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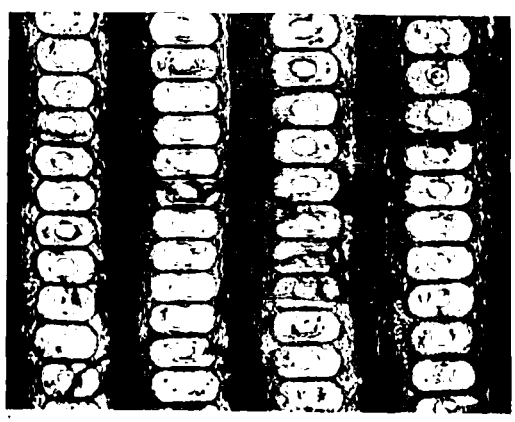

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407. ON SOME GYLIAKIAN *PTEROTRIGONIAE* FROM KYUSHU AND HOKKAIDO, JAPAN*

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九州・北海道産ギリヤーク統 *Pterotrigonia* 4 種について：ギリヤーク統 *Pterotrigonia* 4 種うち 1 新種を記載し，Genus *Pterotrigonia* についての新知識を加えた。

中野光雄・沼野恭一郎

Introduction and Acknowledgements

Pterotrigonia VAN HOEPEN, 1929 is a Cretaceous cosmopolitan genus and is well characterized by its own outline and surface costation. In Japan it is well represented by numerous forms from Neocomian to Turonian. It was most prospered and widely spread from Kyushu to Sachalin from Aptian to Cenomanian, i.e. Japanese Miyakoan to early Gyliakian, but disappeared in the Senonian s.l., i.e. Urakawan to Hetonaian.

Since 1947, the senior author collected numerous trigoniid specimens from the Gyliakian formations in Kyushu and Hokkaido. With the junior author, the palaeontological study was carried on a lot of them. As a result, some interesting trigoniids are distinguished as follows:

Pterotrigonia brevicula (YEHARA)
Pterotrigonia sakakurai (YEHARA)
Pterotrigonia (*Rinetrigonia*) *yeharai*, sp. nov.
Pterotrigonia (*Rinetrigonia*) sp. nov.

To the description of these species, some notes are added on the genus *Pterotrigonia* VAN HOEPEN.

The materials dealt with in this paper were collected by Shingo EHARA (formerly YEHARA), Tatsuro MATSUMOTO, Hakuyu OKADA and Mitsuo NAKANO from Kyushu and Hokkaido, and stored in the Geological Institute of the University of Kyoto (JM), Kyushu University (GK), and Hiroshima University (GH).

The authors wish to express their sincere thanks to Prof. Sotoji IMAMURA of the Hiroshima University, Prof. Shingo EHARA of the Ritsumeikan University at Kyoto and Prof. Tatsuro MATSUMOTO of the Kyushu University at Fukuoka for their kind guidances and encouragements, to Messers Tomowo OSE and Ichiro HAYASHI of the Sumitomo Colliery Company and Dr. Minoru TAMURA of of the Kumamoto University for their assistances in field works, to Dr. Hakuyu

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OKADA for supply of a trigoniid specimen, and to Prof. Susumu MATSUSHITA of the University of Kyoto and Mr. Ikuwo OBATA of the Kyushu University for the assistance which the authors received at the universities. Finally, the authors record their cordial thanks to Prof. Teiichi KOBAYASHI of the University of Tokyo for reading the manuscript of this paper thus completed.

Subfamily Pterotrigoniinae VAN HOEPEN, 1929

KOBAYASHI and NAKANO's proposal (1957) is here accepted. Recently, SAVELIEV (1958) suggested that his Pterotrigoniinae including *Pterotrigonia* VAN HOEPEN, *Scabrotrigonia* DIETRICH, *Linotrigonia* VAN HOEPEN and *Oistotrigonia* COX were derived from *Apiotrigonia* COX of his Megatrigoniinae. It can, however, hardly be overlooked that the immature shell of many species in this subfamily is quite similar to *Haidaia* of *Myophorella* in the presence of distinct carinae, diagonal *Haidaia*-type crenulate costation on the flank, and transversely costellate area. Therefore, as pointed out by KOBAYASHI and NAKANO (1957), this subfamily was issued probably from *Haidaia* of *Myophorella*.

Genus *Pterotrigonia* VAN HOEPEN, 1929

Type species:—*Pterotrigonia crista* VAN HOEPEN, 1929. "Mid. Cret."; Zululand, South Africa.

Subgenus *Pterotrigonia* s.s.

Synonym:—*Ptilotrigonia* VAN HOEPEN, 1929=*Notoscabrotrigonia* DIETRICH, 1939.

Remarks:—This was cosmopolitan in the Cretaceous, and comprises a number of species and varieties as listed by KOBAYASHI and NAKANO (1957, pp. 225-226). The additional forms are as follows:

Trigonia aliformis var. *attenuata* LYCETT, 1875. Low. Cret.: England.

Trigonia bowersiana ANDERSON, 1958. Up. Cret.: California.

Pterotrigonia hemilunaris SAVELIEV, 1958. Up. Albian-Cenomanian (?); Manghyschlack.

Pterotrigonia klytscheva SAVELIEV, 1958. Up. Albian: Manghyschlack.

Trigonia packardi ANDERSON, 1958. Low. Cenomanian; California.

Pterotrigonia pseudocundata var. *dumbeae* FRENEIX, 1958. Senonian; New Caledonia.

Trigonia stellegi HILL, 1893. Up. Albian; Texas and Arizona.

Pterotrigonia tatiana incava SAVELIEV, 1958. Up. Albian: Maghyschlack.

Pterotrigonia tatiana typica SAVELIEV, 1958. Up. Albian; Manghyschlack.

Like *Haidaia* of *Myophorella* the immature shell of this subgenus has the distinct carinae, diagonal *Haidaia*-type crenulate costae on the flank and the transversely costellate area. In many forms the carinae, the *Haidaia*-type costation, and the transverse costellae on the area become obscure in the middle growth stages.

Flank is sculptured with tuberculate or sometimes plain costae. In the adult stage the flank is ornamented with tuberculate or sometimes plain costae. In the adult stage the flank is ornamented with tuberculate or sometimes plain costae, and the area is generally smooth but rarely costellate transversely.

The shell form and surface sculptures are variable to a large extent in this subgenus. European Lower and "Middle" Cretaceous forms, i.e. *caudata*, *etheridgei*, and *scabricola*, have transverse costellae on their area, but smooth in most others. Plain costae are recognized on the flank in *columbiana*, *sakakurai*, and *yokoyamai* etc., which occur in the "Middle" to Upper Cretaceous of the Northern Pacific region. Costae on the

flank are obsolete in the anterior part of *chivensis* (ARCHANGELSKY, 1916 : pl. 4, fig. 6), but they are distinct in many others and tuberculate and diagonal on the flank. Costellae on the escutcheon are tuberculate or plain and disposed transversely.

The shell outline is crescentic and attenuate posteriorly in *aliformis* var. *attennata*, *brevicula*, *crista*, *pocilliformis*, and *yokoyamai* etc., but somewhat quadrate in *columbiana*, *sakakurai*, and *wendleri* etc. The quadrate forms are known from the "Middle Cretaceous" of Japan and North America. Most others are subtrigonal in outline.

The median furrow is often distinct, but it is very obscure in some large forms, ex. *plebeia* and *sakakurai*.

Pterotrigonia vectiana (LYCETT) in SAVELIEV (1958, pl. 39, figs. 1-3) may be better excluded from this subgenus. Because its marginal carina is distinct and its area obliquely costellate, it is probably a member of *Linotrigonia*.

In a recent paper, KOBAYASHI and NAKANO (1957) tentatively placed *Trigonia elisae* BRIART et CORNET in this subgenus, but it is better to be referred to *Acanthotrigonia* because of the presence of the oblique costation on the area. COSSMANN's *T. elisae* (1912, pl. 2, figs. 1, 10-12; pl. 4, fig. 18) is a typical *Quadratotrigonia* as can be judged from the surface costation and shell form.

Distribution :—Cosmopolitan in the Cretaceous Lower to "Middle" Cretaceous of the eastern hemisphere excluding Australia. "Middle" to Upper Cretaceous of Australia, North and South America, and Europe.

Pterotrigonia brevicula (YEHARA)

Pl. 13, Figs. 4-8.

1915. ? *Trigonia hokkaidoana* (pars) YEHARA, *Sci. Rep. Tohoku Imp. Univ., 2nd Ser., Vol. 2, No. 2*, p. 39, pl. 1, fig. 5 only.

1915. *Trigonia brevicula* YEHARA, *Ibid., Vol. 2, No. 2*, p. 42, pl. 2, figs. 18-19.

Material :—Lectotype, YEHARA's specimen (1915, pl. 2, fig. 18), immature, along the Ikushumbetsu river, about 3 km. above the Ikushmbetsu coal-mines, Central Hokkaido.

Numerous specimens were collected from several localities in the vicinity of the Ikushumbetsu coal-mines, Mikasa-city, Central Hokkaido. Among them, fairly well preserved specimens, GH. NM. 1051-62, occurred in the *Calycoceras* zone (?) of the lower "*Trigonia* Sandstone" along the Pombetsu river, about 1 km. above the Ikushumbetsu coal-mines.

In T. MATSUMOTO's collection, GK. H. 6038-42, from the *Calycoceras* zone (?) at T. MATSUMOTO's loc. IK-2021 along the Pombetsu river. Besides this MATSUMOTO's collection contains many unregistered materials from the *Mantelliceras* zone and the *Calycoceras* zone of the same district.

Description :—Shell medium in size, crescentic, inequilateral, broader than high, inflated anteriorly, attenuate posteriorly; anterior margin rounded, passing gradually into broadly curved ventral margin which is more or less sinuated in the vicinity of postero-ventral margin; dorsal margin concave and nearly two-thirds as long as the shell; siphonal margin narrow and well rounded. Umbo broad, low and rather improminent; beak opisthogyrous, pointed at about a fourth to two-fifths from the anterior end. Flank with numerous bluntly tuberculate, broadly spaced costae which are round-topped and steep on the umbonal or anterior side but gently inclined on the other; umbonal 4 or so concentric to oblique; next 8 or so on the most inflated

part thick, somewhat sinuous and diagonal, first slender but rapidly thickened anteriorly; last 8 or so somewhat slender and oblique forward but gradually turning backward; antecarinal depression shallow and distinct. Carinae absent except near umbo. Area narrow, smooth, with distinct median furrow. Escutcheon wide, depressed, with numerous transverse costellae.

Growth-lines coarse and well developed on whole surface. Internally, a radial groove exists on the central part of the area; ventral margin smooth or slightly plicated. Test very thick and about 4 mm. in adult form.

Measurements in mm.

Specimen	Valve	Length	Height	L/H
GII. NM. 1051	Right	48. 2	36. 6	1. 32
GII. NM. 1052c	Right	34. 4	26. 7	1. 29
GH. NM. 1054a	Left	48. 7	35. 0	1. 39
GH. NM. 1054c	Right	45. 7	35. 0	1. 30
GH. NM. 1055	Left	32. 9	25. 5	1. 29
GH. NM. 1058	Left	29. 0	25. 9	1. 12
GH. NM. 1061	Left	40. 0	32. 0	1. 25
GK. H. 6038	Right	47. 1	35. 0	1. 33
GK. H. 6039	Left	51. 5	34. 5	1. 49
GK. H. 6040	Right	42. 0	28. 0	1. 50
GK. H. 6041	Right	38. 4	31. 2	1. 22
GK. H. 6042	Right	57. 0	39. 4	1. 45

Remarks:—The surface ornamentation is rather constant in ontogenetic development, but the shell form is somewhat variable.

In the immature stage, the shell (less than 30 mm. long and 27 mm. high) is ovately trigonal in outline and the beak situated at about two-fifths from the anterior periphery but sometimes subcentral. The height-length proportion is less than 1 : 1.20. Except for the umbonal region costae number 10 or to 13 on the flank, 6 to 8 of which are on the most inflated part and 4 to 5 on the posterior one.

In the next stage, the shell (L : 30-40 mm., H : 25-30 mm.) becomes subtrigonal in outline and the beak shifted to about a third to two-fifths from the anterior. The height-length proportion ranges 1 : 1.20 to 1 : 1.30. 7 to 9 costae are on the inflated part, and the remaining posterior part is provided with 5 to 6 subvertical costae.

The adult shell, 46-57 mm. in length and 35-40 mm. in height, is crescentic and rostrate posteriorly. The height-length proportion is 1 : 1.30 to 1 : 50. The position of the beak is about a fourth to a third from the anterior end. On the flank, subvertical costae number 6 to 9 on the posterior part, but 7 to 9 costae are present on the inflated part. The ventral sinuation becomes distinct in this stage.

Because of ill-preservation from the primary, costellae on the escutheon are usually not well observed. As shown in figs. 5a-b on pl. 13, costellae are sometimes recognized in the middle part of

the escutheon where the number of costellae is 7 per cm.

YEHARA's specimen (1915, pl. 1, fig. 5) of *Trigonia hokkaidoana* has a narrow area and a distinct sinuation on the ventral part. It looks quite similar to certain *brevicula* than typical *hokkaidoana*.

Comparison:—This form resembles closely *Pterotrigonia pseudocundata* (HECTOR) in WOODS (1917, p. 21, pl. 7, fig. 9; pl. 8, figs. 15) from the upper Senonian of New Zealand and *P. pseudocundata* var. *dumbeae* FRENEIX (1958, pp. 167-169, pl. 1, figs. 12a-b, text-fig. 1) from the Senonian of New Caledonia in shell form and surface costation, but easily distinguishable from them by its less numerous costae on the flank and more elongated postero-ventral periphery. This species is similar to *Pterotrigonia yokoyamai* (YEHARA) from the Miyakoan (Aptian-Albian) of the Miyako area in in North Japan, but differs by the presence of thick and bluntly tuberculate costae on its flank. In shell outline, this is quite similar to *Acanthotrigonia longiloba* (JIMBO) which is sometimes found associated, but different in the absence of the oblique costation on the area, the presence of the thick and bluntly tuberculate costae on the flank, the sinuation on the ventral periphery, and thicker test.

Occurrence:—Abundant in the *Mantelliceras* and *Calycoceras* zones of the lower member of the "*Trigonia* Sandstone" in the Ikushumbetsu district, Mikasa-city, Central Hokkaido. Its age is probably lower to middle Cenomanian.

Pterotrigonia sakakurai (YEHARA)

Pl. 13. Figs. 9-10.

1923. *Trigonia sakakurai* YEHARA, *Jour. Geol. Soc. Tokyo, Vol. 30*, p. 6, pl. 4, fig. 6.

1923. *Trigonia sakakurai* YEHARA, *Japan. Jour. Geol. Geogr., Vol. 2, No. 3*, pp. 76-77, pl. 11, fig. 3; pl. 13, fig. 2.

1931. *Trigonia sakakurai* YEHARA, *Trigoniae in Japan*, pp. 19-20, text-fig.

Material:—Lectotype, YEHARA's specimen (1923a, pl. 4, fig. 5; JM. 10171), from the Goshonoura group in Goshonoura-jima, Amakusa-gun, Higo Prov., Kumamoto Pref., Kyushu, but its exact locality is uncertain.

Some other specimens at hand are more or less well preserved. Among them, CH. NM. Ps-01 was obtained from the middle Goshonoura-jima.

Description:—Shell line in size oblong to subtrigonal, inequilateral, inflated anteriorly, attenuate posterior margin rounded; ventral broadly arched; dorsal long and concave; siphonal well rounded; ventral broadly arched; dorsal long and concave; siphonal well rounded. Umbo large and blunt; beak opisthogyrous, pointed at about anterior third to fourth. Escutcheon depressed, fairly broad, provided with transverse costellae. Area narrow near umbo but soon broadened later. Carinae and median furrow indistinct. Flank with plain, stout, broadly spaced costae; anterior about 5 costae nearly straight and diagonal; some 5 posterior costae subvertical and more slender and narrowly spaced than anterior ones.

Growth-lines indistinct on whole surface.

Remarks:—This species is characterized by its large and quadrate outline and thick costae on the flank. Its immature shell is not well known.

In the middle stage, its shell (about 50 mm. long and 40 mm. high) is subtrigonal in outline and the beak located at about anterior third. Except for the umbonal region the flank is sculptured with about 9 plain costae. The adult shell (L: 65-80., H: 55-65 mm.) is quad-

rately trigonal in shape and the beak located at about anterior third to fourth. Costae on the flank number 10 to 11.

Because of ill-preservation, surface costation near umbo and escutcheon are not well observable.

Comparison:—This species is closely allied to *Pterotrigonia columbiana* (PACKARD) from the Haida formation (Up. Albian?) of the Queen Charlotte series in Britith Columbia, but differs in having wider intercostal spaces and more slender costae on the flank. In outline, this form is similar to *Pterotrigonia plebeia* VAN HOEPEN and *Trigonia rogersi* KITCHIN respectively in the "Middle" and the Lower Cretaceous of South Africa, but differs in having less numerous plain costae. *Trigonia wendleri* WHITNEY from the lower Glen Rose formation Albian of Texas is similar to this species, but easily distinguished by the presence of the tuberculation on the slender costae of the flank.

Occurrence:—Lectotype (JM. 10171 on fig. 10 in pl. 13 is 75 mm. long and 66 mm. high. Fairly abundant in the middle Goshonoura group in Goshonoura-jima, Higo Prov., Kumamoto Pref., Kyushu.

Subgenus *Rinetrigonia*

VAN HOEPEN, 1929

Type species:—*Trigonia ventricosa* KRAUSS, 1847. Neocomian of East Africa and Tithonian to Neocomian in India.

Synonym:—*Pisotrigonia* VAN HOEPEN, 1929.

Remarks:—In 1957, KOBAYASHI and NAKANO discussed this subgenus and assigned 3 Indo-African forms and possibly 2 South American species to this subgenus. The followings are probably added to them.

Pterotrigonia cubanica (pars) SINZOW in SAVELIEV, 1958. Up. Albian; Manghyschlack.

Pterotrigonia subpiriformis SAVELIEV, 1958. Up. Albian; Manghyschlack.

Trigonia subventricosa STANTON, 1901. Up. Neocomian; Patagonia.

Pterotrigonia (*Rinetrigonia*) *yeharai*, n. sp. Cenomanian; Amakusa, Japan.

Pterotrigonia (*Rinetrigonia*?) sp. *a* & *b* by KOBAYASHI and NAKANO, 1958. Aptian; Yatsushiro ditrict, Higo Prov., Kumomato Pref., Kyushu, Japan.

The shell form is almost invariable in this subgenus, but the costation on the flank is fairly variable. The outline is generally subtrigonal but lunate or crescentic in *cubanica* (pars) and *yeharai*, n. sp. Costae on the anterior part of the flank are commonly tuberculate, while *yeharai*, n. sp. and *subpiriformis* have plain costae. The posterior costae are plain and very slender in *kraussi*, but tuberculate and fairly thick in *salebrosa*. The median furrow is indistinct in large forms, i.e. *kraussi*, *salebrosa*, and *tuberculifera*, but distinct in small ones, such as, *cubanica* (pars), *subpiriformis*, *ventricosa*, and *yeharai*, n. sp.

Pterotrigonia cubanica (SINZOW) in SAVELIEV (1958, pl. 34, figs. 1a-b, non figs. 2-6) is an interesting form. It is probably a member of *Acanthotrigonia*, because of obliquely costellate area. The other illustrated forms (pl. 31, figs. 2-6) possibly belong to this subgenus as can be judged from the surface costation.

In Japan KOBAYASHI and NAKANO (1958) reported from the occurrences of *a* and *b* forms of *Pterotrigonia* (*Rinetrigonia*?) in the Aptian Hinagu formation near Yatsushiro-city, Higo Prov., Kumamoto Pref., Kyushu. They are imperfect. *Pterotrigonia* (*Rinetrigonia*) sp. nov. was recently collected from the middle Mifune group (Cenomanian) at Miyanomoto, Mifune-machi, Higo Prov., Kumamoto Pref. It is closely allied to *Pterotrigonia* (*Rinetrigonia*) *ventricosa* (KRAUSS) from

the formation from Tithonian to Neocomian in India and the Neocomian of South Africa.

Distribution:—Tithonian to "Middle Cretaceous"; India, Africa, South America Japan, and Caspian region.

Pterotrigonia (*Rinetrigonia*) *yeharai*, sp. nov.

Pl. 13, Figs. 1-2.

1923. *Trigonia yokoyamai* var. YEHARA, *Jour. Geol. Soc. Tokyo, Vol. 30*, pp. 7-8, pl. 6, fig. 8.

1923. *Trigonia sakakurai* var. YEHARA, *Japan. Jour. Geol. Geogr., Vol. 2, No. 3*, pp. 77-78, pl. 12, fig. 9.

Material:—Holotype, GH. NM. 3028a, from the middle Goshonoura group at Enokuchi in Goshonoura-jima, Amakusa-gun, Higo Prov., Kumamoto Pref. Paratype, YEHARA's specimen (1923a, pl. 6, fig. 8; 1923b, pl. 12, fig. 9; JM. 10163), from the Goshonoura group in Goshonoura-jima, but its exact horizon and locality is not well known. Beside this, M. NAKANO's collections several imperfect unregistered specimens from the middle Goshonoura group at Enokuchi in Goshonoura-jima.

Description:—Shell medium in size, lunate to subtrigonal, inequilateral, broader than high, rather strongly inflated anteriorly and rostrate posteriorly; anterior margin rounded, passing gradually into broadly curved ventral which is sometimes slightly sinuated near the posterior end; dorsal long and concave; siphonal margin well rounded. Umbo rather broad, fairly prominent; beak opisthogyrous, located at about a third from the front. Carinae obscure except near umbo. Area narrow near umbo, but soon broadened and smoothed. Median furrow fairly shallow but distinct. Escutcheon wide, excavated, with broadly spaced, feeble transverse costellae. Flank with numerous plain diagonal costae; 3 or so near umbo concentric to subconcentric; next some 8 on the most inflated part oblique, slightly sinuous and abruptly swollen toward vented; last about 7 slended, nearly straight and first oblique forward but subvertical later. Ante-carinal depression shallow and indistinct.

