

On Some Pectinids and Venerids from the Miyazaki Group : Palaeontological Study of the Miyazaki Group-VII

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On Some Pectinids and Venerids from the Miyazaki Group*

(Palaeontological Study of the Miyazaki Group-VII)

By

Tsugio SHUTO

Introduction

The large family Pectinidae is, as several authors pointed out, important from two standpoints, bio-stratigraphical and ecological. The Veneridae is also very large family and includes a number of index fossil species. Among the molluscan collection from the Miyazaki group, twelve species belonging to eight genera of the Pectinidae and twenty-two species belonging to ten genera of the Veneridae are distinguished. The descriptions of all the species of the said families are given here except for previously reported ones such as *Paphia* (*Paphia*) *exilis* SHUTO, *P. (P.) tsumaensis* SHUTO, *P. (P.) takanabensis* SHUTO, *P. (P.) hirabayashii* OTUKA. *Amusiopecten praesignis* (YOKOYAMA) and *A. hyugaensis* SHUTO.

I wish to express my cordial thanks to Dr. Katura OYAMA of the Geological Survey of Japan and Assistant Professor Tadashige HABA of Kyushu University for their valuable aid in classifying the material. I am also indebted to Professor Tatsuro MATSUMOTO of the same University for his thorough advices in the course of the general study and to Professor Ryuzo TORIYAMA for his kind encouragements and reading over the typescript. This study was partly financed by the grant of the Ministry of Education.

Systematic Descriptions

Family Pectinidae LAMARCK, 1821

Subfamily Pectininae LAMARCK, 1881

Genus *Gloripallium* IREDALE, 1931

(type-species: *Ostrea pallium* LINNÉ by original designation)

Gloripallium satowi (YOKOYAMA)

Pl. 12, Fig. 5

1928. *Pecten* (*Chlamys*) *satowi* YOKOYAMA, *Imp. Geol. Surv. Japan Rep. No. 101*, p. 94, pl. 13, f. 13-14; pl. 14, f. 2.

* Received November 20, 1959

Material.—A few specimens from the tuffaceous sandstone at Tōriyama. The registered specimens are almost perfect in preservation. Homeotype: GK-L 4389.

Measurements.—

| specimen GK-L | length (mm) | height (mm) | depth (mm) | H/L (%) | D/L (%) | apical angle (degrees) | number of the ribs | length of the hinge | valve |
|------------------|----------------|----------------|---------------|------------|------------|------------------------------|-----------------------|------------------------|-------|
| 4389 | 75.0 | 76.7 | 12.7 | 101.2 | 16.9 | 89 | 27 | 42.6 | right |
| 4352 | 57.1 | 61.5 | 9.4 | 107.7 | 16.4 | 85 | 25 | 33.2 | right |

Remarks.—*Pecten (Chlamys) satowi* YOKOYAMA is said to have the tri-partite ribs provided with numerous small scales and the large ears of which the posterior one does not incline against the umbo. These important characteristics are diagnostic to the genus *Gloripallium* IREDALE 1931, and other subordinate characters also agree with the generic diagnosis of it. Consequently the present species must belong to that genus.

The specimens obtained from the Miyazaki group are quite identical to the type specimens of the original author except for the slight difference in the number of the ribs and the size of the shell. The original description and the figures based on the specimens from the Byoritsu beds of Formosa show that the species at most has the shell of about fifty mm. high ornamented with about thirty ribs. The specimens in hand, however, have twenty-five to twenty-eight ribs and attain large size of about seventy-five mm. in height. Another group of specimens came from the Shimajiri group of Okinawa attains greater size of about ninety mm. in height and is provided with about thirty ribs, that is to say, they are enlarged copies of the type specimen. Therefore it is reasonable to conclude that *G. satowi* is rather variable in form, and the specimens from the Miyazaki group are within the range of the normal variation of the species.

Horizon.—The upper part of the Takanabe member (Lower Pliocene).

Locality.—Tōriyama¹⁾ (MI-5595), Kawaminami mura, Koyu gun, Miyazaki Prefecture.

Gloripallium miurensis (YOKOYAMA)

Pl. 13, Fig. 10, Text-fig. 1

1920. *Pecten miurensis* YOKOYAMA, *Jour. Coll. Sci. Imp. Univ. Tokyo*, Vol. 39, Art. 6, p. 157, pl. 12, f. 2-6.
 1954. *Chlamys (Chlamys) miurensis*, TAKI and OYAMA, *Palaeont. Soc. Japan, Spec. Paper*, No. 2, p. 35, pl. 13, f. 2-6 (reproduced from YOKOYAMA's figures).

Material and Measurements.—A single imperfect right valve (Homeotype: GK-L 4855) and a few other fragmental ones, all of which came from the calcareous fine

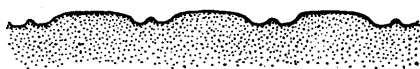
1) 宮崎県児湯郡川南村通山

sandstone at Kakoi. Apical angle is measured 108 degrees and the ribs are twenty-four in number. The maximum diameter of the disc is about eighty mm. in the homeotype specimen.

Remarks.—The type specimens of this species obtained from the Miocene bed of Zushi, Kanagawa Prefecture are characterized by the ribbing on the shell-surface. According to the original description the ribs are about twenty-five in number, prominent, and somewhat wider than the interstices. The surface of the ribs is smooth or sculptured by rather irregular and indistinct many riblets, and each interstice is intercalated by a scaly riblet. The present specimens show quite identical ribbing as the original ones, as indicated in Text-fig. 1, and the shell-size is also of the same order as the types. Though imperfect in preservation, they undoubtedly belong to the species on the basis of the above mentioned diagnosis.

Horizon.—The Kawabaru member (Upper Miocene).

Locality.—Kakoi¹⁾ (MI-4074), Sanzai mura, Koyu gun, Miyazaki Prefecture.



Text-fig. 1. Sectional view of the radial ribs of *Gloripallium miurensis* (YOKOYAMA) from the Miyazaki group.

Gloripallium aurantiacus (ADAMS and REEVE)

Pl. 12, Fig. 1; Pl. 13, Fig. 5

1850. *Pecten aurantiacus* ADAMS and REEVE, *Voyage of H. M. S. Samarang*, p. 74, pl. 21, f. 12.
 1855. *Pecten aurantiacus*, REEVE, *Conch. Icon. Vol. 8, Pecten*, sp. 105.
 1888. *Pecten aurantiacus*, KÜSTER and KOBELT, *Syst. Conch. Cab. Vol. 7, pt. 2*, p. 171, pl. 47, f. 7.
 1928. *Pecten (Chlamys) aurantiacus*, YOKOYAMA, *Imp. Geol. Surv. Japan Rep. No. 101*, p. 93, pl. 13, f. 7-8.

Material.—A single right valve and a mould of the right valve from Tōriyama and another right valve from Kizukume. The matrix is tuffaceous sandstone at each locality and the preservation is almost perfect. Homeotype: GK-L 4904.

Measurements.—

| specimen GK-L | locality | length (mm) | height (mm) | depth (mm) | H/L (%) | D/L (%) | apical angle (degrees) | number of the ribs |
|------------------|----------|----------------|----------------|---------------|------------|------------|------------------------------|-----------------------|
| 4853 | Tōriyama | 25.1 | 25.3 | 6.2 | 100.8 | 24.7 | 92 | 17 |
| 4859 | Tōriyama | 32.2 | 30.9 | 6.7 | 95.9 | 20.8 | 93 | 17 |
| 4904 | Kizukume | 23.2 | 24.5 | 5.7 | 102.5 | 23.8 | 94 | 18 |

Remarks.—The quinpartile scaly ribs of about seventeen in number and the comparatively small valves indicate that the present specimens belong to *Gloripallium aurantiacus* (ADAMS and REEVE), which was reported from the Pliocene beds of Formosa and Indonesia and as a living form from Chinese Sea. Judging from the present specimens the species seems to be rather stable in form characters.

1) 宮崎県児湯郡三財村囲

Horizon.—The upper part of the Takanabe member (Lower Pliocene).

Localities.—Tôriyama¹⁾ (MI-5595), Kawaminami mura and Kizukume²⁾ (MI-5793), Tonda mura, Koyu gun, Miyazaki Prefecture.

Genus *Mimachlamys* IREDALE, 1929

(type-species: *Pecten asperimus* LAMARCK by original designation)

Mimachlamys cf. *miniacea* (LAMARCK)

Pl. 13, Fig. 4

1821. *Pecten miniaceus* LAMARCK, *Hist. Nat. Anim. sans Vert.* Vol. 6, p. 177.

1855. *Pecten miniaceus*, REEVE, *Conch. Icon.* Vol. 8, *Pecten*, sp. 86.

1934. *Chlamys miniacea*, HIRASE, *Illust. Handb. Shells*, pl. 12, f. 2.

Material.—Homeotype: GK-L 4477 from the tuffaceous sandstone at Tôriyama. Other imperfect specimens came from the same locality and the sandstone at Tonogôri. Preservation is unfavourable.

Measurements.—

| specimen | length (mm) | height (mm) | depth (mm) | H/L (%) | D/L (%) | apical angle (degrees) | number of the ribs |
|--------------|----------------|----------------|---------------|------------|------------|---------------------------|-----------------------|
| GK-L 4477 | ca 22 | 24.4 | ca 5 | 110 | 23 | 85 | 24 |

Description.—The shell is rather small in size, ovato-trigonal in outline, somewhat higher than long, moderately convex and equilateral. The antero- and postero-dorsal margins are almost straight and equal in length, forming an apical angle of about eighty-five degrees. The surface ornamented with some twenty-four radial ribs. The ribs are regularly spaced, prominent, minutely scaled, and remarkably elevated with the round tops and the almost vertical sides. The interstices are narrower than the ribs and peculiarly excavated. The ears are not known in details.

Remarks.—The present specimens fairly resemble *Mimachlamys miniacea* (LAMARCK) from the southern waters of Japan in their general characters of the shell. However some important characters as the ear are not observed on account of the imperfect preservation. Hereupon I withhold the identification until well preserved additional samples become available.

Horizon.—The Tonogôri and Takanabe member (Uppermost Miocene to Lower Pliocene).

Localities.—Tonogôri³⁾ (MI-4717), Saito City; and Tôriyama⁴⁾ (MI-5595), Kawaminami mura, Koyu gun, Miyazaki Prefecture).

1) 宮崎県児湯郡川南村通山 2) 全郡富田村鬼付女 3) 宮崎県西都市都於郡 4) 全県児湯郡川南村通山

Genus *Cryptopecten* DALL, BARTSCH, and REHDER, 1938(type-species: *Cryptopecten alli* DALL, BARTSCH, and REHDER
by original designation)*Cryptopecten vesiculosus* (DUNKER)

Pl. 12, Fig. 3

1877. *Pecten vesiculosus* DUNKER, *Malak. Blät.* Vol. 24, p. 72.
 1882. *Pecten vesiculosus*, DUNKER, *Index Moll. Mar. Jap.* p. 241, pl. 11, f. 1.
 1920. *Pecten vesiculosus*, YOKOYAMA, *Jour. Coll. Sci. Imp. Univ. Tokyo* Vol. 39, Art. 6, p. 154, pl. 13, f. 13.
 1934. *Chlamys vesiculosus*, HIRASE, *Illust. Handb. Shells*, pl. 12, f. 6.
 1951. *Cryptopecten vesiculosus*, HABE, *Genera of Japanese Shells*, p. 76, f. 156-158.
 1954. *Cryptopecten vesiculosus*, KIRA, *Japan. Shell in Natural Color*, p. 49, f. 1.

Material.—A number of specimens came from the tuffaceous sandstone at Tōriyama and Kizukume and from the fine sandstone at Hagenoshita. Preservation is complete. Homeotype: GK-L 4905.

Measurements.—The measurements of the selected specimens are given below.

| specimen GK-L | locality | length (mm) | height (mm) | depth (mm) | H/L (%) | D/L (%) | apical angle (degrees) | number of the ribs | valve |
|------------------|-------------|----------------|----------------|---------------|------------|------------|------------------------------|-----------------------|-------|
| 4856 | Tōriyama | 12.5 | 12.9 | 3.3 | 103.2 | 26.4 | 93 | 15 | right |
| 4858 | Hagenoshita | 17.5 | 17.5 | 4.4 | 101.7 | 25.1 | 91 | 16 | right |
| 4905 | Kizukume | 19.0 | 18.4 | 4.6 | 96.7 | 24.2 | 93 | 16 | left |

Remarks.—The shell is small and ornamented with about fifteen to sixteen radial ribs. The ribs are distinct and elevated with the steep sides and have the secondary minute riblet on the interspace close to the ribs themselves. These features are characteristic to *Cryptopecten vesiculosus* (DUNKER), which is one of the common species of the Pliocene to recent warm water faunas of our country.

