakazawa, p. 241, pl. 3, figs. 9–11.

Age and distribution.—Carnian. Nabae group (N3 formation) in Maizuru zone.

Unionites? takiguchiensis (Tokuyama)

1960c. *Anodontophora takiguchiensis* Tokuyama, p. 214, pl. 12, figs. 14–17.

Type.—Holotype (UMUT MM4580) from Takiguchi, Mine, Yamaguchi Pref.

Age and distribution.—Carnian. Mine group (Takiguchi formation) in Mine area.

Family ACTINODONTOPHORIDAE Newell, 1969

Genus ***Palaeopharus*** Kittl, 1907

Palaeopharus maizurensis Kobayashi and Ichikawa [Pl. 4, Fig. 10]

1951. *Palaeopharus maizurensis* Kobayashi and Ichikawa, p. 9, pl. 1, figs. 1–6.—1952a. *Palaeopharus maizurensis* Kobayashi and Ichikawa: Kobayashi and Ichikawa, p. 79, pl. 3, figs. 1–3.—1955. *Palaeopharus maizurensis* Kobayashi and Ichikawa: Nakazawa, p. 256, pl. 16, figs. 4–6, 8.—1955. *Palaeopharus maizurensis* Kobayashi and Ichikawa var.: Nakazawa, p. 257, pl. 16, fig. 7.—1957b. *Palaeopharus maizurensis* Kobayashi and Ichikawa: Nakano, p. 65, pl. 9, figs. 8–13.—1957b. *Palaeopharus maizurensis* var. *imamurai* Nakano,

p. 66, pl. 9, fig. 14.—1957b. *Palaeopharus maizurensis* var. *flexicostatus* Nakano, p. 66, pl. 9, fig. 15.

Type.—Holotype (UMUT MM5301) from Maizuru area (not precisely recorded) in Kyoto (or Fukui) Pref. Holotype by monotypy of *Palaeopharus maizurensis* var. *imamurai* (IGSH Ky. Pi 1) and holotype by monotypy of *Palaeopharus maizurensis* var. *flexicostatus* (IGSH Ky. Pf 1) from Onji (Kyowa), Shitsuki, Okayama Pref.

Age and distribution.—Carnian. Nabae group (N1–N3 formations) and Heki formation in Maizuru zone, and Kyowa formation in Nariwa area.

Palaeopharus oblongatus (Kobayashi and Ichikawa)

1939. *"Pleurophorus"* sp. aff. *P. perlongus:* Katayama, pl. 8, figs. 14, 15.—1950a. *Pleurophorus oblongatus* Kobayashi and Ichikawa, p. 212, pl. 1, fig. 10.—1950a. *Pleurophorus oblongatus* var. *compressus* Kobayashi and Ichikawa, p. 212, pl. 1, fig. 9.—compare 1954d. *"Pleurophorus"* cf. *oblongatus* Kobayashi and Ichikawa: Ichikawa, p. 65.—1958. *Palaeopharus oblongatus* (Kobayashi and Ichikawa): Tokuyama, p. 294, pl. 43, figs. 8–11.—1958. *Palaeopharus oblongatus buriji* Kiparisova: Tokuyama, p. 296, pl. 43, fig. 12.—1959b. *Palaeopharus oblongatus* (Kobayashi and Ichikawa): Tamura, p. 223, pl. 2, fig. 24.

Type.—Holotype (UMUT MM5144) from Owada-Horiake, Sakawa, Kochi Pref. Holotype of *Pleurophorus oblongatus* var. *compressus* (UMUT MM5145) from Kashiwai, Sakawa, Kochi Pref.

Age and distribution.—Carnian. Kochigatani group (lower part) in Sakawa and Sakamoto areas, and Mine group (Hirabara formation) in Mine area.

Palaeopharus paucicostatus Nakazawa

1955. *Palaeopharus paucicostatus* Nakazawa, p. 258, pl. 16, fig. 11.

Type.—Holotype (UK JM10301) from Shinmichi, Maizuru, Kyoto Pref.

Age and distribution.—Carnian. Nabae group (N3 formation) in Maizuru zone.

Order TRIGONIOIDA Dall, 1889
Superfamily TRIGONIACEA Lamarck, 1819
Family MYOPHORIIDAE Bronn, 1849
Genus ***Costatoria*** Waagen, 1907

Costatoria kobayashii (Kambe)

1951. *Myophoria goldfussi* Alb. *in* Bittner var. *kobayashii* Kambe, p. 54, pl. 4, fig. 7.—1960. *Costatoria kobayashii* (Kambe): Nakazawa, p. 52, pl. 6, figs. 10–20.

Type.—**Lectotype** here designated (Kambe, 1951, pl. 4, fig. 7) (UMUT MM6477) from Gujo, Oe, Kyoto Pref.

Age and distribution.—Upper Permian. Gujo formation in Maizuru zone.

Remarks.—This was originally described as a Triassic form.

Costatoria goldfussi (Alberti)

1972. *Costatoria goldfussi* (Alberti): Tamura, p. 69, pl. 1, figs. 17–20.

Age and distribution.—Ladinian or Carnian. Konosé group in Yamae area. This species has been reported from central and south Europe.

Costatoria multistriata (Kobayashi and Ichikawa)

1954a. *Myophoria multistriata* Kobayashi and Ichikawa, *in* Ichikawa, p. 59, pl. 7, figs. 2–4.

Type.—Holotype (UMUT MM5427) from Arai, Itsukaichi, Tokyo Pref.

Age and distribution.—Triassic (precisely unknown). Arai formation in Itsukaichi area.

Genus ***Myophoria*** Bronn, 1834

Myophoria sp. cf. **M. intermedia** (Schauroth)

1972. *Myophoria* sp. cf. *intermedia* (Schauroth): Tamura, p. 68, pl. 1, figs. 23, 24.

Age and distribution.—Ladinian or Carnian. Konosé group in Yamae area.

Genus ***Gruenewaldia*** Wöhrmann, 1889

Gruenewaldia decussata (Münster)

1972. *Gruenewaldia decussata* (v. Münster): Tamura, p. 70, pl. 1, figs. 1–13.

Age and distribution.—Ladinian or Carnian. Konosé group in Yamae area. This species has been known from Alps.

Gruenewaldia sp. cf. **G. elegans** (Dunker)

1972. *Elegantinia* sp. cf. *elegans* (Dunker): Tamura, p. 71, pl. 1, figs. 21, 22.

Age and distribution.—Ladinian or Carnian. Konosé group in Yamae area.

Genus ***Neoschizodus*** Giebel, 1856

Subgenus ***Neoschizodus*** Giebel, 1856

Neoschizodus (Neoschizodus) tangoensis (Kambe)

1951. *Myophoria tangoensis* Kambe, p. 51, text-fig. 1, pl. 4, fig. 1.—compare 1957. *Myophoria tangoensis* Kambe: Kambe, p. 14, text-figs. 9, 10, pl. 1, figs. 23, 24.

Type.—Holotypy by monotypy (UMUT MM6471) (not "cotype" as originally designated) from Mirokudani (Shidaka), Maizuru, Kyoto Pref.

Age and distribution.—Skytian. Shidaka group in Maizuru zone. Some authors have regarded this group as Upper Triassic.

Neoschizodus (Neoschizodus) sp. cf. **N. (N.) laevigatus** (Zieten)

1951. *Myophoria shidakensis* Kambe, p. 51, pl. 4, fig. 2.—1951. cf. *Myophoria laevigata* (Zieten) var. *elongata* Phil.: Kambe, p. 53, pl. 4, fig. 5.—1951. cf. *Myophoria laevigata* (Zieten) var. *rotunda* Phil.: Kambe, p. 53, pl. 4, fig. 6.—1957. *Myophoria tajimensis* Kambe, p. 6, text-fig. 2, pl. 1, figs. 1–4.—1957. *Myophoria laevigata* (Zieten): Kambe, p. 7, text-figs. 3, 4, pl. 1, figs. 5–7.—1957. *Myophoria* cf. *laevigata* (Zieten): Kambe, p. 9, text-fig. 5, pl. 1, figs. 8–11.—1957. *Myophoria laevigata* (Zieten) var. *miharaiensis* Kambe, p. 10, pl. 1, fig. 12.—1957. *Myophoria* cf. *laevigata* (Zieten) var. *elongata* Phil.: Kambe, p. 11, text-fig. 6, pl. 1, figs. 14–17.—1957. *Myophoria cardissoides* (Zieten): Kambe, p. 12, text-figs. 7, 8, pl. 1, figs. 18, 19.—1957. *Myophoria* aff. *nakajimensis* Ichikawa: Kambe, p. 13, pl. 1, figs. 20–22.—1957. *Myophoria shidakensis* Kambe: Kambe, p. 15, pl. 1, figs. 25, 26.—1960. *Neoschizodus* cf. *laevigatus* (Zieten): Nakazawa, p. 56, text-fig. 2, pl. 6, figs. 21–32.

Type.—Holotype by monotypy of *Myophoria shidakensis* (UMUT MM6472) (not "cotype" as originally designated) from Mirokudani (Shidaka), Maizuru, Kyoto Pref. Holotype of *Myophoria tajimensis* (GSJ F-3148) from Miharaiyama, Oya, Hyogo Pref. Holotype of *Myophoria laevigata* var. *miharaiensis* (GSJ F-3159) from Miharaiyama, Oya, Hyogo Pref.

Age and distribution.—Skytian. Miharaiyama group and Shidaka group in Maizuru zone. Some authors have regarded these groups as Upper Triassic.

Neoschizodus (Neoschizodus) nakajimensis (Ichikawa)

1949b. *Myophoria nakajimensis* Ichikawa, *in* Kobayashi and Ichikawa, p. 180, pl. 6, fig. 4.

Type.—Holotype (UMUT MM5227) from Nakajima, Sakawa, Kochi Pref.

Age and distribution.—Carnian. Kochigatani group (lower part) in Sakawa area.

Neoschizodus (Neoschizodus) dieneri (Ichikawa)

1949b. *Myophoria dieneri* Ichikawa, *in* Kobayashi and Ichikawa, p. 181, pl. 6, fig. 1.—1949b. *Myophoria dieneri* var. *longa* Ichikawa, *in* Kobayashi and Ichikawa, p. 181, pl. 6, fig. 3.—1949b. *Myophoria umenokiensis* Ichikawa, *in* Kobayashi and Ichikawa, p. 183, pl. 6, fig. 6.

Type.—Holotype (UMUT MM5223) from Umenokidani, Sakawa, Kochi Pref. Holotype of *Myophoria umenokiensis* (UMUT MM5229) from the same locality. Holotype of *Myophoria dieneri* var. *longa* (UMUT MM5225) from Nakajima, Sakawa, Kochi Pref.

Age and distribution.—Carnian. Kochigatani group (lower part) in Sakawa area.

Neoschizodus (Neoschizodus) tokyoensis (Ichikawa)

1954a. *Myophoria tokyoensis* Ichikawa, p. 58, pl. 7, fig. 6.

Type.—Holotype (UMUT MM5431) from Arai, Itsukaichi, Tokyo Pref.

Age and distribution.—Triassic (precisely unknown). Arai formation in Itsukaichi area.

Neoschizodus (Neoschizodus) usugataniensis Ichikawa

1950. *Myophoriopsis* (*Pseudocorbula?*) *orbicularis* Ichikawa, p. 249, pl. 5, figs. 10, 11 (non *Neoschizodus orbicularis* (Bronn, 1837)).—1954d. *Neoschizodus usugataniensis* Ichikawa, p. 60.

Type.—Holotype (UMUT MM5183) from Usugatani, Kaminaka, Tokushima Pref.

Age and distribution.—Carnian. Kochigatani group (lower part) in Sakuradani area.

Neoschizodus (Neoschizodus) semicostatus Nakazawa

1955. *Neoschizodus semicostatus* Nakazawa, p. 252, pl. 15, figs. 1–5.

Type.—Holotype (UK JM10289) from Nishimitsumatsu, Takahama, Fukui Pref.

Age and distribution.—Carnian (or Norian). Nabae group (N4 formation) in Maizuru zone.

Subgenus ***Okunominetania*** Ichikawa, 1954

Neoschizodus (Okunominetania) okunominetaniensis (Ichikawa)

1949b. *Myophoria okunominetaniensis* Ichikawa, *in* Kobayashi and Ichikawa, p. 181, pl. 6, figs. 7–9.—1954d. *Neoschizodus* (*Okunominetania*) *okunominetaniensis* (Ichikawa): Ichikawa, p. 62, pl. 4, figs. 1–3.

Type.—Holotype (UMUT MM5231) from Okunominetani, Sakawa, Kochi Pref.

Age and distribution.—Carnian. Kochigatani group (lower part) in Sakawa and Sakuradani areas.

Neoschizodus (Okunominetania) kawarensis Nakazawa

1956. *Neoschizodus* (*Okunominetania*) *kawarensis* Nakazawa, p. 245, pl. 4, figs. 11–15.

Type.—Holotype (UK JM10389) from Kongoin, Maizuru, Kyoto Pref.

Age and distribution.—Carnian. Nabae group (N2 formation) in Maizuru zone.

Subgenus uncertain

Neoschizodus? shikii Nakazawa

1960. *Neoschizodus* (?) *shikii* Nakazawa, p. 59, pl. 6, figs. 34–38.

Type.—Holotype (UK JM10468) from Katsuradani, Hirobatake, Kyoto Pref.

Age and distributioh.—Skytian. Yakuno group (Hirobatake formation) in Maizuru zone.

Family TRIGONIIDAE Lamarck, 1819

Subfamily TRIGONIINAE Lamarck, 1819

Genus ***Trigonia*** Bruguière, 1789

Trigonia senex Kobayashi and Mori

1954. *Trigonia senex* Kobayashi and Mori, p. 167, pl. 16, fig. 8.

Type.—Holotype by monotypy (UMUT MM4305) from Niranohama, Utatsu, Miyagi Pref.

Age and distribution.—Hettangian. Shizukawa group (Niranohama formation) in Shizukawa area.

Trigonia sumiyagura Kobayashi and Kaseno [Pl. 5, Figs. 1, 2]

1947. *Trigonia sumiyagura* Kobayashi and Kaseno, p. 42, pl. 10, figs. 1, 2.—1954. *Trigonia sumiyagura* Kobayashi and Kaseno: Kobayashi and Mori, p. 168, pl. 16, figs. 1–3.—1954. *Trigonia sumiyagura* Kobayashi and Kaseno, var.: Kobayashi and Mori, p. 170, pl. 16, figs. 4–7.—1959c. *Trigonia sumiyagura* Kobayashi and Kaseno: Hayami, p. 65, text-fig. 1, pl. 5, figs. 21, 22.—1961b. *Trigonia sumiyagura* Kobayashi and Kaseno: Nakano, p. 84, pl. 8, fig. 1.

Type.—Holotype (UMUT MM4301) from Kosaba, Karakuwa, Miyagi Pref.

Age and distribution.—Bajocian. Karakuwa group (Kosaba formation) in Karakuwa area, Hashiura group (Aratozaki formation) in Shizukawa area, and Ojika group (Kodaijima formation) in Ojika area.

Genus ***Frenguelliella*** Leanza, 1942

Subgenus ***Kumatrigonia*** Tamura, 1959

Frenguelliella (Kumatrigonia) tanourensis Tamura [Pl. 5, Fig. 7]

1959a. *Frenguelliella* (*Kumatrigonia*) *tanourensis* Tamura, p. 214, text-fig. 2, pl. 2, figs. 1–6.

Type.—Holotype (UMUT MM3080) from Okiba, Tanoura, Kumamoto Pref.

Age and distribution.—Carnian. Kochigatani group (lower part) in Tanoura area.

Genus ***Geratrigonia*** Kobayashi, 1954

Geratrigonia hosourensis (Yokoyama) [Pl. 5, Fig. 3]

1904. *Trigonia hosourensis* Yokoyama, p. 11, pl. 1, fig. 3.—1954. *Geratrigonia hosourensis* (Yokoyama): Kobayashi and Mori, p. 171, pl. 15, figs. 1, 2.—1954. *Geratrigonia hosourensis* (Yokoyama) var. *convexa* Kobayashi, *in* Kobayashi and Mori, p. 172, pl. 16, fig. 9.—1959. *Geratrigonia hosourensis convexa* Kobayashi: Kobayashi, Mori and Tamura, p. 289.—1959a. *Geratrigonia hosourensis* (Yokoyama): Hayami, p. 72, pl. 7, figs. 6–8.—1963. *Geratrigonia hosourensis* (Yokoyama): Nakano, p. 519, pl. 56, fig. 3.—1968. *Geratrigonia hosourensis* (Yokoyama): Hayami and Nakano, p. 201, fig. 3–11.

Type.—Yokoyama (1904) described this species on the basis of two specimens. One of

the syntype specimens, which was illustrated by Yokoyama (1904, pl. 1, fig. 3) and regarded as holotype by Kobayashi and Mori (1954, p. 172), is designated here as the **lectotype** (UMUT MM7174). It was collected from Niranohama, Utatsu, Miyagi Pref. Holotype by monotypy of *Geratrigonia hosourensis* var. *convexa* (UMUT MM4314) from the same locality.

Age and distribution.—Hettangian. Shizukawa group (Niranohama formation) in Shizukawa, Hashiura and Mizunuma areas.

Geratrigonia lata Kobayashi

1954. *Geratrigonia lata* Kobayashi, *in* Kobayashi and Mori, p. 173, pl. 15, figs. 6, 7.

Type.—Holotype (IGPS not registered; plaster cast UMUT MM4315) from Niranohama, Utatsu, Miyagi Pref.

Age and distribution.—Hettangian. Shizukawa group (Niranohama formation) in Shizukawa area.

Remarks.—This is possibly conspecific with *Geratrigonia hosourensis*.

Geratrigonia kurumensis Kobayashi

1957a. *Geratrigonia kurumensis* Kobayashi, p. 44, pl. 1, fig. 19.

Type.—Holotype by monotypy (UMUT MM4388) from Otakidani, Omi (Agero), Niigata Pref.

Age and distribution.—Toarcian. Kuruma group (Otakidani formation) in Omi area.

Genus ***Latitrigonia*** Kobayashi, 1957

Latitrigonia pyramidalis Kobayashi and Tamura [Pl. 5, Fig. 4]

1957. *Latitrigonia pyramidalis* Kobayashi and Tamura, p. 36, pl. 1, fig. 8.—1963. *Latitrigonia pyramidalis* Kobayashi and Tamura: Nakano, p. 520, pl. 56, fig. 4.

Type.—Holotype by monotypy (UMUT MM4378) from Nodezawa, Soma, Fukushima Pref.

Age and distribution.—Bajocian (or Bathonian). Soma group (Awazu formation) in Soma area.

Latitrigonia unicarinata Kobayashi and Tamura

1957. *Latitrigonia unicarinata* Kobayashi and Tamura, p. 37, pl. 1, fig. 9.

Type.—Holotype (UMUT MM4379) from Sugaya, Soma, Fukushima Pref.

Age and distribution.—Bathonian (or thereabout). Soma group (Yamagami formation) in Soma area.

Latitrigonia unituberculata Kobayashi and Tamura

1957. *Latitrigonia unituberculata* Kobayashi and Tamura, p. 37, pl. 1, fig. 10.

Type.—Holotype (UMUT MM4380) from Sugaya, Soma, Fukushima Pref.

Age and distribution.—Bathonian (or thereabout). Soma group (Yamagami formation) in Soma area.

Latitrigonia tetoriensis Kobayashi

1957a. *Latitrigonia tetoriensis* Kobayashi, p. 45, pl. 1, figs. 11–13.

Type.—Holotype (UMUT MM4389) from Umagatani (Yambara), Izumi, Fukui Pref.

Age and distribution.—Oxfordian. Tetori group (Yambarazaka formation) in Izumi area.

Latitrigonia orbicularis Kobayashi

1957a. *Latitrigonia orbicularis* Kobayashi, p. 45, pl. 1, figs. 14, 15.

Type.—Holotype (UMUT MM4392) from Umagatani, Izumi, Fukui Pref.

Age and distribution.—Oxfordian. Tetori group (Yambarazaka formation) in Izumi area.

Genus ***Ibotrigonia*** Kobayashi, 1957

Ibotrigonia masatanii Kobayashi and Tamura [Pl. 5, Fig. 5]

1957. *Ibotrigonia masatanii* Kobayashi and Tamura, p. 38, pl. 1, figs. 5, 6.—1957. *Ibotrigonia masatanii* Kobayashi and Tamura var.: Kobayashi and Tamura, p. 39, pl. 1, fig. 7. —1963. *Ibotrigonia masatanii* Kobayashi and Tamura: Nakano, p. 521, pl. 56, fig. 5.

Type.—Holotype (UMUT MM4381) from Sugaya, Soma, Fukushima Pref.

Age and distribution.—Bathonian (or thereabout). Soma group (Yamagami formation) in Soma area.

Genus ***Nipponitrigonia*** Cox, 1952

Nipponitrigonia sagawai sagawai (Yehara)

1927. *Trigonia sagawai* Yehara, p. 34, pl. 3, fig. 10.—1954. *Nipponitrigonia sagawai* (Yehara): Kobayashi, p. 77.—1957c. *Nipponitrigonia sagawai* (Yehara): Kobayashi, p. 53, pl. 10, figs. 2–8 (non figs. 9–11).—1960d. *Nipponitrigonia sagawai* (Yehara): Tamura, p. 234.—1962. *Nipponitrigonia sagawai* (Yehara): Maeda, p. 503, pl. 1, figs. 1–15.

Type.—Holotype by monotypy (UK not registered) from Kambaradani, Sakawa, Kochi Pref.

Age and distribution.—Bajocian–Tithonian. Torinosu group in Sakawa area, and Soma group (Awazu, Yamagami and Nakanosawa formations) in Soma area.

Nipponitrigonia sagawai kobayashii Maeda

1957c. *Nipponitrigonia sagawai* (Yehara): Kobayashi, p. 53 (pars), pl. 10, figs. 9–11 (non figs. 2–8).—1962c. *Nipponitrigonia kobayashii* Maeda, p. 505, pl. 2, figs. 1–15, pl. 3, figs. 13–15.—1962c. *Nipponitrigonia imamurai* Maeda, p. 506, pl. 3, figs. 1–12.—1963. *Nipponitrigonia kobayashii* Maeda: Maeda and Kawabe, p. 57, pl. 1, figs. 2–8.

Type.—Holotype (CU R627501) from Kiritani, Yatsuo, Toyama Pref. Holotype of *Nipponitrigonia imamurai* (CU R627601) from the same locality.

Age and distribution.—Oxfordian. Tetori group (Kiritani formation) in Yatsuo area.

Nipponitrigonia furukawensis Maeda

1962a. *Nipponitrigonia furukawensis* Maeda, p. 276, pl. 42, figs. 1–15.

Type.—Holotype (CU R6192101) from Sugizaki, Furukawa, Gifu Pref.

Age and distribution.—Oxfordian (or thereabout). Tetori group (Sugizaki sandstone) in Furukawa area.

Nipponitrigonia sakamotoensis (Yehara)

1921. *Trigonia sakamotoensis* Yehara, p. 10, pl. 5, fig. 4.—1921. *Trigonia kikuchiana* Yokoyama: Yehara, pl. 5, fig. 3.—1923b. *Trigonia naumanni* Yehara, p. 81, pl. 8, figs. 1–3, pl. 9, fig. 6.—1954. *Nipponitrigonia sakamotoensis* (Yehara): Kobayashi, p. 77.—1957c. *Nipponitrigonia naumanni* (Yehara): Kobayashi, p. 54, pl. 10, figs. 12, 13, pl. 11, figs. 1, 2, ? 3.—1957c. *Nipponitrigonia sakamotoensis* (Yehara): Kobayashi, p. 55, pl. 10, fig. 15, pl. 11, fig. 8.—1958. *Nipponitrigonia naumanni* (Yehara): Kobayashi and Nakano, p. 144.—1962c. *Nipponitrigonia naumanni* (Yehara): Maeda, p. 510, pl. 6, figs. 1–12, pl.

7, figs. 1–14.—1964. *Nipponitrigonia naumanni* (Yehara): Maeda and Kitamura, p. 54, pl. 2, figs. 1–11, pl. 3, figs. 1–14, pl. 4, figs. 1–15.—1967b. *Nipponitrigonia naumanni* (Yehara): Maeda and Kawabe, p. 91, pl. 1, fig. 4.

Type.—Holotype by monotypy (UK JM10153) from Sakamoto, Katsuura, Tokushima Pref. Syntype of *Trigonia naumanni* (UK JM10152) from Katsuura, Katsuura, Tokushima Pref., Todai, Miwa, Nagano Pref. and Ninomiya, Sakawa, Kochi Pref.

Age and distribution.—Neocomian–Albian. Hoji formation in Katsuuragawa area, Lower Monobegawa group in Sakawa and Monobegawa areas, Todai formation in Takato area, and Kikunotani formation in Kurosegawa area.

Nipponitrigonia sanchuensis Maeda

1962c. *Nipponitrigonia sanchuensis* Maeda, p. 509, pl. 5, figs. 1–18.

Type.—Holotype (CU R 627401) from Ishido, Ohinata, Nagano Pref.

Age and distribution.—Upper Neocomian–Aptian. Ishido formation in Sanchu area.

Remarks.—This is intimately related to, if not identical with, *Nipponitrigonia plicata* Kobayashi and Nakano, 1958.

Nipponitrigonia choshiensis Maeda

1962c. *Nipponitrigonia choshiensis* Maeda, p. 507, pl. 4, figs. 1–13.—1972. *Nipponitrigonia choshiensis* Maeda: Shikama and Suzuki, pl. 6, fig. 1.

Type.—Holotype (CU R627201) from Ashikajima, Choshi, Chiba Pref.

Age and distribution.—Aptian. Choshi formation in Choshi area.

Nipponitrigonia kikuchiana (Yokoyama) [Pl. 5, Fig. 10]

1891. *Trigonia kikuchiana* Yokoyama, p. 363, pl. 40, figs. 4–6.—1891. *Trigonia rotundata* Yokoyama, p. 365, pl. 40, figs. 7–9.—1915. *Trigonia kikuchiana* Yokoyama: Yehara, p. 44, pl. 2, figs. 1–9.—1923a. *Trigonia kikuchiana* Yokoyama: Yehara, p. 80, pl. 11, figs. 1, 2.—1923b. *Trigonia kikuchiana* Yokoyama: Yehara, p. 9, pl. 7, figs. 1, 2.—1927. *Trigonia kikuchiana* Yokoyama: Yabe, pl. 4, fig. 4.—1934. *Trigonia kikuchiana* Yokoyama: Nagao, p. 206.—1952. *Nipponitrigonia kikuchiana* (Yokoyama): Cox, p. 53, pl. 3, fig. 6.—1954. *Nipponitrigonia kikuchiana* (Yokoyama): Kobayashi, p. 76.—1954. *Nipponitrigonia rotundata* (Yokoyama): Kobayashi, p. 77.—1957c. *Nipponitrigonia kikuchiana* (Yokoyama): Kobayashi, p. 53.—1958. *Nipponitrigonia kikuchiana* (Yokoyama): Kobayashi and Nakano, p. 143.—1962c. *Nipponitrigonia kikuchiana* (Yokoyama): Maeda, p. 511, pl. 8, figs. 1–10, pl. 9, figs. 1–17.—1963. *Nipponitrigonia kikuchiana* (Yokoyama): Nakano, p. 524, pl. 56, fig. 9.—1968. *Nipponitrigonia kikuchiana* (Yokoyama): Hayami and Nakano, p. 200, fig. 2–2.

Type.—Syntype (repository unknown) from Tanno, Katsuura, Tokushima Pref., Soyama, Nangoku, and Yamanokami, Sakawa, Kochi Pref. Syntype of *Trigonia rotundata* (repository unknown) from Tanno, Katsuura, Tokushima Pref. and Ninomiya, Yamanokami and Sendachino, Sakawa, Kochi Pref.

Age and distribution.—Neocomian–Cenomanian. Hoji formation in Katsuuragawa area, Lower Monobegawa group in Sakawa and Monobegawa areas, Miyako group (Tanohata and Hiraiga formations) in Tanohata and Omoto areas, Arita formation in Yuasa area, Hinagu and Yatsushiro formations in Sakamoto and Yatsushiro areas, Kikunotani formation in Kurosegawa area, and Gosyonoura group in Gosyonoura island.

Nipponitrigonia convexa Kobayashi

1957c. *Nipponitrigonia convexa* Kobayashi, p. 55, pl. 10, fig. 14, pl. 11, figs. 4–7.

Type.—Syntype (IGPS not registered, UMUT MM4443–4445, UK not registered) from Yamanokami, Sakawa, Kochi Pref., Sendatsuno, Ochi, Kochi Pref., Miyanohara, Ochi, Kochi Pref., and Gosyonoura, Kumamoto Pref.

Age and distribution.—Neocomian–Cenomanian. Lower and Upper Monobegawa groups in Sakawa area, and Gosyonoura group in Gosyonoura island.

Remarks.—This is a doubtful species, and the type locality is not yet decided. All the syntype specimens are secondarily deformed, and morphological difference from *Nipponitrigonia kikuchiana* is not necessarily clear.

Nipponitrigonia quadrata Kobayashi and Nakano

1958. *Nipponitrigonia quadrata* Kobayashi and Nakano, p. 144, pl. 11, fig. 3.

Type.—Holotype (GK not registered) from Shimofukami, Sakamoto, Kumamoto Pref.

Age and distribution.—Albian. Yatsushiro formation in Sakamoto area.

Nipponitrigonia plicata Kobayashi and Nakano

1958. *Nipponitrigonia kikuchiana* var. *plicata* Kobayashi and Nakano, p. 143, pl. 11, figs. 1, 2.

Type.—Holotype (GK not registered) from the north of Shimofukami, Sakamoto, Kumamoto Pref.

Age and distribution.—Upper Neocomian–Albian. Yatsushiro formation in Yatsushiro area, Arita formation in Yuasa area.

Genus ***Rutitrigonia*** van Hoepen, 1929

Rutitrigonia yeharai Kobayashi

1923a. *Trigonia neumayri* Yehara, p. 82, pl. 9, figs. 1–3. (non *Trigonia neumayri* Choffat, 1885)—1954. *Rutitrigonia yeharai* Kobayashi, p. 77.—1957c. *Rutitrigonia yeharai* Kobayashi: Kobayashi, p. 59, pl. 10, fig. 1.—1958. *Rutitrigonia yeharai* Kobayashi: Kobayashi and Nakano, p. 145, pl. 12, figs. 9, 10.

Type.—Syntype (UK not registered) from Yamanokami, Sakawa, Kochi Pref.

Age and distribution.—Neocomian. Lower Monobegawa group (Yamanokami sandstone) in Sakawa area.

Rutitrigonia sanchuensis (Nakano)

1957c. *Psilotrigonia sanchuensis* Nakano, p. 70, text-figs. 1–3.—1958. *Rutitrigonia sanchuensis* (Nakano): Kobayashi and Nakano, p. 145, pl. 12, figs. 1–8.

Type.—Holotype (Yokohama Nat. Univ. not registered) from Ohinata, Nagano Pref.

Age and distribution.—Upper Neocomian–Albian. Ishido formation in Sanchu area, and Yatsushiro formation in Sakamoto area.

Subfamily MINETRIGONIINAE Kobayashi, 1954

Genus ***Minetrigonia*** Kobayashi and Katayama, 1938

Minetrigonia hegiensis hegiensis (Saeki) [Pl. 5, Fig. 6]

1925. *Trigonia hegiensis* Saeki, p. 35, pl. 12, figs. 1–3.—1925. *Trigonia yeharai* Saeki, p. 36, pl. 12, figs. 4, 5.—1952a. *Minetrigonia hegiensis* (Saeki): Kobayashi and Ichikawa, p. 72, pl. 3, figs. 4–11.—1955. *Minetrigonia hegiensis* (Saeki): Nakazawa, p. 253, pl. 15, figs. 6–10.

Type.—Holotype (UMUT MM5026) from the west of Nukata, Heki (Yakuno), Kyoto Pref. Holotype of *Trigonia yeharai* (UMUT MM5028) from the same locality.
Age and distribution.—Carnian. Heki formation and Nabae group (N1 and N2 formations) in Maizuru zone.

Minetrigonia hegiensis obsoleta Nakazawa

1956. *Minetrigonia hegiensis obsoleta* Nakazawa, p. 246, pl. 4, figs. 5–9.

Type.—Holotype (UK JM10408) from Higashiarata, Takahama, Fukui Pref.
Age and distribution.—Carnian. Nabae group (N2 formation) in Maizuru zone.

Minetrigonia katayamai (Kobayashi and Ichikawa)

1938. *Trigonia* (*Minetrigonia*) *hegiensis* Saeki: Kobayashi and Katayama, p. 188, text-figs. 1, 2.—1949b. *Trigonia* (*Minetrigonia*) *katayamai* Kobayashi and Ichikawa, p. 184.—1954d. *Minetrigonia katayamai* (Kobayashi and Ichikawa): Ichikawa, p. 63, pl. 4, figs. 9, 10.—1956. *Minetrigonia katayamai* Kobayashi and Ichikawa: Nakazawa, p. 246, pl. 4, fig. 4.—1957b. *Minetrigonia katayamai* Kobayashi and Ichikawa: Nakano, p. 65, pl. 9, figs. 5–7.—1960c. *Minetrigonia katayamai* Kobayashi and Ichikawa: Tokuyama, p. 212, pl. 13, figs. 1–5.—1968. *Minetrigonia katayamai* Kobayashi and Ichikawa: Hayami and Nakano, p. 201, fig. 3–18.

Type.—Syntype (UMUT MM4238, 4239) from Mugikawa, Mine, Yamaguchi Pref., syntype from Okunominetani, Kashiwai and Oowada-Horiake, Sakawa, Kochi Pref.
Age and distribution.—Carnian. Mine group (Hirabara formation) in Mine area, Kochigatani group (lower part) in Sakawa and Sakuradani areas, Nabae group (N2 formation) in Maizuru zone, and Kyowa formation in Nariwa area.

Subfamily PROSOGYROTRIGONIINAE Kobayashi, 1954

Genus ***Prosogyrotrigonia*** Krumbeck, 1924

MM3080 -5-7

Prosogyrotrigonia inouyei (Yehara) [Pl. 5, Fig. 7]

1921. *Trigonia inouyei* Yehara, p. 8, pl. 5, figs. 1, 2.—1954. *Prosogyrotrigonia inouyei* (Yehara): Kobayashi, p. 76.—1954. *Prosogyrotrigonia inouyei* (Yehara): Kobayashi and Mori, p. 157, pl. 15, figs. 3–5.—1959h. *Prosogyrotrigonia inouyei* (Yehara): Hayami, p. 70, pl. 7, figs. 12–14.—1968. *Prosogyrotrigonia inouyei* (Yehara): Hayami and Nakano, p. 201, fig. 3–20.

Type.—Syntype (UK JM10151) from Higashinagano, Toyoda, Yamaguchi Pref.
Age and distribution.—Sinemurian. Toyora group (Higashinagano formation) in Toyoda area.

Subfamily MYOPHORELLINAE Kobayashi, 1954

Tribe VAUGONIINI Kobayashi, 1954

Genus ***Vaugonia*** Crickmay, 1930

Subgenus ***Vaugonia*** Crickmay, 1930

Vaugonia (Vaugonia) niranohamensis Kobayashi and Mori

1955. *Vaugonia niranohamensis* Kobayashi and Mori, p. 80, pl. 3, figs. 1–6, pl. 4, fig. 1.

Type.—Holotype (UMUT MM4323) from Niranohama, Utatsu, Miyagi Pref.
Age and distribution.—Hettangian–Bajocian. Shizukawa group (Niranohama and

Hosoura formations) and Hashiura group (Aratozaki formation) in Shizukawa and Hashiura areas.

Vaugonia (Vaugonia) namigashira Kobayashi and Mori

1904. *Trigonia v-costata* Lycett: Yokoyama, p. 8, pl. 2, figs. 2–4.—1955. *Vaugonia yokoyamai* Kobayashi and Mori, p. 81, pl. 3, figs. 7, 8.—1955. *Vaugonia yokoyamai* forma *gracilis* Kobayashi and Mori, p. 81, pl. 3, fig. 9.—1955. *Vaugonia namigashira* Kobayashi and Mori, p. 83, pl. 3, figs. 10, 11.

Type.—Holotype (UMUT MM4333) from Hoinyashiki (Hosoura), Shizukawa, Miyagi Pref. Syntype of *Vaugonia yokoyamai* (UMUT MM4324–MM4326) from Hoinyashiki (Hosoura), Shizukawa; Oiwazawa, Kitakami (Hashiura); and Tsukinoura, Ishinomaki, all in Miyagi Pref. Holotype by monotypy of *Vaugonia yokoyamai* forma *gracilis* (UMUT MM4327) from Hoinyashiki.

Age and distribution.—Hettangian–Bajocian. Shizukawa group (Niranohama formation) and Hashiura group (Aratozaki formation) in Shizukawa and Hashiura areas, and Ojika group (Tsukinoura formation) in Ojika area.

Remarks.—*Vaugonia yokoyamai and Vaugonia namigashira* were proposed by Kobayashi and Mori (1955) in the same publication. Here, synonymizing the two, the latter name is adopted. Kobayashi and Mori indicated one of the original specimens of *V. yokoyamai* as "Yokoyama's type", but this indication is not regarded here as holotype designation.

Vaugonia (Vaugonia) kodaijimensis Kobayashi and Mori

1955. *Vaugonia kodaijimensis* Kobayashi and Mori, p. 82, pl. 3, figs. 12–15.

Type.—Holotype (UMUT MM4329) from Kodaijima, Ishinomaki, Miyagi Pref.

Age and distribution.—Bajocian. Ojika group (Kodaijima formation) in Ojika area.

Vaugonia (Vaugonia) awazuensis Kobayashi

1957. *Vaugonia awazuensis* Kobayashi, *in* Kobayashi and Taumra, p. 39, pl. 1, fig. 4.

Type.—Holotype by monotypy (UMUT MM4384) from Ono, Soma, Fukushima Pref.

Age and distribution.—Bajocian (or thereabout). Soma group (Awazu formation) in Soma area.

Vaugonia (Vaugonia) yambarensis Kobayashi

1956a. *Vaugonia yambarensis* Kobayashi, p. 1, pl. 1, fig. 1.

Type.—Holotype by monotypy (UMUT MM4366) from Yambara, Izumi, Fukui Pref.

Age and distribution.—Upper Jurassic (not older than Oxfordian). Tetori group (Yambara formation) in Izumi area.

Vaugonia (Vaugonia) fukuiensis Maeda

1962d. *Vaugonia fukuiensis* Maeda, p. 515, pl. 1, figs. 1–16, pl. 2, figs. 2–16.

Type.—Holotype (CU R627703) from Aradani, Nishidani, Fukui Pref.

Age and distribution.—Oxfordian. Tetori group (Yambarazaka formation) in Nishidani area.

Vaugonia (Vaugonia) ariminensis Maeda and Kawabe

1963. *Vaugonia ariminensis* Maeda and Kawabe, p. 57, pl. 1, fig. 1.

Type.—Holotype (CU R I–14) from Inonedani, Oyama, Toyama Pref.

Age and distribution.—Oxfordian (or thereabout). Tetori group (Magawa formation) in Arimine area.

Subgenus ***Hijitrigonia*** Kobayashi, 1955

Vaugonia (Hijitrigonia) geniculata Kobayashi and Mori [Pl. 5, Fig. 8]

1955. *Vaugonia (Hijitrigonia) geniculata* Kobayashi and Mori, p. 84, pl. 4, figs. 4–9.

Type.—Holotype (UMUT MM4337) from Akaiwazaki (Hosoura), Shizukawa, Miyagi Pref.

Age and distribution.—Bajocian. Hashiura group (Aratozaki formation) in Shizukawa area, and Karakuwa group (Kosaba formation) in Karakuwa area.

Vaugonia (Hijitrigonia) kojiwa Kobayashi and Mori

1955. *Vaugonia (Hijitrigonia) kojiwa* Kobayashi and Mori, p. 85, pl. 4, figs. 2, 3.

Type.—Holotype (UMUT MM4342) from Yokokurazawa, Kitakami (Hashiura), Miyagi Pref.

Age and distribution.—Hettangian. Shizukawa group (Niranohama formation) in Hashiura area.

Genus ***Orthotrigonia*** Cox, 1952

Orthotrigonia? midareta Kobayashi and Mori

1955. *Orthotrigonia midareta* Kobayashi and Mori, p. 87, pl. 4, fig. 11.—1955. *Orthotrigonia corrugata* Kobayashi and Mori, p. 87, pl. 4, fig. 10.

Type.—Holotype (UMUT MM4344) from Niranohama, Utatsu, Miyagi Pref. Holotype of *Orthotrigonia corrugata* (UMUT MM4345) from the same locality.

Age and distribution.—Hettangian. Shizukawa group (Niranohama formation) in Shizukawa area.

Tribe MYOPHORELLINI Kobayashi, 1954

Genus ***Myophorella*** Bayle, 1878

Subgenus ***Myophorella*** Bayle, 1878

Myophorella (Myophorella) dekaiboda Kobayashi and Tamura

1955. *Myophorella (Myophorella) dekaiboda* Kobayashi and Tamura, p. 95, pl. 6, figs. 6–9.

Type.—Holotype (UMUT MM4346) from Minahara, Kashima, Fukushima Pref.

Age and distribution.—Kimmeridgian. Soma group (Nakanosawa formation) in Soma area.

Subgenus ***Promyophorella*** Kobayashi and Tamura, 1955

Myophorella (Promyophorella) sigmoidalis Kobayashi and Tamura [Pl. 5, Fig. 9]

1955. *Myophorella (Promyophorella) sigmoidalis* Kobayashi and Tamura, p. 96, pl. 5, figs. 1–3.—1959c. *Myophorella (Promyophorella) sigmoidalis* Kobayashi and Tamura: Hayami, p. 66, pl. 5, fig. 24.

Type.—Holotype (UMUT MM4350) from Akaiwazaki (Hosoura), Shizukawa, Miyagi Pref.

Age and distribution.—Bajocian. Hashiura group (Aratozaki formation) in Shizukawa area.

Myophorella (Promyophorella) sugayensis Kobayashi and Tamura

1955. *Myophorella* (*Promyophorella*) *sugayensis* Kobayashi and Tamura, p. 97, pl. 5, fig. 4.—1955. *Myophorella* (*Promyophorella*) *sugayensis* var. *geniculata* Kobayashi and Tamura, p. 97, pl. 5, fig. 5.—1959. *Myophorella* (*Promyophorella*) *sugayensis geniculata* Kobayashi and Tamura: Kobayashi, Mori and Tamura, p. 290.

Type.—Holotype (UMUT MM4353) from Sugaya, Soma, Fukushima Pref. Holotype by monotypy of *Myophorella* (*Promyophorella*) *sugayensis* var. *geniculata* (UMUT MM-4354) from the same locality.

Age and distribution.—Bathonian (or thereabout). Soma group (Yamagami formation) in Soma area.

Myophorella (Promyophorella) imamurai Kobayashi

1956a. *Myophorella* (*Promyophorella*) *imamurai* Kobayashi, p. 3, pl. 1, fig. 3.

Type.—Holotype by monotypy (UMUT MM4368) from Kiritani, Yatsuo, Toyama Pref.

Age and distribution.—Oxfordian. Tetori group (Kiritani formation) in Yatsuo area.

Myophorella (Promyophorella) hashimotoi Kobayashi

1956a. *Myophorella* (*Promyophorella?*) *hashimotoi* Kobayashi, p. 3, pl. 1, figs. 4–7.—1960d. *Myophorella* (*Promyophorella?*) *hashimotoi* Kobayashi: Tamura, p. 234.

Type.—Holotype (UMUT MM4369) from Kurisaka, Kaminaka, Tokushima Pref.

Age and distribution.—Kimmeridgian. Torinosu group (Kurisaka formation) in Sakuradani area.

Myophorella (Promyophorella) toyamensis Maeda and Kawabe

1966a. *Myophorella* (*Promyophorella*) *toyamensis* Maeda and Kawabe, p. 43, pl. 1, figs. 1–14.

Type.— Holotype (CU R H-1a) from Higashisakamoridani, Oyama, Toyama Pref.

Age and distribution.—Oxfordian. Tetori group (Magawa formation) in Arimine area.

Myophorella (Promyophorella) magawensis Maeda and Kawabe

1966a. *Myophorella* (*Promyophorella*) *magawensis* Maeda and Kawabe, p. 47, pl. 1, figs. 15–19.—1966a. *Myophorella* (*Promyophorella*) *tetoriensis* Maeda and Kawabe, p. 48, pl. 1, figs. 20–22.

Type.—Holotype (CU R M-71) from Magawa, Oyama, Toyama Pref. Syntype of *Myophorella* (*Promyophorella*) *tetoriensis* (CU R m-280a, m-280b) from the same locality.

Age and distribution.—Oxfordian. Tetori group (Arimine formation) in Arimine area.

Myophorella (Promyophorella) hidensis Maeda and Kawabe

1966a. *Myophorella* (*Promyophorella*) *hidensis* Maeda and Kawabe, p. 46, pl. 2, figs. 1–29.

Type.—Holotype (CU R m-269) from Magawa, Oyama, Toyama Pref.

Age and distribution.—Oxfordian. Tetori group (Arimine formation) in Arimine area.

Myophorella (Promyophorella) orientalis Kobayashi and Tamura

1955. *Myophorella* (*Promyophorella*) *orientalis* Kobayashi and Tamura, p. 98, pl. 5, fig. 6.—1957a. *Myophorella* (*Promyophorella*) *orientalis* Kobayashi and Tamura: Kobayashi, p. 46, pl. 1, figs. 16–18.—1957b. *Myophorella* (*Promyophorella*) *orientalis* Kobayashi and Tamura: Kobayashi, p. 360, pl. 3, fig. 8.—compare 1960. *Myophorella* (*Promyophorella*) cf. *orientalis* Kobayashi and Tamura: Hayami, Sugita and Nagumo, p. 94.—1966b. *Myophorella* (*Promyophorella*) *orientalis* Kobayashi and Tamura: Maeda and Kawabe, p. 51, text-fig. 4, pl. 1, figs. 1–22, pl. 2, figs. 1–14.

Type.—Holotype (UMUT MM4355) from Umazawa (Koyamada), Kashima, Fukushima Pref.
Age and distribution.—Callovian–Berriasian. Soma group (Koyamada formation) in Soma area, Ojika group (Tashiro sandstone) in Ojika area, Shishiori group (Kogoshio formation) in Kesennuma area, and Tetori group (Kaizara formation) in Izumi area. This species was also reported from Mindoro.

Myophorella (Promyophorella) obsoleta Kobayashi and Tamura

1955. *Myophorella (Promyophorella) obsoleta* Kobayashi and Tamura, p. 99, pl. 5, fig. 7.—1960. *Myophorella (Promyophorella) obsoleta* Kobayashi and Tamura: Hayami, Sugita and Nagumo, p. 94.

Type.—Holotype (UMUT MM4357) from Yobaiji-pass, Kesennuma, Miyagi Pref.
Age and distribution.—Tithonian–Berriasian. Shishiori group (Kogoshio formation) and Isokusa formation in Kesennuma and Oshima areas.

Subgenus ***Haidaia*** Crickmay, 1930

Myophorella (Haidaia) crenulata Kobayashi and Tamura

1955. *Myophorella (Haidaia) crenulata* Kobayashi and Tamura, p. 100, pl. 5, figs. 8–10.—1955. *Myophorella (Haidaia) crenulata* var. *lunulata* Kobayashi and Tamura, p. 101, pl. 6, figs. 1, 2.—1959. *Myophorella (Haidaia) crenulata lunulata* Kobayashi and Tamura: Kobayashi, Mori and Tamura, p. 290.—1961c. *Myophorella (Haidaia) crenulata* Kobayashi and Tamura: Hayami, p. 267, pl. 14, fig. 8.

Type.—Holotype (UMUT MM4358) from Minahara, Kashima, Fukushima Pref. Holotype of *Myophorella (Haidaia) crenulata* var. *lunulata* (UMUT MM4361) from Minamisawa, Kashima, Fukushima Pref.
Age and distribution.—Kimmeridgian. Soma group (Nakanosawa formation) in Soma area, and Shishiori group (Mone formation) in Oshima area.

Myophorella (Haidaia) subcircularis Kobayashi and Tamura

1955. *Myophorella (Haidaia) subcircularis* Kobayashi and Tamura, p. 101, pl. 6, fig. 3.

Type.—Holotype (UMUT MM4363) from Nakanosawa, Kashima, Fukushima Pref.
Age and distribution.—Kimmeridgian. Soma group (Nakanosawa formation) in Soma area.

Myophorella (Haidaia) gracilenta Kobayashi

1956a. *Myophorella (Haidaia) gracilenta* Kobayashi, p. 4, pl. 1, fig. 8.—1959c. *Myophorella (Haidaia) gracilenta* Kobayashi: Tamura, p. 25, pl. 5, figs. 19–22.—1960d. *Myophorella (Haidaia) gracilenta* Kobayashi: Tamura, p. 234.

Type.—Holotype (UMUT MM4373) from Arinoki, Sakawa, Kochi Pref.
Age and distribution.—Upper Jurassic. Torinosu group in Sakawa and Sakamoto areas.

Myophorella (Haidaia) pulex Tamura

1959c. *Myophorella (Haidaia) pulex* Tamura, p. 25, text-fig. 2, pl. 5, figs. 15–18.—1960d. *Myophorella (Haidaia) pulex* Tamura, p. 234.

Type.—Holotype (UMUT MM2988) from Sakamoto, Sakamoto, Kumamoto Pref.
Age and distribution.—Upper Jurassic. Torinosu group in Sakamoto, Tanoura, Sakawa and Sakuradani areas.

Myophorella (Haidaia) ohmachii Tamura

1959c. *Myophorella (Haidaia) ohmachii* Tamura, p. 26, pl. 5, figs. 23–26.

Type.—Holotype (UMUT MM2998) from Uminoura, Tanoura, Kumamoto Pref.

Age and distribution.—Upper Jurassic. Torinosu group in Tanoura area.

Myophorella (Haidaia) kappazakensis Maeda and Adachi

1965. *Myophorella (Haidaia) kappazakensis* Maeda and Adachi, p. 322, text-fig. 3, pl. 1, figs. 1–5.

Type.—Holotype (CU R64100402) from Hirose, Minamimaki, Nagano Pref.

Age and distribution.—Upper Jurassic (precisely unknown). Torinosu group (Kappazaka formation) in Minamimaki area.

Genus ***Linotrigonia*** van Hoepen, 1929

Subgenus ***Linotrigonia*** van Hoepen, 1929

Linotrigonia (Linotrigonia) toyamai (Yehara)

1923b. *Trigonia toyamai* Yehara, p. 78, pl. 9, figs. 4, 5.—1927. *Trigonia toyamai* Yehara: Yehara, p. 35, pl. 3, fig. 9.—1954. *Linotrigonia toyamai* (Yehara): Kobayashi, p. 77.—1956a. *Linotrigonia toyamai* (Yehara): Kobayashi, p. 6, pl. 1, figs. 10–12.—1960d. *Linotrigonia toyamai* (Yehara): Tamura, p. 234.

Type.—Syntype (UK? not registered) from Nioigataki, Yoshidayashiki and Torinosu, Sakawa, and Ogawa, Monobegawa, all in Kochi Pref.

Age and distribution.—Upper Jurassic. Torinosu group in Sakawa, Monobegawa and Sakuradani areas.

Subgenus ***Oistotrigonia*** Cox, 1952

Linotrigonia (Oistotrigonia?) prima (Kobayashi and Tamura)

1955. *Oistotrigonia prima* Kobayashi and Tamura, p. 102, pl. 6, figs. 4, 5.

Type.—Holotype (UMUT MM4364) from Yamashita, Kashima, Fukushima Pref.

Age and distribution.—Kimmeridgian. Soma group (Nakanosawa formation) in Soma area.

Genus ***Scaphotrigonia*** Dietrich, 1933

Scaphotrigonia somensis Kobayashi and Tamura

1957. *Scaphotrigonia somensis* Kobayashi and Tamura, p. 40, pl. 1, figs. 1–3.

Type.—Holotype (UMUT MM4385) from Minahara, Soma, Fukushima Pref.

Age and distribution.—Bathonian (or thereabout). Soma group (Yamagami formation) in Soma area.

Genus ***Steinmanella*** Crickmay, 1930

Subgenus ***Yeharella*** Kobayashi and Amano, 1955

MM4413 −5−12

Steinmanella (Yeharella) japonica (Yehara) [Pl. 5, Fig. 12]

1923a. *Trigonia japonica* Yehara, p. 10, pl. 6, figs. 6, 7.—1923b. *Trigonia japonica* Yehara: Yehara, p. 83, pl. 12, figs. 3, 4.—1954. *Steinmannella japonica* (Yehara) [*sic*]: Kobayashi, p. 76.—1955. *Steinmannella (Yeharella) japonica* (Yehara) [*sic*]: Kobayashi and Amano, p. 201, pl. 14, figs. 1–3, pl. 15, fig. 4.—1955. *Steinmannella (Yeharella) japonica* var. *obsoleta* Kobayashi and Amano [*sic*], p. 202, pl. 14, figs. 4, 5.

Type.—Lectotype designated by Kobayashi and Amano (1955, p. 201) (UK JM10161)

from Oe, Amakusa, Kumamoto Pref. Syntype of *Steinmanella* (*Yeharella*) *japonica* var. *obsoleta* (UMUT MM4417) from Imuta, Shimokoshiki, and syntype of the same variety (UMUT MM4418) from Tairajima, Shimokoshiki, both in Kagoshima Pref.

Age and distribution.—Campanian. Himenoura group in Amakusa and Shimokoshiki islands, and Izumi group in Kitadani and Onsen areas.

Steinmanella (Yeharella) lymani Kobayashi and Amano

1915. *Trigonia* cf. *tryoniana* Gabb: Yehara, p. 43, pl. 2, figs. 11–13.—1955. *Steinmannella* (*Yeharella*) *lymani* Kobayashi and Amano [*sic*], p. 203, pl. 13, fig. 3.

Type.—Holotype by monotypy (UMUT MM4419) from a boulder on a branch of Hoe river, south Saghalin.

Age and distribution.—Cenomanian–Turonian. Middle Yezo group in Ikushumbetsu, Yubari and Hoe river areas.

Steinmanella (Yeharella) kimurai kimurai (Tokunaga and Shimizu)

1926. *Trigonia kimurai* Tokunaga and Shimizu, p. 189, pl. 27, figs. 3, 4.—1954. *Steinmannella kimurai* (Tokunaga and Shimizu) [*sic*]: Kobayashi, p. 76.—1955. *Steinmannella* (*Yeharella*) *kimurai* (Tokunaga and Shimizu) [*sic*]: Kobayashi and Amano, p. 205, pl. 13, fig. 1 (non fig. 2)—1958. *Steinmannella* (*Yeharella*) *kimurai* (Tokunaga and Shimizu) [*sic*]: Nakano, p. 86.—1964. *Steinmannella* (*Yeharella*) *kimurai* (Tokunaga and Shimizu) [*sic*]: Maeda and Sato, p. 64, text-fig. 8, pl. 1, figs. 1–6, pl. 2, figs. 1–5.

Type.—Syntype (lost by fire during the 2nd World War) from Sakakurazawa, Hirono, Fukushima Pref.

Age and distribution.—Coniacian. Futaba group in Futaba area.

Steinmanella (Yeharella) kimurai sanukiensis Nakano

1955. *Steinmannella* (*Yeharella*) *kimurai* (Tokunaga and Shimizu) [*sic*]: Kobayashi and Amano, p. 205, pl. 13, fig. 2 (non fig. 1).—1958. *Steinmannella* (*Yeharella*) *kimurai* (Tokunaga and Shimizu) subspecies *sanukiensis* Nakano [*sic*], p. 86, pl. 13, fig. 1.

Type.—Holotype (IGSH NM. S. Y. 00001) from Kamikashiwara, Sogisho, Kagawa Pref.

Age and distribution.—Campanian. Izumi group (Korobishi formation) in Ayauta area.