Growth-lines somewhat distinct in anterior half of the flank, and sometimes thickened at the intersections with oblique costae.

Remarks:—This species rather variable in ontogenetic development. In the early stage, when the shell is about 30 mm. as long as high, its outline trigonally ovate and the beak located at about two-fifths from the front. On the flank, the anterior inflated part is provided with about 7 oblique diagonal costae and the posterior part with some 4 slender costae.

In the adult stage, the shell (L: about 50 mm., H: about 40 mm.) is subtrigonal to crescentic in outline and the beak lies at about anterior third. Except for the umbonal region 8 to 8 rather thick costae are on the anterior inflated part of the flank and 8 to 9 slender ones on the posterior portion.

Holotype (L: 51.0 mm., H: 38.5 mm.) is crescentic in outline and inflated anteriorly, but the paratype (L: 50.0 mm., H: about 42.0 mm.) is subtrigonal and compressed.

Comparison:—The ornamentation on the flank is discrepant between the anterior and posterior parts. Therefore this form may be a member of *Rinetrigonia* rather than *Pterotrigonia* s.s. In this aspect, it is closely allied to *Pterotrigonia* (*Rinetrigonia*) *tuberculifera* (STOLICZKA) from the Trichinopoly group in South India and *P.* (*R.*) *ventricosa* (KRAUSS) from the formations from Tithonian to Neocomian of

India and the Neocomian of South Africa, but differs by the presence of plain costae on the flank. This species is so intimately related to the immature form of *Pterotrigonia sakakurai* (YEHARA) from the Gyliakian (Cenomanian-Turonian) of Amakusa in Japan, but easily distinguished by numerous costae on the flank where the posterior part is occupied by several slender costae. It is easily distinguishable from *Pterotrigonia yokoyamai* (YEHARA) from the Miyakoan (Aptian-Albian) of Miyako district in North Japan by the inflated shell and the thick costae on the anterior part of the flank. *Pterotrigonia brevicula* (YEHARA) resembles this form, but differs by the bluntly tuberculate costae on the flank.

Occurrence:—Middle formation of the Goshonoura group in Goshonoura-jima, Amakusa-gun, Higo Prov., Kumamoto Pref., Kyushu.

Pterotrigonia (*Rinetrigonia*) sp. nov.

Pl. 13, Fig. 3.

Material:—A single imperfect right valve specimen (GK. H. 6057) was collected by H. OKADA from the middle Mifune group at Miyanomoto, Mifune-machi, Kamimasuki-gun, Higo Prov., Kyushu.

Description—Shell rather small in size, subtrigonal, inequilateral, a little broader than high, inflated anteriorly and attenuate posteriorly; anterior margin rounded; ventral margin not well traceable, but presumably a broad sinuation exists on the posterior part of the arcuate ventral; dorsal margin long and nearly straight or slightly concave. Umbo rather broad and prominent; beak opisthogyrous, pointed at about anterior third. Flank with numerous, slightly tuberculate costae; umbonal 4 or so concentric to subconcentric; next 6 costae on the most inflated part of shell oblique, arcuate diagonally and abruptly swollen toward venter; last 4 thin, flexious and subvertical. Ante-carinal depression shallow, broad and distinct. Carinae distinct near umbo, but obsolete in the later stages. Area narrow and transversely costellate in the early stage, but soon broadened and smoothed. Median furrow fairly deep, distinct, and separates a broader anterial and narrower posterial parts. Escutcheon excavated, broad, with 10 or more rather feeble transverse costellae which are finely tuberculate.

Remarks and Comparison:—Costae on the flank tend to be discrepant between the anterior and posterior parts. In this aspect, this form is closely allied to *Rinetrigonia*. It has some resemblances to *P.(R.) ventricosa* (KRAUSS) in surface sculpture and shell form, but is easily distinguishable from the latter by arcuate costae on the flank and distinct tuberculation of the costae. This form is closely allied also to *P.(R.) tuberculifera* (STOLICZKA), but differs in the small shell and indistinct tuberculation on the costae of the flank. As compared with *Pterotrigonia subpiriformis* SAVELIEV and *P. cubanica* (SINZOW) (pars) in SAVELIEV from the upper Albian of Manghyschlack, its outline is more trigonal and the costae on the flank are less numerous. *Pterotrigonia* (*Rinetrigonia* sp. *a* and *b* by KOBAYASHI and NAKANO, 1958) from the Hinagu formation (Aptian) of Kumamoto Prefecture are similar to this form, but the two formers are poorly preserved. *Pterotrigonia brevicula* (YEHARA) is similar to this, but easily distinguishale from it by thicker costae and lunate outline.

Occurrence:—The illustrated specimen is, if complete, 30 mm. long and 26 mm. high, collected from the middle Mifune group at Miyanomoto, Mifune-machi, Kamimasuki-gun, Higo Prov., Kumamoto Pref., Kyushu. Its age is probably early Cenomanian.

References

ANDERSON, F. M. (1958) : Upper Cretaceous of the Pacific Coast. *Geol. Soc. Amer., Mem. 71*, pp. 1-378, pls. 1-75.

ARCHANGELSKY, A. D. (1916) : Les Mollusques du Crétaceé supérieur du Turkestan. *Mém. Com. geol. N. Sér., Livr. 152, Petersburg*, pp. 1-57, pls. 1-8.

COSSMANN, M. (1912) : Sur l'evolution des Trigonies. *Ann. Paléont., Tom. 7*, pp. 57-84, pls. 1-4.

COX, L. R. (1952) : Notes on the Trigoniidae, with Outlines of a Classification of the Family. *Proc. Mal. Soc. London, Vol. 29, Pts. 2-3*, pp. 45-70, pls. 3-4.

CRICKMAY, C. H. (1932) : Contribution toward a Monograph of the Trigoniidae. I. *Amer. Jour. Sci., Vol. 24, No. 144*, pp. 443-464, pls. 1-2.

FRENEIX, S. (1958) : Contribution à l'étude de Lemellibranches du Crétacé de Nouvelle-Calédonie. *Sciences de la Terre, Tom. 4, Nos. 3-4*, pp. 153-207, pls. 1-3.

VAN HOEPEN, E. C. N. (1929) : Die Krytfauna van Soeloeland. 1. Trigoniidae. *Navorsing Nas. Mus. Bloemfontein, Deel 1, Stuk 1*, pp. 1-38, pls. 1-7.

JIMBO, K. (1894) : Beiträge zur Kenntniss der Kreideformation von Hokkaido. *Pal. Abhandl., N. F., Bd. 2, Ht. 3*, pp. 149-194, pls. 17-25.

JONES, D. L. (1960) : Pelecypods of the genus *Pterotrigonia* from the west coast of North America. *Jour. Palaeont., Vol. 34, No. 3*, pp. 433-439, pls. 59-60.

KOBAYASHI, T. and M. NAKANO (1957) : On the Pterotrigoniidae. *Japan. Jour. Geol. Geogr., Vol. 28, Nos. 4*, pp. 219-238, pls. 16-17.

—— and —— (1958) : The Lower and Middle Cretaceous Trigonians in Wakayama, Oita and Kumamoto Prefectures, West Japan. *Ibid., Vol. 29, Nos. 1-3*, pp. 139-162, pls. 11-12.

NAKANO, M. (1960) ; Stratigraphic Occurrences of the Cretaceous Trigoniids in the Japanese Islands and their Faunal Significances. *Jour. Sci. Hiroshima Univ., Ser. C, Vol. 3, No. 2*, pp. 215-280, pls. 23-30.

PACKARD, E. L. (1921) : The Trigoniae from the Pacific Coast of North America. *Univ Oregn Publ., Vol. 1, No. 9*, pp. 1-59, pls. 1-11.

SAVELIEV, A. A. (1958) : Lower Cretaceous Trigoniids from Manghyschlack and Western Turkmen. *Leningrad*. pp. 1-386, pls. 1-58.

STOLICZKA, F. (1871) : Cretaceous Fauna of Southern India. *Pal. Indica, Ser. 6, Vol. 3*, pp. 1-537, pls. 1-50.

STOYANOW, A. (1949) : Lower Cretaceous Stratigraphy in Southern Arizona. *Geol. Soc. Amer., Mem. 38*, pp. 1-156, pls. 8-26.

WHITNEY, M. (1952) : Some New Pelecypoda from the Glen Rose Formation of Texas. *Jour. Palaeont., Vol. 26, No. 5*, pp. 697-707, pls. 86-89.

WOODS, H. (1917) : The Cretaceous Faunas of the North Eastern Part of the South Island of New Zealand. *New Zealand Geol. Surv., Palaeont. Bull., No. 4*, pp. 1-41, pls. 1-19.

YEHARA, S. (1915) : The Cretaceous Trigoniae from Miyako and Hokkaido. *Sci. Rep. Tohoku Imp. Univ., 2nd Ser., Vol. 2, No. 2*, pp. 35-44, pls. 1-2.

—— (1923a) : Cretaceous Trigoniae from Amakusa Islands, Prov. Higo, Kyushu, Japan. *Jour. Geol. Soc. Tokyo, Vol. 30*, pp. 1-12, pls. 4-7.

—— (1923) : Cretaceous Trigoniae from Southwestern Japan. *Japan. Jour. Geol. Geogr., Vol. 2, No. 3*, pp. 59-84, pls. 8-13.

—— (1931) : *Trigoniae* in Japan. *Iwanami Lecture Series. Geology and Palaeontology* (in Japanese).

Explanation of Plate 13

(All natural size)

Pterotrigonia (*Rinetrigonia*) *yeharai*, sp. nov. ..... p. 95

Fig. 1. Modelling cast of a left valve (paratype, YEHARA's specimen; JM. 10163). Loc. Goshonoura-jima, Higo Prov., Kumamoto Pref.

Figs. 2a-b. Gypsum cast of a left valve (holotype, GH. NM. 3028a). Loc. Enokuchi in Goshonoura-jima.

Pterotrigonia (*Rinetrigonia*) sp. nov. ..... p. 96

Fig. 3. Modelling cast of an imperfect right valve (GK. H. 6057). Loc. Miyanomoto, Mifune-machi, Higo Prov., Kumamoto Pref.

Pterotrigonia brevicula (YEHARA) ..... p. 91

Fig. 4. Right valve (GH. NM. 1051). Loc. along the Pombetsu river, about 1km. above from the Ikushumbetsu coal-mines, Ikushumbetsu, Mikasa-city, Central Hokkaido.

Figs. 5a-b. An imperfect right valve (GH. NM. 1053a), showing the costation on the escutcheon. Loc. ditto.

Fig. 6. An immature left valve (GH. NM. 1058). Loc. ditto.

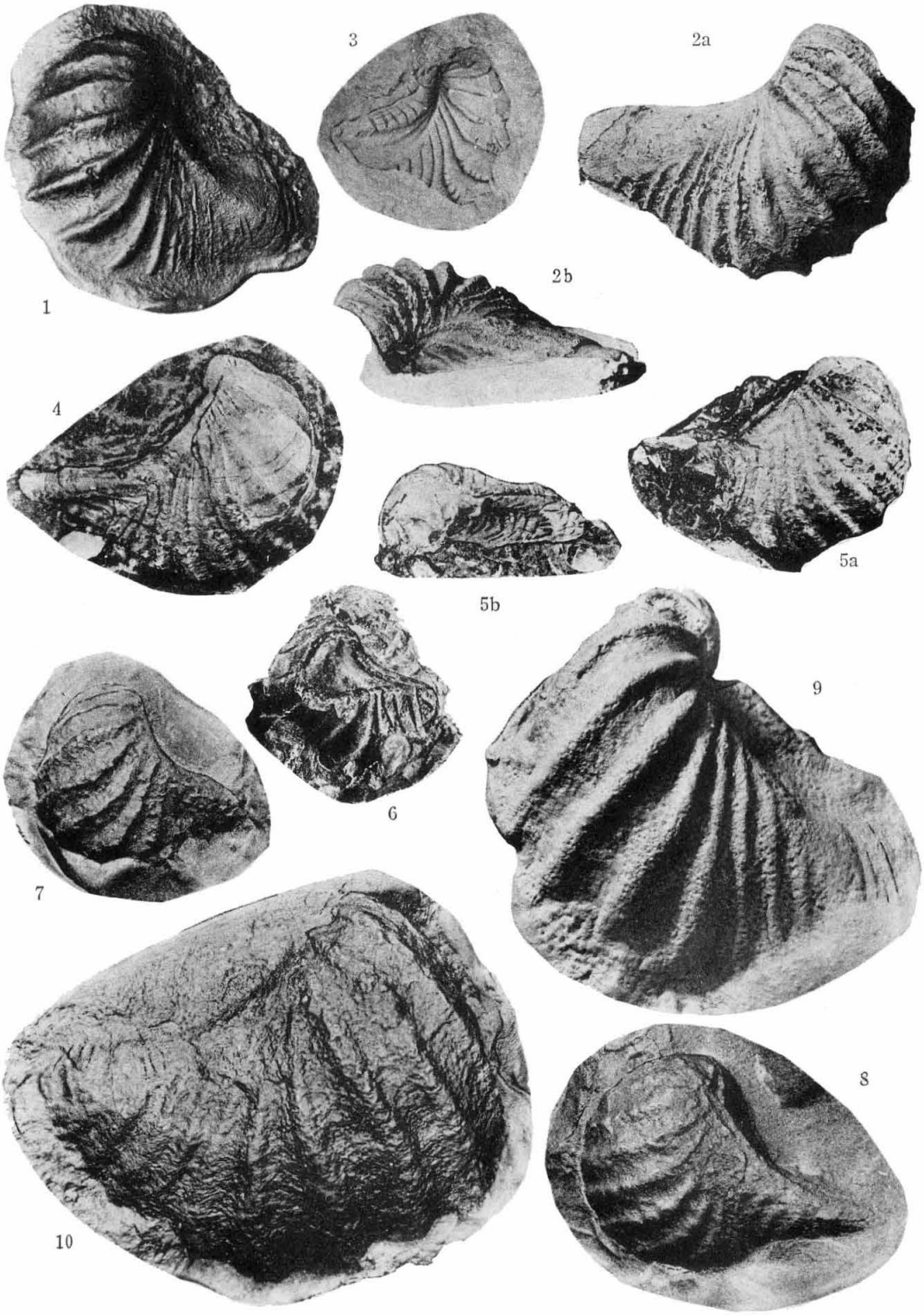
Fig. 7. Modelling cast of an imperfect left valve (GH. NM. 1054b). Loc. ditto.

Fig. 8. Modelling cast of a left valve (GH. NM. 1054a). Loc. ditto.

Pterotrigonia sakakurai (YEHARA) ..... p. 93

Fig. 9. Modelling cast of an imperfect left valve (GH. NM. Ps-01). Loc. Koshiji in Goshonoura-jima, Higo Prov., Kumamoto Pref.

Fig. 10. Modelling cast of a right valve (lectotype, JM. 10171). Loc. Goshonoura-jima.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Trans. Proc. Palaeont. Soc. Japan, N. S., No. 43, pp. 99-104, pl. 14, Sept. 25, 1961

408. THE STRATIGRAPHICAL SIGNIFICANCE OF THE VARIATION OF FOSSIL *BATILLARIA MULTIFORMIS* (LISCHKE) IN SOUTH KANTO, JAPAN*

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南関東産化石ウミニナの変異の層位学的意味：この論文は東京湾および先史東京湾のウミニナの形態を報告し，またウミニナの形態が下末吉層を含めた成田層群の上部と下部とでは異ること又三浦半島北辺の屏風浦層のウミニナの形態が成田層群の下部より出るものに一致していることおよび宮田層の大木根から出るウミニナの形態から宮田層の層位上の位置をも推定しようと試みたものである。

永　沢　譲　次

Introduction

In this paper the writer demonstrates that the Pleistocene Narita group (NAKAGAWA 1960; NAGASAWA, 1960) in south Kanto, Japan, can be divided stratigraphically into the upper and lower parts by the variation in shell form of *Batillaria multiformis* (LISCHKE), and suggests the horizon of the Byobugaura formation (MAKIYAMA, 1931) distributed in the northern border of Miura Peninsula and the Miyata formation (SUZUKI, 1932; FUJITA, 1951; HIGUCHI, 1954; MAKINO, 1960) distributed in the central part of it, South Kanto of Japan.

Thanks are due to Dr. I. HAYASAKA, the president of Shimane University for his general suggestions.

Shell Form of *B. multiformis*

Late Dr. ÔTUKA (1929, p. 379) collected several fossil specimens characterized by having the prominent subsutural tubercles, belonging to *B. multiformis* from the so-called Naganuma fourth zone (the Byobugaura formation) and considered them to be a new variety as he named *B. multiformis yamadensis*.

Dr. TAKI figured three variants (TAKI, 1937, p. 16, pl. 16, fig. 3) of *B. multiformis* in his book "Illustrated Marine Shells in Natural Colours", among which one variant with tubercles agrees with *B. multiformis yamadensis* by ÔTUKA.

The writer, from his careful observations, divides Recent and fossil *B. multiformis* into three types according to the condition of the development of subsutural tubercles: Type A without subsutural tubercles except for the body whorl, type C with prominent and often angular subsutural tubercles on almost all whorls, and intermediate type B. But, the above mentioned three forms are considered to be a variation of *B. multiformis*.

According to HAYASHI's observation (1956, p. 58) which was performed in the Midori river, Kumamoto Prefect., Japan, in the brackish water, the Melanian is ornamented with sharp spiral threads and longitudinal ribs. But, in the fresh

* Received March 9, 1961; read Jan. 15, 1961.

water, its surface is nearly smooth and he suggested that the salinity has a great influence upon its ornamentation.

According to the writer's study (1960-B) in Tokyo Bay and at the Kita-ura, Hime Island, Ôita Prefect., Japan, it appears that there is the same relation as described above, between the depth or salinity and the development of spiral ridges on the shell surface of *Rapana thomasiana* CROSSE.

The writer collected many specimens of C type of Recent and fossil *B. multiformis* from the muddy bottom of the Totoro Bay, Miyazaki Prefect., the Byobugaura formation (muddy facies), Kanagawa Prefect., the Sahama silt (KOBAYASHI, 1942), Shizuoka Prefect., the Kusanagi silt (TSUCHI, 1955), Shizuoka Prefect..

Table 1.

Locality	No. of indiv.	Type A %	Type B %	Type C %	Size	Bottom sediments of habitate
No. 1	50	90	10		Large form	Rock
No. 2	25	80	20		L. f.	Silt
No. 3	10	100			L. f. and small form	Sand
No. 4	30	100			S. f. and medium f.	Gravelly s.
No. 5	28	100			S. f. and m. f.	F. s.
No. 6*	5	80	20		L. f. and s. f.	?
No. 7*	7	100			S. f.	?
No. 8	42	83	17		S. f.	Rock
No. 9*	3		33	67	L. f.	S., r.
No. 10	60	7	63	30	L. f. and s. f.	Rock, sand
No. 11	120		42	58	L. f. and s. f.	Muddy sediments
No. 12	42	93	7		S. f.	S.
No. 13	81	8	50	42	L. f. and s. f.	Boulders

* Dead shell

Locality No. 1. Northeast of Mabori, Yokosuka City.
2. Sio-hama, Kawasaki City.
3. Coast of Makuwari, Chiba Prefect..
4. Kurozuna, Chiba City. Coll. Mitio SUZUKI.
5. Kohama, Kisarazu City.
6. Tomiura, Chiba Prefect..
7. Tateyama Bay, Chiba Prefect..
8. Kurosaki near Simo-miyata, Miura Peninsula.
9. Coast of Nishina, Izu Peninsula.
10. Inou, north of Nisiura, Atumi Bay.
11. Totoro Bay, Miyazaki Prefect..
12. Nakatu City, Ôita Prefect..
13. Shimabara, Nagasaki Prefect..

The muddy bottom of the shore is not essential factor which produced C type because many individuals of C type were collected from both muddy bottom of the one shore (the Totoro Bay) and gravelly bottom of the other (Shimabara).

Experimental investigations are necessary for the solution of the cause which produced C type, although it seems that it concerns with rather highly saline water.

Type of *B. multiformis* in Tokyo Bay and the Prehistoric Tokyo Bay

Table 1 shows the frequency of three types of Recent Japanese *B. multiformis*.

As may be noticed from Table 1, type of *B. multiformis* in Tokyo Bay is generally A.

Table 2.

Locality	No. of indiv.	Type A %	Type B %	Type C %	Size	Lithofacies
No. 1	18	94	6		Small form.	Fine sand
No. 2	8	25	75		S. f., medium f.	F. s., silt
No. 3	3	70	30		S. f.	F. s.
No. 4	1	100			S. f.	F.~coarse s.
No. 5	2	100			S. f.	? Silt
No. 6	6	100			S. f.	F. s.
No. 7	24	96	4		Medium f., s. f.	F. s.
No. 8	6	83	17		Large f., s. f.	F. s., silt

Locality No. 1. The new drainage-pass of the Naka river, Edogawa-ku, Tokyo City. Coll. Yosiro KITAMURA and the writer.
2. Hana-batake-machi, Adachi-ku, Tokyo City. Coll. M. SUZUKI and the writer.
3. Sio-hama, Kawasaki City.
4. Near the Kohoku bridge, Adachi-ku, Tokyo City. Coll. M. SUZUKI.
5. South of Higashi-hakuraku station, Kanagawa Prefect..
6. North of Makuwari, Chiba Prefect..
7. Dezu, Chiba City.
8. Coast of Sanuki-machi, Chiba Prefect..

Table 2 shows the frequency of two types of fossil *B. multiformis* from older Holocene deposits of the environs of Tokyo: Deposits of the Prehistoric Tokyo Bay.

As may be noticed from Table 2, type of *B. multiformis* in the Prehistoric Tokyo Bay seems to be generally A.

Table 3.