Horizon.—The Takanabe member (Lower Pliocene).

Localities.—Hagenoshita¹⁾ (MI-6351), Uwaye mura; Tōriyama²⁾ (MI-5595), Kawaminami mura and Kizukume³⁾ (MI-5793), Tonda mura, Koyu gun, Miyazaki Prefecture.

Genus *Palliolium* MONTEROSATO, 1884(type-species: *Pecten testae* PHILIPPI by original designation)Subgenus *Delectopecten* STEWART, 1930(type-species: *Pecten* (*Pseudamussium*) *vancouverensis* WHITEAVES
by original designation)*Palliolium* (*Delectopecten*) *peckhami* (GABB)

Pl. 12, Figs. 8 and 9

1) 宮崎県児湯郡上江村元の下 2) 全郡川南村通山 3) 全郡富田村鬼付女

1869. *Pecten peckhami* GABB, *Geol. Surv. Calif. Palaeont. Vol. 2*, pp. 59-60, pl. 16, f. 19-19a.
 1905. *Pecten (Pseudamussium) peckhami*, ARNOLD, *U.S. Geol. Surv. Prof. Pap. No. 47*, p. 56, pl. 3, f. 6-8.
 1925. *Pecten tairanus* YOKOYAMA, *Jour. Coll. Sci. Imp. Univ. Tokyo Vol. 14. Art. 7*, p. 8, pl. 1, f. 8-9.
 1930. *Palliolum (Delectopecten) peckhami*, STEWART, *Acad. Nat. Sci. Philadelphia Spec. Publ. 3*, pp. 119-120, pl. 13, f. 4.
 1932. *Pecten peckhami*, YOKOYAMA, *Imp. Geol. Surv. Japan Rep. No. 111*, p. 14.
 1934. *Pecten (Pseudamussium) peckhami*, OSE, *Jour. Geol. Soc. Tokyo Vol. 41, No. 486*, pp. 125-130.
 1938. *Hyaopecten (Delectopecten) peckhami*, WOODRING, *U.S. Geol. Surv. Prof. Pap. No. 190*, pp. 35-40.
 1954. *Palliolum (Delectopecten) peckhami*, OMORI and UTASHIRO, *Shinseidai-no-kenkyu No. 19*, pp. 21-30, pl. 1-3.
 1957. *Palliolum peckhami*, UTASHIRO, *Sci. Rep. Takada Colledge, Fac. Education, Niigata Univ. No. 1*, pp. 161-174, pl. 1-4.
 1958. *Palliolum peckhami*, UTASHIRO, *Jubilee Publ. Prof. FUJIMOTO's 60th Birthday*, pp. 320-330, pl. 12-14.

Material.—A few specimens were obtained from various localities. They are not perfect in preservation. The matrix is grey hard siltstone at every localities except for Takeuchi, where the bed is characterized by the monotonous silty sandstone. Homeotype: GK-L 4860.

Measurements.—

| specimen GK-L | locality | length (mm) | height (mm) | apical angle (degrees) | length of hinge-line (mm) | valve |
|------------------|----------|----------------|----------------|---------------------------|---------------------------------|-------|
| 4860 | Kaichigo | 9.2 | 9.0 | 103 | — | right |
| 4906 | Hosoye | 6.7 | 6.4 | 98 | 4.7 | right |
| 4907 | Oriuzako | 6.6 | 6.7 | 97 | 5.3 | left |
| 4909 | Takeuchi | 5.1 | 5.0 | 104 | 3.8 | left |

Remarks.—The famous *Palliolum (Delectopecten) peckhami* (GABB) was recently fully discussed by T. UTASHIRO (1957, pp. 161-174, and 1958, pp. 320-330). According to him the specimens from our country are rather variable in form, and the distinction of them from the living species, *P. (D.) macrocheiricola* HABE is rather delicate. However the latter is practically distinguished from the former by its more glassy valves with less distinct concentric undulations.

Horizon.—The top of the Boroishi member, lower part of the Takaoka member, and the middle part of the Kibana subformation (lower Upper Miocene).

Localities.—Takeuchi¹⁾ (MI-X1), Kaichigo²⁾ (MI-2622), and Oriuzako³⁾ (MI-7191), Miyazaki City; and Hosoye⁴⁾ (MI-1413), Ikime mura, Miyazaki gun, Miyazaki Prefecture.

Palliolum (Delectopecten) macrocheiricola HABE

Text-fig. 2

1931. *Palliolum vitreum*, KURODA, *Venus, Vol. 3, No. 1*, p. 81, f. 94-95.

1) 宮崎県宮崎市竹内 2) 全市家一郷 3) 全市折生迫 4) 全県宮崎郡生目村細江

1938. *Delectopecten vitrea*, HIRO, *Ann. Zool. Japan*, Vol. 16, p. 474.

1961. *Palliolium (Delectopecten) macrocheiricola*, HABE, *Genera of Japanese Shells*, p. 80.

Material and Measurements.—Homeotype: GK-L 4908. A single valve came from the tuffaceous sandstone at Kizukume. The ear of the specimen was broken in preparing for photography, though the original preservation is perfect. Length: 4.4 mm.; height: 4.3 mm.; and apical angle: 93 degrees.

Horizon.—The upper part of the Takanabe member (Lower Pliocene).

Locality.—Kizukume¹⁾ (MI-5793), Tonda mura, Koyu gun, Miyazaki Prefecture.

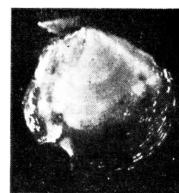


Table 2. *Palliolium macrocheiricola* HABE ($\times 6$), GK-L 4908, Homeotype; loc. Kizukume, Tonda mura, Koyu gun, Miyazaki Prefecture.

Genus *Patinopecten* DALL, 1898

(type-species: *Pecten caurinus* GOULD by original designation)

Patinopecten taiwanus NOMURA

Pl. 12, Figs. 2, 10, and 11, and Pl. 14, Figs. 7 and 15

1933. *Pecten (Patinopecten) taiwanus* NOMURA, *Sci. Rep. Tohoku Imp. Univ. Ser. 2, Vol. 16*, p. 56, pl. 2, f. 5a-5b.

Material.—This species was established by NOMURA on the basis of a single right valve obtained from the Byoritsu bed of Formosa. The type specimen of the original author is extraordinarily small in size for a *Patinopecten* and shows the juvenile feature. The present specimens collected from the Upper Miyazaki group contain the gerontic forms together with the juvenile ones, i.e. a fairly complete growth series. The gerontic and the adult forms among them are seemingly different from the type specimen in having larger shell ornamented with sharper ribs and longer hinge line, however, the juvenile ones quite agree with the type and reasonably identified to it. In other words it is no doubt that the original description was based on a juvenile specimen. To avoid future confusion the revised description of the species is given here. Homeotype: GK-L 4385. All specimens came from the tuffaceous sandstone at Tōriyama.

Measurements.—

| specimen GK-L | length (mm) | height (mm) | depth (mm) | H/L (%) | D/L (%) | apical angle (degrees) | length of hinge-line (mm) | number of the ribs | valve |
|------------------|----------------|----------------|---------------|------------|------------|------------------------------|---------------------------------|-----------------------|-------|
| 4384 | 25.0 | 26.1 | 3.9 | 104.4 | 15.6 | 96 | — | 5 | right |
| 4385 | 36.8 | 36.9 | 5.4 | 100.3 | 14.6 | 93 | 25.7 | 5 | right |
| 4387 | 27.6 | 28.4 | 4.0 | 102.9 | 14.5 | 97 | 21.2 | 5 | right |
| 4388 | 13.1 | 12.8 | 1.5 | 97.7 | 11.4 | 97 | — | 5 | right |
| 4531 | — | 46.9 | 7.3 | — | — | 96 | 31.7 | 5 | right |
| 4692 | 11.8 | 11.5 | 1.2 | 97.4 | 10.2 | 93 | 8.4 | 5 | right |
| 4693 | 35.5 | 34.4 | 4.2 | 96.9 | 11.8 | 99 | — | 5 | right |
| 4910 | 7.3 | 7.4 | 0.7 | 101.3 | 9.6 | 90 | 5.0 | 5 | left |

1) 宮崎県児湯郡富田村鬼付女

Diagnosis.—The shell is medium in size, orbicular in outline, equilateral except for the ear, and slightly inequivalve. The right valve is moderately convex and the left one is rather flat. The height of the shell is almost equal to or slightly larger than the length. The test is rather thin. The antero- and postero-dorsal sides are straight and nearly equal in length and form a apical angle of about ninety-five degrees. The ventral margin is regularly and broadly curved and continues to the dorsal margins with the abrupt curvature. The external surface except for the apical part is sculptured with the prominent radial ribs, the fine incremental lines of growth, and the minute tessellations; the apical part is rather flat and has only the faint lines of growth. The ribs on the right valve are five to six in number, elevated and round in sectional view with rather steep side-walls, and broader than the interstices. They are unequal in size; the central ones are more elevated and more steeply sided than those of the anterior and the posterior part, which, in certain specimens, have a few indistinct riblets on themselves. The interstices are similarly round in sectional view. The ribs on the left valve are as many as those of the right one and roof-shaped, but the ridges are not so sharp except for those of the central part of the disk which represent the middle stage of the growth. The tessellations are very distinctive on the entire surface of the shell except for the ventral part of the full grown shells. The growth lines, on the contrary, are discernible only on the ventral part of the adult shell. The hinge line is straight and long, attaining about seventy percent of the shell-length. The ears are distinctly large, and sculptured with a few weak radial riblets, minute tessellations, and faint growth lines. The anterior one, below which a shallow sinuous notch is provided, is slightly larger than the posterior one. The interior surface of the shell is smooth and undulated corresponding to the exterior ribbing.

Comparison.—The present species is featured by its small shell and the paucity of the ribs. *Patinopecten kimurai tiganouraensis* NAKAMURA (1940, p. 13, pl. 2, f. 5) shows a fairly resembling ribbing, but it is more than two times larger than the largest specimen of the present species and has the smaller ears.

No other forms with similar ribbing has been reported from our country and elsewhere.

Horizon.—The upper part of the Takanabe member (Lower Pliocene).

Locality.—Tôriyama¹⁾ (MI-5595), Kawaminami mura, Koyu gun, Miyazaki Prefecture.

Subfamily Amusiinae THIELE, 1935

Genus *Amusium* RÖDING, 1798

1) 宮崎県兒湯郡川南村通山

(type-species: *Amusium pleuronectus* (LINNÉ) by original designation)

Amusium sp. (n. sp. ?)

Pl. 12, Fig. 6

Material.—A single adult valve and other immature ones from the fossiliferous lens in the thin sandstone intercalated in the thick grey siltstone. Registered specimen: GK-L 4861 and 4862.

Measurements.—

| specimen | length (mm) | height (mm) | H/L (%) | apical angle (degrees) | number of the inner ribs |
|----------|----------------|----------------|------------|---------------------------|-----------------------------|
| GK-L | | | | | |
| 4861 | ca 38 | ca 44 | 116 | 113 | 8 couples |
| 4862 | ca 14 | ca 15 | 107 | 105 | 9 couples |

Description.—The shell is medium in size, circular in outline, perfectly equilateral and remarkably thin. The test is medium in thickness and rather fragile. The antero- and postero-dorsal margins are slightly concave, almost equal in length and making an apical angle of about 113 degrees. The anterior and posterior margins are regularly and broadly rounded and smoothly continuous to the regularly arched ventral margin. The exterior surface is ornamented with the weak but definite incremental lines and faint radial striae. The interior surface except for the apical part has about eight couples of the strong ribs which reach the ventral margin. The anterior and posterior ears are small, equal in size, and their side-margins incline to the umbo. The hinge line is short.

Comparison.—The present species is characterized by its small apical angle, definite concentric lines on the shell surface, and paucity of the interior ribs. The juvenile specimen of *Amusium pleuronectus* (LINNÉ) (1791, *Ostrea* sp. 6, p. 3317) fairly resembles the present species, but the former has still larger apical angle, more obscure growth lines, and a little more numerous interior ribs than the latter.

A. obliteratum (LINNÉ) (1758, *Ostrea*, p. 607=1767, p. 1146) resembles the present species in its appearance from outside, but has much closer interior ribs than the latter.

Horizon.—The Tonogôri member (Uppermost Miocene).

Locality.—Tonogôri¹⁾ (MI-4717), Saito City, Miyazaki Prefecture.