Steinmanella (Yeharella) ainuana (Yabe and Nagao) [Pl. 5, Fig. 11]

1928. *Trigonia ainuana* Yabe and Nagao, p. 84, pl. 16, fig. 20.—1954. *Steinmannella ainuana* (Yabe and Nagao) [*sic*]: Kobayashi, p. 76.—1955. *Steinmannella* (*Yeharella*) *ainuana* (Yabe and Nagao) [*sic*]: Kobayashi and Amano, p. 204.—1961c. *Steinmannella* (*Yeharella*) *ainuana* (Yabe and Nagao) [*sic*]: Nakano, p. 141, pl. 20, figs. 1–6, pl. 21, figs. 1–6.—1968. *Steinmannella* (*Yeharella*) *ainuana* (Yabe and Nagao) [*sic*]: Hayami and Nakano, p. 200, fig. 2–4.

Type.—Holotype by monotypy (IGPS no. 22591) from Pombetsu, Mikasa (Ikushumbetsu), Ishikari Prov., Hokkaido.

Age and distribution.—Cenomanian–Turonian. Middle Yezo group (Mikasa sandstone) in Ikushumbetsu area.

Steinmanella (Yeharella) deckeina (Kubota)

1952. *Trigonia deckeina* Kubota, p. 14, pl. 1, figs. 1, 2.—1958. *Steinmannella* (*Yeharella*) *deckeina* (Kubota) [*sic*]: Nakano, p. 87, pl. 13, fig. 2, pl. 14, fig. 1.

Type.—Holotype (GMH? not registered) from the upper course of Rupeshupe river (a tributary of the Teshio), Nakagawa, Teshio Prov., Hokkaido.
Age and distribution.—Campanian or Maestrichtian. Hakobuchi group in Abeshinai area.

Steinmanella (Yeharella) jimboi Kobayashi and Amano

1955. *Steinmannella* (*Yeharella*) *jimboi* Kobayashi and Amano [*sic*], p. 204, pl. 13, fig. 4.

Type.—Holotype by monotypy (UMUT MM4420) from Pombetsu, Mikasa (Ikushumbetsu), Ishikari Prov., Hokkaido (not Yubari as originally described).
Age and distribution.—Cenomanian–Turonian. Middle Yezo group (Mikasa sandstone) in Ikushumbetsu area.

Subgenus ***Setotrigonia*** Kobayashi and Amano, 1955

Steinmanella (Setotrigonia) shinoharai Kobayashi and Amano [Pl. 5, Fig. 13]

1955. *Steinmannella* (*Setotrigonia*) *shinoharai* Kobayashi and Amano [*sic*], p. 207, pl. 15, figs. 1–3.

Type.—Holotype (UMUT MM4424) from Tsubasayama, Hiketa, Kagawa Pref.
Age and distribution.—Campanian. Izumi group (basal part) in Hiketa area.

Tribe uncertain

Genus ***Apiotrigonia*** Cox, 1952

Subgenus ***Apiotrigonia*** Cox, 1952

Apiotrigonia (Apiotrigonia) minor (Yabe and Nagao)

1915. *Trigonia* cf. *subovalis* Jimbo: Yehara, p. 42, pl. 1, figs. 14–17.—1921. *Trigonia* cf. *subovalis* Jimbo: Hayasaka, p. 4, pl. 1, fig. 2.—1923a. *Trigonia* cf. *subovalis* Jimbo: Yehara, p. 8, pl. 6, figs. 1–5.—1923b. *Trigonia subovalis* Jimbo: Yehara, p. 78, pl. 11, figs. 4–8.—1925. *Trigonia subovalis* var. *minor* Yabe and Nagao, p. 116.—1927. *Trigonia subovalis* var. *minor* Yabe and Nagao: Yabe, pl. 7, fig. 4.—compare 1930. *Trigonia subovalis* var. *minor* Yabe and Nagao: Nagao, p. 18.—1938. *Trigonia subovalis* var. *minor* Yabe and Nagao: Nagao and Otatume, p. 42, pl. 1, figs. 7–9.—1954. *Apiotrigonia subovalis minor* (Yabe and Nagao): Kobayashi, p. 77.—compare 1957a. "*Trigonia subovalis* Jimbo var. *minor* Yabe and Nagao": Amano, p. 57, pl. 1, fig. 19.—1957a. *Apiotrigonia minor* (Yabe and Nagao): Nakano, p. 110, pl. 8, figs. 1–4.—1962. *Apiotrigonia minor* (Yabe and Nagao): Saito, p. 63, pl. 1, figs. 8, 9.—1962. *Apiotrigonia ashizawensis* Saito, p. 64, pl. 1, fig. 6.—1967a. *Apiotrigonia minor* (Yabe and Nagao): Maeda and Kawabe, p. 423, pl. 1, figs. 10–25.—1967a. *Apiotrigonia futabaensis* Maeda and Kawabe, p. 421, pl. 1, figs. 5, 6.—1967a. *Apiotrigonia hironoensis* Maeda and Kawabe, p. 422, pl. 1, figs. 7–9.—1967a. *Apiotrigonia orikiensis* Maeda and Kawabe, p. 423, pl. 1, figs. 1–4.

Type.—Holotype (IGPS? not registered) from the south of Cape Khoi near Alexandrofsk, north Saghalin. Syntype of *Apiotrigonia ashizawensis* (GIUM nos. 40637–40639) from Ashizawa and a few other localities, Hisanohama and Hirono, Fukushima Pref. Holotype of *Apiotrigonia futabaensis* (CU R64031567) from Sakurazawa, holotype of *Apiotrigonia hironoensis* (CU R660219133) from Oriki, and holotype of *Apiotrigonia orikiensis* (CU R64031512) from Kitazawa; all in Hirono, Fukushima Pref.
Age and distribution.—Cenomanian–Campanian. Werblude group in Alexandrovsk area, Middle Yezo group (Mikasa sandstone) in Ikushumbetsu and Yubari areas, Futaba group (Ashizawa and Asamigawa formations) in Futaba area, Uwajima group in

Uwajima area, Miyakura formation in Tokushima area, and (?) Himenoura group in Amakusa and Koshikijima islands.

Apiotrigonia (Apiotrigonia) undulosa Nakano

1957a. *Apiotrigonia undulosa* Nakano, p. 112, pl. 8, fig. 8.

Type.—Holotype (UMUT F-3a) from Taikorin, Hirono, Fukushima Pref.

Age and distribution.—Coniacian. Futaba group (lower part) in Futaba area, and Onogawa group (Inukai formation) in Onogawa area.

Apiotrigonia (Apiotrigonia) obliquecostata Nakano

1957a. *Apiotrigonia obliquecostata* Nakano, p. 113, pl. 8, figs. 9, 10.

Type.—Holotype (IGSH NM Am 1) from Wadanohana, Ryugatake (Amakusa-kami-shima), Kumamoto Pref.

Age and distribution.—Santonian. Himenoura group in Amakusa islands.

Apiotrigonia (Apiotrigonia) crassoradiata Nakano

1957a. *Apiotrigonia crassoradiata* Nakano, p. 113, pl. 8, figs. 11, 12.

Type.—Holotype (UMUT not registered) from Aonami, Yuyama, Ehime Pref.

Age and distribution.—Campanian. Izumi group (basal part) in Onsen area.

Apiotrigonia (Apiotrigonia) obsoleta Nakano

1957a. *Apiotrigonia obsoleta* Nakano, p. 114, pl. 9, figs. 5–7.—1957a. *Apiotrigonia minor* var. *nankoi* Nakano, p. 112, pl. 9, figs. 1–4.—1972. *Apiotrigonia obsoleta* Nakano: Tashiro, p. 331, pl. 41, figs. 1–8, 12, 13.

Type.—Holotype (IGSH NM Aw 1) from Hirota, Midori (Awaji), Hyogo Pref. Holotype of *Apiotrigonia minor* var. *nankoi* (IGSH NM Aw 7) from Hansanji, Seidan (Awaji), Hyogo Pref.

Age and distribution.—Campanian. Izumi group (Minato shale and Shichi shale) in Awaji island, and Himenoura group in Uto area.

Apiotrigonia (Apiotrigonia) postonodosa Nakano

1957a. *Apiotrigonia postonodosa* Nakano, p. 114, pl. 9, figs. 8–14.

Type.—Holotype (IGSH NM00004) from Noriden, Kawaura (Amakusa-shimoshima), Kumamoto Pref.

Age and distribution.—Campanian (or thereabout). Himenoura group (upper part) in Amakusa islands and Izumi group (Shichi shale) in Awaji island.

Apiotrigonia (Apiotrigonia) utoensis Tashiro

1972. *Apiotrigonia utoensis* Tashiro, p. 333, text-fig. 7, pl. 41, figs. 9–11.

Type.—Holotype (KE 1881) from Okoshiki, Uto, Kumamoto Pref.

Age and distribution.—Santonian or Campanian. Himenoura group (? upper part) in Uto area.

Subgenus ***Heterotrigonia*** Cox, 1952

Apiotrigonia (Heterotrigonia) subovalis (Jimbo)

1894. *Trigonia subovalis* Jimbo, p. 42, pl. 8, fig. 5.—1923b. *Trigonia sawatai* Yehara, p. 80, pl. 10, fig. 9.—1954. *Apiotrigonia subovalis* (Jimbo): Kobayashi, p. 77.—1954. *Heterotrigonia sawatai* (Yehara): Kobayashi, p. 77.—1957a. *Apiotrigonia jimboi* Nakano, p. 115,

pl. 8, figs. 5–7.—1957a. *Heterotrigonia subovalis* (Jimbo): Nakano, p. 118, pl. 8, figs. 13–15.—1961. *Heterotrigonia subovalis* (Jimbo): Nakano, p. 57, pl. 9, figs. 1–14.—1963. *Heterotrigonia subovalis* (Jimbo): Matsumoto, p. 45, pl. 67, fig. 5.

Type.—Lectotype designated by Matsumoto (1963, p. 45) (UMUT MM7488) from Pombetsu, Mikasa (Ikushumbetsu), Ishikari Prov. Hokkaido. Holotype by monotypy of *Trigonia sawatai* (UK? not registered) from Katsurazawa, Mikasa (Ikushumbetsu), Ishikari Prov., Hokkaido. Holotype of *Apiotrigonia jimboi* (UMUT Cr. 1284a) from Mikasa (Ikushumbetsu), Ishikari Prov., Hokkaido.

Age and distribution.—Cenomanian–Turonian. Middle Yezo group (Mikasa sandstone) in Ikushumbetsu area.

Apiotrigonia (Heterotrigonia) granosa (Nakano)

1957a. *Heterotrigonia granosa* Nakano, p. 119, pl. 8, fig. 16.

Type.—Holotype (IGSH NM Am 5) from Wadanohana, Ryugatake (Amakusa-kami-shima), Kumamoto Pref.

Age and distribution.—Santonian. Himenoura group (middle part) in Amakusa islands.

Apiotrigonia (Heterotrigonia) himenourensis (Tashiro)

1972. *Heterotrigonia himenourensis* Tashiro, p. 334, text-fig. 8, pl. 41, figs. 14–16.

Type.—Holotype (KE 1884) from Okoshiki, Uto, Kumamoto Pref.

Age and distribution.—Santonian or Campanian. Himenoura group in Amakusa and Shimokoshiki islands.

Genus ***Microtrigonia*** Nakano, 1957

Microtrigonia amanoi Nakano

1957a. *Microtrigonia amanoi* Nakano, p. 117, pl. 9, figs. 21, 22.

Type.—Holotype (KU MA00001) from Ukimizu, Kashima (Shimokoshiki), Kagoshima Pref.

Age and distribution.—Santonian or Campanian. Himenoura group (upper part) in Shimokoshiki island.

Microtrigonia minima Nakano

1957a. *Microtrigonia minima* Nakano, p. 117, pl. 9, figs. 17–20.

Type.—Holotype (IGSH NM AW. Yt 1) from Mitsukawa, Sumoto (Awaji), Hyogo Pref.

Age and distribution.—Campanian–Maestrichtian. Izumi group (Shichi shale and Kitaama sandstone and shale) in Awaji island.

Microtrigonia tuberculata (Nakano)

1957a. *Apiotrigonia tuberculata* Nakano, p. 115, pl. 9, figs. 15, 16.

Type.—Holotype (IGSH NM00011) from Hansanji, Seidan (Awaji), Hyogo Pref.

Age and distribution.—Campanian. Izumi group (Shichi shale) in Awaji island.

Microtrigonia imutensis Tashiro

1972. *Microtrigonia imutensis* Tashiro, p. 335, text-fig. 9, pl. 40, fig. 26.

Type.—Holotype (KE1887) from Ukimizu, Kashima (Shimokoshiki), Kagoshima Pref.

Age and distribution.—Santonian or Campanian. Himenoura group (upper part) in Shimokoshiki island.

Subfamily PTEROTRIGONIINAE van Hoepen, 1929

Genus ***Pterotrigonia*** van Hoepen, 1929

Subgenus ***Pterotrigonia*** van Hoepen, 1929

Pterotrigonia (Pterotrigonia) pocilliformis (Yokoyama)

1891. *Trigonia pocilliformis* Yokoyama, p. 361, pl. 40, figs. 1–3.—1923b. *Trigonia pocilliformis* Yokoyama: Yehara, p. 71, pl. 9, figs. 8–10, pl. 10, figs. 4–6 (non pl. 10, figs. 1–3).—1926. *Trigonia pocilliformis* Yokoyama: Yabe, Nagao and Shimizu, p. 45.—1927. *Trigonia pocilliformis* Yokoyama: Yabe, pl. 4, fig. 3.—1954. *Pterotrigonia pocilliformis* (Yokoyama): Kobayashi, p. 77.—1957. *Pterotrigonia pocilliformis* (Yokoyama): Kobayashi and Nakano, p. 227, pl. 16, figs. 1–3.—1957. *Pterotrigonia pocilliformis* var. *yamanokamiensis* Kobayashi and Nakano, p. 229, pl. 16, figs. 8–10.—1958. *Pterotrigonia pocilliformis* (Yokoyama): Kobayashi and Nakano, p. 147, pl. 11, fig. 12.—1964. *Pterotrigonia pocilliformis* (Yokoyama): Matoba, pl. 37, figs. 6, 7.—1964. *Pterotrigonia pocilliformis* (Yokoyama): Maeda and Kitamura, p. 52, pl. 1, figs. 1–12.—1967b. *Pterotrigonia pocilliformis* (Yokoyama): Maeda and Kawabe, p. 91, pl. 1, figs. 1–3.

Type.—Syntype (repository unknown; plaster cast of one of the syntype specimens, UMUT MM4450) from Saoyama and Okuminodani, Nangoku; Hagino, Kahoku; Sendachino and Hirano, Ochi; Yamanokami, Sakawa, all in Kochi Pref.; and Tanno, Katsuura, Tokushima Pref. Holotype of *Pterotrigonia pocilliformis* var. *yamanokamiensis* (UMUT MM4453) from Yamanokami, Sakawa, Kochi Pref.

Age and distribution.—Neocomian–Albian. Lower Monobegawa group in Nangoku, Sakawa, Ochi and Monobegawa areas, Hoji and Hanoura formations in Katsuuragawa area, Arita formation in Yuasa area, Todai formation in Takato area, Ishido formation in Sanchu area, and Kikunotani formation in Kurosegawa area.

Pterotrigonia (Pterotrigonia) hokkaidoana (Yehara) [Pl. 6, Fig. 1]

1915. *Trigonia hokkaidoana* Yehara, p. 39, pl. 1, figs. 1–8.—1915. *Trigonia kotoi* Yehara, p. 40, pl. 1, fig. 10.—compare 1921. *Trigonia* cf. *hokkaidoana* Yehara: Hayasaka, p. 15, pl. 1, fig. 2.—1923a. *Trigonia hokkaidoana* Yehara: Yehara, p. 5, pl. 7, figs. 3–5.—1923b. *Trigonia hokkaidoana* Yehara: Yehara, p. 70, pl. 11, figs. 9, 10, pl. 12, fig. 5.—1923b. *Trigonia kotoi* Yehara: Yehara, p. 73, pl. 9, fig. 7.—1925. *Trigonia pocilliformis* var. *sachalinensis* Yabe and Nagao, p. 118, pl. 28, figs. 5, 6.—1927. *Trigonia hokkaidoana* Yehara: Yabe, pl. 4, fig. 6.—1934. *Trigonia hokkaidoana* Yehara: Nagao, p. 205.—1934. *Trigonia kotoi* Yehara: Nagao, p. 206.—1954. *Pterotrigonia hokkaidoana* (Yehara): Kobayashi, p. 76.—1954. *Pterotrigonia kotoi* (Yehara): Kobayashi, p. 77.—1954. *Pterotrigonia pocilliformis sachalinensis* (Yabe and Nagao): Kobayashi, p. 77.—compare 1956a. *Myophorella* (*Promyophorella*) *obsoleta* Kobayashi and Tamura: Kobayashi, p. 2, pl. 1, fig. 2.—1957. *Pterotrigonia hokkaidoana* (Yehara): Kobayashi and Nakano, p. 229, pl. 16, fig. 4.—1958. *Pterotrigonia hokkaidoana* (Yehara): Kobayashi and Nakano, p. 148, pl. 11, figs. 9–11.—compare 1960d. *Myophorella* (*Promyophorella*) *obsoleta* Kobayashi and Tamura: Tamura, p. 234.—1964. *Pterotrigonia hokkaidoana* (Yehara): Matoba, p. 259, pl. 37, figs. 4, 5.—1964. *Pterotrigonia* cf. *hokkaidoana* (Yehara): Matoba, p. 259, pl. 37, figs. 1–3.—1967. *Pterotrigonia* (*Pterotrigonia*) *hokkaidoana* (Yehara): Hayami and Kawasawa, p. 79, pl. 9, figs. 6–9.—1968. *Pterotrigonia hokkaidoana* (Yehara): Hayami and Nakano, p. 200, fig. 2–6.—1969. *Pterotrigonia hokkaidoana* (Yehara): Hatai, Kotaka and Noda, p. 32, pl. 1, figs. 1, 11.—1972. *Pterotrigonia hokkaidoana* (Yehara): Hashimoto, Hayami and Noda, p. 47, pl. 10, figs. 2–5.

Type.—Lectotype designated by Kobayashi and Nakano (1957, p. 230) (IGPS no. 4224) from Hiraiga, Tanohata, Iwate Pref. Holotype by monotypy of *Trigonia kotoi* (IGPS no. 4351) from the same locality. Syntype of *Trigonia pocilliformis* var. *sachalinensis* (IGPS not registered) from the south of Cape Khoi, near Alexandrovsk, north Saghalin.
Age and distribution.—Upper Neocomian–Cenomanian. Miyako group (Tanohata, Hiraiga and Aketo formations) in Tanohata and Miyako areas, Middle Yezo group (Mikasa sandstone) in Ikushumbetsu area, Ishido formation in Sanchu area, Arita formation in Yuasa area, Oshima formation in Oshima area, Hachiryusan, Hinagu and Yatsushiro formations in Sakamoto and Yatsushiro areas, Haidateyama formation in Nozu area, Lower Monobegawa group in Sakawa, Monobegawa and Ochi areas, Hoji formation in Katsuuragawa area, Gosyonoura group in Gosyonoura island, Shimantogawa group (Doganaro formation) in Susaki area, Gumizaki formation in Gumizaki area, and Miocene Misaki formation in Misaki area (derived fossil).
Remarks.—The relationship between *Pterotrigonia* (*Pterotrigonia*) *pocilliformis* and the present species should be further studied, because their discrimination is not necessarily clear.

Pterotrigonia (Pterotrigonia) yokoyamai (Yehara)

1915. *Trigonia yokoyamai* Yehara, p. 41, pl. 2, figs. 15–17.—1934. *Trigonia yokoyamai* Yehara: Nagao, p. 205.—1954. *Pterotrigonia yokoyamai* (Yehara): Kobayashi, p. 77.

Type.—Syntype (IGPS nos. 4366, 4367) from Hiraiga, Tanohata, Iwate Pref.
Age and distribution.—Upper Neocomian (?)–Aptian. Miyako group (Hiraiga formation) in Tanohata area, and (?) Ishido formation in Sanchu area.

Pterotrigonia (Pterotrigonia) datemasamunei (Yehara)

1915. *Trigonia datemasamunei* Yehara, p. 38, pl. 2, figs. 13. 14.—1923b. *Trigonia datemasamunei* var.: Yehara, p. 69, pl. 10, figs. 7, 8.—1934. *Trigonia datemasamunei* Yehara: Nagao, p. 205.—1954. *Pterotrigonia datemasamunei* (Yehara): Kobayashi, p. 76.—1958. *Pterotrigonia datemasamunei* (Yehara): Kobayashi and Nakano, p. 148, pl. 11, figs. 5, 6.

Type.—Syntype (IGPS no. 4331) from Raga, Tanohata, Miyagi Pref.
Age and distribution.—Aptian–Albian. Miyako group (Hiraiga formation) in Tanohata area, and Haidateyama formation in Nozu area.

Pterotrigonia (Pterotrigonia) brevicula (Yehara)

1915. *Trigonia brevicula* Yehara, p. 42, pl. 2, figs. 18, 19.—1954. *Pterotrigonia brevicula* (Yehara): Kobayashi, p. 76.—1961. *Pterotrigonia brevicula* (Yehara): Nakano and Numano, p. 91, pl. 13, figs. 4–8.

Type.—Lectotype designated by Nakano and Numano (1961, p. 91) (IGPS no. 4329) from Mikasa (Ikushumbetsu), Ishikari Prov., Hokkaido.
Age and distribution.—Cenomanian–Turonian. Middle yezo group (Mikasa sandstone) in Ikushumbetsu area.

Pterotrigonia (Pterotrigonia) sakakurai (Yehara)

1923a. *Trigonia sakakurai* Yehara, p. 6, pl. 4, fig. 6.—1923b. *Trigonia sakakurai* Yehara: Yehara, p. 76, pl. 11, fig. 3, pl. 13, fig. 2.—1954. *Pterotrigonia sakakurai* (Yehara): Kobayashi, p. 77.—1961. *Pterotrigonia sakakurai* (Yehara): Nakano and Numano, p. 93, pl. 13, figs. 9, 10.

Type.—Lectotype designated by Nakano and Numano (1961, p. 93) (UK JM10171) from Gosyonoura, Kumamoto Pref.
Age and distribution.—Albian (?)–Cenomanian. Gosyonoura group (mainly middle part) in Gosyonoura island.

Subgenus ***Acanthotrigonia*** van Hoepen, 1929

Pterotrigonia (Acanthotrigonia) longiloba (Jimbo)

1894. *Trigonia longiloba* Jimbo, p. 38, pl. 8, figs. 2–4.—1915. *Trigonia longiloba* Jimbo: Yehara, p. 40, pl. 1, fig. 9, pl. 2, figs. 10–12.—1923b. *Trigonia longiloba* Jimbo: Yehara, p. 73, pl. 8, figs. 5–8.—1954. *Pterotrigonia longiloba* (Jimbo): Kobayashi, p. 77.—1957. *Acanthotrigonia longiloba* (Jimbo): Kobayashi and Nakano, p. 234, pl. 17, figs. 3–6.—1963. *Acanthotrigonia longiloba* (Jimbo): Matsumoto, p. 45, pl. 67, figs. 2–4.

Type.—Lectotype designated by Kobayashi and Nakano (1957, p. 235) (see also Matsumoto, 1963, p. 45) (UMUT MM7489) from Ponhorokabetsu, Yubari, Ishikari Prov., Hokkaido.
Age and distribution.—Cenomanian–Turonian. Middle Yezo group (Mikasa sandstone) in Yubari and Ikushumbetsu areas, and Miyanohara formation in Ochi area.

Pterotrigonia (Acanthotrigonia) moriana (Yehara)

1927. *Trigonia moriana* Yehara, p. 33, pl. 3, figs. 7, 8.—1954. *Pterotrigonia moriana* (Yehara): Kobayashi, p. 77.—1957. *Acanthotrigonia moriana* (Yehara): Kobayashi and Nakano, p. 233, pl. 16, figs. 5, 6, pl. 17, figs. 9, 10.

Type.—Lectotype designated by Kobayashi and Nakano (1957, p. 233) (UK JM10172) from Hagino, Kahoku, Kochi Pref.
Age and distribution.—Aptian. Lower Monobegawa group (Hagino formation) in Monobegawa area.

Pterotrigonia (Acanthotrigonia) dilapsa (Yehara)

1923a. *Trigonia dilapsa* Yehara, p. 2, pl. 4, figs. 1, 2, pl. 5, fig. a.—1923b. *Trigonia dilapsa* Yehara: Yehara, p. 74, pl. 8, fig. 9, pl. 12, figs. 1, 2, pl. 13, fig. 1a.—1954. *Pterotrigonia dilapsa* (Yehara): Kobayashi, p. 76.

Type.—Syntype (UK JM10156) from Gosyonoura and Oe (Amakusa), Kumamoto Pref.
Age and distribution.—Albian (?)–Cenomanian. Gosyonoura group in Gosyonoura island.

Pterotrigonia (Acanthotrigonia) ogawai (Yehara)

1923a. *Trigonia ogawai* Yehara, p. 4, pl. 4, figs. 3–5.—1923b. *Trigonia ogawai* Yehara: Yehara, p. 75, pl. 12, figs. 6–8, pl. 13, fig. 1b.—1954. *Pterotrigonia ogawai* (Yehara): Kobayashi, p. 77.—1957. *Acanthotrigonia ogawai* (Yehara): Kobayashi and Nakano, p. 235, pl. 17, figs. 1, 2.—1958. *Acanthotrigonia ogawai* (Yehara): Kobayashi and Nakano, p. 150, pl. 11, fig. 4.

Type.—Lectotype designated by Kobayashi and Nakano (1958, p. 150) (UK JM10195) from Gosyonoura, Kumamoto Pref.
Age and distribution.—Albian (?)–Cenomanian. Gosyonoura group in Gosyonoura island, and Miyaji formation in Yatsushiro area.

Pterotrigonia (Acanthotrigonia) pustulosa (Nagao)

1923b. *Trigonia pocilliformis* Yokoyama: Yehara, p. 71 (pars), pl. 10, figs. 1–3 (non pl. 9,

figs. 8–10, pl. 10, figs. 4–6).—1930. *Trigonia pustulosa* Nagao, p. 17, pl. 3, figs. 9–12.—1954. *Pterotrigonia pustulosa* (Nagao): Kobayashi, p. 77.—1957. *Acanthotrigonia pustulosa* (Nagao): Kobayashi and Nakano, p. 234, pl. 16, fig. 7, pl. 17, figs. 7, 8.

Type.—Syntype (GMH? not registered) from Gosyonoura, Kumamoto Pref.

Age and distribution.—Albian (?)–Cenomanian. Gosyonoura group in Gosyonoura island, and Miyanohara formation in Ochi area.

Pterotrigonia (Acanthotrigonia) yeharai Nakano and Numano

1923a. *Trigonia yokoyamai* var.: Yehara, p. 7, pl. 6, fig. 8.—1923b. *Trigonia sakakurai* var.: Yehara, p. 77, pl. 12, fig. 9.—1961. *Pterotrigonia (Rinetrigonia) yeharai* Nakano and Numano, p. 95, pl. 13, figs. 1, 2.—1968. *Acanthotrigonia yeharai* (Nakano and Numano): Tamura, Tashiro and Motojima, p. 38, text-fig. 2, pl. 1, figs. 19–23.

Type.—Holotype (IGSH NM3028a) from Enokuchi, Gosyonoura, Kumamoto Pref.

Age and distribution.—Albian (?)–Cenomanian. Gosyonoura group in Gosyonoura island.

Pterotrigonia (Acanthotrigonia) higoensis (Tamura and Tashiro)

1961. *Pterotrigonia (Rinetrigonia)* sp.: Nakano and Numano, p. 96, pl. 13, fig. 3.—1967. *Acanthotrigonia higoensis* Tamura and Tashiro, p. 17, text-fig. 2, pl. 1, figs. 14–17.

Type.—Holotype (KE 1725) from Kawauchi, Yabe, Kumamoto Pref.

Age and distribution.—Cenomanian–Turonian. Mifune group in Yabe and Matsubase areas.

Pterotrigonia (Acanthotrigonia) mashikensis (Tamura and Tashiro)

1967. *Acanthotrigonia mashikensis* Tamura and Tashiro, p. 19, text-fig. 2, pl. 1, figs. 1–7.

Type.—Holotype (KE 1712) from Itoishi, Toyono, Kumamoto Pref.

Age and distribution.—Cenomanian–Turonian. Mifune group in Matsubase, Yabe and Mifune areas.

Pterotrigonia (Acanthotrigonia) mifunensis (Tamura and Tashiro)

1967. *Acanthotrigonia mifunensis* Tamura and Tashiro, p. 20, text-fig. 2, pl. 1, figs. 8–13.

Type.—Holotype (KE 1719) from Itoishi, Toyono, Kumamoto Pref.

Age and distribution.—Cenomanian–Turonian. Mifune group in Matsubase area.

Remarks.—This is possibly conspecific with *Pterotrigonia (Acanthotrigonia) mashikensis.*

Subgenus ***Scabrotrigonia*** Dietrich, 1933

Pterotrigonia (Scabrotrigonia) imanishii (Nakano)

1956. *Trigonia pocilliformis* Yokoyama: Imanishi, p. 53, figs. 1, 3.—1958b. *Scabrotrigonia imanishii* Nakano, p. 230, pl. 29, figs. 1–4.

Type.—Holotype (IGSH NM Sc-i 01) from Horombetsu, Utanobori, Kitami Prov., Hokkaido.

Age and distribution.—Aptian–Albian. Horombetsu formation in Esashi area.

Pterotrigonia (Scabrotrigonia) obsoleta (Nakano)

1958b. *Scabrotrigonia obsoleta* Nakano, p. 230, pl. 29, fig. 5.

Type.—Holotype (IGSH NM Sc-o 01) from Kurosaki, Gosyonoura, Kumamoto Pref.

Age and distribution.—Albian (?)–Cenomanian. Gosyonoura group (middle part) in Gosyonoura island.

Pterotrigonia (Scabrotrigonia) kobayashii (Nakano)

1958b. *Scabrotrigonia kobayashii* Nakano, p. 231, pl. 29, figs. 6, 7.

Type.—Holotype (IGSH NM Sc-k 01) from Katsurazawa, Ikushumbetsu, Ishikari Prov., Hokkaido.

Age and distribution.—Cenomanian–Turonian. Middle Yezo group (Mikasa sandstone) in Ikushumbetsu area.

Subclass HETERODONTA Neumayr, 1884

Order VENEROIDA Adams and Adams, 1856

Superfamily LUCINACEA Fleming, 1828

Family LUCINIDAE Fleming, 1828

Subfamily LUCININAE Fleming, 1828

Genus ***Luciniola*** Skeat and Madsen, 1898

Luciniola hasei (Hayami)

1959h. *Lucina* (s. l.) *hasei* Hayami, p. 76, pl. 8, figs. 6–8.

Type.—Holotype (UMUT MM3455) from Takayama, Toyoda, Yamaguchi Pref.

Age and distribution.—Sinemurian. Toyora group (Higashinagano formation) in Toyoda area.

Genus ***Mesolinga*** Chavan, 1951

Mesolinga masatanii Hayami

1961b. *Mesolinga masatanii* Hayami, p. 119, text-fig. 1, pl. 16, figs. 8–10.

Type.—Holotype (UMUT MM3686) from Sugaya, Soma, Fukushima Pref.

Age and distribution.—Bathonian (or thereabout). Soma group (Yamagami formation) in Soma area.

Subfamily MYRTEINAE Chavan, 1969

Genus ***Mesomiltha*** Chavan, 1938

Mesomiltha? tsunoensis (Kimura)

1956. *Lucina tsunoensis* Kimura, p. 87, pl. 1, figs. 11–13.—1959e. *Lucina tsunoensis* Kimura: Tamura: Tamura, p. 115, pl. 12, figs. 21, 22.—1960d. *Lucina tsunoensis* Kimura: Tamura, p. 241.

Type.—Holotype (UMUT MM7160) from Komiguchi, Go, Kochi Pref.

Age and distribution.—Upper Jurassic. Torinosu group in Sakawa, Sakamoto and Tanoura areas.

Genus ***Lucinoma*** Dall, 1901

Lucinoma? kotoi (Nagao)

1934. *Lucina kotoi* Nagao, p. 226, pl. 29, figs. 5, 6.—1965b. *Lucinoma* (?) *kotoi* (Nagao): Hayami, p. 113, pl. 15, figs. 4–6.

Type.—Holotype (GMH no. 6773) from Hiraiga, Tanohata, Iwate Pref.

Age and distribution.—Aptian–Albian. Miyako group (Hiraiga and Aketo formations) in Tanohata area.

Genus ***Myrtea*** Turton, 1822

Myrtea ezoensis (Nagao)

1890. *Lucina* cf. *fallax* Forbes: Yokoyama, p. 176, pl. 18, fig. 9.—1938. *Lucina* (*Myrtea*) *ezoensis* Nagao, p. 136, pl. 16, figs. 4–6.—compare 1957a. *Lucina* aff. *fallax* Forbes: Amano, p. 58, pl. 1, figs. 5–11.—1962. *Lucinoma ezoensis* (Nagao): Saito, p. 70, pl. 2, figs. 6, 11.—1963. *Lucina* (*Myrtea*) *ezoensis* Nagao: Matsumoto, Hayami and Asano, p. 29, pl. 44, fig. 9.

Type.—Holotype (GMH no. 8234) from the middle course of the Obirashibe, Teshio Prov., Hokkaido.

Age and distribution.—Coniacian–Campanian. Upper Yezo group in Urakawa, Abeshinai, Obirashibe and some other areas of Hokkaido, and Futaba group (Ashizawa formation) in Futaba area.

Subfamily uncertain

Lucina? toishiyamensis Tamura

1960d. "*Lucina*" *toishiyamensis* Tamura, p. 241, pl. 2, figs. 15–17.

Type.—Holotype (UMUT MM3624) from Toishiyama, Sakawa, Kochi Pref.

Age and distribution.—Upper Jurassic. Torinosu group in Sakawa area.

Lucina? sp.

1930. *Lucina* cf. *occidentalis* (Morton): Nagao, p. 19, pl. 2, fig. 8.

Age and distribution.—Santonian–Campanian. Himenoura group in Amakusa islands.

Family MACTROMYIDAE Cox, 1929

Genus ***Thetis*** Sowerby, 1826

Thetis japonica (Yabe and Nagao)

1927. *Thetironia affinis* var. *japonica* Yabe and Nagao, *in* Yabe, pl. 5, fig. 7 (nom. nud.).—1928. *Thetironia affinis* var. *japonica* Yabe and Nagao, p. 89, pl. 17, figs. 14, 15.

Type.—Syntype (IGPS no. 22605) from the middle course of the Ikushumbetsu, Mikasa, Ishikari Prov., Hokkaido.

Age and distribution.—Cenomanian–Turonian. Middle Yezo group (Mikasa sandstone) in Ikushumbetsu area.

Genus ***Clisocolus*** Gabb, 1869

Subgenus ***Crenocolus*** Ichikawa, 1966

Clisocolus (Crenocolus) crenulatus Ichikawa and Maeda [Pl. 10, Figs. 3a–c]

1966. *Clisocolus* (*Crenocolus*) *crenulatus* Ichikawa and Maeda, p. 236, pl. 7, figs. 1–3.

Type.—Holotype (OMM F1025) from Azenotani, Sennan, Osaka Pref.

Age and distribution.—Campanian–(?) Maestrichtian. Izumi group (Azenotani shale, Shichi shale and Minato shale) in Izumi mountains and Awaji island.

Family FIMBRIIDAE Nicol, 1950

Genus ***Schafhaeutlia*** Cossmann, 1897

Schafhaeutlia mellingi japonica Ichikawa

1950. *Schafhäutlia mellingi* Hauer *japonica* Ichikawa, p. 250, pl. 5, fig. 8.

Type.—Holotype (UMUT MM5177) from Shimoyama, Sakawa, Kochi Pref.

Age and distribution.—Carnian. Kochigatani group (lower part) in Sakawa area.

Schafhaeutlia nakazawai Tokuyama

1956. *Schafhäutlia* cf. *astartiformis* (Münster): Nakazawa, p. 243, pl. 3, figs. 15–17.—1960c. *Schafhäutlia nakazawai* Tokuyama, p. 211, pl. 13, figs. 12–14.

Type.—Holotype (UMUT MM4593) from Hirabarazaka, Mine, Yamaguchi Pref.

Age and distribution.—Carnian. Mine group (Hirabara formation) in Mine area, and Nabae group (N2 and N3 formations) in Maizuru zone.

Genus ***Sphaeriola*** Stoliczka, 1871

Sphaeriola nipponica Hayami [Pl. 6, Fig. 2]

MM3450 -6-2

1959h. *Sphaeriola nipponica* Hayami, p. 74, pl. 8, figs. 10–13.

Type.—Holotype (UMUT MM3450) from Higashinagano, Toyoda, Yamaguchi Pref.

Age and distribution.—Sinemurian. Toyora group (Higashinagano formation) in Toyoda area.

Genus ***Fimbria*** Megerle von Mühlfeld, 1811

Fimbria somensis Hayami

1961b. *Fimbria somensis* Hayami, p. 120, pl. 16, figs. 11–13.

Type.—Holotype (UMUT MM3687) from Sugaya, Soma, Fukushima Pref.

Age and distribution.—Bathonian (or thereabout). Soma group (Yamagami formation) in Soma area.

Fimbria? tenuiconcha Hayami

1959c. *Fimbria* (?) *tenuiconcha* Hayami, p. 68, pl. 5, fig. 32.

Type.—Holotype (UMUT MM2973) from Akaiwazaki (Hosoura), Shizukawa, Miyagi Pref.

Age and distribution.—Bajocian. Hashiura group (Aratozaki formation) in Shizukawa area.

Superfamily CARDITACEA Fleming, 1820

Family PERMOPHORIDAE van de Poel, 1959

Subfamily PERMOPHORINAE van de Poel, 1959

Genus ***Triaphorus*** Marwick, 1953

Triaphorus hamadaensis (Yabe and Shimizu)

1927. *Myoconcha hamadaensis* Yabe and Shimizu, p. 134, pl. 13, figs. 13–16.

Type.—Syntype (IGPS not registered) from Hamada, Rifu, Miyagi Pref.

Age and distribution.—Ladinian. Rifu formation in Rifu area.

Triaphorus trapezoidalis (Kobayashi and Ichikawa)

1950a. *Myoconcha trapezoidalis* Kobayashi and Ichikawa, p. 213, pl. 1, figs. 12, 13.—1950a. *Myoconcha trapezoidalis* var. *posteroexpansa* Kobayashi and Ichikawa, p. 214, pl. 1, fig. 11.—1959b. *Myoconcha trapezoidalis* Kobayashi and Ichikawa: Tamura, p. 223, pl. 2, fig. 21.

Type.—Holotype (UMUT MM5148) from Umenokidani, Sakawa, Kochi Pref. Holotype of *Myoconcha trapezoidalis* var. *posteroexpansa* (UMUT MM5151) from the same locality.

Age and distribution.—Carnian. Kochigatani group (lower part) in Sakawa and Sakamoto area.

Subfamily MYOCONCHINAE Newell, 1957

Genus ***Myoconcha*** Sowerby, 1824

Myoconcha planata Kobayashi and Ichikawa

1954a. *Myoconcha planata* Kobayashi and Ichikawa, *in* Ichikawa, p. 62, pl. 7, fig. 7.

Type.—Holotype (UMUT MM5422) from Arai, Itsukaichi, Tokyo Pref.

Age and distribution.—Triassic (precisely unknown). Arai formation in Itsukaichi area.

Myoconcha modesta Hayami

1965b. *Myoconcha modesta* Hayami, p. 76, pl. 13, fig. 1.

Type.—Holotype (GK H6391) from Koikorobe, Tanohata, Iwate Pref.

Age and distribution.—Aptian. Miyako group (Tanohata formation) in Tanohata area.

Family CARDITIDAE Fleming, 1828

Genus ***Tutcheria*** Cox, 1946

Tutcheria itoi Hayami

1969a. *Tutcheria itoi* Hayami, p. 28, pl. 3, figs. 1–5.

Type.—Holotype (GK H6859) from Higashinagano, Toyoda, Yamaguchi Pref.

Age and distribution.—Sinemurian. Toyora group (Higashinagano formation) in Toyoda area.

Genus ***Ludbrookia*** Chavan, 1951

Ludbrookia sp. cf. **L. tenuicosta** (Sowerby)

1965b. *Pseudocardia* sp. cf. *P. tenuicosta* (Sowerby): Hayami, p. 77, pl. 7, figs. 1–3.—1972. *Pseudocardia* sp. cf. *P. tenuicosta* (Sowerby): Shikama and Suzuki, pl. 6, fig. 2.

Age and distribution.—Aptian. Miyako group (Tanohata formation) in Miyako area, and Choshi formation in Choshi area.

Genus ***Xenocardita*** Vokes, 1946

Xenocardita amanoi (Hayami)

1957b. *Cardita* (?) sp.: Amano, p. 98, pl. 2, text-fig. 2, figs. 27–29.—1965b. *Pseudocardia amanoi* Hayami, p. 79, pl. 7, figs. 4–7, pl. 15, figs. 1, 2.—compare 1972. *Pseudocardia amanoi* Hayami: Shikama and Suzuki, pl. 6, fig. 3.

Type.—Holotype (GK H6777) from Hagino, Kahoku, Kochi Pref.

Age and distribution.—Aptian. Lower Monobegawa group (Hagino formation) in Monobegawa area.

Genus ***Izumicardia*** Ichikawa, 1963

Izumicardia parva Ichikawa and Maeda [Pl. 10, Figs. 1, 2]

1963. *Izumicardia parva* Ichikawa and Maeda, p. 120, text-fig. 2, pl. 9, figs. 1–7.

Type.—Holotype (OCU MM286) from Mikumayama, Sumoto (Awaji), Hyogo Pref.

Age and distribution.—Campanian. Izumi group (Yoroizaki sandstone) in Awaji island.

Family uncertain

Cardita? sulcataria Hayami

1965. "*Cardita*" *sulcataria* Hayami, *in* Matsumoto, Hayami and Hashimoto, p. 11, pl. 2, figs. 2–4.

Type.—Holotype (CPC no. 13) from a core of PK-3 well at the depth of 2036.1–2039.1 m, Peikang, west Formosa.

Age and distribution.—Aptian. Buried Cretaceous formation in west Formosa.

Superfamily CRASSATELLACEA Férussac, 1822

Family ASTARTIDAE d'Orbigny, 1844

Subfamily ASTARTINAE d'Orbigny, 1844

Genus ***Astarte*** Sowerby, 1816

Subgenus ***Astarte*** Sowerby, 1816

Astarte (Astarte) sakamotoensis Tamura

1959c. *Astarte sakamotoensis* Tamura, p. 29, pl. 5, figs. 1–3.—1960c. *Astarte sakamotoensis* Tamura: Tamura, p. 286, pl. 33, figs. 1, 2.—1960d. *Astarte sakamotoensis* Tamura: Tamura, p. 240.

Type.—Holotype (UMUT MM2976) from Ohira, Yatsushiro, Kumamoto Pref.

Age and distribution.—Upper Jurassic–Berriasian. Torinosu group in Yatsushiro, Sakamoto and Sakuradani areas, and Soma group (Nakanosawa and Koyamada formations) in Soma area.

Astarte (Astarte) defecta Tamura

1959c. *Astarte defecta* Tamura, p. 29, pl. 5, figs. 4–7.—1960c. *Astarte defecta* Tamura: Tamura, p. 286.—1960d. *Astarte defecta* Tamura: Tamura, p. 240.

Type.—Holotype (UMUT MM2978) from Uminoura, Tanoura, Kumamoto Pref.

Age and distribution.—Upper Jurassic. Torinosu group in Tanoura, Sakamoto and Sakawa areas, and Soma group (Nakanosawa formation) in Soma area.

Astarte (Astarte) sp. cf. **A. (A.) spitiensis** Stoliczka

1960. *Astarte* cf. *spitiensis* Stoliczka: Hayami, Sugita and Nagumo, p. 94, pl. 8, figs. 16, 17.

Age and distribution.—Tithonian–Berriasian. Shishiori group (Kogoshio formation) in Kesennuma area, and Isokusa formation in Oshima area.

Astarte (Astarte) subsenecta Yabe and Nagao [Pl. 6, Figs. 3, 4]

1926. *Astarte subsenecta* Yabe and Nagao, *in* Yabe, Nagao and Shimizu, p. 47, pl. 13, figs. 14–16, pl. 14, fig. 11.—1965b. *Astarte* (*Astarte*) *subsenecta* Yabe and Nagao: Hayami, p. 81, pl. 7, figs. 10–18, pl. 14, figs. 1–5.—compare 1965b. *Astarte* (*Astarte*) sp. cf. *A.* (*A.*) *subsenecta* Yabe and Nagao: Hayami, p. 84, pl. 11, figs. 9, 10.—1972. *Astarte* (*Astarte*) *subsenecta* Yabe and Nagao: Shikama and Suzuki, pl. 6, fig. 4.

Type.—Lectotype designated by Hayami (1965b, p. 82) (IGPS no. 22534) from Ishido, Ohinata, Nagano Pref.

Age and distribution.—Upper Neocomian–Albian. Ishido formation in Sanchu area, Haidateyama formation in Nozu area, Yatsushiro formation in Yatsushiro area, Hanoura formation in Katsuuragawa area, and Choshi formation in Choshi area.

Astarte (Astarte) costata Yabe and Nagao

1926. *Astarte subsenecta* var. *costata* Yabe and Nagao, *in* Yabe, Nagao and Shimizu, p. 48, pl. 14, fig. 10.—1965b. *Astarte* (*Astarte*) *costata* Yabe and Nagao: Hayami, p. 85,

pl. 8, figs. 1, 2.—1972. *Astarte* (*Astarte*) *costata* Yabe and Nagao: Shikama and Suzuki, pl. 6, fig. 5.

Type.—Holotype by monotypy (IGPS no. 22483) from Ôze, Nakazato, Gumma Pref.

Age and distribution.—Upper Neocomian–Aptian. Ishido formation in Sanchu area, and Choshi formation in Choshi area.

Subgenus ***Nicaniella*** Chavan, 1945

Astarte (Nicaniella) higoensis Tamura

1959c. *Astarte higoensis* Tamura, p. 28, pl. 5, figs. 11, 12,—1960d. *Astarte higoensis* Tamura: Tamura, p. 240.

Type.—Holotype (UMUT MM2986) from Tsurubami, Sakamoto, Kumamoto Pref.

Age and distribution.—Upper Jurassic. Torinosu group in Sakamoto and Sakawa areas.

Astarte (Nicaniella) semicostata Nagao

1934. *Astarte semicostata* Nagao, p. 221, pl. 31, figs. 3–5, pl. 32, fig. 6 (non pl. 25, fig. 2). —1965b. *Astarte* (*Astarte*) *semicostata* Nagao: Hayami, p. 86, pl. 8, figs. 3–10.

Type.—Lectotype designated by Hayami (1965b, p. 86) (GMH no. 6792) from Hiraiga, Tanohata, Iwate Pref.

Age and distribution.—Aptian. Miyako group (Hiraiga formation) in Tanohata area.

Subgenus ***Trautscholdia*** Cox and Arkell, 1948

Astarte (Trautscholdia) ogawensis Kimura

1956. *Astarte ogawensis* Kimura, p. 86, pl. 1, fig. 9.—1959c. *Astarte ogawensis* Kimura: Tamura, p. 29, pl. 5, figs. 8–10.—1960c. *Astarte ogawensis* Kimura: Tamura, p. 286.—1960d. *Astarte ogawensis* Kimura: Tamura, p. 240.

Type.—Holotype (UMUT MM7164) from Nioigataki, Sakawa, Kochi Pref.

Age and distribution.—Upper Jurassic. Torinosu group in Sakawa, Sakamoto, Yatsushiro and Tanoura areas, and Soma group (Nakanosawa formation) in Soma area.

Astarte (Trautscholdia) minor Nagao

1934. *Astarte minor* Nagao, p. 220, pl. 28, figs. 5–10.—1965b. *Astarte* (*Nicaniella*) *minor* Nagao: Hayami, p. 91, pl. 8, figs. 19–22.

Type.—Lectotype designated by Hayami (1965b, p. 91) (IGPS no. 66425) from Hiraiga, Tanohata, Iwate Pref.

Age and distribution.—Aptian–Albian. Miyako group (Hiraiga and Aketo formations) in Tanohata area.

Subgenus ***Yabea*** Hayami, 1965

Astarte (Yabea) kambarensis Kimura

1956. *Astarte kambarensis* Kimura, p. 85, pl. 1, fig. 7.—1956. *Astarte kambarensis* var. *elongata* Kimura, p. 86, pl. 1, fig. 8.—1960c. *Astarte kambarensis* Kimura: Tamura, p. 286, pl. 33, figs. 14–18.—1960d. *Astarte kambarensis* Kimura: Tamura, p. 240.

Type.—Holotype (UMUT MM7166) from Kambaradani, Sakawa, Kochi Pref. Holotype of *Astarte kambarensis* var. *elongata* (UMUT MM7168) from the same locality.

Age and distribution.—Upper Jurassic–Berriasian. Torinosu group in Sakawa area, and Soma group (Nakanosawa and Koyamada formations) in Soma area.

Astarte (Yabea) shinanoensis Yabe and Nagao [Pl. 6, Figs. 5a, b]

1926. *Astarte shinanoensis* Yabe and Nagao, *in* Yabe, Nagao and Shimizu, p. 47, pl. 13, figs. 29, 30.—1965b. *Astarte* (*Yabea*) *shinanoensis* Yabe and Nagao: Hayami, p. 93, pl. 8, figs. 25, 26, pl. 14, figs. 7, 8.—compare 1965b. *Astarte* (*Yabea*) sp. aff. *A.* (*Y.*) *shinanoensis* Yabe and Nagao: Hayami, p. 94, pl. 9, fig. 1, pl. 14, fig. 9.

Type.—Lectotype (IGPS no. 22544) designated by Hayami (1965b, p. 93) from Ishido, Ohinata, Nagano Pref.

Age and distribution.—Upper Neocomian–Aptian. Ishido formation in Sanchu area.

Astarte (Yabea) akatsui Hayami

1965b. *Astarte* (*Yabea*) *akatsui* Hayami, p. 95, pl. 9, figs. 2–5, pl. 14, figs. 10, 11.—compare 1972. *Astarte* (*Yabea*) akatsui Hayami: Shikama and Suzuki, pl. 6, fig. 6.

Type.—Holotype (GK H6171) from Bisho, Toyo, Kumamoto Pref.

Age and distribution.—Albian. Yatsushiro formation in Yatsushiro area.

Astarte (Yabea?) sp.

1959c. *Astarte?* sp. aff. *hermanni* Oppel: Tamura, p. 30, pl. 5, fig. 14.

Age and distribution.—Upper Jurassic. Torinosu group in Sakamoto area.

Subgenus ***Leckhamptonia*** Cox and Arkell, 1948

Astarte (Leckhamptonia?) subomalioides Nagao

1934. *Astarte subomalioides* Nagao, p. 219, pl. 27, figs. 3, 4.—1934. *Astarte semicostata* Nagao, p. 221 (pars), pl. 25, fig. 2 (non pl. 31, figs. 3–5, pl. 32, fig. 6).—1965b. *Astarte* (*Freiastarte*) *subomalioides* Nagao: Hayami, p. 88, pl. 8, figs. 12–18.—compare 1965b. *Astarte* (*Freiastarte*) sp. cf. *A.* (*F.*) *subomalioides* Nagao: Hayami, p. 90, pl. 8, fig. 24.

Type.—Lectotype (IGPS no. 66446) from Hiraiga, Tanohata, Iwate Pref.

Age and distribution.—Aptian–Albian. Miyako group (Hiraiga and Aketo formations) in Tanohata and Omoto areas.

Genus ***Neocrassina*** Fischer, 1886

Neocrassina sp. cf. **N. subdepressa** (Blake and Hudleston)

1960c. *Astarte subdepressa* Blake and Hudleston: Tamura, p. 287, pl. 33, figs. 19–22.

Age and distribution.—Kimmeridgian–Berriasian. Soma group (Nakanosawa and Koyamada formations) in Soma area.

Genus ***Coelastarte*** Böhm, 1893

Coelastarte cardiniiformis Hayami

1958c. *Coelastarte cardiniiformis* Hayami, p. 106, pl. 7, figs. 12–16.—compare 1959c. *Coelastarte* sp. ex gr. *cardiniiformis* Hayami: Hayami, p. 67, pl. 5, figs. 25, 26.

Type.—Holotype (UMUT MM2880) from Hosoura, Shizukawa, Miyagi Pref.

Age and distribution.—Hettangian. Shizukawa group (Niranohama formation) in Shizukawa area.

Coelastarte somensis (Tamura)

1960c. *Astarte* (*Coelastarte*) *somensis* Tamura, p. 287, pl. 33, figs. 11–13.

Type.—Holotype (UMUT MM3314) from Yamashita, Kashima, Fukushima Pref.

Age and distribution.—Kimmeridgian. Soma group (Nakanosawa formation) in Soma area.

Genus ***Praeconia*** Stoliczka, 1871

Praeconia sp. cf. **P. tetragona** (Terquem)

1959h. *Praeconia* cf. *tetragona* (Terquem): Hayami, p. 71, pl. 7, figs. 15, 16, pl. 8, figs. 2–4.

Age and distribution.—Sinemurian. Toyora group (Higashinagano formation) in Toyora area.

Genus uncertain

Astarte? iwayai Ichikawa

1954d. *Astarte? iwayai* Ichikawa, p. 65, pl. 4, figs. 4, 5.

Type.—Holotype (UMUT MM5469) from Ura (Usugatani), Kaminaka, Tokushima Pref.

Age and distribution.—Carnian. Kochigatani group (lower part) in Sakuradani area.

Astarte? kumamotoensis (Tamura)

1959e. *Eomiodon kumamotoensis* Tamura, p. 115, pl. 12, figs. 17, 18.—1960d. *Eomiodon kumamotoensis* Tamura: Tamura, p. 240.

Type.—Holotype (UMUT MM3105) from Tsurubami, Sakamoto, Kumamoto Pref.

Age and distribution.—Upper Jurassic. Torinosu group in Sakamoto and Sakuradani areas.

Subfamily ERIPHYLINAE Chavan, 1952

Genus ***Eriphyla*** Gabb, 1864

Subgenus ***Eriphyla*** Gabb, 1864

Eriphyla (Eriphyla) miyakoensis (Nagao)

1927. *Astarte miyakoensis* Nagao, *in* Yabe, pl. 4, fig. 5 (nom. nud.).—1934. *Astarte miyakoensis* Nagao, p. 218 pl. 30, fig. 8, pl. 32, figs. 1, 3–5.—compare 1957. *Astarte* cf. *miyakoensis* Nagao: Amano, p. 96, pl. 2, figs. 19–24.—1965b. *Eriphyla* (*Miyakoella*) *miyakoensis* (Nagao): Hayami, p. 101, pl. 10, figs. 1–8, pl. 11, figs. 1–8.—compare 1965b. *Eriphyla* (*Miyakoella*) sp. cf. *E.* (*M.*) *miyakoensis* (Nagao): Hayami, p. 104.

Type.—Lectotype designated by Hayami (1965b, p. 101, erroneously regarded as holotype) (IGPS no. 7105), which was illustrated by Yabe (1927, pl. 4, fig. 5) and Nagao (1934, pl. 32, fig. 3), from Hiraiga, Tanohata, Iwate Pref.

Age and distribution.—Aptian–Albian. Miyako group (Tanohata, Hiraiga and Aketo formations) in Tanohata and Omoto areas.

Eriphyla (Eriphyla) pulchella Hayami

1965b. *Eriphyla* (*Eriphyla*) *pulchella* Hayami, p. 98, pl. 9, figs. 6–12, pl. 14, fig. 6.—? 1969. *Eriphyla* (*Eriphyla*) *pulchella* Hayami: Hatai, Kotaka and Noda, p. 33.—compare 1972. *Eriphyla* (*Eriphyla*) sp. cf. *E.* (*E.*) *pulchella* Hayami: Shikama and Suzuki, pl. 6, fig. 7.