The northern border of the Miura Peninsula

	Formation	Locality	No. of indiv.	Type A %	Type B %	Type C %	Range of Height (in mm)	Lithofacies
Up. part	Simosueyoshi	Kikuna	7	57	43		18+~23+ ; small form	Fine sand, silt
Low. part	Byobugaura	Usiroyamada, Inariyato, Byobugaura	16		19	81	23+~34+ ; s. f. and large f.	Fine sand, silt, medium sand
	The southern part of the Miura Peninsula							
	Miyata	Ôkine	62	11	65	24	23+~30+ ; s. f. and l. f.	Silt
	The Bôsô Peninsula (Narita Group)							
Up. part	Kiorosi	Hossaku Izumi, Matudo	6	100			15+~18+ ; s. f.	Medium sand
	Bôyatu shell bed	Bôyatu	8	63	37		16+~22+ ; s. f.	Fine sand~ coarse s.
	Iriyamazu shell bed	Iriyamazu	1		100		25+ : s. f.	Fine sand
Low. part	Tatunokuchi-Kiyokawa shell beds (Yabu F.)	Tatunokuchi, Kiyokawa, Kamiizumi	23	52	39	9	18+~28+ ; s. f. and l. f.	Fine sand, silt
	Atebi shell bed (Zizôdô F.)	Atebi	12		25	75	23+~27+ ; s. f. and l. f.	Sand
	Nishiyatu upper shell bed	Mizumoto, Nishiyatsu	4	50		50	26+~37+ ; s. f. and l. f.	Medium sand, fine sand
	Sanuki silt (Sasage F.)	Coast of Sanuki-machi	9	33	23	44	23+~38+ ; s. f. and l. f.	Fine sand

+ denotes wear of a shell

Type of *B. multiformis* from the Narita Group

As may be noticed from Table 3, from the upper part of the Narita group of the Bôsô Peninsula and also the Shimosueyoshi formation which is an extension of it, small adult forms of type A and type B are collected, but dominantly type C containing large form, from the lower part of the Narita group.

The above fact may probably be considered as a result based mainly on the ecological change of *B. multiformis*.

Type of *B. multiformis* from the Byobugaura Formation

From the table 3, the writer points out the fact that types and size of *B. multiformis* from the Byobugaura formation which is correlated with any horizon of the lower part of the Narita group from the stratigraphical standpoint also coincide with that from the lower part, espe-

cially the Zizôdô, Nishiyatsu and Sasage formations, of the Narita group.

Probable Horizon of the Miyata Formation

The exact stratigraphical position of the Miyata formation which is unconformably overlain by the Musashino loam correlated recently by the writer, in the Pleistocene series, as far, is unknown, but it is not impossible to correlate the Miyata formation containing mainly type B and type C, with any horizon of the lower part of the Narita group owing to the accordance with types and size of *B. multiformis*.

References

FUJITA, Y. (1951), On the Mechanism of Sedimentation of Miyata Formation. *Jour. Geol. Soc. Japan, Vol. 57, No. 664*, pp. 21–28.

HAYASHI, Y. (1956), On the Variation of *Corbicula* due to Environmental Factors. *Venus. Vol. 19, No. 1*, pp. 54-60.

HIGUCHI, Y. (1954), Fossil Foraminifera from the Miyata Formation, Miura Peninsula, Kanagawa Prefect., *Jour. Geol. Soc. Jap. Vol. 60, No. 703*, pp. 138-144.

KOBAYASHI, K. (1942), Pleistocene Stratigraphy around Lake Hamana. *Jour. Geol. Soc. Jap., Vol. 49, No. 587*, pp. 326-331.

MAKIYAMA, J. (1931), The Pleistocene Deposits of South Kanto, Japan. *Japan. Jour. Geol. Geog., Vol. 9*, pp. 21-53.

MAKINO, T. (1960), Fossil Biocoenosis in the Miyata Formation. Part 1. *Jour. Geol. Soc. Japan, Vol. 66, No. 778*, p. 457.

NAKAGAWA, H. (1960), On the Stratigraphy of Jizôdô and Yabu formations. *Jour. Geol. Soc. Japan, Vol. 66, No. 776*, pp. 305-310.

NAGASAWA, J. (1960-A), On the Geological Age of *Menyanthes* Bearing Beds in the Southern Kanto Region. *Jour. Geol. Soc. Japan, Vol. 66, No. 777*, pp. 384-392.

—— (1960-B), On the Variation of *Rapana thomasiana* CROSSE in the Pleistocene Formations of the Bôsô Peninsula. *Sci. Rep. Tohoku Univ., Sendai, 2nd Ser. (Geol.) Spec. Vol., No. 4*, pp. 502-508.

ÔTUKA, Y. (1930), On the Stratigraphy of the Northern Part of the Miura Peninsula and the variation of the Shore-Line in the Latest Geological Age in the Southern Part of Kanagawa Prefect., *Jour. Geol. Soc. Japan, Vol. 37, No. 442*, pp. 343-386.

SUZUKI, K. (1932), On the Pliocene Series near Atsuki, Kanagawa Prefect., Part 2. *Jour. Geol. Soc. Japan, Vol. 39, No. 462*, pp. 97-132.

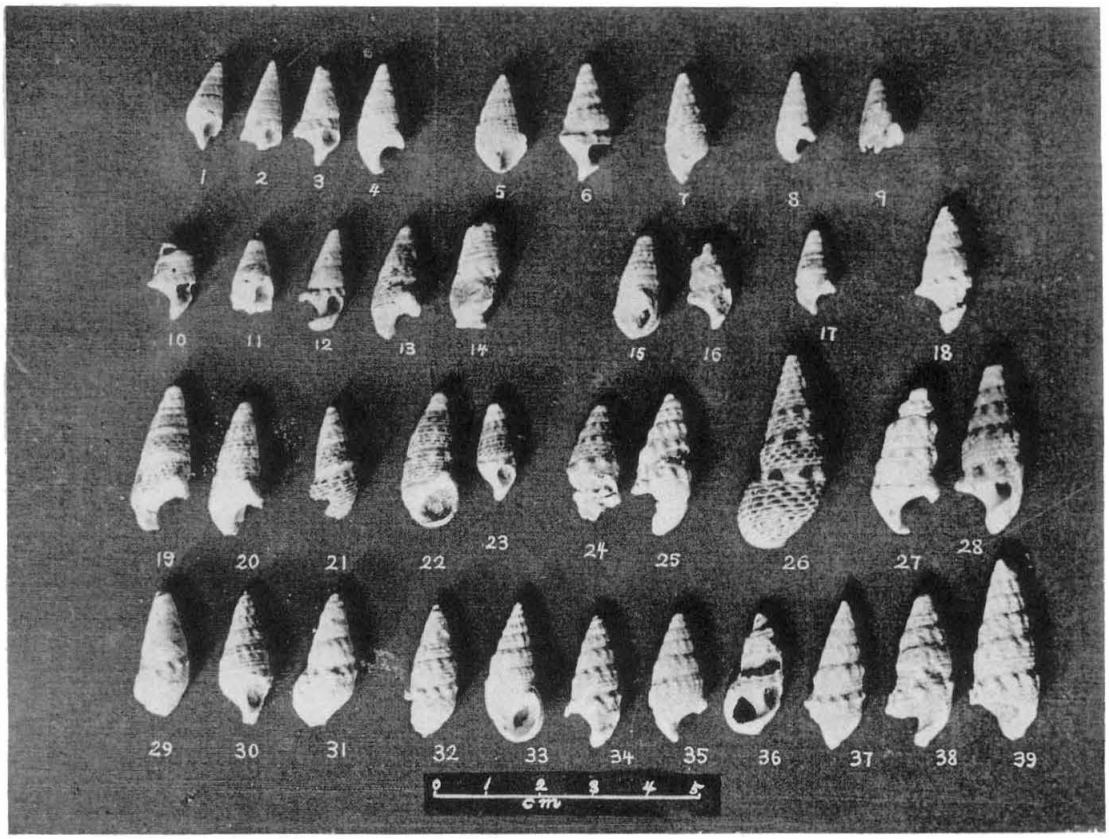
TAKI, I. (1937), Illustrated Marine Shells in Natural Colours. 81 pp., 60 pls.

TSUCHI, R. (1955), On the Depositional Condition of the Kusanagi Mud, the Pleistocene Bed, Shizuoka, Japan. *Rep. Lib. Art. Fac. Shizuoka Univ. Vol. 1, No. 7*, pp. 61-68.

Explanation of Plate 14

Batillaria multiformis (LISCHKE)

Figs. 1–4. Type A, Kikuna.
Figs. 5–7. Type B, Kikuna.
Figs. 8–9. Type A, Hossaku.
Figs. 10–14. Type A, Bôyatu, east of Chiba City.
Figs. 15–17. Type B, Bôyatu.
Fig. 18. Type B, Iriyamazu.
Figs. 19–21. Type A, cliff, 1.3 km east of Kiyokawa station.
Figs. 22–23. Type B, cliff, 1.3 km east of Kiyokawa station.
Figs. 24–25. Type C, Atebi.
Fig. 26. Type C, Mizumoto, near Kisarazu City.
Figs. 27–28. Type C, Sanuki silt.
Fig. 29. Type B, Inariyato.
Figs. 30–31. Type B, Ushiroyamada.
Figs. 32–39. Type C, Ushiroyamada.
Figs. 40–42. Type A, Ôkine.
Figs. 43–49. Type C, Ôkine.
Figs. 50–52. Type C, Kusanagi silt.
Figs. 53–57. Type C, Totoro Bay.
Figs. 58–61. Type B, Inou, north of Nisiura, Atumi Bay.
Figs. 62–66. Type A, Northeast of Mabori, Yokosuka City.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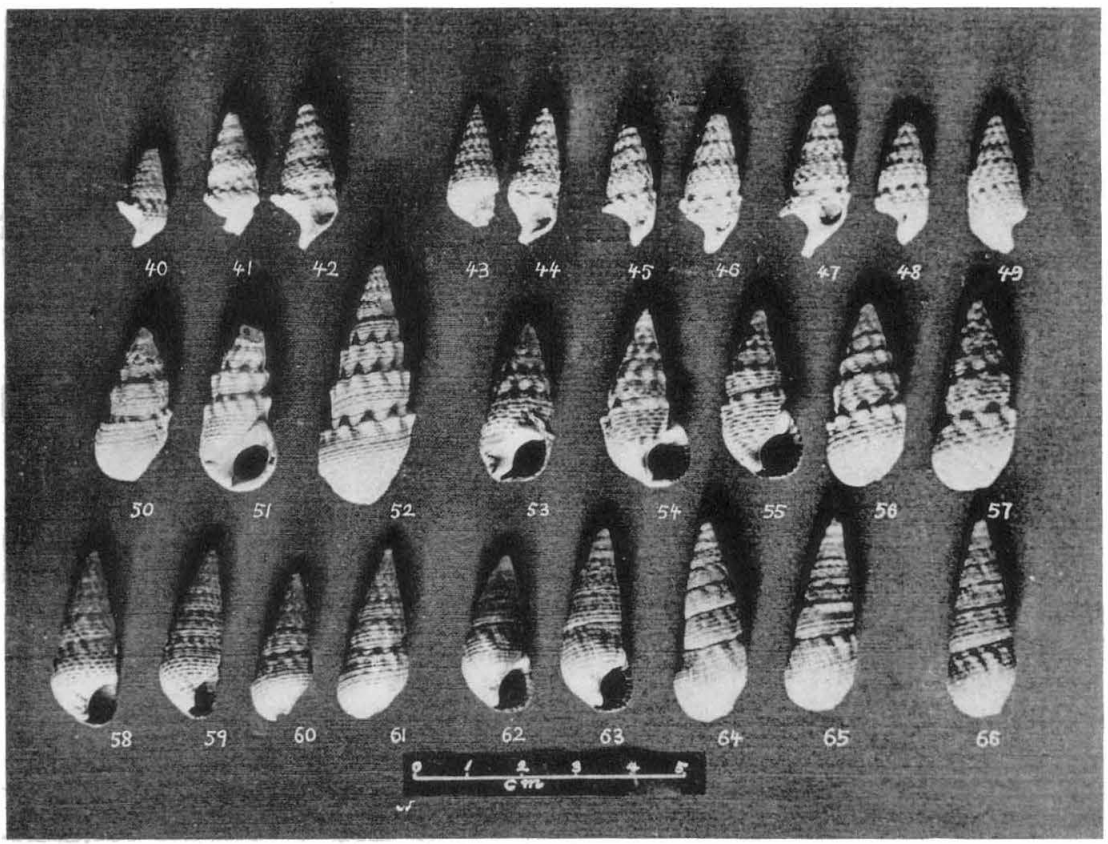
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409. LOWER PERMIAN BRYOZOA FROM MIHARANO, TAISHAKU PLATEAU, SOUTHWESTERN JAPAN*

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帝釈石灰岩台地三原野産下部二畳紀蘚虫化石：三原野からは紡錘虫をはじめ多くの化石が産するがこゝでは蘚虫化石 5 種を記載した。これらのうちとくに *Polypora eliasi* n. sp. の系統的な考察及び *Anastomopora* 属についての検討をおこなった。

坂上澄夫・赤木三郎

Introduction and Acknowledgements

Although there are many reports on the geology and paleontology of the said area by YOSHINO (1937), FUJIMOTO (1944), YABE (1948), YOKOYAMA (1957, 1960), ENDO (1957), KONISHI (1960), and AKAGI (1958a, 1958b), no description has yet been made of the bryozoan fossils.

In this article, the writers describe some Permian Bryozoa collected from the Miharano formation distributed in Miharano, in the eastern part of the Taishaku district, Tojo-machi, Hida-gun, Hiroshima Prefecture, Southern Japan.

Here the writers express their sincere thanks to Dr. Haruyoshi FUJIMOTO, Professor Emeritus of the Tokyo University of Education for his kind advice and encouragement throughout the course of the present study. Thanks are also due to Mr. Isao NISHIKAWA of Yuki-machi, Jinseki-gun, Hiroshima Prefecture, for his kind information and guidance to the fossil locality, and Professor Kotora HATAI of the Tohoku University for his kindness in reading this manuscript.

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Remarks on the Stratigraphy

AKAGI (1958) investigated the geology and paleontology of the Permian rocks distributed in the eastern part of the Taishaku district, and recognized four lithologic units, which in descending order are as follows:

Arito formation: Alternation of sandstone and shale, graywacke type sandstone interbedding conglomeratic limestone or lenticular dark gray limestone breccia. *Yabeina shiraiwaensis*, *Lepidolina* sp., *Rauserella* sp., corals, brachiopods.

.....conformity.....

Ippaimizu formation: Dark gray massive limestone, dark gray conglomeratic limestone. Marginal lithofacies change into

non-calcareous rocks. *Neoschwagerina craticulifera, Verbeekina verbeeki, Pseudodoliolina ozawai*, minor foraminifera, corals, bryozoa.

.....unconformity.....

Uyamano formation: Crystallized limestone, oolitic white limestone correlative with the *Parafusulina* zone. The northern part yields many *Schwagerina* and *Parafusulina* in the same horizon.

.....conformity.....

Miharano formation: White compact massive limestone, in places bioclastic limestone. *Pseudoschwagerina, Triticites, Pseudofusulina*, corals, molluscs, brachiopods, trilobites, bryozoa, etc.

The Miharano formation which is the lowest unit is classified into three subzones, namely *Pseudofusulina krotowi* subzone, *Pseudoschwagerina miharanoensis* subzone, and *Triticites nishikawai* subzone in descending order.

Locality and Mode of Occurrence of the Bryozoa

The specimens of bryozoa occur from the massive limestone of the *Triticites nishikawai* subzone exposed in the southern slope of Miharano at about 1000 meters north of the Jufukuji-temple of Shimen-Gôtani, Tojo-machi, Hiba-gun, Hiroshima Prefecture. They were found in the compact white massive limestone which consists of a clear calcite matrix, and associated with smaller foraminifers, corals, brachiopods, molluscs and the other invertebrate fossils, which could be easily separated from the matrix. The best specimens are from the locality no. M-002.

The Miharano fauna occurs in dense arrangement in the rocks. They are well preserved in close contact with one another retaining their entire outer shells or occur as casts and molds, which still preserve their external sculpture.

This subzone yielded *Triticites nishikawai* AKAGI (MS), *T. subobsoletus, T. simplex, T.* sp., *Amblysiphonella yoshinoi, A.* cf. *dichotoma, Stylidophyllum yokoyamai tertioseptum, Huangia misakensis*, crinoid gen. et sp. indet., *Aviculopecten* sp., *Annuliconcha* sp. *Pleurotomaria* sp., *Agathiceras* sp., *Leptodus* sp., *Richthofenia* sp., *Squamularia* sp., *Spirifer* sp., *Waagenoconcha* sp., *Cyclus japonicus* (MS), and *Pseudophyllipsia* sp. besides others. The bryozoa described in this article occur in association with the above mentioned fossils.

Remarks on the Bryozoan Fauna

The following bryozoan species were discriminated from the *Triticites nishikawai* subzone of the Miharano formation.

Fistulipora miharanoensis SAKAGAMI and AKAGI, n. sp.

Batostomella sp. indet.

Fenestella (*Minilya*) *taishakuensis* SAKAGAMI and AKAGI, n. sp.

Polypora eliasi SAKAGAMI and AKAGI n. sp.

Anastomopora orientalis SAKAGAMI and AKAGI, n. sp.

Streblascopora lineata SAKAGAMI and AKAGI, n. sp.

Fistulipora miharanoensis n. sp. compared with previously known species is nearest to *F. compacta* CROCKFORD which was reported from the *Calceolispongia* Stage of the Wandagee Series (correlated to the late Artinskian to upper Kungrian by CROCKFORD (1951)) in Western Australia. *Fenestella taishakuensis* n. sp. may be an ancestral form of *Fenestella rhomboidea* NIKIFOROVA which was reported from the zone of *Parafusulina anderssoni* (Chernaiarechka zone) (by ELIAS and CONDRA (1957)). *Polypora eliasi* n. sp., *Anastomopora orientalis* n. sp. and *Streblascopora lineata* n. sp. are considered

to be important for consideration of the geological age. *Polypora eliasi* n. sp. belongs to the Group of *P. elliptica* by ELIAS (1937) and if ELIAS opinion is correct, the present species may indicate an age corresponding to latest Uralian to Sakumarian. *Anastomopora orientalis* n. sp. may be correlated with *Anastomopora borealis* (STUCKENBERG) which was reported from the lower Permian (P_1) of Timan, USSR. *Streblascopora lineata* n. sp. is easily distinguishable from the other species in the genus, but the present genus is not known before the lower Permian. From the above mentioned facts, it is considered that the limestone may at least correspond to the lower Permian from the bryozoan fauna.

Repository:—All of the specimens treated in this paper are preserved in the collection of the Geological and Mineralogical Institute, Tokyo University of Education.

Description of Species

Fistulipora miharanoensis SAKAGAMI and AKAGI, n. sp.

Pl. 15, figs. 3, 4.

A single obliquely longitudinal section. The material can be separated easily from the previously described species of the genus. The material is a part of a small ramose zoarium, about 4 mm wide and 9 mm long. Zooecium oval, its longer diameter 0.28 mm to 0.32 mm, and shorter diameter 0.24 mm to 0.28 mm, and usually 2.5 to 3 zooecia in 2 mm. Interspaces between zooecial tubes measure 0.28 mm to 0.32 mm, but occasionally attached to each other. Vesicular tissue thin-walled, irregular and coarse in inner zone of longitudinal section, but gradually becomes slightly thicker-walled, smaller and quadrilateral or fish-scale like near surface. In inner zone of tangential section, vesicular tissue irregularly polygonal. One or two rows of vesicles occur in interspaces between zooecial tubes. Lunarium very weak or absent. Thick diaphragms straight or slightly concave, develop frequently, usually 6 in 2 mm of zooecial tube.

Remarks:—The present form is characteristic in the irregular and coarse vesicular tissue. In this character, it is somewhat resembles *Fistulipora compacta* CROCKFORD (1944) which was reported from the *Calceolispongia* stage of the Wandagee Series in Western Australia. However, the present form differs from *F. compacta* by the shorter diameter of the zooecial tube.

Reg. no. 22232 (holotype).

Batostomella sp. indet.

Pl. 15, fig. 7.

A single section longitudinal to tangential. From the longituginal section, it is known that the zoarium is ramose, its diameter about 4 mm. Zooecial tube circular or oval, 0.14 mm to 0.16 mm in diameter near surface. Mesopore seldom occurs, its diameter about 0.08 mm. Interspaces between zooecial tubes very wide in the outer part of mature region. Many minute acanthopores arranged at random and regular in size, 0.004 mm to 0.006 mm. Diaphragms present, but not counted owing to unfavorably oriented section.

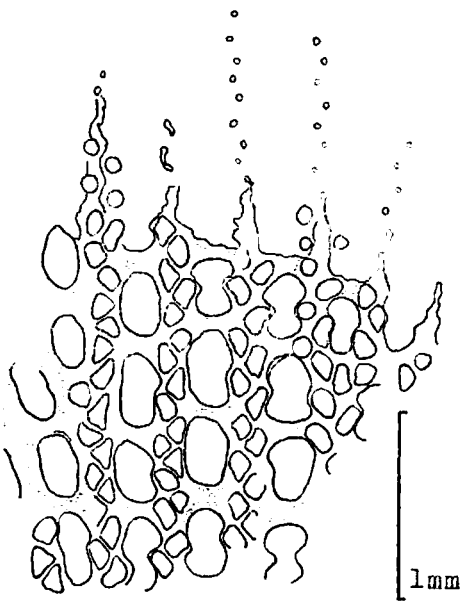
Remarks:—The present from is represented by a single section of an ill-preserved specimen insufficient for specific identification. A larger number of specimens are necessary for comparison with the previously described species.

Reg. no. 22233.

Fenestella (Minilya) taishakuensis SAKAGAMI and AKAGI, n. sp.

Pl. 15, fig. 8; text-fig. 1.