Genus *Parvamussium* SACCO, 1897

(type-species: *Pecten duodecimlamellatus* BRONNIART by original designation)

Subgenus *Parvamussium* SACCO, 1897

Parvamussium (*Parvamussium*) *kyushuense* n. sp.

Pl. 12, Figs. 4, 7; Text-figs. 7, 14

1) 宮崎県西都市都於郡

Material.—Holotype: GK-L 4863, paratypes: GK-L 4708, 4864, 4865, 4866, 4867, 4868, 4869, 4870, and 4871. All specimens came from one and the same locality. The matrix is massive grey sandy siltstone.

Measurements.—

| specimen GK-L | length (mm) | height (mm) | H/L (%) | apical angle (degrees) | number of interior ribs | length of hinge-line (mm) | valve |
|------------------|----------------|----------------|------------|---------------------------|-------------------------------|---------------------------------|-------|
| 4863 | 18.4 | 20.1 | 109.2 | 104 | 8 | 7.8 | right |
| 4865 | 15.5 | ca 16 | 103.2 | 107 | 8 | 6.5 | right |

Diagnosis.—The shell is rather small in size, almost orbicular, a little higher than long, compressed, almost equilateral and inequivalve. The left valve is somewhat larger than the right one and has more produced ventral part which extend to some extent beyond the ventral margin of the left valve. The antero-dorsal margin is slightly excavated and the postero-dorsal one almost straight or slightly convexed. They are almost equal in length and form an angle of about 105 degrees. The anterior, posterior, and ventral margins are regularly and broadly rounded. The exterior sculpture is the very fine incremental lines and the minute and irregular radial striae in the left valve, and the more distinct and regular concentric lines in the right valve.

The interior surface is ornamented with eight radial ribs, which start from the umbonal part and reach about three-quarters from the umbo toward the ventral margin in the left valve and attain near that margin in the right valve. The interior ribs are weak in the young stage and become large and prominent as the shell grows. The hinge line short, about forty percent of the shell-length. The ears are different in size; the anterior one is somewhat larger than the posterior one. The weak but apparent byssal notch is present at the upper part of the antero-dorsal margin where the ear joins the dorsal slope in the right valve.

Comparison.—Comparing with the type species of the genus, the present new species has larger shell with smaller ears and less numerous inner ribs.

Parvamussium (Parvamussium) rubrotinctum OYAMA (1951, p. 81, pl. 13, f. 8-10), a living species in south Japan, agrees with the present species in its size, but has lower shell with more numerous inner ribs and larger apical angle.

P. (P.) maorium DELL (1956, p. 20, f. 30-31) also resembles the present species, but the former has much larger shell with larger anterior ear than the latter.

P. (P.) ina (DAUTZENBERG and BAVAY) (1912, p. 32, pl. 28, f. 18-21) is also an ally, but it has smaller shell with more numerous inner ribs than the present species. Furthermore the right anterior ear of the former is remarkably larger than that of the latter.

P. (P.) spendulum WOODRING (1925, p. 75, pl. 9, f. 3-4) agrees with the new species in its ribbing, but is much smaller in size and stronger in the concentric sculpture of the shell-surface.

Horizon.—The lower part of the Tsuma member (Upper Miocene).

Locality.—Nagano¹⁾ (MI-5109), Mino mura, Koyu gun, Miyazaki Prefecture.

Family Veneridae STOLICZKA, 1879

Subfamily Venerinae STOLICZKA, 1879

Genus *Venus* LINNÉ, 1748

(type-species: *Venus verrucosa* LINNÉ by subsequent designation, GRAY, 1847)

Subgenus *Ventricoloidea* SACCO, 1900

(type-species: *Cytherea multilamella* LAMARCK by original designation)

Venus (Ventricoloidea) foveolata miyazakiensis (SHUTO)

Pl. 14, Figs. 13, 16; Text-figs. 8, 11, 13

1957. *Ventricola foveolata miyazakiensis* SHUTO, *Jour. Geol. Soc. Japan* Vol. 63, No. 745, p. 569, text-fig. 4.

Material.—A number of specimens were collected from various localities, where the present species occurs abundantly with the association of *Paphia*, *Crassatellites*, and *Joannisiella*. The matrix is grey silty sandstone of massive feature at each locality. Holotype: GK-L 4451, paratypes: GK-L 4242, 4248, 4253, 4257, and 4315. Since the detailed description was not offered in the foregoing literature, it is newly given below.

Measurements.—The measurements of the selected specimens are shown in table 1.

Table 1. The measurements of the selected specimens of
Venus (Ventricoloidea) foveolata miyazakiensis (SHUTO)

| specimen GK-L | locality | length (mm) | height (mm) | depth (mm) | H/L (%) | D/L (%) | umbonal angle (degrees) | valve |
|------------------|----------|----------------|----------------|---------------|------------|------------|-------------------------------|-----------|
| 4241 | Yanaze | 31.4 | 25.0 | 6.7 | 79.6 | 21.3 | 117 | right |
| 4242** | Akatani | 22.0 | 16.3 | 4.8 | 74.2 | 21.9 | 126 | right |
| 4243 | Akatani | 28.3 | 24.7 | 6.4 | 93.9 | 20.6 | 110 | right |
| 4244 | Akatani | 22.1 | 18.6 | 4.1 | 84.2 | 18.5 | 112 | right |
| 4248** | Yanaze | 34.6 | 27.8 | 7.5 | 80.4 | 21.7 | 119 | conjoined |
| 4249 | Akatani | 32.6 | 27.1 | 7.6 | 83.0 | 23.3 | 110 | right |
| 4250 | Akatani | 34.8 | 28.7 | 7.3 | 82.4 | 21.0 | 109 | conjoined |
| 4252 | Akatani | 34.7 | 26.8 | 7.5 | 70.4 | 20.4 | 119 | left |
| 4253** | Akatani | 34.5 | 30.8 | 7.5 | 95.3 | 20.7 | 109 | right |
| 4254 | Kanno | 38.3 | 31.3 | 7.4 | 80.7 | 19.0 | 112 | left |
| 4255 | Kanno | 36.1 | 31.3 | 8.2 | 92.2 | 22.7 | 119 | right |
| 4257** | Kanno | 47.7 | 38.0 | 9.8 | 79.5 | 20.6 | 116 | conjoined |
| 4258 | Akatani | 19.2 | 16.5 | 4.7 | 92.9 | 25.9 | 109 | left |
| 4315** | Haigano | 30.3 | 24.4 | 7.3 | 80.1 | 24.1 | 116 | conjoined |

1) 宮崎県児湯郡三納村永野

| | | | | | | | | |
|-------|---------|------|------|-----|------|------|-----|-----------|
| 4318 | Haigano | 31.0 | 28.5 | 8.9 | 91.9 | 28.7 | 103 | right |
| 4321 | Haigano | 27.4 | 24.7 | 6.4 | 90.3 | 23.4 | 115 | left |
| 4324 | Haigano | 14.0 | 11.9 | 3.4 | 85.0 | 24.3 | 121 | left |
| 4355 | Haigano | 29.3 | 27.3 | 7.1 | 93.2 | 24.2 | 106 | conjoined |
| 4356 | Haigano | 27.3 | 23.8 | 6.2 | 87.3 | 22.7 | 104 | left |
| 4451* | Kanno | 35.3 | 28.7 | 8.4 | 81.4 | 23.8 | 115 | right |
| 4478 | Akatani | 39.0 | 32.8 | 9.7 | 87.1 | 24.9 | 115 | conjoined |

* Holotype ** Paratypes

Diagnosis.—The shell is medium in size, moderately convex, ovate in outline and inequilateral. The test is rather thick. The antero-dorsal margin is concave and much shorter than the postero-dorsal margin, which is almost straight or slightly convex. The dorsal margins form the umbonal angle of about 110-120 degrees. The anterior margin is narrowly rounded and smoothly continues to both the antero-dorsal and the ventral margin; on the contrary, the posterior margin is short, and almost vertical and continues to the postero-dorsal margin through an blunt angle and to the broadly rounded ventral margin through a narrow curvature. The umbo is rather small but prominent, acute, prosogyrate, and situated at the anterior two-fifths to one-fourth. The lunule is cordate, rather elongated, bounded by a deep incised groove on each side, and somewhat elevated at the middle part. The escutcheon is lanceolate, distinct, and bounded by an angular ridges. The surface of the shell is ornamented with the regularly spaced concentric lamellae. On the space between each lamella there are a few fine concentric lines of growth. The interior margin is finely crenulated. The hinge plate is rather heavy with three cardinal teeth, of which the anterior one is small and greatly oblique, the middle is strong and nearly vertical, and the posterior one is prominent, long, and oblique. The anterior lateral tooth is small. The adductor muscle impressions are almost equal in size and distinct, of which the anterior one is deep and pear-shaped and the posterior one shallow and circular. The pallial sinus is small, shallow, and triangular.

Remarks and comparison.—RÖMER established the genus *Ventricola* in 1867 without indication of a type. Many authors adopted DALL's citation of *Venus rugosa* GMELIN 1790 (= *V. rigida* DILWYN, 1817) for the type, but before his citation KOBELT designated *Venus verrucosa* LINNÉ for the type in 1881. Whereas the last mentioned species is the type of *Venus* LINNÉ 1758 itself. In other words, *Ventricola* RÖMER 1867 is a synonym of *Venus* LINNÉ 1758. KEEN established *Ventricolaria* in 1954 on the basis of *Venus rigida* LINNÉ for the type which is "*Ventricola*" of DALL and other authors, not of RÖMER. This genus has the faint radial striae sometimes. However the Japanese species which has been included in "*Ventricola*" by many authors has no radial striae, and consequently it should be placed in *Venus* (*Ventricoloidea*) SACCO 1900 as was indicated by KEEN.

The present subspecies differs from SOWERBY'S species chiefly in having more straight postero-dorsal margin and lower shell and in the convexity of the shell which is almost equal in the young stage of growth in both two forms and becomes less convex in the adult in the present subspecies.

V. (*Ventricoloidea*) *faveolata cassinaeformis* (YOKOYAMA) (1926, p. 352, pl. 39, f. 7), which has been reported occasionally from the Lower Pliocene beds of the Pacific side of southwest Japan and Formosa, is distinguished from the present subspecies in having the higher shell, more circular outline with roundly convexed postero-dorsal margin.

The present subspecies occurs abundantly from Aya and Tano area and show considerably wide range of variation in form. The comparison of the populations from both areas reveals that the specimens from Aya area have generally larger, longer, and shallower shells than those from Tano area. The standard dimensions and ratios are following.

| population | standard length (mm) | H/L (%) | D/L (%) |
|------------|-------------------------|------------|------------|
| Aya | 34-40 | 79-84 | 20-22 |
| Tano | 22-23 | 85-92 | 24 |

Besides the dimensions any other difference is seen between the specimen groups of two areas.

Horizon.—The Tano and Kawabaru members (Upper Miocene).

Localities.—Kagamisu pass¹⁾ (MI-2610), Kiyotake macni; Haigano²⁾ (MI-1434), Tano machi, Miyazaki gun; Oyamada³⁾ (MI-3592), Akatani⁴⁾ (MI-770), Kano⁵⁾ (MI-157), and Yanaze⁶⁾ (MI-746), Takoka machi, Higashi-morogata gun; Yamaji⁷⁾ (MI-5061'), Mino mura, Koyu gun, Miyazaki Prefecture.

Subfamily Pitarinae STEWART, 1930

Genus *Callista* POLI, 1791

(type-species: *Venus chione* LINNÉ by subsequent designation, MEEK, 1876)

Subgenus *Callista* POLI, 1791

Callista (*Callista*) *chinensis* (HOLTEN)

Pl. 13, Fig. 2

1855. *Cytherea sinensis*, SOWERBY, *Thes. Conch. Vol. 2*, p. 624, pl. 131, f. 79-80.

1864. *Dione chinensis*, REEVE, *Conch. Icon. Vol. 14*, *Dione*, sp. 4.

1869. *Cytherea chinensis*, PFEIFFER, *Syst. Conch. Cab. in MARTINI and CHEMNITZ, Vol. 11, Pt. 1*, Veneridae p. 31, pl. 11, f. 2.

1869. *Cytherea chinensis*, LISCHKE, *Jap. Meer. Conch., Vol. 1*, p. 122.