Type.—Holotype (GK H6442) from the northeast of Raga, Tanohata, Iwate Pref.

Age and distribution.—Aptian (?)–Albian. Miyako group (Tanohata? and Aketo formations) in Tanohata area.

Eriphyla (Eriphyla) minima Hayami

1965b. *Eriphyla* (*Eriphyla*) *minima* Hayami, p. 99, pl. 9, figs. 13–16, pl. 14, figs. 12, 13.

Type.—Holotype (GK H6181) from Bisho, Toyo, Kumamoto Pref.
Age and distribution.—Upper Neocomian–Albian. Yatsushiro formation in Yatsushiro area, and Ishido formation in Sanchu area.

Eriphyla (Eriphyla) japonica Ichikawa and Maeda

1963. *Eriphyla japonica* Ichikawa and Maeda, p. 114, text-fig. 1, pl. 8, figs. 4–11.
Type.—Holotype (OCU MM312) from Yamamoto, Nandan (Awaji), Hyogo Pref.
Age and distribution.—Campanian–Maestrichtian. Izumi group (Shimonada sandstone and siltstone, Kitaama sandstone, Shichi shale, Minato shale and Azenotani shale) in Awaji island and Izumi mountains.

Eriphyla (Eriphyla) elegans Ichikawa and Maeda

1963. *Eriphyla elegans* Ichikawa and Maeda, p. 117, pl. 8, figs. 1–3.
Type.—Holotype (OCU MM304) from Yamamoto, Nandan (Awaji), Hyogo Pref.
Age and distribution.—Maestrichtian. Izumi group (Shimonada sandstone and siltstone) in Awaji island.
Remarks.—This is possibly conspecific with *Eriphyla (Eriphyla) japonica.*

Eriphyla (Eriphyla?) sp.

1928. *Astarte (Dozyia)* aff. *striata* Sowerby: Yabe and Nagao, p. 90, pl. 17, figs. 7, 8.
Age and distribution.—Cenomanian–Turonian. Middle Yezo group (Mikasa sandstone) in Manji area.

Subfamily OPINAE Chavan, 1952

Genus ***Opis*** Defrance, 1825

Subgenus ***Trigonopis*** Fischer, 1887

Opis (Trigonopis) torinosuensis Kimura

1956. *Opis (Trigonopis) torinosuensis* Kimura, p. 87, pl. 1, fig. 10.—1959e. *Opis (Trigonopis) torinosuensis* Kimura: Tamura, p. 113, pl. 12, figs. 11–13.—1960c. *Opis (Trigonopis) torinosuensis* Kimura: Tamura, p. 288, pl. 33, figs. 5–7.—1960d. *Opis (Trigonopis) torinosuensis* Kimura: Tamura, p. 240.
Type.—Holotype (UMUT MM7170) from Yatsuji, Sakawa, Kochi Pref.
Age and distribution.—Upper Jurassic. Torinosu group in Sakawa, Yatsushiro, Sakamoto and Sakuradani areas, and Soma group (Nakanosawa formation) in Soma area.

Opis (Trigonopis) trigonalis Tamura

1959e. *Opis (Trigonopis) trigonalis* Tamura, p. 114, pl. 12, figs. 14–16.
Type.—Holotype (UMUT MM3099) from Sakamoto, Sakamoto, Kumamoto Pref.
Age and distribution.—Upper Jurassic. Torinosu group in Sakamoto area.

Subgenus ***Opis*** Defrance, 1825

Opis (Opis) haginoensis Amano

1957b. *Opis (Trigonopis) haginoensis* Amano, p. 97, pl. 2, figs. 25, 26.—1965b. *Opis (Opis) haginoensis* Amano: Hayami, p. 106.
Type.—Holotype (KML UMUT KML0045) from Hagino, Kahoku, Kochi Pref.
Age and distribution.—Aptian. Lower Monobegawa group (Hagino formation) in Monobegawa area.

Opis (Opis) nakanoi Hayami

1965b. *Opis (Opis) nakanoi* Hayami, p. 105, pl. 11, figs. 11, 12.

Type.—Holotype (GK H6451) from Hideshima (Sakiyama), Miyako, Iwate Pref.

Age and distribution.—Aptian. Miyako group (Tanohata formation) in Miyako area.

Opis (Opis) amakusensis Ueda

1963. *Opis (Opis) amakusensis* Ueda, p. 73, pl. 11, figs. 1–4, 15.

Type.—Holotype (GK H6098) from Furukojiro, Amakusa, Kumamoto Pref.

Age and distribution.—Santonian. Himenoura group (lower part) in Amakusa islands.

Opis (Opis) hokkaidoensis Ueda

1963. *Opis (Opis) hokkaidoensis* Ueda, p. 74, pl. 11, figs. 5–14, 16.

Type.—Holotype (GK H6101) from Ponporoto, Hamanaka, Kushiro Prov., Hokkaido.

Age and distribution.—Campanian or Maestrichtian. Nemuro group (Hamanaka formation) in Akkeshi area.

Opis (Opis) sp.

1962. *Opis neocomiensis* d'Orbigny: Saito, p. 71, pl. 1, fig. 21.

Age and distribution.—Coniacian. Futaba group (Ashizawa formation) in Futaba area.

Genus ***Coelopis*** Fischer, 1887

Coelopis tanourensis (Tamura)

1959e. *Opis (Coelopis) tanourensis* Tamura, p. 114, pl. 12, figs. 5–7.

Type.—Holotype (UMUT MM3091) from Uminoura, Tanoura, Kumamoto Pref.

Age and distribution.—Upper Jurassic. Torinosu group in Tanoura and Sakamoto areas.

Family CRASSATELLIDAE Férussac, 1822

Subfamily CRASSATELLINAE Férussac, 1822

Genus ***Pachythaerus*** Conrad, 1869

Pachythaerus kagaharensis (Yokoyama)

1890. *Crassatella kagaharensis* Yokoyama, p. 200, pl. 25, figs. 14–16.—1963. *Pachythaerus kagaharensis* (Yokoyama): Matsumoto, Hayami and Asano, p. 32, pl. 51, figs. 14–16.—1965b. *Pachythaerus kagaharensis* (Yokoyama): Hayami, p. 107, pl. 13, figs. 7–11, pl. 14, figs. 14, 15.

Type.—Syntype (depository unknown) from Kagahara, Nakazato, Gumma Pref.

Age and distribution.—Upper Neocomian–Aptian. Ishido formation in Sanchu area.

Pachythaerus nagaoi (Matsumoto)

1938. *Crassatella (Pachythaerus) nagaoi* Matsumoto, p. 16, text-figs. 10, 11.—1956. *Crassatellites nagaoi* Matsumoto: Amano, p. 74, pl. 1, figs. 16–20.

Type.—Syntype (UMUT MM7797–MM7801) from Kobunenosako and Enokuchi, Gosyonoura, Kumamoto Pref.

Age and distribution.—Albian (?)-Cenomanian. Gosyonoura group in Gosyonoura and Shishijima islands.

Genus ***Anthonya*** Gabb, 1864

Anthonya subcantiana Nagao [Pl. 6, Figs. 8, 9]

1934. *Anthonya subcantiana* Nagao, p. 222, pl. 25, fig. 11, pl. 30, figs. 6, 7.—1965b.

Anthonya subcantiana Nagao: Hayami, p. 110, pl. 12, figs. 1–11, pl. 13, figs. 2–5.—compare 1965b. *Anthonya* sp. cf. *A. subcantiana* Nagao: Hayami, p. 113, pl. 13, fig. 6.—1969. *Anthonya subcantiana* Nagao: Hatai, Kotaka and Noda, p. 33, pl. 1, figs. 6, 7.—1972. *Anthonya subcantiana* Nagao: Tamura and Packard, p. 27, text-fig. 3.

Type.—Lectotype designated by Hayami (1965b, p. 110) (GMH no. 6768) from Haipe, Tanohata, Iwate Pref.

Age and distribution.—Aptian–Albian. Miyako group (Tanohata, Hiraiga and Aketo formations) in Tanohata and Omoto areas.

Anthonya apicalis apicalis Nagao

1938. *Anthonya apicalis* Nagao, p. 134, pl. 15, figs. 1–3.—1972. *Anthonya apicalis* Nagao: Tamura and Packard, p. 27.

Type.—Syntype (GMH no. 8203) from Poronai, Mikasa, Ishikari Prov., Hokkaido.

Age and distribution.—Cenomanian–Turonian. Middle Yezo group (Mikasa sandstone) in Ikushumbetsu area.

Anthonya apicalis shishijimensis Amano

1956. *Anthonya apicalis shishijimensis* Amano, p. 75, pl. 2, figs. 6–12.—1972. *Anthonya apicalis shishijimensis* Amano: Tamura and Packard, p. 27.

Type.—Syntype (KU not registered) from Miyanohara, Ochi, Kochi Pref., and Shishijima, Azuma, Kagoshima Pref.

Age and distribution.—Albian (?)–Cenomanian. Gosyonoura group in Shishijima island, and Miyanohara formation in Ochi area.

Anthonya japonica Matsumoto

1938. *Anthonya japonica* Matsumoto, p. 16, text-figs. 6, 7.—1938. *Anthonya ensiformis* Nagao, p. 135, pl. 15, figs. 4–8, p. 142 (postscript).—1972. *Anthonya japonica* Matsumoto: Tamura and Packard, p. 27, text-fig. 3, pl. 1, figs. 9–11.

Type.—Syntype (UMUT MM7788) from Arakuchi, Gosyonoura, Kumamoto Pref. Syntype of *Anthonya ensiformis* (GMH no. 8250) from Ikushumbetsu, Mikasa, Ishikari Prov., Hokkaido.

Age and distribution.—Cenomanian–Turonian. Gosyonoura group in Gosyonoura island, and Middle Yezo group (Mikasa sandstone) in Ikushumbetsu area.

Family CARDINIIDAE Zittel, 1881

Genus ***Cardinia*** Agassiz, 1841

Cardinia triadica Kobayashi and Ichikawa

1952a. *Cardinia triadica* Kobayashi and Ichikawa, p. 62, pl. 1, figs. 1–5.—1955. *Cardinia triadica* Kobayashi and Ichikawa: Nakazawa, p. 258, pl. 16, fig. 9.—1960c. *Cardinia triadica* Kobayashi and Ichikawa: Tokuyama, p. 211, pl. 13, figs. 17, 18.

Type.—Holotype (UMUT MM5380a) from the west of Heki, Yakuno, Kyoto Pref.

Age and distribution.—Carnian. Heki formation and Nabae group (N2 formation) in Maizuru zone, and Mine group (Hirabara formation) in Mine area.

Cardinia misawensis Kobayashi and Ichikawa

1952b. *Cardinia misawensis* Kobayashi and Ichikawa, p. 265, pl. 10, figs. 7, 8.—1954d. *Cardinia misawensis* Kobayashi and Ichikawa: Ichikawa, p. 58, pl. 4, figs. 7, 12–14.—compare 1955. *Cardinia* cf. *misawensis* Kobayashi and Ichikawa: Nakazawa, p. 259, pl. 16,

fig. 10.—1956. *Cardinia misawensis* Kobayashi and Ichikawa: Nakazawa, p. 231, pl. 1, fig. 1.
Type.—Holotype (UMUT MM5399d) from Misawa (east of Jito), Kawakami, Okayama Pref.
Age and distribution.—Carnian–(?) Norian. Nariwa group (lower part) in Nariwa area, Kochigatani group (lower part) in Sakuradani area, and Nabae group (N3 formation) in Maizuru zone.

MM2918-6-10 **Cardinia toriyamai** Hayami [Pl. 6, Figs. 10, 11]

MM2917-6-11 1958e. *Cardinia toriyamai* Hayami, p. 121, pl. 9, figs. 1–11.—1959h. *Cardinia toriyamai* Hayami: Hayami, p. 71.
Type.—Holotype (UMUT MM2918) from Higashinagano, Toyoda, Yamaguchi Pref.
Age and distribution.—Sinemurian. Toyora group (Higashinagano formation) in Toyoda area.

Cardinia orientalis Hayami

1959h. *Cardinia orientalis* Hayami, p. 70, pl. 8, fig. 1.
Type.—Holotype (UMUT MM3439) from Higashinagano, Toyoda, Yamaguchi Pref.
Age and distribution.—Sinemurian. Toyora group (Higashinagano formation) in Toyoda area.

Genus ***Minepharus*** Tokuyama, 1958

MM4470-6-12 **Minepharus triadicus** (Tokuyama) [Pl. 6, Figs. 12, 13]

1958. *Palaeopharus* (*Minepharus*) *triadicus* Tokuyama, p. 297, text-fig. 2, pl. 43, figs. 1–4, 6, 7 (non fig. 5)

MM4475-6-13 *Type.*—Holotype (UMUT MM4470) from Hirabarazaka, Mine, Yamaguchi Pref.
Age and distribution.—Carnian. Mine group (Hirabara formation) in Mine area.

Superfamily CARDIACEA Lamarck, 1809

Family CARDIIDAE Lamarck, 1809

Subfamily PROTOCARDIINAE Keen, 1951

Genus ***Protocardia*** von Beyrich, 1845

Subgenus ***Protocardia*** von Beyrich, 1845

Protocardia (Protocardia) kurumensis Hayami

1958d. *Protocardia kurumensis* Hayami, p. 194, pl. 28, figs. 5–8.
Type.—Holotype (UMUT MM2803) from Shinatani, Omi (Agero), Niigata Pref.
Age and distribution.—Pliensbachian–Toarcian. Kuruma group (Shinatani formation) in Omi area.

Protocardia (Protocardia) onoi Hayami

1959h. *Protocardia onoi* Hayami, p. 77, pl. 8, figs. 16–18.
Type.—Holotype (UMUT MM3463) from Higashinagano, Toyoda, Yamaguchi Pref.
Age and distribution.—Sinemurian. Toyora group (Higashinagano formation) in Toyoda area.

Protocardia (Protocardia) inaii Hayami

1959e. *Protocardia inaii* Hayami, p. 140, pl. 14, figs. 11–13.
Type.—Holotype (UMUT MM3135) from Shizuhama, Shizukawa, Miyagi Pref.

Age and distribution.—Bajocian. Hashiura group (Aratozaki formation) in Shizukawa area.

Protocardia (Protocardia) tosensis Kimura

1956. *Protocardia tosensis* Kimura, p. 88, pl. 1, fig. 14.—1959c. *Protocardia tosensis* Kimura: Tamura, p. 28, pl. 5, figs. 33–37.—1960c. *Protocardia tosensis* Kimura: Tamura, p. 290, pl. 33, figs. 23, 24.—1960d. *Protocardia tosensis* Kimura: Tamura, p. 241.

Type.—Holotype (UMUT MM7159) from Yatsuji, Sakawa, Kochi Pref.

Age and distribution.—Upper Jurassic–Berriasian. Torinosu group in Sakawa, Sakamoto and Sakuradani areas, and Soma group (Nakanosawa and Koyamada formations) in Soma area.

Protocardia (Protocardia) morii Hayami

1960a. *Protocardia morii* Hayami, p. 18, pl. 3, figs. 11–15.

Type.—Holotype (UMUT MM3574) from Nagashioya, Kitakami (Hashiura), Miyagi Pref.

Age and distribution.—Tithonian or lower Neocomian. Jusanhama group in Hashiura area.

Protocardia (Protocardia) ibukii Nakazawa and Murata

1966. *Protocardia ibukii* Nakazawa and Murata, p. 314, pl. 4, fig. 7, pl. 5, figs. 1–4.

Type.—Holotype (IGPS no. 85765) from Kanayamazawa, Omine, Iwate Pref.

Age and distribution.—Neocomian. Kamihei group in Kamaishi area.

Protocardia (Protocardia) hiraigensis Hayami

1934. *Cardium* sp.: Nagao, p. 228, pl. 29, fig. 15 (? fig. 7).—1965b. *Protocardia hiraigensis* Hayami, p. 119, pl. 15, figs. 8–10.

Type.—Holotype (GK H6483) from Hiraiga, Tanohata, Iwate Pref.

Age and distribution.—Aptian. Miyako group (Hiraiga formation) in Tanohata and Miyako areas.

Genus ***Globocardium*** Hayami, 1965

Globocardium sphaeroideum (Forbes)

1934. *Protocardia* sp.: Nagao, p. 228, pl. 29, fig. 13.—1965b. *Protocardia* (*Globocardium*) *sphaeroidea* (Forbes): Hayami, p. 117, pl. 16, figs. 1–6.

Age and distribution.—Aptian. Miyako group (Tanohata and Hiraiga formations) in Tanohata area. This species is also known from the Aptian of western Europe, Crimea and Caucasus.

Remarks.—The concentric ribs on the disk seems to be more flat-topped in the Japanese specimens than in European ones, but the difference may be attributed to geographic variation.

Genus ***Nemocardium*** Meek, 1876

Subgenus ***Nemocardium*** Meek, 1876

Nemocardium (Nemocardium) yatsushiroense Hayami

1965b. *Nemocardium yatsushiroense* Hayami, p. 120, pl. 17, figs. 1–7.—compare 1965. *Nemocardium* sp. aff. *N. yatsushiroense* Hayami: Matsumoto, Hayami and Hashimoto,

p. 13, pl. 2, fig. 8.—1972. *Nemocardium yatsushiroense* Hayami: Shikama and Suzuki, pl. 6, fig. 9.

Type.—Holotype (GK H6486) from Nekodani, Yatsushiro, Kumamoto Pref.

Age and distribution.—Aptian–Albian. Yatsushiro formation in Yatsushiro area, and Choshi formation in Choshi area.

Nemocardium (Nemocardium) koshikijimense (Amano)

1957a. *Protocardium koshikijimense* Amano, p. 60, pl. 1, figs. 1–4.

Type.—Holotype (UMUT KML0061) from Ukimizu, Kashima (Shimokoshiki), Kagoshima Pref.

Age and distribution.—Santonian (?)–Campanian. Himenoura group (upper part) in Shimokoshiki island.

Genus ***Integricardium*** Rollier, 1912

Subgenus ***Yokoyamaina*** Hayami, 1958

Integricardium (Yokoyamaina) hayamii (Keen and Casey) [Pl. 7, Figs. 1, 2]

1904. *Cyrena elliptica* Yokoyama, p. 11, pl. 1, fig. 4 (non *Cyrena elliptica* Dunker, 1843).—1958b. *Yokoyamaina elliptica* (Yokoyama): Hayami, p. 24, pl. 3, figs. 11–16.—compare 1958b. *Yokoyamaina* cf. *elliptica* (Yokoyama): Hayami, p. 25, pl. 3, fig. 17.—1969. *Yokoyamaina hayamii* Keen and Casey, *in* Cox et al., p. N668, fig. E140–12.—1972. *Integricardium* (*Yokoyamaina*) *hayamii* (Keen and Casey): Hayami, p. 204, pl. 38, figs. 10, 11.

Type.—Holotype by monotypy (UMUT MM7173) from Niranohama, Utatsu, Miyagi Pref.

Age and distribution.—Hettangian. Shizukawa group (Niranohama formation) in Shizukawa, Hashiura and Mizunuma areas.

Subgenus uncertain

Intergricardium? seikaianum (Amano, Ogata and Nire)

1958. *Tendagurium seikaianum* Amano, Ogata and Nire, p. 19, pl. 1, figs. 1–5.

Type.—Holotype (KU not registered) from Tateishi, Azuma (Shishijima), Kagoshima Pref.

Age and distribution.—Cenomanian. Gosyonoura group in Shishijima island.

Subfamily LAEVICARDIINAE Keen, 1936

Genus ***Laevicardium*** Swainson, 1840

Laevicardium? ishidoense (Yabe and Nagao)

1926. *Cardium ishidoense* Yabe and Nagao, *in* Yabe, Nagao and Shimizu, p. 48, pl. 12, figs. 9, 16, 18.—1965b. *Laevicardium* (?) *ishidoense* (Yabe and Nagao): Hayami, p. 123, pl. 17, figs. 8–10.—compare 1972. *Laevicardium* (?) *ishidoense* Hayami: Shikama and Suzuki, pl. 6, fig. 10.

Type.—Lectotype designated by Hayami (1965b, p. 123) (IGPS no. 22533) from Ishido, Ohinata, Nagano Pref.

Age and distribution.—Upper Neocomian–Albian. Ishido formation in Sanchu area, and Yatsushiro formation in Sakamoto and Yatsushiro areas.

Laevicardium? corpulentum (Amano)

1957b. *Cardium corpulentum* Amano, p. 99, pl. 2, fig. 30.—1965b. *Laevicardium* (?) *corpulentum* (Amano): Hayami, p. 125, pl. 15, fig. 11.

Type.—Holotype (UMUT KML0004) from Hagino, Kahoku, Kochi Pref.

Age and distribution.—Aptian. Lower Monobegawa group (Hagino formation) in Monobegawa area.

Subfamily uncertain

Cardium? naganoense Hayami

1959h. *Cardium* (s. l.) *naganoense* Hayami, p. 77, pl. 8, figs. 14, 15.

Type.—Holotype (UMUT MM3461) from Higashinagano, Toyoda, Yamaguchi Pref.

Age and distribution.—Sinemurian. Toyora group (Higashinagano formation) in Toyoda area.

Superfamily MACTRACEA Lamarck, 1809

Family MACTRIDAE Lamarck, 1809

Genus ***Cymbophora*** Gabb, 1869

Cymbophora ezoensis (Yabe and Nagao)

1928. *Spisula* (*Cymbophora*) *ezoensis* Yabe and Nagao, p. 91, pl. 16, figs. 5–10.—1938. *Spisula* (*Cymbophora*) *ezoensis* var. *hetonaiensis* Nagao and Otatume, p. 47, pl. 2, fig. 3.

Type.—Syntype (IGPS no. 22614) from the upper course of the Ponnebetsu, Manji, Ishikari Prov., Hokkaido. **Lectotype** of *Spisula* (*Cymbophora*) *ezoensis* var. *hetonaiensis*, here designated, (Nagao and Otatume, 1938, pl. 2, fig. 3; GMH no. 5975) from Osachinai, Hidaka Prov., Hokkaido.

Age and distribution.—Cenomanian–Campanian. Middle Yezo group (Mikasa sandstone) in Manji area, and Hakobuchi group (lower part) in Osachinai area.

Cymbophora? tellinoides (Nagao and Otatume)

1938. *Spisula* (*Cymbophora?*) *tellinoides* Nagao and Otatume, p. 49, pl. 2, fig. 8.

Type.—**Lectotype** here designated (Nagao and Otatume, 1938, pl. 2, fig. 8; GMH no. 5945) from Sanusubezawa, Nakahobetsu, Hidaka Prov., Hokkaido.

Age and distribution.—Campanian. Hakobuchi group (lower part) in Hobetsu area.

Superfamily SOLENACEA Lamarck, 1809

Family CULTELLIDAE Davies, 1935

Genus ***Leptosolen*** Conrad, 1865

Leptosolen japonica Ichikawa and Maeda

1958b. *Leptosolen japonicus* Ichikawa and Maeda [*sic*], p. 106, pl. 6, figs. 3–6.

Type.—Holotype (OCU F1113) from Nakanotani, Sennan, Osaka Pref.

Age and distribution.—Campanian–Maestrichtian. Izumi group (Azenotani shale, Shichi shale, Yoroizaki sandstone and Kitaama sandstone) in Izumi mountains and Awaji island.

Family uncertain

Cultellus? ellipsoidalis Kobayashi and Ichikawa

1950c. *"Cultellus"? ellipsoidalis* Kobayashi and Ichikawa, p. 237, pl. 4, fig. 9.

Type.—Holotype (UMUT MM5161) from Umenokidani, Sakawa, Kochi Pref.
Age and distribution.—Carnian. Kochigatani group (lower part) in Sakawa area.

Superfamily TELLINACEA de Blainville, 1814

Family ICANOTIIDAE Casey, 1916

Genus ***Scittila*** Casey, 1961

Scittila japonica Hayami

1957b. aff. *Tellina carteroni* d'Orbigny: Amano, p. 102, text-fig. 3, pl. 1, fig. 26.—1965b. *Scittila japonica* Hayami, p. 126, pl. 18, fig. 1.

Type.—Holotype (GK H6533) from Hiroyasu, Katsuura, Tokushima Pref.
Age and distribution.—Upper Neocomian—Aptian. Hanoura formation in Katsuuragawa area, and Lower Monobegawa group (Hagino formation) in Monobegawa area.

Family TANCREDIIDAE Meek, 1864

Genus ***Sakawanella*** Ichikawa, 1950

MM5169 -7-4

Sakawanella triadica Ichikawa [Pl. 7, Fig. 4]

1950. *Sakawanella triadica* Ichikawa, p. 246, pl. 5, figs. 1–7.

Type.—Holotype (UMUT MM5169) from Okunominetani, Sakawa, Kochi Pref.
Age and distribution.—Carnian. Kochigatani group (lower part) in Sakawa area.

Genus ***Tancredia*** Lycette, 1850

Tancredia rostrata Tamura

1959e. *Tancredia rostrata* Tamura, p. 117, text-fig. 3, pl. 12, fig. 23.

Type.—Holotype (UMUT MM3110) from Tsurubami, Sakamoto, Kumamoto Pref.
Age and distribution.—Upper Jurassic. Torinosu group in Sakamoto and Tanoura areas.

Genus ***Meekia*** Gabb, 1864

Meekia hokkaidoana Tamura

1928. *Meekia* cf. *sella* Gabb: Yabe and Nagao, p. 86, pl. 17, figs. 12, 13, 19.—1973. *Meekia hokkaidoana* Tamura, p. 102, pl. 1, figs. 1–10.

Type.—Holotype (GK H5675) from Yonnosawa (a tributary of the Ponhorokabetsu), Yubari, Ishikari Prov., Hokkaido.
Age and distribution.—(?) Cenomanian–Turonian. Middle Yezo group (Mikasa sandstone) in Yubari and Manji areas.

Superfamily ARCTICACEA Newton, 1891

Family ARCTICIDAE Newton, 1891

Genus ***Isocyprina*** Roeder, 1882

Isocyprina shizuhamensis Hayami

1959c. *Isocyprina shizuhamensis* Hayami, p. 67, pl. 5, figs. 29–31.

Type.—Holotype (UMUT MM2970) from Akaiwazaki (Hosoura), Shizukawa, Miyagi Pref.
Age and distribution.—Bajocian. Hashiura group (Aratozaki formation) in Shizukawa area.

Isocyprina aliquantula (Amano)

1957b. *Cyprina aliquantula* Amano, p. 95, pl. 2, figs. 13–18.—1965b. *Isocyprina aliquantula* (Amano): Hayami, p. 137, pl. 19, figs. 8, 9.—1969. *Isocyprina aliquantula* (Amano): Hatai, Kotaka and Noda, p. 34.

Type.—Holotype (UMUT KML0026) from Hagino, Kahoku, Kochi Pref.

Age and distribution.—Aptian. Lower Monobegawa group (Hagino formation) in Monobegawa area, and Miyako group (Tanohata formation) in Tanohata area.

Genus ***Pronoella*** Fischer, 1887

Pronoella sugayensis Hayami

1961b. *Pronoella sugayensis* Hayami, p. 121, pl. 16, figs. 14–16.

Type.—Holotype (UMUT MM3692) from Sugaya, Soma, Fukushima Pref.

Age and distribution.—Bathonian (or thereabout). Soma group (Yamagami formation) in Soma area.

Genus ***Somarctica*** Tamura, 1960

MM3320-9-3

Somarctica abukumensis (Tamura) [Pl. 7, Fig. 3]

1960c. *Arctica* (*Somarctica*) *abunkumensis* Tamura, p. 290, pl. 33, figs. 25–28.

Type.—Holotype (UMUT MM3319) from Yamashita, Kashima, Fukushima Pref.

Age and distribution.—Kimmeridgian. Soma group (Nakanosawa formation) in Soma area.

Genus ***Veniella*** Stoliczka, 1871

Veniella? japonica Nagao

1930. *Veniella* (?) *japonica* Nagao, p. 21, pl. 2, figs. 1, 3.—compare 1965b. *Veniella* sp. aff. *V. japonica* Nagao: Hayami, p. 139, pl. 19, fig. 10.—compare 1969. *Veniella* sp. cf. *japonica* Nagao: Hatai, Kotaka and Noda, p. 34.

Type.—Syntype (GMH? not registered) from Gosyonoura, Kumamoto Pref.

Age and distribution.—Albian (?)–Cenomanian. Gosyonoura group in Gosyonoura island.

Genus ***Izumia*** Ichikawa, 1963

Izumia trapezoidalis Ichikawa and Maeda [Pl. 10, Figs. 4–6]

1963. *Izumia trapezoidalis* Ichikawa and Maeda, p. 124, text-fig. 3, pl. 10, figs. 1–10.

Type.—Holotype (OCU MM262) from Magatayama, Sumoto (Awaji), Hyogo Pref.

Age and distribution.—Campanian. Izumi group (Yoroizaki sandstone and Azenotani shale) in Awaji island and Izumi mountains.

Genus ***Agapella*** Vokes, 1946

Agapella? koikorobensis Hayami

1965b. *Agapella* (?) *koikorobensis* Hayami, p. 144, pl. 20, fig. 14.

Type.—Holotype (GK H6495) from Koikorobe, Tanohata, Iwate Pref.

Age and distribution.—Aptian. Miyako group (Tanohata formation) in Tanohata area.

Family PTYCHOMYIDAE Keen, 1969

Genus ***Ptychomya*** Agassiz, 1842

Ptychomya densicostata Nagao [Pl. 7, Fig. 5]

1934. *Ptychomya densicostata* Nagao, p. 224, pl. 28, fig. 4.—1965b. *Ptychomya densicostata* Nagao: Hayami, p. 141, pl. 21, figs. 1–4.

Type.—Lectotype designated by Hayami (1965b, p. 141) (GMH no. 6611) from Raga, Tanohata, Iwate Pref.

Age and distribution.—Upper Neocomian–Albian. Miyako group (Hiraiga formation) in Tanohata area, Arita formation in Yuasa area, Ofunato group (Nagaiso member) in Ofunato area, Ishido formation in Sanchu area, and Yatsushiro formation in Yatsushiro and Sakamoto areas.

Family NEOMIODONTIDAE Casey, 1955

Subfamily EOMIODONTINAE Hayami, 1965

Genus ***Eomiodon*** Cox, 1935

MM2840-17-6

Eomiodon lunulatus (Yokoyama) [Pl. 7, Figs. 6, 7]

MM2843-17-7

1904. *Cyrena lunulata* Yokoyama, p. 10, pl. 2, fig. 9.—1958b. *Eomiodon lunulatus* (Yokoyama): Hayami, p. 17, pl. 2, figs. 1–12.—1959b. *Eomiodon lunulatus* (Yokoyama): Hayami, p. 78, text-figs.

Type.—Holotype by monotypy (UMUT MM7178) from Niranohama, Utatsu, Miyagi Pref.

Age and distribution.—Hettangian. Shizukawa group (Niranohama formation) in Shizukawa, Hashiura and Mizunuma areas.

Eomiodon vulgaris Hayami

1958b. *Eomiodon vulgaris* Hayami, p. 19, pl. 2, figs. 15–21, pl. 3, figs. 1–3.

Type.—Holotype (UMUT MM2844) from the lower course of the Daira, Asahi, Toyama Pref.

Age and distribution.—Lower Jurassic (especially Pliensbachian–Toarcian). Kuruma group (Kitamatadani, Negoya, Shinatani, Tsuchizawa formations) in Asahi, Omi, Kotaki, and Otari areas, Shizukawa group (Niranohama formation) in Shizukawa area, Iwamuro formation in Katashina area, and Yamaoku formation in Osakabe area.

Eomiodon? giganteus Hayami

1958b. *Eomiodon* (?) *giganteus* Hayami, p. 21, pl. 3, figs. 7–10.

Type.—Holotype (UMUT MM2857) from Niranohama, Utatsu, Miyagi Pref.

Age and distribution.—Hettangian. Shizukawa group (Niranohama formation) in Shizukawa area.

Eomiodon sakawanus (Kobayashi and Suzuki)

1939. *Astarte sakawana* Kobayashi and Suzuki, p. 219, pl. 13, fig. 11 (non pl. 13, figs. 12, 13).—1973. *Eomiodon sakawanus* (Kobayashi and Suzuki): Ohta, p. 250, pl. 1, figs. 1–11.

Type.—Lectotype designated by Ohta (1973) (Kobayashi and Suzuki, 1939, pl. 13, fig. 11; UMUT MM7910) from Kaisekiyama, Sakawa, Kochi Pref. Ohta (1973, p. 251) regarded this specimen as holotype, but Kobayashi and Suzuki (1939) did not designate any type in the original description.

Age and distribution.—Neocomian. Ryoseki formation in Sakawa area, Kawaguchi formation in Sakamoto area, and Yuasa formation in Yuasa area.

Eomiodon nipponicus Ohta

1939. *Astarte sakawana* Kobayashi and Suzuki, p. 219 (pars), pl. 13, figs. 12, 13 (non pl.

13, fig. 11).—1973. *Eomiodon nipponicus* Ohta, p. 252, pl. 1, figs. 15–22, pl. 2, figs. 14–19.
Type.—Holotype (GF Y230) from Yoshimo, Shimonoseki, Yamaguchi Pref.
Age and distribution.—Neocomian. Toyonishi group (Yoshimo formation) in Shimonoseki area.

Eomiodon hayamii Ohta

1973. *Eomiodon hayamii* Ohta, p. 254, pl. 1, figs. 12–14.
Type.—Holotype (GF Y239) from Yoshimo, Shimonoseki, Yamaguchi Pref.
Age and distribution.—Neocomian. Toyonishi group (Yoshimo formation) in Shimonoseki area.

Eomiodon matsumotoi Ohta

1973. *Eomiodon matsumotoi* Ohta, p. 255, pl. 2, figs. 1–13.
Type.—Holotype (GF K102) from Sakayoriue, Kawamata, Kumamoto Pref.
Age and distribution.—Neocomian. Kawaguchi formation in Kawamata area, and Ryoseki formation in Kochi and Sakawa areas.

Genus ***Protocyprina*** Vokes, 1946

Protocyprina naumanni (Neumayr) [Pl. 7, Figs. 8, 9]

1890. *Cyrena naumanni* Neumayr, *in* Naumann and Neumayr, p. 33, pl. 4, figs. 3, 4.—1890. *Cyrena lithocardium* Neumayr, *in* Naumann and Neumayr, p. 34, pl. 4, fig. 1.—1890. *Cyrena gravida* Nuemayr, *in* Naumann and Neumayr, p. 34, pl. 4, fig. 2.—1926. *Cyrena naumanni* Neumayr: Yabe, Nagao and Shimizu, p. 49, pl. 12, figs. 6, 17, 18, pl. 14, fig. 25, pl. 14, figs. 23, 24, 26, 29–31.—1927. *Cyrena naumanni* Neumayr: Yabe, pl. 3, fig. 5.—1943. *Polymesoda (Geloina) naumanni* (Neumayr): Suzuki and Oyama, p. 139, 146.—1963. "*Cyrena*" *naumanni* Neumayr: Hayami, Matsumoto and Asano, p. 34, pl. 52, figs. 1–4.—1965. *Protocyprina naumanni* (Neumayr): Hayami and Nakai, p. 117, text-fig. 3, pl. 13, figs. 1–3, pl. 14, figs. 1–8.

Type.—Syntype (Naturhistorischen Museum, Wien) from Yanagidani, Kamikatsu, Tokushima Pref. Holotype by monotypy of *Cyrena lithocardium* and holotype by monotypy of *Cyrena gravida* from the same locality.
Age and distribution.—Neocomian. Tatsukawa formation in Katsuuragawa area, Shiroi formation in Sanchu area, Yuasa formation in Yuasa area, and Tetori group (Kuwajima formation) in Tetori area.

Genus ***Costocyrena*** Hayami, 1965

Costocyrena otsukai (Yabe and Nagao)

1926. *Cyrena otsukai* Yabe and Nagao, *in* Yabe, Nagao and Shimizu, p. 50, pl. 2, figs. 20–24.—1973. *Costocyrena otsukai* (Yabe and Nagao): Ohta, p. 256, pl. 3, figs. 1–11.—1973. *Costocyrena crenatus* Ohta [*sic*], p. 258, pl. 3, fig. 12.

Type.—Syntype (IGPS no. 22453, 22476) from Bomeki, Ohinata, Nagano Pref. Holotype of *Costocyrena crenata* (GF S920) from Shiroi, Ueno, Gumma Pref.
Age and distribution.—Neocomian. Shiroi formation in Sanchu area, Yuasa formation in Yuasa area, and Ryoseki formation in Kochi area.

Costocyrena ominensis (Nakazawa and Murata)

1966. "*Eomiodon*" *ominensis* Nakazawa and Murata, p. 315, pl. 5, figs. 5–12, 15.

Type.—Holotype (UK JM11159) from Obirakizawa, Omine, Iwate Pref.
Age and distribution.—Neocomian. Kamihei group in Kamaishi area.

Costocyrena radiatostriata (Yabe and Nagao)

1926. *Cyrena radiatostriata* Yabe and Nagao, *in* Yabe, Nagao and Shimizu, p. 51, pl. 12, figs. 29–35, pl. 13, fig. 45.—1965b. *Costocyrena radiatostriata* (Yabe and Nagao): Hayami, p. 135, pl. 19, figs. 1–7.—compare 1965b. *Costocyrena* sp. aff. *C. radiatostriata* (Yabe and Nagao): Hayami, p. 137, pl. 18, figs. 13–15.

Type.—Lectotype designated by Hayami (1965b, p. 135) (IGPS no. 35523) from Hachimanzawa (Kagahara), Nakazato, Gumma Pref.
Age and distribution.—Aptian–Albian. Sebayashi formation in Sanchu area.

Costocyrena matsumotoi Hayami [Pl. 7, Figs. 10, 11]

1965b. *Costocyrena matsumotoi* Hayami, p. 133, pl. 18, figs. 2–12.—compare 1972. *Costocyrena matsumotoi* Hayami: Shikama and Suzuki, pl. 6, fig. 11.

Type.—Holotype (GK H6502) from Miyaji, Yatsushiro, Kumamoto Pref.
Age and distribution.—Albian. Yatsushiro formation in Yatsushiro area.

Costocyrena peikangensis Hayami

1965. *Costocyrena peikangensis* Hayami, *in* Matsumoto, Hayami and Hashimoto, p. 12, pl. 2, figs. 5, 6.

Type.—Holotype (CPC no. 17) from a core of Pk-2 well at the depth, of 1977.65 m, Peikang, west Formosa.
Age and distribution.—Lower Cretaceous (not younger than Aptian). Buried Cretaceous formation in west Formosa.

Genus ***Pseudasaphis*** Matsumoto, 1938

MM7749 -7-12

Pseudasaphis japonica Matsumoto [Pl. 7, Fig. 12]

1938. *Pseudasaphis japonicus* Matsumoto [*sic*], p. 18, pl. 2, figs. 4, 5.

Type.—Syntype (UMUT MM7749, 7750, 7809–7813) from Narukogawa, Gosyonoura, Kumamoto Pref.
Age and distribution.—Cenomanian. Gosyonoura group in Gosyonoura island, and Middle Yezo group (Mikasa sandstone) in Ikushumbetsu area.

Subfamily NEOMIODONTINAE Casey, 1955

Genus ***Crenotrapezium*** Hayami, 1958

MM2823 -7-13
MM2829 -7-14

Crenotrapezium kurumense kurumense Hayami [Pl. 7, Figs. 13, 14]

1958b. *Crenotrapezium kurumense* Hayami, p. 14, pl. 2, figs. 22–28.—1958b. *Crenotrapezium kurigata* Hayami, p. 16, pl. 2, figs. 29, 30.

Type.—Holotype (UMUT MM2823) from Tsuchizawa, Otari, Nagano Pref. Holotype of *Crenotrapezium kurigata* (UMUT MM2832) from the same locality.
Age and distribution.—Lower Jurassic (especially Pliensbachian–Toarcian). Kuruma group (Tsuchizawa, Kitamatadani, Negoya and Shinatani formations) in Otari, Kotaki, Omi and Asahi areas.

Crenotrapezium kurumense grossum Hayami

1961a. *Crenotrapezium kurumense grossum* Hayami, p. 115, pl. 16, fig. 4.

Type.—Holotype (UMUT MM3678) from Ochiai, Oosa, Okayama Pref.

Age and distribution.—Toarcian. Yamaoku formation in Osakabe area.

Crenotrapezium kitakamiense Hayami

1960a. *Crenotrapezium kitakamiense* Hayami, p. 17, text-fig. 2, pl. 3, figs. 8–10.

Type.—Holotype (UMUT MM3570) from Nagashioya, Kitakami (Hashiura), Miyagi Pref.

Age and distribution.—Tithonian or lower Neocomian. Jusanhama group in Hashiura area.

Crenotrapezium? kobayashii (Maeda)

1959. *Polymesoda (Isodomella) kobayashii* Maeda, p. 158 pl. 17, figs. 1–11.

Type.—Holotype (CU not registered) from Kashiwate river (a tributary of the Takahara), Kamitakara, Gifu Pref.

Age and distribution.—Lower Cretaceous (precisely unknown). Tetori group (Tochio formation) in Kamitakara area.

Genus ***Neomiodon*** Fischer, 1887

Neomiodon? amagashiraensis (Kobayashi and Suzuki)

1937. *Corbicula amagashiraensis* Kobayashi and Suzuki, p. 45, pl. 5, figs. 8–12.—1973. *Neomiodon? amagashiraensis* (Kobayashi and Suzuki): Ohta, p. 264, pl. 3, figs. 13–17.

Type.—Holotype (UMUT MM7007) from Amagashiradani, Izumi, Fukui Pref.

Age and distribution.—Upper Jurassic (precisely unknown). Tetori group (Shimoanama formation) in Izumi area.

Genus ***Myrene*** Casey, 1955

Subgenus ***Mesocorbicula*** Suzuki and Oyama, 1943

Myrene (Mesocorbicula) tetoriensis (Kobayashi and Suzuki) [Pl. 8, Fig. 1]

1937. *Corbicula tetoriensis* Kobayashi and Suzuki, p. 46, text-fig. 2, pl. 5, figs. 8–12.—1943. *Corbicula (Mesocorbicula) tetoriensis* Kobayashi and Suzuki: Suzuki and Oyama, p. 143.—1973. *Myrene (Mesocorbicula) tetoriensis* (Kobayashi and Suzuki): Ohta, p. 260, pl. 3, fig. 18, pl. 4, figs. 1–12.

Type.—Holotype (UMUT MM7008) from Izuki, Izumi, Fukui Pref.

Age and distribution.—Upper Jurassic. Tetori group (Izuki and Ushimaru formations) in Izumi and Makito areas.

Subfamily uncertain

Genus ***Isodomella*** Kobayashi and Suzuki, 1939

Isodomella shiroiensis (Yabe and Nagao)

1926. *Cyrena shiroiensis* Yabe and Nagao, *in* Yabe, Nagao and Shimizu, p. 52, pl. 14, figs. 4–6, 19, 20, 22, 25.—1926. *Cyrena shiroiensis* var. *alata* Yabe and Nagao, *in* Yabe, Nagao and Shimizu, p. 53, pl. 13, fig. 26, pl. 14, fig. 15, 28.—1939. *Polymesoda shiroiensis* (Yabe and Nagao): Kobayashi and Suzuki, p. 219, pl. 14, figs. 1–9.—1943. *Polymesoda (Geloina) shiroiensis* (Yabe and Nagao): Suzuki and Oyama, p. 139, 146.—1955. *Polymesoda (Isodomella) naumanni* (Neumayr): Yamagiwa, p. 47, pl. 1, figs. 5–15.

Type.—Syntype (IGPS no. 22451) from Bomeki, Ohinata, Nagano Pref. Syntype of *Cyrena shiroiensis* var. *alata* (IGPS, not registered) from Shiroi, Ohinata, Nagano Pref.

Age and distribution.—Neocomian. Shiroi formation in Sanchu area, Toyonishi group

(Yoshimo formation) in Shimonoseki area, and Matsuo formation in Shima area.

Superfamily CORBICULACEA Gray, 1847

Family CORBICULIDAE Gray, 1847

Genus ***Eocallista*** Douvillé, 1921

Eocallista? regularis Tamura

1959e. "*Eocallista*" *regularis* Tamura, p. 116, text-fig. 1, pl. 12, figs. 8–10.

Type.—Holotype (UMUT MM3107) from Matsuzaki, Sakamoto, Kumamoto Pref.

Age and distribution.—Upper Jurassic. Torinosu group in Sakamoto area.

Genus ***Filosina*** Casey, 1955

Filosina jusanhamensis Hayami

1960a. *Filosina jusanhamensis* Hayami, p. 15, text-fig. 1, pl. 3, figs. 1–7.—compare 1966. *Filosina* sp. aff. *F. jusanhamensis* Hayami: Nakazawa and Murata, p. 317, pl. 5, figs. 13, 14.

Type.—Holotype (UMUT MM3562) from Nagashioya, Kitakami (Hashiura), Miyagi Pref.

Age and distribution.—Tithonian or lower Neocomian. Jusanhama group in Hashiura area.

Genus ***Tetoria*** Kobayashi and Suzuki, 1937

Subgenus ***Tetoria*** Kobayashi and Suzuki, 1937

MM7004 MM~~7005~~ -8-2

Tetoria (Tetoria) yokoyamai (Kobayashi and Suzuki) [Pl. 8, Fig. 2]

1937. *Batissa yokoyamai* Kobayashi and Suzuki, p. 44, pl. 4, figs. 3–6.—1943. *Corbicula (Tetoria) yokoyamai* (Kobayashi and Suzuki): Suzuki and Oyama, p. 141, 147.

Type.—Holotype (UMUT MM7004) from Kurouchi, Furukawa, Gifu Pref.

Age and distribution.—Upper Jurassic. Tetori group (Kurouchi, Izuki and Ushimaru formations) in Furukawa, Izumi and Makito areas.

Tetoria (Tetoria) antiqua (Kobayashi and Suzuki)

1937. *Batissa antiqua* Kobayashi and Suzuki, p. 42, pl. 4, figs. 1, 2.—1943. *Corbicula (Tetoria) antiqua* (Kobayashi and Suzuki): Suzuki and Oyama, p. 141, 147.

Type.—Holotype (UMUT MM7002) from Izuki, Izumi, Fukui Pref.

Age and distribution.—Upper Jurassic. Tetori group (Izuki and Kurouchi formation) in Izumi and Furukawa areas.

Subgenus ***Paracorbicula*** Kobayashi and Suzuki, 1939

MM7992-1 -8-3

Tetoria (Paracorbicula) sanchuensis (Yabe and Nagao) [Pl. 8, Fig. 3]

1926. *Corbicula (Veloritina?) sanchuensis* Yabe and Nagao, *in* Yabe, Nagao and Shimizu, p. 53, pl. 12, fig. 8, pl. 13, figs. 8–10, 17.—1943. *Polymesoda (Paracorbicula) sanchuensis* (Yabe and Nagao): Suzuki and Oyama, p. 141, 146.—compare 1955. *Polymesoda (Paracorbicula)* cf. *sanchuensis* (Yabe and Nagao): Yamagiwa, p. 49, pl. 1, figs. 3, 4.—1959. *Polymesoda (Paracorbicula) sanchuensis* (Yabe and Nagao): Maeda, p. 159, pl. 17, figs. 12–16.—1965. *Tetoria (Paracorbicula) sanchuensis* (Yabe and Nagao): Ota, pl. 13, fig. 14.

Type.—Syntype (IGPS no. 22449, 22467) from Bomeki, Ohinata, Nagato Pref.

Age and distribution.—Upper Jurassic–Neocomian. Shiroi formation in Sanchu area, Tetori group (Tochio formation) in Kamitakara area, and Ryoseki formation in Kochi area.

Tetoria (Paracorbicula) yoshimoensis Ota

1939. *Corbicula sanchuensis* Yabe and Nagao: Kobayashi and Suzuki, p. 221, pl. 14, figs. 10–15.—1965. *Tetoria (Paracorbicula) yoshimoensis* Ota, p. 168, pl. 12, figs. 1–22, pl. 13, figs. 1–13.

Type.—Holotype (GF Y64325) from Yoshimo, Shimonoseki, Yamaguchi Pref.

Age and distribution.—Upper Jurassic–Neocomian. Toyonishi group (Yoshimo formation) in Shimonoseki area, Tetori group (Izuki and Kurouchi formations) in Izuki and Furukawa areas, and Kawaguchi formation in Tanoura area.

Family PISIDIIDAE Gray, 1857

Genus ***Sphaerium*** Scopoli, 1777

Sphaerium anderssoni anderssoni (Grabau)

1943. *Sphaerium anderssoni* (Grabau): Suzuki, p. 62, pl. 4, figs. 1–4.—1960. *Sphaerium anderssoni anderssoni* (Grabau): Hase, p. 319, pl. 37, figs. 12–15, pl. 38, figs. 2–24.

Age and distribution.—Lower Cretaceous (precisely unknown). Kwanmon group (Sengoku, Nyoraida, Wakamiya, Shiohama and Inakura formations) in various areas of north Kyushu and west Chugoku, and Naktong group in Keisyo-do, south Korea. This subspecies was originally described from north China.

Sphaerium anderssoni jeholense (Grabau)

1943. *Sphaerium anderssoni jeholense* (Grabau): Suzuki, p. 63, pl. 4, figs. 5–13.—1960. *Sphaerium anderssoni jeholense* (Grabau): Hase, p. 321, pl. 38, figs. 25–30.

Age and distribution.—Lower Cretaceous (precisely unknown). Kwanmon group (Wakamiya and Inakura formations) in Nogata, Takibe and Asa areas, and Naktong group in Keisyo-do, south Korea. This subspecies was originally described from north China.

Superfamily VENERACEA Rafinesque, 1815

Family VENERIDAE Rafinesque, 1815

Subfamily PITARINAE Stewart, 1930

Genus ***Aphrodina*** Conrad, 1869

Aphrodina pseudoplana (Yabe and Nagao)

1924. *Callista* cf. *plana* (Sowerby): Yehara, p. 38, pl. 2, fig. 6, pl. 3, figs. 3–6.—1925. *Callista pseudoplana* Yabe and Nagao, p. 120, pl. 28, figs. 9, 10, pl. 29, figs. 2, 4.—1925. *Callista pseudoplana* var. *elongata* Yabe and Nagao, p. 120, pl. 29, fig. 5.—1925. *Callista pseudoplana* var. *alata* Yabe and Nagao, p. 120, pl. 29, figs. 1, 6.—1925. *Callista pseudoplana* var. *rotundata* Yabe and Nagao, p. 120, pl. 29, fig. 3.—1927. *Callista pseudoplana* Yabe and Nagao: Yabe, pl. 5, fig. 6.—compare 1938. *Aphrodina* cf. *pseudoplana* (Yabe and Nagao): Nagao and Otatume, p. 46, pl. 3, figs. 1–3, 6–10.—compare 1963. *Aphrodina* sp. cf. *A.* (*Larma*) *pseudoplana* (Yabe and Nagao): Ichikawa and Maeda, p. 129, pl. 11, fig. 8.—compare 1964. *Aphrodina* (*Sechurina*) cf. *pseudoplana* (Yabe and Nagao): Katto and Hattori, 1964, p. 8, pl. 1, figs. 7–9.

Type.—Lectotype designated by Ichikawa and Maeda (1963, p. 130) (IGPS no. 8553) from the upper course of Ponnebetsu (a tributary of the Horomui), Manji, Ishikari Prov., Hokkaido. Syntype of *Callista pseudoplana* var. *elongata* (IGPS not registered) from Ponhorokabetsu, Yubari, Ishikari Prov.; syntype of *Callista pseudoplana* var. *alata* from Ekimomaanoro, Yubari, Ishikari Prov.; and syntype of *Callista pseudoplana* var. *rotundata*

from Wenshirianbibai, Bibai, Ishikari Prov. Yabe and Nagao (1925) used the term "holotype" for this species and these three varieties, but there is no indication of specimen in the explanation of plates.

Age and distribution.—Cenomanian–Turonian. Middle Yezo group (Mikasa sandstone) in Manji, Yubari, Bibai and Ikushumbetsu areas, and Cape Khoi beds in Alexandrovsk area.

Aphrodina izumensis Ichikawa and Maeda

1963. *Aphrodina izumensis* Ichikawa and Maeda, p. 128, pl. 11, fig. 7.

Type.—Holotype (OCU MM327) from Yamamoto, Nandan (Awaji), Hyogo Pref.

Age and distribution.—Maestrichtian. Izumi group (Shimonada siltstone) in Awaji island.

Aphrodina japonica (Amano)

1957a. *Callistina* (*Larma*) *japonica* Amano, p. 59, pl. 1, figs. 14–18.

Type.—Holotype (UMUT KML 0068) from Imuta, Kashima (Shimokoshiki), Kagoshima Pref.

Age and distribution.—Santonian–Campanian. Himenoura group in Koshikijima islands.

Aphrodina hataii Katto and Hattori

1964. *Aphrodina* (*Aphrodina*) *hataii* Katto and Hattori, p. 8, pl. 1, figs. 1–6.

Type.—Holotype (Kochi Univ. not registered) from Sada, Nakamura, Kochi Pref.

Age and distribution.—Upper Cretaceous (precisely unknown). Shimantogawa group (Nakamura formation) in Nakamura area.

Genus ***Pseudamiantis*** Kuroda, 1933

Pseudamiantis? crenulata (Matsumoto)

1938. "*Callista*" (*Pseudamiantis*) *crenulatus* Matsumoto [*sic*], p. 19, text-figs. 12, 13, pl. 1, fig. 5.—1956. *Pseudamiantis crenulatus* (Matsumoto) [*sic*]: Amano, p. 78, pl. 1, fig. 26, pl. 2, figs. 13–19.—1963. "*Callista*" (*Pseudamiantis*) *crenulatus* Matsumoto [*sic*]: Iwasaki, p. 94, pl. 15, figs. 4–7.

Type.—Syntype (UMUT MM7751, 7752, 7825–7830) from Kobunenosako and Umedo, Gosyonoura, Kumamoto Pref.

Age and distribution.—Cenomanian. Gosyonoura group in Gosyonoura and Shishijima islands.

Genus ***Tenea*** Conrad, 1870

Tenea japonica Ichikawa and Maeda

1963. *Tenea japonica* Ichikawa and Maeda, p. 131, pl. 11, figs. 1–4.

Type.—Holotype (OCU MM331) from Hansanji, Seidan (Awaji), Hyogo Pref.

Age and distribution.—Campanian. Izumi group (Shichi shale and Azenotani shale) in Awaji island and Izumi mountains.

Genus ***Trigonocallista*** Rennie, 1930

Trigonocallista ornata Ichikawa and Maeda

1963. *Trigonocallista ornata* Ichikawa and Maeda, p. 126, pl. 11, figs. 5, 6.

Type.—Holotype (OCU MM328) from Tsubasayama, Hiketa, Tokushima Pref.

Age and distribution.—Campanian. Izumi group (Tsubasayama sandstone) in Hiketa area.

Genus ***Nagaoella*** Hayami, 1965

Nagaoella corrugata (Nagao) [Pl. 8, Figs. 5, 6]

1934. *Dosiniopsis corrugata* Nagao, p. 229, pl. 24, figs. 2–6, 9.—1965b. *Nagaoella corrugata* (Nagao): Hayami, p. 148, pl. 19, figs. 12–15, pl. 20, figs. 1–12.—compare 1965b. *Nagaoella* sp. aff. *N. corrugata* (Nagao): Hayami, p. 150, pl. 20, fig. 13.

Type.—Holotype (GMH no. 6791) from Hiraiga, Tanohata, Iwate Pref.

Age and distribution.—Aptian–Albian. Miyako group (Tanohata, Hiraiga and Aketo formations) in Tanohata, Omoto and Miyako areas.

Family uncertain

Callista? sp.

1932. *Callista* (?) cf. *arata* (Gabb): Nagao, p. 39, pl. 6, fig. 6.

Age and distribution.—Coniacian–Santonian. Upper Yezo group in Hobetsu area.

Calva? sp.

1925. *Dosiniopsis* (?) cf. *caperata* (Sowerby): Yabe and Nagao, p. 119, pl. 29, fig. 9.