Zoarium fan-shaped, consists of straight branches connected by dissepiments at regular intervals. Branch 0.16 mm to 0.21 mm in width and 25 to 26 in 10 mm horizontally. Width of dissepiment 0.08 mm to 0.11 mm. Fenestrule ellipsoidal or rectangular with rounded corners in outline, its width and length 0.16 mm to 0.21 mm and 0.32 mm to 0.37 mm, respectively. Number of fenestrules 22 to 24 in 10 mm vertically. Zooecial apertures 0.08 mm to 0.09 mm, 22 to 24 in 5 mm length of one row, usually 2 apertures per fenestrule; sharply triangular at middle level of branch and of kidney-like form at upper level. Zooecial tube bending outward. Carina prominent, with two rows of zigzag nodes. Diameter of node 0.032 mm to 0.040 mm, 44 to 48 in in 5 mm length of branch. Distance between nodes about 0.064 mm.



Text-fig. 1. *Fenestella (Minilya) taishakuensis* SAKAGAMI and AKAGI, n. sp. Tangential section, Reg. no. 22235.

Meshwork formula:—25-26/22-24//44-48*.

Remarks:—The present form may be included into the Group IX (*Fenestella plummerae* Group) by ELIAS and CONDRA (1957), and is very close to *Fenestella rhomboidea* NIKIFOROVA in the external features and stabilization of dissepiments in relation to apertures. However, the present species may be an ancestral form of *F. rhomboidea*, as it has finer meshwork formula (in *F. rhomboidea* 18-20/18-19//19-20/38-40).

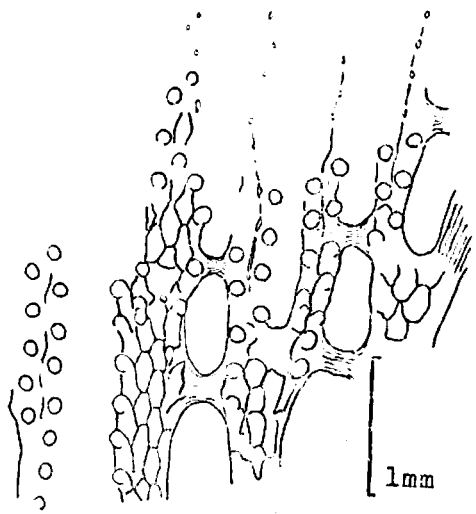
Reg. nos. 22234 (holotype), 22235.

Polypora eliasi SAKAGAMI and AKAGI, n. sp.

Pl. 15, figs. 1, 2; text-fig. 2.

Zoarium fan-shaped, consists of straight branches connected by dissepiments at regular intervals. Branch 0.24 mm to 0.48 mm in width and 14 to 15 in 10 mm horizontally. Width of dissepiment about 0.16 mm. Fenestrule ellipsoidal or rectangular with rounded corners in outline, its width and length 0.32 mm to 0.43 mm and 0.80 mm to 0.85 mm, respectively. Number of fenestrules 9 to 10 in 10 mm vertically. Zooecial aperture circular in shape and arranged in alternating longitudinal series, usually 3 rows on each branch, but four rows before bifurcation which subsequently split in-

* 25-25: branches in 10 mm of width of zoarium, 22-24: fenestrules in 10 mm of length of zoarium, 22-24: zooecia in 5 mm of length of branch, 44-48: nodes in 5 mm of length of branch.



Text-fig. 2. *Polypora eliasi* SAKAGAMI and AKAGI n. sp. Tangential section, Reg. no. 22237.

to two on each side of two new branches, 18 to 20 in 5 mm length of one row, 3 to 4 apertures per fenestrule; oblique oval or rectangular with rounded corners at lower level of branch, of kidney-like form at middle level and circular at upper level. Diameter of zooecial apertures 0.096 mm to 0.104 mm and distance between zooecial apertures 0.128 mm to 0.16 mm. Diameter of node 0.040 mm to 0.052 mm, 18 to 20 nodes in 5 mm length of one row, and distance between nodes 0.16 mm to 0.26 mm. Line separating rows of zooecia appearing nearly straightly, but undulating at lower level. Tissue between zooecial apertures composed fine and closely arranged granules.

Meshwork formula:—14-15/9-10//18-20/18-20.

Remarks: -The present form has not been observed form the obverse surface. However, the reverse surface and thin section are sufficient for study.

The present form is included into the Group of *Polypora elliptica* by ELIAS (1937). ELIAS discussed the evolutionary change in the *Polypora elliptica* Group and concluded that the zoarium shows homogeneous expansion with the advance of geologic time, the distance between the branches, fenestrules and zooecia being gradually increased from the smallest in *P. elliptica* of the Missouri Series to the largest in *P. tripliseriata* of the Permian of Timor. The table shows the measurments for comparison of the present from and the previously described species of the group. The present form can be easily distinguished form *P. tri-*

Table 1. Comparison of the Species belonging to *Polypora elliptica* Group.

Species	Locality	Age	Distance between		
			Branches	Fenestrules	Zooecia
P. tripliseriata	Timor	Artinskian	0.87	1.25	0.31
P. eliasi n. sp.	Taishaku, Japan	Sakumarian (Wolfcampian)	0.80	1.05	0.29
P. elliptica mut. *β*	Howard limestone Kansas	Virgil Series Wabaunsee Group	0.77	1.02	0.27
P. elliptica (s. s)	Oread limestone Kansas	Virgil Series Shawnee Group	0.69	0.87	0.26
P. elliptica mut. *α*	Drum limestone Kansas	Missouri Series	0.64	0.77	0.25

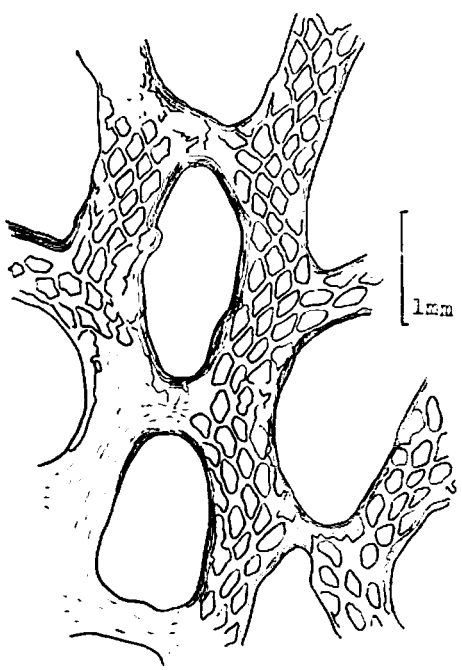
pliseriata by the smaller distances between the branches, fenestrules and zooecia; and is nearest to *P. elliptica* mut. *β* ELIAS which was reported from the Wabaunsee Group of Kansas but is slightly larger in the measurements.

Reg. nos. 22236 (holotype), 22237.

Anastomopora orientalis SAKAGAMI and AKAGI, n. sp.

Pl. 15, figs. 9, 10; text-fig. 3.

Zoarium forming reticula e expansion, consisting of anastomosing branches. Width of branch 0.60 mm to 0.68 mm and about 7 branches in 10 mm, horizontally. Fenestrules variable in shape, oval, rounded rectangular or rhomboidal; but relatively regular in size. Width and length of fenestrule 0.72 mm to 1.00 mm and 1.40 mm to 1.64 mm, respeccively; usually 4.5 fenestrules in 10 mm, vertically. Zooecial apertures arranged in alternating longitudinal series, usually 4 to 5 rows on each branch, but occasionally 3 rows of zooecia. Near obverse surface, section of zooecia oval in shape, its diameter 0.096 mm to 0.112 mm and distance between zooecial tubes measured along longitudinal row 0.16 mm to 0.192 mm, but becomes sharply rhomboidal at middle to lower level of branch. Occasionally, zooecial tubes arranging into two outer rows which seem to bend outwards. Thick stereom covering the reverse side. No capillary developed.



Text-fig. 3. *Anastomopora orientalis* SAKAGAMI and AKAGI, n. sp. Tangential section, Reg. no. 22239.

Meshwork formula:—7/4.5//15?/4-5*.

Remarks:—With regard to the genus *Anastomopora* and *Reteporidra*, discussions have been given by NICKLES and BASSLER (1900) and NIKIFOROVA (1938). The genus *Reteporidra* was proposed by NICKLES and BASSLER (1900) for *Reteporella* which was established by SIMPSON (1895), because it was preoccupied a generic name of a recent organism by BUSK (1883), and at that time, *Anastomopora* was included in the newly established genus *Reteporidra* as a synonym. However, later BASSLER (1953) reestablished the generic name *Anastomopora* in so far as it was proposed prior to the name *Reteporidra*.

On the other hand, NIKIFOROVA stated that *Reteporidra* should be taken to replace the generic name *Reteporella* and the presence of a thickend margin is not proper to the genus *Reteporella*, but is characteristic of *Anastomopora*. Therefore, NIKIFOROVA recognized the two genera *Anastomopora* and *Reteporidra*.

It is the writers' opinion that the

* 7: branches in 10 mm of width of zoarium, 4.5: fenestrules in 10 mm of length of zoarium, 15?: zooecia in 5 mm of length of branch, 4-5: number of rows of zooecia.

presence of a thickend margin is not so important to divide the genus as NICKLES and BASSLER already pointed out; therefore, *Reteporidra* should be included in the genus *Anastomopora* as a synonym.

Several species belonging to the genus *Anastomopora* have been known from the Devonian of the U. S. A. and from the Permian-Carboniferous of USSR, but the latters were recorded under the generic name of *Reteporidra*.

The present form is nearest to *Anastomopora borealis* (STUCKENBERG) which was reported from the lower Permian of Timan of USSR by STUCKENBERG (1895) and reexamined by NIKIFOROVA (1938) in detail, in the meshwork formula. However, the present form can be distinguished by the narrow width of branch and larger fenestrule.

Reg. nos. 22238 (holotype), 22239.

Streblascopora lineata SAKAGAMI and AKAGI, n. sp.

Pl. 15, figs. 5, 6.

A single longitudinal section. Zoarium slender and ramose, its diameter about 1.5 mm. Central bundle of small parallel tubes surrounded by zooecial tube circular or oval and about 0.21 mm in diameter. Length of zooecium from bundle to aperture 0.96 mm to 1.15 mm. Mesopores present but indistinctly observed owing to single longitudinal section. Wall of adjacent zooecial tubes separated by a dark line. Diaphragms lacking, but one superior and inferior hemisepta developed in a single tube. Superior hemiseptum disposed at center of length of tube and arises at about 40 degree from proximal side of wall, and inferior hemiseptum disposed at opposite side of slightly outer part of superior hemiseptum and arises at right angles from the wall.

Remarks:—It is not necessary to compare the present new species with the previously described one, because it can be easily distinguished by the thick wall of the adjacent zooecial tubes being separated by a dark line.

Reg. no. 22240 (holotype).

References

AKAGI, S. (1958a): On Some Permian Porifera from Japan. *Jubilee Publ., Commem. Prof. H. FUJIMOTO*, pp. 66-73, 1 pl.

—— (1958b): *Pseudoschwagerina miharanoensis*, A New Permian Fusulinid, and its Growth and Form. *Sci. Rept. Tokyo Kyoiku Daigaku, Sec. C, Vol. 6, no. 54*, pp. 147-156, 1 pl.

BASSLER, R. S. (1929): Permian Bryozoa of Timor. *Paläont Timor, xvi. Lief., vol. xxviii*, pp. 37-89, pls. CCXV (1)-CCXLV (23).

—— 1953: Treatise on Invertebrate Paleontology. G: Bryozoa. *Kansas Univ. Kansas Press*. pp. G1-G253.

CROCKFORD, J. (1944): Bryozoa from the Permian of Western Australia, Part I: Cyclostomata and Cryptostomata from the Northwest Basin and Kimberley District. *Proc. Linnean Soc., N. S. W., Vol. 69, pt. 3-4*, pp. 139-175, pls. 4, 5.

—— (1951): The Development of Bryozoan Faunas in the Upper Palaeozoic of Australia. *Ibid., Vol. 76*, pp. 105-120.

—— (1957): Permian Bryozoa from the Fitzroy Basin, Western Australia. *Commonwealth of Aust., Dept. Nat. Devolop. Bureau of Min. Res., Geol. Geophysics, Bull. No. 34*, pp. 1-137, pls. 1-21.

ELIAS, M. K. (1937): Stratigraphic Significance of Some Late Paleozoic Fenestrate Bryozoans. *Jour. Paleont., Vol. 11, no. 4*, pp. 306-334, Text-figs. 1-3.

ELIAS, M. K. and CONDRA, G. E. (1957): *Fenestella* from the Permian of West Texas. *Geol. Soc. Amer., Mem. 70*, pp. 1-158, pls. 1-23.

ENDO, R. (1957): Stratigraphical and Paleontological Studies of the Later Paleozoic Calcareous Algae in Japan. XI. Fossil Algae from the Taishaku District, Hiro-

shima-ken, and Kitami-no-kuni, Hokkaidô. *Sci. Rept. Saitama Univ., Ser. B. Vol. II, no. 3*, pp. 279–305, pls. 37–44.

FUJIMOTO, H. (1944) : Paleontolcgical Study on Titibu System of Taishaku-kyo Region, Hiroshima Prefecture. (in Japanese) *Bull. Geol. Min. Inst. Tokyo Bunrika Daigaku, no. 1*, pp. 1–19.

KONISHI, K. (1960) : *Sinopora dendroidea* (YO). Auroporoid Coral from Late Permian of Western Honshu. *Trans. Proc. Palaeont. Soc. Japan, N.S., no. 40*, pp. 325–328.

NICKLES, J. M. and BASSLER, R. S. (1900) : A Synopsis of American Fossil Bryozoa including Bibliography and Synonymy. *U. S. Geol. Surv., Bull. 173*, pp. 1–663.

NIKIFOROVA, A. I. (1938) : Types of Carboniferous Bryozoa of the European Part of the USSR. *Paleont. USSR, Vol. IV, Pt. 5, Fasc. 1*, pp. 1–290, pls. I–LV.

STUCKENBERG, A. (1895) : Korallen und Bryozoen der Steinkohlenablagerungen des Urals und des Timan. *Com. Géol. Mém. 10, Fasc. 3*, pp. 1–244, pls. 1–24.

YABE, H. (1948) : Two Permian Fossils from China and Japan of Uncertain Affinity. *Proc. Japan Acad., Vol. 25, no. 6*.

YOKOYAMA, T. (1957) : Notes on Some Carboniferous Corals from Taishaku District, Hiroshima Prefecture, Japan. *Jour. Sci., Hiroshima Univ., Ser.C, Vol. 2, no. 1*, pp. 73–82, pls. 10–12.

——(1960) : Permian Corals from the Taishaku District, Hiroshima Prefecture, Japan. *Trans. Proc. Palaeont. Soc. Japan, N.S., no. 38*, pp. 239–248, pls. 27, 28.

YOSHINO, M. (1937) : Palaeozoic Fossils found in the Limestone of Taishakudai, Bingo Province (I–II). *Jour. Geogr., Vol. XLIX, no. 580*, p. 269, *no. 581*, p. 309.

Explanation of Plate 15

Figs. 1, 2. *Polypora eliasi* SAKAGAMI and AKAGI, n. sp.
1, Tangential section, ×5, Reg. no. 22237 ;
2, Reverse surface, ×2, Reg. no. 22236.

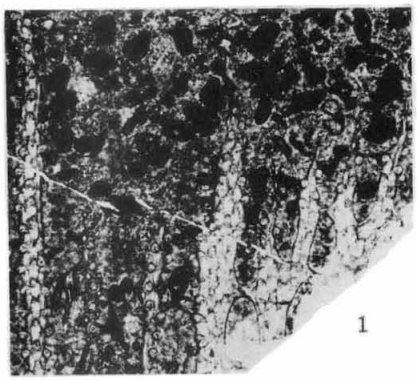
Figs. 3, 4. *Fistulipora miharanoensis* SAKAGAMI and AKAGI, n. sp.
3 Obliquely longitudinal section, ×10, Reg. no. 22232 ;
4, Enlarged part of Fig. 3, ×30.

Figs. 5, 6. *Streblascopora lineata* SAKAGAMI and AKAGI, n. sp.
5, Longitudinal section, ×20, Reg. no. 22240 ;
6, Enlarged part of Fig. 5 (tangential part), ×60.

Fig. 7. *Batostomella* sp. indet.
Oblique section, ×10, Reg. no. 22233.

Fig. 8. *Fenestella (Minilya) taishakuensis* SAKAGAMI and AKAGI, n. sp.
Reverse surface, ×3, Reg. no. 22234.

Figs. 9, 10. *Anastomopora orientalis* SAKAGAMI and AKAGI, n. sp.
9, Reverse surface, ×2, Reg. no. 22238 ;
10 Tangential section, ×5, Reg. no. 22239.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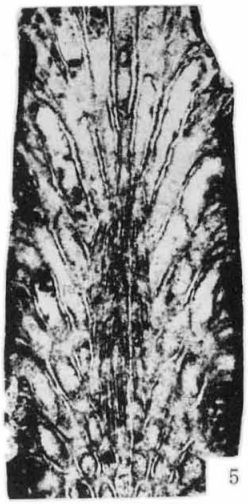
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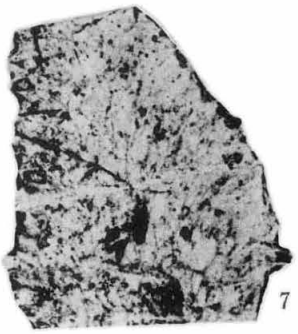
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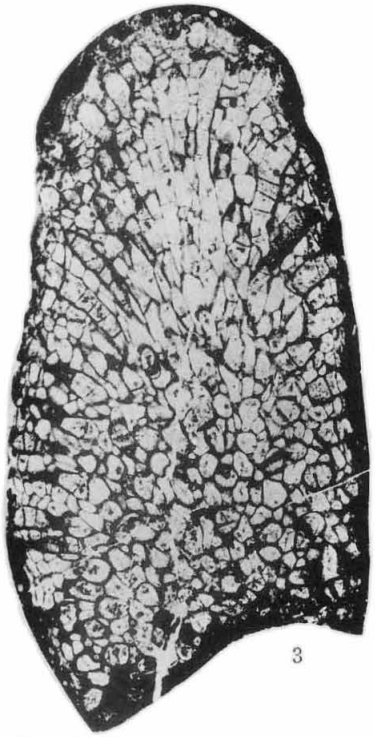
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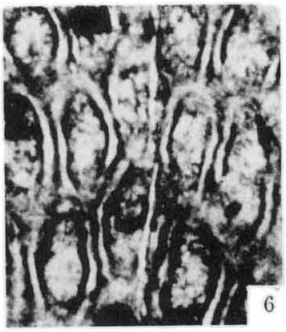
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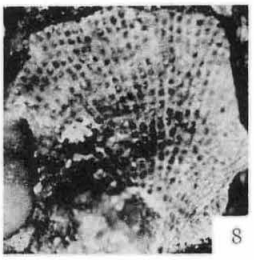
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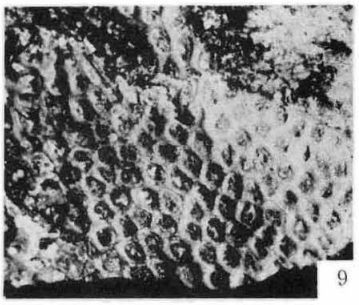
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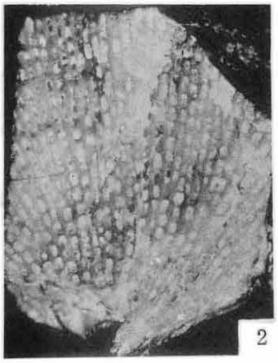
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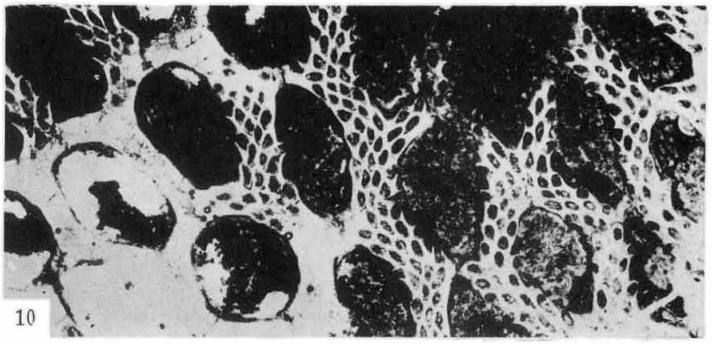
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SAKAGAMI photo

Trans. Proc. Palaeont. Soc. Japan, N. S., No. 43, pp. 113-116, pl. 16, Sept. 25, 1961

410. PELECYPODS FROM THE LIASSIC YAMAOKU FORMATION IN WEST JAPAN*

(Studies on the Liassic Pelecypods in Japan, 11)

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岡山県山奥層産のライアス斧足類：小西健二によって発見された岡山県刑部北方の山奥層の斧足類を検討した結果 *Nuculana* (*Dacryomya*), *Meleagrinella* の2新種と来馬層群にも多い *Crenotrapezium* の1新亜種を識別したので記載した。　速水　格

KONISHI (1954) has discovered Lower Jurassic strata near Yamaoku in northern Okayama Prefecture, and compared the litho- and bio-facies with the Liassic Kuruma group in the frontier region of Toyama, Niigata and Nagano Prefectures in central Japan, suggesting that the Yamaoku pelecypods bear some affinities with the Liassic fauna of Japan, instead of the Upper Triassic one. The palaeontologic description was, however, not published by him. Here I take an opportunity to examine his collection through his courtesy.

As I noted before (1957, 1958), the paralic carbonaceous sandstones in its lower part (Y_1 member by KONISHI) bear abundant cyrenoid pelecypods such as *Bakevellia magnissima*, *Isognomon* sp. and *Eomiodon vulgaris*. These three genera are ubiquitous members in the Liassic cyrenoid beds of this country, but the occurrence of *Bakevellia magnissima* is restricted to the Shinatani formation of the Kuruma group and the Iwamuro formation in the Ashio mountains. Because the Shinatani formation is younger than the *Amaltheus*-bearing Teradani formation (upper Pliensbachian) and older than the grammoceratid bearing Otakidani formation (upper? Toarcian), I am now inclined to consider that the age of the main parts of the Yamaoku and Iwamuro formations is upper Lias. The Y_2 member is marine, and its black shales can be included in the category of "ammonite shale" in the Inner Zone of Southwest Japan. The change of sedimentary condition may be attributable to the Toarcian transgression which can be recognized in other sedimentary basins in Japan.