- 1) 宮崎県宮崎郡清武町鏡洲峠 2) 全郡田野町灰ヶ野 3) 全県東諸県郡高岡町小山田
4) 全町赤谷 5) 全町狩野 6) 全町梁瀬 7) 全県兒湯郡三納村山路

1882. *Callista chinensis*, DUNKER, *Index Moll. Mar. Jap.*, p. 200.
 1895. *Meretrix (Callista) chinensis*, PILSBRY, *Cat. Mar. Moll. Japan*, p. 127.
 1920. *Meretrix (Callista) chinensis*, YOKOYAMA, *Jour. Coll. Sci. Imp. Univ. Tokyo*, Vol. 39, Art. 6, p. 120, pl. 8, f. 9-10.
 1928. *Meretrix (Macrocallista) ezoensis*, YOKOYAMA, *Imp. Geol. Surv. Japan Rep. No. 101*, pp. 77-78, pl. 8, f. 1.
 1934. *Callista chinensis*, HIRASE, *Illust. Handb. Shells*, pl. 34, f. 7.
 1935. *Callista pacifica*, OTUKA, *Earthq. Res. Inst. Bull. Vol. 14*, p. 895, pl. 16, f. 181.
 1951. *Callista chinensis*, OYAMA, *Mineralogy and Geology*, Vol. 3, No. 6, p. 227.
 1954. *Callista chinensis*, KIRA, *Japan. Shells in Natural Color*, p. 112, pl. 56, f. 3.

Material.—A number of specimens came from various localities, where the matrix of the fossils is grey silty sandstone. Preservation is generally perfect. Homeotype: GK-L 4376.

Measurements.—The measurements of a few selected specimens, containing a growth series, are given bellow.

| specimen GK-L | locality | length (mm) | height (mm) | depth (mm) | H/L (%) | D/L (%) | valve |
|------------------|----------|----------------|----------------|---------------|------------|------------|-------|
| 4376 | Tôriyama | 71.4 | 48.9 | 18.1 | 68.4 | 25.3 | left |
| 4377 | Tôriyama | 59.3 | 39.6 | — | 66.8 | — | left |
| 4378 | Tôriyama | 49.7 | 34.3 | 12.6 | 69.0 | 25.3 | left |

Remarks.—The present specimens from the Miyazaki group slightly differ from the living species in our country in the more convexed postero-dorsal margin than the latter. However except for this slight difference the former quite agrees with the latter.

Horizon.—The Kawabaru and Takanabe member (Upper Miocene to Lower Pliocene).

Localities.—Kugino¹⁾ (MI-550), Aya machi; Nakabyu²⁾ (MI-513), Yatsushiro mura, Higashi-morogata gun; Azukino³⁾ (MI-4862), Sanzai mura; Tôriyama⁴⁾ (MI-5595), Kawaminami mura; Tonogôri⁵⁾ (MI-4717), Saito City, Miyazaki Prefecture.

Callista (Callista) roscida (GOULD)

Pl. 14, Fig. 12

1861. *Cytherea roscida* GOULD, *Proc. Boston Soc. Nat. Hist.*, Vol. 8, p. 28.
 1934. *Callista roscida*, HIRASE, *Illust. Handb. Shells*, pl. 34, f. 6.
 1951. *Callista (Callista) roscida*, HABE, *Genera of Japanese Shells*, p. 164.

Material.—A single but perfectly preserved right valve came from the very fine sandstone at Yamaji with the association of large molluscan assemblage. Homeotype: GK-L 4920.

Measurements.—

1) 宮崎県東諸県郡綾町久野木 2) 全郡八代村中別府 3) 全県兒湯郡三財村小豆野 4) 全郡川南村通山 5) 全県西都市都於郡

| specimen | length | height | depth | H/L | D/L |
|----------|--------|--------|-------|------|------|
| GK-L | (mm) | (mm) | (mm) | (%) | (%) |
| 4920 | 6.1 | 4.9 | 1.1 | 80.3 | 18.0 |

Remarks.—The present species is a sand dweller in the warm waters surrounding south Japan at the depth of some twenty to thirty meters. Though it is not a rare element in the recent warm faunas, it has scarcely been reported from the Pliocene beds of our country and its adjacent areas. This fact may, be explained by the following evidence. The species has very small valves and dwells on the clean fine sand bottom, where the current and wave action are apt to sweep away the light materials. The present specimen was collected from the fine sand bed quite resembles the living environment of it.

Horizon.—Lower part of the Tsuma member (Upper Miocene).

Locality.—Yamaji¹⁾ (MI-5061'), Mino mura, Koyu gun, Miyazaki Prefecture.

Genus *Pitar* RÖMER, 1857

(type-species: *Cytherea tumens* GMELIN by monotypy)

Subgenus *Pitarina* JUKES-BROWNE, 1913

(type-species: *Cytherea citrina* LAMARCK by original designation)

Pitar (*Pitarina*) cf. *sulfurea* PILSBRY

Pl. 14, Fig. 2

1904. *Pitar sulfurea* PILSBRY, *Proc. Acad. Nat. Sci. Philad.*, Vol. 56, p. 553, pl. 39, f. 7-9.

1934. *Pitar sulfurea*, HIRASE, *Illust. Handb. Shells*, pl. 34, f. 5.

1951. *Pitar* (*Pitarina*) *sulfurea*, HABE, *Genera of Japanese Shells*, p. 162.

Material.—A single right valve from the grey silty sandstone. Preservation is not perfect. Homeotype: GK-L 4472.

Measurements.—Length: 21.7 mm., height: 19.0 mm., and depth: 6.2 mm. in the Homeotype.

Remarks.—Among the living species of *Pitar*, *Pitarina sulfurea* from the seas surrounding Okinawa Islands is the closest ally to the present species. However the two slightly differ in the following aspects. The present specimen has somewhat higher shell with smaller umbonal angle, more straight postero-dorsal margin, and more convexed ventral curvature. Unfortunately the hinge is not observed on my fossil specimen because of the unsuitable preservation. Under these situation I hold the identification as tentative.

Horizon.—The Tano member (Lower Upper Miocene).

Locality.—Akatani²⁾ (MI-770), Takaoka machi, Higashi-morogata gun, Miyazaki Prefecture.

1) 宮崎県児湯郡三納村山路 2) 宮崎県東諸県郡高岡町赤谷

Pitar (Pitarina) dohrni (RÖMER)

Pl. 14, Figs. 4, 9; Text-fig. 3-B

1869. *Cytherea dohrni* RÖMER, *Monographie der Molluskengattung Venus* LINNÉ, Bd. 1, *Cytherea*, p. 100, pl. 27, f. 3.

Material.—The available sample contain a few conjoined valves and other imperfect ones. Whole specimens came from one and the same locality, where the matrix of the fossils is grey silty sandstone with the association of *Crassatellites*, *Paphia*, *Ventriloloidea*, and other pelecypod genera. Homeotype: GK-L 4405.

Measurements.—The measurements of the selected specimens are given below.

| specimen | length (mm) | height (mm) | depth (mm) | H/L (%) | D/L (%) | valve |
|----------|----------------|----------------|---------------|------------|------------|-----------|
| GK-L | | | | | | |
| 4405 | 28.2 | 19.9 | 6.4 | 67.7 | 22.7 | right |
| 4409 | 22.3 | 15.4 | 5.7 | 69.0 | 25.5 | conjoined |

Remarks.—*Pitar (Pitarina) dohrni* (RÖMER) is living in the Indian Ocean, and its type specimen figured by the original author is somewhat larger than the present specimens with the dimensions L=29 mm., H=23 mm., and D=15 mm. and has slightly shorter postero-dorsal margin.

P. (P.) pudica (MENKE) (RÖMER, 1869, p. 110, pl. 30, f. 1 reproduced from MENKE's original figure) is also an ally to the present specimens, but the former is still larger with the dimensions L=34 mm., H=28 mm., and D=18 mm. and has higher shells than the latter. The present specimens agree more closely with *P. (P.) dohrni* than with *P. (P.) pudica*.

Horizon.—The Tano member (lower Upper Miocene).

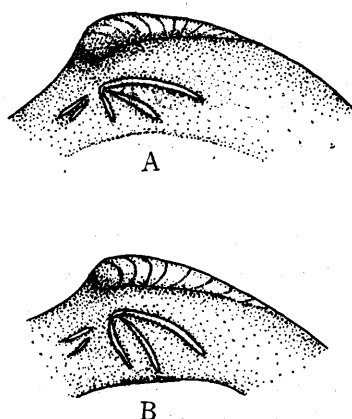
Locality.—Akatani¹⁾ (MI-770), Takaoka machi, Higashi-morogata gun, Miyazaki Prefecture.

Pitar (Pitarina) pellucida (LAMARCK)

Pl. 13, Fig. 6

1818. *Cytherea pellucida* LAMARCK, *Anim. s. Vert.*, Vol. 5, p. 571.
 1864. *Dione pellucida*, REEVE, *Conch. Icon.*, Vol. 14, *Dione*, sp. 48.
 1934. *Pitar pellucida*, HIRASE, *Illust. Handb. Shells*, pl. 35, f. 6.
 1951. *Pitar (Pitarina) pellucida*, HABE, *Genera of Japanese Shells*, p. 162.
 1954. *Pitar (Pitarina) pellucida*, KIRA, *Japanese Shells in Natural Color*, p. 115, pl. 57, f. 9.

1) 宮崎県東諸県郡高岡町赤谷



Text-fig. 3. Hinge plate of two species of *Pitarina* from the Miyazaki group.

A—*Pitar (Pitarina) semeliformis* n. sp.
 B—*Pitar (Pitarina) dohrni* (RÖMER)

Material.—Perfectly preserved single left valve collected from the fossiliferous nodules in the monotonous silty sandstone. Homeotype: GK-L 4915.

Measurements.—

| specimen | length (mm) | height (mm) | depth (mm) | H/L (%) | D/L (%) | valve |
|--------------|----------------|----------------|---------------|------------|------------|-------|
| GK-L 4915 | 23.6 | 18.0 | 8.1 | 76.3 | 34.3 | left |

Remarks.—The present specimen fairly agrees with the living form in the sea of Okinawa except for the slight difference that the former has somewhat smaller shell and slightly broader posterior end. However such a slight difference as this is not considered to be valid criterion to separate the species. The figured specimen is naturally included within the normal range of the variation of the species.

Horizon.—The Kawabaru member (Upper Miocene).

Locality.—Azukino¹⁾ (MI-4862), Sanzai mura, Koyu gun, Miyazaki Prefecture.

Pitar (Pitarina) semeliformis n. sp.

Pl. 14, Figs. 1, 3; Text-fig. 3-A

Material.—A few specimens, containing the conjoined and separated valves, were obtained from the grey silty sandstone at Akatani. The preservation is rather suitable but the shell material is partly removed. Holotype: GK-L 4469, paratypes: 4468, and 4470.

Measurements.—

| specimen | length (mm) | height (mm) | depth (mm) | H/L (%) | D/L (%) | valve |
|--------------|----------------|----------------|---------------|------------|------------|-----------|
| GK-L 4468 | 22.7 | 16.4 | 5.4 | 71.8 | 23.4 | conjoined |
| 4469 | 22.3 | 17.9 | 6.8 | 80.3 | 30.5 | right |
| 4470 | 24.5 | 18.6 | 6.4 | 75.9 | 26.1 | right |

Diagnosis.—The shell is moderately small in size, ovate in outline, moderately convex, and markedly inequilateral. The test is thin. The length of the shell is much larger than the height. The umbo is prominent, prosogyrate, and situated at three-fifths of the shell-length from the anterior end. The antero-dorsal margin deeply concave and much longer than the gently arcuated postero-dorsal one. The anterior and posterior ends are narrowly curved and continue to the broadly curved ventral margin without any discontinuity. The lunule is distinct, lanceolate, and rather large but is not bounded by any distinct ridge. The escutcheon is absent. The surface is ornamented by the fine and regular concentric lines of growth. The interior margin of the venter is smooth. The hinge plate is moderately small with three cardinals and the anterior lateral tooth. On the left valve the posterior cardinal tooth is largest, arcuate, and almost horizontal starting just below the

1) 宮崎県児湯郡三財村小豆野

prodissoconch. The middle cardinal is somewhat smaller than the posterior and oblique with the angle of about thirty-five degrees to it. The anterior one is smallest, least oblique, and fused at the base with the posterior one as indicated in Text-fig. 3-A. The anterior lateral one is small and slightly apart from the cardinals. The pallial lines and the muscle impressions are not known.

Comparison.—The present species must have had thin shells and have easily been deformed, because the valves are more or less deformed though the associated pelecypod species are obtained in almost undeformed state. The present species, inspite of its *Semele*-like form, is provided with true *Pitarina* dentition. Among the species of *Pitarina* no form has been known with such peculiar shape as the present one. It is considered a distinct new species.

Horizon.—The Tano member (lower Upper Miocene).

Locality.—Akatan¹⁾ (MI-770), Takaoka machi, Higashi-morogata gun, Miyazaki Prefecture.