Age and distribution.—Cenomanian–Turonian. Cape Khoi beds in Alexandrovsk area.

Order MYOIDA Stoliczka, 1870

Suborder MYINA Stoliczka, 1870

Superfamily MYACEA Lamarck, 1809

Family CORBULIDAE Lamarck, 1818

Subfamily CORBULINAE Lamarck, 1818

Genus ***Corbula*** Bruguière, 1797

Corbula? globosa Tamura

1959e. *Corbula globosa* Tamura, p. 114, pl. 12, figs. 1–4.—1960c. *Corbula globosa* Tamura: Tamura, p. 290.—1960d. *Corbula globosa* Tamura: Tamura, p. 242.

Type.—Holotype (UMUT MM3093) from Sakamoto, Sakamoto, Kumamoto Pref.

Age and distribution.—Upper Jurassic–Berriasian. Torinosu group in Sakamoto, Tanoura, Sakawa and Sakuradani areas. Soma group (Nakanosawa and Koyamada formations) in Soma area.

Corbula? imamurae Hase

1960. *Corbula* (?) *imamurae* Hase, p. 324, pl. 37, figs. 16–21, pl. 39, figs. 2–4.

Type.—Holotype (IGSH HA271) from Ohata, Utsui, Yamaguchi Pref.

Age and distribution.—Lower Cretaceous (precisely unknown). Toyonishi group (Yoshimo formation) in Shimonoseki area.

Genus ***Pulsidis*** Ota, 1964

Pulsidis higoensis (Matsumoto)

1938. *Aloidis* (*Caryocorbula*) *higoensis* Matsumoto, p. 19, text-fig. 9, pl. 2, fig. 8.—1964. *Pulsidis higoensis* (Matsumoto): Ota, p. 153, pl. 21, figs. 13–17.—1966. *Pulsidis higoensis*

(Matsumoto): Hayami, p. 156.—1972. *Pulsidis higoensis* (Matsumoto): Shikama and Suzuki, pl. 6, figs. 13, 14.

Type.—Lectotype designated by Ota (1964, p. 153) (UMUT MM7755) from Kawauchida, Mifune, Kumamoto Pref.

Age and distribution.—Aptian–Cenomanian. Mifune group in Mifune area, Gosyonoura group in Gosyonoura island, Yatsushiro formation in Yatsushiro area, and Choshi formation in Choshi area.

Pulsidis nagatoensis Ota [Pl. 10, Fig. 9]

1964. *Pulsidis nagatoensis* Ota, p. 150, pl. 20, figs. 1–14, 25.

Type.—Holotype (GF Y6301) from Yoshimo, Shimonoseki, Yamaguchi Pref.

Age and distribution.—Neocomian. Toyonishi group (Yoshimo formation) in Shimonoseki area.

Pulsidis okadai Ota

1964. *Pulsidis okadai* Ota, p. 152, pl. 20, figs. 15–24.

Type.—Holotype (GF M6365) from Kawachida, Masuki, Kumamoto Pref.

Age and distribution.—Cenomanian–Turonian. Mifune group (lower part) in Mifune area.

Genus ***Eoursivivas*** Ota, 1964

Eoursivivas matsumotoi (Hase) [Pl. 10, Figs. 7, 8]

1960. *Corbula matsumotoi* Hase, p. 322, pl. 39, figs. 5–21.—1964. *Eoursivivas matsumotoi* (Hase): Ota, p. 156, pl. 21, figs. 1–11.

Type.—Holotype (GK H6084) from Sakayorikami, Kawamata, Kumamoto Pref.

Age and distribution.—Neocomian. Kawaguchi formation in Kawamata and Tanoura areas, and Toyonishi group in Shimonoseki area.

Genus ***Nipponicorbula*** Ota, 1964

Nipponicorbula mifunensis Ota [Pl. 10, Fig. 10]

1964. *Nipponicorbula mifunensis* Ota, p. 158, pl. 21, figs. 18–27.

Type.—Holotype (GF M63001) from Asanoyabu, Mifune, Kumamoto Pref.

Age and distribution.—Cenomanian–Turonian. Mifune group (lower part) in Mifune area.

Superfamily HIATELLACEA Gray, 1824

Family HIATELLIDAE Gray, 1824

Genus ***Panopea*** Menard, 1807

Subgenus ***Myopsis*** Agassiz, 1840

Panopea (Myopsis) plicata (Sowerby)

1926. *Panopaea* aff. *gurgitis* (Brongniart): Yabe, Nagao and Shimizu, p. 55, pl. 12, figs. 10, 15, 19, 20.—1934. *Panope* sp. aff. *gurgitis* (Brongniart): Nagao, p. 231, pl. 31, figs. 10, 14.—1957b. *Panopea* (?) sp.: Amano, p. 106, pl. 2, fig. 12.—1966. *Panopea* (*Myopsis*) *plicata* (Sowerby): Hayami, p. 153, pl. 22, figs. 1–7.

Age and distribution.—Upper Neocomian–Aptian. Miyako group (Hiraiga formation) in Tanohata area, Ishido formation in Sanchu area, and Lower Monobegawa group

(Hagino formation) in Monobegawa area. This species is known in western Europe and Trinidad.

Remarks.—The Japanese specimens of *P.* (*M.*) *plicata* are generally more or less shorter than typical specimens from western Europe, though specific distinction seems unnecessary.

Panopea (Myopsis) nagaoi Hayami

1966. *Panopea* (*Myopsis*) *nagaoi* Hayami, p. 155, pl. 22, fig. 8.

Type.—Holotype (GK H6545) from Kohara, Toyo, Kumamoto Pref.

Age and distribution.—Upper Neocomian–Albian. Yatsushiro formation in Sakamoto area and Arita formation in Yuasa area.

Suborder PHOLADINA Adams and Adams, 1858

Superfamily PHOLADACEA Lamarck, 1809

Family TEREDINIDAE Rafinesque, 1815

Subfamily uncertain

Teredo? matsushimaensis Hatai

1951. *Teredo matsushimaensis* Hatai, p. 30, pl. 5, figs. 1–5 —1966. "*Teredo*" *matsushimaensis* Hatai: Hayami, p. 172, pl. 26, figs. 6, 7, 9 (? non fig. 8).—1969. *Teredo matsushimaensis* Hatai: Hatai, Kotaka and Noda, p. 35, pl. 1, figs. 12–14.

Type.—Lectotype designated by Hayami (1966, p. 173) (IGPS no. 73697) from Matsushima of Moshi, Iwaizumi, Iwate Pref.

Age and distribution.—Aptian. Miyako group (Tanohata and Hiraiga formations) in Omoto and Tanohata areas.

Order HIPPURITOIDA Newell, 1965

Superfamily HIPPURITACEA Gray, 1848

Family REQUIENIIDAE Douvillé, 1914

Genus ***Toucasia*** Munier-Chalmas, 1873

Toucasia carinata orientalis Nagao

1932. *Toucasia carinata* var. *orientalis* Nagao, p. 511, text-figs.—1933b. *Toucasia carinata* var. *orientalis* Nagao: Nagao, p. 164, pl. 21, figs. 1, 2, pl. 22, figs. 1–5.—1964. *Toucasia carinata orientalis* Nagao: Saito, p. 320, pl. 47, figs. 8, 9.

Type.—Syntype (GMH nos. 5707, 5776, 5779, 5781, 5782, 5784) from the lower course of the Sorachi, between Ponmoshiri and Shimanoshita, Ishikari Prov., Hokkaido.

Age and distribution.—Aptian. Lower Yezo group ("*Orbitolina limestone*") in Sorachi area.

Family CAPROTINIDAE Gray, 1848

Genus ***Praecaprotina*** Yabe and Nagao, 1926

Praecaprotina yaegashii (Yehara) [Pl. 10, Fig. 11]

1920. *Horiopleura Yaegashii* Yehara, p. 41, pl. 1, figs. 1–3, pl. 2, figs. 1–3.—1926. *Praecaprotina yaegashii* (Yehara): Yabe and Nagao, p. 21, pl. 7, figs. 1–10.—1934. *Praecaprotina*

yaegashii (Yehara): Nagao, p. 226.—1964. *Praecaprotina yaegashii* (Yehara): Saito, p. 320, pl. 47, figs. 10–12.

Type.—Syntype (IGPS not registered) from Moshi, Iwaizumi, and Hiraiga, Tanohata, Iwate Pref.

Age and distribution.—Aptian. Miyako group (Tanohata and Hiraiga formations) in Omoto and Tanohata areas.

Genus ***Pachytraga*** Paquier, 1900

Pachytraga japonica Okubo and Matsushima

1959. *Pachytraga japonica* Okubo and Matsushima, p. 2, text-figs. 1–7.

Type.—Holotype (Dept. of Geology, Shinshu Univ., not registered) from Toyama, Nagano Pref.

Age and distribution.—Lower Cretaceous (precisely unknown). "Shimantogawa group" of Shirane belt in Shirane area.

Family CAPRINIDAE d'Orbigny, 1850

Genus ***Caprina*** d'Orbigny, 1822

Caprina uwajimensis Shikama and Tanabe

1970. *Caprina uwajimensis* Shikama and Tanabe, p. 53, pl. 6, fig. 1, pl. 7, figs. 1, 2.

Type.—Holotype (GYU M-17) from Mt Kushima island, Uwajima, Ehime Pref.

Age and distribution.—Santonian. Uwajima group (Makinoyama formation) in Uwajima area.

Subclass ANOMALODESMATA Dall, 1889

Order PHOLADOMYOIDA Newell, 1965

Superfamily PHOLADOMYACEA Gray, 1847

Family PHOLADOMYIDAE Gray, 1847

Genus ***Pholadomya*** Sowerby, 1823

Subgenus ***Pholadomya*** Sowerby, 1823

Pholadomya (Pholadomya) tuberculata Hayami

1966. *Pholadomya tuberculata* Hayami, p. 160, pl. 24, figs. 1–3.

Type.—Holotype (GK H6555) from Hiraiga, Tanohata, Iwate Pref.

Age and distribution.—Aptian. Miyako group (Hiraiga formation) in Tanohata area.

Pholadomya (Pholadomya) japonica Amano

1956. *Pholadomya japonica* Amano, p. 80, pl. 2, figs. 1–5.

Type.—Holotype (KU not registered) from Miyanohara, Ochi, Kochi Pref.

Age and distribution.—Cenomanian. Upper Monobegawa group (Miyanohara formation) in Ochi area.

Subgenus ***Bucardiomya*** Rollier, 1912

Pholadomya (Bucardiomya) somensis Tamura

1960b. *Pholadomya somensis* Tamura, p. 279, pl. 32, figs. 10, 11.—compare 1960d. *Pholadomya* cf. *somensis* Tamura: Tamura, p. 242, pl. 2, fig. 25.

Type.—Holotype (UMUT MM3278) from Yamashita, Kashima, Fukushima Pref.
Age and distribution.—Kimmeridgian. Soma group (Nakanosawa formation) in Soma area.

Pholadomya (Bucardiomya) brevitesta Nagao

1943. *Pholadomya brevitesta* Nagao, p. 157, pl. 13, fig. 3.—1966. *Pholadomya brevitesta* Nagao: Hayami, p. 157, pl. 23, fig. 2.—1969. *Pholadomya brevitesta* Nagao: Hatai, Kotaka and Noda, p. 34, pl. 1, figs. 2, 3.

Type.—Holotype by monotypy (GMH? not registered) from Koikorobe, Tanohata, Iwate Pref.
Age and distribution.—Aptian. Miyako group (Tanohata formation) in Tanohata area.

Pholadomya (Bucardiomya) subpedelnalis Nagao

1934. *Pholadomya subpedelnalis* Nagao, p. 214, pl. 26, fig. 8.—1943. *Pholadomya subpedelnalis* Nagao: Nagao, p. 156, pl. 12, fig. 7.—1966. *Pholadomya subpedelnalis* Nagao: Hayami, p. 160, pl. 23, fig. 1.

Type.—Holotype by monotypy (GMH no. 6796) from Hideshima (Sakiyama), Miyako, Iwate Pref.
Age and distribution.—Aptian. Miyako group (Tanohata and Hiraiga formations) in Miyako and Tanohata areas.

Pholadomya (Bucardiomya) miyamotoi Nagao [Pl. 8, Fig. 9]

1943. *Pholadomya* (?) *miyamotoi* Nagao, p. 158, pl. 12, figs. 8, 9.—1966. *Pholadomya miyamotoi* Nagao: Hayami, p. 157, pl. 22, figs. 9–14, pl. 23, figs. 3–5.

Type.—Lectotype designated by Hayami (1966, p. 157) (GMH? not registered) from Hiraiga, Tanohata, Iwate Pref.
Age ana distribution.—Aptian. Miyako group (Hiraiga formation) in Tanohata area.

Pholadomya (Bucardiomya) sp. aff. **P. (B.) cornueliana** (d'Orbigny)

1957b. *Pholadomya* aff. *cornueliana* (d'Orbigny): Amano, p. 92, pl. 2, fig. 9.—1966. *Pholadomya* sp. aff. *P. cornueliana* (d'Orbigny): Hayami, p. 162.

Age and distribution.—Aptian. Lower Monobegawa group (Hagino formation) in Monobegawa area.

Subgenus uncertain

Pholadomya? ashikitensis Tamura

1959e. *Pholadomya? ashikitensis* Tamura, p. 118, pl. 12, figs. 26, 27.

Type.—Holotype (UMUT MM3119) from Uminoura, Tanoura, Kumamoto Pref.
Age and distribution.—Upper Jurassic. Torinosu group in Tanoura area.

Genus ***Neoburmesia*** Yabe and Sato, 1942

Neoburmesia iwakiensis Yabe and Sato [Pl. 8, Fig. 7]

MM3283 -8-7

1942. *Neoburmesia iwakiensis* Yabe and Sato, p. 251, text-figs. 1–3.—1960b. *Neoburmesia iwakiensis* Yabe and Sato: Tamura, p. 280, text-fig. 1, pl. 32, figs. 21–24.

Type.—Holotype by monotypy (IGPS no. 65274) from Koike, Kashima, Fukushima Pref.
Age and distribution.—Kimmeridgian. Soma group (Nakanosawa formation) in Soma area.

Genus ***Tetorimya*** Hayami, 1959

MM3181 -8-8

Tetorimya carinata Hayami [Pl. 8, Fig. 8]

1959g. *Tetorimya carinata* Hayami, p. 161, pl. 13, figs. 14–16.

Type.—Holotype (UMUT MM3181) from Nonomata, Shokawa, Gifu Pref.

Age and distribution.—Callovian. Tetori group (Mitarai formation) in Makito area.

Genus ***Goniomya*** Agassiz, 1841

Subgenus ***Goniomya*** Agassiz, 1841

MM3292 -8-10

Goniomya (Goniomya) nonvscripta Tamura [Pl. 8, Fig. 10]

1960b. *Goniomya nonvscripta* Tamura, p. 281, pl. 32, figs. 15–18.—compare 1960d. *Goniomya* cf. *nonvscripta* Tamura: Tamura, p. 242.

Type.—Holotype (UMUT MM3292) from Tatenosawa, Kashima, Fukushima Pref.

Age and distribution.—Kimmeridgian. Soma group (Nakanosawa formation) in Soma area.

Goniomya (Goniomya) subarchiaci Nagao [Pl. 8, Fig. 11]

1934. *Goniomya subarchiaci* Nagao, p. 215, pl. 29, figs. 2, 3.—1966. *Goniomya subarchiaci* Nagao: Hayami, p. 163, pl. 25, figs. 1–13.

Type.—Holotype (GMH no. 6786) from the northeast of Raga, Tanohata, Iwate Pref.

Age and distribution.—Aptian–Albian. Miyako group (Tanohata, Hiraiga and Aketo formations) in Tanohata area.

Genus ***Homomya*** Agassiz, 1843

Homomya matsuoensis Nakazawa

1956. *Homomya matsuoensis* Nakazawa, p. 237, pl. 2, figs. 1, 2.—1960c. *Homomya matsuoensis* Nakazawa: Tokuyama, p. 215, pl. 13, figs. 15, 16.

Type.—Holotype (UK JM10358) from Higashiarata (Matsuo), Maizuru, Kyoto Pref.

Age and distribution.—Carnian. Nabae group (N2 formation) in Maizuru area, and Mine group (Hirabara formation) in Mine area.

Homomya satoi Hayami

1958d. *Homomya satoi* Hayami, p. 196, pl. 28, fig. 10.

Type.—Holotype (UMUT MM2810) from Shinatani, Omi (Agero), Niigata Pref.

Age and distribution.—Pliensbachian–Toarcian. Kuruma group (Shinatani formation) in Omi area.

Homomya gibbosa (Sowerby)

1960b. *Homomya gibbosa* (Sowerby): Tamura, p. 280, text-fig. 2.

Age and distribution.—Kimmeridgian. Some group (Nakanosawa formation) in Soma area. This species has been known from western Europe.

Homomya? dubia Yabe and Nagao

1926. *Homomya? dubia* Yabe and Nagao, *in* Yabe, Nagao and Shimizu, p. 55, pl. 12, figs. 11, 39, pl. 14, fig. 1.

Type.—Syntype (IGPS no. 22505) from Hachimanzawa, Nakazato, Gumma Pref.

Age and distribution.—Aptian–Albian. Sebayashi formation in Sanchu area.

Family BURMESIIDAE Healey, 1908

Genus ***Burmesia*** Healey, 1908

Burmesia japonica Hayami

1959a. *Burmesia japonica* Hayami, p. 74, pl. 7, figs. 13–18.

Type.—Holotype (UMUT MM2936) from Futamataji (Mizunuma), Ishinomaki, Miyagi Pref.

Age and distribution.—Hettangian. Shizukawa group (Niranohama formation) in Mizunuma area.

Family MYOPHOLADIDAE Cox, 1964

Genus ***Myopholas*** Douvillé, 1907

Myopholas sp. cf. **M. acuticostata** (Sowerby)

1960b. *Myopholas* cf. *acuticostata* (J. de C. Sowerby): Tamura, p. 278, pl. 32, figs. 25, 26.

Age and distribution.—Kimmeridgian. Soma group (Nakanosawa formation) in Soma area.

Myopholas sp.

1926. *Myopholas* cf. *semicostata* (Agassiz): Yabe, Nagao and Shimizu, p. 56, pl. 12, fig. 5, pl. 13, fig. 1, pl. 14, figs. 21, 27.

Age and distribution.—Neocomian. Shiroi formation in Sanchu area.

Family PLEUROMYIDAE Dall, 1900

Genus ***Pleuromya*** Agassiz, 1842

Pleuromya forsbergi nipponica Kobayashi and Ichikawa

1950c. *Pleuromya forsbergi nipponica* Kobayashi and Ichikawa, p. 235, pl. 4, fig. 11.—compare 1956. *Pleuromya* (?) aff. *forsbergi nipponica* Kobayashi and Ichikawa: Nakazawa, p. 240, pl. 3, figs. 4, 5.—1959b. *Pleuromya forsbergi nipponica* Kobayashi and Ichikawa: Tamura, p. 223, pl. 2, figs. 22, 23.

Type.—Holotype (UMUT MM5159) from Nezukamiishi, Sakawa, Kochi Pref.

Age and distribution.—Carnian. Kochigatani group (lower part) in Sakawa and Sakamoto areas.

Pleuromya wakasana Nakazawa

1956. *Pleuromya wakasana* Nakazawa, p. 239, pl. 3, figs. 1–3.—1956. *Pleuromya wakasana* new subspecies?: Nakazawa, p. 240, pl. 2, fig. 3.

Type.—Holotype (UK JM10364) from Nishimitsumatsu, Takahama, Fukui Pref.

Age and distribution.—Carnian. Nabae group (N4 formation) in Maizuru zone.

Pleuromya hashidatensis Hayami

1958d. *Pleuromya hashidatensis* Hayami, p. 195, pl. 28, fig. 9.

Type.—Holotype (UMUT MM2808) from Kanayamadani, Omi, Niigata Pref.

Age and distribution.—Pliensbachian. Kuruma group (Teradani formation) in Omi area.

Pleuromya hidensis Hayami

1959g. *Pleuromya hidensis* Hayami, p. 158, pl. 13, figs. 12, 13.

Type.—Holotype (UMUT MM3179) from Mitarai, Shokawa, Gifu Pref.

Age and distribution.—Callovian. Tetori group (Mitarai formation) in Makito area.

Superfamily PANDORACEA Rafinesque, 1815

Family LATERNULIDAE Hedley, 1918

Genus ***Cercomya*** Agassiz, 1843

Subgenus ***Cercomya*** Agassiz, 1843

Cercomya (Cercomya) gurgitis (Pictet and Campiche) [Pl. 8, Fig. 12]

1934. *Anatina (Cercomya)* sp.: Nagao, p. 216, pl. 32, fig. 2.—1957b. *Anatina (Cercomya?)* sp.: Amano, p. 93, pl. 2, figs. 10, 11.—1966. *Cercomya gurgitis* (Pictet and Campiche): Hayami, p. 166, pl. 24, figs. 8–10.

Age and distribution.—Aptian–Albian. Miyako group (Hiraiga and Aketo formations) in Tanohata area, and Lower Monobegawa group (Hagino formation) in Monobegawa area. This species has been known from western Europe.

Genus ***Plectomya*** de Loriol, 1868

Plectomya punctostriae (Tamura)

1959e. *Pleuromya? punctostriae* Tamura, p. 117, pl. 12, figs. 29–32.—1960b. *Pleuromya? punctostriae* Tamura: Tamura, p. 278, pl. 32, figs. 27, 28.—1960d. *Pleuromya punctostriae* Tamura: Tamura, p. 241, pl. 2, fig. 14.

Type.—Holotype (UMUT MM3113) from Sakamoto, Sakamoto, Kumamoto Pref.

Age and distribution.—Upper Jurassic. Torinosu group in Sakamoto, Sakuradani and Sakawa areas, and Soma group (Nakanosawa formation) in Soma area.

Plectomya aritagawana Hayami

1966. *Plectomya aritagawana* Hayami, p. 168, pl. 25, figs. 14, 15, pl. 26, fig. 2.

Type.—Holotype (GK H6577) from Yoshikawa, Yuasa, Wakayama Pref.

Age and distribution.—Upper Neocomian–Albian. Arita formation in Yuasa area, and Yatsushiro formation in Sakamoto area.

Plectomya sp. aff. **P. anglica** Woods

1966. *Plectomya* sp. aff. *P. anglica* Woods: Hayami, p. 169, pl. 25, fig. 16.

Age and distribution.—Albian. Yatsushiro formation in Yatsushiro area.

Genus ***Periplomya*** Conrad, 1870

Periplomya nagaoi nagaoi Ichikawa and Maeda

1938. *Periplomya elliptica* Nagao and Otatume, p. 43, pl. 3, figs. 4, 5. (non *Periplomya elliptica* (Gabb, 1862))—1958b. *Periplomya nagaoi* Ichikawa and Maeda, p. 103.

Type.—Holotype (GMH no. 5943) from Kiusu, Hobetsu, Iburi Prov., Hokkaido.

Age and distribution.—Campanian–Maestrichtian. Hakobuchi group (Fukaushi sandstone) in Hobetsu area, and Izumi group (Azenotani shale) in Izumi mountains.

Periplomya nagaoi brevis Ichikawa and Maeda

1958b. *Periplomya nagaoi brevis* Ichikawa and Maeda, p. 103, pl. 6, figs. 7, 8.

Type.—Holotype (OMN F1111) from Sobura, Izumi mountains.

Age and distribution.—Campanian. Izumi group (Azenotani shale and Shichi shale) in Izumi mountains and Awaji island.

Periplomya grandis Ichikawa and Maeda

1958b. *Periplomya grandis* Ichikawa and Maeda, p. 104, pl. 7, figs. 1–3.

Type.—Holotype (OCU MM255) from Kuroiwa, Nandan (Awaji), Hyogo Pref.
Age and distribution.—Campanian–Maestrichtian. Izumi group (Azenotani shale and Shimonada siltstone) in Izumi mountains and Awaji island.

Family PERIPLOMATIDAE Dall, 1895

Genus ***Periploma*** Schmacher, 1817

Subgenus ***Offadesma*** Iredale, 1930

Periploma (Offadesma) altissimum (Hayami)

1966. *Offadesma altissimum* Hayami, p. 169, pl. 26, fig. 1.
Type.—Holotype (GK H6581) from the northeast of Raga, Tanohata, Iwate Pref.
Age and distribution.—Aptian–Albian. Miyako group (Hiraiga and Aketo formations) in Tanohata area.

Family THRACIIDAE Stoliczka, 1870

Genus ***Thracia*** Sowerby, 1823

Thracia subrhombica Hayami

1958d. *Thracia subrhombica* Hayami, p. 196, pl. 28, figs. 12–14.
Type.—Holotype (UMUT MM2812) from Niranohama, Utatsu, Miyagi Pref.
Age and distribution.—Hettangian. Shizukawa group (Niranohama formation) in Shizukawa area.

Thracia shokawensis Hayami

1959g. *Thracia shokawensis* Hayami, p. 162, pl. 13, figs. 17–19.
Type.—Holotype (UMUT MM3188) from Mitarai, Shikawa, Gifu Pref.
Age and distribution.—Callovian. Tetori group (Mitarai formation) in Makito area.

Thracia fukushimensis Tamura

1960c. *Thracia fukushimensis* Tamura, p. 290, pl. 33, figs. 8–10.
Type.—Holotype (UMUT MM3326) from Koike, Kashima, Fukushima Pref.
Age and distribution.—Kimmeridgian. Soma group (Nakanosawa formation) in Soma area.

Family uncertain

Corymya? tanohatensis Hayami

1966. *Corimya* (?) *tanohatensis* Hayami [*sic*], p. 171, pl. 26, figs. 4, 5.
Type.—Holotype (GK H6724) from Hiraiga, Tanohata, Iwate Pref.
Age and distribution.—Aptian. Miyako group (Tanohata formation) in Tanohata area.

Superfamily POROMYACEA Dall, 1886

Family CUSPIDARIIDAE Dall, 1886

Genus ***Cuspidaria*** Nardo, 1840

Cuspidaria? ayabensis Nakazawa

1956. "*Cuspidaria*" *ayabensis* Nakazawa, p. 242, pl. 3, figs. 13, 14.
Type.—Holotype (UK JM10384) from Miuchi, Ayabe, Kyoto Pref.
Age and distribution.—Carnian. Nabae group (N2 and N3 formations) and Heki formation in Maizuru zone.

Cuspidaria? praenipponica Hayami

1958d. *Cuspidaria* (?) b sp.: Hayami, p. 198, pl. 28, figs. 20, 21.—1959a. *Cuspidaria* (?) *praenipponica* Hayami, p. 73, pl. 7, figs. 9–12.

Type.—Holotype (UMUT MM2932) from Futamataji (Mizunuma), Ishinomaki, Miyagi Pref.

Age and distribution.—Hettangian. Shizukawa group (Niranohama formation) in Mizunuma and Shizukawa areas.

Cuspidaria brevirostris Nagao

1938. *Cuspidaria brevirostris* Nagao, p. 132, pl. 16, figs. 7–9.

Type.—Holotype (GMH no. 8226) from Kawakami colliery, south Saghalin.

Age and distribution.—Upper Cretaceous (precisely unknown). Upper Yezo group in Kawakami area, and Middle Yezo group in Ikushumbetsu area.

V. GENERA AND SUBGENERA OF MESOZOIC BIVALVIA PROPOSED ON THE MATERIALS FROM JAPAN AND ITS ADJACENT AREAS

Sixty-nine genera or subgenera of Mesozic Bivalvia hitherto proposed on the materials from Japan and its adjacent areas are reviewed, and such basic information as the reference of original description, revised systematic position, type-species, main diagnostic characters, geologic age and geographic distribution of each taxon is indicated. The systematic position of several taxa seem to have been misinterpreted in previous works, and different views from the *Treatise on invertebrate paleontology*, part N, if present, are explained in the remarks. The distribution of these genera and subgenera is in most cases restricted to Japan and its adjacent areas, but they may be important for the general consideration of bivalve phylogeny and classification. The diagnoses are in many cases adapted or abridged from original or subsequent emended descriptions (source in parentheses) but, if necessary, are written afresh.

Trigonucula Ichikawa, 1949, Japan. Jour. Geol. Geogr., 21 (1–4): 267.
Systematic position.—A genus of the Nuculidae.
Type-species.—*Trigonucula sakawana* Ichikawa, 1949 (original designation) [Pl. 1, Fig. 1]
Diagnosis.—Shell roundly trigonal, subequilateral; umbo subcentral, somewhat opisthogyrous; escutcheon delimited by a sharp ridge; ventral margin smooth internally; no radial ornament; hinge typical of nuculid, but two series of denticles forming a more acute angle than in *Nucula* and many other genera of the Nuculidae; resilifer not so oblique as in *Nucula*.
Age and distribution.—Carnian. Japan.

Ezonuculana Nagao, 1938, Jour. Fac. Sci. Hokkaido Imp. Univ., [4], 4 (1–2): 121.
Systematic position.—A subgenus of *Jupiteria* (Nuculanidae)
Type-species.—*Nuculana mactraeformis* Nagao, 1932 (original designation) [Pl. 9, Fig. 1]
Diagnosis.—Shell inflated, short, subtrigonal, not distinctly rostrated posteriorly, with subcentral and slightly opisthogyrous umbo; no lunule; indistinct escutcheon; surface smooth; hinge in two angular rows of nearly equal length; chondrophore distinct and wide; pallial sinus obsolete; test apparently not nacreous. (abridged from Ichikawa and Maeda, 1958b, p. 86)
Age and distribution.—Coniacian–Campanian. Japan and Saghalin.
Remarks.—Nagao originally proposed *Ezonucula* as a subgenus of *Nuculana*, but, as regarded by Ichikawa and Maeda (1948b), it seems to be more closely related to *Jupiteria* Bellardi, 1875, which is, however, characterized by more distinctly sinuated pallial line.

Palaeocucullaea Tokuyama, 1960c, Japan. Jour. Geol. Geogr., 31 (2–4): 205.
Systematic position.—A subgenus of *Parallelodon* (Parallelodontidae).
Type-species.—*Parallelodon monobensis* Nakazawa, 1955 (original designation) [Pl. 1, Fig. 3]
Diagnosis.—Shell roundly elongate-trapezoidal; ventral sinuation, if present, shallow; posterior margin rounded with indistinct posterior wing; ligament area triangular, broad in adult shells, with several chevrons; teeth radiating from the upper side, composed of a few opisthoclinal anterior teeth, a few prosoclinal posterior teeth and many small median denticles.
Age and distribution.—Carnian–(?) Lower Jurassic. Japan, east Siberia and (?) New Zealand.
Remarks.—*Palaeocucullaea* was synonymized with *Parallelodon* Meek and Worthen, 1866, in the *Treatise*, but subgeneric distinction from *Parallelodon* (s. s.) seems to be appropriate in view of the *Barbatia*-like rounded outline and the *Idonearca*-like inclined anterior and posterior teeth.

Torinosucatella Tamura, 1959d, Trans. Proc. Pal. Soc. Japan, n. s., (34): 55.
Systematic position.—A subgenus of *Parallelodon* (Parallelodontidae).
Type-species.—*Catella* (*Torinosucatella*) *kobayashii* Tamura, 1959 (original designation) [Pl. 1, Figs. 4, 5]
Diagnosis.—Shell small, arciform, posteriorly alate, submesially constricted; ventral margin deeply concave in accordance with the constriction; surface with fine radial ribs and concentric wrinkles; hinge similar to *Parallelodon* (*Cosmetodon*).
Age and distribution.—Upper Jurassic. Japan.
Remarks.—*Torinosucatella* was originally regarded as a subgenus of *Catella* Healey, 1908, but, as treated by Hayami *in* Hayami, Sugita and Nagumo (1960), the general outline, ventral sulcus and surface ornamentation indicate that it is more closely related to *Parallelodon*, especially to its subgenus *Cosmetodon*. The figure of "*Catella* (*Torinosucatella*) *kobayashii*" in the *Treatise* (p. N259, figs. C7-1a, b) was erroneously reproduced from Tamura's (1959d) illustration of *Catella* (*Catella*) *laticlava* Healey.

Pleurogrammatodon Ichikawa and Maeda, 1958a, Jour. Inst. Polytech. Osaka City Univ., [G], 3: 63.
Systematic position.—A genus of the Parallelodontidae.
Type-species.—*Pleurogrammatodon splendens* Ichikawa and Maeada, 1958 (original disignation) [Pl. 9, Figs. 7a, b]
Diagnosis.—Shell large, elongate, thick-shelled, with improminent umbo and wide triangular limament area; no ventral sinus; surface with strong radial ribs which are dissimilar between two valves as in *Indogrammatodon;* dentition consisting of three or more elongated posterior teeth, a series of subvertical median denticles and three or four short anterior teeth. (abridged from Ichikawa and Maeda, 1958a, p. 63)
Age and distribution.—Campanian–Maestrichtian. Japan, Madagascar and (?) west Canada.
Remarks.—In the *Treatise Pleurogrammatodon* was assigned as a subgenus of *Nemodon* Conrad, 1869, but many essential characters seem to indicate that it is more closely

related to *Indogrammatodon* Cox, 1937. Here I agree with Ichikawa and Maeda (1958a) in considering that *Pleurogrammatodon* is a distinct genus of the Grammatodontinae. The figure of "*Nemodon* (*Pleurogrammatodon*) *splendens*" in the *Treatise* (p. N259, fig. C7–5a, only) does not agree with Ichikawa and Maeda's illustration and any other specimens of this type-species, but was probably erroneously reproduced from some figure of an unrelated bivalve.

Matsumotoa Okada, 1958, Mem. Fac. Sci. Kyushu Univ., [D], 8 (2): 36.
Systematic position.—A genus of the Noetiidae.
Type-species.—*Matsumotoa japonica* Okada, 1958 (original designation) [Pl. 1, Figs. 6, 7]
Diagnosis.—Shell ovally subtapezoidal, sometimes transversely elongated; umbo orthogyrous or slightly prosogyrous, located at about the anterior third; large submedian depression running from umbonal area to ventral margin; ventral margin broadly sinuate and smooth internally; ligament area subtriangular, vertically striated without chevrons; hinge plate broad, with ventrally converging short median denticles and a number of slender and unusually long teeth on anterior and posterior sides; surface with several narrow radial riblets.
Age and distribution.—Cenomanian–Turonian. Japan.

Hanaia Hayami, 1965a, Mem. Fac. Sci. Kyushu Univ., [D], 15 (2): 250.
Systematic position.—A subgenus of *Glycymeris* (Glycymerididae).
Type-species.—*Glycymeris densilineata* Nagao, 1934 (original designation) [Pl. 1, Figs. 9, 10]
Diagnosis.—Shell very small, strongly inflated, prosocline; umbo submesial; inner ventral margin coarsely crenulated; hinge with stout and elongated lateral teeth and not much degenerated median denticles; flattened area along periphery of hinge plate unusually narrow; surface smooth except for broad rounded radial ribs and grooves on which there are numerous fine radial striae. (abridged from Hayami, 1965a, p. 250)
Age and distribution.—Aptian–Albian. Japan.
Remarks.—*Hanaia* is regarded as a small and primitive group of *Glycymeris*, characterized by strong convexity, coarse ventral crenulation and comparatively large teeth extending near the periphery of hinge plate. This was not cited in the *Treatise*. Tashiro (1971) referred some Late Cretaceous species of *Glycymeris* from Japan to this subgenus, but I think they are more appropriately referable to the subgenus *Glycymerita* Finlay and Marwick, 1937.

Pseudoveletuceta Tashiro, 1971, Trans. Proc. Pal. Soc. Japan, n. s., (84): 236.
Systematic position.—A subgenus of *Glycymeris* (Glycymeridiae).
Type-species.—*Glycymeris* (*Pseudoveletuceta*) *mifunensis* Tashiro, 1971 (original designation) [Pl. 1, Fig. 8]
Diagnosis.—Shell orbicular to ovate, prosocline, highly inequilateral; umbo small, prosogyrous, located very anteriorly; surface smooth except for fine radial threads which do not form bundles; inner ventral margin densely crenulated. (abridged from Tashiro, 1971, p. 236)
Age and distribution.—Cenomanian–Turonian. Japan.

Remarks.—In spite of the *Limopsis*-like external features, the presence of ventral crenulations and chevron-shaped ligament indicates that this is a specialized group of *Glycymeris*.

Plesiopinna Amano, 1956, Kumamoto Jour. Sci., [B], [1], 2 (1): 70.
Systematic position.—A subgenus of *Pinna* (Pinnidae).
Type-species.—*Plesiopinna atriniformis* Amano, 1956 (original designation) [Pl. 1, Fig. 13]
Diagnosis.—Shell comparatively small, wedge-shaped; median ridge distinct young shells but later obsolete; posterior margin subvertically truncated and closed; surface with or without radial ribs.
Age and distribution.—Albian–Cenomanian. Japan.
Remarks.—*Plesiopinna*, which was originally proposed as a distinct genus of the Pinnidae, is here treated as a subgenus of *Pinna* in agreement with the *Treatise*. So far as the original specimens are observed, the closed posterior margin is not due to secondary deformation but does characterize this subgenus.

Somapteria Tamura, 1960a, Trans. Proc. Pal. Soc. Japan, n. s., (37): 224.
Systematic position.—A genus of the Pteriidae.
Type-species.—*Somapteria koikensis* Tamura, 1960 (original designation) [Pl. 1, Fig. 16]
Diagnosis.—Shell small, equivalve, subrhomboidal, obliquely elongated; umbo not prominent; both valves possessing obtusely truncated posterior wing and fairly large pointed anterior wing; surface smooth; hinge composed of a few short anterior teeth and two elongated posterior teeth in each valve; ligament area narrow, of pteriid-type.
Age and distribution.—Kimmeridgian. Japan.

Eopinctada Tamura, 1961, Trans. Proc. Pal. Soc. Japan, n. s., (44): 147.
Systematic position.—A subgenus of Pinctada (Pteriidae).
Type-species.—*Pinctada* (*Eopinctada*) *matsumotoi* Tamura, 1961 (original designation) [Pl. 2, Fig. 2]
Diagnosis.—Shell subequivalve, obliquely trigonal, higher than long, thick, not alate; umbo subterminal, prosogyrous; byssal margin deeply concave; antero-ventral and posterior margins converging to meet at subangular postero-ventral extremity; surface smooth; cardinal area wide, with a large and obliquely triangular pit; hinge edentulous in adult shells; adductor muscle scar crescentic, strongly impressed.
Age and distribution.—Cenomanian–Turonian. Japan.
Remarks.—Although *Eopinctada* was regarded in the *Treatise* as generically distinct from *Pinctada*, the ligament and other essential characters are similar as originally described by Tamura (1961),

Neobakevellia Nakazawa, 1959, Mem. Coll. Sci. Univ. Kyoto, [B], 26 (2): 200.
Systematic position.—A subgenus of *Bakevellia* (Bakevelliidae).
Type-species.—*Gervillia costata* von Schlotheim, 1820 (original designation).
Diagnosis.—Medium- or large-sized *Bakevellia*, with much degenerated anterior adductor muscle scar; subequivalve to fairly inequivalve; hinge teeth differentiated into

a few short anterior teeth and one or two elongated posterior teeth; ligament pits typically triangular and small in number but subquadrate and numerous in advanced species.

Age and distribution.—Lower Triassic–Upper Cretaceous. Cosmopolitan.

Remarks.—In the *Treatise*, *Neobakevellia* was treated as a junior synonym of subgenus *Bakevelloides* Tokuyama, 1959, notwithstanding that *Bakevellia costata* (von Schlotheim), the type-species of *Neobakevellia*, was figured as an example of *Bakevellia* (*Bakevellia*). *Bakevellia costata* and some other Lower-Middle Triassic species are actually not much different from the Permian typical representatives of *Bakevellia* (s. s) but the degeneration of anterior adductor muscle scar is noteworthy. Upper Triassic and later species except for the species referable to *Bakevelloides* and *Yoshimopsis* are generally much larger, highly inequivalve and provided with more numerous ligament pits. So far as various Mesozoic species are observed, such advanced species are at least subgenerically separable from the Permian type-species. The Lower-Middle Triassic species including *Bakevellia costata* appear to be intermediate in many characters. The subgeneric name of *Neobakevellia* is tentatively used for the most Mesozoic species of *Bakevellia* from Japan, though further comparative studies may be needed about the systematic position and affinities of *Odontoperna* Frech, 1891, and *Pseudogervilleia* Gillet, 1922, which were similarly proposed for Mesozoic representatives.

Maizuria Nakazawa, 1959, Mem. Coll. Sci. Univ. Kyoto, (B), 26 (2): 201.

Systematic position.—Subjective synonym of *Neobakevellia* Nakazawa, 1959 (Bakevelliidae).

Type-species.—*Bakevellia* (*Maizuria*) *kambei* Nakazawa, 1959 (original designation).

Bakevelloides Tokuyama, 1959a, Trans. Proc. Pal. Soc. Japan, n. s., (35): 148.

Systematic position.—A subgenus of *Bakevellia* (Bakevelliidae).

Type-species.—*Gervillia hekiensis* Kobayashi and Ichikawa, 1952 (original designation) [Pl. 2, Fig. 4]

Diagnosis.—Medium-sized *Bakevellia*, with thick, subequivalve and roundly triangular shells; ligament area wide, depressed triangular, with a few deep pits; anterior teeth commonly numerous, small, divergent from umbo; posterior wing undeveloped, obtusely or subrectangularly truncated.

Age and distribution.—Middle Triassic–Upper Jurassic. Japan, western Europe and Petchora.

Remarks.—Tokuyama (1959a) regarded *Bakevelloides* as a distinct genus of the Bakevelliidae. Although the pseudotaxodont denticles are diagnostic, *Bakevelloides* is similar to *Bakevellia* (s. s.) in the subequivalve and roundly triangular outline. The taxonomic treatment in the *Treatise*, where *Bakevelloides* was regarded as a subgenus of *Bakevellia*, seems to be appropriate.

Yoshimopsis Ohta, 1974, Bull. Fukuoka Univ. Educ., 23 (3): 79.

Systematic position.—A subgenus of *Bakevellia* (Bakevelliidae).

Type-species.—*Bakevelloides* (*Yoshimopsis*) *nagatoensis* Ohta, 1974 (original designation) [Pl. 9, Fig. 2]

Diagnosis.—Medium-sized bakevelliids with subtrapezoidal to subrhomboidal shell and

underveloped posterior wing; hinge plate narrow but extending along entire length of dorsal margin; anterior teeth taxodont-like, numerous, diverging from upper side; surface with weak radial riblets in young stage (abridged from Ohta, 1974, p. 79)
Age and distribution.—Neocomian. Japan.
Remarks.—*Yoshimopsis*, as originally considered, may be related to *Bakevelloides*, but is here treated as a subgenus of *Bakevellia*. It is distinguishable from *Bakevellia* (s. s.) and *Bakevelloides* by the extremely long hinge area with more numerous denticles and the presence of distinct radial riblets in young shells.

Kobayashites Hayami, 1959e, Trans. Proc. Pal. Soc. Japan, n. s., (35): 138.
Systematic position.—A genus of the Bakevelliidae.
Type-species.—*Kobayashites hemicylindricus* Hayami, 1959 (original designation) [Pl. 2, Fig. 6]
Diagnosis.—Shell small, soleniform, elongate-rectangular, highly inequivalve, not alate; left valve moderately inflated, hemicylindrical; right valve nearly flat; umbo subterminal, prosogyrous; byssal gape wide; ligament area narrow, with several widely separated pits; hinge of *Bakevellia*-type, but anterior teeth obliquely elongated, supported by septum-like thickening below umbo; surface smooth.
Age and distribution.—Bajocian. Japan.

Waagenoperna Tokuyama, 1959a, Trans. Proc. Pal. Soc. Japan, n. s., (35): 151.
Systematic position.—A genus of the Isognomonidae.
Type-species.—*Edentula lateplanata* Waagen, 1907 (original designation)
Diagnosis.—Shell subequivalve, mytiliform or cuneiform, compressed; both wings not clearly delimited; umbo prosogyrous, subterminal; ligament area elongated along dorsal margin but becoming somewhat obscure near posterior end, provided with several subquadrate pits of *Isognomon*-type; anterior and posterior teeth obsolete already in early stage; no radial ribs.
Age and distribution.—Middle Permian–Upper Triassic. Middle Europe and Japan.
Remarks.—*Waagenoperna* was proposed as a substitute name for *Edentula* Waagen, 1907, non Nitzsch, 1820. Cox (1954) established a new genus *Cuneigervillia* also "as the substitute" for *Edentula* Waagen, 1907, but the type-species of that genus, *Gervillia hagenowi*, may belong to the Bakevelliidae and is clearly different from Waagen's species in many characters. *Waagenoperna*, as interpreted in the *Treatise*, should be regarded as a distinct genus of the Isognomonidae. Nakazawa and Newell (1968) clarified that *Waagenoperna* is already well represented in the Middle-Upper Permian bivalve fauna of Japan. Nakazawa and Murata (1966) regarded an early Cretaceous species from north Japan as belonging to this genus, but the generic reference seems to be quite doubtful.

Asoella Tokuyama, 1959b, Japan. Jour. Geol. Geogr., 30: 2.
Systematic position.—A genus of the Aviculopectinidae.
Type-species.—*Eumorphotis* (*Asoella*) *confertoradiata* Tokuyama, 1959 (original designation) [Pl. 2, Figs. 8, 9]
Diagnosis.—Shell small, roundly subquadrate, nearly acline; left valve strongly convex, with broadly inflated umbonal area; right valve weakly convex; right anterior auricle

clearly demarcated, projecting forward; byssal notch shallow but distinct; other auricles obtusely or subrectangularly truncated; surface with or without fine radial ribs.
Age and distribution.—Carnian–Norian. Japan.
Remarks.—*Asoella* was originally proposed as a subgenus of *Eumorphotis* Bittner, 1901. Although all the materials of the type-species and two other simultaneously described species are poorly preserved, *Asoella* can be regareded as a distinct genus, as already assigned in the *Treatise*.

Pleuromysidia Ichikawa, 1954c, Jour. Inst. Polytech. Osaka City Univ., [G], 1 (1): 52.
Systematic position.—Subjective synonym of *Otapiria* Marwick, 1935 (Monotidae).
Type-species.—*Pleuromysidia dubia* Ichikawa, 1954 (original designation).

Somapecten Kimura, 1951, Jour. Fac. Sci. Univ. Tokyo, [2], 7 (7): 347.
Systematic position.—A genus of the Entoliidae.
Type-species.—*Somapecten kamimanensis* Kimura, 1951 (original designation) [Pl. 3, Figs. 3, 4]
Diagnosis.—Shell equilateral, compressed, subovate, higher than long; auricles subequal, comparatively large, obtusely truncated or rounded; no byssal notch; dorsal margin of left (?) valve elevated above hinge-axis as in *Entolium* and *Pernopecten;* surface smooth; auricular crura distinct; a strong bifid tooth in left (?) valve, and a corresponding deep socket and angular ridges on both sides in right (?) valve. (adapted from Tamura, 1959d, p. 61).
Age and distribution.—Upper Jurassic. Japan.
Remarks.—*Somapecten* is very similar to *Entolium* Meek, 1865, in every external characters. Though it was referred to the Entoliidae with a query in the *Treatise*, the familial referrence is undoubted. The strong subumbonal tooth, however, seems to be quite unique in this family.

Tosapecten Kobayashi and Ichikawa, 1949a, Japan. Jour. Geol. Geogr., 21 (1–4): 163.
Systematic position.—A genus of the Pectinidae.
Type-species.—*Pecten* (*Velopecten*) *suzukii* Kobayashi, 1931 (original designation) [Pl. 3, Fig. 7]
Diagnosis.—Shell subequilateral exclusive auricles, nearly as long as high; right valve more strongly convex than left; anterior and posterior areas of left valve depressed or slightly concave; anterior auricle larger than posterior; byssal notch moderately deep; surface ornamented with plicated radial costae which are somewhat irregular in breadth and different in arrangement between two valves; scales undeveloped.
Age and distribution.—Carnian–Norian. Japan and east Siberia.
Remarks.—Although *Tosapecten* was regarded as a subgenus of *Weyla* Böhm, 1922, in the *Treatise*, they are morphologically and biogeographically distinct from each other and do not show any direct phyletic relationship. This genus is also well represented in the Upper Triassic of east Siberia.

Neithella Hayami, 1965a. Mem. Fac. Sci. Kyushu Univ., (D), 15 (2): 291.
Systematic position.—A subgenus of *Neithea* (Pectinidae).

Type-species.—*Janira wrightii* Shumard, 1860 (original designation).
Diagnosis.—Shell commonly small, comparatively narrow; right valve strongly convex with four to six strongly plicated radial ribs; ribs of left valve correspond with the ribs (instead of grooves) of right valve at the digitated ventral margin; a number of fine radial striae marked on the bottom of interspace and slope of the ribs; left valve nearly flat or slightly concave; auricles highly unequal; anterior auricle pointed forward, much larger than posterior.
Age and distribution.—Neocomian–Turonian. Cosmopolitan.

Radulonectites Hayami, 1957d, Trans. Proc. Pal. Soc. Japan, n. s., (27): 89.
Systematic position.—A genus of the Pectinidae.
Type-species.—*Radulonectites japonicus* Hayami, 1957 (original designation) [Pl. 3, Figs. 9, 10]
Diagnosis.—Shell inequivalve, inequilateral, higher than long, a little prosocline in young stage but more or less opisthocline in adult; left valve slightly more strongly convex than right; antero-dorsal margin of disk broadly concave as in *Pleuronectites* and *Camptonectes;* byssal notch deep, but ctenolium apparently undeveloped; right anterior auricle protruded forward as in *Chlamys;* surface nearly smooth in young stage but marked with numerous wavy radial grooves after middle stage.
Age and distribution.—Lower Jurassic (Pliensbachian or thereabout). Japan, east Siberia, (?) middle Europe and (?) Argentina.
Remarks.—As originally described and treated in the *Treatise*, *Radulonectites* resembles *Pleuronectites* and *Camptonectes* but seems to consitute a distinct genus of the Pectinidae. *Radulonectites hayamii* Polubotko, *in* Efimova et al., 1968, from the Pliensbachian of east Siberia (Verkhoyansk and Okhotsk areas) is, if not identical with, closely similar to the type-species.

Micronectes Ichikawa and Maeda, 1958b, Jour. Inst. Polytech. Osaka City Univ., [G], 4: 95.
Systematic position.—A genus of the Pectinidae.
Type-species.—*Micronectes bellaturus* Ichikawa and Maeda, 1958 (original designation) [Pl. 9, Fig. 3]
Diagnosis.—Shell small, slightly prosocline or acline in young stage but a little opisthocline in adult; anterior auricle much larger than posterior; byssal notch distinct; cardinal crura well developed; auricular crura absent; surface smooth except for regular and widely spaced concentric ribs and fine microscopic radiating lines on entire surface.
Age and distribution.—Campanian–Maestrichtian. Japan.
Remarks.—*Micronectes* was regarded as a subgenus of *Eburneopecten* Conrad, 1865, in the *Treatise*, but its generic distinction by original authors seems to be appropriate.

Paranodonta Kobayashi and Suzuki, 1936, Japan. Jour. Geol. Geogr., 13 (3–4): 253.
Systematic position.—A genus of the Unionidae.
Type-species.—*Paranodonta otai* Kobayashi and Suzuki, 1936 (original designation) [Pl. 9, Fig. 6]
Diagnosis.—Shell subelliptical to subovate, highly convex; umbo subcentral; pseudocardinal teeth rudimentary; posterior teeth absent; ligament subinternal; test very thick;

no surface marking except for growth-lines. (according to Kobayashi and Suzuki, 1936, p. 253)
Age and distribution.—Lower Cretaceous. Japan.
Remarks.—The above generic diagnosis may be insufficient for its distinction from other genera of the Unionacea, but no diagnostic characters can be added to the original description owing to the poorly preserved material.

Plicatounio Kobayashi and Suzuki, 1936, Japan. Jour. Geol. Geogr., 13 (3–4): 250.
Systematic position.—A genus of the Unionidae.
Type-species.—*Plicatounio naktongensis* Kobayashi and Suzuki, 1936 (original designation) [Pl. 9, Figs. 4, 5]
Diagnosis.—Shell medium-sized, moderately convex, subelliptical to subtriangular; umbo located submesially or a little anteriorly; pseudocardinal teeth comparatively long, subparallel to pre-umbonal margin, regularly crenulated; posterior teeth strong, may or may not be crenulated; posterior area of surface with several broad radial plications.
Age and distribution.—Lower Cretaceous. South Korea, Japan, north China, Thailand and Sahara.
Remarks.—*Plicatounio* can be classified into two subgenera: *Plicatounio* (s. s.) and *Kwanmonia*. *Plicatounio* (s. s.) is characterized by elongated and subelliptical outline, large umbonal angle, relatively weak crenulation on pseudocardinal teeth and nearly smooth posterior teeth.

Kwanmonia Ota, 1963, Geol. Rept. Hiroshima Univ., 12: 504.
Systematic position.—A subgenus of *Plicatounio* (Unionidae).
Type-species.—"*Plicatounio*" *kwanmonensis* Ota, 1959 (original designation).
Diagnosis.—*Plicatounio* with subtriangular outline, relatively small umbonal angle, strong crenulation on pseudocardinal teeth and distinct transverse crenulation on posterior teeth.
Age and distribution.—Lower Cretaceous. Japan.

Nakamaranaia Suzuki, 1943, Jour. Shigenkagaku Kenkyusho, 1 (2): 213.
Systematic position.—A genus of the Unionacea (family uncertain).
Type-species.—*Leptesthes chingshanensis* Grabau, 1923 (original designation).
Diagnosis.—Shell medium-sized, subtrapezoidal, truncated behind, moderately inflated, posteriorly carinated; test thick; surface smooth; two pseudocardinal teeth in each valve; posterior teeth two in right valve and one in left; umbonal cavity deep. (abridged from Suzuki, 1943, p. 213)
Age and distribution.—Lower Cretaceous. North China, south Korea and Japan.
Remarks.—*Nakamuranaia* is now an ambiguously defined genus, since Suzuki proposed it on the basis of the material from Korea, whose specific identity with *Leptesthes chingshanensis* from north China is not necessarily warranted. This taxonomic problem is now under examination in detail by Mr. S. Yang, and the relation and affinity of this genus will be more clarified in the near future.

Nippononaia Suzuki, 1941, Jour. Geol. Soc. Japan, 48 (575): 411.
Systematic position.—A genus of the Trigonioididae.

Type-species.—*Unio* (*Nippononaia*) *ryosekianus* Suzuki, 1941 (original designation) [Pl. 4, Figs. 3, 4]

Diagnosis.—Shell medium-sized, transversely elongated, tapering posteriorly; umbo low, orthogyrous, anteriorly located; surface ornamented with characteristic sculpture scribing Vs in the middle part and upward curving riblets on the antero- and postero-dorsal peripheral areas; hinge of unionid type, composed of two crenulated pseudocardinal teeth along pre-umbonal margin and one or two stout non-crenulated posterior teeth along postero-dorsal margin.

Age and distribution.—Lower Cretaceous. Japan, Thailand and (?) Colorado.

Remarks.—Though the type-locality of *Nippononaia ryosekiana* is still unknown, the rediscovery of firmly identical specimens with the type-species (Hayami and Ichikawa, 1965) made the generic characters more clear. In the *Treatise*, *Nippononaia* was still placed in the Unionidae as done by some previous Japanese authors, but it is certainly referable to the Trigonioididae.

Trigonioides Kobayashi and Suzuki, 1936, Japan. Jour. Geol. Geogr., 13 (3–4): 249.

Systematic position.—A genus of the Trigonioididae.

Type-species.—*Trigonioides kodairai* Kobayashi and Suzuki, 1936 (original designation) [Pl. 4, Figs. 5, 6]

Diagnosis.—Shell medium- or large-sized, subelliptical to trigonally ovate; umbo prominent, orthogyrous, located submesially or a little anteriorly; median part of disk ornamented with strong ribs which converge ventrally to form acute Vs; antero- and postero-dorsal peripheral areas having upward curving riblets which form reversed Vs with the ribs on median part; hinge plate thickened along preumbonal margin; pseudocardinal teeth two to five in right valve and three or four in left, radiating from umbo, strongly crenulated; posterior teeth short, also transversely crenulated; lunule and escutcheon may or may not be demarcated.