Putting aside the age problem, the Yamaoku fauna from the Y_1 and Y_2 members bears also the following indigenous species and subspecies, which are described in the present paper:

Nuculana (*Dacryomya*) *konishii* HAYAMI, new species

Meleagrinella okayamensis HAYAMI, new species

Crenotrapezium kurumense grossum HAYAMI, new subspecies

Before the description I wish to express

* Received May 4, 1961; read Sept. 23, 1961

my sincere thanks to Prof. Teiichi KOBAYASHI of the University of Tokyo for his kind guidance and supervision of this manuscript, and also to Dr. Kenji KONISHI of the Kanazawa University for the privilege of describing his collection.

Family Nuculanidae

Genus *Nuculana* LINK, 1807

Subgenus *Dacryomya* AGASSIZ, 1840

Nuculana (Dacryomya) konishii HAYAMI, new species

Plate 16, Figure 1.

1954. *Saccella* sp., KONISHI, *Jour. Geol. Soc. Japan, Vol. 60, No. 707*, p. 330, listed.

Description:—Shell medium-large for the subgenus, spoon-shaped, highly rostrated, cuspidated backwards; main body, which is defined from posterior rostrum by an obscure shallow sulcus, subelliptical and moderately inflated; umbo not very prominent, opisthogyrous, located at about two-fifths of length from front; anterior margin short and rounded, while postero-dorsal one is unusually long and broadly concave; posterior rostrum elongated, gently tapered backwards, scarcely bending upwards; surface marked with irregularly spaced growth-lamellae and numerous irregularly oriented subvertical or oblique striae which are especially well marked on the anterior part of posterior rostrum; a blunt carina running from umbo along postero-dorsal margin, defining a narrow escutcheon; hinge with about a dozen taxodont denticles on each side of chondrophore; pallial line apparently entire.

Measurement:—Holotype (left valve, MM 3675) 30.5 mm. long, 12.5 mm. high, 4.0 mm. thick.

Observation and comparison:—Three specimens are at hand. The holotype composed of external and internal moulds reveals the dentition and the characteristic surface ornaments. Although the detailed structure of chondrophore is not observable in the holotype, its presence can be ascertained in another internal mould. This is referable to "*Ryderia*" which has been used by some authors for certain Liassic nuculanids having more elongated rostrum and less prominent umbo than typical *Dacryomya* from the Middle and Upper Jurassic. However, it is provisionally referred to *Dacryomya*, since the validity of the name of *Ryderia* WILTON, 1830, on a figured but specifically unnamed shell cannot be warranted here.

In the outline this is fairly similar to *Longinuculana krutschinini* SAVELIEV, 1958, from the lower Aptian of Mangischlak. Although the presence of non-concentric striae on the postero-dorsal surface of the Russian species may indicate a phyletic connection with such Liassic nuculanids as this species, this is specifically distinct from SAVELIEV's, because the posterior rostrum is less elongated and more distinctly tapered backwards in *konishii*. This is probably allied to *Nuculana (Dacryomya) toriyamae* HAYAMI, 1959, from the lower Liassic Higashinagano formation in west Japan, but the post-umbonal margin is not so deeply concave and the dimensions are much larger than that species. In the presence of oblique striae this may be closer to *Leda texturata* TERQUEM and PIETTE, 1868, from the lower Lias of eastern Paris basin, but the dimensions are much larger and the oblique striae more discordant with the growth-lines. The general outline and especially the shape of posterior rostrum resemble those of *Leda tenuistriata* PIETTE in TERQUEM

and PIETTE (1868). But the size is still larger and oblique striae are unknown in that species.

Occurrence:—Rare in the Y_1 member of the Yamaoku formation at the west of Ochiai and Y_2 member at the northwest of Ochiai, in Yamaoku area of Osakabe town, Atetsu county, Okayama Prefecture.

Family **Aviculopectinidae**

Genus *Meleagrinella* WHITFIELD, 1885

Meleagrinella okayamensis HAYAMI, new species

Plate 16, Figures 2-3.

1954. *Pseudomonotis* (s. l.) sp. nov. KONISHI, *Jour. Geol. Soc. Japan, Vol. 60, No. 707*, p. 330, listed.

Description:—Shell small, highly inequivalve, inequilateral, obliquely ovate, slightly higher than long. Left valve moderately convex; umbo prominent, recurved, more or less anterior to median in portion; anterior wing very small or absent, posterior one rudimentary; surface marked with some 50 fine radial riblets: primary and secondary riblets not clearly defined from each other; growth-lines generally obscure, but radials become slightly squamose near ventral margin and sometimes concentric constrictions appear in early or middle shell. Right valve pronouncedly smaller than left; shell-convexity much weaker; surface apparently smooth except for several obscure radial undulations. Hinge structure unknown.

Measurement:—Holotype (both valves, MM 3676) 11.5 mm. long, 12.0 mm. high. Paratype (left valve, MM 3677) 11.0+mm. long, 12.0 mm. high, 3.5 mm. thick.

Observation and comparison:—The holotype is a bivalved specimen. The inequivalveness and the different mode of surface ornamentation are well recognized on it, though the convexity may have been somewhat decreased by secondary deformation.

This is probably allied to *Meleagrinella japonica* HAYAMI, 1959, from the lower Lias of west Japan, but the shell is slightly more prosocline and the posterior wing is less developed. *Avicula substriata* ZIETEN (GOLDFUSS, 1833-1840) from the Lias of Europe resembles this in the prosocline shell, but the postero-dorsal angle is more rounded and the shell more elongated obliquely.

Occurrence:—Rare in Y_2 member at the northwest of Ochiai.

Family **Neomiodontidae**

Genus *Crenotrapezium* HAYAMI, 1958

Crenotrapezium kurumense grossum HAYAMI, new subspecies

Plate 16, Figure 4.

1954. "*Cypricardia*" (?) sp. nov., KONISHI, *Jour. Geol. Soc. Japan, Vol. 60, No. 707*, p. 330, listed.

Description:—Shell large for genus, fairly variable in outline but typically triangular, strongly carinated posteriorly; siphonal margin well defined from postero-dorsal and ventral; ratio of length/height approximately 1.10-1.35; other characters including hinge and musculature similar to *Crenotrapezium kurumense* s. s., though crenulation on lateral teeth cannot be recognized owing to coarse-grained matrices of these specimens.

Measurement:—Holotype (right valve, MM 3678) 36.0 mm. long, 32.5 mm. high; 6.0 mm. thick. Paratype (left valve, MM

3679) 42.0 mm. long, 30.5 mm. high, 6.5 mm. thick.

Observation and comparison:—More than 15 specimens are available. Though most of them are broken to some extent, the dentition, $\frac{\text{AIII}\ \ \text{AI}\ \ 3a\ \ 3b\ \ \text{PI}\ \ \text{PIII}}{\text{AII}\ \ \ \ \ \ 2\ \ 4b\ \ \text{PII}}$, can be observed in many internal moulds including the holotype. As I suggested before (1958, p. 16), this form may be conspecific with *Crenotrapezium kurumense* from the Liassic Kuruma group, but seems to require subspecific distinction, because the dimensions of Yamaoku specimens are much larger, the siphonal margin is better defined and the average ratio of length/height seems slightly smaller than typical *kurumense*. Several specimens from the sandstones of the Kitamatadani and Shinatani formations show comparable sizes to the present ones, but their outline seems close to the typical form.

Crenotrapezium is very close to *Neomiodon* FISCHER in the hinge apparatus, if the characteristic fine crenules on the lateral teeth AI, AII, PI and PIII are ignored. Among various species of *Neomiodon* from the Middle and Upper Jurassic, *N. navis* CHAVAN, 1952, from the Astartian of Calvados and a few other species resemble *kurumense* in the outline, but the posterior carina of *Neomiodon* is generally less conspicuous.

Occurrence:—Common in Y_1 member at the west of Ochiai.

References

CHAVAN, A. (1945), Les lamellibranches hétérodontes des sables astartiens de Cordebugle (Calvados). *Jour. Conchyl., Vol. 86*, pp. 41-88, 1 pl.

—— (1952), Les pélécypodes des sables astartiens de Cordebugle (Calvados). *Mém. Suiss. de Paléont., Vol. 69*, pp. 1-132, 4 pls.

GOLDFUSS, A. (1833-1840), Petrefacta germaniae, Bd. 2. *Düsseldorf.* 312 pp. 91 pls.

HAYAMI, I. (1957), Liassic *Bakevellia* in Japan. *Japan. Jour. Geol. Geogr., Vol. 28, Nos. 1-3*, pp. 47-59, 2 pls.

—— (1958), A review of the so-called Liassic "cyrenoids" in Japan. *Ibid., Vol. 29, Nos. 1-3*, pp. 11-27, 2 pls.

—— (1959), Lower Liassic lamellibranch fauna of the Higashinagano formation in west Japan. *Jour. Fac. Sci. Univ. Tokyo, Sec. 2, Vol. 12, Pt. 1*, pp. 31-84, 4 pls.

KONISHI, K. (1954), Yamaoku formation (A Jurassic deposit recently discovered in Okayama Prefecture). *Jour. Geol. Soc. Japan, Vol. 60, No. 707*, pp. 325-332.

SAVELIEV, A. A. (1958), *Longinuculana krutschinini* SAVEL. gen. et sp. nov. from the lower Aptian of Mangischlak. *Doklady Acad. Nauk USSR, Tom. 119, No. 1*, pp. 161-164, 1 pl.

TERQUEM, O. and PIETTE, E. (1868), Le Lias inférieur de l'est de la France comprenant la Meurthe, la Moselle, le Grand-Duché de Luxembourg, la Belgique et la Meuse. *Mém. Soc. géol. France, Sér. 2, Tom. 8*, pp. 1-168, 18 pls.

Trans. Proc. Palaeont. Soc. Japan, N. S., No. 43, pp. 117-123, pl. 16, Sept. 25, 1961

411. SOME JURASSIC PELECYPODS FROM THE AWAZU AND YAMAGAMI FORMATIONS IN NORTHEAST JAPAN*

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福島県相馬地方の粟津・山上層産のジュラ紀斧足類：　正谷清，田村実らによって採集された相馬層群下半部の斧足類化石を検討した結果，粟津層から *Chlamys*, 山上層から *Isognomon*, *Plagiostoma*, *Mesolinga*, *Fimbria*, *Pronoella* 等を識別した。山上層の動物群には欧州の Great Oolite 統に近似の種があるが，両層の斧足類は三角貝類をも含めて本邦では独特の構成を示し，下中部ジュラ系と上部ジュラ系の豊富な動物群の間の移行を知る上に重要な資料と考えられる。　速水　格

In contrast with the rich pelecypods in the upper part of the Soma group (Kimmeridgian and later), which were fully described by YABE and SATO (1942), KIMURA (1951) and TAMURA (1959-1960), little has been done on the pre-Kimmeridgian fauna of the group except for KOBAYASHI and TAMURA's study (1955, 1957) on the characteristic trigoniids.

MASATANI (1950) listed several pelecypods from the Hatsuno (=Hayama), Awazu and Yamagami (=Sugaya) formations. His collection was further amplified by TAMURA and myself, and now kept in the Geological Institute, University of Tokyo. Although the preservation of material is somewhat worse than those of the overlying Nakanosawa and Koyamada formations, pelecypods bear special importance for the biostratigraphy of this group, because ammonites are comparatively rare except for a few horizons.

The Awazu formation including the 1st and 2nd trigonian zones by MASATANI and TAMURA is at least in part upper Bajocian (or lowermost Bathonian) as indicated by the occurrence of "*Parkinsonia*" (MASATANI, 1950), which belongs to *Bigotites* according to SATO (1960, MS). The exact age of the overlying Yamagami formation bearing the 3rd and 4th trigonian zones cannot be decided at present, but it is older than Oxfordian and probably Callovian or thereabout.

As the results of this palaeontological study, the following species were distinguished in the Awazu and Yamagami faunas.

From the Awazu formation

Chlamys awazuensis HAYAMI, new species

From the Yamagami formation

Isognomon sp. indet.

Plagiostoma sp. ex gr. *subcardiiforme* (GREPPIN)

Liostrea sp. indet.

Lopha sp. indet.

Mesolinga masatanii HAYAMI, new species

Fimbria somensis HAYAMI, new species

Pronoella sugayensis HAYAMI, new species

In this paper are described the above

* Received May 4, 1961; read Sept. 23, 1961

pelecyods exclusive of the two ostreids which are represented by ill-preserved specimens. This is the first time that *Mesolinga* and *Pronoella* have ever been found in the Jurassic of Japan.

According to KOBAYASHI and TAMURA (1955, 1957), the trigoniids of the two formations, comprising *Vaugonia*, *Myophorella* (*Promyophorella*), *Scaphotrigonia*, *Latitrigonia* and *Ibotrigonia* are fairly unique in specific assemblage, and there are no common species with the faunas in the upper part of the Soma group and the Jurassic of other sedimentary basins but for ubiquitous *Nipponitrigonia sagawai*. Similar tendency is ascertained also as to other pelecypods. Because of the rarity of contemporaneous pelecypods in Japan, these faunules seem important as the lineage between the rich Lias-Bajocian and Upper Jurassic faunas which were described from various areas.

It is a pleasure to record here my sincere thanks to Prof. Teiichi KOBAYASHI of the University of Tokyo for his kind guidance and critical reading of this manuscript. Particular thanks are also due to Mr. Kiyoshi MASATANI and Dr. Minoru TAMURA for the privilege of describing their collections. I wish to express appreciation to Dr. Tadashi SATO for the permission of inspection of the mimeograph of his thesis "Etude biostratigraphiques des Ammonites du Jurassique du Japon. Thèse presentée à la Faculté des Sciences de l'Université de Paris".

Family **Isognomonidae**

Genus *Isognomon* SOLANDER, 1786

Isognomon sp. indet.

Plate 16, Figure 5.

Represented by internal and external moulds of a left valve. The obliquely elongated mytiliform outline and absence of byssal gape suggest that it belongs to subgenus *Mytiloperna* IHERING, 1903, but the unfavourable state of preservation prevents me from specific determination. (MM 3680, 25.0+mm. long; 36.0 mm. high)

Occurrence:—Ith trigonian zone of Yamagami formation at Yamagami Primary School of Sugaya, Soma City, Fukushima Prefecture.

Family **Pectinidae**

Genus *Chlamys* RÖDING, 1798

Chlamys awazuensis HAYAMI, new species

Plate 16, Figures 6a-b.

Description:—Represented by an external mould of left valve (holotype, MM 3681, 31.5 mm. long, 33.5+mm. high, 5.5 mm. thick). Shell medium in size, nearly acline, moderately inflated, higher than long; antero-dorsal margin slightly concave; anterior auricle triangular, large, well defined from main body; surface ornamented with more than 90 radial riblets of two orders of prominence; number of secondaries increases by irregular insertion at various stages; numerous concentric fila cross riblets and grooves but much weaker than radials; internal characters unknown.

Observation and comparison:—The specimen is more or less broken in the marginal part and deformed secondarily, but the characteristic surface-ornaments are well preserved. It is probably allied to *Chlamys mitaraiensis* HAYAMI, 1959, from the (?) Oxfordian of Makito area of Central Japan, but the radials and concentrics are finer and more numerous. Though the right valve of this form is

unknown, the delicate riblets differ from many Jurassic species hitherto referred to *Chlamys* and *Camptochlamys*.

Occurrence:—1st trigonian zone of the Awazu formation at the west of Awazu, Soma City, Fukushima Prefecture.

Family Limidae

Genus *Plagiostoma* SOWERBY, 1814

Plagiostoma sp. ex gr. *subcardiiforme* (GREPPIN)

Plate 16, Figures 7a-b.

cf. 1853. *Lima cardiiformis* MORRIS and LYCETT, *Monogr. Moll. Great Oolite Series, Pt. 2*, p. 27, pl. 3, figs. 2, 2a (non SOWERBY, 1815).

1867. *Lima subcardiiformis* GREPPIN, *Essai géol. sur le Jura Suisse*, p. 53.

1888. *Lima (Radula) subcardiiformis* SCHLIPPE, *Abh. geol. Spezialk. Elsass-Lothr., Bd. 4*, p. 118, pl. 2, fig. 7.

1936. *Plagiostoma subcardiiformis* DECHASEAUX, *Mém. Mus. roy. Hist. nat. Belgique, Sér. 2, Fasc. 8*, p. 25.

1948. *Lima (Plagiostoma) subcardiiformis* COX and ARKELL, *Survey Moll. Brit. Great Oolite Series, Pt. 1*, p. 16.

Description:—Shell medium in size, gibbose or broadly semicircular, moderately inflated; umbonal region improminent; apical angle between anterior and posterior margins exclusive of auricles measures about 90 degrees; anterior umbonal ridge nearly straight, rounded, weakened towards antero-ventral but defines a slightly excavated lunule; both auricles well defined, subequal, comparatively small, obtusely truncated; surface of main body marked with more than 60 simple weak radial riblets which are depressed and rounded at tops; interspaces nearly as broad as riblets, apparently non-punctate; posterior auricle marked also with several weak radials, but lunule seems smooth except for faint radials near anterior umbonal ridge.

Measurement:—Right external mould (MM 3682) 41.0+mm. long, 46.0 mm. high, 8.5 mm. thick.

Observation and comparison:—Two external moulds, though their marginal parts are considerably broken, are available for study. Because of the coarse-grained matrix, the growth-lines and punctation on the interspaces are invisible, but this form may be allied to *Lima subcardiiformis* GREPPIN in MORRIS and LYCETT (1953) and SCHLIPPE (1888) from the Great Oolite series in the broadly semicircular outline. The number of radials, however, seems more numerous, and the radial ribs may be slender than European specimens. In the mode of radial ornaments this may be closer to *Lima rigida* SOWERBY in GOLDFUSS, 1836, from the Oxfordian, but this is clearly different from the Corallian specimens illustrated by ARKELL (1932) in the non-sinuous and less numerous radials. *Plagiostoma semicirculare* GOLDFUSS, 1836 (COX, 1944) from the Inferior Oolite has more broadly rounded outline. *Plagiostoma kobayashii* HAYAMI, 1959, from the lower Lias of western Japan differs from this in the less inflated shell and more opisthocline and blunt anterior umbonal ridge.

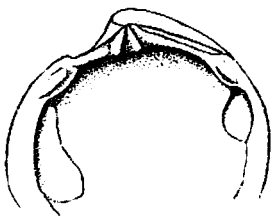
Occurrence:—3rd trigonian zone of the Yamagami formation at the north of Sugaya, Soma City, Fukushima Prefecture.

Family Lucinidae

Genus *Mesolinga* CHAVAN, 1951

Mesolinga masatanii HAYAMI, new species

Plate 16, Figures 8-10.



Text-fig. 1. Internal characters of *Mesolinga masatanii* HAYAMI, n. sp. (restored from the right internal mould, holotype, MM 3686) ×1.

Description:—Shell medium to large, inequilateral, suborbicular, slightly longer than high, strongly inflated; test fairly thick for lucinids; umbo submedian, prominent, prosogyrous; antero-dorsal margin concave to form a large lunule; postero-dorsal margin feebly convex, passing gradually into posterior and ventral; hinge of lucinoid type, as formulated below:

$$\frac{(AIV)\quad AII\quad 2\quad 4b\quad (PII)\quad (PIV)}{AIII\quad 3a\ 3b\quad PIII}$$

3a indistinguishable from border of lunule; 2 nearly acline, compapatively thin; 3b slightly prosocline, stout; 4b weak; AIII tubercular, heavy; PIII weak, short; AII, AIV, PII and PIV probably undeveloped; nymph narrow; both adductor impressions distinct; anterior one large, pyriform, elongated subvertically; posterior one ovate, much smaller; pallial line entire; surface smooth except fine growth-lines.

Measurement:—Holotype (MM 3686) right internal mould, 39.5 mm. long, 28.5 +mm. high, 12.0 mm. thick; paratype (MM 3685) left internal mould, 38.0 mm. long, 31.5+mm. high, 9.0 mm. thick.

Observation and comparison:—Three internal moulds and an external are at hand. The characteristic musculature of lucinoid type is clearly impressed on the internal moulds, and the dentition is observable in the holotype. Among the diagnoses of various Jurassic lucinid genera proposed by CHAVAN (1937-1938, 1946, 1951, 1952) and others this agrees best with *Mesolinga* CHAVAN, 1951, in the comparatively thick test, vertically elongated anterior adductor scar, large lunule and heavy lateral tooth AIII. In these characteristics this is similar to *Mesolinga typica* CHAVAN, 1952 (=*Lucina plebeia* CONTEJEAN, 1859, non GIEBEL, 1856) from the Kimmeridgian-Purbeckian of Europe, but the dimensions of these specimens are much larger and the pre-umbonal margin less excavated than *typica*.

Occurrence:—3rd and 4th trigonian zones of the Yamagami formation at the north of Sugaya and the Primary School of Sugaya, Soma City, Fukushima Prefecture.

Family **Fimbriidae**

Genus *Fimbria* MEGERLE, 1811

(=*Corbis* CUVIER, 1817)

Fimbria somensis HAYAMI, new species

Plate 16, Figures 11-13.

Description:—Shell medium to large, subovate, more or less longer than high, moderately inflated; test comparatively thin; umbo submedian, not very prominent, slightly prosogyrous; antero-dorsal margin slightly concave, passing gradually into anterior; postero-dorsal margin long, straight, bent down into posterior with an obtuse angle; hinge plate comparatively narrow; dentition as formulated below:

$$\frac{AIV\quad (AII)\quad 2\quad 4b\quad (PII)\quad PIV}{AIII\quad 3a\ 3b\quad PIII}$$

3a small, indistinguishable from lunular

margin; 2 slightly opisthocline, thin but stout; 3b nearly acline, thin but stout; 4b small, not clearly defined from nymph; AIII tubercular, stout, situated fairly close to cardinals; AIV and PIV weak; other laterals undeveloped; musculature unknown; surface marked with more or less wide-spaced erect concentric lines whose interval increases from 1.3 mm. to 3.0 mm. through growth; inner ventral margin smooth.