Subgenus *Agriopoma* DALL, 1902

(type-species: *Meretrix texasiana* DALL by monotypy)

Pitar (*Agriopoma*) sp.

Pl. 14, Fig. 6

Material.—Moderately favourable left valve was obtained from the coarse sand bearing fine sandstone. Registered specimen: GK-L 4474.

Measurements.—Length: 14.1 mm., height: 9.0 mm., and depth: 33 mm.

Description.—The shell is small in size, roundly triangular in outline, moderately convexed, and almost equilateral. The antero-dorsal margin is remarkably concave just below the umbo and almost equal in length with rather the straight postero-dorsal one. The two dorsal margins form the apical angle of about 120 degrees. The umbo is moderately prominent, prosogyrate, and situated slightly anterior of the middle of the shell-length from the anterior end. The anterior margin is narrowly rounded and smoothly continues without any angulation to the broadly curved ventral margin. The posterior margin is subtruncated. A blunt ridge runs from the umbo towards the postero-ventral corner. The lunule is small but rather deep and elongatedly cordate bounded by the blunt ridge. The escutcheon is very narrow and long, but its boundary is not distinct. The surface of the shell is ornamented by the weak and numerous concentric lines of growth. They are regularly and similarly spaced throughout the entire surface. The hinge plate is provided with the fused cardinals, but the details is unknown because of the unsuitable preservation.

Remarks.—The general character indicates that the specimen belongs to the

1) 宮崎県東諸県郡高岡町赤谷

genus *Agriopoma* DALL 1902. The present specimen shows the resemblance in certain degrees with *P. (A.) japonica* KURODA, living in our country, but the latter is much larger and somewhat higher than the former.

Horizon.—The lower part of the Tano member (upper Middle Miocene).

Locality.—Mokudo¹⁾ (MI-437), Aya machi, Higashi-morogata gun, Miyazaki Prefecture.

Subfamily Dosiniinae H. and A. ADAMS, 1858

Genus *Dosinia* SCOPOLI, 1777

(type-species: *Dosinia africana* HANLEY by subsequent designation, DALL, 1902)

Subgenus *Phacosoma* JUKES-BROWNE, 1912

(type species: *Artemis japonica* REEVE by original designation)

Dosinia (Phacosoma) troscheli (LISCHKE)

Pl. 13, Fig. 1

1873. *Dosinia troscheli* LISCHKE, *Malak. Blät.* Vol. 21, p. 24.
 1874. *Dosinia troscheli*, LISCHKE, *Jap. Meeres Conch.* Bd. 3, p. 89, pl. 8, f. 1-3.
 1882. *Dosinia troscheli*, DUNKER, *Index Moll. Mar. Jap.* p. 203.
 1951. *Dosinia (Phacosoma) troscheli*, HABE, *Genera of Japanese Shells*, p. 169.
 1954. *Dosinia (Phacosoma) troscheli*, KIRA, *Japanese Shells in Natural Color*, p. 112, pl. 56, f. 6.

Material.—A number of the specimens came from the tuffaceous silty sandstone at Tōriyama and Kizukume. Preservation is favourable. Homeotype: GK-L 4379.

Measurements.—The measurements of the selected specimens are given below.

| Specimen | locality | length (mm) | height (mm) | depth (mm) | H/L (%) | D/L (%) | umbonal angle (degrees) | valve |
|----------|----------|----------------|----------------|---------------|------------|------------|----------------------------|-------|
| GK-L | | | | | | | | |
| 4379 | Tōriyama | 49.6 | 44.0 | 7.7 | 88.7 | 15.9 | 123 | right |
| 4475 | Tōriyama | 29.5 | 25.1 | 4.6 | 85.1 | 15.6 | 120 | left |

Horizon.—The Takanabe member (Lower Pliocene).

Localities.—Tōriyama²⁾ (MI-5595), Kawaminami mura; and Kizukume³⁾ (MI-5793), Tonda mura, Koyu gun, Miyazaki Prefecture.

Dosinia (Phacosoma) nomurai (OTUKA)

Pl. 14, Fig. 10

1934. *Dosinia japonica nomurai* OTUKA, *Bull. Earthq. Res. Inst.* Vol. 12, p. 618, pl. 48, f. 54.
 1935. *Dosinia nomurai*, NOMURA, *Saito Hoon-kai Mus. Res. Bull.*, No. 6, p. 217, pl. 17, f. 7.
 1937. *Dosinia japonica nomurai*, OTUKA, *Japan. Jour. Geol. Geogr.* Vol. 14, Nos. 1-2, p. 29, pl. 3, f. 3-4.
 1937. *Dosinia nomurai*, NOMURA and HATAI, *Saito Hoon-kai Mus. Res. Bull.* No. 13, p. 136, pl. 19, f. 6.

1) 宮崎県東諸県郡綾町李道 2) 全県兒湯郡川南村通山 3) 全郡富田村鬼付女

Material.—A few imperfect specimens came from the lower fossil beds of the Miyazaki group. Though each specimen is imperfect, the total features are available for the identification. Homeotype: GK-L 4458.

Measurements.—

| specimen GK-L | locality | length (mm) | height (mm) | depth (mm) | H/L (%) | D/L (%) | umbonal angle (degrees) | valve |
|------------------|----------|----------------|----------------|---------------|------------|------------|----------------------------|-----------|
| 4458 | Nakabyu | ca 47 | ca 45 | ca 9 | 96 | 19 | 108 | right |
| 4459 | Yamaji | — | ca 49.5 | — | — | — | 97 | left |
| 4916 | Tonogori | ca 47 | ca 46 | ca 8 | 98 | 17 | — | conjoined |

Remarks.—All the specimens are more or less imperfect, but show the characteristics of *D. (P.) nomurai* such as smaller size, smaller umbonal angle, more convexed postero-dorsal margin, and thicker test than *D. (P.) japonica* (REEVE). Besides the morphologic difference the ecology of *nomurai* seems to differ from that of *japonica*, that is to say, it must have dwelled on the deeper bottom than the latter as is surmised on the basis of the associated molluscan species.

Horizon.—The Kawabaru member (Upper Miocene).

Localities.—Azukino¹⁾ (MI-4862), Sanzai mura; Yamaji²⁾ (MI-5061'), Mino mura, Koyu gun; and Nakabyu³⁾ (MI-513), Yatsushiro mura, Higashi-morogate gun, Miyazaki Prefecture.

Subgenus *Dosinorbis* DALL, 1902

(type species: *Artemis bilunulata* GRAY by original designation)

Dosinia (Dosinorbis) bilunulata (GRAY)

Pl. 13, Fig. 3

1838. *Artemis bilunulata* GRAY, *Analyst. Quart. Jour. Pt. 24*, p. 309.
 1851. *Artemis bilunulata*, REEVE, *Conch. Icon.*, Vol. 6, *Artemis*, sp. 22.
 1882. *Dosinia bilunulata*, DUNKER, *Index Moll. Mar. Jap.*, p. 203.
 1934. *Dosinia bilunulata*, HIRASE, *Illust. Handb. Shells*, pl. 32, f. 1.
 1951. *Dosinia (Dosinorbis) bilunulata*, HABE, *Genera of Japanese Shells*, p. 168, f. 385.
 1954. *Dosinia (Dosinorbis) bilunulata*, KIRA, *Japanese Shells in Natural Color*, p. 112, pl. 56, f. 8.

Material.—A few juvenile specimens were obtained from the tuffaceous sandstone at Tōriyama. Preservation is moderately favourable. Homeotype: GK-L 4465.

Measurements.—

| specimen GK-L | length (mm) | height (mm) | depth (mm) | H/L (%) | D/L (%) | umbonal angle (degrees) | valve |
|------------------|----------------|----------------|---------------|------------|------------|----------------------------|-------|
| 4461 | ca 36 | ca 31 | — | 86.0 | — | 103 | right |
| 4465 | 25.1 | 21.8 | 4.4 | 86.8 | 15.9 | 113 | right |

Horizon.—The upper part of the Takanabe member (Lower Pliocene).

1) 宮崎県児湯郡三財野村小豆野 2) 全郡三納野村山路 3) 全県東諸県郡八代村中別府

Locality.—Tôriyama¹⁾ (MI-5595), Kawaminami mura, Koyu gun, Miyazaki Prefecture.

Subgenus *Bonartemis* IREDALE, 1929

(type-species: *Bonartemis stabilis* IREDALE by original designation)

Dosinia (*Bonartemis*) cf. *suketoensis* (OTUKA)

Pl. 14, Figs. 5, 11

1938. *Dosinia suketoensis* OTUKA, *Jour. Fac. Sci. Imp. Univ. Tokyo, Sec. 2, Vol. 5, Pt. 2*, p. 31, pl. 1, f. 6, 7, and 9.

Material.—A few specimens came from the calcareous silty sandstone at Waritsuke. Preservation is not perfect and the shell substance is partly removed. Homeotype: GK-4589.

Measurements.—

| specimen | length (mm) | height (mm) | depth (mm) | H/L (%) | D/L (%) | valve |
|----------|----------------|----------------|---------------|------------|------------|-------|
| GK-L | | | | | | |
| 4527 | 17.6 | 17.3 | 3.5 | 98.3 | 19.9 | right |
| 4589 | 15.1 | 14.9 | 3.6 | 98.6 | 23.8 | left |

Remarks.—*Dosinia suketoensis* is characterized by its solid, rather swollen and moderately small shell, the narrowly curved postero-dorsal margin, and the lamellate concentric sculpture. These features are the characteristics of *Bonartemis* IREDALE 1929. The present specimens quite resemble OTUKA's species in these respects except for the concentric lamellae, which are not scrutinized on account of unsuitable preservation of the fossil specimens.

Horizon.—The Tano member (lower Upper Miocene).

Locality.—Waritsuke²⁾ (MI-671), Aya machi, Higashi-morogata gun, Miyazaki Prefecture.

Genus *Kaneharaia* MAKIYAMA, 1936

(type-species: *Dosinia kaneharai* YOKOYAMA by original designation)

Kaneharaia kaneharai YOKOYAMA

Text-fig. 4

1926. *Dosinia kaneharai* YOKOYAMA, *Jour. Fac. Sci. Imp. Univ. Tokyo, Sec. 2, Vol. 1, Pt. 4*, p. 133, pl. 17, f. 4-5; pl. 18, f. 2.
 1935. *Dosinia kaneharai*, NOMURA, *Saito Hoon-kai Mus. Res. Bull. No. 5*, p. 83, pl. 3, f. 6-8.
 1936. *Dosinia kaneharai*, NOMURA and HATAI, *ibid*, No. 10, p. 128, pl. 14, f. 2.
 1936. *Dosinia kaneharai*, NOMURA and JIMBO, *ibid*, No. 10, p. 339, pl. 20, f. 1.
 1936. *Dosinia* (*Kaneharaia*) *kaneharai*, MAKIYAMA, *Mem. Coll. Sci. Kyoto Imp. Univ. Ser. B, Vol. 2, No. 4, Art. 8*, pp. 213-214, pl. 4, f. 2.

1) 宮崎県児湯郡川南村通山 2) 全県東諸県郡綾町割付

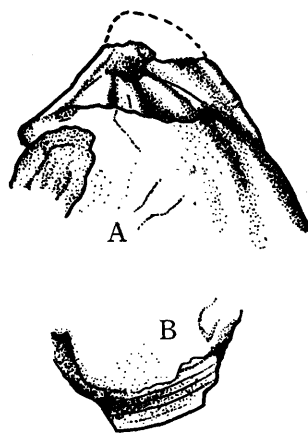
1936. *Dosinia kaneharai*, OTUKA, *Bull. Earthq. Res. Inst.*, Vol. 14, Pt. 3, p. 443, pl. 30, f. 3.
 1940. *Dosinia kaneharai*, NOMURA and ONISI, *Japan. Jour. Geol. Geogr.*, Vol. 17, Nos. 3-4, p. 183, pl. 17, f. 2-7.
 1940. *Dosinia kaneharai*, NOMURA, *Sci. Rep. Tohoku Imp. Univ.*, Ser. B, Geology, Vol. 21, No. 1, p. 26, pl. 1, f. 15-16.
 1951. *Kaneharaia kaneharai*, HABE, *Genera of Japanese Shells*, p. 170.
 1955. *Dosinia (Kaneharaia) kaneharai*, KANNO, *Trans. Proc. Palaeont. Soc. Japan*, N.S. No. 19, p. 82, pl. 13, f. 7a-7b.

Material and Measurements.—Imperfect conjoined valves came from the fine sandstone bed at Takeuchi. The shell material is almost removed. Homeotype: GK-L 4921. Diameter of the valve is about sixty mm. and the depth of the valve is about fourteen mm.