Age and distribution.—Lower Cretaceous–Upper Cretaceous. South Korea, Japan, north China (Manchuria), south China (Yunnan), Laos and Thailand.

Remarks.—The type-species of *Trigonioides* was recently redescribed by Yang (1974) on the basis of many well-preserved topotype specimens, and the generic characters became much clear. Various disputed opinions have been presented as to the classification and phylogeny of *Trigonioides* and allied genera (Cox, 1955; Kobayashi, 1956, 1963, 1968; Ota, 1959b, 1963; Hayami and Ichikawa, 1965; Martinsson, 1965; Tamura, 1970; etc.). Although the ontogenetic transformation of hinge teeth should be further examined, the radiating pseudocardinal teeth of *Trigonioides* (s. s.) was, I presume, originated from the subparallel teeth along the pre-umbonal margin as seen in *Plicatounio* and *Nippononaia*, which seem to be more closely related to unionid teeth rather than to trigoniid teeth. It is now maintained that the similarity of surface ornamentation between *Trigonioides* and *Nippononaia* is not superficial. *Trigonioides* seems to be classifiable into four subgenera: *Hoffetrigonia* Suzuki, 1940, *Wakinoa* Ota, 1963, *Kumamotoa* Yang, 1974, and *Trigonioides* (s. s.). *Trigonioides* (s. s.) is characterized by the medium size, suboval outline, moderately developed radiating pseudocardinal teeth (three in right valve and two or three in left) and crenulated posterior teeth (two in right and one in left).

Wakinoa Ota, 1963, Geol. Rept. Hiroshima Univ., 12: 504.
Systematic position.—A subgenus of *Trigonioides* (Trigonioididae).
Type-species.—"*Nippononaia*" *wakinoensis* Ota, 1959 (original designation).
Diagnosis.—Shell medium-sized, transversely elongated; two pseudocardinal teeth subparallel to pre-umbonal margin, narrow, finely crenulated; subumbonal teeth, if present, much smaller than in *Trigonioides* (s. s.); posterior teeth two in left valve and one or two in right, long, finely crenulated; surface ornament as in *Trigonioides* (s. s.).
Age and distribution.—Lower Cretaceous. Japan.
Remarks.—This subgenus appears to be ancestral to *Trigonioides* (s. s.) and morphologically intermediate between *Nippononaia* and *Trigonioides* (s. s.). Some recent authors (Tamura, 1970; Yang, 1974) regarded *Wakinoa* as a distinct genus of the Trigonioididae.

Kumamotoa Yang, 1974, Trans. Proc. Pal. Soc. Japan, n. s., (95): 405.
Systematic position.—A subgenus of *Trigonioides* (Trigonioididae).
Type-species.—*Trigonioides mifunensis* Tamura, 1970 (original designation) [Pl. 4, Figs. 7, 8]
Diagnosis.—Shell relatively large, subtrapezoidal or subtrigonal; surface ornament similar to that of *Trigonioides* (s. s.); hinge plate much thickened along umbonal margin, provided with three or four strong pseudocardinal teeth which radiate from umbo and are strongly crenulated; posterior teeth comparatively short.
Age and distribution.—Lower Cretaceous–Upper Cretaceous. Japan.
Remarks.—*Kumamotoa* shows the best developed subumbonal teeth among various groups of *Trigonioides*, and was possibly derived from *Trigonioides* (s. s.).

Cardinioides Kobayashi and Ichikawa, 1952a, Japan. Jour. Geol. Geogr., 22: 65.
Systematic position.—A genus of the Pachycardiidae.
Type-species.—*Cardinioides japonicus* Kobayashi and Ichikawa, 1952 (original designation).
Diagnosis.—Shell medium-sized, trigonally ovate to ovate, moderately inflated; no lunule; no escutcheon; ligament external; left valve with large trigonal median tooth commonly carved by several subvertical grooves; right valve with two teeth on both sides of the corresponding socket; posterior lateral tooth distinct in right valve, far isolated from cardinals, rounded, placed near posterior adductor scar; surface smooth except for growth-lines.
Age and distribution.—Carnian–middle Lower Jurassic. Japan and (?) Thailand.
Remarks.—This genus was referred to the Cardiniidae by Kobayashi and Ichikawa (1952a) and Hayami (1957c), but is more appropriately referred to the Pachycardiidae, as suggested by Hayami (1961c, p. 258) and in the *Treatise*. Because the materials of the type-species are poorly preserved, the above diagnostic characters are partly supplemented by a related Lower Jurassic species, *Cardinioides varidus* Hayami, 1957 [Pl. 4, Fig. 9]

Okunominetania Ichikawa, 1954d, Jour. Inst. Polytech. Osaka City Univ., [G], 2: 62.
Systematic position.—A subgenus of *Neoschizodus* (Myophoriidae).
Type-species.—*Myophoria okunominetaniensis* Ichikawa, 1949 (original designation).

Diagnosis.—*Neoschizodus* with shallow transverse lateral crenulation on cardinal teeth. (according to Ichikawa, 1954d, p. 62)
Age and distribution.—Triassic. Japan.
Remarks.—*Okunominetania* was regarded in the *Treatise* as a synonym of *Neoschizodus*. In fact, the distinction of this subgenus from *Neoschizodus* (s. s.) is still obscure, since the hinge structure, particularly presence or absence of transverse crenulation on the cardinal teeth, has not been sufficiently examined in most species of *Neoschizodus*.

Kumatrigonia Tamura, 1959a, Mem. Fac. Educ. Kumamoto Univ., 7: 213.
Systematic position.—A subgenus of *Frenguelliella* (Trigoniidae).
Type-species.—*Frenguelliella* (*Kumatrigonia*) *tanourensis* Tamura, 1959 (original designation) [Pl. 5, Fig. 7]
Diagnosis.—Shell trigonal, moderately convex, with orthogyrous umbo, strong marginal carina, fine but distinct escutcheon carina, lanceolate escutcheon costellated by fine striae, transversely costellated area and plain regular concentric costae on disk which are connected with the costellae on area. (according to Tamura, 1959a, p. 213)
Age and distribution.—Carnian. Japan.
Remarks.—*Kumatrigonia* was regarded in the *Treatise* as a subgenus of *Trigonia* but is here treated as a subgenus of *Frenguelliella* which is taken as a distinct genus.

Geratrigonia Kobayashi *in* Kobayashi and Mori, 1954, Japan. Jour, Geol. Geogr., 25 (3–4): 171.
Systematic position.—A genus of the Trigoniidae.
Type-species.—*Trigonia hosourensis* Yokoyama, 1904 (original designation) [Pl. 5, Fig. 3]
Diagnosis.—Shell medium-sized, ovately trigonal, with orthogyrous or slightly opisthogyrous umbo, obtuse marginal carina, smooth and bipartite area, lanceolate and smooth escutcheon and somewhat irregular subconcentric ribs on disk. (abridged from Kobayashi and Mori, 1954, p. 171)
Age and distribution.—Hettangian–Toarcian. Japan.
Remarks.—*Geratrigonia* is quite unique not only in the morphology but also in the mode of occurrence. Unlike other trigoniid genera it is found primarily in cyrenoid-beds which indicate embayment condition and somewhat decreased or unstable salinity.

Latitrigonia Kobayashi *in* Kobayashi and Tamura, 1957, Japan. Jour. Geol. Geogr., 28 (1–3): 36.
Systematic position.—A genus of the Trigoniidae.
Type-species.—*Latitrigonia pyramidalis* Kobayashi and Tamura, 1957 (original designation) [Pl. 5, Fig. 4]
Diagnosis.—Shell small-sized, subquadrate or suborbicular, with diagonal marginal carina; area often very large, nearly smooth; escutcheon narrow, smooth; costae on disk parallel to ventral margin, each sometimes thickened into a node at the posterior end. (according to Kobayashi and Tamura, 1957, p. 36)
Age and distribution.—Bajocian–Oxfordian. Japan.

Ibotrigonia Kobayashi *in* Kobayashi and Tamura, 1957, Japan. Jour. Geol. Geogr., 28 (1–3): 38.

Systematic position.—A genus of the Trigoniidae.
Type-species.—*Ibotrigonia masatanii* Kobayashi and Tamura, 1957 (original designation) [Pl. 5, Fig. 5]
Diagnosis.—Shell small-sized, roundly trigonal; umbo submedian, opisthogyrous; escutcheon narrow, smooth; area smooth or transversely costellate; three carinae tuberculate; costae on disk subconcentric, small in number, broken into tubercles on posterior side. (according to Kobayashi and Tamura, 1957, p. 38)
Age and distribution.—Bathonian (or thereabout). Japan.

Nipponitrigonia Cox, 1952, Proc. Malac. Soc. London, 29, (2–3): 52.
Systematic position.—A genus of the Trigoniidae.
Type-species.—*Trigonia kikuchiana* Yokoyama, 1891 (original designation) [Pl. 5, Fig. 10]
Diagnosis.—Shell trigonally ovate, short, moderately inequilateral; umbo prominent; marginal carina obtuse, rounded off in later growth-stage; area smooth, escutcheon not defined; disk with concentric costae near umbo, but later smooth or only with impersistent concentric costae on its anterior part. (adapted from Cox, 1952, p. 52)
Age and distribution.—Bathonian–Cenomanian. Japan and Philippines.

Minetrigonia Kobayashi and Katayama, 1938, Proc. Imp. Acad. Tokyo, 14: 187.
Systematic position.—A genus of the Trigoniidae.
Type-species.—*Trigonia hegiensis* Saeki, 1925 (original designation) [Pl. 5, Fig. 6]
Diagnosis.—Shell roundly subtrigonal to subtrapezoidal; umbo nearly orthogyrous; posterior area well defined, forming an obtuse angle with disk, provided with a median furrow, ornamented with fine and densely set striae in form of oblique lattice; disk covered with plain regular concentric costae and radial ribs. (abridged from Kobayashi and Ichikawa, 1952a, p. 69)
Age and distribution.—Carnian–Norian. Japan, Bear Island, east Siberia, British Columbia, Peru and New Zealand.
Remarks.—*Minetrigonia* was originally established as a subgenus of *Trigonia*, but most recent investigators share the opinion that it constitutes a very characteristic genus and one of the earliest trunk in the evolution of the Trigoniidae.

Hijitrigonia Kobayashi *in* Kobayashi and Mori, Japan. Jour. Geol. Geogr., 26 (1–2): 84.
Systematic position.—A genus of *Vaugonia* (Trigoniidae).
Type-species.—*Vaugonia* (*Hijitrigonia*) *geniculata* Kobayashi and Mori, 1955 (original designation) [Pl. 5, Fig. 8]
Diagnosis.—*Vaugonia* with geniculate anterior branches of V-costae which are often finer and more numerous than posterior ones. (according to Kobayashi and Mori, 1955, p. 84).
Age and distribution.—Hettangian–Bajocian. Japan, (?) western Europe and (?) Argentina.
Remarks.—Although some authors (e.g., *Treatise*) did not accept the subgeneric distinction, the name of *Hijitrigonia* seems to be applicable for a specialized species group of *Vaugonia* with geniculate anterior ribs.

Promyophorella Kobayashi and Tamura, 1955, Japan. Jour. Geol. Geogr., 26 (1–2): 96.
Systematic position.—A subgenus of *Myophorella* (Trigoniidae).
Type-species.—*Myophorella* (*Promyophorella*) *sigmoidalis* Kobayashi and Tamura, 1955 (original designation) [Pl. 5, Fig. 9]
Diagnosis.—*Myophorella*, of relatively small-size, with narrow costae on disk, which have numerous small tubercles regularly arranged on the top, though the tubercles are obsolete in some later species. (emended from Kobayashi and Tamura, 1955, p. 96)
Age and distribution.—Toarcian–Lower Neocomian. Japan, western Europe, Argentina, western Canada, Philippines and east Siberia.
Remarks.—*Promyophorella* was regarded by some authors (e.g., *Treatise*) as synonymous with *Myophorella*. I agree, however, with most Japanese authors in considering that *Myophorella* (s. s.), *Promyophorella* and *Haidaia* are subgenerically separable from one another, because of the differences in the surface ornamentation and geographic distribution.

Yeharella Kobayashi and Amano, 1955, Japan. Jour. Geol. Geogr., 26 (3–4): 200.
Systematic position.—A subgenus of *Steinmanella* (Trigoniidae).
Type-species.—*Trigonia japonica* Yehara, 1923 (original designation) [Pl. 5, Fig. 12]
Diagnosis.—Shell large-sized, resembling *Steinmanella* (s. s.) but different in the obsolete carinae and transverse costellae on area; oblique costae on disk frequently broken into large and somewhat irregularly spaced tubercles. (adapted from Kobayashi and Amano, 1955, p. 200)
Age and distribution.—Cenomanian–Maestrichtian. Japan and Saghalin.

Setotrigonia Kobayashi and Amano, 1955, Japan. Jour. Geol. Geogr., 26 (3–4): 206.
Systematic position.—A subgenus of *Steinmanella* (Trigoniidae).
Type-species.—*Steinmanella* (*Setotrigonia*) *shinoharai* Kobayashi and Amano, 1955 (original designation) [Pl. 5, Fig. 13]
Diagnosis.—Shell large-sized, resembling *Steinmanella* (s. s.) and *Yeharella*, but different in the complete effacement of carinae and the transverse ribs on area which are connected with costae on disk at the obtuse angulation in place of marginal carina; costae and costellae broken into cords at different intervals in grown stage. (emended from Kobayashi and Amano, 1955, p. 206)
Age and distribution.—Campanian. Japan.

Microtrigonia Nakano, 1957a, Japan. Jour. Geol. Geogr., 28 (1–3): 116.
Systematic position.—A genus of the Trigoniidae.
Type-species.—*Microtrigonia amanoi* Nakano, 1957 (original designation) [Pl. 9, Fig. 8]
Diagnosis.—Shell very small, suborbicular, moderately convex; umbo broad, improminent, slightly opisthogyrous, with several plain concentric costae; carinae obscure except near umbo; area wide, with often tuberculated transverse costellae; escutcheon narrow, with transverse costellae; costae on disk composed of two series: anterior series oblique and tuberculate; posterior series also tuberculate, radial or subvertical. (abridged from Nakano, 1957a, p. 116)
Age and distribution.—Campanian–Maestrichtian. Japan.

Crenocolus Ichikawa, *in* Ichikawa and Maeda, 1966, Prof. Matsushita Mem. Vol., Kyoto: 235.
Systematic position.—A subgenus of *Clisocolus* (Mactromyidae).
Type-species.—*Clisocolus* (*Crenocolus*) *crenulatus* Ichikawa and Maeda, 1966 (original designation) [Pl. 10, Figs. 3a–c]
Diagnosis.—*Clisocolus* with crenulated inner margin of the valve. It becomes comparatively large. (according to Ichikawa and Maeda, 1966, p. 235)
Age and distribution.—Campanian–Maestrichtian. Japan.

Izumicardia Ichikawa *in* Ichikawa and Maeda, 1963, Jour. Geosci. Osaka City Univ., 7 (5): 118.
Systematic position.—A genus of the Carditidae.
Type-species.—*Izumicardia parva* Ichikawa and Maeda, 1963 (original designation) [Pl. 10, Figs. 1, 2]
Diagnosis.—Shell small-sized, moderately convex, roundly subquadrate, subequilateral, with prominent and prosogyrous umbo; lunule distinct, deeply excavated; escutcheon present; hinge of astartoid type, formulated: AI 3a 3b 5b PIII/AII 2 4b (PII); inner ventral margin denticulate. (abridged from Ichikawa and Maeda, 1963, p. 118)
Age and distribution.—Campanian–Maestrichtian. Japan.

Yabea Hayami, 1965b, Mem. Fac. Sci. Kyushu Univ., [D], 17 (2): 92.
Systematic position.—A subgenus of *Astarte* (Astartidae).
Type-species.—*Astarte shinanoensis* Yabe and Nagao, 1926 (original designation) [Pl. 6, Figs. 5a, b]
Diagnosis.—Medium-sized *Astarte* with highly inequilateral outline, strong convexity, subterminal and extremely prosogyrous umbo, deeply excavated pre-umbonal margin and fine ventral crenulation; hinge of astartoid type, formualted: AI (3a) 3b 5b (PIII)/ AII 2 4b PII; cardinal teeth 2, 3b and 4b very strong, highly elevated; umbonal cavity profound. (abridged from Hayami, 1965b, p. 92)
Age and distribution.—Oxfordian–Albian. Japan, Philippines and Middle Europe.

Miyakoella Hayami, 1965b, Mem. Fac. Sci. Kyushu Univ., (D), 17 (2): 100.
Systematic position.—Subjective synonym of *Eriphyla* (Astartidae).
Type-species.—*Astarte miyakoensis* Nagao, 1934 (original designation).
Remarks.—Originally *Miyakoella* was proposed as a subgenus of *Eriphyla*, but was later regarded in the *Treatise* as a synonym of *Eriphyla* (s. s.). The development of inner marginal crenulations, which was once regarded as diagnostic in *Miyakoella*, should be taxonomically evaluated in the future, because this character seems to be often variable within one astartid species.

Minepharus Tokuyama, 1958, Trans. Proc. Pal. Soc. Japan, n. s., (32): 296.
Systematic position.—A genus of the Cardiniidae.
Type-species.—*Palaeopharus* (*Minepharus*) *triadicus* Tokuyama, 1958 (original designation).
Diagnosis.—Shell medium-sized, oblong; umbo anteriorly located, prosogyrous; ligament, escutcheon and pseudo-lunule of *Cardinia*-type; anterior adductor scar strongly

impressed, smaller than posterior, accompanied by a strongly impressed pedal retractor scar; one cardinal tooth (3b) in right valve and two (2 and 4b) in left; lateral teeth also of *Cardinia*-type; ornament consisting of several broad radial costae on posterior area and irregular growth lamellae on entire surface.
Age and distribution.—Carnian. Japan.
Remarks.—*Minepharus* was originally proposed as a subgenus of *Palaeopharus* Kittl, 1907. As originally suggested, however, it shares many common essential characters with *Cardinia* and is certainly referable to the Cardiniidae. On the other hand, *Palaeopharus* belongs to the Actinodontophoridae and is not directly related to *Minepharus* as recognized from the difference of hinge structure. One of the paratype specimens of the type-species (Tokuyama, 1958, pl. 43, fig. 5) is immature and shows "pseudoradial ribs", a characteristic feature of *Palaeopharus*. However, it is probably referable to *Palaeopharus oblongatus*, which occurs with the present type-species at the same locality.

Globocardium Hayami, 1965b, Mem. Fac. Sci. Kyushu Univ., [D], 17 (2): 116.
Systematic position.—A genus of the Cardiidae.
Type-species.—*Cardium sphaeroideum* Forbes, 1845 (original designation) [Pl. 6, Fig. 14]
Diagnosis.—Shell large, globose, more or less higher than long; disk ornamented with widely spaced concentric costae; posterior area nearly smooth, without any conspicuous radial ribs; posterior carina obsolete, but there are three narrow internal ridges, two in right valve and one in left, along the boundary between disk and posterior area; inner ventral margin smooth; hinge similar to that of *Protocardia*.
Age and distribution.—Upper Neocomian–Albian. West Europe, Crimea, Caucasus, Japan and Tanzania.
Remarks.—*Globocardium* was originally proposed as a subgenus of *Protocardia*. Recently Palmer (1974) has clarified its ancestry and regarded it as a distinct genus of the Protocardiinae. His scheme of classification is here accepted.

Yokoyamaina Hayami, 1958b, Japan. Jour. Geol. Geogr., 29 (1–3): 23.
Systematic position.—A subgenus of *Integricardium* (Cardiidae).
Type-species.—*Cyrena elliptica* Yokoyama, 1904, non Dunker, 1843 (original designation) (= *Yokoyamaina hayamii* Keen and Casey *in* Cox et al., 1969) [Pl. 7, Figs. 1, 2]
Diagnosis.—A subgenus of *Integricardium* with subelliptical or suborbicular outline, distinct pallial sinus and elongated parvincular ligament attached to a shallow groove on nymph; hinge of cyclodont-type, with well developed conical cardinal teeth 2 and 3b, ill-defined 3a and 4b and stout tubercular lateral teeth AI and PI; surface with weak radial threads on posterior or over entire surface. (adapted from Hayami, 1972, p. 205)
Age and distribution.—Hettangian–Toarcian. Japan and south Viet-Nam.
Remarks.—*Yokoyamaina* was originally proposed for a strange sinupalliate heterodont species, *Cyrena elliptica* Yokoyama, 1904, from the lower Lias of north Japan. Then, it was referred, with some doubt, to the Arcticidae. In the *Treatise*, Keen and Casey treated *Yokoyamaina* as a member of the Corbiculidae also with a query and gave a new name to the type-species, because Yokoyama's name was preoccupied by an independent cyrenoid species of Dunker (1843). On the occasion of describing a related

species from south Viet-Nam (Hayami, 1972), I reexamined the type-species and reached the conclusion that *Yokoyamaina* is actually a cardiid and more appropriately regarded as a subgenus of *Integricardium*.

Sakawanella Ichikawa, 1950, Jour. Fac. Sci. Univ. Tokyo, [2], 7 (3): 245.
Systematic position.—A genus of the Tancrediidae.
Type-species.—*Sakawanella triadica* Ichikawa, 1950 (original designation) [Pl. 7, Fig. 4]
Diagnosis.—Shell small, elongate subquadrate; umbo orthogyrous, submesially placed; right valve with two cardinal and one posterior lateral teeth; left valve with one cardinal; no anterior lateral teeth; adductor scars and pallial line strongly impressed, as in *Tancredia*; two internal grooves diverging from beak.
Age and distribution.—Carnian. Japan.

Somarctica Tamura, 1960c, Trans. Proc. Pal. Soc. Japan, n. s., (39): 288.
Systematic position.—A genus of the Arcticidae.
Type-species.—*Arctica* (*Somarctica*) *abukumensis* Tamura, 1960 (original designation) [Pl. 7, Fig. 3]
Diagnosis.—Shell large, subovate, moderately convex; umbo strongly prosogyrous; dentition of cyprinoid-type, as formulated: 3a 1 3b PI/AII-2a 2b 4b; cardinal 1 tuberculiform, not fully developed, 3a distinct, 3b trigonal, wide and bifid, PI short, 2a not clearly differentiated from AII, 4b obliquely elongated.
Age and distribution.—Kimmeridgian. Japan.
Remarks.—Tamura (1960c) proposed *Somarctica* as a subgenus of *Arctica*, but, as regarded in the *Treatise*, it is here treated as a distinct genus.

Izumia Ichikawa *in* Ichikawa and Maeda, 1963, Jour. Geosci. Osaka City Univ., 7 (5): 122.
Systematic position.—A genus of the Arcticidae.
Type-species.—*Izumia trapezoidalis* Ichikawa and Maeda, 1963 (original designation) [Pl. 10, Figs. 4–6]
Diagnosis.—Shell trapeziform, moderately convex, posteriorly carinated; lunule wide but bluntly limited; no escutcheon; surface nearly smooth, but numerous close-set fine radial striae appearing on weathered surface; hinge of cyrenoid type, as formulated: AIII AI 3a 1 3b PI (PIII)/AII 2a 2b 4b PII; anterior lateral teeth tuberculiform, not clearly differentiated from anterior cardinals; posterior lateral teeth not much degenerated; inner ventral margin finely crenulated.
Age and distribution.—Campanian. Japan.
Remarks.—While *Izumia* was originally proposed as a genus of the Veneridae, in the *Treatise* it was placed in the Arcticidae with a query. In fact, the discrimination of the two families is often difficult as to Cretaceous material, since the Veneridae are believed to have been derived polyphyletically from the Arcticidae in this period. The mode of pallial line, which is one of the criteria for the discrimination, is unknown in the type material. In the present study *Izumia* is tentatively included in the Arcticidae, because such a posteriorly carinated shell and persistent posterior lateral teeth are more commonly met with in this family.

Costocyrena Hayami, 1965b, Mem. Fac. Sci. Kyushu Univ., [D], 17 (2): 130.
Systematic position.—A genus of the Neomiodontidae.
Type-species.—*Costocyrena matsumotoi* Hayami, 1965 (original designation) [Pl. 7, Figs. 10, 11]
Diagnosis.—Shell medium-sized, trigonally ovate or subcuneiform, weakly carinated; umbo prosogyrous; lunule large, shallow, nearly smooth, delimited by a shallow furrow; surface with numerous fine radial riblets which are interrupted by prominent concentric lamellae; hinge quite similar to *Eomiodon*, provided with small but distinct posterior cardinal tooth 5b, as formulated: AIII AI 3a 3b 5b PI/AII 2 4b PII; lateral teeth not crenulated; ventral margin smooth internally. (adapted from Hayami, 1965b, p. 131)
Age and distribution.—Neocomian–Albian. Japan and Formosa.
Remarks.—*Costocyrena* was regarded as a member of the Corbiculidae in the *Treatise*, but as originally considered and subsequently supported by Ohta (1973), it is certainly referable to the Neomiodontidae. *Costocyrena* shares many common internal characters with *Eomiodon* and was probably derived from that genus.

Pseudasaphis Matsumoto, 1938, Jour. Geol. Soc. Japan, 45 (532): 17.
Systematic position.—A genus of the Neomiodontidae.
Type-species.—*Pseudasaphis japonica* Matsumoto, 1938 (original designation) [Pl. 7, Fig. 12]
Diagnosis.—Shell medium-sized, trigonally ovate; umbo prosogyrous, anteriorly located; hinge essentially similar to that of *Eomiodon* and *Costocyrena*, with distinct posterior cardinal tooth 5b and elongated and non-crenulated lateral teeth; surface ornamented with narrow but strong radial ribs which typically consist of two orders of strength; concentric lamellae undeveloped.
Age and distribution.—Cenomanian. Japan.
Remarks.—*Pseudasaphis* was included in the Corbiculidae with a query in the *Treatise*, but Hayami (1965b) and Ohta (1973) suggested that it is referable to the Neomiodontidae owing to the similarity of hinge structure to *Eomiodon*. It is reasonable to consider that *Pseudoasaphis* was evolved from *Eomiodon* through *Costocyrena*.

Crenotrapezium Hayami, 1958b, Japan. Jour. Geol. Geogr., 29 (1–3): 13.
Systematic position.—A genus of the Neomiodontidae.
Type-species.—*Crenotrapezium kurumense* Hayami, 1958 (original designation) [Pl. 7, Figs. 13, 14]
Diagnosis.—Shell of medium-size, triangular, with sharp posterior carina; umbo more or less prosogyrous, prominent; escutcheon and lunule not impressed; dentition as formulated: AIII AI 3a 3b PI PIII/AII 2 4b PII; cardinal 5b undeveloped at all; lateral teeth transversely crenulated; surface smooth.
Age and distribution.—Lower Jurassic–Tithonian, (?) Lower Neocomian. Japan.
Remarks.—Although originally proposed as a member of the Arcticidae, this genus, as subsequently regarded by Hayami (1959b) and also in the *Treatise*, is more appropriately referred to the Neomiodontidae. The carinated outline is somewhat similar to *Eotrapezium* Doubillé, 1912, but the hinge structure is almost identical with that of *Neomiodon*.

Mesocorbicula Suzuki and Oyama, 1943, Venus, 12 (3–4): 143, 147.
Systematic position.—A subgenus of *Myrene* (Neomiodontidae).
Type-species.—*Corbicula tetoriensis* Kobayashi and Suzuki, 1937 (original designation) [Pl. 8, Fig. 1]
Diagnosis.—Shell subtrigonal to subovate, moderately inflated; lunule limited by a weak ridge; no escutcheon; surface smooth or only with concentric lamellae; dentition formula: AIII AI 3a 3b (5b) PI PIII/AII AO 2 4b PO PII; lateral teeth cross-striated; pallial line entire.
Age and distribution.—Upper Jurassic. Japan.
Remarks.—Suzuki and Oyama (1943) proposed *Mesocorbicula* as a section of *Corbicula* with a brief diagnosis, but, as clarified by Ohta (1973), the hinge structure is not of corbiculoid-type. Though *Mesocorbicula* was once regarded as a synonym of *Neomiodon* by Hayami (1965b, p. 128) and subsequently as synonymous with *Veloritina* Meek, 1872, in the *Treatise*, it is more adequately regarded as a subgenus of *Myrene*, as considered by Ohta (1973).

Isodomella Kobayashi and Suzuki, 1939, Japan. Jour. Geol. Geogr., 16 (3–4): 219.
Systematic position.—A genus of the Neomiodontidae.
Type-species.—*Cyrena shiroiensis* Yabe and Nagao, 1926 (original designation) [Pl. 8, Fig. 4]
Diagnosis.—Shell medium-sized, trigonally ovate, rounded in front, obliquely truncated at hind; umbo prominent, anteriorly located; pre-umbonal margin broadly concave to form a large lunule; hinge of (?) astartoid-type with strong, transversely striated cardinal teeth 2, 3b and 4b; lateral teeth elongated but weak; surface smooth except for growth-lamellae.
Age and distribution.—Neocomian. Japan.
Remarks.—Kobayashi and Suzuki (1939) regarded *Isodomella* as a section of *Polymesoda* Rafinesque, 1820. Some authors erroneously interpreted that *Cyrena shiroiensis* is a synonym of *Cyrena naumanni* Neumayr, 1890, and this treatment was adopted also in the *Treatise* (p. N668). As clarified by Hayami and Nakai (1965), "*Cyrena naumanni*" is undoubtedly referable to *Protocyprina*, a member of the Neomiodontidae, and regarded as unrelated to "*Cyrena shiroiensis*". *Isodomella* has traditionally been included in the Corbiculidae, but the disposition and transverse striation on the cardinal teeth strongly remind me of the hinge of the Neomiodontidae. Anyhow, a further study is required to decide the systematic position of this genus.

Tetoria Kobayashi and Suzuki, 1937, Japan. Jour. Geol. Geogr., 14 (1–2): 44.
Systematic position.—A genus of the Corbiculidae.
Type-species.—*Batissa yokoyamai* Kobayashi and Suzuki, 1937 (original designation) [Pl. 8, Fig. 2]
Diagnosis.—Shell medium-sized, suborbicular or subelliptical, a little longer than high, typically not strongly inflated; lunule and escutcheon not impressed; pallial sinus deep; hinge of cyrenoid-type as formulated: AIII AI 3a 1 3b PI PIII/AII 2a 2b 4b PII; anterior cardinals generally connected with anterior laterals; lateral teeth long, curved, faintly crenulated; posterior laterals shorter than anterior ones and separated from

cardinals by a wide, flattened intervening space. (emended from Ota, 1965, p. 218)
Age and distribution.—Upper Jurassic–Neocomian. Japan and Formosa.
Remarks.—*Tetoria* was originally proposed as a section of the genus *Batissa*, but the difference from the type-species of *Batissa*, as pointed out by Ota (1965), deserves a generic distinction. The radial threads on the surface of the holotype of *Batissa yokoyamai*, which were reported by Kobayashi and Suzuki (1937) and regarded by Ota (1965) as one of the diagnostic characters of *Tetoria* (s. s.), are not considered as original structure.

Paracorbicula Kobayashi and Suzuki, 1939, Japan. Jour. Geol. Geogr., 16 (3–4): 220.
Systematic position.—A subgenus of Tetoria (Corbiculidae).
Type-species.—*Corbicula sanchuensis* Yabe and Nagao, 1926 (original designation).
Diagnosis.—Shell suborbicular, strongly inflated; surface marked only with concentric growth lines; hinge with three cardinal teeth and both laterals in each valve; cardinals 1 and 2a rarely bifid; laterals curved and anterior ones long. (emended from Ota, 1965, p. 168)
Age and distribution.—Neocomian and (?) Aptian. Japan and Formosa.
Remarks.—Although *Paracorbicula* was originally proposed as a section of *Corbicula* s. s., its generic distinction from *Corbicula* can be based on the more primitive cardinal teeth and deep pallial sinus as well as the suborbicular outline. On the other hand, as pointed out by Ota (1965), *Paracorbicula* is essentially similar to *Tetoria*, and the former is here regarded as a subgenus of the latter. *Paracorbicula* differs from *Tetoria* (s. s.) in the more strongly inflated shell.

Nagaoella Hayami, 1965b, Mem. Fac. Sci. Kyushu Univ., [D], 17 (2): 145.
Systematic position.—A genus of the Veneridae.
Type-species.—*Dosiniopsis corrugata* Nagao, 1934 (original designation) [Pl. 8, Figs. 5, 6]
Diagnosis.—Shell small, subelliptical, strongly inflated; umbo prosogyrous, placed anteriorly; lunule superficial, large but shallow; escutcheon clearly delimited; surface shiny, smooth except for growth-lines and numerous subinternal radial threads; hinge of cyrenoid-type, as formulated: (AIII) AI 3a 1 3b PI/AII 2a 2b 4b PII; 3b thick and bifid; laterals weak; pallial line triangularly sinuate; inner ventral margin finely crenulated in accordance with subinternal radial threads.
Age and distribution.—Aptian–Albian. Japan.

Pulsidis Ota, 1964, Mem. Fac. Sci. Kyushu Univ., [D], 15 (1): 149.
Systematic position.—A genus of the Corbulidae.
Type-species.—*Pulsidis nagatoensis* Ota, 1964 (original designation) [Pl. 10, Fig. 9]
Diagnosis.—Shell small, moderately inflated; right valve larger than left, rostrated posteriorly, with a low ridge extending from umbo to postero-ventral margin; left valve trigonal, less developed posteriorly; surface with flat-topped regular concentric ribs; interior of right valve grooved for the reception of the margin of left valve; right cardinal tooth subtriangular, heavy; left valve possessing relatively broad chondrophore; pallial line forming a nearly right angle at postero-ventral corner, slightly sinuated. (abridged from Ota, 1964, p. 150)

Age and distribution.—Neocomian–Turonian. Japan.

Eoursivivas Ota, 1964, Mem. Fac. Sci. Kyushu Univ., [D], 15 (1): 155.
Systematic position.—A genus of the Corbulidae.
Type-species.—*Corbula matsumotoi* Hase, 1960 (original designation) [Pl. 10, Figs. 7, 8]
Diagnosis.—Shell somewhat large for family, thin, elongated subpyriform; right valve slightly larger than left; umbo anteriorly placed; anterior and middle areas moderately inflated, posterior area narrowed and compressed; surface with a few gentle concentric undulations; inner ventral margin of right valve grooved for the reception of the margin of left; right cardinal tooth moderately heavy; left valve having relatively broad subtriangular chondrophore, which is posteriorly continuous with dorsal margin and separated from it by a shallow groove; pallial line with a small and indistinct sinus. (abridged from Ota, 1964, p. 155)
Age and distribution.—Neocomian. Japan.
Remarks.—The generic name of *Eoursivivas* was ethymologically derived from *Ursirivas* Vokes, 1945, also a corbulid genus, but emendation of the original spelling would be unjustified, because it is not considered as due to a typographical error.

Nipponicorbula Ota, 1964, Mem. Fac. Sci. Kyushu Univ., [D], 15 (1): 157.
Systematic position.—A genus of the Corbulidae.
Type-species.—*Nipponicorbula mifunensis* Ota, 1964 (original designation) [Pl. 10, Fig. 10]
Diagnosis.—Shell small, moderately thick, elongated subtrigonal; a prominent ridge extending from umbo to antero-ventral margin; right valve larger than left, rostrated, with two cord-like keels extending from umbo to posterior periphery; left valve not so posteriorly produced; disk of right valve with strong cancellate sculpture, while left valve has moderately strong concentric ribs and a few slender radial ribs confined to middle part; inner margin of right valve grooved for the reception of left margin; right cardinal tooth large; left valve with a relatively narrow, moderately elongated chondrophore. (abridged from Ota, 1964, p. 157)
Age and distribution.—Cenomanian–Turonian. Japan.

Praecaprotina Yabe and Nagao, 1926a, Sci. Rept. Tohoku Imp. Univ., [2], 7 (4): 21.
Systematic position.—A genus of the Caprotinidae.
Type-species.—*Horiopleura yaegashii* Yehara, 1920 (original designation) [Pl. 10, Fig. 11]
Diagnosis.—Attached valve irregularly conical; tooth strongly projecting; anterior muscle insertion on extension of cardinal platform on thickened area of shell wall, posterior muscle insertion extending as erect plate from tooth to postero-ventral shell wall. Free valve convex; teeth subequal; elongate anterior muscle insertion extending from cardinal platform along shell wall, separated from it by a shallow groove; posterior muscle insertion on thin vertical plate; large posterior accessory cavity extending from dorsal to ventral border. (abridged from the *Treatise*, p. N787)
Age and distribution.—Aptian. Japan.

Neoburmesia Yabe and Sato, Proc. Imp. Acad. Tokyo, 18 (5): 251.
Systematic position.—A genus of the Pholadomyidae.
Type-species.—*Neoburmesia iwakiensis* Yabe and Sato, 1942 (original designation) [Pl. 8, Fig. 7]
Diagnosis.—Shell large, inflated; umbo anteriorly located; surface divided into three areas by strong posterior carina and weak anterior carina; anterior and posterior areas covered with weak concentric ribs; middle area with distinct radial and concentric ribs, tuberculate at their intersections; escutcheon long, narrow and well delimited; posterior gaping distinct; hinge edentulous; no chondrophore. (abridged from Tamura, 1960b, p. 279)
Age and distribution.—Kimmeridgian. Japan.

Tetorimya Hayami, 1959g, Japan. Jour. Geol. Geogr., 30: 159.
Systematic position.—A genus of the Pholadomyidae.
Type-species.—*Tetorimya carinata* Hayami, 1959 (original designation) [Pl. 8, Fig. 8]
Diagnosis.—Shell equivalve, pyriform or rounded subtrapezoidal, expanded postero-ventrally, strongly convex; post-umbonal margin long, nearly straight; ventral margin a little concave in anterior part; surface divided diagonally into antero-ventral and postero-dorsal parts by a striking carina running from umbo to postero-ventral margin; umbo subterminal, rising above hinge-line; valve margin nearly closed; surface smooth; pallial line deeply sinuate; hinge apparently edentulous. (emended from Hayami, 1959g, p. 159)
Age and distribution.—Middle–Upper Jurassic. Japan, Alaska, Siberia, Ural and western Europe.
Remarks.—Some Russian authors described similar shells to *Tetorimya carinata* under the generic name of *Bureiamya* Voronetz, 1937. As the result of subsequent type designation of *Bureiamya* by Cox (1969, in *Treatise*), however, *Bureiamya* can be regarded as a synonym of *Bucardiomya*, from which *Tetorimya* is clearly distinguishable.

VI. REGISTERED SPECIMENS PRESERVED IN THE UNIVERSITY MUSEUM, UNIVERSITY OF TOKYO

All the registered type specimens of Mesozoic Bivalvia from Japan and its adjacent areas, which are preserved at the University Museum, University of Tokyo, are listed by author (with date) and also systematically in agreement with the present systematic catalogue. The following abbreviations are adopted for the indication of the category of type specimens; (H): holotype, (P): paratype, (S): syntype, (L): lectotype. Some small collections, which were already described but are not yet formally registered, are omitted here.

i) DESCRIBED SPECIMENS BY AUTHOR AND DATE

Amano (1957b): not yet registered
Amano and Marui (1958): not yet registered
Hayami (1957a): UMUT MM2651–2671, 7175
Hayami (1957b): UMUT MM2672–2688, 7176
Hayami (1957c): UMUT MM2637–2650
Hayami (1957d): UMUT MM2689–2696
Hayami (1957e): UMUT MM2697–2718
Hayami (1958a): UMUT MM2719–2744
Hayami (1958b): UMUT MM2823–2870, 7173, 7178
Hayami (1958c): UMUT MM2871–2884
Hayami (1958d): UMUT MM2800–2822
Hayami (1959a): UMUT MM2924–2941
Hayami (1959c): UMUT MM2942–2975
Hayami (1959d): UMUT MM3124–3129
Hayami (1959e): UMUT MM3130–3137
Hayami (1959f): UMUT MM3138–3163
Hayami (1959g): UMUT MM3164–3192
Hayami (1959h): UMUT MM3350–3471
Hayami (1960a): UMUT MM3562–3581
Hayami (1960b): UMUT MM3582–3611, 9069–9086, 9088–9093
Hayami (1961a): UMUT MM3675–3680
Hayami (1961b): UMUT MM3681–3692
Hayami and Ichikawa (1965): UMUT MM7000
Hayami, Sugita and Nagumo (1960): UMUT MM3634–3658
Ichikawa (1949): UMUT MM5242–5246
Ichikawa (1950): UMUT MM5169–5186
Ichikawa (1951): UMUT MM5369, 5370
Ichikawa (1954a): UMUT MM5415–5434
Ichikawa (1954b): UMUT MM5438–5451
Ichikawa (1954c, d): UMUT MM5453–5500
Ichikawa (1963): UMUT MM5001–5003

Ichikawa and Maeda (1958b): UMUT MM7738
Iwasaki (1963): UMUT MM3823–3825
Jimbo (1894): UMUT MM7481, 7487–7489, 8534–7538
Kambe (1951): UMUT MM6471–6477
Kimura (1951): UMUT MM7080–7131
Kimura (1956): UMUT MM 7153–7172
Kobayashi (1926): UMUT MM9081–9086
Kobayashi (1931): UMUT MM4216–4220, 5029–5031
Kobayashi (1935): UMUT MM4221–4225, 5232–5234, 5521
Kobayashi (1956a): UMUT MM4366–4377
Kobayashi (1957a): UMUT MM4388–4396
Kobayashi (1957b): UMUT MM4397, 4398, 4407
Kobayshi (1957c): UMUT MM4427–4449
Kobayashi and Aoti (1943): UMUT MM5036–5058
Kobayashi and Hukasawa (1940): UMUT MM5035
Kobayashi and Ichikawa (1949a): UMUT MM5029–5032, 5187–5210
Kobayashi and Ichikawa (1949b): UMUT MM5211–5234
Kobayashi and Ichikawa (1949c): UMUT MM5247–5300
Kobayashi and Ichikawa (1950a): UMUT MM5133–5151
Kobayashi and Ichikawa (1950b): UMUT MM5101–5132
Kobayashi and Ichikawa (1950c): UMUT MM5152–5167
Kobayashi and Ichikawa (1951): UMUT MM5301–5305
Kobayashi and Ichikawa (1952a): UMUT MM5026–5028, 5371–5398
Kobayashi and Ichikawa (1952b): UMUT MM5399, 5400
Kobayashi and Kaseno (1947): UMUT MM4301
Kobayashi and Katayama (1938): UMUT MM4238, 4239
Kobayashi and Mori (1954): UMUT MM4302–4316, 7174
Kobayashi and Mori (1955): UMUT MM4317–4345
Kobayashi and Nakano (1957): UMUT MM4450–4468
Kobayashi and Nakano (1958): UMUT 4469
Kobayashi and Suzuki (1936): UMUT MM7919–7939
Kobayashi and Suzuki (1937): UMUT MM7001–7021
Kobayashi and Suzuki (1939): UMUT MM7878–7899
Kobayashi and Tamura (1955): UMUT MM4346–4365
Kobayashi and Tamura (1957): UMUT MM4378–4387
Kobayashi and Tokuyama (1959): UMUT MM3472–3558, 5001–5003
Matsumoto (1938): UMUT MM7744–7755, 7782–7863
Matsumoto (1963): UMUT MM7481, 7487–7489, 7534–7538
Mojsisovics (1888): UMUT MM5001–5003
Nagao and Matsumoto (1939, 1940): UMUT MM7481, 7487, 7534–7537, 7543, 7876, 7877, I-960, I-1013; some specimens not yet registered
Saeki (1925): UMUT MM5026–5028
Takagi (1944): UMUT MM5069
Tamura (1959a): UMUT MM3076–3086
Tamura (1959c): UMUT MM2976–3000, 3002–3012
Tamura (1959d): UMUT MM3013–3075
Tamura (1959e): UMUT MM3087–3123
Tamura (1959f): UMUT MM3193–3235
Tamura (1960a): UMUT MM3236–3260

Tamura (1960b): UMUT MM3261–3296
Tamura (1960c): UMUT MM3297–3332
Tamura (1960d): UMUT MM3613–3631
Tamura (1961): UMUT MM3704–3708
Tokuyama (1958): UMUT MM4470–4481
Tokuyama (1959a): UMUT MM4482–4497
Tokuyama (1959b): UMUT MM4498–4530
Tokuyama (1960a): UMUT MM4548–4564
Tokuyama (1960b, c): UMUT MM4565–4600
Yokoyama (1891): UMUT MM4450
Yokoyama (1904): UMUT MM7173–7178

ii) REGISTERED SPECIMENS BY SPECIES

Trigonucula sakawana Ichikawa: MM5242(H), 5243(P), 5244(H of *T. s.* var. *tokombensis*), 5245(H of *T. s.* var. *lata*), 5438(H of *T. s.* var. *inequilatera*)
Nuculopsis (*Palaeonucula*) *makitoensis* Hayami: MM3141(H), 3142(P), 3143(P)
Nucula (*Leionucula*) *azenotanensis* (Ichikawa and Maeda): MM7723
Nucula? iwayai Ichikawa: MM5246(H)
Palaeoneilo sakuradaniensis Ichikawa: MM5440, 5445(H), 5446(P)
Palaeoneilo fujinohira Ichikawa: MM5464a(H), 5464b(P), 5464c
Palaeoneilo telliniformis Kobayashi and Ichikawa: MM5247(H), 5248
Palaeoneilo iwaiensis Ichikawa: MM5441a(H), 5441b(P), 5441c–f, 5442
Nuculana (*Dacryomya*) *toriyamae* Hayami: MM3352(H), 3353(P), 3354
Nuculana (*Dacryomya*) *konishii* Hayami: MM3675(H)
Nuculana (*Dacryomya*) *stenodolichos* Kimura: MM3029, 3030, 3208, 7154(H), 7155, 7156
Nuculana (*Dacryomya*) *minutula* Kimura: MM7157(H)
Nuculana (*Praesaccella*) *erinoensis* Kimura: MM3017, 3018, 3019, 7153(H)
Nuculana (*Praesaccella*) *yatsushiroensis* Tamura: MM3020(H), 3021(P), 3635
Portlandia sp. aff. *P. furcata* Ichikawa and Maeda: MM7726
Solemya suprajurensis Hayami: MM3138(H)
Solemya kobayashii Tamura: MM3615(H), 3616(P)
Solemya murotoensis Kobayashi: MM4397(H), 4398(P)
Parallelodon (*Cosmetodon*) *niranohamensis* Hayami: MM2871(H), 2872(P), 2873(P), 2884, 2924, 2925
Parallelodon (*Cosmetodon*) *infraliassicus* Hayami: MM3355(H), 3356(P), 3357(P), 3358, 3359
Parallelodon (*Cosmetodon*) *inflatus* Tamura: MM3022(P), 3023(H), 3196, 3197, 3198
Parallelodon (*Cosmetodon*) *koikensis* Tamura: MM3193(H), 3194(P), 3195(P)
Parallelodon (*Cosmetodon*) *kesennumensis* Hayami: MM3636(H), 3637(P)
Parallelodon (*Palaeocucullaea*) *monobensis* Nakazawa: MM4565, 4566, 4567, 4568, 4569, 4570, 4571
Parallelodon (*Palaeocucullaea?*) *subnavicellus* Hayami: MM3360(H)
Parallelodon (*Torinosucatella*) *kobayashii* (Tamura): MM3024(H), 3025(P), 3026(P), 3027(P), 3028(P), 3206, 3207, 3638
Parallelodon? infrequens Kobayashi and Ichikawa: MM5164(H), 5168
Grammatodon (*Grammatodon*) *takiensis* Kimura: MM3014, 3015, 3016, 3199, 3200, 3639, 3640, 7158(H)
Grammatodon (*Grammatodon*) *toyorensis* Hayami: MM3361(H), 3362(P), 3363(P), 3364, 3365
Grammatodon (*Indogrammatodon*) *nakanoi* Hayami: MM2878(H), 2879(P)

Grammatodon (*Indogrammatodon*) *densistriatus* Tamura: MM3201(P), 3202(H), 3203(P), 3204(P), 3205(P)
Cucullaea (*Idonearca*) *mabuchii* Hayami: MM2874(H), 2875(P), 2876, 2877
Cucullaea (*Idonearca*) *ezoensis amaxensis* Matsumoto: MM7745(L), 7782, 7783, 7784
Cucullaea (*Idonearca*) sp. cf. *C.* (*I.*) *aalensis* Quenstedt: MM2942
Glycymeris (*Glycymerita*) *amakusensis* Nagao: MM7786
Mytilus (*Falcimytilus*) *nasai* Kobayashi and Ichikawa: MM5134(H), 5135(H of *M. n.* var. *nagaides*), 5136(H of *M. n.* var. *hirataides*), 5137, 5489, 5490, 5493
Mytilus (*Falcimytilus?*) *tenuiformis* Kobayashi and Ichikawa: MM5139, 5140(H of *M. t.* var. *punctatus*)
Mytilus (*Falcimytilus*) *hirabarensis* Tokuyama: MM4590(H)
Mytilus (*Falcimytilus*) *heranirus* Hayami: MM2723(H), 2724(P), 2730
Mytilus (*Falcimytilus*) *stricapillatus* Hayami: MM2726(H), 2727(P), 2728(P), 2729, 2731, 2732
Mytilus punctus Ichikawa: MM5424(H), 5425
Mytilus chohi Ichikawa: MM5419(H), 5420(P), 5421
Arcomytilus dairensis Kobayashi and Hayami: MM2734(H), 2735
Arcomytilus laitmairensis (de Loriol): MM3268, 3269, 3270, 3618
Modiolus paronaiformis (Kobayashi and Ichikawa): MM5133(H)
Modiolus nagatoensis Tokuyama: MM4561(H)
Modiolus okubatensis Tokuyama: MM4587(H), 4588(P), 4589(P)
Modiolus bakevelloides (Hayami): MM2919(H), 2720(P), 2721(P), 2822
Modiolus magatama Hayami: MM3366(H), 3367(P)
Modiolus sp. cf. *M. bipartitus* Sowerby: MM3261, 3262
Modiolus maedae Hayami: MM3145(H), 3146(P), 3147(P), 3148(P), 3149, 3150, 3151
Inoperna plicata (Sowerby): MM3263, 3264, 3265, 3266
Crenella gyliakina Matsumoto: MM7747(H), 7748
Pinna (*Pinna*) sp. cf. *P.* (*P.*) *mitis* Philips: MM3273, 3274, 3275
Pinna (*Pinna*) sp. aff. *P.* (*P.*) *sandsfootensis* Arkell: MM3153, 3154
Pteria? mugikawensis Tokuyama: MM4515(H)
Pteria kitakamiensis Hayami: MM2737(H), 2738(P), 2739, 6918 (paralectotype of *Gervillia trigona*)
Pteria masatanii Tamura: MM3236(H)
Pteroperna lingulata Tamura: MM3248(H), 3249(P), 3250(P)
Pteroperna pauciradiata Tamura: MM3246(H), 3247(P)
Somapteria koikensis Tamura: MM3238(P), 3239(P), 3240(P), 3241(P), 3242(H), 3243(P), 3244(P), 3245(P)
Pinctada (*Eopinctada*) *matsumotoi* Tamura: MM3704(H), 3705(P)
Bakevellia (*Neobakevellia?*) *araiensis* (Ichikawa): MM5417(H), 5418
Bakevellia (*Neobakevellia*) *trigona* (Yokoyama): MM2651, 2652, 2653, 2654, 2926, 7175(L)
Bakevellia (*Neobakevellia*) *magnissima* Hayami: MM2655(H), 2656(P), 2657(P), 2658, 2659
Bakevellia (*Neobakevellia*) *otariensis* Hayami: MM2660(H), 2661(P), 2662(P), 2663(P)
Bakevellia (*Neobakevellia*) *negoyensis* Hayami: MM2664(H), 2665(P), 2666(P)
Bakevellia (*Neobakevellia*) *ohishiensis* Hayami: MM2667(H), 2668(P)
Bakevellia (*Neobakevellia?*) *cassianelloides* Kobayashi and Hayami: MM2669(H), 2670(P), 2671(P)
Bakevellia (*Bakevelloides*) *hekiensis* (Kobayashi and Ichikawa): MM4482, 4483, 4484, 4485, 4486, 4487, 4488, 5387(H), 5388(P)
Bakevellia (*Bakevelloides?*) *saekii* (Kobayashi and Ichikawa): MM5379(H), 5399a
Bakevellia (*Yoshimopsis*) *nagatoensis* (Ohta): MM7893, 7894, 7895, 7896, 7897, 7898, 7899

Gervillia (*Cultriopsis*) *hosonaga* (Kobayashi and Ichikawa): MM5415(H), 5416
Gervillia (*Cultriopsis*) *shizukawensis* Hayami: MM2672(H)
Gervillia (*Gervillia*) *tatenosawensis* Tamura: MM3254(P), 3255(H), 3256(P), 3257(P), 3258 (P), 3259(P), 3260(P), 3617
Gervillia (*Gervillia*) *takiensis* Tamura: MM3613(H), 3614(P)
Kobayashites hemicylindricus Hayami: MM3130(H), 3131(P), 3132(P), 3133, 3134
Cassianella? dubia Kobayashi and Ichikawa: MM5219(H), 5237, 5238
Waagenoperna triangularis (Kobayashi and Ichikawa): MM4489, 4490, 4491, 4492, 4493, 4494, 4495, 4496, 4497, 5399b(H), 5399c(P)
Waagenoperna ozawai (Kobayashi): MM4222(S), 4223(S), 4224(S), 5521(S)
Isognomon (*Isognomon*) *rikuzenicus* (Yokoyama): MM2675, 2676, 2677, 2678, 2679, 7176(H)
Isognomon (*Isognomon*) sp. cf. *rikuzenicus* (Yokoyama): MM2685, 2686
Isognomon (*Mytiloperna*) *ageroensis* Hayami: MM2680(H), 2681(P), 2682(P), 2683, 2684
Pseudomytiloides lunaris (Hayami): MM3582(H), 3583(P)
Pseudomytiloides matsumotoi (Hayami): MM3584(H), 3585(P), 3586(P), 3587(P), 3588, 3589, 3590, 3591, 3592, 3593
Inoceramus (*Mytiloceramus*) *karakuwensis* Hayami: MM3597(H), 3598(P)
Inoceramus (*Retroceramus*) sp. cf. *I.* (*R.*) *lucifer* von Eichwald: MM3603
Inoceramus (*Retroceramus*) *utanoensis* Kobayashi: MM9081(L), 9082, 9083, 9084, 9085
Inoceramus (*Retroceramus*) *ogurai* Kobayashi: MM9086(H)
Inoceramus (*Mytiloides*) *morii* Hayami: MM2953(H), 2954(P), 2955(P), 3595, 3596
Inoceramus (*Mytiloides*) sp. aff. *I.* (*M.*) *fuscus* Quenstedt: MM3599
Inoceramus (*Mytiloides*) *hashiurensis* Hayami: MM3602(H)
Inoceramus (*Mytiloides*) *hamadae* Hayami: MM3601(H)
Inoceramus (*Mytiloides*) sp. cf. *I.* (*M.*) *nitescens* Arkell: MM3600
Inoceramus (*Mytiloides*) sp. aff. *I.* (*M.*) *galoi* Boehm: MM9079
Inoceramus (*Inoceramus*) *maedae* Hayami: MM9069, 9070, 9071, 9072, 9073, 9074, 9075, 9076(H), 9077(P), 9078(P), 9079, 9080
Inoceramus (*Inoceramus*) *incertus* Jimbo: MM7481, 7535(S), 7543(S)=I-152
Inoceramus (*Inoceramus*) *angulosus* Jimbo: MM7534(H)=I-150
Inoceramus (*Inoceramus*) *amakusensis* Nagao and Matsumoto: MM7876, I-960(L)
Inoceramus (*Sphenoceramus*) *sachalinensis* Sokolow: MM7487, 7536=I-153, 7537=I-154
Inoceramus (*Cataceramus*) *japonicus* Nagao and Matsumoto: MM7877, I-1013(L)
Inoceramus fukadae Hayami: MM3605(H), 3606(P)
Inoceramus furukawensis Hayami: MM3604(H)
Inoceramus? kudoi Hayami: MM9088(H), 9089, 9090, 9091, 9092, 9093(P)
Inoceramus? naganoensis Hayami: MM3611(H)
Asoella confertoradiata (Tokuyama): MM4498(H), 4499(P), 4500(P), 4501(P), 4502(P), 4503(P), 4504(P)
Asoella laevigata (Tokuyama): MM4505(H), 4506(P), 4507(P), 4508(P)
Asoella nakatsukensis (Tokuyama): MM4509(P), 4510(H), 4508(P)
Eumorphotis? sp. aff. *E.? spitzbergensis* (Boehm): MM5249, 5250, 5251, 5252
Oxytoma (*Oxytoma*) *mojsisovicsi* Teller: MM4516, 4517, 4518, 4519, 4520, 4521, 4577, 5101 (H of *O. yeharai*), 5102(P of *O. yeharai*), 5103, 5104, 5105, 5106, 5107, 5108, 5109(H of *O. subzitteli*), 5110, 5111
Oxytoma (*Oxytoma*) *kashiwaiensis* Kobayashi and Ichikawa: MM5116(H), 5117(P), 5118(P), 5119(H of *O. pulchra*), 5120 (H of *O. sujimabara*), 5121, 5122, 5123(H of *O. sedaka*), 5124(P of *O. sedaka*), 5125, 5126, 5127, 5128, 5129, 5130, 5131, 5241, 5497, 5498, 5499, 5500, 5522, 5523