Measurement:—Holotype (MM 3687), right internal mould, 31.5 mm. long, 27.0 mm. high, 5.5 mm. thick.

Observation and comparison:—Represented by three specimens. The dentition is clearly observed in two small internal mould of right and left valves (holotype and paratype). The ontogenetic development of hinge structure is unknown, because the adult stage is shown only by an external mould. This species may not be a typical *Fimbria*, since the hinge plate is narrow, cardinal teeth comparatively thin and the ventral margin smooth without crenulations. The disposition of cardinals and laterals, subovate outline and erect surface concentrics, however, suggest that it is closer to *Fimbria* than to other lucinoid genera. Among numerous Jurassic species of *Fimbria*, it is most closely allied to *Corbis lajoyei* D'ARCHIAC, 1842 (MORRIS and LYCETT, 1853; COX and ARKELL, 1948, 1949) from the Great Oolite series of England in view of the ovate outline, straight postero-dorsal margin and absence of radial ornaments. According to COX and ARKELL the concentric ornaments of *lajoyei* are somewhat variable, but it may be distinguishable from that species by the thinner cardinal teeth and generally coarser concentrics. *Corbis* aff. *neptunyi* LYCETT in SCHMIDTILL, 1926, from the Aalenian of Germany resembles this in the outline, but the shell is more elongated and the concentrics are finer than this species.

Occurrence:—3rd and 4th trigonian zones of the Yamagami formation at the north of Sugaya and the Primary School of Sugaya, Soma City, Fukushima Prefecture.

Family Arcticidae

Genus *Pronoella* FISCHER, 1887

Pronoella sugayensis HAYAMI, new species

Plate 16, Figures 14-16.

Description:—Shell medium, trigonally ovate to ovate, moderately inflated, weakly carinated, much longer than high; test thick; umbo slightly recurved, prosogyrous, located at about a third of shell-length from front; antero-dorsal margin short and concave, while postero-dorsal margin is long and slightly convex and forms an obtuse angle with posterior margin; lunule probably not impressed; though pre-umbonal region slightly excavated; escutcheon narrow but not clearly impressed; hinge as formulated below:

$$\frac{\text{AII}}{\text{AI (3a)}} \quad \frac{\text{2a}}{\text{1}} \quad \frac{\text{2b}}{\text{3b}} \quad \frac{\text{4b}}{\text{PI}} \quad \text{PII},$$

cardinal 1 comparatively weak, prosocline; 2a rounded, acline; 2b thick, unusually stout, very prosocline; 3a undeveloped or absent; 3b elongated, stout; 4b thin, subparallel to post-umbonal margin; laterals AI and AII weak, not clearly defined from 1 and 2a; PI and PII unusually long, curved along posteo-dorsal margin; adductor scars well marked, comparatively small; pallial line not observed; surface smooth but for weak growth-lines.

Measurement:—Holotype (MM 3692, left

in. mould) 26.5 mm. long, 20.0 mm. high, 5.0 mm. thick; paratype (MM 3690, right in. mould) 29.0 mm. long, 22.5 mm. high, 6.0 mm. thick.

Observation and comparison:—This seems to be one of the commonest species in the Yamagami formation, and is represented by many specimens. The dentition is well impressed on the internal moulds including the holotype and paratype. The hinge structure may be somewhat deviated from that of typical *Pronoella* which was clearly illustrated by DOUVILLÉ (1921), because the cardinals 1 and 2b are more prosocline, 2b unusually stout and 2a much weaker than that figure. The disposition and inclination of cardinal teeth agree well with those of *Pronoella elongata* COX, 1944, and *P. beneckei* ROLLIER, 1914, from the Aaleni-

Explanation of Plate 16

Nuculana (*Dacryomya*) *konishii* HAYAMI, n. sp. ..... p. 116
Fig. 1. Plaster cast of left external mould (MM 3675), holotype, ×1.5. Y_2 member of the Yamaoku formation. KONISHI coll.

Meleagrinella okayamensis HAYAMI, n. sp. ..... p. 117
Fig. 2. Left valve (MM 3676), holotype, ×2. Y_2 member of the Yamaoku formation. KONISHI coll.
Fig. 3. Left valve (MM 3677), paratype, ×2. ditto.

Crenotrapezium kurumense grossum HAYAMI, n. subsp. ..... p. 117
Fig. 4. Right internal mould (MM 3678), holotype, ×1. Y_1 member of the Yamaoku formation. KONISHI coll.

Isognomon sp. indet. ..... p. 120
Fig. 5. Left internal mould (MM 3688), ×1. 4th trigonian zone of the Yamagami formation. MASATANI coll.

Chlamys awazuensis HAYAMI, n. sp. ..... p. 120
Fig. 6a. Clay cast of left external mould (MM 3681), holotype, ×1. 1st trigonian zone of the Awazu formation. TAMURA coll.
Fig. 6b. Surface ornamentation of the same specimen, ×3.

Plagiostoma sp. ex gr. *subcardiiforme* (GREPPIN) ..... p. 121
Fig. 7a. Right internal mould (MM 3682), ×1. 3rd trigonian zone of the Yamagami formation. MASATANI coll.
Fig. 7b. Plaster cast of the same external mould, ×1.

Mesolinga masatanii HAYAMI, n. sp. ..... p. 121
Fig. 8. Right internal mould (MM 3684), paratype, ×1. 3rd trigonian zone of the Yamagami formation. MASATANI coll.
Fig. 9. Left internal mould (MM 3685), paratype, ×1. ditto.
Fig. 10a. Right internal mould (MM 3686), holotype, ×1. ditto.
Fig. 10b. Plaster cast of the same specimen, ×1.

Fimbria somensis HAYAMI, n. sp. ..... p. 122
Fig. 11. Right internal mould (MM 3687), holotype, ×1. 3rd trigonian zone of the Yamagami formation. MASATANI coll.
Fig. 12. Left internal mould (MM 3688), paratype, ×1. ditto.
Fig. 13. Plaster cast of right external mould (MM 3689), paratype, ×1. 4th trigonian zone of the Yamagami formation.

Pronoella sugayensis HAYAMI, n. sp. ..... p. 123
Fig. 14. Right internal mould (MM 3690), paratype, ×1. 4th trigonian zone of the Yamagami formation.
Fig. 15. Left internal mould (MM 3691), paratype, ×1. ditto.
Fig. 16. Left internal mould (MM 3692), holotype, ×1. ditto.

All specimens illustrated here are kept in the Geological Institute, University of Tokyo.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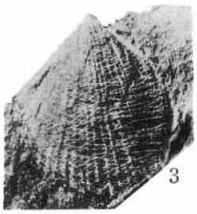
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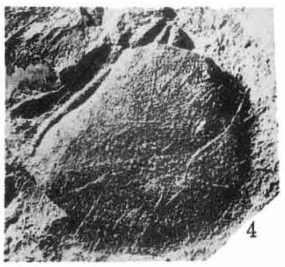
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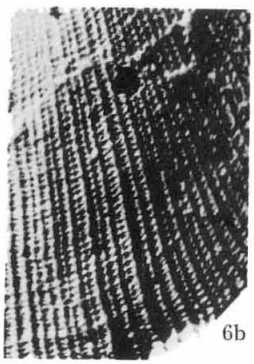
6b


14


15


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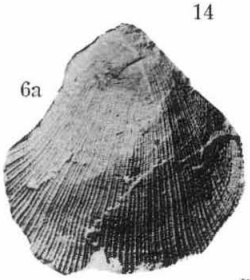
10b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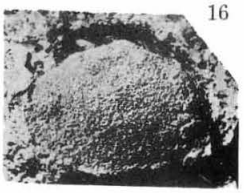
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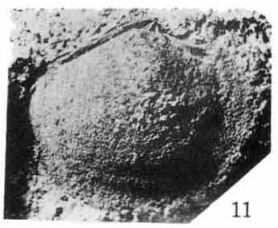
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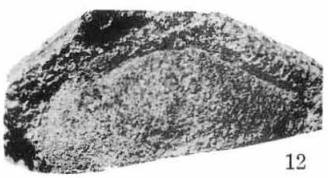
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7a


7b


13

an of Europe, whose internal characters were shown by COX (1947). However, 2b seems much thicker and PI and PII are more elongated than the two species. In the ovate outline this resembles *Pronoella ravenscarensis* COX, 1947, but the antero-dorsal margin of that species is more deeply excavated to form a profound lunule.

Occurrence:—3rd and 4th trigonian zones of the Yamagami formation at the Primary School of Sugaya, Soma City, Fukushima Prefecture.

References

D'ARCHIAC, A. (1842), Description géologique du département de l'Aisne. *Mém. Soc. géol. France, Tom. 5*, pp. 129-419, 11 pls.

ARKELL, W. J. (1932). A Monograph of British Corallian Lamellibranchia. Part 4. *Palaeontogr. Soc. London*, 48 pp., 8 pls.

CHAVAN, A. (1937-1938), Essai critique de classification des Lucines. *Jour. de Conchyliologie, Vol. 81*, pp. 133-153, 198-216, 237-282, *Vol. 82*, pp. 59-97, 105-130, 215-241.

—— (1946), L'evolution des faunes marines de mollusques. *Bull. Soc. géol. France, Sér. 5, Tom. 16*, pp. 193-212.

—— (1951), Dénominations supraspécifiques de mollusques modifiées ou nouvelles. *C. R. Somm. Soc. géol. France, Séance du 18 juin*, pp. 210-212.

—— (1952). Les pélécypodes des sables astartiens de Cordebugle (Calvados). *Mém. Suisses de Paléont., Vol. 69*, pp. 1-132, 4 pls.

COX, L. R. (1944), The English upper Lias and Inferior Oolite species of *Lima*. *Proc. Malacol. Soc. London, Vol. 25*, pp. 151-187, 24 pls.

—— (1947). The Lamellibranch family Cyprinidae in the Lower Oolite of England. *Ibid., Vol. 27*, pp. 141-184, 3 pls.

—— and ARKELL, W. J. (1948). A survey of the mollusca of the British Great Oolite series. *Palaeontogr. Soc. London*, pp. i-xiii, 1-48.

DOUVILLÉ, H. (1921), La charnière dans les Lamellibranches hétérodontes et son évolution. *Bull. Soc. géol. Frace, Sér. 4, Tom. 21*, pp. 116-124.

GOLDFUSS, A. (1833-1840), Petrefacta Germaniae, Vol. 2. *Düsseldorf*.

HAYAMI, I. (1959a). Late Jurassic Isodont and Myacid pelecypods from Makito, Central Japan. *Japan. Jour. Geol. Geogr., Vol. 30*, pp. 151-167, 1 pl.

—— (1959b). Lower Liassic Lamellibranch fauna of the Higashinagano formation in west Japan. *Jour. Fac. Sci. Univ. Tokyo, Sec. 2, Vol. 12, Pt. 1*, pp. 31-84, 4 pls.

KOBAYASHI, T. and TAMURA, M. (1955), The Myophorellinae from North Japan. Studies on the Jurassic Trigonians in Japan, Part IV. *Japan. Jour. Geol. Geogr., Vol. 26, Nos. 1-2*, pp. 89-103, 2 pls.

—— and —— (1957). Additional new genera and species of Trigonians from the Jurassic of Soma, north Japan. *Ibid., Vol. 28, Nos. 1-3*, pp. 35-41, 1 pl.

MASATANI, K. (1950), A study of the Jurassic formations in the Soma district, Fukushima. *Jour. Geol. Soc. Japan, Vol. 56, No. 662*, pp. 499-505 (in Japanese with English abstract).

—— and TAMURA, M. (1959), A stratigraphic study on the Jurassic Soma group on the eastern foot of the Abukuma mountains, northeast Japan. *Japan. Jour. Geol. Geogr., Vol. 30*, pp. 245-257.

MORRIS, J. and LYCETT, J. (1853), A monograph of the mollusca from the Great Oolite chiefly from Minchinhampton and the coast of Yorkshire. Pt. 2. Bivalves. *Palaeontogr. Soc. London*.

SCHLIPPE, A. O. (1888), Die Fauna des Bathonien im oberrheinischen Tieflande. *Abh. geol. Spezialk. Elsass-Lothr., Bd. 4, Heft 4*, 267 pp., 8 pls.

TAMURA, M. (1959). On the Torinosu pelecypod-fauna in the Jurassic group of Soma of Fukushima Prefecture. *Jour. Geol. Soc. Japan. Vol. 65, No. 764*, pp. 280-289. (in Japanese with English abstract).

Trans. Proc. Palaeont. Soc. Japan, N. S., No. 43, pp. 124-126, pl. 17, Sept. 25, 1961

412. A MIOCENE PROBLEMATICA FROM WAKAYAMA PREFECTURE*

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和歌山県中新統産プロブレマチカ：鉾山層の砂岩中より採集された生痕を，甲藤次郎が四国から報告した種属と比較して，*Tosalorbis kattoi* n. sp. と命名した。

畑井小虎・小高民夫

Introduction and Acknowledgements

It is known that many kinds of problematical fossils occur from the Tertiary rocks of Japan, but there has been little study concerning them. HATAI (1957) described some interesting sand-pipe problematica from the Miocene Toyoda formation distributed in the western margin of Yamagata Basin, Yamagata Prefecture and ascribed them to the marking of marine worms. KATTO (1960) described some problematica from the Eocene and Oligocene deposits distributed in southern Kochi Prefecture, Shikoku and ascribed them to marine worms. He gave them generic names, among which his *Tosalorbis hataii* KATTO was named for the peculiar sand-pipe previously described by HATAI (1957) from the Miocene of Yamagata Prefecture.

The writers were fortunate in obtaining many interesting specimens of a problematical fossil from the marine Miocene deposits distributed near the Seto Marine Biological Laboratory at Shirahama, Wakayama Prefecture. These seem to be new to the problematical fauna of Japan and are described in this article.

Here the writers thank Assistant Professor Yushi FUNAYAMA, Mr. Hideo MII, and Miss Tomoko TAKEDA of the Tohoku University for their assistance in the field during collection of the specimens. Thanks are due to Mr. Kimiji KUMAGAI of the Tohoku University for his photographic work.

Description of the Problematica

From the sandstone of the Kanayama formation (TAKEYAMA, 1930) numerous cylindrical structures, generally parallel with the bedding plane but also sometimes in vertical or oblique depositions, measuring up to about or a little more than five centimeters in length, up to five millimeters in diameter, nearly straight, somewhat curved to sigmoidal along their length, nearly circular to more or less flattened oval in cross-section were collected from an outcrop of the Miocene Kanayama formation near the Seto Marine Biological Laboratory at Shirahama in Wakayama Prefecture. These cylindrical rods are crowded in

* Recieved Jan. 15, 1961; read Jan. 15th 1961

the tuffaceous sandstone, generally more or less separated from one another, overlapping or transversing others at various angles, and occur within a thickness of about 30 centimeters in the above mentioned sandstone. Well preserved specimens have a hollow, circular cross-section, transverse concentric lines or weak ridges like segments separated by nearly equal distances on the surface; no longitudinal sculpture was observed. The segments or concentric ridges may be equal to or a little broader than the interspaces which are apparently round bottomed. So far as observed all of the well preserved specimens agree with one another in having concentric or segment like sculpture on their external surfaces. The material filling the hollow appears to be the same as that in which the peculiar structures are embedded. No external calcareous or chitinous covering seems to have been present.

From the shape, crowded occurrence, orientation from nearly parallel with the bedding plane or vertical to oblique, hollow and circular cross-section, external sculpture of only concentric segment-like ridges without longitudinal ornamentation, the present specimens recall *Tosalorbis peculiaris* KATTO described by KATTO (1960) from the Oligocene Misaki formation distributed along the sea coast of Kawajiri, Misaki, Tosa-Shimizu City in Kochi Prefecture. The present specimens, however, can be distinguished from KATTO's species in the less tubular bodies, less distinctly developed surface sculpture, more crowded occurrence, and by the size. *Tosalorbis hataii* KATTO and *T. hanzawai* KATTO both described by KATTO (1960) from the Paleogene deposits in Kochi Prefecture, which also have tubular bodies and segmented sculpture can be also distinguished from the present specimens in the strength of the external segment-like sculpture, greater breadth of the bodies with regard to length, and in that the present ones show more distinct hollow cross-section. Being distinguishable from similar forms the present specimens are considered to represent an undescribed species to which the name of *Tosalorbis kattoi* HATAI and KOTAKA, n. sp., is given. The specific name is given in recognition of Dr. Jiro KATTO's work on the problematical fauna from the Paleogene deposits of southern Kochi Prefecture.

Remarks on Problematica refered to Marine Worms

At the present time problematica having elongate bodies with surface sculptured by concentric or segment-like ridges and troughs, with or without any kind of longitudinal ornamentation, situated parallel-, vertical- or oblique to the bedding plane of the stratum in which they occur, crowded to sporadic occurrence, straight or curved to sigmoid shape, and resemblance with living marine worms, have been refered to marine worms sometimens with doubt. The present specimens from this view may also be fossils of marine worms.

Among marine worm genera hitherto reported from the Tertiary rocks of Japan there should be mentioned *Nereites* and *Tosalorbis* described by KATTO (1960) from southern Kochi Prefecture and *Potamilla* recorded by HATAI (1952) from the Miocene Yamagata Prefecture. The present specimens are referred to the genus *Tosalorbis* as a new species because distinction from the other genera is clear and no other related genera have been reported from Japan, fossil or Recent. Among the genera known from the seas of Japan, *Arenicola* and *Balanoglossus* are more or less similar so far as

the concentric sculpture is concerned, but can be distinguished from the present ones in size, more elongate bodies with more distinct segments, different shape of apical and anal parts and in that the present ones form a crowded population whereas the two mentioned genera are more sporadic in occurrence in living condition.

The present new species as already mentioned occurs forming a crowded population and so far as is known no other marine invertebrate or vertebrate fossils have been found in the layer yielding this marine worm. From this view it may be added that where worms occur in abundance other kinds of marine organisms are generally not found in association because of that the worm eat the larva, whereby causing local extinction of other benthonic marine animals, and such areas are avoided by marine animals. This may explain why no other kinds of fossils were found in association or in the same sandstone horizon as that which yielded the worms treated in this article.

References

DANNER, W. R. (1955). Some Fossil Worm Tubes of Western Washington. *Rocks and Minerals*., pp. 451–457, 7 figs.

HATAI, K. (1951). A Probelmatical Fossil from Yamagata. *Short Papers, IGPS, No. 3*. pp. 41–45. 1 pl.

—— (1957). Interesting Sand-Pipes from the Miocene Toyoda Formation, Yamagata Prefecture, Japan. *Trans. Proc. Palaeont. Soc. Japan, N. S., No. 27*, pp. 95-98. (This sand pipe was refered to *Tosalorbis hataii* KATTO, as a new species.)

KATTO, J. (1960). Some Problematica from the So-called Unknown Mesozoic Strata in the Southern Part of Shikoku, Japan. *Hanzawa Memorial Volume. Sci. Rept., Tohoku Univ., 2nd Ser., Spec. Vol., No. 4*, pp. 323–334, 2 pls.

TAKEYAMA, T. (1930). Tertiary Stratigraphy of the Environs of Tanabe, Kii. *Chikyu (The Globe), Vol 13, No. 2*. pp. 92–105.

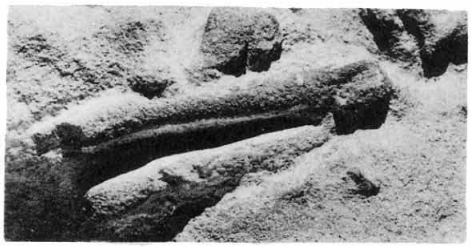
Explanation of Plate 17

Tosalorbis kattoi HATAI and KOTAKA n. sp.

Figs. 1–3. Surficial view.

Fig. 4. Lateral view of the specimen figured in Fig. 2.

All figures in natural size.



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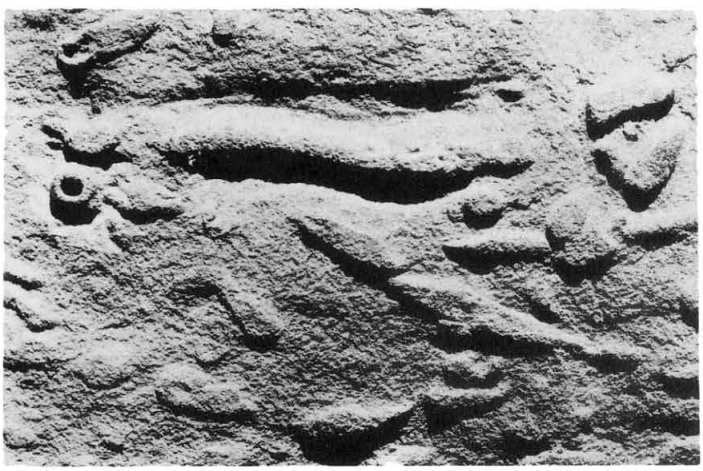

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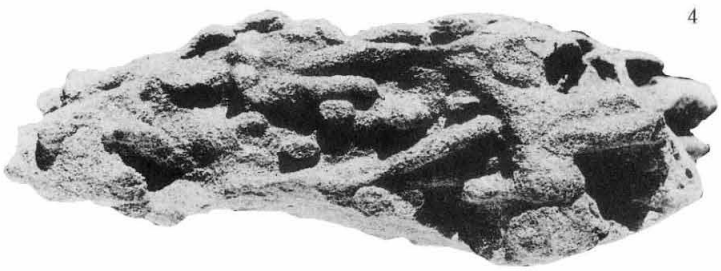

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Trans. Proc. Palaeont. Soc. Japan, N. S., No. 43. pp. 127-137. pls. 18, 19, Sept. 25, 1961

413. MIDDLE CARBONIFEROUS CORALS FROM THE ICHINOTANI FORMATION (UPPER PALEOZOIC CORALS FROM FUKUJI, SOUTH-EASTERN PART OF THE HIDA MASSIF, PART 3)

HISAYOSHI IGÔ

Institute of Geology and Mineralogy, Tokyo University of Education

---の谷層の中部石炭系珊瑚：福地付近上部古生界珊瑚の研究その3として、*Caninia pseudoyohi*, *C.* sp. A, *C.* sp. B, *Dorlodotia fujimotoi*, *Kionophyllum carbonarium*, *Liangshanophyllum mizuyagadaniensis*, *Ivanovia manchurica* forma *podolskiensis*, *I. manchurica* forma *eguchii* の記載をおこなった。一の谷層の *Fusulinella* zone 上部は *I. manchurica* forma *podolskiensis* の多産することによって、その上部の *Fusulina* zone とともに Moscovian の Podolsk 層準に対比されることが明白になった。なお亀井によって二畳系の Artinskian として記載された *Huangia mizuyagadaniensis* は中部石炭系のものである。

猪郷久義

Introduction and Ackrowledgements

In a previous work I described several corals from the Ichinotani and Mizuyagadani formations (IGÔ 1958, 1959), exposed in the Fukuji district, Kamitakara Village, Yoshiki County, Gifu Prefecture (approximately 36°13′ N. Lat., 137°32′ E. Long), and in this paper I treat several interesting corals from the middle part of the Ichinotani formation distributed in the Ichinotani, Mizuboradani and Mizuyagadani valleys and also discuss their recent stratigraphic data. The stratigraphic positions of the corals from the Ichinotani formation were summarized by FUJIMOTO and IGÔ (1958).