Remarks.—*Kaneharaia kaneharai* (YOKOYAMA) is said to have the prominent umbo and the concentric cords with narrow furrows on the shell surface. The present specimen, though imperfect in preservation, apparently show these characteristic features.

Horizon.—The lower part of the Boroishi member (upper Middle Miocene).

Locality.—Takeuchi¹⁾ (MI-X1), Miyazaki City, Miyazaki Prefecture.



Text-fig. 4. *Kaneharaia kaneharai* (YOKOYAMA)

A—hinge part of the conjoined valve (GK-L 4921, loc. Takeuchi, Miyazaki City)

B—ventral part showing the concentric cords; same specimen as A

Subfamily Clementiinae FRIZZELL, 1936

Genus *Clementia* (GRAY), 1847

(type-species: *Venus papyracea* GRAY by original designation)

Clementia papyracea (GRAY)

Pl. 13, Figs. 8, 11; Text-figs. 5, 6, 9

1825. *Venus papyracea* GRAY, *Ann. Philosophy, New Ser.* Vol. 9, p. 137.
 1847. *Clementia papyracea*, GRAY, *Proc. Zool. Soc. London*, 1847, p. 184.
 1855. *Venus papyracea*, SOWERBY, *Thes. Conch.* Vol. 2, p. 700, pl. 151, f. 155.
 1879-1880. *Clementia papyracea*, MARTIN, *Tertiärsch. auf Java*, pp. 99-100, pl. 17, f. 6, 6a.
 1913. *Clementia papyracea*, JUKES-BROWNE, *Ann. Mag. Nat. Hist. Ser. 8, Vol. 12*, p. 61, pl. 1, f. 3-4.
 1913. *Clementia papyracea*, SMITH, *Philippine Jour. Sci.* Vol. 8, Sec. A, p. 272, pl. 8, f. 3.

Material.—Abundant specimens came from the various localities of the lower part and the uppermost part of the Miyazaki group, but the greater number of

1) 宮崎県宮崎市竹内

them are more or less deformed on account of the fragility of their thin valves. However a few examples are excellently perfect to enable the identification. The matrix is muddy fine sandstone to sandy mudstone of grey color and the shells are found sporadically in the bed. The conjoined valves are common. Homeotype: GK-L 4540.

Measurements.—Shown in table 2.

Table 2. The measurements of the selected specimens of
Clementia papyracea (GRAY)

| specimen GK-L | locality | length (mm) | height (mm) | depth (mm) | H/L (%) | D/L (%) | umbonal angle (degrees) | valve |
|------------------|---------------|----------------|----------------|---------------|------------|------------|-------------------------------|-----------|
| 4337 | Haigano | 42.4 | 32.9 | 13.2 | 77.4 | 31.1 | 100 | conjoined |
| 4338 | Haigano | 35.2 | 31.9 | 11.2 | 90.5 | 31.8 | 98 | right |
| 4439 | Haigano | 25.1 | 19.7 | 7.3 | 78.3 | 29.1 | 118 | right |
| 4341 | Haigano | 49.4 | 37.9 | 14.9 | 76.7 | 30.2 | 99 | left |
| 4346 | Haigano | 34.2 | 29.2 | 9.5 | 85.4 | 27.7 | 102 | conjoined |
| 4351 | Haigano | 49.1 | 42.3 | 12.1 | 86.0 | 24.7 | 100 | conjoined |
| 4381 | Haigano | 49.3 | 41.2 | 11.5 | 83.4 | 23.6 | 103 | conjoined |
| 4535 | Haigano | 34.7 | 28.9 | 11.1 | 83.7 | 32.0 | 115 | conjoined |
| 4538 | Hokobo | 52.0 | 47.3 | 19.0 | 91.0 | 36.7 | 101 | conjoined |
| 4539 | Kariyabaru | 51.1 | 39.1 | 17.3 | 76.5 | 33.7 | 102 | conjoined |
| 4540* | Kagamisu-pass | 44.1 | 37.8 | 14.3 | 85.5 | 32.4 | 104 | conjoined |
| 4543 | Haigano | 26.5 | 22.6 | 9.4 | 85.4 | 35.5 | 96 | left |
| 4544 | Akatani | 34.9 | 26.5 | 9.9 | 75.9 | 28.3 | 108 | left |
| 4345 | Akatani | 27.0 | 21.1 | 8.6 | 78.2 | 31.9 | 93 | right |
| 4548 | Kariyabaru | 49.0 | 37.7 | 15.9 | 76.9 | 32.4 | 96 | conjoined |
| 4549 | Kagamisu-pass | 30.4 | 28.6 | 8.1 | 94.3 | 26.7 | 103 | conjoined |
| 4552 | Hokobo | 33.5 | 29.9 | 9.6 | 89.4 | 28.7 | 100 | conjoined |
| 4553 | Haigano | 30.9 | 28.9 | 10.0 | 93.5 | 32.4 | 97 | conjoined |
| 4554 | Akatani | 41.4 | 32.1 | 11.2 | 77.6 | 27.1 | 103 | conjoined |
| 4555 | Obira | 39.5 | 32.9 | 10.8 | 83.3 | 27.2 | 119 | conjoined |
| 4557 | Hokobo | 34.5 | 33.9 | 12.6 | 98.1 | 36.5 | 100 | conjoined |
| 4561 | Hokobo | 25.1 | 19.2 | 6.1 | 76.3 | 24.3 | 92 | conjoined |
| 4562 | Kariyabaru | 31.4 | 26.1 | 9.6 | 83.2 | 30.4 | 105 | conjoined |
| 4563 | Horiguchi | 34.8 | 30.9 | 8.7 | 94.3 | 26.7 | 103 | conjoined |
| 4570 | Kariyabaru | 40.0 | 38.5 | 13.5 | 96.4 | 33.8 | 92 | left |
| 4571 | Kaichigo | 26.1 | 19.2 | 6.4 | 73.4 | 24.5 | 103 | conjoined |
| 4573 | Akatani | 35.2 | 25.1 | 11.4 | 71.3 | 32.2 | 97 | conjoined |
| 4574 | Akatani | 25.8 | 20.4 | 8.4 | 79.2 | 32.6 | 109 | conjoined |
| 4580 | Yamaji | 22.9 | 19.1 | 5.5 | 83.4 | 24.0 | 114 | left |

* Hypotype

Remarks.—*Clementia papyracea* (GRAY), well known in the Malaya-Indonesian waters, has been rarely reported from the Neogene strata of our country, and *C. vatheletii* MABILLE, living in Japanese waters, has been repeatedly reported. However it is not necessarily true status; that is to say, some of the specimens named *C. vatheletii* should be amended to belong to *C. papyracea*. The latter is plainly distinguished from the former in having much smaller valves with more stronger and regular concentric folds. The specimens from the Miyazaki group show rather wide range

of morphologic variation as indicated in the table. The specimens from the calcareous muddy sediments of the shallow mudflat of the embayment are large and swollen and those from the coarser sandy beds or sediments of the open water environment are small and rather compressed. *C. papyracea* is variable in form corresponding to the ecological condition as above mentioned. Possibly certain species of *Clementia* as *C. speciosa* YOKOYAMA, *C. hyaline* PHILIPPI, *C. nakamurai* OTUKA etc., or at least some of the named specimens of several authors, are included in *C. papyracea* (GRAY).

Horizon.—The Tano, Kawabaru, and Takanabe member (Upper Miocene to Lower Pliocene).

Localities.—Hôkôbô¹⁾ (MI-2131); Kariyabaru²⁾ (MI-903); Horiguchi³⁾ (MI-839); Obira⁴⁾ (MI-1028), Tano machi; Kagamisu pass⁵⁾ (MI-2610), Kiyotake machi, Miyazaki gun; Akatani⁶⁾ (MI-770 and 169); Kano⁷⁾ (MI-157), Takaoka machi, Higashimorogata gun; Yamaji⁸⁾ (MI-5060), Mino mura; Tôriyama⁹⁾ (MI-5595), Kawaminami mura, Koyu gun; Kaichigo¹⁰⁾ (MI-2695), Miyazaki City, Miyazaki Prefecture.

Subfamily Chioninae FRIZZELL, 1936

Genus *Placamen* IREDALE, 1925

(type-species: *Venus placida* PHILIPPI by original designation)

Placamen tiara (DILLWYN)

Pl. 14, Fig. 14

1817. *Chione tiara* DILLWYN, *A Descriptive Catalogue of Recent Shells*, Vol. 2, p. 352.
 1863. *Venus thiara*, REEVE, *Conch. Icon.*, Vol. 14, *Venus*, sp. 109.
 1920. *Chione isabellina*, YOKOYAMA, *Jour. Coll. Sci. Imp. Univ. Tokyo*, Vol. 39, Art. 6, p. 121, pl. 8, f. 13.
 1934. *Chione tiara*, HIRASE, *Illust. Handb. Shells*, pl. 37, f. 4.
 1951. *Placamen tiara*, HABE, *Genera of Japanese Shells*, p. 175, f. 376-377.
 1954. *Placamen tiara*, KIRA, *Japanese Shells in Natural Color*, p. 115, pl. 57, f. 20.

Material.—A few specimens came from the tuffaceous sandstone at Tôriyama and clean fine sandstone at Hagenoshita. Preservation is favourable. Homeotype: GK-L 4906.

Measurements.—

| specimen | locality | length (mm) | height (mm) | number of the concentric lamellae | valve |
|----------|-------------|----------------|----------------|--------------------------------------|-------|
| GK-L | | | | | |
| 4875 | Tôriyama | 14.4 | 13.9 | 14 | left |
| 4906 | Hagenoshita | 20.8 | 18.4 | 18 | right |

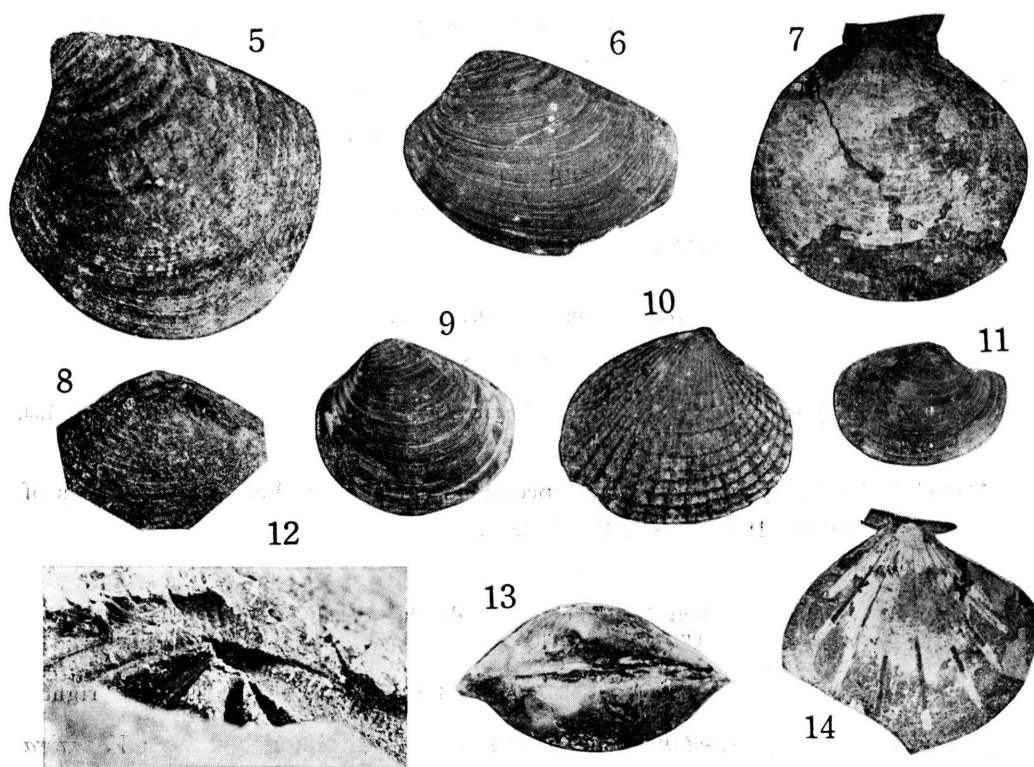
Remarks.—The present species is one of the common elements of the Pliocene

- 1) 宮崎県宮崎郡田野町法光坊 2) 全町假屋原 3) 全町堀口 4) 全町尾平 5) 全郡清
 武町鏡洲峠 6) 全県東諸県郡高岡町赤谷 7) 全町狩野 8) 全県兒湯郡三納村山路 9) 全郡
 川南村通山 10) 全県宮崎市家一郷

warm water faunas of our country. Several authors reported erroneously it as *Placamen isabellina*, however the distinction between the two is decisive in that *P. tiara* has smaller valves with the anterior end subtruncated than *P. isabellina*.