Oxytoma (*Oxytoma*) *atsuensis* Tokuyama: MM4522(H), 4525
Oxytoma (*Oxytoma*) *multistriata* Tokuyama: MM4523(H), 4524
Oxytoma (*Oxytoma*) *inequivalvis* (Sowerby): MM2947, 2948, 2949, 2950, 2951, 2952, 3375, 3376, 3377, 3378
Oxytoma (*Oxytoma*) *kobayashii* Hayami: MM3372(H), 3373(P), 3374(P)
Oxytoma (*Oxytoma*) *tetoriensis* Hayami: MM3155(H), 3156(P), 3157
Oxytoma (*Palmoxytoma*) sp. cf. *O.* (*P.*) *cygnipes* (Young and Bird): MM3371
Meleagrinella japonica Hayami: MM3368(H), 3369(P), 3370(P)
Meleagrinella okayamensis Hayami: MM3676(H), 3677(P)
Oxytoma? dieneri Kobayashi and Ichikawa: MM5112(H)
Bositra japonica (Kobayashi and Hukasawa): MM5035(H)
Daonella sakawana Mojsisovics: MM3508, 3509, 5002(L, cast) 5003
Daonella kotoi Mojsisovics: MM3487, 3488, 3489, 3499, 3500, 3501, 3502, 3503, 3504, 3505, 3506, 3507, 3549, 5001(H, cast)
Daonella densisulcata Yabe and Shimizu: MM3510(H of *D. subquadrata zohoinensis*), 3511, 3512, 3513, 3514, 3515, 3516, 3517, 3518, 3519, 3520, 3521, 3522, 3523, 3524, 3525(H of *D. subquadrata symmetrica*), 3526, 3527, 3528, 3529, 3530, 3531, 3550, 3551, 3553, 5006, 5008
Daonella multistriata Yabe and Shimizu: MM3545(P, cast), 3546(H, cast), 5004, 5005
Daonella alta Yabe and Shimizu: MM3474, 3475, 3476, 3477, 5007
Daonella indica Bittner: MM3478, 3479, 3480, 3483, 3484, 3485, 3486, 3490, 3491, 3492, 3493, 3494, 3495, 3538, 3539, 3540
Daonella yoshimurai Kobayashi: MM3472, 5520(H)
Daonella tenuistriata Kobayashi and Tokuyama: MM3473(H)
Daonella iwayai Kobayashi and Tokuyama: MM3481, 3482, 3497(H), 3498(P), 3537
Daonella pectinoides Kobayashi and Tokuyama: MM3532(H), 3533(P)
Daonella asymmetrica Kobayashi and Tokuyama: MM3534(H)
Daonella hiratai Kobayashi and Tokuyama: MM3535(H), 3536
Daonella sp. cf. *D. spitiensis* Bittner: MM3496
Halobia molukkana Wanner: MM5046, 5047, 5048
Halobia kawadai Yehara: MM4527, 4528, 5036, 5037, 5038, 5052, 5053, 5525
Halobia sedaka Kobayashi and Aoti: MM5051(H)
Halobia obsoleta Kobayashi and Aoti: MM5042, 5043(H), 5239
Halobia multilineata Kobayashi and Aoti: MM5044, 5045, 5050(H)
Halobia alta Kobayashi and Aoti: MM5040(H)
Halobia longissima Kobayashi and Aoti: MM5041(H)
Halobia aotii Kobayashi and Ichikawa: MM4530, 5054(H), 5055, 5056, 5057, 5058
Halobia kashiwaiensis Kobayashi and Ichikawa: MM4529, 5220(H)
Halobia atsuensis Tokuyama: MM4525(H)
Halobia subsedaka Tokuyama: MM4526(H), 4600
Monotis (*Entomonotis*) *ochotica* (Keyserling): MM5033, 5034, 5069, 5080, 5081, 5267, 5268, 5269, 5270, 5271, 5272, 5281, 5282, 5283, 5284, 5285, 5286, 5287, 5288, 5289, 5290, 5291, 5334, 5335, 5338
Monotis (*Entomonotis*) *subcycloidea* (Kobayashi): MM4221(H)
Monotis (*Entomonotis*) *tenuicostata* (Kobayashi and Ichikawa): MM5276(H), 5277, 5278(H of *E. t.* var. *mabara*), 5279, 5280, 5292
Monotis (*Entomonotis*) *iwaiensis* (Ichikawa): MM5369(H), 5370
Monotis (*Entomonotis*) *multistriata* (Kobayashi and Ichikawa): 5273(H), 5274, 5275, 5293
Monotis (*Entomonotis*) *zabaikalica* (Kiparisova): MM5253, 5254, 5255, 5256, 5257, 5258,

5259, 5260(H of *E. z.* var. *intermedia*), 5261(P of *E. z.* var. *intermedia*), 5262, 5263, 5264, 5266, 5297, 5298, 5299, 5437

Otapiria dubia (Ichikawa): 5475(H), 5476(P), 5477, 5478, 5479, 5486(P)

Entolium sp. cf. *E. calvum* (Goldfuss): MM3391, 3392, 3393, 3394, 3395

Entolium sp. cf. *E. lunare* (Roemer): MM3396, 3397

Entolium sp. cf. *E. disciforme* (Schübler): MM2961

Entolium inequivalve Hayami: MM3166(H), 3167(P), 3168(P), 3169(P), 3170(P), 3171(P), 3172

Entolium japonicum Kurata and Kimura: MM7102(H), 7103, 7104

Entolium yatsujiense Kurata and Kimura: MM3045, 3046, 3223, 7105(H), 7106, 7107, 7108

Entolium kimurai Tamura: MM3035(P), 3036(P), 3037(P), 3038(P), 3039(P), 3040, 3041(H), 3042(P), 3043(P), 3044(P), 3224, 3646

Somapecten kamimanensis Kimura: MM3069, 3070, 3071, 3072, 3073, 3074, 3075, 3225, 7119(H), 7120, 7121, 7122, 7123, 7124

Tosapecten suzukii suzukii (Kobayashi): MM3076, 3077, 3078, 3079, 4225, 5029(H), 5030, 5031, 5032(S of *Pecten fujimotoi*), 5196(P), 5197(P), 5198(P), 5199, 5200, 5201, 5202(H of *T. s.* var. *paucicostatus*), 5203(H of *T. s.* var. *inflatus*), 5206, 5207, 5455

Tosapecten suzukii okadai Nakazawa: MM4562, 4563, 4564

Tosapecten pseudohiemalis Kobayashi and Ichikawa: MM5204(H), 5205(H of *T. p.* var. *mabarus*)

Chlamys mojsisovicsi Kobayashi and Ichikawa: MM4558, 4559, 4560, 5187(H), 5188(P), 5189(P), 5190, 5191(H of *C. m.* var. *toyamai*), 5192, 5193(P of *C. m.* var. *toyamai*), 5194, 5195, 5456, 5457, 5458, 5459

Chlamys textoria (Schlotheim): MM3379, 3380, 3381, 3382, 3383

Chlamys kurumensis Kobayashi and Hayami: MM2697(H), 2698, 2699

Chlamys kotakiensis Takai and Hayami: MM2700(H), 2701(P), 2702, 2703

Chlamys awazuensis Hayami: MM3681(H)

Chlamys mitaraiensis Hayami: MM3160(H), 3161(P), 3162(P), 3163(P)

Chlamys iboibo Kurata and Kimura: MM3052, 3053, 3054, 7091(H), 7092, 7093, 7094

Chlamys camptonectoides Tamura: MM3209(P), 3210(P), 3211(P), 3212(H)

Aequipecten? toyorensis Hayami: MM3384(H), 3385(P), 3386(P), 3387(P), 3388, 3389

Aequipecten? vulgaris Kimura: MM3059, 3060, 3061, 3062, 3219, 7114(H), 7115, 7116

Aequipecten? kotsubu (Kimura): MM3048, 3049, 3050, 3051, 7109(H), 7110, 7111, 7112, 7113

Radulopecten nagatakensis (Kurata and Kimura): MM3047, 7090(H)

Radulopecten ogawensis (Kimura): MM3055, 3056, 3215, 3216, 3217, 7129(H), 7130, 7131

Radulonectites japonicus Hayami: MM2689(H), 2690(P), 2691(P), 2692(P), 2693, 2694, 2695, 2696(H of *R. j.* var. *convexus*)

Camptonectes (*Camptonectes*) *inexpectatus* Hayami: MM2927(H), 2928(P)

Camptonectes (*Camptonectes*) sp. cf. *C.* (*C.*) *auritus* (Schlotheim): MM2957, 2958, 2959

Camptonectes (*Camptonectes*) sp. aff. *C.* (*C.*) *browni* Cox: MM3063

Camptonectes? oishii Kobayashi and Hayami: MM2705(H), 2706, 2707, 2708

Camptonectes? subflabelliformis Hayami: MM2709(H), 2710

Camptonectes? torinosuensis Kurata and Kimura: MM7095(H), 7096, 7097, 7098, 7099

Camptonectes? mimikirensis Kurata and Kimura: MM7100(H), 7101

Micronectes bellaturus Ichikawa and Maeda: MM7738

Eopecten? infrequens (Kobayashi and Ichikawa): MM5208(H)

Eopecten? sumeriensis (Kobayashi and Ichikawa): MM5209, 5210(H)

Eopecten punctus (Kimura): MM3220, 3221, 3222, 7125(H)

Eopecten kurisakensis Tamura: MM3627(H)

Parvamussium habunokawense (Kimura): MM3031, 3032, 3033, 3034, 3643, 3644, 3645, 7117a(H), 7118
Plicatula hekiensis Nakazawa: MM4553, 4554, 4555, 4556
Plicatula praenipponica Hayami: MM3406(H), 3407(P), 3408(P), 3409
Plicatula subcircularis Hayami: MM3401(H), 3402(P), 3403(P), 3404(P), 3405
Plicatula dichotomocosta Tamura: MM3232(P), 3233(P), 3234(H), 3235
Plicatula yatsujiensis Tamura: MM3620(P), 3621(H), 3622(P)
Placunopsis sp. cf. *P. pseudotruncata* (Yabe and Nagao): MM7918
Placunopsis sp. aff. *P. linensis* (Whiteaves): MM7746, 7853, 7855, 7856
Mysidioptera ominensis Tokuyama: MM4591(H), 4592(P)
Plagiostoma higaeribarense Tokuyama: MM4548(H), 4549(P), 4550(H of *P. h.* var. *yuguchiense*)
Plagiostoma? kuromagariense (Kobayashi and Ichikawa): MM5218(H)
Plagiostoma kobayashii Hayami: MM3411(H), 3412(P), 3413
Plagiostoma matsumotoi Hayami: MM3414(H), 3415(P), 3416(P), 3417(P), 3418, 3419
Plagiostoma sp. aff. *P. subcardiiforme* (Greppin): MM3682, 3683
Plagiostoma enormicosta (Tamura): MM3226(P), 3227(P), 3228(H), 3229(P), 3619
Antiquilima nagatoensis Hayami: MM3421(H), 3422(P), 3423
Pseudolimea naumanni (Kobayashi and Ichikawa): MM5211(H), 5212(P), 5213(P), 5214(H of *Lima naumanni* var. *obliqua*), 5215, 5216, 5217, 5222, 5460
Ctenoides tosanus (Kurata and Kimura): MM3065, 3066, 7126(H), 7127, 7128
Ctenostreon japonicum Hayami: MM3424(H), 3425(P), 3426
Ctenostreon proboscideum (Sowerby): MM3231
Cternostreon sp. cf. *C. proboscideum* (Sowerby): MM2960
Ctenostreon ojikense Hayami: MM3126(H), 3127(P)
Limatula? asoensis Tokuyama: MM4551(H), 4552(P)
Limatula? iwayae Hayami: MM3173(H), 3174(P), 3175(P), 3176
Limatula? akiyamae Hayami: MM3647(H), 3648(P)
Limatula? reticulata Tamura: MM3064(H)
Liostrea shiraiwensis Tokuyama: MM4572(P), 4573(P), 4574(P), 4575(H), 4576(P)
Liostrea toyorensis Hayami: MM3428(H), 3429(P), 3430(P), 3431
Liostrea sp. cf. *L. stoliczkai* Cox: MM3629, 3630, 3631
Nanogyra kumensis (Tamura): MM3003(H), 3004(P), 3005(P), 3297
Lopha (*Actinostreon*) *sazanami* Hayami: MM3432(H), 3433, 3434, 3435
Crassostrea yoshimoensis (Kobayashi and Suzuki): MM7916(S), 7917(S)
Crassostrea ryosekiensis (Kobayashi and Suzuki): MM7914(S), 7915(S)
Plicatounio (*Plicatounio*) *naktongensis naktongensis* Kobayashi and Suzuki: MM7926(cast), 7927(cast), 7928(H, cast), 7929, 7930, 7934
Plicatounio (*Plicatounio*) *triangularis* Kobayashi and Suzuki: MM7931(H), 7932(P)
Unio? ogamigoensis Kobayashi and Suzuki: MM7001(H)
Paranodonta otai Kobayashi and Suzuki: MM7921(H), 7922(P), 7923(P), 7924(P), 7925(P)
"*Nakamuranaia chingshanensis* (Grabau)": MM7919, 7920, 7935(H of *Corbicula coreanica*), 7936(P of *C. coreanica*), 7938(P of *C. coreanica*), 7939
Nippononaia ryosekiana (Suzuki): MM7000(H)
Trigonioides (*Kumamotoa*) *matsumotoi* Kobayashi and Suzuki: MM7845, 7846(L), 7847, 7848, 7849, 7850, 7851
Cardinioides japonicus Kobayashi and Ichikawa: MM5371(H), 5372, 5373, 5374(H of *C. j.* var. *elongatus*), 5375(H of *C. splendidus*), 5409, 5410, 5411(H of *C. subtrigonalis*)
Cardinioides varidus Hayami: MM2637(H), 2638(P), 2639(P), 2640(P), 2641, 2642

Cardinioides ovatus Hayami: MM2643(H), 2644(P), 2645(P), 2646, 2647, 2648, 2649
Trigonodus? hashimotoi Ichikawa: MM5484(H), 5485
Unionites kochigataniensis (Kobayashi and Ichikawa): MM5152(H), 5153(P), 5154, 5155, 5156(H of *A. k.* var. *hiratai*), 5165
Unionites sp. cf. *U. kochigataniensis* (Kobayashi and Ichikawa): MM4557
Unionites carinatus (Kobayashi and Ichikawa): MM5157(H)
Unionites? takiguchiensis (Tokuyama): MM4578(P), 4579(P), 4580(H), 4581(P)
Palaeopharus maizurensis Kobayashi and Ichikawa: MM5301(H), 5302, 5303, 5304, 5305, 5376, 5377, 5378
Palaeopharus oblongatus (Kobayashi and Ichikawa): MM4477, 4478, 4479, 4480, 4481, 5144-(H), 5145(H of *P. o.* var. *compressus*), 5151(P of *P. o.* var. *compressus*)
Costatoria multistriata (Kobayashi and Ichikawa): MM5427(H), 5428(P), 5429, 5430, 5432
Neoschizodus (*Neoschizodus*) *tangoensis* (Kambe): MM6471(H)
Neoschizodus (*N.*) sp. cf. *N.* (*N.*) *laevigatus* (Zieten): MM6472
Neoschizodus (*Neoschizodus*) *nakajimensis* (Ichikawa): MM5227(H)
Neoschizodus (*Neoschizodus*) *dieneri* (Ichikawa): MM5223(H), 5224, 5225(H of *Myophoria dieneri* var. *longa*), 5226, 5229(H of *M. umenokiensis*), 5230
Neoschizodus (*Neoschizodus*) *tokyoensis* (Ichikawa): MM5431(H)
Neoschizodus (*Neoschizodus*) *usugataniensis* Ichikawa: MM5183(H), 5184, 5240, 5473
Neoschizodus (*Okunominetania*) *okunominetaniensis* (Ichikawa): MM5231(H), 5232(P), 5233, 5234, 5453
Trigonia senex Kobayashi and Mori: MM4305(H)
Trigonia sumiyagura Kobayashi and Kaseno: MM2962, 2963, 4301(H)(=7084), 4306, 4307, 4308, 4309, 4310, 4311, 4312
Frenguelliella (*Kumatrigonia*) *tanourensis* Tamura: MM3080(H), 3081(P), 3082(P), 3083(P), 3084(P), 3085(P), 3086(P)
Geratrigonia hosourensis (Yokoyama): MM2929, 2930, 2931, 4313, 4314(H of *G. h.* var. *convexa*), 7174(L), 7174-I
Geratrigonia lata Kobayashi: MM4315(H, cast), 4316
Geratrigonia kurumensis Kobayashi: MM4388(H)
Latitrigonia pyramidalis Kobayashi and Tamura: MM4378(H)
Latitrigonia unicarinata Kobayashi and Tamura: MM4379(H)
Latitrigonia unituberculata Kobayashi and Tamura: MM4380(H)
Latitrigonia tetoriensis Kobayashi: MM4389(H), 4390(P), 4391(P)
Latitrigonia orbicularis Kobayashi: MM4392(H), 4393(P)
Ibotrigonia masatanii Kobayashi and Tamura: MM4381(H), 4382(P), 4383
Nipponitrigonia sagawai sagawai (Yehara): MM4428, 4429, 4430, 4431, 4432, 4433
Nipponitrigonia sagawai kobayashii Maeda: MM4434, 4435, 4436
Nipponitrigonia sakamotoensis (Yehara): MM4437, 4438, 4439, 4440, 4441, 4447, 4448
Nipponitrigonia convexa Kobayashi: MM4442, 4443(S), 4444(S), 4445(S), 4446(S)
Rutitrigonia yeharai Kobayashi: MM4449
Rutitrigonia sanchuensis (Nakano): MM4469
Minetrigonia hegiensis hegiensis (Saeki): MM4244, 4245, 5026(H), 5027, 5028(H of *Trigonia yeharai*), 5389, 5390, 5391, 5392, 5393, 5394, 5395, 5398
Minetrigonia katayamai (Kobayashi and Ichikawa): MM4238(S), 4239(S), 4582, 4583, 4584, 4585, 4586, 5235, 5236, 5252, 5261, 5262, 5491, 5492
Prosogyrotrigonia inouyei (Yehara): MM3436, 3437, 3438, 4302, 4303, 4304
Vaugonia (*Vaugonia*) *niranohamensis* Kobayashi and Mori: MM4317(P), 4318(P), 4319(P), 4320(P), 4321(P), 4322(P), 4323(H)

Vaugonia (*Vaugonia*) *namigashira* Kobayashi and Mori: MM4324(S of *V. yokoyamai*), 4325 (S of *V. yokoyamai*), 4326(S of *V. yokoyamai*), 4327(H of *V. yokoyamai* forma *gracilis*), 4332(P), 4333(H), 6908, 6909, 7177(S of *V. yokoyamai*)
Vaugonia (*Vaugonia*) *kodaijimensis* Kobayashi and Mori: MM4328(P), 4329(H), 4330(P)
Vaugonia (*Vaugonia*) *awazuensis* Kobayashi and Mori: MM4384(H)
Vaugonia (*Vaugonia*) *yambarensis* Kobayashi: MM4366(H)
Vaugonia (*Hijitrigonia*) *geniculata* Kobayashi and Mori: MM2964, 4336(P), 4337(H), 4338(P), 4339(P), 4340(P), 4341(P)
Vaugonia (*Hijitrigonia*) *kojiwa* Kobayashi and Mori: MM4342(H), 4343(P)
Orthotrigonia? midareta Kobayashi and Mori: MM4344(H), 4345(H of *O. corrugata*)
Myophorella (*Myophorella*) *dekaiboda* Kobayashi and Tamura: MM4346(H), 4347(P), 4348 (P), 4349(P)
Myophorella (*Promyophorella*) *sigmoidalis* Kobayashi and Tamura: MM2965, 4350(H), 4351 (P), 4352(P)
Myophorella (*Promyophorella*) *sugayensis* Kobayashi and Tamura: MM4353(H), 4354(H of *M. s.* var. *geniculata*)
Myophorella (*Promyophorella*) *imamurai* Kobayashi: MM4368(H)
Myophorella (*Promyophorella*) *hashimotoi* Kobayashi: MM4369(H), 4370(P), 4371(P), 4372 (P)
Myophorella (*Promyophorella*) *orientalis* Kobayashi and Tamura: MM3649, 4355(H), 4394, 4395, 4396, 4406, 4407
Myophorella (*Promyophorella*) *obsoleta* Kobayashi and Tamura: MM3650, 4357(H)
Myophorella (*Haidaia*) *crenulata* Kobayashi and Tamura: MM4358(H), 4359(P), 4360(P), 4361(H of *M. c.* var. *lunulata*), 4362(P of *M. c.* var. *lunulata*)
Myophorella (*Haidaia*) *subcircularis* Kobayashi and Tamura: MM4363(H)
Myophorella (*Haidaia*) *gracilenta* Kobayashi: MM2993, 2994, 2995, 2996, 4373(H)
Myophorella (*Haidaia*) *pulex* Tamura: MM2988(H), 2989(P), 2990(P), 2991(P), 2992(P)
Myophorella (*Haidaia*) *ohmachii* Tamura: MM2997(P), 2998(H), 2999(P), 3000(P)
Linotrigonia (*Linotrigonia*) *toyamai* (Yehara): MM4375, 4376, 4377
Linotrigonia (*Oistotrigonia?*) *prima* (Kobayashi and Tamura): MM4364(H), 4365(P)
Scaphotrigonia somensis Kobayashi and Tamura: MM4385(H), 4386(P), 4387(P)
Steinmanella (*Yeharella*) *japonica* (Yehara): MM4413, 4414, 4415, 4416, 4417(S of *S. j.* var. *obsoleta*), 4418(S of *S. j.* var. *obsoleta*)
Steinmanella (*Yeharella*) *lymani* Kobayashi and Amano: MM4419
Steinmanella (*Yeharella*) *kimurai kimurai* (Tokunaga and Shimizu): MM4421, 4422
Steinmanella (*Yeharella*) *jimboi* Kobayashi and Amano: MM4420(H)
Steinmanella (*Setotrigonia*) *shinoharai* Kobayashi and Amano: MM4424(H), 4425(P), 4426
Apiotrigonia (*Heterotrigonia*) *subovalis* (Jimbo): MM7488(L), (=I-148), I-1284a(H of *A. jimboi*)
Pterotrigonia (*Pterotrigonia*) *pocilliformis* (Yokoyama): MM4450(S, cast), 4451, 4452, 4453(H of *P. p.* var. *yamanokamiensis*), 4454(P of the same variety), 4455(P of the same variety)
Pterotrigonia (*Pterotrigonia*) *hokkaidoana* (Yehara): MM4367, 4456
Pterotrigonia (*Acanthotrigonia*) *longiloba* (Jimbo): MM4463, 4464, 4465, 4466 , 7489(L) (=I-144)
Pterotrigonia (*Acanthotrigonia*) *moriana* (Yehara): MM4457, 4458, 4459
Pterotrigonia (*Acanthotrigonia*) *ogawai* (Yehara): MM4467, 4468
Pterotrigonia (*Acanthotrigonia*) *pustulosa* (Nagao): MM4460, 4461, 4462
Luciniola hasei (Hayami): MM3455(H), 3456(P), 3457(P), 3458(P), 3459, 3460
Mesolinga masatanii Hayami: MM3684(P), 3685(P), 3686(H)
Mesomiltha? tsunoensis (Kimura): MM3102, 3103, 7160(H), 7161, 7162, 7163

Lucina? toishiyamensis Tamura: MM3624(H), 3625(P), 3626(P)
Schafhaeutlia mellingi japonica Ichikawa: MM5177(H), 5178, 5181
Schafhaeutlia nakazawai Tokuyama: MM4593(H), 4594(P), 4595(P)
Sphaeriola nipponica Hayami: MM3450(H), 3451(P), 3452(P), 3453(P), 3454
Fimbria somensis Hayami: MM3687(H), 3688(P), 3689(P)
Fimbria? tenuiconcha Hayami: MM2973(H), 2974(P)
Triaphorus trapezoidalis (Kobayashi and Ichikawa): MM5148(H), 5149(P), 5150, 5151(H of *M. t.* var. *posteroexpansa*)
Myoconcha planata Kobayashi and Ichikawa: MM5422(H)
Astarte (*Astarte*) *sakamotoensis* Tamura: MM2976(H), 2977(P), 3300, 3301
Astarte (*Astarte*) *defecta* Tamura: MM2978(H), 2979(P), 2980(P), 3299
Astarte (*Astarte*) sp. cf. *A.* (*A.*) *spitiensis* Stoliczka: MM3652, 3653
Astarte (*Nicaniella*) *higoensis* Tamura: MM2986(H)
Astarte (*Trautscholdia*) *ogawensis* Kimura: MM2981, 2982, 2983, 2984, 3298, 7164(H), 7165
Astarte (*Yabea*) *kambarensis* Kimura: MM3302, 3303, 3304, 3305, 3306, 3307, 3308, 7166(H), 7167, 7168(H of *A. k.* var. *elongata*)
Neocrassina sp. cf. *N. subdepressa* (Blake and Hudleston): MM3309, 3310, 3311, 3312, 3313
Coelastarte cardiniiformis Hayami: MM2880(H), 2881(P), 2882(P), 2883(P)
Coelastarte somensis (Tamura): MM3314(H), 3315(P), 3316(P)
Praeconia sp. cf. *P. tetragona* (Terquem): MM3442, 3443, 3444, 3445, 3446
Astarte? iwayai Ichikawa: MM5469(H), 5470
Astarte? kumamotoensis (Tamura): MM3104(P), 3105(H), 3106(P)
Opis (*Trigonopis*) *torinosuensis* Kimura: MM3087, 3088, 3089, 3090, 3317, 7170(H), 7171, 7172
Opis (*Trigonopis*) *trigonalis* Tamura: MM3098(P), 3099(H), 3100, 3101
Coelopis tanourensis (Tamura): MM3091(H), 3092(P)
Pachythaerus nagaoi (Matsumoto): MM7797(S), 7798(S), 7799(S), 7800(S), 7801(S)
Anthonya japonica Matsumoto: MM7788(S)
Cardinia triadica Kobayashi and Ichikawa: MM4598, 4599, 5380a(H)
Cardinia misawensis Kobayashi and Ichikawa: MM5399d(H), 5400, 5481, 5482, 5483
Cardinia toriyamai Hayami: MM2913, 2914, 2915, 2916, 2917(P), 2918(H), 2919, 2920, 2921(P), 2922, 2923, 3441
Cardinia orientalis Hayami: MM3439(H), 3440(P)
Minepharus triadicus (Tokuyama): MM4470(H), 4471(P), 4472(P), 4473(P), 4474(P), 4475(P), 4476(P)
Protocardia (*Protocardia*) *kurumensis* Hayami: MM2803(H), 2804(P), 2805, 2806, 2807
Protocardia (*Protocardia*) *onoi* Hayami: MM3463(H), 3464(P), 3465(P), 3466
Protocardia (*Protocardia*) *inaii* Hayami: MM3135(H), 3136(P), 3137(P)
Protocardia (*Protocardia*) *tosensis* Kimura: MM3007, 3008, 3009, 3010, 3330, 3331, 7159(H)
Protocardia (*Protocardia*) *morii* Hayami: MM3574(H), 3575(P), 3576(P), 3577(P), 3578(P), 3579
Integricardium (*Yokoyamaina*) *hayamii* (Keen and Casey): MM2864, 2865, 2866, 2867, 2868, 2869, 7173(H)
Cardium? naganoense Hayami: MM3461(H), 3462(P)
Cultellus? ellipsoidalis Kobayashi and Ichikawa: MM5161(H)
Sakawanella triadica Ichikawa: MM5169(H), 5170(P), 5171, 5172(P), 5173, 5174, 5175, 5176
Tancredia rostrata Tamura: MM3110(H), 3111(P)
Isocyprina shizuhamensis Hayami: MM2970(H), 2971(P), 2972(P)
Veniella japonica Nagao: MM7789
Pronoella sugayensis Hayami: MM3690(P), 3691(P), 3692(H)

Somarctica somensis (Tamura): MM3319(H), 3320(P), 3321(P), 3322(P), 3323(P), 3324(P)
Eomiodon lunulatus (Yokoyama): MM2833, 2834, 2835, 2836, 2837, 2838, 2839, 2840, 2841, 2842, 2843, 7178(H)
Eomiodon vulgaris Hayami: MM2844(H), 2845(P), 2846(P), 2847(P), 2848, 2849, 2850, 2851, 2855, 2856
Eomiodon? giganteus Hayami: MM2857(H), 2858(P), 2859(P), 2860(P), 2861
Eomiodon sakawanus (Kobayashi and Suzuki): MM7910(L)
Eomiodon nipponicus Ohta: MM7911, 7912
Pseudasaphis japonica Matsumoto: MM7749(S), 7750(S), 7809(S), 7810(S)
Crenotrapezium kurumense kurumense Hayami: MM2823(H), 2824(P), 2825(P), 2826(P), 2827, 2828, 2829, 2830, 2831(P of *C. kurigata*), 2832(H of *C. kurigata*)
Crenotrapezium kurumense grossum Hayami: MM3678(H), 3679(P)
Crenotrapezium kitakamiense Hayami: MM3570(H), 3571(P), 3572(P), 3573
Neomidon? amagashiraensis (Kobayashi and Suzuki): MM7007(H)
Myrene (*Mesocorbicula*) *tetoriensis* (Kobayashi and Suzuki): MM7008(H), 7009(P), 7010(P), 7011(P), 7011(P), 7012(P), 7013(P), 7014(P), 7015, 7016(P), 7017(P), 7018(P), 7019, 7020, 7021
Isodomella shiroiensis (Yabe and Nagao): MM7878, 7879, 7880, 7881, 7882, 7883, 7884, 7885, 7886
Eocallista? regularis Tamura: MM3107(H)
Filosina jusanhamensis Hayami: MM3562(H), 3563(P), 3564(P), 3565(P), 3566(P), 3567, 3568, 3569
Tetoria (*Tetoria*) *yokoyamai* (Kobayashi and Suzuki): MM4234, 4235, 7004(H), 7005(P), 7006(P)
Tetoria (*Tetoria*) *antiqua* (Kobayashi and Suzuki): MM7002(H), 7003(P)
Tetoria (*Paracorbicula*) *yoshimoensis* Ota: MM7887, 7888, 7889, 7890, 7891, 7892
Pseudamiantis? crenulata (Matsumoto): MM3832, 3824, 3825, 7751(S), 7752(S)
Corbula? globosa Tamura: MM3093(H), 3094(P), 3095(P), 3096(P), 3097(P), 3332
Pulsidis higoensis (Matsumoto): MM7755(L), 7840, 7841, 7842, 7843, 7844
Pholadomya (*Bucardiomya*) *somensis* Tamura: MM3278(H), 3279(P), 3280(P), 3281(P), 3628
Pholadomya? ashikitensis Tamura: MM3119(H), 3120(P)
Neoburmesia iwakiensis Yabe and Sato: MM3282, 3283, 3284, 3285, 3286, 3287
Tetorimya carinata Hayami: MM3181(H), 3182(P), 3183(P), 3184(P), 3185(P), 3186(P), 3187
Goniomya (*Goniomya*) *nonvscripta* Tamura: MM3289(P), 3290(P), 3291(P), 3292(H), 3293(P), 3294(P)
Homomya matsuoensis Nakazawa: MM4596, 4597
Homomya satoi Hayami: MM2810(H)
Homomya gibbosa (Sowerby): MM3288
Burmesia japonica Hayami: MM2936(H), 2937(P), 2938, 2939(P), 2940, 2941
Myopholas sp. cf. *M. acuticostata* (Sowerby): MM3295, 3296
Pleuromya forsbergi nipponica Kobayashi and Ichikawa: MM5159(H)
Pleuromya hashidatensis Hayami: MM2808(H), 2809
Pleuromya hidensis Hayami: MM3179(H), 3180(P)
Plectomya punctostriae (Tamura): MM3112(P), 3113(H), 3114(P), 3276, 3277, 3623
Thracia subrhombica Hayami: MM2812(H), 2813(P), 2814(P)
Thracia shokawensis Hayami: MM3188(H), 3189(P), 3190(P), 3191(P), 3192
Thracia fukushimensis Tamura: MM3325(P), 3326(H), 3327(P), 3328(P), 3329(P)
Cuspidaria? praenipponica Hayami: MM2932(H), 2933, 2934, 2935(P)

ACKNOWLEDGMENTS

I am much indebted to many courteous paleontologists and technicians in the preparation of this manuscript: Professor Emeritus Teiichi Kobayashi (Japan Academy) for his continuous encouragement, upon whose suggestion I have been studying Mesozoic bivalves for twenty years; Professor Tetsuro Hanai (University of Tokyo) for his kind advice on the planning of this work and his reading of the final draft of this manuscript; Professor Tatsuro Matsumoto (Kyushu University) for his instructive advice on the cataloguing of the Japanese Inoceramidae and his permission to study the specimens at the Kyushu University; Dr. Mitsuo Nakano (Hiroshima University) for his kind suggestion on the classification of the Trigoniidae; Professor Minoru Tamura (Kumamoto University) for the discussion on the systematic treatment of some doubtful taxa; Professor Koichiro Ichikawa (Osaka City University), Professor Yoshihisa Ohta (Fukuoka University of Education) and Dr. Katsura Oyama (Geological Survey of Japan) for their courteous suggestions on the classification of the Bivalvia; Professor Yokichi Takayanagi (Tohoku University) for his permission to examine the type specimens at the Tohoku University; Mr. Niall Mateer (Uppsala University) for the grammatical improvement of the manuscript; **Mr. Takeo Ichikawa** and Mr. Norimasa Nishida for their patient assistance in the curatorial work and photography at our museum. Acknowledgments are also due to Professor Takeshi Sekino, the Director, and other staff of the University Museum, University of Tokyo, for their kind effort and arrangement in the publication of this study.

REFERENCES

i) BIBLIOGRAPHY ON MESOZOIC BIVALVIA FROM JAPAN

Amano, Masahisa (1955) Occurrence of a new species of *Pleuronectites* in the Triassic of Japan. *Trans. Proc. Pal. Soc. Japan*, n. s., (17): 23–28, pl. 5.

——— (1956) Some Upper Cretaceous fossils from southwestern Japan (Part 1). *Kumamoto Jour. Sci.*, [B], (1), **2** (1): 63–86, pls. 1, 2.

——— (1957a) Upper Cretaceous molluscan fossils from Shimo-koshiki-jima, Kyushu. *Kumamoto Jour. Sci.*, [B], [1], **2** (2): 51–75, pls. 1, 2.

——— (1957b) The Lower Cretaceous fauna from Hagino in southern Shikoku, Japan. *Kumamoto Jour. Sci.*, [B], [1], **2** (2): 77–121, pls. 1, 2.

——— (1960) Geology of Tobase-jima and Senzokuzozo-jima, Amakusa, Kumamoto Prefecture. *Kumamoto Jour. Sci.*, [B], [1], **4** (1): 1–12, pl. 1.

——— and Furukawa, Watatsu (1959) On the *Dreissensia* cfr. *lanceolata* (Sowerby) occurred from the Cretaceous bed in Shishi-jima, Kyushu, Japan. *Kumamoto Jour. Sci.*, [B], [1], **3** (1): 21–26.

——— and Marui, Nobuyuki (1958) On the new species of *Spondylus* from the Cretaceous formation in Nagano Prefecture. *Kumamoto Jour. Sci.*, [B], [1], **3** (1): 27–30, pl. 2.

———, Ogata, Shinsuke and Nire, Naomichi (1958) On the *Tendagurium* from the lower bed of the Goshonoura group in Shishi-jima, Kagoshima Prefecture, Kyushu, Japan. *Kumamoto Jour. Sci.*, [B], [1], **3** (1): 17–20, pl. 1.

Cox, Leslie R. (1952) Notes on the Trigoniidae with outline of a classification of the family. *Proc. Malacol. Soc. London*, **29** (2–3): 45–70, pls. 3, 4.

——— (1955) On the affinities of the Cretaceous lamellibranch genera *Trigonioides* and *Hoffetrigonia*. *Geol. Mag.*, **92** (4): 345–349.

——— and others (1969) *Treatise on invertebrate paleontology*. Part N (2 vols.). 952 pp. Geol. Soc. America and Univ. Kansas.

Dhondt, Annie V. (1973) Systematic revision of the subfamily Neitheinae (Pectinidae, Bivalvia, Mollusca) of the European Cretaceous. *Mém. Inst. roy. Sci. nat. Belgique*, (176): 1–101, pls. 1–5.

Diener, Carl von (1915) Japanische Triasfaunen. *Denkschr. k. Akad. Wiss. Wien*, Math.-Naturw. Kl., **92**: 1–30, pls. 1–7.

Hase, Akira (1960) The Late Mesozoic formations and their molluscan fossils in west Chugoku and north Kyushu. *Jour. Sci. Hiroshima Univ.*, [C], **3** (2): 281–342, pls. 31–39.

——— (1961) A find of *Monotis* (*Entomonotis*) from eastern Yamaguchi Prefecture, Japan. *Trans. Proc. Pal. Soc. Japan*, n. s., (42): 79–87, pl. 12.

Hatai, Kotora (1951) A Lower Cretaceous *Teredo*. *Short Papers, IGPS*, (3): 29–32, pl. 5.

———, Kotaka, Tamio and Noda, Hiroshi (1969) Some marine mollusca from Schimanokoshi harbor in Tanohata-cho, Shimohei-gun, Iwate Prefecture, northeast Honshu, Japan. *Saito Ho-on Kai Museum, Res. Bull.*, (38): 29–36, pl. 1.

Hayami, Itaru (1957a) Liassic *Bakevellia* in Japan. *Japan. Jour. Geol. Geogr.*, **28** (1–3): 47–59, pls. 2, 3.

——— (1957b) Liassic *Gervillia* and *Isognomon* in Japan. *Japan. Jour. Geol. Geogr.*, **28** (1–3): 95–106, pls. 6, 7.

——— (1957c) On the occurrence of *Cardinioides* from the Liassic Kuruma group in central Japan. *Trans. Proc. Pal. Soc. Japan*, n. s., (26): 69–73, pl. 12.
——— (1957d) *Radulonectites*, a new pectinid genus, from the Liassic Kuruma group in central Japan. *Trans. Proc. Pal. Soc. Japan*, n. s., (27): 89–93, pl. 16.
——— (1957e) Liassic *Chlamys*, "*Camptonectes*" and some other pectinids from the Kuruma group in central Japan. *Trans. Proc. Pal. Soc. Japan*, n. s., (28): 119–127, pl. 20.
——— (1958a) Liassic *Volsella*, *Mytilus* and some other dysodont species in Japan. *Trans. Proc. Pal. Soc. Japan*, n. s., (29): 155–165, pls. 23, 24.
——— (1958b) A review of the so-called Liassic "cyrenoids" in Japan. *Japan. Jour. Geol. Geogr.*, **29** (1–3): 11–27, pls. 2, 3.
——— (1958c) Some Hettangian pelecypods from the "*Trigonia*-sandstone" of the Shizukawa group in northeast Japan. *Japan. Jour. Geol. Geogr.*, **29** (1–3): 99–110, pl. 7.
——— (1958d) Supplementary descriptions of the Liassic pelecypods from the Kuruma and Shizukawa groups in Japan. *Trans. Proc. Pal. Soc. Japan*, n. s., (30): 193–200, pl. 28.
——— (1958e) Taxonomic notes on *Cardinia* with description of a new species from the Lias of western Japan. *Jour. Fac. Sci. Univ. Tokyo*, [2], **11** (2): 115–130, pl. 9.
——— (1959a) Pelecypods of the Mizunuma Jurassic in Miyagi Prefecture, with some stratigraphical remarks. *Trans. Proc. Pal. Soc. Japan*, n. s., (34): 66–77, pl. 7.
——— (1959b) An additional note on the Liassic "cyrenoids" in Japan. *Trans. Proc. Pal. Soc. Japan*, n. s., (34): 78.
——— (1959c) Bajocian pelecypods of the Aratozaki formation in northeast Japan. *Japan. Jour. Geol. Geogr.*, **30**: 53–70, pl. 5.
——— (1959d) Some pelecypods from the Tsukinoura formation in Miyagi Prefecture. *Trans. Proc. Pal. Soc. Japan*, n. s., (35): 133–137, pl. 14.
——— (1959e) Some pelecypods from the upper Aratozaki formation including a new genus *Kobayashites*. *Trans. Proc. Pal. Soc. Japan*, n. s., (35): 138–141, pl. 14.
——— (1959f) Late Jurassic lipodont, taxodont and dysodont pelecypods from Makito, central Japan. *Japan. Jour. Geol. Geogr.*, **30**: 135–150, pl. 12.
——— (1959g) Late Jurassic isodont and myacid pelecypods from Makito, central Japan. *Japan. Jour. Geol. Geogr.*, **30**: 151–167, pl. 13.
——— (1959h) Lower Liassic lamellibranch fauna of the Higashinagano formation in west Japan. *Jour. Fac. Sci. Univ. Tokyo*, [2], **12** (1): 31–84, pls. 5–8.
——— (1960a) Pelecypods of the Jusanhama group (Purbeckian or Wealden) in Hashiura area, northeast Japan. *Japan. Jour. Geol. Geogr.*, **31** (1): 13–22, pl. 3.
——— (1960b) Jurassic inoceramids in Japan. *Jour. Fac. Sci. Univ. Tokyo*, [2], **12** (2): 277–328, pls. 15–18.
——— (1961a) Pelecypods from the Liassic Yamaoku formation in west Japan. *Trans. Proc. Pal. Soc. Japan*, n. s., (43): 113–116, pl. 16.
——— (1961b) Some Jurassic pelecypods from the Awazu and Yamagami formations in northeast Japan. *Trans. Proc. Pal. Soc. Japan*, n. s., (43): 117–123, pl. 16.
——— (1961c) On the Jurassic pelecypod faunas in Japan. *Jour. Fac. Sci. Univ. Tokyo*, [2], **13** (2): 243–343, pl. 14.
——— (1962a) Jurassic pelecypods faunas in Japan with special referance to their stratigraphical distribution and biogeographical provinces. *Jour. Geol. Soc. Japan*, **68** (797): 96–108. (in Japanese)
——— (1962b) On the dentition formulae of heterodont pelecypods. *Kaseki (Fossils)*, (4): 67–78. (in Japanese)
——— (1965a) Lower Cretaceous marine pelecypods of Japan, part I. *Mem. Fac. Sci. Kyushu Univ.*, [D], **15** (2): 221–349, pls. 27–52.

——— (1965b) Lower Cretaceous marine pelecypods of Japan, part II. *Mem. Fac. Sci. Kyushu Univ.*, [D], **17** (2): 73–150, pls. 7–21.

——— (1966) Lower Cretaceous marine pelecypods of Japan, part III. *Mem. Fac. Sci. Kyushu Univ.*, [D], **17** (3): 151–249, pls. 22–26.

——— (1969a) Occurrence of *Tutcheria* from the Lower Jurassic of west Japan. *Trans. Proc. Pal. Soc.* Japan, n. s., (73): 26–31, pl. 3.

——— (1969b) Notes on Mesozoic "planktonic" bivalves. *Jour. Geol. Soc. Japan*, **75** (7): 375–385. (in Japanese)

——— (1971) Lower Jurassic Bivalvia from the environs of Saigon. *Geol. Pal. Southeast Asia*, **10**: 179–230, pls. 33–38.

——— and Ichikawa, Takeo (1965) Occurrence of *Nippononaia ryosekiana* from the Sanchu area, Japan. *Trans. Proc. Pal. Soc. Japan*, n. s., (60): 145–155, pl. 17.

——— and Kawasawa, Keizo (1967) Some Lower Cretaceous bivalves from the Shimanto-gawa group of south Shikoku. *Trans. Proc. Pal. Soc. Japan*, n. s., (66): 73–82, pl. 9.

———, Matsumoto, Tatsuro and Asano, Kiyoshi (1963) A survey of the fossils from Japan illustrated in classical monographs. Part VIII. E. Naumann and M. Neumayr: Zur Geologie und Paläontologie von Japan. *Pal. Soc. Japan, 25th Anniv. Vol.*, 33–36, pls. 52, 53.

——— and Nakai, Isao (1965) On a Lower Cretaceous pelecypod, "*Cyrena naumanni*", from Japan. *Trans. Proc. Pal. Soc. Japan*, n. s., (59): 114–125, pls. 13, 14.

——— and Nakano, Mitsuo (1968) Consideration on the numerical taxonomy in palaeontology, taking the Trigoniidae as an example. *Sci. Rept. Kyushu Univ., Geol.*, **8** (4): 191–236. (in Japanese)

———, Sugita, Munemitsu and Nagumo, Yoshihiro (1960) Pelecypods of the Upper Jurassic and Lowermost Cretaceous Shishiori group in northeast Japan. *Japan. Jour. Geol. Geogr.*, **31** (1): 85–98, pl. 8.

Ichikawa, Koichiro (1949) *Trigonucula* (nov.) and other taxodont pelecypods from the Upper Triassic of the Sakawa basin in Shikoku, Japan. *Japan. Jour. Geol. Geogr.*, **21** (1–4): 267–272, pl. 10.

——— (1950) *Sakawanella*, new genus, and some other pelecypods from the Upper Triassic Kochigatani group in the Sakawa basin, Shikoku, Japan. *Jour. Fac. Sci. Univ. Tokyo*, [2], **7** (3): 245–256, pl. 5.

——— (1951) Notes on the *Entomonotis*-bearing Triassic formation at Iwai near Itsukaichi, Tokyo Prefecture with a description of a new *Entomonotis*. *Trans. Proc. Pal. Soc. Japan*, n. s., (2): 43–48.

——— (1954a) Triassic Mollusca from the Arai formation at Iwai near Itsukaichi, Tokyo Prefecture. *Japan. Jour. Geol. Geogr.*, **24**: 45–70, pl. 7.

——— (1954b) Early Neo-Triassic pelecypods from Iwai, near Itsukaichi, Tokyo Prefecture. *Japan. Jour. Geol. Geogr.*, **25** (3–4): 177–195, pl. 17.

——— (1954c) Late Triassic pelecypods from the Kochigatani group in the Sakuradani and Kito areas, Tokushima Prefecture, Shikoku, Japan, part 1. *Jour. Inst. Polytech. Osaka City Univ.*, [G], **1**: 35–57, pls. 1, 2.

——— (1954d) Late Triassic pelecypods from the Kochigatani group in the Sakuradani and Kito areas, Tokushima Prefecture, Shikoku, Japan, part 2. *Jour. Inst. Polytech. Osaka City Univ.*, [G], **2**: 53–72, pls. 3, 4.

——— (1954e) Molluscan fossils from the Osako formation in the upper course of the River Yoshino, Nara Pref. *Rept. Synth. Res. Nara Pref., Yoshinogawa basin*, 1 (Geol.).

——— (1958) Zur Taxionomie und Phylogenie der triadischen "Pteriidae" (Lamellibranch.) mit besonderer Berücksichtigung der Gattungen *Claraia*, *Eumorphotis*, *Oxytoma* und *Monotis*. *Palaeontographica*, **111** (A): 131–212, pls. 21–24.

——— (1963) A survey of the fossils from Japan illustrated in classical monographs. Part IV. E. Mojsisovics: Über einige japanische Trias-fossilien. *Pal. Soc. Japan, 25th Anniv.* Vol., 11, pls. 17–20.

——— and Maeda, Yasuo (1958a) Late Cretaceous pelcypods from the Izumi group. Part 1. Cucullaeidae (*Pleurogrammatodon* nov., *Nanonavis* and *Indogrammatodon*). *Jour. Inst. Polytech. Osaka City Univ.*, [G], **3**: 61–74, pls. 1, 2.

——— and ——— (1958b) Late Cretaceous pelecypods from the Izumi group. Part 2. Orders Taxodontida, Prionodontida, Dysodontida, Desmodontida and Adapedontida. *Jour. Inst. Polytech. Osaka City Univ.*, [G], **4**: 71–122, pls. 3–7.

——— and ——— (1963) Late Cretaceous pelecypods from the Izumi group. Part 3. Order Heterodontida (1). *Jour. Geosci. Osaka City Univ.*, **7** (5): 113–136, pls. 8–11.

——— and ——— (1966) *Clisocolus* (Bivalvia, Late Cretaceous) from the Izumi group of the Kinki district, Japan. *Prof. Matsushita Memorial Vol., Kyoto*, 233–240, pl. 7.

——— and Yabe, Yukio (1955) *Eumorphotis multiformis shionosawensis*, subsp. nov. from the Shionosawa limestone at Shionosawa, north of the Sanchu graben, Kwanto mountainland, Japan. *Trans. Proc. Pal. Soc. Japan.* n. s., (17): 5–12, pl. 2.

Imanishi, Shigeru (1956) On the occurrence of *Trigonia* bearing sandstone at Horombetsu, Utanobori-mura, Esashi-gun, north Hokkaido. *Kumamoto Jour. Sci.*, [B], [1], **2** (1): 49–55.

Iwasaki, Yasuhide (1963) *Pseudamiantis*, a pelecypod genus. *Trans. Proc. Pal. Soc. Japan*, n. s., (51): 91–101, pls. 14, 15.

Jimbo, Kotora (1894) Beiträge zur Kenntnis der Fauna der Kreideformation von Hokkaido. *Paläont. Abhandl.*, N. F., **2** (3): 149–194, pls. 17–25.

Kambe, Nobukazu (1951) On the myophorians from Kyoto Prefecture (Prov. Tango). *Trans. Proc. Pal. Soc. Japan*, n. s., (2): 49–56, pl. 4.

——— (1957) On the myophorians from the Miharaiyama group in Hyogo Prefecture. *Rept. Geol. Surv. Japan.* (173): 1–19.

——— (1963) On the boundary between the Permian and Triassic Systems in Japan, with the description of the Permo-Triassic formations at Takachiho-cho, Miyazaki Prefecture in Kyushu and the Skytic fossils contained. *Rept. Geol. Surv. Japan*, (198): 1–66, pls. 1–19.

Kanie, Yasumitsu (1972) *Anagaudryceras* and *Inoceramus* from the Cretaceous formation of southwestern Yuasa, Wakayama Prefecture, Japan. *Sci. Rept. Yokosuka City Museum*, (19): 20–22, pl. 3.

Katayama, Masaru (1938) Stratigraphical study on the Mine series. *Jour. Geol. Soc. Japan*, **46** (546): 127–141.

Katto, Jiro and Hattori, Mutsuo (1964) Some Veneridae from the Shimantogawa group in the outer zone of Shikoku, Japan. *Res. Rept. Kochi Univ.*, (13), Nat. Sci., **1** (2): 7–10, pl. 1.

——— and Ozaki, Hiroshi (1956) Fossil *Solemya* found from the undivided Mesozoic complex of southern Shikoku. *Res. Rept. Kochi Univ.*, Nat. Sci., **5** (10): 1–3, pl. 1.

Kimura, Toshio (1951) Some pectinids and a limid from the Jurassic Torinosu group in Japan. *Jour. Fac. Sci. Univ. Tokyo*, (2), **7** (6–10): 337–350, pl. 1.

——— (1956) Some pelecypods from the Upper Jurassic Torinosu group in Kochi Prefecture, Japan. *Jour. Earth Sci. Nagoya Univ.*, **4** (2): 80–90, pl. 1.

Kobayashi, Teiichi (1926) Notes on the Mesozoic formations in Province Nagato, Chugoku, Japan. *Jour. Geol. Soc. Tokyo*, **33** (398): 1–9, pl. 11.

——— (1931) Notes on a new occurrence of Ladino-Carnic limestone at Sambosan, Tosa Province, Japan. *Japan. Jour. Geol. Geogr.*, **8** (3–4): 251–258, pl. 25.

——— (1935) Einige neue triadische Bivalven aus der Inner Zone Südwest Japans. *Japan. Jour. Geol. Geogr.*, **12** (1–2): 27–32, pl. 7.

——— (1954) Studies on the Jurassic trigonians in Japan. Part 1. Preliminary notes. *Japan. Jour. Geol. Geogr.*, **25** (1–2): 61–80.
——— (1956a) Studies on the Jurassic trigonians in Japan. Part V. Some Jurassic trigonians from central and west Japan. *Japan. Jour. Geol. Geogr.*, **27** (1): 1–8, pl. 1.
——— (1956b) On the dentition of *Trigonioides* and its relation to similar pelecypod genera. *Japan. Jour. Geol. Geogr.*, **27** (1): 79–92, pl. 5.
——— (1957a) Studies on the Jurassic trigonians in Japan. Part VII. Some trigonians from the Hida plateau region, central Japan. *Japan. Jour. Geol. Geogr.*, **28** (1–3): 43–46, pl. 1.
——— (1957b) A trigonian faunule from Mindoro in the Philippine islands. *Jour. Fac. Sci. Univ. Tokyo*, [2], **10** (3): 351–365, pl. 3.
——— (1957c) *Nipponitrigonia* and *Rutitrigonia* in Japan. *Trans. Proc. Pal. Soc. Japan*, n. s., (26): 51–61, pls. 10, 11.
——— and Amano, Masahisa (1955) On the pseudoquadratae trigonians, *Steinmannella*, in the Indo-Pacific province. *Japan. Jour. Geol. Geogr.*, **26** (3–4): 193–208, pls. 13–15.
——— and Aoti, Kiyohiko (1943) Halobiae in Nippon. *Jour. Shigenkagaku Kenkyusho*, **1** (2): 241–255, pls. 24, 25.
——— and Hukasawa, Tuneo (1940) A new species of *Posidonia* from the Inai series (?) in the southern Kitakami mountainland, Japan. *Jour. Geol. Soc. Japan*, **47** (567): 517–519.
——— and Ichikawa, Koichiro (1949a) *Tosapecten*, gen. nov. and other Upper Triassic Pectinidae from the Sakawa basin in Shikoku, Japan. *Japan. Jour. Geol. Geogr.*, **21** (1–4): 163–176, pl. 5.
——— and ——— (1949b) *Myophoria* and other Upper Triassic pelecypods from the Sakawa basin in Shikoku, Japan. *Japan. Jour. Geol. Geogr.*, **21** (1–4): 177–192, pl. 6.
——— and ——— (1949c) Late Triassic "*Pseudomonotis*" from the Sakawa basin in Shikoku, Japan. *Japan. Jour. Geol. Geogr.*, **21** (1–4): 245–262, pl. 9.
——— and ——— (1950a) Late Triassic *Mytilus*, *Volsella*, *Pleurophorus* and *Myoconcha* from the Sakawa basin in Shikoku, Japan. *Jour. Fac. Sci. Univ. Tokyo*, [2], **7** (3): 207–215, pl. 1.
——— and ——— (1950b) Triassic *Oxytoma* from the Sakawa basin in Shikoku, Japan. *Jour. Fac. Sci. Univ. Tokyo*, [2], **7** (3): 217–229, pls. 2, 3.
——— and ——— (1950c) *Anodontophora* and some other Carnic pelecypods from the Sakawa basin in Shikoku, Japan. *Jour. Fac. Sci. Univ. Tokyo*, [2], **7** (3): 231–243, pl. 4.
——— and ——— (1951) On *Palaeopharus*, a Late Triassic pelecypod genus. *Trans. Proc. Pal. Soc. Japan*, n. s., (1): 7–12, pl. 1.
——— and ——— (1952a) The Triassic fauna of the Heki formation in the Province of Tamba (Kyoto Prefecture), Japan. *Japan. Jour. Geol. Geogr.*, **22**: 55–84, pls. 1–3.
——— and ——— (1952b) Some Late Triassic fossils from the Nariwa district in the Province of Bitchu (Okayama Prefecture), Japan. *Japan. Jour. Geol. Geogr.*, **22**: 261–274, pl. 10.
——— and Ishibashi, Takeshi (1970) *Halobia styriaca*, Upper Triassic pelecypod, discovered in Okinawa-jima, the Ryukyu Islands. *Trans. Proc. Pal. Soc. Japan*, n. s., (77): 243–248, pl. 26.
——— and Kaseno, Yoshio (1947) A new Liassic species of *Trigonia* s. str. (i.e. *Lyriodon*) from the Kitakami mountains in Nippon. *Japan. Jour. Geol. Geogr.*, **20** (2–4): 41–43, pl. 10.
——— and Katayama, Masaru (1938) Further evidence as to the chronological determination of so-called Rhaeto-Liassic floras with a description of *Minetrigonia*, a new subgenus of *Trigonia*. *Proc. Imp. Acad. Tokyo*, **14** (5): 184–189.
——— and Mori, Kazuo (1954) Studies on the Jurassic trigonians in Japan. Part II. *Prosogyrotrigonia* and the Trigoniinae. *Japan. Jour. Geol. Geogr.*, **25** (3–4): 155–175, pls. 15, 16.
——— and ——— (1955) Studies on the Jurassic trigonians in Japan. Part III. The Vaugoniinae from the Kitakami mountains in north Japan. *Japan. Jour. Geol. Geogr.*, **26** (1–2): 73–88, pls. 3, 4.