The following corals are herein described, namely, *Caninia pseudoyohi* IGÔ n. sp., *C.* sp. A, *C.* sp. B, *Dorlodotia fujimotoi* IGÔ, n. sp., *Kionophyllum carbonarium* IGÔ, n. sp., *Liangshanophyllum mizuyagadaniensis* (KAMEI), *Ivanovia manchurica* forma *podolskiensis* DOBROLYUBOVA and *I. manchurica* forma *eguchii* IGÔ, n. forma.

I thank Dr. Haruyoshi FUJIMOTO, Professor Emeritus of the Tokyo University of Education, Dr. Wataru HASHIMOTO, Professor of the same University, and Dr. Kotora HATAI, Professor of the Tohoku University for their continued encouragements concerning my researches. Financial support of the present study was received from the Research Fund of the Japan Society for the Promotion of Science and from the Ministry of Education, Japanese Government.

Stratigraphic Position of the Corals and Their Significance

Caninia pseudoyohi IGÔ, n. sp., was collected from the southern slope of the Mizuboradani valley. The exact stratigraphic position of this coral is still uncertain, but about five meters below the horizon of this coral bed *Prousu-*

* Read May 23, 1959; received May, 9, 1961.

linella fukujiensis IGÔ, and *Eostaffella* sp. were found. *Caninia* sp. A and B were obtained from the Kimmamichi section, nothern slope of the Ichinotani valley in association with *Fusulinella hanzawai* IGÔ, *F.* sp. and *Liang shanophyllum mizuyagadaniensis* (KAMEI). This horizon belongs apparently to the upper part of the *Fusulinella* zone.

Dorlodotia fujimotoi IGÔ and *Kionophyllum carbonarium* IGÔ coexist and are associated with large *Chaetetes*-colonies in the Ichinotani valley. From this limestone no reliable fusulinids have been found but unfavourably preserved *Profusulinella*? occur scattered. This limestone is situated above the lower red shale member (IGÔ 1960a) which overlies with disconformity the *Profusulinella*-limestone. However, there is possibility that the limestone is repeated by fault of the *Profusulinella*-limestone.

Liangshanophyllum mizuyagadaniensis (KAMEI) was originally described by KAMEI (1957) from the Mizuyagadani valley, west of the Ichinotani valley. He thought that the coral was derived from the Permian Mizuyagadani formation. Furthermore, he insisted that the coral indicated the Artinskian in age. The Sakmarian age of the Mizuyagadani formation was already discussed by IGÔ, (1958). I reexamined KAMEI's type locality and collected further material and confirmed that his coral was derived from the *Fusulinella*-limestone. In my previous paper in collaboration with FUJIMOTO (1958) I listed *Huangia japonica* IGÔ (MS) from the *Fusulinella* zone of the Ichinotani valley. From the present study, however, I came to conclusion that the species is conspecific with KAMEI's *Liangshanophyllum* (=*Huangia*) *mizuyagadaniensis* discussed later. I found large colonies of this species from the type section of the Ichinotani formation (IGÔ's horizon 1-10, 1957) in association with *Eoschubertella lata* (LEE et CHEN), *Fusiella typica* (LEE et CHEN), *Fusulinella pseudobocki* (LEE et CHEN) and *F. bocki asiatica* IGÔ. Therefore the stratigraphic range of this coral extends downwards, and it ranges throughout the entire part of the upper *Fusulinella* zone.

Ivanovia manchurica forma *podolskiensis* and *I. manchurica* forma *eguchii* are associated with *Liangshanophyllum mizuyagadaniensis* and *Fusulinella hanzawai* in the Kimmamichi section. It is noteworthy to record the occurrence of *I. manchurica* forma *podolskiensis* because it is a characteristic species of the Penchi series of China (YABE and EGUCHI 1944) and the Podolsk horizon of the Moscovian of Soviet Russia (DOBROLYUBOVA 1937).

Previously I (IGÔ 1957) described *Koninckocarinia* from the Ichinotani valley and thought that the coral bed may be equivalent with the *Ivanovia*-bed of the Kimmamichi section and at that occasion treated it as the top of the *Fusulinella* zone. However, recently I have found a *Fusulina* (=*Beedeina*) limestone from the lower horizon of the *Koninckocarinia* bed in the Ichinotani valley (IGÔ 1960b). Therefore the *Koninckocarinia* bed represents the uppermost *Fusulina* (=*Beedeina*) zone and a position slightly higher than the *Ivanovia*-limestone in the Kimmamichi section. I correlated the *Koninckocarinia*-limestone to the Podolsk of the Moscow Basin. This view is further upheld by the present determination of *Ivanovia manchurica* forma *podolskiensis* from the upper part of the *Fusulinella* zone. From the rich occurrence of these corals from the uppermost part of the *Fusulinella* and *Fusulina* zones recognized in the Ichinotani formation, it is evident that they can be cor-

related with the Podolsk horizon of the Moscovian of Soviet Russia.

Description of Species

Family Cyathopsidae DYBOWSKI, 1873

Genus *Caninia* MICHELIN, 1840

Caninia pseudoyohi IGO, n. sp.

Pl. 19, figs. 1, 2.

Corallum simple, cylindrical. Corallites small, circular in transverse section and with diameter of about 14 to 15 mm at maturity. External wall exceedingly thin with weak septal grooves. Outer surface unobservable.

Major septa 27, very thin, slightly flexible, short in cardinal quadrant, rather long in counter quadrant and extend to three-fourths or radius. Their arrangements more of less *Zaphrentites*-like in pattern. Cardinal fossula distinct. Minor septa almost lacking. Inner wall with well developed phyllotheca. Narrow dissepimental area composed of herringbone pattern or concentrically arranged dissepiments.

In longitudinal section one to three rows of vesicules developed at periphery; irregular in shape and size, their convex sides facing upwards and inwards. Tabulated area wide. Tabulae mostly complete, rather loosely spaced, horizontal in middle portion, steeply inclined downwards proxima ly at their peripheries. Five to eight tabulae in vertical distance of five mm.

Remarks:—This new species resembles closely *Caninia yohi* CHI described from Kwangsi, the Weiningian System of South China, in arrangements of major septa, however, the latter differs from the former in the large corallite, more numerous septa, and characteristic arrangements of the tabulae.

Occurrence:—Southern slope of the Mizuboradani Valley, Fukuji, Kamitakara Village, Yoshiki County, Gifu Prefecture.

Geological age:—Early Middle Carboniferous (the *Profusulinella* zone). Reg. no. 20475 (holotype).

Caninia sp. A

Pl. 19, figs. 5, 6.

Corallum simple, small, external character unobservable. Outer wall very thin, without septal grooves. Corallite circular in transverse section, and with diameter of about 20 mm in mature stage.

Major septa 41, reach near center, seven to eight mm in length, slightly flexible and more or less thickend by stereoplasmic deposits, especially in cardinal quadrant. Cardinal septum slightly shorter than other septa, but cardinal fossula not distinct. Minor septa very short, spine-like, almost rudimentary, and restricted to peripheral zone.

Dissepimental area rather wide. Dissepiments arranged concentrically or herringbone pattern. Inner wall with feeble stereotheca. Cut-edges of tabulae occupy central part of corallite.

In longitudinal section dissepiments rather irregular in size, five to four rows, and their convex sides faced upwards as well as inwards. 10 to 11 tabulae in space of 10 mm, loosely arranged, complete or incomplete, subhorizontal or slightly arched in middle portion, but their outer margin inclined downwards steeply.

Remarks:—This species resembles *Caninia tieni* CHI, *C. linguacusis* LEE et YÜ from the Weiningian System and the Maping limestone of South China, respectively, but the former possesses more numerous major septa and larger corallite than those of the latters. It is also closely related to *Caninia quardrifossula* CHI from the Weiningian System in

number of major septa, size of corallite and in many other respects, however the former has tertiary septa and less distinct fossula compared with the latter.

Occurrence:—Northern slope of the Ichinotani valley, Fukuji, Kamitakara Village, Yoshiki County, Gifu Prefecture.

Geological age:—Middle Carboniferous (upper part of the *Fusulinella* zone). Reg. no. 20473.

Caninia sp. B

Pl. 19, figs. 3, 4.

Corallum simple, corallite small in size, about 20 mm in diameter. Outer wall very thin. Surface character unobservable.

Major septa 30, long, reach near center, thin, flexible or straight, and more or less thickend with stereoplasmic deposits especially in cardinal quadrant. Minor septa almost lacking, but very short ones appear sporadically at maturity.

Dissepiments arranged herringbone pattern or concentrically in peripheral zone, but in some cases dissepiments considerably vesiculated and major septa interrupted at periphery.

In longitudinal section, dissepiments variable in size, four to five rows, and their convex sides faced upwards and inwards. Fourteen tabulae in distance of 10 mm, complete or incomplete, horizontal, more or less loosely spaced.

Remarks:—The present species is closely related to *Caninia* sp. A of the present district, but has fewer number of septa, less distinct tertiary septa and irregular tabulae. It is also related to *Caninia quardrifossula* CHI of the Weiningian System of South China, however, the former possesses fewer septa and less distinct fossula than those of the latter. It is easily distinguishable from *C. simpliseptata* CHI, which is also a Weiningian species, in the longer septa and fewer septal number.

Occurrence and *Geological age*:—Same as the preceding species. Reg. no. 20174.

Family Lithostrotioniidae D'ORBIGNY, 1851

Genus *Dorlodotia* SALÉE, 1920

Dorlodotia fujimotoi IGO, n. sp.

Pl. 19, figs. 13, 14, 15.

Corallum composite, fasciculate. Outer wall thick, but surface character unobservable. Corallites circular in transverse section and variable in size. Diameter of corallites about six to nine mm in full growth.

Diameter of corallite	Number of major septa
3.0 mm	15
3.5 mm	12
4.0 mm	15
5.2 mm	18
6.2 mm	18
7.0 mm	19
7.0 mm	20
7.8 mm	19
8.8 mm	21

In early stage of corallites major septa 12 to 15, and arranged pinnately. Counter and cardinal septa joined across corallites, slightly strengthened by stereoplasmic deposits and consists of weak columella. Lonsdaleoid dissepiments not developed and septa reach to external wall. Dissepiments also lacking or poorly developed and general feature closely related with *Siphonodendron*. Later, cardinal septum apart from the cunter septum and few concentric dissepiments appear.

In next stage, lonsdaleoid dissepiments partially appear ususally in alar side, and septa become discontinuous and

gradually increase in septal number. At mature stage two to four rows of lonsdaleoid dissepiments well developed and all major septa interrupted and restricted to intermediate zone. Septa become of two orders, major and minor; former long but not reaching to center slightly thickened by stereoplasmic deposits, the latter alternate with major, but very short and almost rudimentary. Inner dissepiments less developed and arranged concentrically. Columella rather reduced and less distinct than younger stage but mostly connected with counter septum. Finally it separates from counter septum.

In longitudinal section, large lonsdaleoid dissepiments arranged in one or two rows in periphery and their faces directed upwards as well as inwards. Tabulae well developed and nearly horizontal.

Remarks:—The present new species differs from *Thysanophyllum circulocysticum* CHU emend YÜ and *T. asiaticum* YÜ which were referred to *Dorlodotia* by MINATO (1955), in the more numerous lonsdaleoid dissepiments. It also closely resembles *Dorlodotia biariti* SALÉE from the Lower Carboniferous of France, the type species of this genus, but it can be distinguished from it by the more numerous septa and stronger columella.

MINATO (1955) proposed *Pseudodorlodotia* for *Dorlodotia* with indistinct columella. The present form shows features intermediate in biocharacter between the two mentioned genera in the poor development of the columella at maturity. Thus the writer hesitates to accept the generic validity of *Pseudodorlodotia* MINATO.

Occurrence:—Middle course of the Ichinotani valley, Fukuji, Kamitakara Village, Yoshiki County, Gifu Prefecture.

Geological age:—Early Middle Carboniferous (the *Profusulinella* zone or the lowest *Fusulinella* zone). Reg. nos. 21088 (holotype), 21087 (paratype).

Family Aulophyllidae DYBOWSKI, 1873

Genus *Kionophyllum* CHI, 1931

Koinophyllum carbonarium IGÔ, n. sp.

Pl. 18, figs. 16, 17.

Corallum simple, corallite small and circular in transverse section. Diameter of corallite 15 mm in full growth. Outer wall thick. Pentareal arrangement distinct.

Major septa 21, flexous, slightly thickened by stereoplasmic deposits, especially in proximal portions; restricted in intermediate zone, dissepimental, and large vesiculate zone. In outer zone septa entirely incomplete and rarely appear as septal denticles. Minor septa not developed.

Columella spindle-like in transverse section and composed of median plate, very few incomplete axial tabellae and highly strengthened by stereoplasmic deposits and directly joined with counter septum.

Dissepiments of inner ones poorly developed and more or less of angloconcentric pattern. Lonsdaleoid dissepiments in outer zone comprise large periphery and less large inner ones and occupy a broad area and attain about ½ radius of corallite.

In longitudinal section two or three rows of large outer vesicules occupy peripheral zone, and their convex sides faced upwards as well as inwards. Eleven tabulae in space of 5 mm, complete, horizontal or slightly convex with rather rapid arching end.

Remarks:—The present species resembles *Kionophyllum dibunum* CHI described from the Laokanchi limestone of the Weiningian System, Kueichou, South China, however, the former is easily dis-

tinguishable from the latter in the smaller size, less number of septa, and well developed large lonsdaleoid dissepiments.

Previously I (FUJIMOTO and IGÔ 1958) considered that the genera *Kionophyllum* CHI and *Geyerophyllum* HERITSCH were independent and included the present form into the latter genus. However, I now believe that the difference between both genera is slight and of no generic value as already mentioned by HILL (1956).

Occurrence and *Geological age*:—Same as the preceding species. Reg. no. 21086 (holotype).

Family Lonsdaleiidae CHAMPMAN, 1893

Genus *Ivanovia* DOBROLYUBOVA, 1935

Ivanovia manchurica forma *podolskiensis* DOBROLYUBOVA

Pl. 18, figs. 1, 2, 3, text-fig. 1.

1935 *Ivanovia podolskiensis* DOBROLUBOVA: *Trans. All-Union Res. Inst. Econ. Min., Vol. 81*, pp. 35, 45, pl. 12, figs. 1-2.

1944 *Cystophyllum manchurica* forma *podolskiensis* YABE et EGUCHI: *Geol. Soc. Japan, Jour., Vol. 51*, pp. 74-75, pl. 3, fig. 3.

Corallum compound, massive, apheroid and partly cerioid. Corallites of unequal size, and confluent by lonsdaleoid dissepiments or partially bounded by distinct but highly discontinuous external walls. Distance to center of adjacent corallites measures from five to 10 mm. Diameter of intrathecal region usually 5.0 mm in full growth. Septa consists of two orders, major and minor and variable in septal number.

Diameter of intrathecal region	Number of major septa	Number of minor septa
5.5 mm	13	13
5.0 mm	13	12
5.0 mm	12	12
5.0 mm	12	7
6.5 mm	18	11

Major septa rather long, flexible or straight and slightly thickened by stereoplasmic deposits in inner dissepimental zone, gradually thinning distally. Counter septum directly united with columella. Minor septa shorter than former, restricted in inner dissepimentarium and occasionally interrupted.

Text-fig. 1. Variously constructed columella of *Ivanovia manchurica* forma *podolskiensis*.

Columella a direct prolongation of septum and very variable, rather complicated and of general forms of *Polithecalis*-like and other styliform type. *Polythecalis*-like columella oval in transverse section, composed of thick median plate and few radiating lamellae and well circumscribing axial tabellae and sometimes form cob-web structure. Such columella strengthend by stereoplasmic deposits in various grades. Inner wall distinct in some corallites. Lonsdaleoid dissepiments various in size and shape. Occasionally short spine of septal denticles developed.

In longitudinal setion, tabulated area rather narrow and horizontal or convex tabulae coarsely developed, nine or less in space of 5 mm. Lonsdaleoid dissepiments large, unequal in size, and their convex sides faced upwards as well as inwards. Columella composed of thick median plate and steeply arching axial tabellae. Styliform type of collumella originated from above mentioned type but with strong stereoplasmic deposition.

Remarks:—The present species has rather well developed external wall and

complicated columella. Thus I am obliged to conclude that it belongs to *I. manchurica* forma *podolskiensis* rather than to either *I. manchurica* forma *kikkawai* or *I. manchurica* (s.s.). However, the variously constructed columella, even adjacent corallites, suggests that the corallites have biocharacters intermediate between *I. manchurica podolskiensis* and *I. manchurica* (s.s.).

Occurrence:—Northern slope of the Ichinotani valley, Kamitakara Village, Yoshiki County, Gifu Prefecture.

Geological age:—Middle Carboniferous (upper part of the *Fusulinella* zone). Reg. nos. 21194, 21195, 21196.

Ivanovia manchurica forma
eguchii IGÔ, n. forma.

Pl. 18, fig. 4.

Corallum compound, massive, apheroid and partly cerioid. Corallites usually six-sided but irregular in shape, bounded by rather thin and highly discontinuous external wall. External wall usually lacking at corner of corallites and confluent by lonsdaleoid dissepiments. Wall three layered, not straight throughout, zig-zag in transverse section and with numerous short spine-like projections. Diameter of center of corallites five to seven mm. Size of corallites variable but usually six to eight mm in shorter and 10 to 12 mm in longer diameter.

Major septa 14 to 17, long, reach near center of corallite flexible, slightly thickened and usually disappear in peripheral londsdaleoid dissepimental area. Minor septa short, about half length of major septa and frequently discontinuous in inner dissepimental zone.

Columella simple palicolumella and a direct prolongation of counter septum, more or less flexible median lamellar with slight stereoplasmic deposits and a few axial tabellae. Lonsdaleoid dissepimental zone well developed, rather variable in width, where septa completely disappear. Inner dissepiments arranged concentrically. Inner wall less distinct but stereotheca very feebly developed.

In longitudinal section central axis formed by vertical lamellae and supplemented with sporadical axial elements. Tabulated area narrow horizontal or down to center, rather coarsely spaced, density of six to eight in vertical distance of five mm. Large lonsdaleoid dissepiments irregular in shape, overlapping one another, three to five rows and their convex sides faced upwards as well as inwards.

Remarks:—The present form is characterized by the simple lamellar palicolumella and external wall. Rudimentary columella suggests that this type is closely related with forma *humboldti* but the distinct wall separates it therefrom. Also it can be distinguished from forma *kikkawai* in the development of the wall. This form was found in the same hand specimen containing the forma *podolskiensis*, but they are independent stocks.

Occurrence and *Geological age*:—Same as the preceding species. Reg. nos. 21197 (holotype).

Genus *Lianghanophyllum* TSENG, 1949

TSENG (1949) established *Liangshanophyllum* based upon *L. lui* TSENG as a subgenus of *Waagenophyllum*; his diagnosis is as follows:—

"Phaceloid and cerioid corals of medium to small size; nature of septa like those of *Waagenophyllum*, tertiary septa sometimes present; dissepiments not well devoloped, and loosely disposed usually forming a narrow zone at the peripheral region, combined with thickened septa forming strong stereozone; tabulae zone broad and prominent; axial column per-

sistance composed of arched tabellae and few radial lamellae. the median plate being distinct. formed by elongated cardinal and counter septa".

Discussion:—YABE (1950) proposed *Huangia* for the Chinese species of *Corwenia* such as *C. chüisingensis* CHI, *C. chihsiaensis* HUANG, *C. chiuyaoshaensis* HUANG, *C. parachihsiaensis* HUANG, *C. lipoensis* HUANG and *C. diphyphylloides* HUANG. Also he pointed out several species described by DOUGLAS (1936) from Iran as of *Waagenophyllum* to his newly proposed genus. YABE's classification seems to be valid and subsequent Japanese students accepted the generic name

Table 1. Comparison among several *Liangshanophyllum* species*

species	Max. diameter of corallite in mm	Number of major septa	Minor septa	Columella mm in dia.	Dissepimental zone	No. of Tabulae in 3 mm	Geological age
chüisingensis	12	30	short	compact 5-3.5	wide (4? rows)	10	Weiningian ls. (Middle Carboniferous)
mizuyagadaniensis	9.0-10	20-24	moderate	compact 3-4	wide (3-5 rows)	7-8	Ichinotani formation (Middle Carboniferous)
hashimotoi	20	30	moderate	loose 3	wide (5-6 rows)	5-6	*Pseudoschwagerina* zone? (Early Permian?)
chiuyaoshanensis	8	25	short	compact 1.5-2	narrow (2-3 rows)	4-5	Failaifeng ls. (Mid. Permian)
chihsiaensis	11	18-22	short	loose 2.0	narrow (2 rows)	5-6	Chihsia ls. (Mid. Permian)
parachisiasnsis	9	20-27	moderate	loose 1.5	?	?	,,
lipoense	7-8	22-23	short	compact 2.7	narrow (2 rows)	5	,,
diphyphylloides	7	20-22	short	compact 2.7	narrow (1 row)	4-5	,,
lüi	5	17-19	short	compact 1.5-1.3	narrow (2 rows)	6-7	Maokou ls. (Late Permian)
stereoseptatum	5.5	18-22	short	compact 1.2-1.3	narrow (1-2 rows)	5-6	,,
wengchengense	5-7	21-24	moderate	compact 1.5-1.8	?	?	,,

* The table suggests that the evolutional tendency of *Liangshanophyllum* is retrogressive rather than progressive in corallite size, septal number, developements of columella, and arrangements of tabulae and dissepiments.