Horizon.—The Takanabe member (Lower Pliocene).

Localities.—Tôriyama¹⁾ (MI-5595), Kawaminami mura and Hagenoshita²⁾ (MI-6351), Uwaye mura, Koyu gun, Miyazaki Prefecture.



Text-figs. 5-14.

- fig. 5, 6, 9 ($\times 1$), *Clementia papyracea* (GRAY)p. 140
 5—GK-L 4570, loc. Kariyabaru, Tano machi, Miyazaki gun, Miyazaki Pref.
 6—GK-L 4544, loc. Akatani, Takaoka machi, Higashi-morogata gun, Miyazaki Pref.
 9—GK-L 4543, loc. Haigano, Tano machi, Miyazaki gun, Miyazaki Pref.
 fig. 7, 14 ($\times 2$), *Parvamussium* (*Parvamussium*) *kyushuense* n. sp.p. 127
 7—GK-L 4708, paratype, loc. Nagano, Mino mura, Koyu gun, Miyazaki Pref.
 14—GK-L 4865, paratype, loc. same as the preceding.
 fig. 8, 11, 13 ($\times 1$), *Venus* (*Ventricoloidea*) *foveolata miyazakiensis* (SHUTO)p. 129
 8—GK-L 4245, loc. Akatani, Takaoka machi, Higashi-morogata gun, Miyazaki Pref.
 11—GK-L 4242, paratype, loc. same as the preceding.
 13—GK-L 4478, loc. same as the preceding.
 fig. 10 ($\times 6$), *Veremolpa scabra* (HANLEY)p. 144
 GK-L 4914, homeotype, loc. Hagenoshita, Uwaye mura, Koyu gun, Miyazaki Pref.
 fig. 12 ($\times 1$), *Mercenaria stimpsoni* (GOULD)p. 144
 GK-L 4464, loc. Tôriyama, Kawaminami mura, Koyu gun, Miyazaki Pref.

1) 宮崎県児島郡川南村通山 2) 全郡上江村元の下

Subfamily Tapetinae FISCHER, 1887

Genus *Veremolpa* IREDALE, 1930(type-species: *Veremolpa ethica* IREDALE by original designation)*Veremolpa scabra* (HANLEY)

Text-fig. 10

1844. *Antigona scabra* HANLEY, *Proc. Zool. Soc. London*, 1844, p. 161, app. p. 361, pl. 16, f. 24.
 1853. *Venus scabra*, SOWERBY, *Thes. Conch. Vol. 2*, p. 718, pl. 157, f. 101, 102.
 1864. *Venus scabra*, REEVE, *Conch. Icon., Vol. 14*, *Venus*, sp. 97.

Material and Measurements.—A single but perfectly preserved right valve. Homeotype: GK-L 4914. Length: 5.1 mm, height: 4.5 mm.

Horizon.—The Takanabe member (Lower Pliocene).

Locality.—Hagenoshita¹⁾ (MI-6351), Uwaye mura, Koyu gun, Miyazaki Prefecture.

Veremolpa mindanensis (SMITH)

Pl. 14, Fig. 8

1886. *Venus (Chione) mindanensis* SMITH, *Challenger Report, Vol. 13, Lamellibranchia*, p. 130, pl. 3, f. 4.

Material.—Perfectly preserved two specimens came from the tuffaceous beds of the Takanabe meter. Homeotype: GK-L 4912.

Measurements.—

| specimen | locality | length (mm) | height (mm) | depth (mm) | H/L (%) | D/L (%) | valve |
|----------|----------|----------------|----------------|---------------|------------|------------|-------|
| GK-L | | | | | | | |
| 4912 | Kizukume | 8.0 | 7.4 | 2.2 | 92.5 | 27.8 | right |
| 4913 | Iwawaki | 6.1 | 5.7 | 1.8 | 93.4 | 29.5 | right |

Remarks.—*Veremolpa mindanensis* (SMITH) is readily distinguished from *V. scabra* (HANLEY) by its much shorter shell with shorter postero-dorsal margin and by smaller umbonal angle than the latter.

Horizon.—The upper part of the Takanabe member (Lower Pliocene).

Localities.—Iwawaki²⁾ (MI-5674) and Kizukume³⁾ (MI-5793), Tonda mura, Koyu gun, Miyazaki Prefecture.

Genus *Mercenaria* SCHUMACHER, 1817.(type-species: *Mercenaria violacea* SCHUMACHER by monotypy)*Mercenaria stimpsoni* (GOULD)

Pl. 13, Fig. 9, Text-fig. 12

1861. *Venus stimpsoni* GOULD, *Proc. Boston Soc. Nat. Hist., Vol. 8*, p. 25.
 1897. *Venus stimpsoni*, BRAUNS, *Geol. Env. Tokyo*, p. 40, pl. 4, f. 21.

1) 宮崎県児湯郡上江村元の下 2) 全郡富田村岩脇 3) 全村鬼付女

1906. *Venus stimpsoni*, TOKUNAGA, *Jour. Coll. Sci. Imp. Univ. Tokyo*, Vol. 21, Art. 2, p. 46.
 1922. *Venus (Mercenaria) stimpsoni*, YOKOYAMA, *ibid.* Vol. 44, Art. 1, p. 148, 148, pl. 11, f. 11-12.
 1927. *Venus stimpsoni*, MAKIYAMA, *Mem. Coll. Sci. Kyoto Imp. Univ. Ser. B*, Vol. 3, No. 1, p. 47.
 1934. *Mercenaria stimpsoni*, HIRASE, *Illust. Handb. Shells*, pl. 38, f. 3.
 1951. *Mercenaria stimpsoni*, HABE, *Genera of Japanese Shells*, p. 171, f. 387-388.
 1954. *Mercenaria stimpsoni*, KIRA, *Japanese Shells in Natural Color*, p. 112, pl. 56, f. 17.
 1958. *Mercenaria stimpsoni*, OZAKI, *Bull. Nat. Sci. Mus. Tokyo*, No. 42, p. 129, pl. 20, f. 6.

Material.—An outer mold of the conjoined valves (Homeotype: GK-L 4474) and an inner mold of the right valve (GK-L 4464). The preservation is favourable. The matrix is tuffaceous sandstone.

Measurements.—

| specimen | length | height | depth | H/L | D/L | umbonal angle | valve |
|----------|--------|--------|-------|------|------|---------------|-------|
| GK-L | (mm) | (mm) | (mm) | (%) | (%) | (degrees) | |
| 4464 | 74.5 | 56.3 | — | 75.5 | — | — | right |
| 4474 | 75.0 | 64.8 | 19.9 | 77.0 | 26.5 | 104 | left |

Remarks.—*Mercenaria chitaniana* (YOKOYAMA), which ranges from Upper Miocene to Lower Pliocene in age, is a close ally to the present species. According to the original author, *M. chitaniana* differs from *M. stimpsoni* chiefly in the following aspects. In *M. chitaniana* the shell is higher, shorter and more inflated; the umbones are larger and more raised; the lunule is shorter and broader; and the hinge plate is lower than in *M. stimpsoni*. The present specimens are quite identical to *M. stimpsoni* in all these features except for the hinge plate, which more resembles that of *M. chitaniana*.

According to the several authors *M. chitaniana* ranges from Upper Miocene to Lower Pliocene and *M. stimpsoni* from Upper Pliocene to recent in age. The former associates with the warm water faunas and the latter with the temperate one. The fact that *M. stimpsoni* occurs from Lower Pliocene Takanabe member and partially resembles *M. chitaniana* is very interesting concerning with this subject.

Horizon.—The upper part of the Takanabe member (Lower Pliocene).

Locality.—Tôriyama¹⁾ (MI-5595), Kawaminami mura, Koyu gun, Miyazaki Prefecture.

Mercenaria chitaniana (YOKOYAMA)

Pl. 13, Fig. 7

1923. *Venus (Mercenaria) stimpsoni*, YOKOYAMA, *Japan. Jour. Geol. Geogr.* Vol. 2, p. 6, pl. 1, f. 5a-5b.
 1926. *Chione chitaniana* YOKOYAMA, *Jour. Fac. Sci. Imp. Univ. Tokyo, Ser. 2. Vol. 1, Pt. 9*, p. 352, pl. 39, f. 13.
 1927. *Venus yokoyamai* MAKIYAMA, *Mem. Coll. Sci. Kyoto Imp. Univ. Ser. B*, Vol. 3, No. 1, pp. 46-47, pl. 2, f. 8.

1) 宮崎県児湯郡川南村通山

1931. *Mercenaria yokoyamai*, KURODA, *Geology of Central Shinano*, Moll. p. 58, pl. 6, f. 36.
 1931. *Mercenaria yokoyamai*, OTUKA, *Jour. Geol. Soc. Japan*, Vol. 45, No. 516, pp. 731-732, pl. 41, f. 6a-6b.
 1950. *Mercenaria chitaniana*, OYAMA, *Mineralogy and Geology*, Vol. 3, No. 6, p. 227.

Material and Measurements.—A single imperfect right valve came from the fossiliferous nodules in the silty sandstone. Homeotype: GK-L 4983. Length: 37.1 mm., height: 31.9 mm., H/L: 86.2 percent.

Horison.—The upper part of the Kawabaru member (Upper Miocene).

Locality.—Azukino¹⁾ (MI-4862), Sanzai mura, Koyu gun, Miyazaki Prefecture.

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Tsugio SHUTO

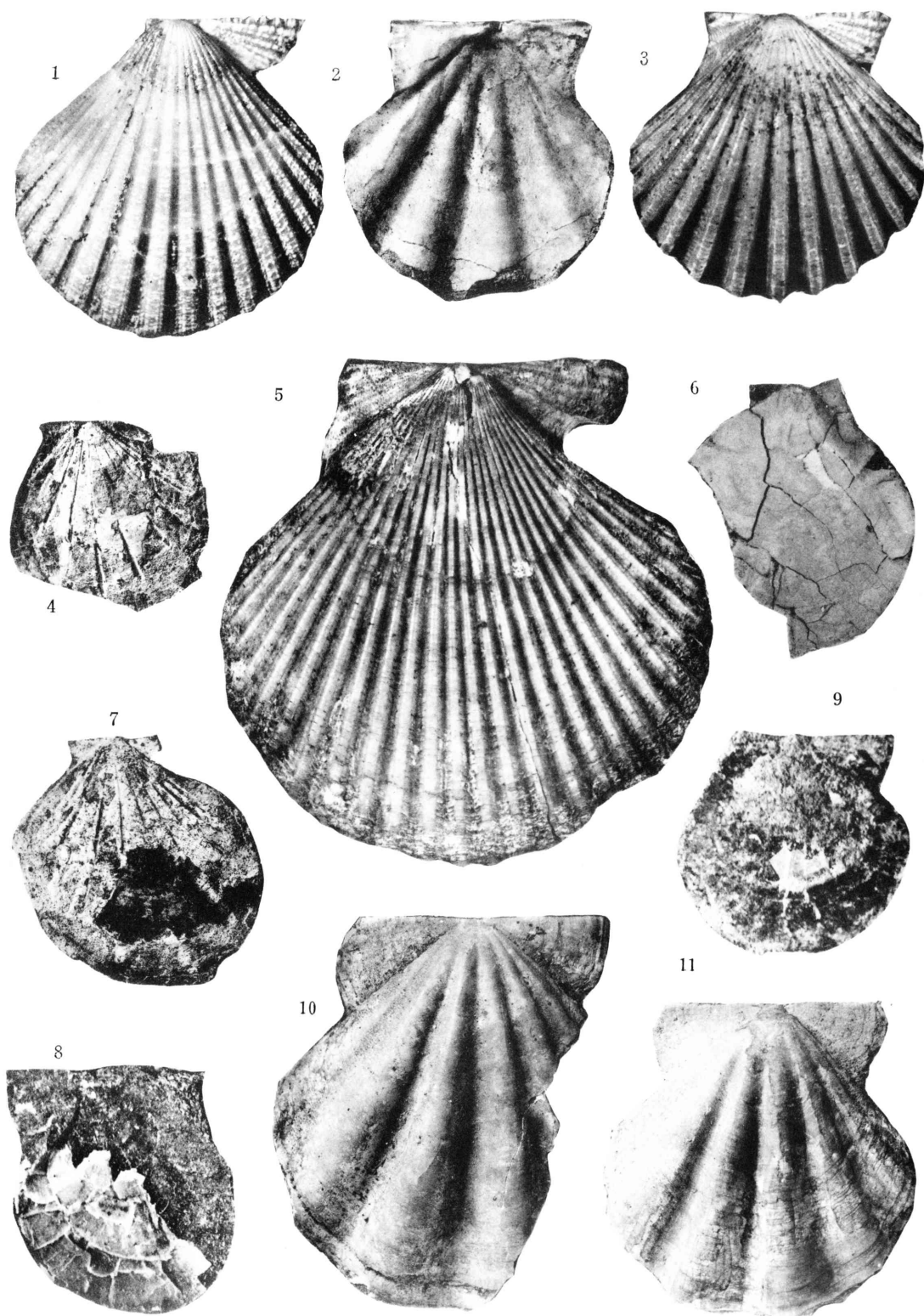
On Some Pectinids and Venerids from the Miyazaki Group
(Palaeontological Study of the Miyazaki Group-VII)