———, ——— and Tamura, Minoru (1959) Studies on the Jurassic trigonians in Japan. Part VIII. The bearing of the Jurassic trigoniids on the stratigraphy of Japan. *Japan. Jour. Geol. Geogr.*, **30**: 273–292.

——— and Nakano, Mitsuo (1957) On the Pterotrigoniinae. *Japan. Jour. Geol. Geogr.*, **28** (4): 219–238, pls. 16, 17.

——— and ——— (1958) The Lower and Middle Cretaceous trigonians in Wakayama, Oita and Kumamoto Prefectures, west Japan. *Japan. Jour. Geol. Geogr.*, **29** (1–3): 139–152, pls. 11, 12.

——— and Suzuki, Kôiti (1936) Non-marine shells of the Naktong-Wakino series. *Japan. Jour. Geol. Geogr.*, **13** (3–4): 234–257, pls. 27–29.

——— and ——— (1937) Non-marine shells of the Jurassic Tetori series in Japan. *Japan. Jour. Geol. Geogr.*, **14** (1–2): 33–51, pls. 4, 5.

——— and ——— (1939) The brackish Wealden fauna of the Yoshimo beds in Prov. Nagato, Japan. *Japan. Jour. Geol. Geogr.*, **16** (3–4): 213–224, pls. 13, 14.

——— and ——— (1941) On the occurrence of *Trigonioides* in southeastern Manchoukuo. *Bull. Geol. Inst. Manchoukuo*, (101): 77–81.

——— and Tamura, Minoru (1955) Studies on the Jurassic trigonians in Japan. Part IV. The Myophorellinae ffrom north Japan. *Japan. Jour. Geol. Geogr.*, **26** (1–2): 89–103, pls. 5, 6.

——— and ——— (1957) Studies on the Jurassic trigonians in Japan. Part VI. Additional new genera and species of trigonians from the Jurassic of Soma, north Japan. *Japan. Jour. Geol. Geogr.*, **28** (1–3): 35–41, pl. 1.

——— and Tokuyama, Akira (1959) *Daonella* in Japan. *Jour. Fac. Sci. Univ. Tokyo*, [2], **12** (1): 1–26, pls. 1–4.

Kubota, Kaoru (1952) Large *Trigonia* from Hakobuchi sandstone. *Syumino-Tigaku*, **5** (3): 14–15, pl. 1.

Maeda, Shiro (1959) On two species of *Polymesoda* from the Tetori group in the Hida mountains, central Japan. *Trans. Proc. Pal. Soc. Japan*, n. s., (36): 157–160, pl. 17.

——— (1962a) Trigoniid from the Tetori group in the Furukawa district, central Japan. *Trans. Proc. Pal. Soc. Japan*, n. s., (47): 273–276, pl. 42.

——— (1962b) Some Lower Cretaceous pelecypods from the Akaiwa subgroup, the upper division of the Tetori group in central Japan. *Trans. Proc. Pal. Soc. Japan*, n. s., (48): 343–351, pl. 53.

——— (1962c) On some *Nipponitrigonia* in Japan. *Jour. Coll. Arts and Sci. Chiba Univ.*, Nat. Sci., **3** (4): 503–514, pls. 1–9.

——— (1962d) On some species of Jurassic trigoniids from the Tetori group in central Japan. *Jour. Coll. Arts and Sci. Chiba Univ.*, Nat. Sci., **3** (4): 515–518, pls. 1, 2.

——— (1962e) On the occurrence of *Nippononaia* in the Late Mesozoic Tetori group. *Trans. Proc. Pal. Soc. Japan*, n. s., (46): 243–248, pl. 38.

——— (1963a) *Trigonioides* from the Late Mesozoic Tetori group, central Japan. *Trans. Proc. Pal. Soc. Japan*, n. s., (51): 79–85, pl. 12.

——— (1963b) Some Jurassic trigoniids from the Tetori group in the Kuzuryu district, central Japan. *Trans. Proc. Pal. Soc. Japan*, n. s., (49): 1–7, pl. 1.

——— and Adachi, Kiyoshi (1965) A new species, *Myophorella* (*Haidaia*) *kappazakensis* from the Kappazaka formation in the Kwanto mountaneous land, central Japan. *Jour. Coll. Arts and Sci. Chiba Univ.*, Nat. Sci., **4** (3): 319–322, pl. 1.

——— and Kawabe, Tetsuya (1963) Two Jurassic trigoniids from the Tetroi group in the Arimine district, central Japan. *Jour. Coll. Arts and Sci. Chiba Univ.*, Nat. Sci., **4** (1): 55–58, pl. 1.

——— and ——— (1966a) Some *Myophorella* from the Tetori group in the Arimine district,

central Japan. *Annual Rept. Foreign Students' Coll. Chiba Univ.*, (1): 43–49, pls. 1, 2.
——— and ——— (1966b) Note on the ontogenetic change of *Myophorella* (*Promyophorella*) *orientalis*. *Annual Rept. Foreign Students' Coll. Chiba Univ.*, (1) 51–55, pls. 1, 2.
——— and ——— (1967a) *Apiotrigonia* from the Futaba group in the Joban district, north Japan. *Prof. H. Shibata Mem. Vol.*, Tokyo, 420–425, pl. 1.
——— and ——— (1967b) Two species of trigoniid from the Todai formation in the Nyugasayama district, central Japan. *Annual Rept. Foreign Students' Coll. Chiba Univ.*, (2): 89–93, pl. 1.
——— and Kitamura, Takeharu (1964) Lower Cretaceous trigoniids from the Todai formation, central Japan. *Jour. Coll. Arts and Sci. Chiba Univ.*, **4** (2): 47–57, pls. 1–4.
——— and Sato, Teruo (1964) *Steinmannella* (*Yeharella*) *kimurai* from the Futaba group in northeast Japan. *Jour. Coll. Arts and Sci. Chiba Univ.*, Nat. Sci., **4** (2): 59–67, pls. 1, 2.
Matoba, Yasumochi (1964) A Cretaceous trigoniid from the Miocene Misaki formation in the Miura peninsula, Kanagawa Prefecture. *Trans. Proc. Pal. Soc. Japan*, n. s., (55): 256–262, pl. 37.
Matsumoto, Tatsuro (1938) Preliminary notes on some of the more important fossils among the Gosyonoura fauna (Contribution to the Cretaceous palaeontology of Japan—III). *Jour. Geol. Soc. Japan*, **45** (532): 13–26, pls. 1, 2.
——— (1957) *Inoceramus mihoensis* n. sp. and its significance. *Mem. Fac. Sci. Kyushu Univ.*, [D], **6** (2): 65–68, pl. 21.
——— (1959a) Zonation of the Upper Cretaceous in Japan. *Mem. Fac. Sci. Kyushu Univ.*, [D], **9** (2): 55–93, pls. 6–11.
——— (1959b) Zoning of the Upper Cretaceous in Japan and adjacent areas with special reference to worldwide correlation. *Congr. Geol. Intern. VVa Session, Mexico*, 347–382.
——— (1963) A survey of fossils from Japan illustrated in classical monographs, Part X. K. Jimbo: Beiträge zur Kenntnis der Fauna der Kreideformation von Hokkaidô. *Pal. Soc. Japan, 25th Anniv. Vol.*, 41–48, pls. 60–68.
——— and Harada, Masato (1964) Creataceous straigraphy of the Yubari dome, Hokkaido. *Mem. Fac. Sci. Kyushu Univ.*, [D], **15** (1): 79–115, pls. 9–11.
———, Hayami, Itaru and Asano, Kiyoshi (1963) A survey of fossils from Japan illustrated in classical monographs, Part VII. M. Yokoyama: Versteinerungen aus der japanischen Kreide. *Pal. Soc. Japan, 25th Anniv. Vol.*, 27–32, pls. 44–51.
———, ——— and Hashimoto, Wataru (1965) Some molluscan fossils from the buried Cretaceous of western Taiwan. *Petrol. Geol. Taiwan*, (4): 1–24 (2 pls. incl.).
——— and Noda, Masayuki (1968) An interesting species of *Inoceramus* from the Upper Cretaceous of Kyushu. *Trans. Proc. Pal. Soc. Japan*, n. s., (71): 317–325, pl. 32.
——— and Ueda, Yoshiro (1962) Palaeontological notes. *In* Y. Ueda: The type Himenoura group. *Mem. Fac. Sci. Kyushu Univ.*, [D], **12** (2): 161–178, pls. 22–27.
Matsushita, Susumu (1926) On the Lower Triassic fossils from Kurotaki, Province of Tosa. *Chikyu*, **5** (5): 420–428, pl. 8. (in Japanese)
Michael, R. (1899) Ueber Kreidefossilien von der Insel Sakhalin. *Jahrb. k. preuss. geol. Landesanst.*, **18**: 153–164, pls. 5, 6.
Mojsisovics, Edmund von (1888) Ueber einige japanische Trias-fossilien. *Beitr. Geol. Pal. Österreich-Ungarns usw.*, **7**: 163–178, pls. 1–4.
Morozumi, Yoshiro (1970) Upper Cretaceous *Inoceramus* from the Shimanto belt of the Kii Peninsula. *Bull. Osaka Mus. Nat. Hist.*, (23): 19–24, pls. 2–4.
Murata, Masafumi (1973) Triassic fossils from the Kitakami massif, northeast Japan. *Sci. Rept. Tohoku Univ.*, [2], spec. vol. 6: 267–275, pl. 29.

Nagai, Kozo, Nakano, Mitsuo, Yoshida, Akihiko and Ohtsuka, Fumio (1962) The inoceramids discovered in the Shimantogawa group of Ehime Prefecture, Shikoku. *Mem. Ehime Univ.*, II (Sci.), [D], **4** (3): 1–7.

Nagao, Takumi (1930) On some Cretaceous fossils from the islands of Amakusa, Kyushu, Japan. *Jour. Fac. Sci. Hokkaido Imp. Univ.*, [4], **1** (1): 1–25, pls. 1–3.

——— (1932a) Some Cretaceous Mollusca from Japanese Saghalin and Hokkaido (Lamellibranchiata and Gastropoda). *Jour. Fac. Sci. Hokkaido Imp. Univ.*, [4], **2** (1): 23–50, pls. 5–8.

——— (1932b) Occurrence of *Toucasia* in the Lower Cretaceous of Japan. *Proc. Imp. Acad. Tokyo*, **8** (10): 511–514.

——— (1933) A new variety of *Toucasia carinata* (Math.) from the Lower Cretaceous of Japan. *Jour. Fac. Sci. Hokkaido Imp. Univ.*, [4], **2** (2): 163–167, pls. 21, 22.

——— (1934) Cretaceous Mollusca from the Miyako district, Honshû, Japan. *Jour. Fac. Sci. Hokkaido Imp. Univ.*, [4], **2** (3): 177–277, pls. 23–39.

——— (1935) Giant *Inoceramus*. Warerano-kobutsu, **4** (5): 197–199. (in Japanese)

——— (1938) Some molluscan fossils from the Cretaceous deposits of Hokkaido and Japanese Saghalien. Part 1. Lamellibranchia and Scaphopoda. *Jour. Fac. Sci. Hokkaido Imp. Univ.*, [4], **4** (1–2): 117–142, pls. 14–16.

——— (1943) *Pholadomya* from Japan. *Jour. Geol. Soc. Japan*, **50** (596): 153–160, pls. 12, 13.

——— and Huzioka, Kazuo (1941) Fossil *Acila* from from Hokkaido and Karafuto (Saghalien). *Jour. Fac. Sci. Hokkaido Imp. Univ.*, [4], **6** (2): 113–141, pls. 29–31.

——— and Matsumoto, Tatsuro (1939) A monograph of the Cretaceous *Inoceramus* of Japan. Part 1. *Jour. Fac. Sci. Hokkaido Imp. Univ.*, [4], **4** (3–4): 241–299, pls. 23–34.

——— and ——— (1940) A monograph of the Cretaceous *Inoceramus* of Japan. Part 2. *Jour. Fac. Sci. Hokkaido Imp. Univ.*, [4], **6** (1): 1–64, pls. 1–22.

——— and Otatume, Kenitirô (1938) Molluscan fossils of the Hakobuti sandstone of Hokkaido. *Jour. Fac. Sci. Hokkaido Imp. Univ.*, [4], **4** (1–2): 31–56, pls. 1–4.

Nakano, Mitsuo (1957a) On the Cretaceous pennatae trigonians in Japan. *Japan. Jour. Geol. Geogr.*, **28** (1–3): 107–120, pls. 8, 9.

——— (1957b) Carnian fossils from Kyowa, Okayama Prefecture, Japan. *Jour. Sci. Hiroshima Univ.*, [C], **2** (1): 63–67, pl. 9.

——— (1957c) On the occurrence of *Psilotrigonia* in the Cretaceous of the Kwanto mountaneous land, Japan. *Jour. Sci. Hiroshima Univ.*, [C], **2** (1): 69–71.

——— (1958a) On some Upper Cretaceous *Steinmannella* (*Yeharella*) in Japan. *Jour. Sci. Hiroshima Univ.*, [C], **2** (2): 83–88, pls. 13, 14.

——— (1958b) Scabrotrigonians in Japan. *Jour. Sci. Hiroshima Univ.*, [C], **2** (3): 227–233, pl. 29.

——— (1960) Stratigraphic occurrences of the Cretaceous trigoniids in the Japanese islands and their faunal significances. *Jour. Sci. Hiroshima Univ.*, [C], **3** (2): 215–280, pls. 23–30.

——— (1961a) Notes on *Heterotrigonia subovalis* (Jimbo). *Trans. Proc. Pal. Soc. Japan*, n. s., (42): 55–62, pl. 9.

——— (1961b) On the Trigoniinae. *Jour. Sci. Hiroshima Univ.*, [C], **4** (1): 71–94, pl. 8.

——— (1961c) Note on *Steinmannella* (*Yeharella*) *ainuana* (Yabe and Nagao). *Trans. Proc. Pal. Soc. Japan*, n. s., (44): 139–145, pls. 20, 21.

——— (1963) On the Rutitrigoniinae. *Geol. Rept. Hiroshima Univ.*, (12): 513–529, pl. 56.

——— (1965) On the Megatrigoniinae. *Jour. Sci. Hiroshima Univ.*, [C], **5** (1): 13–20, pl. 4.

——— (1968) On the Quadratotrigoniinae. *Japan. Jour. Geol. Geogr.*, **39** (1): 27–41.

——— (1970a) Notes on the Trigoniinae and the Nototrigoniinae. *Res. Bull. Hiroshima Inst. Tech.*, **4** (1): 91–108.

——— (1970b) Notes on the Austrotrigoniinae. *Res. Bull. Hiroshima Inst. Tech.*, **5** (1): 7–12.
——— (1970c) Consideration on the life mode of *Nipponitrigonia* and *Pterotrigonia* from the Lower Cretaceous in Katsuuragawa basin, Shikoku, Japan. *Res. Bull. Hiroshima Inst. Tech.*, **5** (1): 15–21. (in Japanese)
——— and Numano, Kyoichiro (1961) On some Gyliakian Pterotrigoniae from Kyushu and Hokkaido. *Trans. Proc. Pal. Soc. Japan*, n. s., (43): 89–98, pl. 13.
Nakazawa, Keiji (1952) A study on the pelecypod-fauna of the Upper Triassic Nabae group in the northern part of Kyoto Prefecture, Japan. Part 1. Pectinids and limids. *Mem. Coll. Sci. Univ. Kyoto*, [B], **20** (2): 95–106, pls. 7–10.
——— (1953) Discovery of *Claraia* and *Eumorphotis* from Triassic Yakuno group, Kyoto Pref., Japan. *Mem. Coll. Sci. Univ. Kyoto*, [B], **20** (4): 261–269, pl. 3.
——— (1954) A study on the pelecypod-fauna of the Upper Triassic Nabae group in the northern part of Kyoto Prefecture, Japan. Part 2. Bakevellids (with appendix to part 1). *Mem. Coll. Sci. Univ. Kyoto*, [B], **21** (2): 213–222, pls. 3–6.
——— (1955) A study on the pelecypod-fauna of the Upper Triassic Nabae group in northern part of Kyoto Prefecture, Japan. Part 3. Halobiids and others. *Mem. Fac. Sci. Univ. Kyoto*, [B], **22** (2): 243–260, pls. 13–16.
——— (1956) A study on the pelecypod-fauna of the Upper Triassic Nabae group in northern part of Kyoto Prefecture, Japan. Part 4. *Cardinioides*, *Homomya*, *Pleuromya* and others, supplement and brief summary. *Mem. Coll. Sci. Univ. Kyoto*, [B], **23** (2): 231–253, pls. 1–4.
——— (1959) Permian and Eo-Triassic Bakevellias from the Maizuru zone, southwest Japan. *Mem. Coll. Sci. Univ. Kyoto*, [B], **26** (2): 193–213, pls. 3, 4.
——— (1960) Permian and Eo-Triassic Myophoriidae from the Maizuru zone, southwest Japan. *Japan. Jour. Geol. Geogr.*, **31** (1): 49–61, pl. 6.
——— (1961) Early and Middle Triassic pelecypod-fossils from the Maizuru zone, southwest Japan. *Mem. Coll. Sci. Univ. Kyoto*, [B], **27** (3): 249–279, pls. 12–14.
——— (1963) Norian pelecypod-fossils from Jito, Okayama Prefecture, west Japan. *Mem. Coll. Sci. Univ. Kyoto*, [B], **30** (2): 47–58, pls. 1, 2.
——— (1964a) On the *Monotis typica* zone in Japan. *Mem. Coll. Sci. Univ. Kyoto*, [B], **30** (4): 21–39, pls. 3–5.
——— (1964b) Discovery of the Anisian fauna from Shikoku, southwest Japan and its geological meaning. *Mem, Coll. Sci. Univ. Kyoto*, [B], **30** (4): 7–19, pls. 1, 2.
——— (1971) The Lower Triassic Kurotaki fauna in Shikoku and its allied faunas in Japan. *Mem. Fac. Sci. Univ. Kyoto*, [B], **38** (1): 103–133, pls. 23–25.
——— and Murata, Masafumi (1966) On the Lower Cretaceous fossils found near the Omine mine, Iwaté Prefecture, northeast Japan. *Mem. Coll. Sci. Univ. Kyoto*, [B], **32** (4): 303–333, pls. 3–6.
——— and Nogami, Yasuo (1967) Problematic occurrence of the Upper Triassic fossils from the western hills of Kyoto. *Mem. Fac. Sci. Univ. Kyoto*, [B], **34** (1): 9–22, pl. 1.
Naumann, Edmund and Neumayr, M. (1890) Zur Geologie und Paläontologie von Japan. *Denkschr. Kaiserl. Akad. Wiss.*, Math.-Naturw. Cl., **57**: 1–41, pls. 1–5.
Noda, Masayuki (1969) Biostratigraphic study of the Onogawa group, Kyushu. *Sci. Rept. Dept. Geol. Kyushu Univ.*, **10** (1): 1–10, pls. 1–3. (in Japanese)
——— (1971) The Cretaceous *Inoceramus* from the Onogawa group and the Tano formation, central Kyushu. *Kagaku-Oita*, (24): 24–34, pls. 1–3. (in Japanese)
——— (1974) A new species of *Inoceramus* from the Shimantogawa group of south Shikoku. *Trans. Proc. Pal. Soc. Japan*, n. s., (93): 240–248, pl. 34.
Okada, Hakuyu (1958) *Matsumotoa:* a new prionodont pelecypod genus from the Cretaceous

Mifuné group, Kyushu, Japan. *Mem. Fac. Sci. Kyushu Univ.*, [D], **8** (2): 35–48, pls. 10, 11.
Okubo, Masahiro and Matsushima, Nobuyuki (1959) On a new species of Pachyodonta from the Akaishi mountains, central Japan. *Chikyu-kagaku*, (42): 1–4. (in Japanese)
Ota, Yoshihisa (1959a) *Plicatounio* of the Wakino formation. *Trans. Proc. Pal. Soc. Japan.* n. s., (33): 15–18, pl. 3.
——— (1959b) *Trigonioides* and its classification. *Trans. Proc. Pal. Soc. Japan*, n. s., (34): 97–104, pl. 10.
——— (1959c) On the "*Nippononaia*" from the Lower Cretaceous Wakino formation, north Kyushu, Japan. *Trans. Proc. Pal. Soc. Japan*, n. s., (34): 105–110, pl. 11.
——— (1963) Notes on the relationship of *Trigonioides* and *Plicatounio*, non-marine Mesozoic Bivalvia from eastern Asia. *Geol. Rept. Hiroshima Univ.*, (12): 503–512.
——— (1964) On some Cretaceous corbulids from Japan. *Mem. Fac. Sci. Kyushu Univ.*, [D], **15** (1): 149–161, pls. 20, 21.
——— (1965) On the Corbiculidae from the lower Neocomian of Japan. *Geol. Rept. Hiroshima Univ.*, (14): 165–171, pls. 12, 13.
——— [Ohta, Yoshihisa] (1973) Pelecypod family Neomiodontidae from the Lower Neocomian of Japan. *Bull. Fukuoka Univ. Educ.*, **22** (3): 245–273 (pls. 1–4 incl.).
——— (1974) A new bakevellid (Bivalvia) from the Lower Cretaceous of southwest Japan. *Bull. Fukuoka Univ. Educ.*, **23** (3): 79–89 (pl. 1 incl.).
Ozaki, Hiroshi and Shikama, Tokio (1954) On three Skytic molluscs from Gumma Prefecture, central Japan. *Bull. Nat. Sci. Mus.*, n. s., **1** (2): 42–45, pl. 19.
Ozawa, Tomowo and Hayami, Itaru (1969) Triassic *Oxytoma* bed in the suburbs of Ome City, Kwanto mountains. *Trans. Proc. Pal. Soc. Japan*, n. s., (73): 32–40, pl. 3.
Saeki, Shiro (1925) On some new species of Jurassic *Trigonia* from Province of Tamba, Japan. *Jour. Geol. Soc. Tokyo*, **32** (373): 35–36.
Sakaguti, Shigeo (1939) A new species of *Entomonotis* from the Upper Triassic of Kitakami mountainland. *Jub. Publ. Comm. Prof. H. Yabe 60th Birthday*, 1: 227–231, pl. 15.
Saito, Toshio (1962) The Upper Cretaceous system of Ibaraki and Fukushima Prefectures, Japan (Part 2). *Bull. Fac. Arts and Sci. Ibaraki Univ.*, Nat. Sci., (13): 51–87, pls. 1–8.
Saito, Yasuji (1964) A rudistid from the Cretaceous deposits of Ryoseki, Kochi Prefecture, Japan. *Trans. Proc. Pal. Soc. Japan*, n. s., (56): 317–321, pl. 47.
Schmidt, M. F. (1873) Ueber die Petrefakten der Kreideformation von der Insel Sachalin. *Mém. Acad. Imp. Sci. St. Petersbourg*, [7], **19** (3): 1–33, pls. 1–8.
Shikama, Tokio and Suzuki, Shigeki (1972) Stratigraphy and tectonic development mainly of Cretaceous formations of Choshi peninsula, Chiba Prefecture. *Sci. Rept. Yokohama Nat. Univ.*, [2], **19**: 133–157, pls. 4–6. (in Japanese)
——— and Tanabe, Kazushige (1970) Late Cretaceous rudistes from Uwajima, Ehime Prefecture, Shikoku, Japan. *Sci. Rept. Yokohama Nat. Univ.*, [2], **17**: 49–58, pls. 6, 7.
Sokolow, D. W. (1914) Kreideinoceramen des russischen Sachalin. *Mém. Comite géol. Leningrad*, n. s., **83**: 1–95, pls. 1–6.
Speden, Ian G. (1967) Revision of *Syncyclonema* (Upper Cretaceous) and comparison with other small pectinid bivalves and *Entolium*. *Peabody Mus. Nat. Hist. Yale Univ., Postilla*, **110**: 1–36, pls. 1–7.
——— (1970) Three new inoceramid species from the Jurassic of New Zealand. *N. Z. Jour. Geol. Geophys.*, **13** (3): 825–851.
Suzuki, Kôiti (1940) Non-marine molluscan faunule of the Siragi series in south Tyôsen. *Japan. Jour. Geol. Geogr.*, **17** (3–4): 215–231, pls. 22–24.
——— (1941) A new naiad, *Unio* (*Nippononaia*) *ryosekiana*, n. subgen. and n. sp. from the Lower Cretaceous of Japan. *Jour. Geol. Soc. Japan*, **48** (575): 410–413.

——— (1943) Restudy on the non-marine molluscan fauna of the Rakutô series in Keisyô-dô, Tyôsen. *Jour. Shigenkagaku Kenkyusho*, **1** (2): 189–219, pls. 14–19.

——— (1949) Development of the fossil non-marine molluscan faunas in eastern Asia. *Japan. Jour. Geol. Geogr.*, **21** (1–4): 91–133.

——— and Oyama, Katsura (1943) Überblick über Corbiculiden ostasiens (Materialien zur Monographie der ostasiatischen Corbiculiden, 1). *Venus*, **12** (3–4): 138–149.

Takagi, Zenzaburo (1944) On the discovery of *Pseudomonotis ochotica* in the vicinity of Ôme town and a note on the geology of this area. *Jour. Geol. Soc. Japan*, **51** (609): 196–198. (in Japanese)

Takai, Yasuaki and Matsumoto, Tatsuro (1961) Cretaceous-Tertiary unconformity in Nagashima, southwest Kyushu. *Mem. Fac. Sci. Kyushu Univ.*, [D], **11** (2): 257–278, pls. 11, 12.

Tamura, Minoru (1959a) On *Kumatrigonia*, a new subgenus of *Frenguelliella*, and a *Tosapecten* from the Carnic Tanoura formation in Kyushu, Japan. *Mem. Fac. Educ. Kumamoto Univ.*, **7**: 212–218, pl. 2.

——— (1959b) Carnic pelecypods from Matsukuma in central Kyushu, Japan. *Mem. Fac. Educ. Kumamoto Univ.*, **7**: 219–224, pl. 2.

——— (1959c) Trigoniidae, Ostreidae, Bakevelliidae, Pteriidae, Cardiidae and Astartidae from the Upper Jurassic Sakamoto formation in central Kyushu, Japan. *Trans. Proc. Pal. Soc. Japan*, n. s., (33): 23–32, pl. 5.

——— (1959d) Taxodonta and Isodonta from the Upper Jurassic Sakamoto formation in central Kyushu, Japan. *Trans. Proc. Pal. Soc. Japan*, n. s., (34): 53–65, pl. 6.

——— (1959e) Some pelecypods from the Upper Jurassic Sakamoto formation in central Kyushu, Japan. *Trans. Proc. Pal. Soc. Japan*, n. s., (35): 113–120, pl. 12.

——— (1959f) Taxodonta and Isodonta from the Jurassic Soma group in north Japan. *Trans. Proc. Pal. Soc. Japan*, n. s., (36): 168–180, pl. 19.

——— (1960a) Upper Jurassic Pteriacea from the Soma group in north Japan. *Trans. Proc. Pal. Soc. Japan*, n. s., (37): 223–229, pl. 26.

——— (1960b) A note on *Neoburmesia*, a peculiar Jurassic pelecypod, with description of mytilids and myacids from the Upper Jurassic Soma group in Japan. *Trans. Proc. Pal. Soc. Japan*, n. s., (38): 275–282, pl. 32.

——— (1960c) Heterodont and other pelecypods from the Upper Jurassic Soma group, Japan. *Trans. Proc. Pal. Soc. Japan*, n. s., (39): 285–292, pl. 33.

——— (1960d) Upper Jurassic pelecypods from the Torinosu group in Shikoku, Japan. *Mem. Fac. Educ. Kumamoto Univ.*, **8**: 227–244, pl. 2.

——— (1961) New subgenus of pearl oyster, *Eopinctada*, from the Creataceous Mifune group in Kumamoto Prefecture, Japan. *Trans. Proc. Pal. Soc. Japan*, n. s., (44): 147–151, pl. 22.

——— (1965) *Monotis* (*Entomonotis*) from Kyushu, Japan. *Mem. Fac. Educ. Kumamoto Univ.*, **13**: 42–57, pls. 1, 2.

——— (1970) The hinge structure of *Trigonioides*, with description of *Trigonioides mifunensis*, sp. nov. from Upper Cretaceous Mifune group, Kumamoto Pref., Japan. *Mem. Fac. Educ. Kumamoto Univ.*, **18** (1): 38–48, pls. 1, 2.

——— (1972) Myophorian fossils discovered from the Konose group, Kumamoto Prefecture, Japan, with a note on Japanese myophoriids. *Mem. Fac. Educ. Kumamoto Univ.*, **21** (1): 66–72, pl. 1.

——— (1973a) Two species of Lower Cretaceous *Parvamussium* from Kyushu, Japan, and Sarawak Borneo. *Geol. Pal. Southeast Asia*, **11**: 119–124, pl. 17.

——— (1973b) *Meekia hokkaidoana*, new species, from Hokkaido, Japan. *Mem. Fac. Educ. Kumamoto Univ.*, **22** (1): 101–104, pl. 1.

——— and Matsumura, Masakatsu (1974) On the age of the Mifune group, central Kyushu, Japan. *Mem. Fac. Educ. Kumamoto Univ.*, **23** (1): 47–55, pl. 1.

——— and Packard, Earl L. (1972) The genotype species of *Anthonya* Gabb. *Mem. Fac. Educ. Kumamoto Univ.*, **20** (1): 22–30, pl. 1.

——— and Tashiro, Masayuki (1966) Upper Cretaceous system south of Kumamoto. *Mem. Fac. Educ. Kumamoto Univ.*, **14** (1): 29–33, pl. 1.

——— and ——— (1967) Cretaceous trigoniids from the Mifune group. *Mem. Fac. Educ. Kumamoto Univ.*, **15** (1): 13–22, pl. 1.

———, ——— and Motojima, Takeshi (1968) The correlation of the Mifune group with the upper formation of the Goshonoura group, with description of some important pelecypods from the strata. *Mem. Fac. Educ. Kumamoto Univ.*, **16** (1): 28–42, pl. 1.

Tanabe, Kazushige (1973) Evolution and mode of life of *Inoceramus* (*Sphenoceramus*) *naumanni* Yokoyama emend., an Upper Cretaceous bivalve. *Trans. Proc. Pal. Soc. Japan*, n. s., (92): 163–184, pls. 27, 28.

Tanaka, Keisaku, Matsumoto, Tatsuro and Mayeda, Yasuo (1952) The Izumi group in the southernmost part of the island of Awaji. "*Jour. Geogr.*" (*Chigakuzasshi*), **61** (2): 67–72. (in Japanese)

Tashiro, Masayuki (1971) Upper Cretaceous glycymerids in Japan. *Trans. Proc. Pal. Soc. Japan*, n. s., (84): 225–242, pls. 27, 28.

——— (1972) On the surface ornamentation of the pennatae trigoniids, and on three new species of the trigoniids from the Himenoura group, Kyushu, Japan. *Trans. Proc. Pal. Soc. Japan*, n. s., (86): 325–339, pls. 40, 41.

Tokunaga, Shigeyasu and Shimizu, Saburo (1926) The Cretaceous formation of Futaba in Iwaki and its fossils. *Jour. Fac. Sci. Imp. Univ. Tokyo*, [2], **1** (6): 181–212, pls. 21–27.

Tokuyama, Akira (1958) Late Triassic *Palaeopharus* in Japan. *Trans. Proc. Pal. Soc. Japan*, n. s., (32): 291–298, pl. 43.

——— (1959a) "*Bakevellia*" and "*Edentula*" from the Late Triassic Mine series, west Japan. *Trans. Proc. Pal. Soc. Japan*, n. s., (35): 147–155, pl. 16.

——— (1959b) Late Triassic Pteriacea from the Atsu and Mine series, west Japan. *Japan. Jour. Geol. Geogr.*, **30**: 1–19, pls. 1, 2.

——— (1960a) Late Triassic pelecypod fauna of the Aso formation in west Japan. *Japan. Jour. Geol. Geogr.*, **31** (1): 23–38, pl. 4.

——— (1960b) On the bio- and litho-facies of the Late Triassic Hirabara formation in Province of Nagato, west Japan. *Japan. Jour. Geol. Geogr.*, **31** (2–4): 185–200, pl. 12.

——— (1960c) On the pelecypod fauna of the Late Triassic Hirabara formation in west Japan. *Japan. Jour. Geol. Geogr.*, **31** (2–4): 201–217, pl. 13.

Ueda, Yoshiro (1963) Two new species of *Opis* from the Cretaceous of Japan. *Trans. Proc. Pal. Soc. Japan*, n. s., (50): 70–80, pl. 11.

Yabe, Hisakatsu (1915) Notes on the some Cretaceous fossils from Anaga on the island of Awaji and Toyajo in the Province of Kii. *Sci. Rept. Tohoku Imp. Univ.*, [2], **4** (1): 13–24.

——— (1927) Cretaceous stratigraphy of the Japanese islands. *Sci. Rept. Tohoku Imp. Univ.*, [2], **11** (1): 27–100, pls. 3–9.

——— and Nagao, Takumi (1925) New or little known Cretaceous fossils from north Saghalin. *Sci. Rept. Tohoku Imp. Univ.*, [2], **7** (4): 111–124, pls. 28, 29.

——— and ——— (1926a) *Praecaprotina*, nov. gen. from the Lower Cretaceous of Japan. *Sci. Rept. Tohoku Imp. Univ.*, [2], **9** (1): 21–24, pl. 7.

——— and ——— (1926b) Fossil Mollusca from the Cretaceous of the Sanchu graben, Kwanto mountainland. *Chikyu*, **5** (5): 429–438, pl. 9. (in Japanese)

——— and ——— (1928) Cretaceous fossils from Hokkaido: Annelida, Gastropoda and Lamellibranchiata. *Sci. Rept. Tohoku Imp. Univ.*, [2], **9** (3): 77–96, pls. 16, 17.

———, ——— and Shimizu, Saburo (1926) Cretaceous Mollusca from the Sanchu graben in the Kwanto mountainland, Japan. *Sci. Rept. Tohoku Imp. Univ.*, [2], **9** (2): 33–76, pls. 12–15.

——— and Sato, Seikô (1942) A new bivalve from the Jurassic Torinosu series of the Abukuma mountainland. *Proc. Imp. Acad. Tokyo*, **18** (5): 251–254.

——— and Shimizu, Saburo (1927) The Triassic fauna of Rifu, near Sendai. *Sci. Rept. Tohoku Imp. Univ.*, [2], **11** (2): 101–136, pls. 10–14.

Yabe, Yukio (1956) Early Triasic Mollusca from Shionosawa in the Sanchu graben, Kwanto massif, Japan. *Sci. Rept. Tokyo Kyoiku Daigaku*, [C], **39**: 283–292, pls. 16, 17.

Yamagiwa, Nobuo (1955) Cretaceous Mollusca from the Shima peninsula, Japan. *Jour. Osaka Univ. Liberal Arts and Educ.*, [B], **3**: 43–56, pls. 1, 2.

Yang, Seong-Young (1974) Note on the genus *Trigonioides* (Bivalvia). *Trans. Proc. Pal. Soc. Japan*, n. s., (95): 395–408, pls. 54, 55.

Yehara, Shingo (1915) The Cretaceous trigoniae from Miyako and Hokkaido. *Sci. Rept. Tohoku Imp. Univ.*, [2], **2** (2): 35–44, pls. 1, 2.

——— (1920) A pachyodont lamellibranch from the Cretaceous deposits of Miyako in Rikuchû. *Jour. Geol. Soc. Tokyo*, **27** (321): 39–44, pls. 11, 12.

——— (1921) On some new species of *Trigonia* from the Lias of Prov. Nagato and the Cretaceous of Prov. Awa. *Jour. Geol. Soc. Tokyo*, **28** (329): 7–12, pl. 5.

——— (1923a) Cretaceous trigoniae from Amakusa islands, Prov. Higo, Kyushu, Japan. *Jour. Geol. Soc. Tokyo*, **30** (352): 1–12, pls. 4–7.

——— (1923b) Cretaceous trigoniae from southwest Japan. *Japan. Jour. Geol. Geogr.*, **2** (3): 59–84, pls. 8–13.

——— (1924) On the Izumi-sandstone group in the Onogawa basin (Prov. Bungo) and the same group in Uwajima (Prov. Iyo). *Japan. Jour. Geol. Geogr.*, **3**: 27–39, pls. 2–4.

——— (1927) Faunal and stratigraphical study of the Sakawa basin, Shikoku. *Japan. Jour. Geol. Geogr.*, **5** (1–2): 1–40, pls. 1–5.

Yokoyama, Matajiro (1890) Versteinerungen aus der japanischen Kreide. *Palaeontographica*, **36**: 159–202, pls. 18–25.

——— (1891) On some Cretaceous fossils from Shikoku. *Jour. Coll. Sci. Imp. Univ. Tokyo*, **4** (2): 357–366, pl. 40.

——— (1904) On some Jurassic fossils from Rikuzen. *Jour. Coll. Sci. Imp. Univ. Tokyo*, **18** (6): 1–13, pls. 1, 2.

ii) OTHER REFERENCES

Cox, Leslie R. (1940) The Jurassic lamellibranch fauna of Kuchh (Cutch). *Palaeont. Indica*, [9], **3** (3): 1–157, pls. 1–10.

——— (1952) The Jurassic lamellibranch fauna of Cutch (Kachh). *Palaeont. Indica*, [9], **3** (4): 1–128, pls. 1–10.

Efimova, A. F. et al. (1968) "*Field atlas of Jurassic fauna and flora from east Siberia*, USSR." 379 pp. (114 pls. incl.). (in Russian)

Hanzawa, Shoshiro, Asano, Kiyoshi and Takai, Fuyuji (1961): Catalogue of type-specimens of fossils in Japan. *Pal. Soc. Japan, 25th Anniv. Vol.*, 422 pp.

Kiparisova, L. D., Bychkov, J. M. and Polubotko, I. V. (1966) "*Late Triassic bivalve Mollusca of east Siberia, "USSR.*" All Soviet Union, Geol. Inst. 230 pp., 40 pls. (in Russian)

Kobayashi, Teiichi (1963) On the Cretaceous Ban Na Yo fauna of east Thailand with a note on the distribution of *Nippononaia*, *Trigonioides* and *Plicatounio*. *Japan. Jour. Geol. Geogr.*, **34** (1): 35–43, pl. 3.

——— (1968) The Cretaceous non-marine pelecypods from the Nam Phung dam site in the northeastern part of the Khorat plateau, Thailand with a note on the Trigonioididae. *Geol. Pal. Southeast Asia*, **4**: 109–138, pls. 20–23.

Martinson, W. B. (1965) Cretaceous lamellibranches of the family Trigonioididae and their classification. *Pal. Jour.*, **1965** (4).

Mayr, Ernst (1963) *Animal species and evolution.* Harvard Univ. Press, Cambridge, Mass. 797 pp.

Nakazawa, Keiji and Newell, Norman D. (1968) Permian bivalves of Japan. *Mem. Fac. Sci Kyoto Univ.*, [B], **35** (1): 1–108, pls. 1–11.

Newell, Norman, D. and Kauffman, Erle G. (1968) Bivalvia. In Moore, R. C. et al.: Developments, trends, and outlooks in paleontology. *Jour. Paleont.*, **42** (6): 1367–1368.

Palmer, C. P. (1974) A new genus of Jurassic bivalve mollusc ancestral to *Globocardium*. *Palaeontology*, **17** (1): 165–178, pls. 18–20.

Yokes, Harold E. (1967) Genera of the Bivalvia: a systematic and bibliographic catalogue. *Bull. Amer. Paleont.*, **51** (232): 1–394.

Woods, Henry (1899–1913) *A monograph of the Cretaceous Lamellibranchia of England.* Vol. 1 (1899–1903), xliii +227 pp., 42 pls.; Vol. 2 (1904–1913), 473 pp., 62 pls. Palaeontogr. Soc. London.

INDEX

Generic and specific names adopted in the present systematic study are indicated in italic type, and other taxonomic names in roman type. Adopted familial names are distinguished by the use of full capitals.

B

C

D

E

F

G

H

K

L

M

N

O

P

U

V

W

X

Y

Z

POSTSCRIPT

Several Mesozoic bivalves from Japan, which were overlooked in the preparation of the present catalogue or described after the completion of this manuscript, are supplementarily listed below.

Family OSTREIDAE Rafinesque, 1815

Subfamily OSTREINAE Rafinesque, 1815

Genus ***Crassostrea*** Sacco, 1897

Crassostrea konbo (Hayasaka and Hayasaka)

1956. *Ostrea konbo* Mabuchi (MS): Hayasaka and Hayasaka, p. 164, pl. 12, figs. 1-3.*

Type.—Syntype (GMH? not registered) from Tomatsu Colliery, Mikasa, Ishikari Prov., Hokkaido.

Age and distribution.—Cenomanian-Turonian. Middle Yezo group (Mikasa sandstone) in Mikasa area.

Family NEOMIODONTIDAE Casey, 1955

Subfamily EOMIODONTINAE Hayami, 1965

Genus ***Isodomella*** Kobayashi and Suzuki, 1939

Isodomella matsumotoi Ohta

1939. *Polymesoda shiroiensis* (Yabe and Nagao): Kobayashi and Suzuki, p. 219, pl. 14, figs. 1-9.—1943. *Polymesoda (Geloina) shiroiensis* (Yabe and Nagao): Suzuki and Oyama, p. 139, 146 (pars).—1975a. *Isodomella matsumotoi* Ohta, p. 97, text-fig. 1, 3, pl. 9, figs. 1-13.

Type.—Holotype (GF. Y147) from Yoshimo, Shimonoseki, Yamaguchi Pref.

Age and distribution.—Neocomian. Toyonishi group (Yoshimo formation) in Shimonoseki area and Kawaguchi formation in Sakamoto area.

Remarks.—Ohta (1975a) examined the hinge structure of *Isodomella* on the basis of several specimens from Yoshimo, and proposed this species on the basis of newly collected specimens which are certainly conspecific with Kobayashi and Suzuki's specimens of "*Polymesoda shiroiensis*" from the same locality. The taxonomic position of *Isodomella* was also clarified. I agree with him in regarding this genus as a member of the subfamily Eomiodontinae.

Family MYOPHOLADIDAE Cox, 1964

Genus ***Myopholas*** Douvillé, 1907

Myopholas carinatus Ohta

1926. *Myopholas* cf. *semicostata* (Agassiz): Yabe, Nagao and Shimizu, p. 56, pl. 12, fig. 5,

* Thanks are due to Dr. Kiyotaka Chinzei of the University of Tokyo for his information about this species.

pl. 13, fig. 1, pl. 14, figs. 21, 27.—1975a. *Myopholas carinatus* Ohta, p. 101, pl. 9, figs. 17–21.
Type.—Holotype (GF. Y450) from Yoshimo, Shimonoseki, Yamaguchi Pref.
Age and distribution.—Neocomian. Toyonishi group (Yoshimo formation) in Shimonoseki area.

Tamura (1975a) recorded new occurrence of *Trigonioides* (*Kumamotoa*) *mifunensis*, *Pterotrigonia* (*Pterotrigonia*) *sakakurai* and *Pterotrigonia* (*Acanthotrigonia*) *yeharai* from the Gosyonoura group at Gosyonoura island, Kumamoto Prefecture. Tamura (1975b) also summarized the general character of Gyliakian (Cenomanian-Turonian) bivalve faunas of Japan and discussed the faunal transition.

Nakano (1974) discussed the classification of the Pterotrigoniinae van Hoepen, 1929, proposing *Metacanthotrigonia* as a new subgenus of *Acanthotrigonia* [type-species: *Pterotrigonia* (*Rinetrigonia*) *yeharai* Nakano and Numano, 1961]. The subgenus was said to be characterized by the presence of discrepant costation between the anterior and posterior parts of the flank. As treated in the present systematic catalogue, *Acanthotrigonia* is regarded as a subgenus of *Pterotrigonia*, because I feel trigoniid genera and subgenera have been more or less oversplit in comparison with other bivalves. *Metacanthotrigonia* is here regarded as a subgenus of *Pterotrigonia* or only an infrasubgeneric group of *Acanthotrigonia*.

Ohta (1975b) reviewed critically the geographic and stratigraphic distribution and its allied genera on the basis of hitherto reported materials. His scheme of classification is seemingly not much different from that of the present catalogue.

Tashiro's important monographic work on the Bivalvia from the Upper Cretaceous Himenoura group in Kyushu (Tashiro, MS) is now in press. It includes the description of many new species and nomenclatorial revision of some formerly described Cretaceous species.

ADDITIONAL REFERENCES

Hayasaka, Ichirô and Hayasaka, Shôzô (1956) on a Cretaceous species of *Ostrea* from Hokkaido, with special reference to its mode of occurrence. *Japan. Jour. Geol. Geogr.*, **27** (2–4): 161–165, pl. 12.

Nakano, Mitsuo (1974) *Rinetrigonia* and its allies. *Jour. Sci. Hiroshima Univ.*, [C], **7** (2): 101–111.

Ohta, Yoshihisa (1975a) Two new non-marine species of Bivalvia from the Lower Cretaceous of southwest Japan. *Trans. Proc. Pal. Soc. Japan*, n. s., (98): 95–104, pl. 9.

(1975b) Notes on the genus *Trigonioides* (Bivalvia). *Bull. Fukuoka Univ. Educ.*, **24** (3): 79–98. (in Japanese)

Tamura, Minoru (1975a) New occurrence of *Trigonioides* (*Kumamotoa*) *mifunensis* Tamura and a note on *Pterotrigonia sakakurai* (Yehara) from Goshonoura island, Kumamoto Prefecture, Japan. *Mem. Fac. Educ. Kumamoto Univ.*, **24** (1): 53–58, pls. 1, 2.

(1975b) On the bivalvian faunas from the Gyliakian of Japan. *Mem. Fac. Educ. Kumamoto Univ.*, **24** (1): 59–62, pl. 3. (in Japanese)

Tashiro, Masayuki (MS) Bivalve faunas of the Cretaceous Himenoura group in Kyushu. *Pal. Soc. Japan, Spec. Papers*, (19). (in press)

HAYAMI: MESOZOIC BIVALVIA FROM JAPAN

PLATES 1–10

Explanation of Plate 1

Fig. 1. *Trigonucula sakawana* Ichikawa: type-species of genus *Trigonucula*. Holotype (UMUT MM 5242), rubber cast from left external mould, ×2. Loc. Umenokidani, Sakawa (Carnian, Kochigatani group).

Fig. 2. *Solemya suprajurensis* Hayami. Holotype (UMUT MM3138), internal mould of right valve, ×1. Loc. Mitarai, Makito (Callovian, Tetori group).

Fig. 3. *Parallelodon* (*Palaeocucullaea*) *monobensis* Nakazawa: type-species of subgenus *Palaeocucullaea*. Rubber cast from left internal mould (UMUT MM4571), ×1. Loc. Hirabarazaka, Mine (Carnian, Mine group).

Fig. 4. *Parallelodon* (*Torinosucatella*) *kobayashii* (Tamura): type-species of subgenus *Torinosucatella*. Rubber cast from left external mould (UMUT MM3207), ×1.5. Loc. Tatenosawa, Soma (Kimmeridgian, Soma group).

Fig. 5. The same species. Left valve (UMUT MM3206), ×1.5. Loc. ditto.

Fig. 6. *Matsumotoa japonica* Okada: type-species of genus *Matsumotoa*. Holotype (GK H6027), rubber cast from right internal mould, ×1. Loc. Tsuzumugi, Mifune (Cenomanian–Turonian, Mifune group).

Fig. 7. The same species. Paratype (GK H6026), left valve, ×1.5. Loc. Kanayama, Masuki (Cenomanian–Turonian, Mifune group).

Fig. 8. *Glycymeris* (*Pseudoveletuceta*) *mifunensis* Tashiro: type-species of subgenus *Pseudoveletuceta*. Holotype (KE 1774), rubber cast from right internal mould, ×1.5. Loc. Asanoyabu, Mifune (Cenomanian–Turonian, Mifune group).

Fig. 9. *Glycymeris* (*Hanaia*) *densilineata* Nagao: type-species of subgenus *Hanaia*. Left valve (GK H6219), ×1.5. Loc. Haipe, Tanohata (Aptian, Miyako group).

Fig. 10. The same species. Topotype (GK H6352), right valve, ×1.5. Loc. Hiraiga, Tanohata (Aptian, Miyako group).

Fig. 11. *Inoperna plicata* (Sowerby). Right valve (UMUT MM3264), ×1. Loc. Yamashita, Soma (Kimmeridgian, Soma group),

Fig. 12. *Modiolus bakevelloides* (Hayami). Holotype (UMUT MM2719), right valve, ×1. Loc. Niranohama, Shizukawa (Hettangian, Shizukawa group).

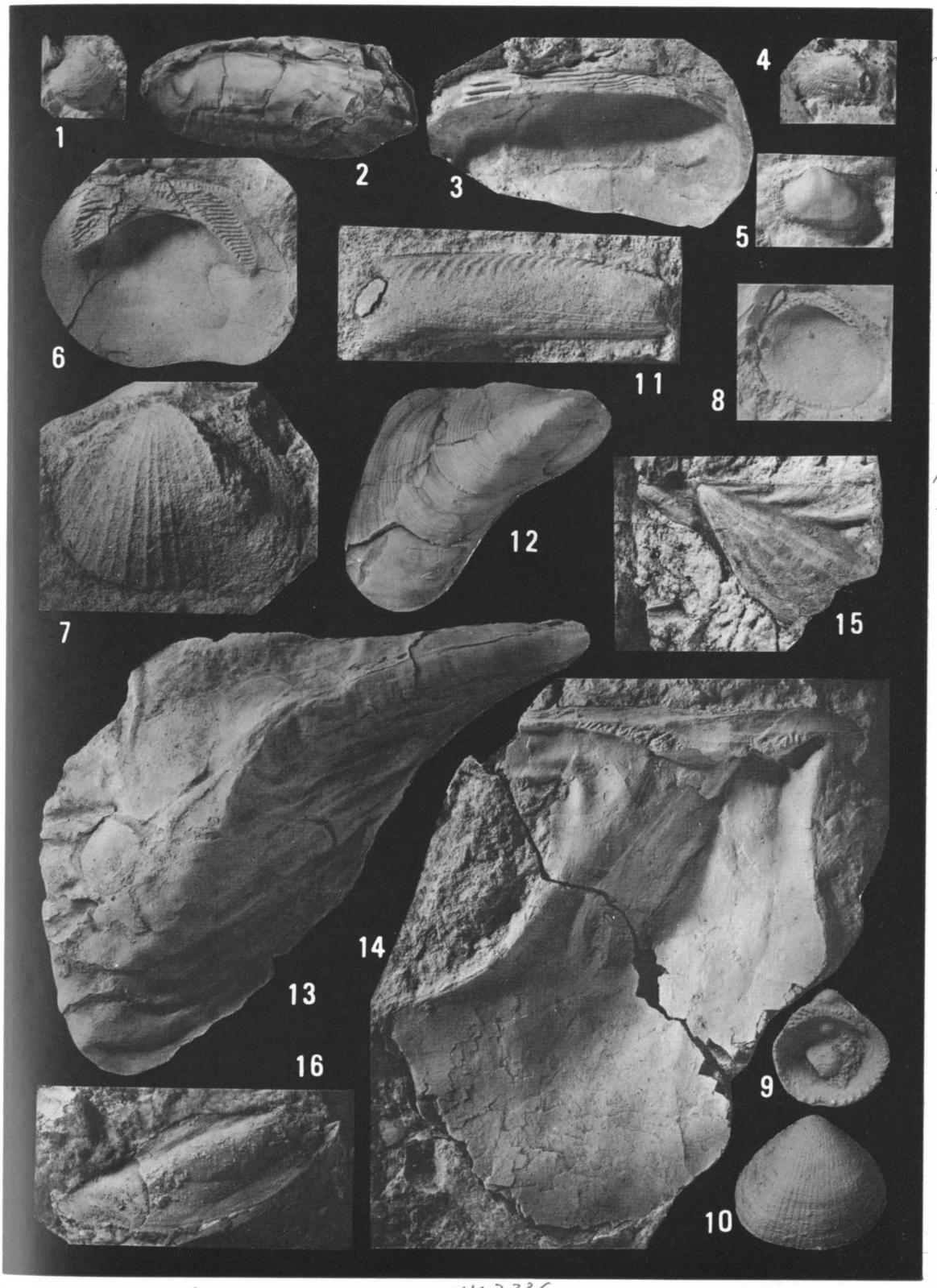
Fig. 13. *Pinna* (*Plesiopinna*) *atriniformis* (Amano): type-species of subgenus *Plesiopinna*. Holotype (KU not registered), right valve, ×1. Loc. Shishijima (Albian?–Cenomanian, Gosyonoura group).

Fig. 14. *Pteria masatanii* Tamura. Holotype (UMUT MM3236), left valve, ×1. Loc. Tatenosawa, Soma (Kimmeridgian, Soma group).

Fig. 15. *Pteroperna pauciradiata* Tamura. Holotype (UMUT MM3246), left valve, ×1. Loc. Tatenosawa, Soma (Kimmeridgian, Soma group).

Fig. 16. *Somapteria koikensis* Tamura: type-species of genus *Somapteria*. Holotype (UMUT MM3242), right valve, ×1.5. Loc. Koike, Soma (Kimmeridgian, Soma group).