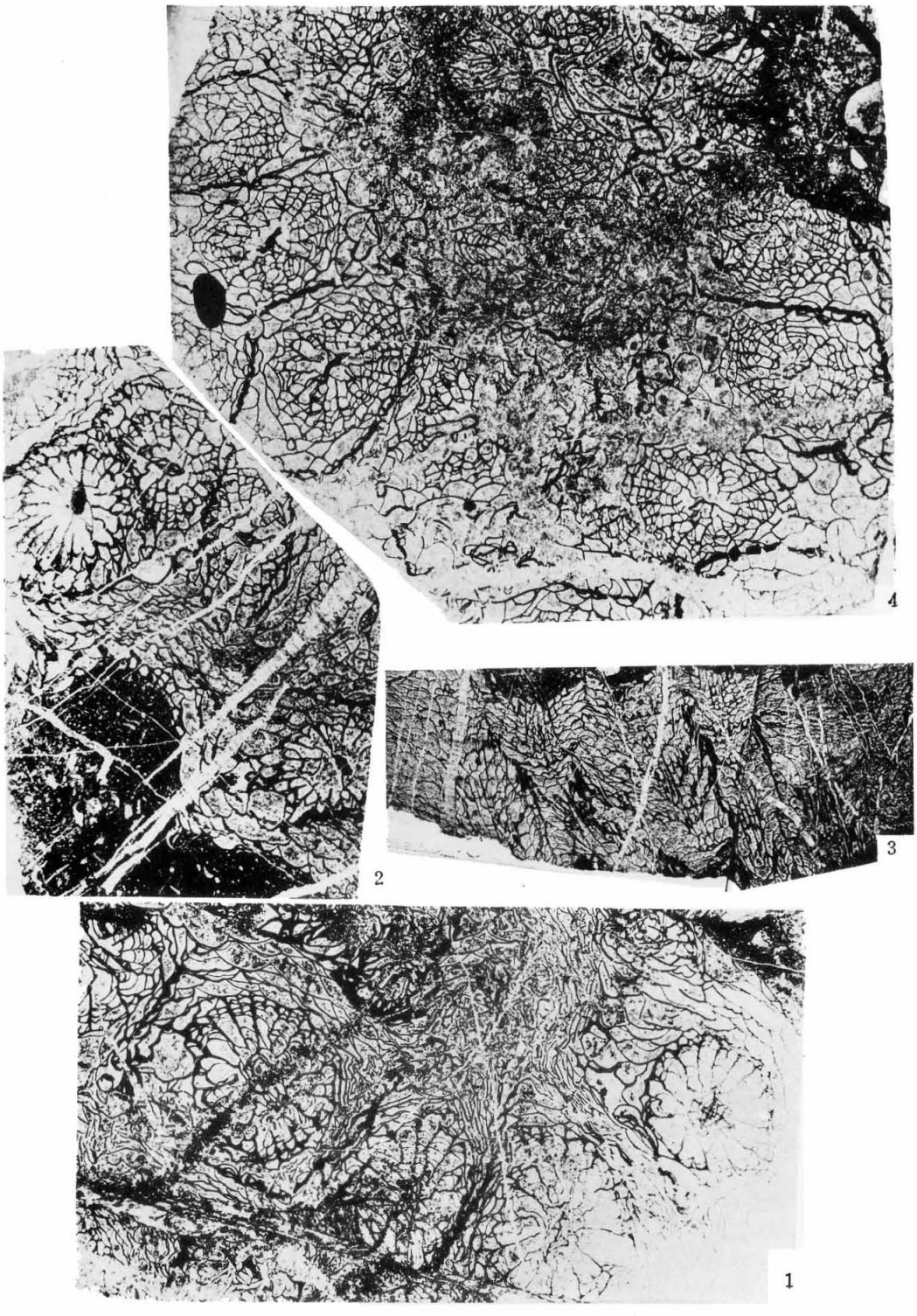
Explanation of Plate 18

Figs. 1-3. *Ivanovia manchurica* forma *podolskiensis* DOBROLYBOVA

1, 2. Transverses sections, showing variously constructed columella and persisted wall, ×4; 3. Longitudinal section, ×4.

Fig. 4. *Ivanovia manchurica* forma *eguchi* IGO n. forma.

4, Transverse section of the holotype; note almost complete wall and simple columella, ×4.



S. Aoki and H. Igô photo

for the Middle Carboniferous and Permian "*Corwenia*". However, almost at the same time TSENG's proposal of a new genus appeared. TSENG's *Liangshanophyllum* appearently differs from the typical *Waagenophyllum* especially in the arrangements of the tabulae. This difference may be of generic rather than of subgeneric value. It resembles *Heritschia* MOORE and JEFFORDS so far as concerns the disposition of the tabulae.

The type species of *Huangia* YABE, *H. chüitsingensis* (CHI) described from the Middle Carboniferous Weiningian limestone of South China, slightly differs from the type species of TSENG's *Liangshanophyllum*, in the more crowded tabulae, broad dissepimental zone and complicated axial structure. Therefore, there are some doubts whether the typical *Huangia* (i.e. *Huangia chüitsingensis*) and *H. mizuyagadaniensis*, described from the Middle Carboniferous are congeneric the typical *Liangshanophyllum*. However, I tentatively treat *Huangia* YABE as a junior synonym of *Liangshanophyllum* TSENG. This view was also mentioned by SATO (1959).

Liangshanophyllum mizuyagadaniensis (KAMEI)

Pl. 19, figs. 7-12, text-fig. 2.

1957 *Huangia mizuyagadaniensis* KAMEI: *Jour. Shinshu Univ.*, pp. 33-34, pl. 2, figs. 1, 2; pl. 3, figs. 1-4.

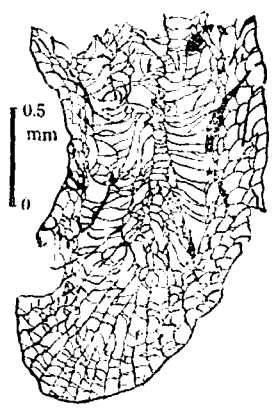
1958 *Huangia japonica* IGO (nomen nudum): *Proc. Japan. Acad., Vol. 34, No. 3.*

Corallum compound, fasciculate. Corallites cylindrical, long, circular in transverse section and rather close to each other. Diameter of corallites about 9.0 to 10mm at maturity. External wall thin, but slightly thickened by deposits.

Septa of two orders, major and minor. Major septa usually 20 to 24 in number at maturity, long, reach to near central area, extend into axial complex, thick in dissepimental area, and thin and more or less flexible in exothecal region. Most of them joined with septal lamellae. Two major septa, probably cardinal and counter septa directly joined with median plate, but separated from each other at senile. Minor septa well developed, alternate with major ones, about ½ as long as major and restricted in dissepimental zone.

Axial complex rather irregular and incomplete spinder-web structure, composed of rather thick but flexible median plate, thin septal lamellae, and axial tabellae. Dissepiments arranged concentrically but partially herringbone pattern especially at maturity. Inner wall more or less distinct stereotheca.

In longitudinal section, triareal arrangements well recognized. Dissepiments three to five rows in peripheral zone, and their faces directed upwards and inwards. Horizontal and steeply downwards inclined tabulae densely developed in medial zone. Axial column composed of flexible median plate and steeply or gradually arched axial tabellae.



Text-fig. 2. Longitudinal section of *Liangshanophyllum mizuyagadaniensis*, showing the disposition of the tabulae.

Increase of corallites laterally and three or two daughter corallites arise simultaneously from mother corallite.

Remarks:—The present species closely resembles *Liangshanophyllum chutsingensis* (CHI) in many features and the difference between the two species are slight. The former differs from the latter in the less number of major septa, longer minor septa, and slightly smaller size of corallite.

Occurrence:—Ichinotani and Mizuyagadani valleys, Fukuji, Kamitakara Village, Yoshiki County, Gifu Prefecture.

Geological age:—Middle Carboniferous upper part of the *Fusulinella* zone). Reg. nos. 21090, 21092, 21093, 21801, 21802 (topotypes).

References

CHI, Y. S. (1931): Weiningian (Middle Carboniferous) corals of China. *Pal. Sinica, ser. B, Vol. 12, fasc. 5*, pp. 1-70, pls. 1-5.

—— (1935): Additional fossil corals from the Weiningian limestone of Hunan, Yunan, and Kwangshi provinces in southwestern China. *Ibid., ser B, vol. 12, fasc. 6*, pp. 1-38, pls. 1-3.

DOBROLUBOVA, T. A. (1937): Simple corals of the Myatshkova and Podolsk horizons of the Middle Carboniferous of the Moscow Basin. *Acad. Sci., U. S. S. R., Inst. Sci. Min. Econ., Trans. Inst., Pal., vol. 6*, pp. 1-92, pls. 1-23.

DOUGLAS, J. A. (1936): A Permo-Carboniferous fauna from southwest Persia (Iran): *Pal. Indica, n. s., vol. 22, no. 6*, pp. 1-59, pls. 1-5.

EASTON, W. H. (1944): Revision of *Campophyllum* in North America. *Jour. Pal., vol. 18, no. 2*, pp. 119-132, pl. 22.

FUJIMOTO, H. and IGÔ, H. (1958): Stratigraphic position of the corals in the Ichinotani formation (Carboniferous), Fukuji district, Hida Massif, Central Japan. *Proc. Japan Acad., vol. 34, no. 3*, pp. 159-163.

HERITSCH, F. (1936): Eine *Caninia* aus dem Karbon des de Geer-Berges im Eisfjord-Gebiet auf Spitzbergen. *Skrifter. Svalband, Ishavet, no. 24*, pp. 3-21, pls. 1-7.

—— (1936): Korallen der Moskauer-,Gshel-und Schwagerinen-Stufe der Karnischen Alpen. *Paleontogr., Abt. A, Bd. 38*, pp. 100-

Explanation of Plate 19

Figs. 1, 2. *Caninia pseudoyohi* IGÔ, n. sp.
1. Transverse section of the holotype; 2, longitudinal section of the same specimen, ×2.

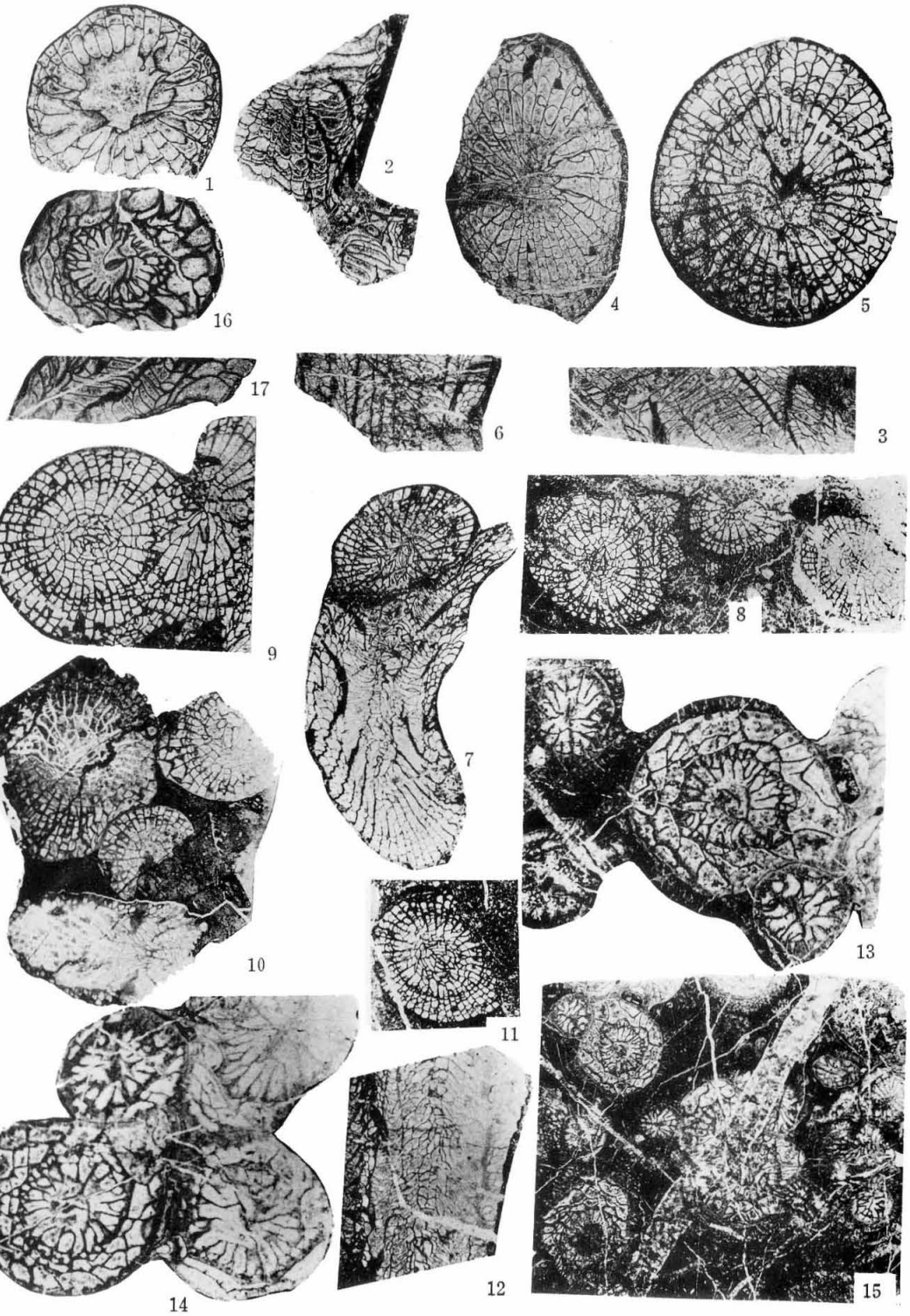
Figs. 3, 4. *Caninia* sp. B.
3. Longitudinal section; 4, transverse section (slightly oblique) of the same secimen, ×1.5.

Figs. 5, 6. *Caninia* sp. A.
5. Transverse section, ×2; 6, longitudinal section of the same specimen, ×1.5.

Figs. 7-12. *Liangshanophyllum mizuyagadanensis* (KAMEI)
7, Transverse and longitudinal section, ×2; 8, transverse sections of three corallites; left side and showing increase of four daughter corallites, ×2; 9, transverse section, ×2.5; 10, transverse section of silicified specimen, 2.5; 11, transverse section, ×2; 12, longitudinal section, ×2.5.

Figs. 13-15. *Dorlodotia fujimotoi* IGÔ, n. sp.
13, 14. Transverse sections of the holotype, showing increase of the corallites, ×4; 15, transverse section of the same specimens, ×2.

Figs. 16, 17. *Kionophyllum carbonarium* IGÔ, n. sp.
16, Transverse section of the holotype; 17, longitudinal section of the same specimen, ×2.



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163, pls. 14-18.

—— (1939) : Die Korallen des Jungpaläeozoikum von Spitzbergen. *Arkiv. Zoologi, Bd. 31A, no. 16*, pp. 1-138, pls. 1-21.

HILL, D. (1956) : "Rugosa" in *Treatise on Invertebrate Paleontology, Pt. F.* Geol. Soc. America, pp. 233-324.

HUANG, T. K. (1932) : Permian corals of South China. *Pal. Sinica. ser. B. vol. 8, fasc. 2*, pp. 1-163, pls. 1-16.

IGÔ, H. (1956) : On the Carboniferous and Permian of the Fukuji district, Hida Massif, with special reference to the fusulinid zones of the Ichinotani group. *Geol. Soc. Japan, Jour., vol. 62*, pp. 1-27 240, (in Japanese with English abstruct).

—— (1958) : On the occurrence of *Koninckocarinia* from the Ichinotani formation (Upper Paleozoic corals from Fukuji, Southeastern part of the Hida Massif, Pt. 1). *Jap. Jour. Geol. Geogr., vol. 20, no. 4*, pp. 209-222, pls. 15-16.

—— (1959) : Notes of some Permian corals from Fukuji, Hida massif, central Japan (Upper Paleozoic corals from Fukuji, Pt. 2). *Trans. Proc. Paleont. Soc. Japan, n. s., no. 34*, pp. 79-85, pl. 8.

—— (1960a) : First discovery of non-marine sediments in the Japanese Carboniferous. *Proc. Japan Acad., vol. 36, no. 8*, pp. 498-502.

—— (1960b) : On the Japanese Fusulininae. *Fossils, no. 1*, pp. 7-11 (in Japanese).

KAMEI, T. (1957) : Two Permian corals from the Mizuyagadani formation. *Jour. Shinshu Univ., vol. . No. .* pp. 29-35, pls. 1-4.

MINATO, M. (1955) : Japanese Carboniferous and Permian corals. *Hokkaido Univ. Fac. Sci., Jour., ser. 4, vol, 9, no. 2*, pp. 1-202, pls. 1-43.

MOORE, R. C. and JEFFORDS, R. M. (1941) : New Permian corals from Kansas, Oklahoma, and Texas. *Kansas Geol. Surv., Bull., 38*, pt. 3, pp. 65-120, pls. 1-8.

OZAWA, Y. (1925) : Paleontological and stratigraphical studies on the Permo-Carboniferous limestone of Nagato, Pt. 2. *Tokyo Imp. Univ., Coll. Sci., Jour. vol. 45*, art. 6, pp. 1-90, pls. 1-14.

SATO, T. (1959) : Key to the genera of Japanese Carboniferous and Permina tetracorals : *Earth Science, no. 41*, pp. 32-42 (in Japanese)

STUCKENBERG, A. (1895) : Korallen und Bryozoen der Steinkohlen-Ablangerungen der Urals und des Timan. *St. Pétersburge Com. Géol. Russie, Mém., vol. 10, no. 3*, pp. 1-244, pls. 1-24.

TSENG, T. C. (1949) : Note on the *Lianghanophyllum*, a new subgenus of *Waagenophyllum* from Permian of China. *Geol. Soc. China, Bull., vol. 29*, pp. 97-104, pl. 1.

YABE, H. (1950) : Permian corals resembling *Waagenophyllum* and *Corwenia*. *Proc. Japan Acad., vol. 26, nos. 2-5*, pp. 74-79.

—— and EGUCHI, M. (1944) : Corals from the Penchi coal field, Manchukuo : *Jour. Geol. Soc. Japan, vol. 51*, pp. 72-76, pl. 3.

—— and HAYASAKA, I. (1915) Paleozoic corals from Japan, Korea, and China : *Geol. Soc. Tokyo, Jour., vols. 22-23.*

YOH, S. S and HUANG, T. K. (1932) : The coral fauna of the Chihsia limestone of the lower Yangtze valley. *Pal. Sinica, ser. B, vol. 8, fasc. 1*, pp. 1-72, pls. 1-10.

YÜ, C. C. (1932) : Lower Carboniferous corals of South China. *Ibid., ser. B, vol. 12, fasc. 3*, pp. 1-212, pls. 1-24.

—— (1934) : Descriptions of corals collected from the Maping and Huanlung limestones in South China. *Nat. Ree. Inst. Geol. Mem., vol. 14*, pp. 55-72, pls. 9-13.

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7. The printing style will be as Journal of Paleontology.
8. Proof reading will be done under the responsibility of the Publication Committee.

例　会　通　知

	開　催　地	開　催　日	講演申込締切日
第 80 回 例 会	九 州 大 学	1961 年 11 月 18 日	1961 年 10 月 25 日
1961 年総会年会	東 北 大 学	1962 年 1 月 20 日	1961 年 12 月 10 日

会　員　消　息

◎ 会員中沢圭二君は Timor 島探険に 8 月上旬出発した。
◎ 会員堀越増興・松田時彦・奈須紀幸・新野 弘・徳永重之の諸君は Honolulu で開催された The Tenth Pacific Science Congress に出席し 9 月上旬帰国した。
◎ 会員小西健二君は琉球大学の出張講義を終え 8 月下旬帰学した。
◎ 会員徳山明君は西独 Bonn 大学に留学のため 8 月下旬出発した。
◎ 会員 R. W. Chaney 君は植物化石研究のため 8 月下旬来日した。
◎ 会員浅野清君はヨーロッパ諸国を視察のため 9 月上旬出発した。
◎ 会員高柳洋吉君は米国 Stanford 大学に留学のため 9 月下旬出発した。
◎ 会員馬廷英君は京都で開催される国際磁気学結晶学会議に出席のため 9 月下旬来日した。

News

◎ 1962 年 4 月 23 日より 28 日まで米国の Tucson の The University of Arizona で International Conference on Palynology が開催される。
◎ 東京大学西アジア洪積世人類遺蹟調査団は本年 7 月エルサレムの北約 100 km チベリアス附近のアムト洞穴でネアンデルタール人の完全な骨骼を発掘した。
◎ Società Paleontologica Italiana (S. P. I.) は 1960 年に "Bollettino della Società Paleontologica Italiana" の Vol. 1, No. 1 を発刊した。
◎ Asociacion Paleontologica Argentina の review "Ameghiniana" の Vol. 1, No. 1 は 1957 年に発刊された。

購読御希望の方は本会宛御申込下さい

1961 年 9 月 15 日　印　刷
1961 年 9 月 25 日　発　行

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