Plate 12-14

Explanation of the Plate

Plate 12

- Gloripallium satowi* (YOKOYAMA)p. 119
Fig. 5 ($\times 1$), GK-L 4389, Homeotype; loc. Tôriyama, Kawaminami mura, Koyu gun, Miyazaki Prefecture, hor. Takanabe member.
- Gloripallium aurantiacus* (ADAMS and REEVE)p. 121
Fig. 1 ($\times 2$), GK-L 4904, Homeotype; loc. Kizukume, Tonda mura, Koyu gun, Miyazaki Prefecture, hor. Takanabe member.
- Crytopecten vesiculosus* (DUNKER)p. 123
Fig. 3 ($\times 2.5$), GK-L 4905, Homeotype; loc. and hor. same as the preceding.
- Palliolum peckhami* (GABB)p. 123
Fig. 8 ($\times 5$), GK-L 4907; loc. Oriuzako, Miyazaki City, hor. Kibama subformation.
Fig. 9 ($\times 5$), GK-L 4906; loc. Hosoye, Ikime mura, Miyazaki gun, Miyazaki Prefecture, hor. Takaoka member.
- Patinopecten taiwanus* NOMURAp. 125
Fig. 2 ($\times 1.5$), GK-L 4387; loc. Tôriyama, Kawaminami mura, Koyu gun, Miyazaki Prefecture, hor. Takanabe member.
Fig. 10 ($\times 1.2$), GK-L 4531; loc. and hor. same as the preceding.
Fig. 11 ($\times 1.25$), GK-L 4385, Homeotype: loc. and hor. same as the preceding.
- Amusium* sp. (n. sp. ?)p. 127
Fig. 6 ($\times 1$), GK-L 4861; loc. Tonogôri, Saito City, hor. Tonogôri member.
- Parvamussium* (*Parvamussium*) *kyushuense* n. sp.p. 127
Fig. 4 ($\times 2$), GK-L 4865, Paratype; loc. Nagano, Mino mura, Koyu gun, Miyazaki Prefecture, hor. lower part of Tsuma member.
Fig. 7 ($\times 2$), GK-L 4863, Holotype; loc. and hor. same as the preceding.

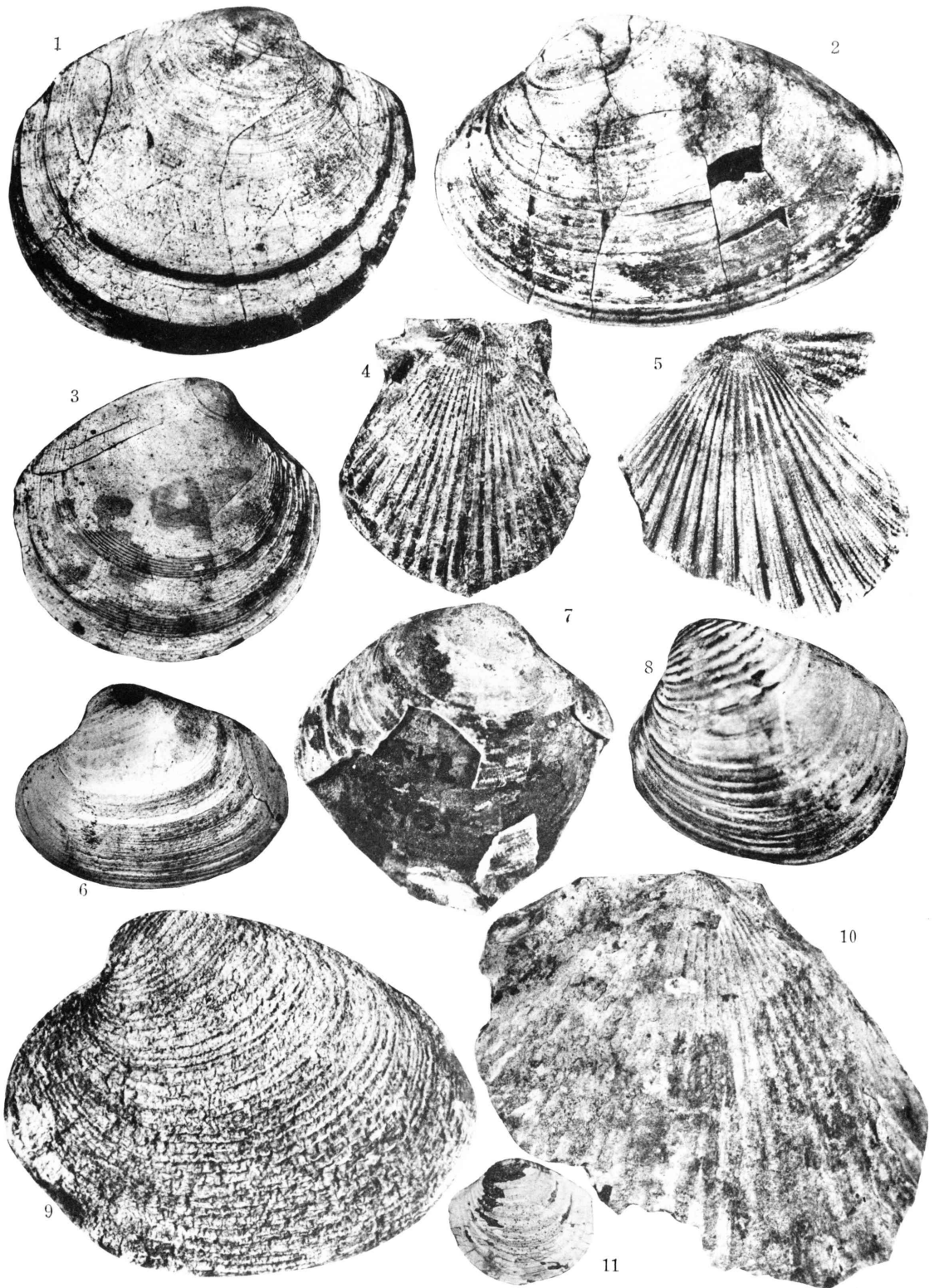


T. SHUTO: On Some Pectinids and Venerids from the Miyazaki Group

Explanation of the Plate

Plate 13

- Gloripallium aurantiacus* (ADAMS and REEVE)p. 121
Fig. 5 ($\times 2$), Plastotype for GK-L 4853; loc. Tōriyama, Kawaminami mura, Koyu gun, Miyazaki Prefecture, hor. Takanabe member.
- Gloripallium miurensis* (YOKOYAMA)p. 120
Fig. 10 ($\times 1$), GK-L 4855, Homeotype; loc. Kakoi, Sanzai mura, Koyu gun, Miyazaki Prefecture, hor. Kawabaru member.
- Mimachlamys* cf. *miniacea* (LAMARCK)p. 122
Fig. 4 ($\times 2$), GK-L 4477, Homeotype; loc. Tōriyama, Kawaminami mura, Koyu gun, Miyazaki Prefecture, hor. Takanabe member.
- Callista* (*Callista*) *chinensis* (HOLTEN)p. 131
Fig. 2 ($\times 1$), GK-L 4376, Hypotype; loc. and hor. same as the Preceding.
- Pitar* (*Pitarina*) *pellucida* (LAMARCK)p. 134
Fig. 6 ($\times 2$), GK-L 4915, Homeotype; loc. Azukino, Sanzai mura, Koyu gun, Miyazaki Prefecture, hor. Kawabaru member.
- Dosinia* (*Phacosoma*) *troscheli* (LISCHKE)p. 137
Fig. 1 ($\times 1.3$), GK-L 4379, Homeotype; loc. Tōriyama, Kawaminami mura, Koyu gun, Miyazaki Prefecture, hor. Takanabe member.
- Dosinia* (*Dosinorbis*) *bilunulata* (GRAY)p. 138
Fig. 2 ($\times 2$), GK-L 4465, Homeotype; loc. and hor. same as the preceding.
- Clementia papyracea* GRAYp. 140
Fig. 8 ($\times 1$), GK-L 4540, Homeotype; loc. Kagamisu pass, Kiyotake machi, Miyazaki gun, Miyazaki Prefecture, hor. Tano member.
Fig. 11 ($\times 1$), GK-L 4580; loc. Yamaji, Mino mura, Koyu gun, Miyazaki Prefecture, hor. Kawabaru member.
- Mercenaria stimpsoni* (GOULD)p. 144
Fig. 9 ($\times 1$), Plastotype for GK-L 4474, Homeotype; loc. Tōriyama, Kawaminami mura, Koyu gun, Miyazaki Prefecture, hor. Takanabe member.
- Mercenaria chitaniana* (YOKOYAMA)p. 145
Fig. 7 ($\times 1.5$), GK-L 4983, Homeotype; loc. Azukino, Sanzai mura, Koyu gun, Miyazaki Prefecture, hor. Kawabaru member.



Explanation of the Plate

Plate 14

- Patinopecten taiwanus* NOMURA.....p. 125
 Fig. 15 ($\times 2$), GK-L 4692; loc. Tōriyama, Kawaminami mura, Koyu gun, Miyazaki Prefecture, hor. Kawabaru member.
- Venus (Ventricoloidea) foveolata miyazakiensis* (SHUTO).....p. 129
 Fig. 13 ($\times 1$), GK-L 4248, Paratype; loc. Akatani, Takaoka machi, Higashi-morogata gun, Miyazaki Prefecture, hor. Tano member.
 Fig. 16 ($\times 1.5$), GK-L 4451, Holotype; loc. Kano, Takaoka machi, Higashi-morogata gun, Miyazaki Prefecture, hor. same as the preceding.
- Callista (Callista) roscida* (GOULD).....p. 132
 Fig. 12 ($\times 5$), GK-L 4920, Homeotype; loc. Yamaji, Mino mura, Koyu gun, Miyazaki Prefecture, hor. Kawabaru member.
- Pitor (Pitarina) semeliformis* n. sp.p. 135
 Fig. 2 ($\times 2$), GK-L 4468, Paratype; loc. Akatani, Takaoka machi, Higashi-morogata gun, Miyazaki Prefecture, hor. Tano member.
 Fig. 3 ($\times 2$), GK-L 4469, Holotype; loc. and hor. same as the preceding.
- Pitar (Pitarina) cf. sulfurea* PILSBRYp. 133
 Fig. 2 ($\times 1.5$), GK-L 4472, Homeotype; loc. and hor. same as the preceding.
- Pitar (Pitarina) dohrni* (RÖMER)p. 134
 Fig. 4 ($\times 2$), GK-L 4409; loc. and hor. same as the preceding.
 Fig. 9 ($\times 2$), GK-L 4405, Homeotype; loc. and hor. same as the preceding.
- Pitar (Agriopoma) sp.*p. 136
 Fig. 6 ($\times 2$), GK-L 4474; loc. Mokudo, Aya machi, Higashi-morogata gun, Miyazaki Prefecture, hor. Tano member.
- Dosinia (Phacosoma) nomurai* (OTUKA)p. 137
 Fig. 10 ($\times 1$), GK-L 4495; loc. Yamaji, Mino mura, Koyu gun, Miyazaki Prefecture, hor. Kawabaru member.
- Dosinia (Bonartemis) cf. suketoensis* (OTUKA)p. 139
 Fig. 5 ($\times 2$), GK-L 4527; loc. Waritsuke, Aya machi, Higashi-morogata gun, Miyazaki Prefecture, hor. Tano member.
 Fig. 11 ($\times 2.5$), GK-L 4589, Homeotype; loc. and hor. same as the preceding.
- Veremolpa mindanensis* (SMITH)p. 144
 Fig. 8 ($\times 3$), GK-L 4912, Homeotype; loc. Kizukume, Tonda mura, Koyu gun, Miyazaki Prefecture, hor. Takanabe member.
- Placamen tiara* (DILLWYN).....p. 142
 Fig. 14 ($\times 2.5$), GK-L 4906, Homeotype; loc. Hagenoshita, Uwaye mura, Koyu gun, Miyazaki Prefecture, hor. same as the preceding.