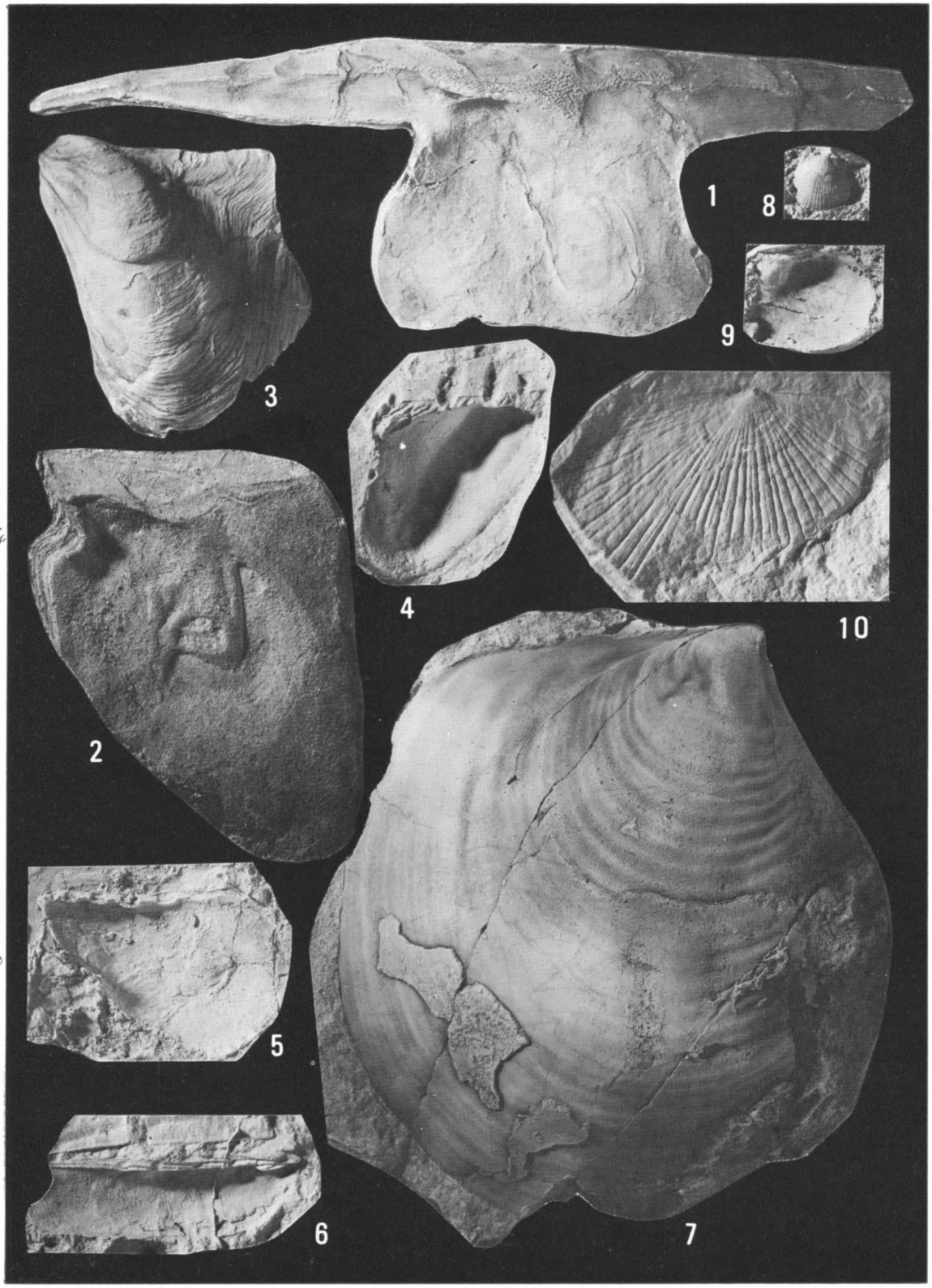
MM5242 MM3138 MM4571 MM3207



MM 3206

MM 3246

MM3242 MM 3236


MM 2851
1
8
MM 4498
MM 4503
9
3
4
MM 3904
MM 500
10
2
MM 4494
5
MM 3130
6
7

MM 9076

Explanation of Plate 2

Fig. 1. *Pterinella shinoharai* Hayami. Holotype (GK H6235), plaster cast from right internal mould, ×0.67. Loc. Nekodani, Yatsushiro (Albian, Yatsushiro formation).

Fig. 2. *Pinctada* (*Eopinctada*) *matsumotoi* Tamura: type-species of subgenus *Eopinctada*. Holotype (UMUT MM3704), rubber cast from right internal mould, ×1. Loc. Kamiumeki, Mifune (Cenomanian–Turonian, Mifune group).

Fig. 3. *Bakevellia* (*Neobakevellia*) *trigona* (Yokoyama). Topotype (UMUT MM2651), left valve, ×1. Loc. Niranohama, Shizukawa (Hettangian, Shizukawa group).

Fig. 4. *Bakevellia* (*Bakevelloides*) *hekiensis* (Kobayashi and Ichikawa): type-species of subgenus *Bakevelloides*. Plaster cast from left internal mould (UMUT MM4485), ×1. Loc. Shiraiwa, Mine (Carnian, Mine group).

Fig. 5. *Waagenoperna triangularis* (Kobayashi and Ichikawa). Rubber cast from right internal mould (UMUT MM4494), ×2. Loc. Higaeribara, Mine (Carnian–Norian, Mine group).

Fig. 6. *Kobayashites hemicylindricus* Hayami: type-species of genus *Kobayashites*. Holotype (UMUT MM3130), rubber cast from left internal mould, ×2. Loc. Akaiwazaki, Shizukawa (Bajocian, Hashiura group).

Fig. 7. *Inoceramus* (*Inoceramus*) *maedae* Hayami. Holotype (UMUT MM9076), right valve, ×0.86. Loc. Mitarai, Makito (Callovian, Tetori group).

Fig. 8. *Asoella confertoradiata* (Tokuyama): type-species of genus *Asoella*. Holotype (UMUT MM4498), rubber cast from left external mould, ×1.5. Loc. Higaeribara, Mine (Carnian–Norian, Mine group).

Fig. 9. The same species. Rubber cast from left internal mould (UMUT MM4503), ×1.5. Loc. ditto.

Fig. 10. *Daonella kotoi* Mojsisovics. Holotype (UMUT MM5001), clay cast from right external mould, ×1. Loc. Zohoin, Sakawa (Ladinian, Zohoin group).

Explanation of Plate 3

Fig. 1. *Oxytoma* (*Oxytoma*) *mojsisovicsi* Teller. Holotype of *O. yeharai* (UMUT MM5101), rubber cast from left external mould, ×1. Loc. Umenokidani, Sakawa (Carnian, Kochi-) gatani group).

Fig. 2. *Entolium inequivalve* Hayami. Holotype (UMUT MM3166), rubber cast from right external mould, ×1. Loc. Mitarai, Makito (Callovian, Tetori group).

Fig. 3. *Somapecten kamimanensis* Kimura: type-species of genus *Somapecten*. Paratype (UMUT MM7120), rubber cast from right(?) internal mould, ×1.5. Loc. Yasukurazawa, Soma (Kimmeridgian, Soma group).

Fig. 4. The same species. Holotype (UMUT MM7119), rubber cast from left(?) internal mould, ×1.5. Loc. ditto.

Fig. 5. *Neithea* (*Neithea*) *ficalhoi* (Choffat). Two right valves (upper: GK H6276, lower: GK H6636), ×1. Loc. Hiraiga, Tanohata (Aptian, Miyako group).

Fig. 6. *Neithea* (*Neithea*) *nipponica* Hayami. Paratype (GK H6632), right valve, ×1. Loc. Aketo, Tanohata (Albian, Miyako group).

Fig. 7. *Tosapecten suzukii suzukii* (Kobayashi): nominal subspecies of the type-species of genus *Tosapecten*. Holotype (UMUT MM5029), rubber cast from right external mould, ×1. Loc. Shimoyama, Sakawa (Carnian, Kochigatani group).

Fig. 8. *Chlamys mojsisovicsi* Kobayashi and Ichikawa. Holotype (UMUT MM5187), rubber cast from left external mould, ×2. Kasayadani, Sakawa (Carnian, Koohigatani group).

Fig. 9. *Radulonectites japonicus* Hayami: type-species of genus *Radulonectites*. Holotype (UMUT MM2689), rubber cast from left external mould, ×1. Loc. Tsuchizawa, Otari (Pliensbachian?, Kuruma group).

Fig. 10. The same species. Paratype (UMUT MM2690), rubber cast from right external mould, ×1. Loc. ditto.

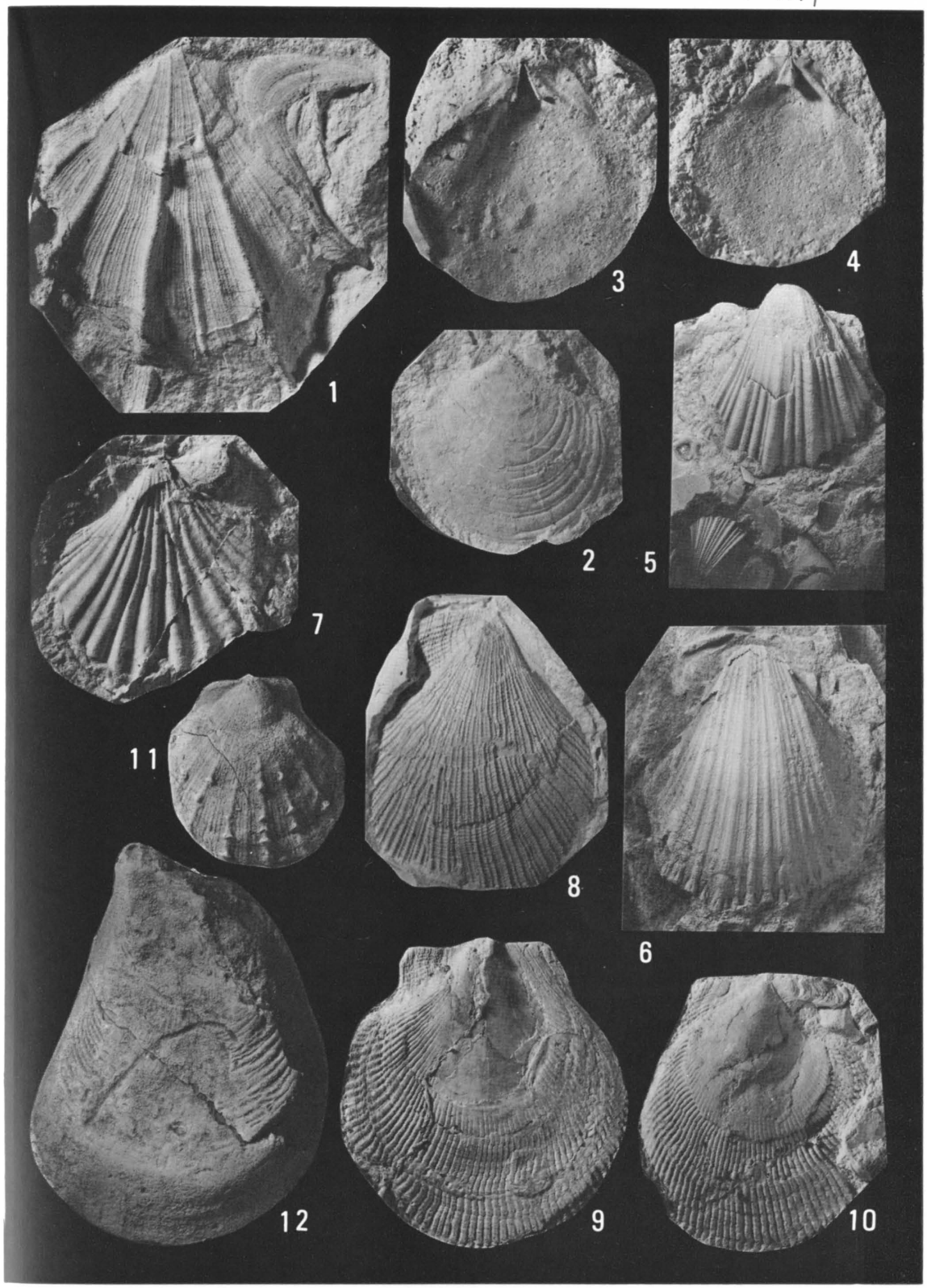
Fig. 11. *Spondylus* (*Spondylus*) *decoratus* Nagao. Topotype (GK H6306), left valve, ×1. Loc. Hideshima, Miyako (Aptian, Miyako group).

Fig. 12. The same species. Topotype (GK H6309), right valve, ×1. Loc. ditto.

MM 5-107

MM7120

MM7119

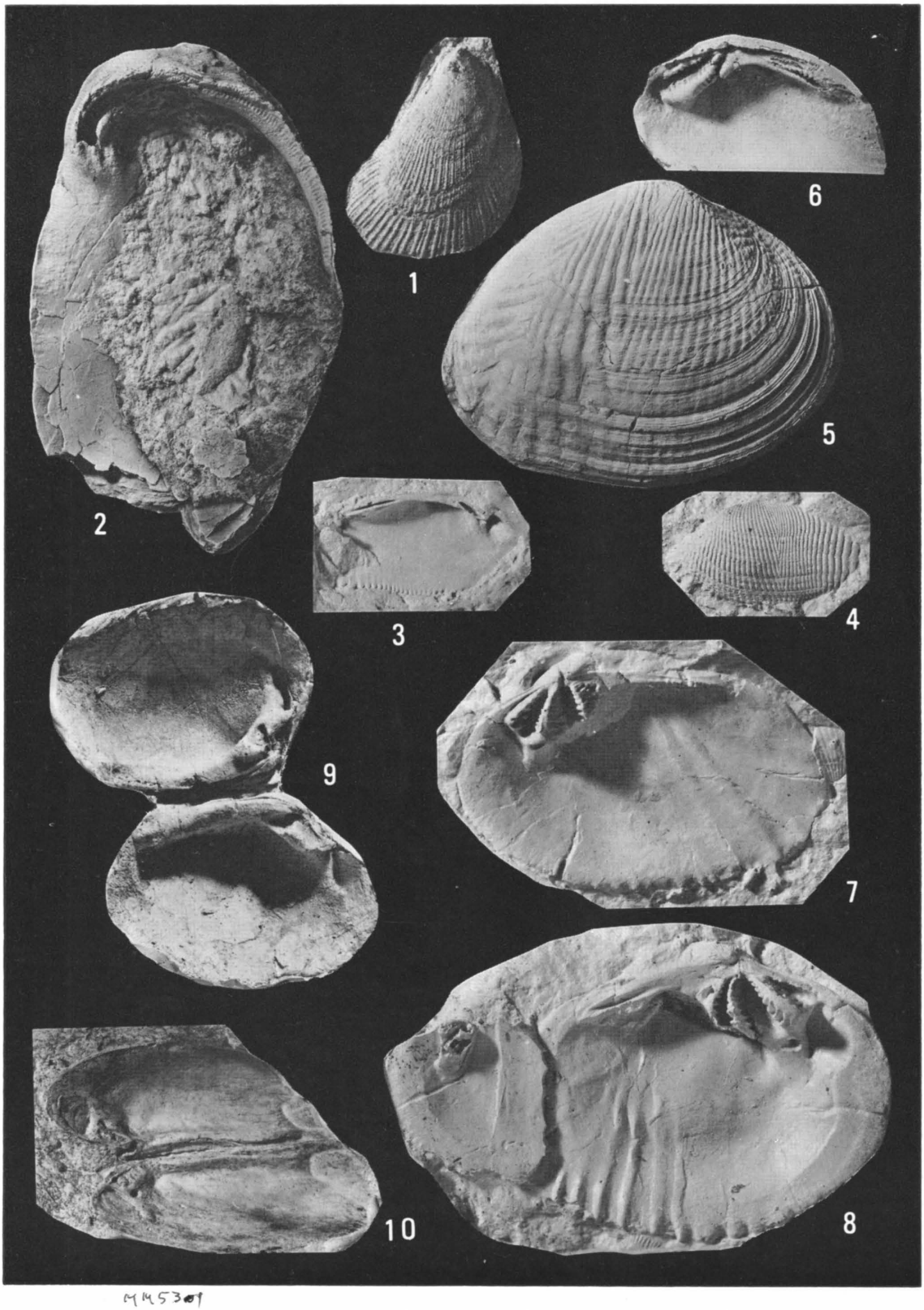


MM 5029

MM2689

MM2690

MM3421



MM 7000

MM 2641

MM5309

Explanation of Plate 4

Fig. 1. *Antiquilima nagatoensis* Hayami. Holotype (UMUT MM3421), rubber cast from left external mould, ×1. Loc. Higashinagano, Toyoda (Sinemurian, Toyora group).

Fig. 2. *Amphidonte* (*Amphidonte*) *subhaliotoidea* (Nagao). Left valve (GK H6343), ×1. Loc. Hiraiga, Tanohata (Aptian, Miyako group).

Figs. 3, 4. *Nippononaia ryosekiana* (Suzuki): type-species of genus *Nippononaia*. Holotype (UMUT MM7000), rubber cast of left internal mould (fig. 3) and rubber cast of left external mould of the same individual (fig. 4), ×1. Loc. unknown (Katsuuragawa area or Sanchu area).

Fig. 5. *Trigonioides* (*Trigonioides*) *kodairai* Kobayashi and Suzuki: type-species of genus *Trigonioides*. Topotype (Kyungpook National Univ., Daegu, Korea, KPE 1001), right valve, ×1.5. Loc. Sumoondong, Keisyo-nan-do (Lower Cretaceous, Naktong group).

Fig. 6. The same species. Topotype (KPE 1007), rubber cast from right internal mould, ×1.5. Loc. ditto.

Fig. 7. *Trigonioides* (*Kumamotoa*) *mifunensis* Tamura: type-species of *Kumamotoa*. Topotype (KE not registered), rubber cast from right internal mould, ×1. Loc. Tashiro, Kosa (Cenomanian–Turonian, Mifune group).

Fig. 8. The same species. Topotype (KE not registered), rubber cast from left internal mould, ×1. Loc. ditto.

Fig. 9. *Cardinioides varidus* Hayami. Rubber cast from bivalved internal mould (UMUT MM2641), ×1. Loc. Tsuchizawa, Otari (Pliensbachian?, Kuruma group).

Fig. 10. *Palaeopharus maizurensis* Kobayashi and Ichikawa. Holotype (UMUT MM5301), rubber cast of bivalved internal mould, ×1.5. Loc. Maizuru (Carnian, Nabae group).

Explanation of Plate 5

Fig. 1. *Trigonia sumiyagura* Kobayashi and Kaseno. Holotype (UMUT MM4300) × rubber cast from left external mould, ×1. Loc. Kosaba, Karakuwa (Bajocian, Karakuwa group).

Fig. 2. The same species. Rubber cast from left external mould (UMUT MM2962), ×1. Loc. Akaiwazaki, Shizukawa (Bajocian, Hashiura group).

Fig. 3. *Geratrigonia hosourensis* (Yokoyama): type-species of genus *Geratrigonia*. Lectoype (UMUT MM7174), left valve of a bivalved specimen, ×1. Loc. Niranohama, Shizukawa (Hettangian, Shizukawa group).

Fig. 4. *Latitrigonia pyramidalis* Kobayashi and Tamura: type-species of genus *Latitrigonia*. Holotype (UMUT MM4378), rubber cast from left external mould, ×1.5. Loc. Nodezawa, Soma (Bajocian, Soma group).

Fig. 5. *Ibotrigonia masatanii* Kobayashi and Tamura: type-species of genus *Ibotrigonia*. Rubber cast from left external mould (UMUT MM4383), ×1.5. Loc. Sugaya, Soma (Bathonian?, Soma group).

Fig. 6. *Minetrigonia hegiensis hegiensis* (Saeki): nominal subspecies of the type-species of genus *Minetrigonia*. Holotype (UMUT MM5026), rubber cast from left external mould, ×1.5. Loc. Nukata, Yakuno (Carnian, Heki formation).

Fig. 7. *Frenguelliella* (*Kumatrigonia*) *tanourensis* Tamura: type-species of subgenus *Kumatrigonia*. Holotype (UMUT MM3080), right valve, ×1. Loc. Okiba, Tanoura (Carnian, Kochigatani group).

Fig. 8. *Vaugonia* (*Hijitrigonia*) *geniculata* Kobayashi and Mori: type-species of subgenus *Hijitrigonia*. Paratype (UMUT MM4338), rubber cast from left external mould, ×1. Loc. Akaiwazaki, Shizukawa (Bajocian, Shizukawa group).

Fig. 9. *Myophorella* (*Promyophorella*) *sigmoidalis* Kobayashi and Tamura: type-species of subgenus *Promyophorella*. Holotype (UMUT MM4350), rubber cast from right external mould, ×1. Loc. Akaiwazaki, Shizukawa (Bajocian, Hashiura group).

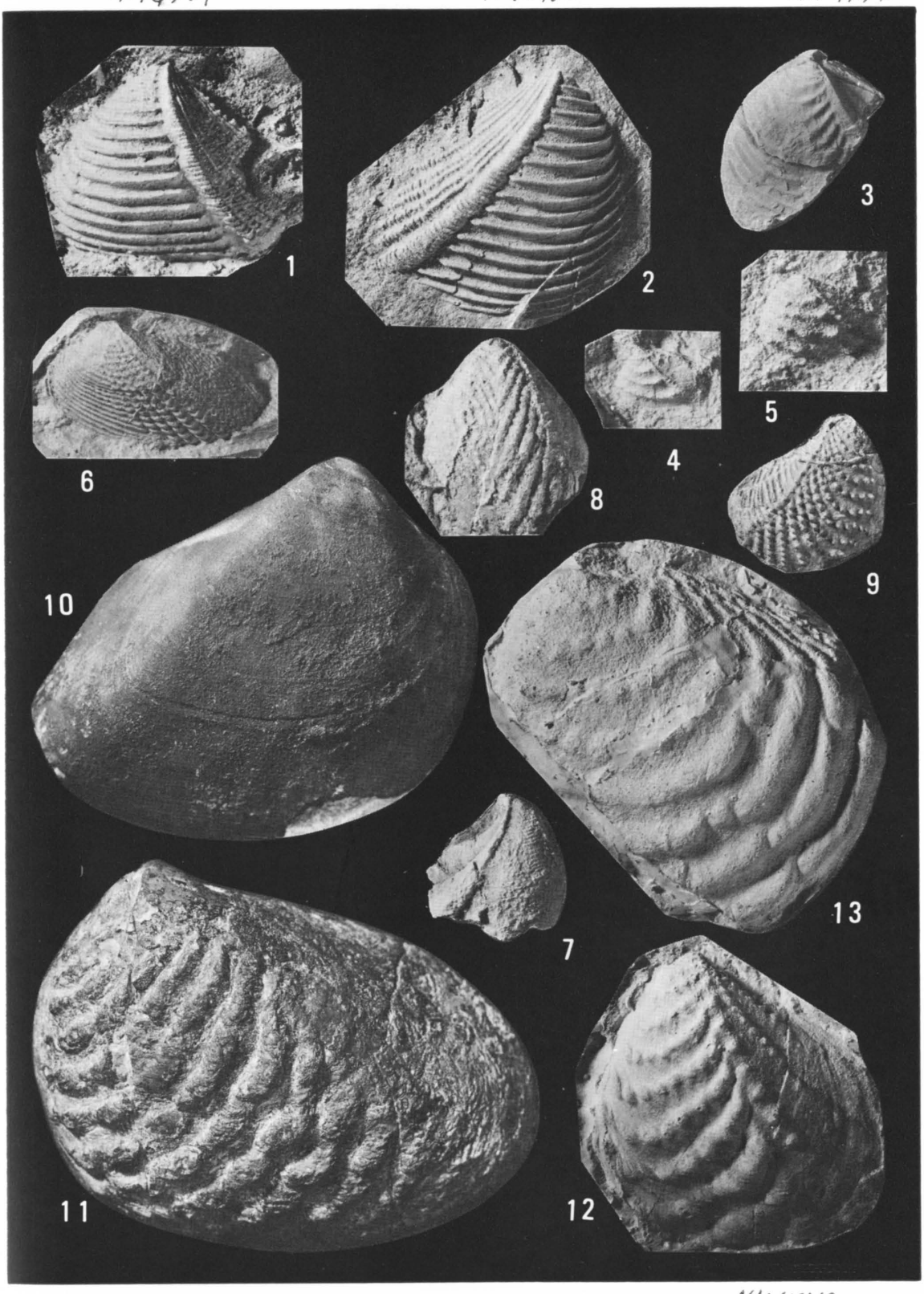
Fig. 10. *Nipponitrigonia kikuchiana* (Yokoyama): type-species of genus *Nipponitrigonia*. Right valve (GK not registered), ×1. Loc. Koikorobe, Tanohata (Aptian, Miyako group).

Fig. 11. *Steinmanella* (*Yeharella*) *ainuana* (Yabe and Nagao). Left valve of a bivalved specimen (GK H6054), ×1. Loc. Katsurazawa-dam, Ikushumbetsu (Cenomanian, Middle Yezo group).

Fig. 12. *Steinmanella* (*Yeharella*) *japonica* (Yehara): type-species of subgenus *Yeharella*. Rubber cast from left external mould (UMUT MM4413), ×1. Loc. Aonami, Onsen (Campanian, Izumi group).

Fig. 13. *Steinmanella* (*Setotrigonia*) *shinoharai* Kobayashi and Amano: type-species of subgenus *Setotrigonia*. Holotype (UMUT MM4424), rubber cast from right external mould, ×1. Loc. Tsubasayama, Hiketa (Campanian, Izumi group).

MM4301 MM2962 MM 4114



MM 5026

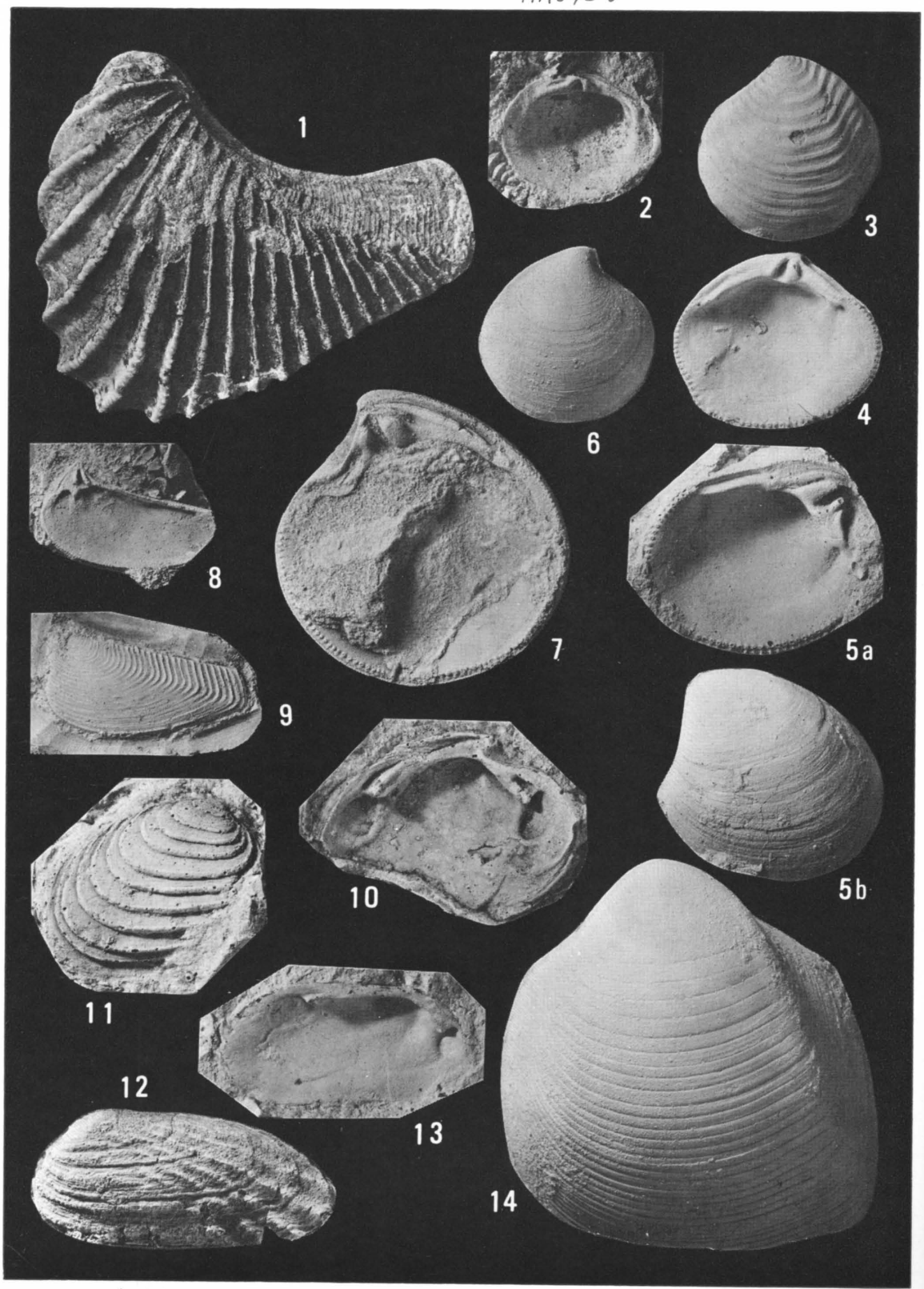
MM 4383

MM 4350

MM 4424

MM 4413

MM3450



MM 2917

MM 4470

Explanation of Plate 6

Fig. 1. *Pterotrigonia* (*Pterotrigonia*) *hokkaidoana* (Yehara). Left valve (GK not registered), ×1. Loc. Haipe, Tanohata (Aptian, Miyako group).

Fig. 2. *Sphaeriola nipponica* Hayami. Holotype (UMUT MM3450), rubber cast from right internal mould, ×1. Loc. Higashinagano, Toyoda (Sinemurian, Toyora group).

Fig. 3. *Astarte* (*Astarte*) *subsenecta* Yabe and Nagao. Rubber cast from left external mould (GK H6405), ×1.5. Loc. Ichinose-bashi, Nakazato (up. Neocomian or Aptian, Ishido formation).

Fig. 4. The same species. Rubber cast from left internal mould (GK H6403), ×1.5. Loc. ditto.

Fig. 5. *Astarte* (*Yabea*) *shinanoensis* Yabe and Nagao: type-species of subgenus *Yabea*. Rubber cast from internal (5a) and external (5b) moulds of a left valve (GK H6652), ×1.5. Loc. ditto.

Fig. 6. *Eriphyla* (*Eriphyla*) *miyakoensis* Nagao. Topotype (GK H6433), right valve, ×1. Loc. Hiraiga, Tanohata (Aptian, Miyako group).

Fig. 7. The same species. Topotype (GK H6436), right valve, ×1.5. Loc. ditto.

Fig. 8. *Anthonya subcantiana* Nagao. Topotype (GK H6464), right valve, ×1.5. Loc. Haipe, Tanohata (Aptian, Miyako group).

Fig. 9. The same species. Left valve (GK H6471), ×1.5. Loc. Hiraiga, Tanohata (Aptian, Miyako group).

Fig. 10. *Cardinia toriyamai* Hayami. Holotype (UMUT MM2918), plaster cast from left internal mould, ×1. Loc. Higashinagano, Toyoda (Sinemurian, Toyora group).

Fig. 11. The same species. Paratype (UMUT MM2917), plaster cast from right external mould, ×1. Loc. ditto.

Fig. 12. *Minepharus triadicus* (Tokuyama): type-species of genus *Minepharus*. Holotype (UMUT MM4470), left valve, ×1. Loc. Hirabarazaka, Mine (Carnian, Mine group).

Fig. 13. The same species. Paratype (UMUT MM4475), rubber cast from left internal mould, ×1. Loc. ditto.

Fig. 14. *Globocardium sphaeroideum* (Forbes): type-species of genus *Globocardium*. Left valve (GK not registered), ×1. Loc. Hiraiga, Tanohata (Aptian, Miyako group).

Explanation of Plate 7

Fig. 1. *Integricardium* (*Yokoyamaina*) *hayamii* (Keen and Casey): type-species of subgenus *Yokoyamaina*. Topotype (UMUT MM2864), left valve, ×1. Loc. Niranohama, Shizukawa (Hettangian, Shizukawa group).

Fig. 2. The same species. Topotype (UMUT MM2867), rubber cast from right internal mould, ×1. Loc. ditto.

Fig. 3. *Somarctica abukumensis* (Tamura): type-species of genus *Somarctica*. Topotype (UMUT MM3320), rubber cast from left internal mould, ×1. Loc. Yamashita, Soma (Kimmeridgian, Soma group).

Fig. 4. *Sakawanella triadica* Ichikawa: type-species of genus *Sakawanella*. Holotype (UMUT MM5169), rubber cast from left internal mould, ×2. Loc. Okunominetani, Sakawa (Carnian, Kochigatani group).

Fig. 5. *Ptychomya densicostata* Nagao. Right valve of a bivalved specimen (GK H6513), Kinchakuiwa, Ofunato (upper Neocomian, Ofunato group).

Fig. 6. *Eomiodon lunulatus* (Yokoyama). Topotype (UMUT MM2840), right valve, ×1.5. Loc. Niranohama, Shizukawa (Hettangian, Shizukawa group).

Fig. 7. The same species. Topotype (UMUT MM2843), rubber cast from bivalved internal mould, ×1.5. Loc. ditto.

Fig. 8. *Protocyprina naumanni* (Neumayr). Topotype (GK H6739), rubber cast from left internal mould, ×1. Loc. Yanagidani, Katsuuragawa (Neocomian, Tatsukawa formation).

Fig. 9. The same species. Topotype (GK H6726), left valve of a bivalved specimen, ×1. Loc. ditto.

Fig. 10. *Costocyrena matsumotoi* Hayami: type-species of genus *Costocyrena*. Holotype (GK H6502), rubber cast from right external mould, ×1.5. Loc. Miyaji, Yatsushiro (Albian, Yatsushiro formation).

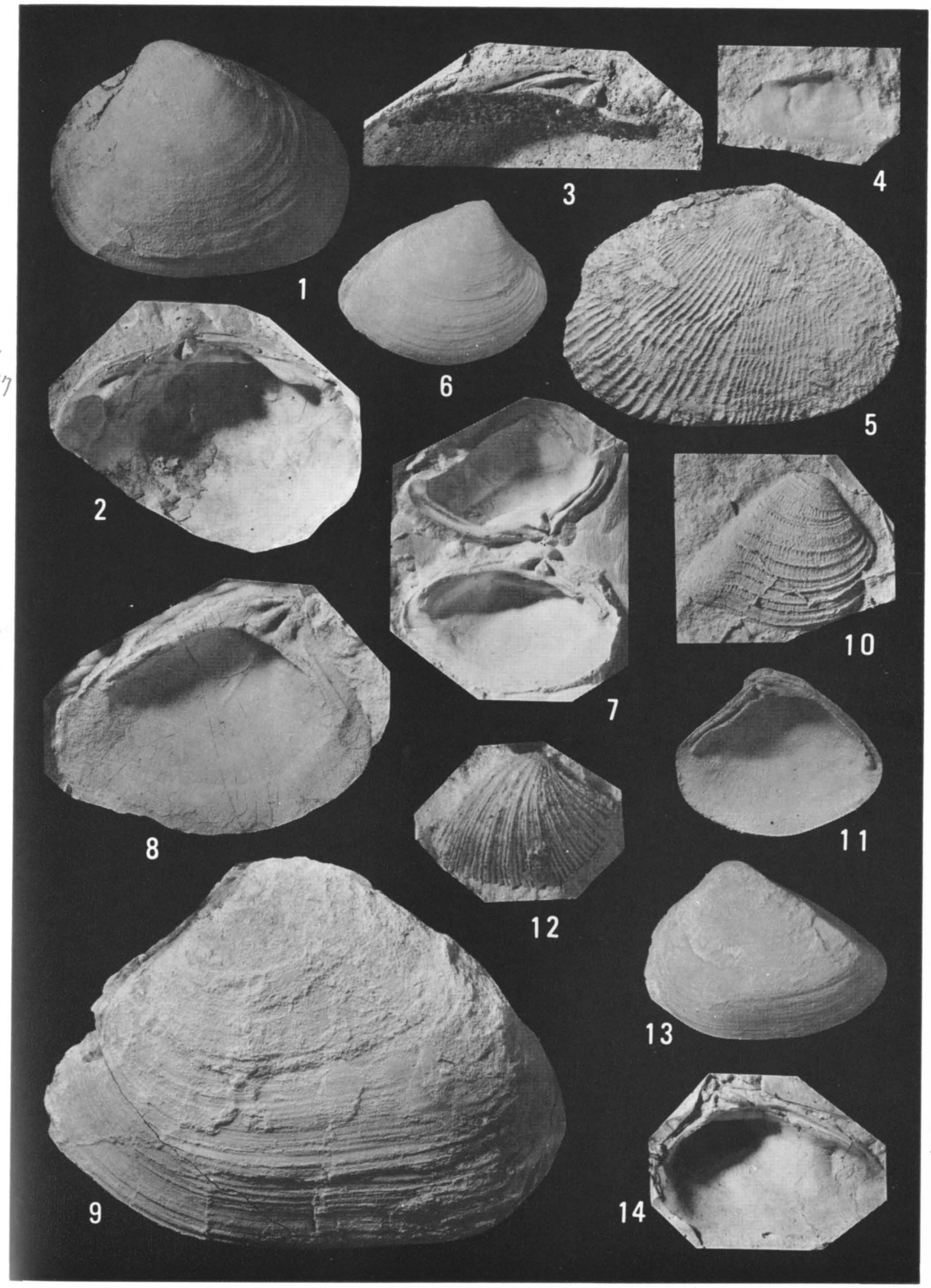
Fig. 11. The same species. Paratype (GK H6503), rubber cast from right internal mould, ×1.5. Loc. ditto.

Fig. 12. *Pseudasaphis japonica* Matsumoto: type-species of genus *Pseudasaphis*. Syntype (UMUT MM7749), rubber cast from right external mould, ×1.5. Loc. Narukogawa, Gosyonoura (Cenomanian, Gosyonoura group).

Fig. 13. *Crenotrapezium kurumense kurumense* Hayami: nominal subspecies of the type-species of genus *Crenotrapezium*. Holotype (UMUT MM2823), left valve, ×1.5. Loc. Tsuchizawa, Otari (Pliensbachian?, Kuruma group).

Fig. 14. The same species. Topotype (UMUT MM2829), rubber cast from right internal mould, ×1.5. Loc. ditto.

MM2864 MM3320 MM5169



MM 3867

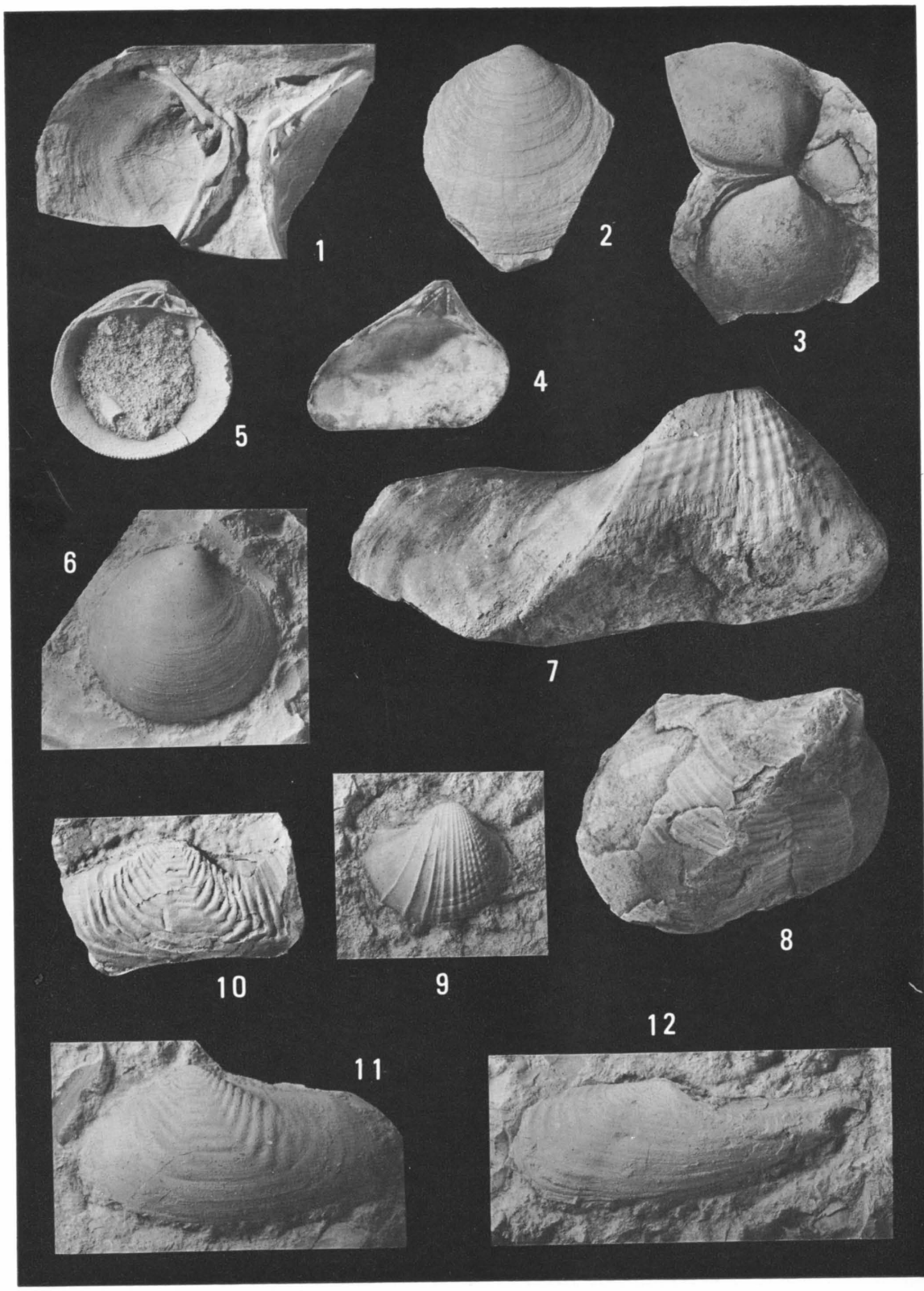
MM 2823

MM 2829

MM 7004

MM 7992

MM 7011



MM 328

MM 318

MM 3292

Explanation of Plate 8

Fig. 1. *Myrene* (*Mesocorbicula*) *tetoriensis* (Kobayashi and Suzuki): type-species of subgenus *Mesocorbicula*. Paratype (UMUT MM7011), rubber cast from bivalved internal mould, ×1. Loc. Izuki, Izumi (UP. Jurassic or Neocomian, Tetori group).

Fig. 2. *Tetoria* (*Tetoria*) *yokoyamai* (Kobayashi and Suzuki): type-species of genus *Tetoria*. Holotype (UMUT MM7004), right valve, ×1. Loc. Kurouchi, Furukawa (Up. Jurassic, Tetori group).

Fig. 3. *Tetoria* (*Paracorbicula*) *yoshimoensis* Ota. Bivalved internal mould (UMUT MM7992–1), ×1. Loc. Yoshimo, Shimonoseki (Neocomian, Yoshimo formation).

Fig. 4. *Isodomella shiroiensis* (Yabe and Nagao): type-species of genus *Isodomella*. Rubber cast from left internal mould (UMUT MM7885), ×1.5. Loc. Yoshimo, Shimonoseki (Neocomoian, Yoshimo formation).

Fig. 5. *Nagaoella corrugata* (Nagao): type-species of genus *Nagaoella*. Topotype (GK H6708), left valve, ×1. Loc. Hiraiga, Tanohata (Aptian, Miyako group).

Tig. 6. The same species. Topotype (GK H6518), right valve, ×1. Loc. ditto.

Fig. 7. *Neoburmesia iwakiensis* Yabe and Sato: type-species of genus *Neoburmesia*. Topotype (UMUT MM3283), Miyama, Soma (Kimmeridgian, Soma group).

Fig. 8. *Tetorimya carinata* Hayami: type-species of genus *Tetorimya*. Holotype (UMUT MM3181), right valve of a bivalved specimen, ×1. Loc. Nonomata, Makito (Callovian, Tetori group).

Fig. 9. *Pholadomya* (*Bucardiomya*) *miyamotoi* Nagao. Topotype (GK H6547), right valve, ×1.5. Loc. Hiraiga, Tanohata (Aptian, Miyako group).

Fig. 10. *Goniomya* (*Goniomya*) *nonvscripta* Tamura. Holotype (UMUT MM3292), left valve, ×1. Loc. Tatenosawa, Soma (Kimmeridgian, Soma group).

Fig. 11. *Goniomya* (*Goniomya*) *subarchiaci* Nagao. Left valve (GK H6559), ×1.5 Loc. Hiraiga, Tanohata (Aptian, Miyako group).

Fig. 12. *Cercomya* (*Cercomya*) *gurgitis* (Pictet and Campiche). Left valve (GK H6574), ×1. Loc. Hiraiga, Tanohata (Aptian, Miyako group).

Explanation of Plate 9

Fig. 1. *Jupiteria* (*Ezonuculana*) *mactraeformis* (Nagao): type-species of subgenus *Ezonuculana*. Left internal mould (OCU MM191), ×3. Loc. Kamatani, Izumi mountains (Campanian, Izumi group). Reproduced from Ichikawa and Maeda, 1958b, pl. 5, fig. 2a.

Fig. 2. *Bakevellia* (*Yoshimopsis*) *nagatoensis* (Ohta): type-species of sugenus *Yoshimopsis*. Holotype (GF Y423), left internal mould, ×1. Loc. Yoshimo, Shimonoseki (Neocomian, Yoshimo formation). Reproduced from Ohta, 1974, pl. 1, fig. 11.

Fig. 3. *Micronectes bellaturus* Ichikawa and Maeda: type-species of genus *Micronectes*. Holotype (OCU MM237), left external mould, ×7. Loc. Kamatani, Izumi mountains (Campanian, Izumi group). Reproduced from Ichikawa and Maeda, 1958b, pl. 5, fig. 15b.

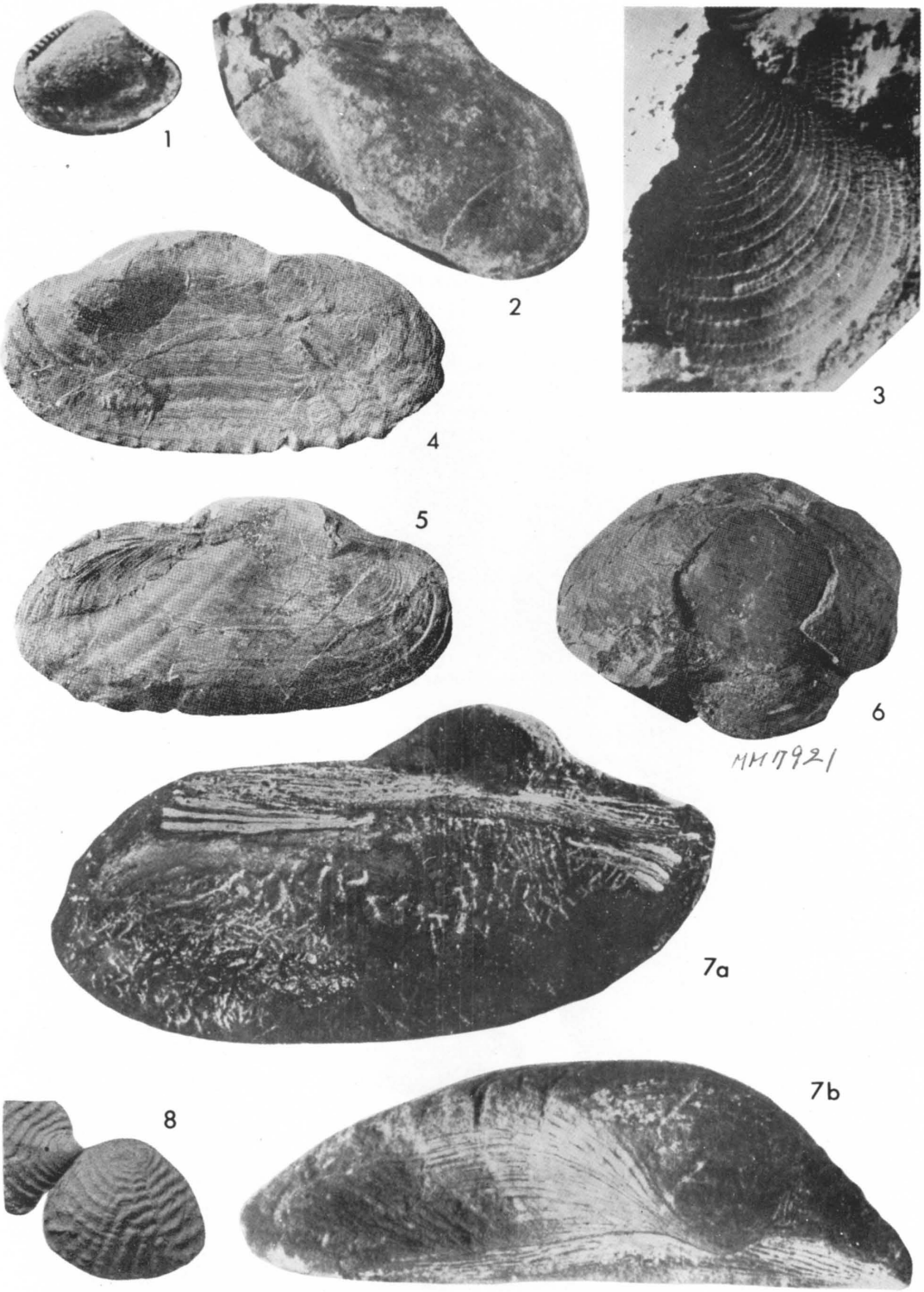
Fig. 4. *Plicatounio* (*Plicatounio*) *naktongensis naktongensis* Kobayashi and Suzuki: nominal subspecies of the type-species of genus *Plicatounio*. Holotype (to be preserved in the Geol. Survey of Korea), left valve of a bivalved specimen, ×1. Loc. Ryohori, Keisyo-nan-do (Low. Cretaceous, Naktong group). Reproduced from Kobayashi and Suzuki, 1936, pl. 28, fig. 1b.

Fig. 5. The same species. Right valve of the same specimen. Reproduced from Kobyashi and Suzuki, 1936, pl. 28, fig. 1a.

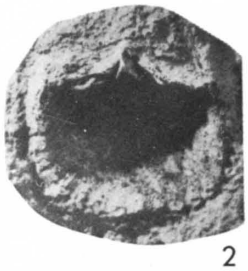
Fig. 6. *Paranodonta otai* Kobayashi and Suzuki: type-species of genus *Paranodonta*. Holotype (UMUT MM7921), right valve of a bivalved specimen, ×1. Loc. Rikimaru, Kurate (Kwanmon group). Reproduced from Kobayashi and Suzuki, 1936, pl. 17, fig. 7.

Fig. 7. *Pleurogrammatodon splendens* Ichikawa and Maeda: type-species of genus *Pleurogrammatodon*. Holotype (OCU MM145), side view (7a) and upper view (7b) of a left valve, ×1. Loc. Nada, Awaji (Maestrichtian, Izumi group). Reproduced from Ichikawa and Maeda, 1958a, pl. 1, figs. 1c, 2.

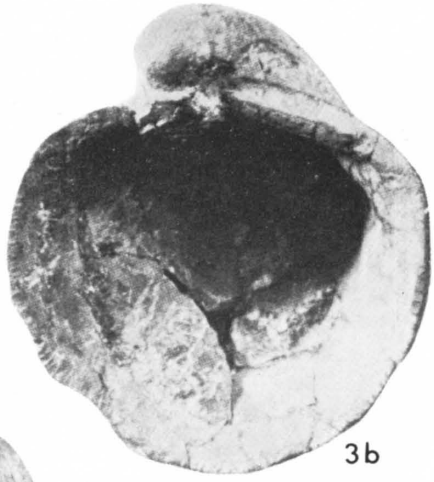
Fig. 8. *Microtrigonia amanoi* Nakano: type-species of genus *Microtrigonia*. Holotype (KU MA00001a), clay cast of bivalved external mould, ×2. Loc. Ukimizu, Shimokoshiki (Santonian or Campanian, Himenoura group). Reproduced from Nakano, 1957a, pl. 9, fig. 21.


1
2
3
4
5
6
MM7921
7a
7b
8

1



2



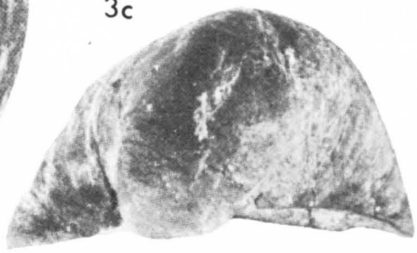
3b

7

3a

8

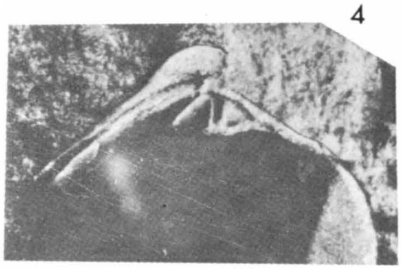
3c



11

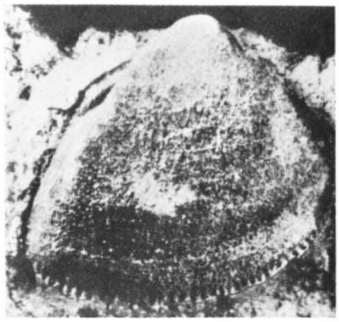
9

4



10

5



6

Explanation of Plate 10

Fig. 1. *Izumicardia parva* Ichikawa and Maeda: type-species of genus *Izumicardia*. Holotype (OCU MM286), rubber cast from right external mould, ×2. Loc. Mikumayama, Sumoto (Campanian, Izumi group). Reproduced from Ichikawa and Maeda, 1963, pl. 9, fig. 1d.

Fig. 2. The same species. Topotype (OCU MM291), rubber cast from right internal mould, ×2. Loc. ditto. Reproduced from Ichikawa and Maeda, 1963, pl. 9, fig. 7a.

Fig. 3. *Clisocolus* (*Crenocolus*) *crenulatus* Ichikawa and Maeda: type-species of subgenus *Crenocolus*. Holotype (OMM F1025), right valve, ×1. Loc. Azenotani, Izumi mountains (Campanian, Izumi group). Reproduced from Ichikawa and Maeda, 1966, pl. 7, figs. 1a–c. 3a: external view, 3b: internal view, 3c: upper view.

Fig. 4. *Izumia trapezoidalis* Ichikawa and Maeda: type-species of genus *Izumia*. Topotype (OCU MM276), clay cast from left internal mould, ×3. Loc. Mikumayama, Sumoto (Campanian, Izumi group). Reproduced from Ichikawa and Maeda, 1963, pl. 10, fig. 8b.

Fig. 5. The same species. Holotype (OCU MM262), right internal mould, ×2. Loc. ditto. Reproduced from Ichikawa and Maeda, 1963, pl. 10, fig. 1a. ×

Fig. 6. The same species. Topotype (OCU MM337), clay cast from right internal mould, ×3. Loc. ditto. Reproduced from Ichikawa and Maeda, 1963, pl. 10, fig. 7b.

Fig. 7. *Eoursivivas matsumotoi* (Hase): type-species of genus *Eoursivivas*. Right internal mould (GF K63050), ×2. Loc. Sakayori-agaru, Yatsushiro (Neocomian, Kawaguchi formation). Reproduced from Ota, 1964, pl. 21, fig. 1.

Fig. 8. The same species. Left internal mould (GF K63061), ×1.8. Loc. ditto. Reproduced from Ota, 1964, pl. 21, fig. 3.

Fig. 9. *Pulsidis nagatoensis* Ota: type-species of genus *Pulsidis*. Holotype (GF Y6301), right internal mould, ×2.5. Loc. Yoshimo, Shimonoseki (Neocomian, Yoshimo formation).

Fig. 10. *Nipponicorbula mifunensis* Ota: type-species of genus *Nipponicorbula*. Paratype (GF M63002), right valve, ×3. Loc. Asanoyabu, Kamimasuki (Cenomanian or Turonian, Mifune group). Reproduced from Ota, 1964, pl. 21, fig. 19.

Fig. 11. *Praecaprotina yaegashii* (Yehara): type-species of genus *Praecaprotina*. Syntype (IGPS not registered), bivalved specimen, ×1. Loc. Moshi, Iwaizumi (Aptian, Miyako group). Reproduced from Yabe and Nagao, 1926, pl. 7, fig. 1.